For evolutionary psychiatrists, psychologists and others interested in soctophystotogtcal Integration

ASCAP

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'We have the great fortune to live on a planet abounding with humans, plants, and animals; and I often marvel at the strange tasks evolution sets them. Of all the errands lite seems to be running, of all the mysteries that enchant us, love is my favorite." *Diane Ackerman* '

Across Species Comparison and Psychopathoiogy (ASCAP)
Newsletter Aims

♦A free exchange of letters, notes, articles, essays or ideas in brief format.
•Elaboration of others[1] ideas.
•Keeping up with productions, events, and other news. ♦Proposals for new initiatives, joint research endeavors, etc.

ASCAP Society Mission Statement

The society represents a group of people who view forms of psychopathology in the context of evolutionary biology and who wish to mobilize the resources of various disciplines and individuals potentially involved so as to enhance the further investigation and study of the conceptual and research questions involved. This scientific society is concerned with the basic plans of behavior that have evolved over millions of years and that have resulted in psychopathologically related states. We are interested in the integration of various methods of study ranging from cellular processes to individuals in groups. The ASCAP Newsletter is a function of the ASCAP society.

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ADDRESSED TO & FROM ...

PLEASURE

It has been a special pleasure to see the Newsletter in its usual fine form. Hope things work out okay at your end in effecting a permanent solution to the support problem. I am sure the Society - including yours truly -- will do everything possible to keep the best Newsletter around up and running. Again, let me know if I can be of help in any way.

I plan to send you a series of brief articles -- in sequence - on mismatch theory. See last month's issue for the first in a small series of installments.

Kent Bailey
Richmond VA, USA

GOOD PAPER

There is a very good paper in the January issue of *Animal Behaviour* (Vol. 51, pp 229-232) by David Quelleron 'The measurement and meaning of inclusive fitness" in which he develops a model from his work on dwarf mongooses. He seems to have a clear grasp of this difficult subject and explains it not only in mathematics but also in words.

I see he comes from the Department of Ecology and Evolutionary Biology at Rice University in Houston. I wonder if there might be a chance of making contact with him while I am with you, perhaps even inviting him over to talk about dwarg mongooses (I think they are the species in which the subordinate females have pseudopregnancies which enables them to nurse the pups of their dominant sister) and we could also have a discussion on the relation of inclusive fitness theory to sexual selection and to the game theory approach to conflict resolution. I am planning a commentary on his paper which hopefully will be suitable for *ASCAP.*

John Price
Goa, INDIA

BETTER NEWSLETTER NAME

I would like to say that I agree entirely with Kalman Glantz. He makes a very convincing case. It's obvious when someone points it out to you. I am now completely sure that we should scrap the name *ASCAP Newsletter.* Aso, I really do not think it helps to share the name *ASCAP* with an established music organisation. I think that what was holding us back was our preoccupation with acronyms. Once we accept that we don't need an acronym for a name, everything becomes simpler. My one objection to the name *"The Mental Health and Evolution Newsletter"* is, as I have said before, we should not restrict ourselves to considerations of health. Why not simply *"The Psychology and Evolution Newsletter"?* It even has a nice acronym, PEN.

Finally, my book is now definitely shortly to come out as a paperback. March is the proposed publication date. The price will be twelve to thirteen pounds, which will place it within reach of a much larger readership.

John Birtchnell
London, ENGLAND

VIOLENCE

I am a clinical psychologist at Atascadero State Hospital, and I'm particularly interested with respect to evolutionary psychology's perspective on the understanding of violence.

William Knowlton
Atascadero CA, USA

CHANGES IN ASCAP EDITORIAL STAFF

Things have not stayed still in our personnel arrangements. Linda Crouch, who has been a loyal worker for many years making many *ASCAP* copies and stuffing many newsletters into envelopes, has been involved in jobs outside of UTMB for some time and has now decided to work only on them. So we are saying a fond goodbye to her in the first part of March, 1996.

And Erica Ainsbury is moving to the San Francisco area. We had known that that was in the crystal ball but had contemplated that even from there given the wonders of Email and other communications, she might do the miracle work of putting out the newsletter. But this may be difficult.

So we were delighted to realize that Frank Correl, a retired yeoman from the Coast Guard who has elected to live in the Galveston area to set up a software business, is

available to replace Linda at UTMB. At the same time with his computer expertise, he is eager to pursue the managing editorship of *The ASCAP Newsletter which* he will assume in the next months. He has already been involved in the production of newsletters in the past. His involvement will be distinctly less costly and makes the push to have mega-membership less imperative. Erica will be here for a month or two more to work through procedures with Frank in an orderly way. So we feel distinctly heartened and look forward to the next era of *ASCAP's* ninth volume even as we say a warm farewell and express many thanks to Linda Crouch and Erica Ainsbury.

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UPDATE AND REMINDER OF THE ASCAP SOCIETY ANNUAL MEETING MAY 5,1996,IN NYC

The meeting will be 8 a.m. to 5 p.m. with a business meeting from 8 a.m. to 10 a.m. and the scientific sessions from 10 a.m. to 5 p.m. with a one hour break for lunch; the room will be held until 6 p.m., however, should we have some continued discussion.

In addition to the winner of the Aaron T. Beck Award speaker and the presidential address by Dr. Sloman, we so far have John Price, Aaron T. Beck, David Preven, John Pearce, Dan Wilson, Kent Bailey, Charles V. Ford, Anneliese Pontius and myself as faculty.

UTMB's Office of Continuing Education at UTMB is eager to help our meeting meet standards such that six Category I AMA Continuing Medical Education Credits can be conferred. This is likely to enhance our chances of attracting physicians to attend the meeting. As year ago, we discussed this possibility for Santa Barbara but ultimately decided that HBES did not have enough physicians potentially attending to make it worth our while. This year we are just before the American Psychiatric Association meeting in NYC so that there is high liklihood that physicians would like to attend and to gather CME credits at the same time.

I will now list the standards that need to be met and then write out how we are drafting them:

(1) Mission statement: Information integrated from a number of vantage points to form the frame work for a basic science for psychiatry and related clinical disciplines (a more elaborate statement is published on the face page of each issue of *The ASCAP Newsletter).*

(2) Needs assessment: The executive committee and member ship of The ASCAP Society have concluded that for heightened awareness of the medical specialty at large, a meeting of this kind is necessary. An editorial accepted by *Biological Psychiatry* will be appended.

(3) Learning objectives:
The audience member upon the completion of the six hour CME session will be able to:
a. describe conceptual models of normal adaptive mechanisms that may be awry in depression,
b. adumbrate seeming conflicts in the models, their reconciliation and methodological issues in its further study,
c. note the essential findings in the resident-intruder animal model of defeat-depression, yielding, triumph and other responses,
d. provide a rationale for how evolutionary mechanisms have operated to result in anger, hostility and depression,
e. list the findings in human patients that have resulted in a formulation involving the limbic system in psychosis and homicide,
f. register how shame and entrap ment processes operate in depres sion and mania,
g. diagram the factors in the four factor model in which evolutionary mechanisms and mismatch theory account for depression and other inhibition states,
h. outline the principles of sociophysiology as a basic science, and
i. describe a strategy for how this framework might be installed into the medical student's curriculum as well as the curricula of other mental health professionals.

(4) Educational design: The CME office will be provided with information concerning my conversations with the executive committee members that similar to the fruitful format of the previous years in Philadelphia and Santa Barbara, we should primarily deploy small group discussions.

(5) Evaluation: Evaluation forms will evaluate the individual speakers-discussion leaders as well as how well the overall learning objectives were met. My office will tabulate the results and summarize the comments after the conference is over. More than half the attendees must turn in their forms or credit would be jeopardized.

(6) Budget: A final budget must be prepared. People who are already members of The ASCAP Society will be admitted free of charge. Nonmemberswho attend the meeting will be charged $50. The society's secretary will handle the monies. As much as possible pre-registration will be accomplished.

(7) Commercial Support and Publicity. We intend to advertise in *Psychiatric News* and over the internet, especially on the HBES and Psycho-pharm email lists. I have so far remained somewhat distant from commercial support although I sense that if we were amenable, this could be a possibil ity.

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TEXAS GOOD NEWS OF VARIOUS KINDS

(1) In the February issue I presented the detailed outline of the editorial I composed upon invitation of the editor of *Biological Psychiatry,* a reasonably prestigious journal that puts forth more articles than any other refereed psychiatry publication, as it is published twice monthly. I have already heard the results, as I received the following, hand somewhat trembling as I opened the envelope: *"I am pleased to report that the referees commended your submission and recommended publication. You should receive proofs... in about six to eight weeks. Thank you for submitting this excellent piece of work to Biological Psychiatry."*

(2) Del Thiessen from the University of Texas in Austin obtained an issue of *The ASCAP Newsletter* and invited me and others in the area to a meeting on evolutionary psychology in Houston on the morning of Saturday, April 6,1996. From UTMB, Thomas Joiner and Bill Harless are interested and I'm sure that John Price will wish to attend as well. Dr. Thiessen is interested in developing a south western group on related topics.

(3) John Price will be at UTMB as a guest professor for the month of April, 1996, his visit funded by the Harry K. Davis Endowment. We have heard from John in Goa, India, where he has been for the early months of 1996 (see letter on David Queller this issue which issued from there). While here, in addition to working with me, we are plan ning a collaboration with Mark Opp, Ph.D. at UTMB. We will examine data from the resident intruder paradigm in rats which idea he had pioneered. Mark has strains of Sprague-Dawley derived rats with differing amounts of corticotopin releasing factor in their brains although they are otherwise genetically similar. What will males from the different strains do upon the introduction of males into their familiarterritory?

(4) David Rosen is arranging a conference on September 13 and 14,1996, at College Station. It will be co-sponsored by the Department of Psychology at Texas A&M and the Texas Region ASCAP Society. Its title is "Evolution of the Psyche." Confirmed invited speakers include:
- Anthony Stevens on "The Evolu tionary Components of Sadomas ochism."
- John Price on "Understanding Schizophrenia from an Evolutionary Perspective."
- Russell Gardner on "The Biology of Leadership."
- David Rosen on "Evolutionary Memory."
- David Buss on "Desire, Status, and Conflict."
- Jeffrey Simpson on "Within-Sex Variation in Sexual Behavior and Mating Strategies: An Evolutionary Perspective."
- William Graziano on "The Evolu tionary History of the Mind" (not a final title).
- Michael Luebbert on "The Survival Value of Forgiveness."
- Holly Huston on "The Evolutionary Significance of Archetypal Dreams."
- Carolyn Boyd on "The Evolution ary History of Symbolic Art."

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ARTICLE.-

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Mismatch theory 2: Reconciliation and the fourfold model

In mismatch essay 1 (February 1996), the fundamental assumptions and implications of mismatch theory were discussed. It was argued that human nature and culture began to separate around 40,000 years ago with the biological "completion" of species *Homo sapiens,* and various antagonisms or mismatches began to develop between a relaxed system of biological evolution and a progressively expanding system of cultural evolution. Two additional points were offered: a) the rates and magnitudes of nature-culture mismatch increased markedly with the agricultural, industrial, and informational revolutions, and b) the rates and magnitudes of mismatch are steeper in the technological realm (neoculture) than in the realm of shared customs, beliefs, and symbolic systems (culture). These various points revolve around the fundamental assumption that rates and magnitudes of mismatch for a given individual are positively correlated with levels of both physical and psychological pathology.

Mismatch theorizing may be seen, with varying degrees of explicitness, in the evolutionary psychology of Tooby and Cosmides,[1] the "paleolithic prescription" of Eaton, Shostak, and Konner,[2] the sociobiological treatment of psychotherapy by Glantz and Pearce,[3] the semi-popular works of Barash,[4] Ornstein,[5] and others, and the Darwinian medicine of Nesse and Williams.[6] Although mismatch thinking has been around for several years, the term "mismatch theory" was first used, to my knowledge, by Robert Wright in his article on the evolution of despair in *Time,*[7] and by myself at HBES last June. Let me quote Nesse and Williams[6] to illustrate the logic of mismatch theory: ... we *are specifically adapted to Stone Age conditions. These conditions ended* a *few thousand years ago, but evolution has not had time since then to adapt us to a world of dense populations, modern socbeco-nomic conditions, low levels of physical activity, and the many other novel aspects of modern environments. We are not referring merely to the world of offices, classrooms, and fast-food restaurants. Life on any primitive farm or in any third-world village may also be thoroughly abnormal for people whose bodies were designed for the world of the Stone Age hunter-gatherer, (p. 134)*

Mismatch theory provides many rich possibilities for placing medical illnesses and psychopathology within an evolutionary context, but several problems must be addressed. First, the logic of mismatch theory begins to falter when attention shifts from etiology and diagnosis of pathological conditions to treatment. If physical or psychological pathology is caused or aggravated by a given individual's rates and magnitudes of mismatch, then is the cure to simply to reduce the levels of mismatch operating? One could easily parody this position by urging a salubrious return to loincloths, freezing caves, and uncooked food, and even the subtlest arguments must necessarily flirt with Humeian naturalistic fallacies and Rousseauian naivete. Clearly, to regress phylogeneti-cally to earlier stages of evolutionary development or to emulate simply the hunter and gatherer ecology is not the solution to the mismatch problem. Besides, clear-headed thinkers like Nesse and Williams[6] and paleoanthropologists Schick and Toth[3] are aware that ancestral times were brutal ones where disease, famine, accidents, and predation were exerting strong selective effects on our unfortunate ancestors. Moreover, if William Calvin's[9] theory about ice age climates and the evolution of intelligence is correct, then our ancestors spent much of their time shivering in snow and slush far surpassing the winter of 1996.

A second problem is that many mismatch theorists seem to believe that biological evolution is primary and culture is merely the medium within which ancient scenarios are adaptively replayed (a "match") or maladaptively thwarted (a "mismatch"). I suggest that human nature and culture were fairly well-matched and mutually complementary up to around 40,000 years ago, but since that time culture and neoculture have evolved - through cultural evolution - into separate

and independent categories that sometimes mesh with human nature but, more often, do not. Moreover, in technologically advanced societies such as the United States, Europe, and Japan, *the drive to achieve cultural success is a more powerful than is the drive to achieve biological success for most people.*

Most members of ASCAP and HBES, for example, often know little about the biological success of other members (e.g., number of offspring or size of extended family), but we are highly sensitive to the various trappings of cultural success in the forms of publications, reputation, and other indices of cultural/ neocultural prestige. Clearly, in success-oriented modern societies the coin of the realm is cultural success and not biological success. In fact, we are all aware that the more educated and wealthy people of modern technological societies tend to produce less rather than more offspring.

A third problem is that mismatch has not been adequately defined in the literature. In fact, the term has been typically used in two different ways: a) first, as a general term for any kind of antagonism between human nature, on the one hand, and culture on the other, and b) second, as a term to describe fairly specific dissonances between particular adaptations and the current contexts in which they are expressed (or thwarted). The semi-popular works tend to employ the first more general form (human nature vs. culture), whereas Tooby and Cosmides,[1] Nesse and Williams,[6] and Eaton, Shostak, and Konner[2] tend toward the more specific formulation (specific adaptation vs. specific contexts). The general form is aptly illustrated in this quote from Barash:[4] *"...we are the product of biological evolution - a slow and natural process... yet we are enmeshed in our own cultural evolution, which is fast and somehow 'unnatural'" (p. 1).* By contrast, in their classic treatise on Darwinian medicine, Williams and Nesse[10] discuss a number of specific disparities between ancestral and current environments that contribute to the "diseases of civilization" that plague modern humans. Here the focus is clearly on specific adaptations versus novel current environments in technological societies.

As a terminological convention, I referto general antagonisms between human nature and culture as nature-culture **conflict,** whereas the term **mismatch** is reserved for the more specific dissonances between various adaptations and their current environments of expression. In my thinking, the general conflict between our ancient and relatively stable human nature and our changing, growing, and progressively demanding culture/neoculture is central to paleopsychopathology, but the various mismatches (inappropriate diet, smoking, pollution, loneliness, alienation, crowding, etc.) experienced by the individual are fundamental as well. In fact, the **ratio** of adaptation matches-to-mismatchesforagiven individual may prove to be an important index of risk for both physical and psychological pathologies. All modem humans exist in a sprawling desert of adaptation-context mismatch, and the frequency and quality of our few "oases of matching" may be essential for good physical health and psychological optimality.

Resolving conflict: Nature-culture reconciliation

The solution to specific mismatch problems (e.g., insufficient fiber in the diet, poor air quality, or crowding) is usually fairly straightforward: seek out or create environments that are adequate to the adaptation or set of adaptations in question (increase fiber intake, go to Arizona, or take a solitary walk in the woods). Unfortunately, human nature-culture conflicts are not so easily solved, as with the modern "superwoman" who must juggle family (biological success) and job (cultural success), or the celibate priest who may deny sexuality and reproduction altogether for some higher good. Mismatch reduction seems particularly important in terms of physical health and Darwinian medicine, but resolving nature-culture conflict seems to go to the heart of paleodynamic theory and evolutionary psychotherapy.

The concept of nature-culture conflict is predicated on several basic assumptions: a) there is an evolved human nature that arose through the processes of natural selection; b) modern human beings exist and function within cultures and neocultures that arose through processes of cultural selection; c) the processes of natural and cultural selection are separate but complementary systems; d) human beings have in-built "drives" to achieve both biological and cultural

success; e) the drive for biological success is built into the human brain and possesses its own neuro-physiological substructures for motivation and behavioral reinforcement; f) the drive for cultural success must co-opt motivational and reinforcement mechanisms of the brain that originally evolved to support biological success; g) the separate drives for biological and cultural success are often in conflict in modern technological societies; and h) the drive for biological success tends to dominate pre-industrial societies, whereas the drive for cultural success tends to dominate modern technology-based societies.

The drives to biological and cultural success are discussed in detail elsewhere.[11] Biological success is defined *proximally* in terms of general physical/ reproductive condition and capacity to pursue biologically-relevant goals, and *ultimately* in terms of reproductive success in generating offspring and promoting inclusive fitness through various kin selective processes. Thus, biological success involves a proximal health component that is probabilistically linked to an ultimate reproductive component; *viz.,* healthy members of the species are more likely, overtime and varying circumstances, to produce more offspring and promote greater levels of inclusive fitness than are unhealthy members.

Whereas biological success revolves around the individual and family, cultural success is externally conferred by those in power and is predicated upon assimilation of cultural knowledge, conformity to the rules of regulations of society, and productivity. In modern technological societies, the successful person must be sufficiently intelligent, educated, self-controlled, law-abiding, and technologically skilled in order to generate social reward in terms of social acceptance, prestige, and financial remuneration for services rendered. For example, Hill[12] argues that"... sociocul-tural success, or prestige, [is] the driving force behind sociocultural evolution" (p. 337).

If we grant that a complete return to nature is not possible, and if success in modem societies is, in reality, predicated more upon cultural than biological success, then *rematching* our human natures with the *Homo sapiens* lifestyle cannot be the solution to the larger conflict problem. The solution must be one of nature-culture reconciliation where both our ancient natures and culture give up a little. In a nutshell, *the fundamental premise of nature-culture reconciliation is that the key to tension-reduction and good physical and psychological health is the proper actualizing and balancing of the respective drives for biological and cultural success in a manner that encourages both personal satisfaction and the attainment of social reward."*

The fourfold model

When the separate impulsions toward biological and cultural success are analyzed in terms of relative success and failure, the following four conceptual categories may be derived: *biological success-cultural success, biological success-cultural failure, cultural success-biological failure, cultural failure-biological failure.* Table 1 summarizes interactions between the domains of biology and culture when levels of success and failure are considered. As shown, each of the four combinations of success-failure have implications for psychological health, ranging from *optimality* in Cell 1 through *social pathology* in Cell 2, *personal maladjustment* in Cell 3, and *severe psychopathology* in Cell 4. The four cells in the fourfold model represent hypothetical prototypes and not actual persons, but it is very fruitful conceptually to compare the characteristics of individuals to the various cell expectations.

Table 1: The Fourfold Model

Cultural Success	high	low
	Cell 1	Cell 2
high	Optimality	Social Pathology
Biological Success		
	Cell 3	Cell 4
low	Personal Maladjustment	Severe Psychopathology

In my next installment, the fourfold model will be discussed in greater detail, and brief descriptions of the four Cell types will be offered. In subsequent installments, various implications of the model for defining normality/abnormality, refining assessment and diagnostic procedures, and developing treatment plans will be addressed.

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ARTICLE:

by J Birtchnell

Response to Koenraad Kortmulder

I would like to comment upon K. Kortmulder's article.[1] I remember the day that Dave Stevens, myself and a few others put together the circular diagram for breaking down the agonic and hedonic modes into their component parts. The diagram emerged out of my contending that the two modes could be accommodated within my biaxial system. In Dave Stevens' August, 1993, article in the Newsletter, he refers to how he drew upon my theoretical position in the development of his axes, but he does not make the connection with my intended objective that I am now doing.[2] Somehow, along the way, my input into this debate has got omitted and Kortmulder, even though he has read the 1993 article, makes no reference to my theoretical position, though it has relevance to what he has to say.

It is not clear why Dave Stevens originally chose to present his four axes in a circular format. A circular format is useful only when the axes are of the same order of things, e.g. closeness and distance and uppemess and lowerness are all spatial concepts. It therefore makes sense to place upper distance between upperness and distance, because it draws upon the upperness and distance on either side of it. It does not make this kind of sense to place distance between disparity and flexibility. Why did he not just place the four axes one below the other? Kortmulder has added further confusion by superimposing his axes of constriction versus expansion and symmetry versus broken-symmetry upon Stevens' axes.

The relevance of the distance-closeness axis is obvious. Agonies are morerdistant than hedonics. The regard axis was intended to take account of my distinction between positive relating and negative relating. I considered that hedonics were more inclined to relate positively. As you know, there are several kinds of positive/negative distinctions, but the two I had in mind were secure/insecure and respectful/disrespectful. Hedonics are more secure and relate more respectfully. The rigidity axis grew out of my idea that good relaters have a broader range of relating skills than bad relaters. Bad (negative) relaters are bad relaters because they lack certain skills. When people lack certain skills they force others to relate within their restricted range of relating. If agonies are bad (i.e. negative) relaters they are bound to be more rigid. The disparity axis was an attempt to bring into play my uppemess-lowemess distinction. Because agonies are more distant, they operate largely on the upper distant/lower distant side of the octagon, and because they are essentially negative relaters, their relating is mainly negative upper distant to negative lower distant. That is, because the upper animals are insecurely upper, they are constantly afraid that they are going to be dislodged or overthrown, and because the lower animals are insecurely lower, they are constantly afraid that they are going to be crushed by the upper animals.

It seems to me that hedonics are more like humans than agonies, and Michael Chance has argued that it is the more relaxed relating of hedonics that has enabled them to turn their attention to invention. If they are more like humans, then they are nearer to being civilised. Further support for their being more like humans is that it is really only humans that relate positively. I am coming round to the idea that positive relating has largely developed out of closeness, for closeness is to do with mutual respect and trust (though I accept that there are negative forms of closeness). Early animals related only up and down the distant side of the octagon. (My objection to ranking theory is that it ignores the closeness side, though I think that Paul Gilbert's SAHP represents a shift towards the closeness side. In SAHP it is possible to indulge in the close acts of liking, approving, admiring, praising, encouraging, etc., which the dog-eat-dog agonies could never do.) Hedonics therefore represent a shift to the close side of the octagon, both in a positional sense and in terms of trust and respect, I have to emphasis that there are two important forms of trust: closeness trust, when the

close person trusts the other not to go away; and lowerness trust, when the lower person trust the upper person not to abuse her/him. Once these were established, it became possible to adopt close and lower positions without danger of being harmed. This is how hedonics and humans came to be able to help one another, to become interdependent, i.e. to have mutually rewarding upper to lower relating. This is not to say that there aren't agonic humans, because obviously humans have retained both the distant side of the octagon and the (negative or distant) capacity to relate ruthlessly and disrespectfully.

Perhaps I should end by saying that by trying to accommodate the two modes theory within my spatial theory I do not wish to reject the two modes theory as redundant. John Price used to say that the two modes theory filled a gap in my theory and it should be superimposed upon it. One reason for trying to accommodate the two modes theory within spatial theory was to refute that suggestion. I have always said that people think up theories to fit their own personal needs. Commonly however, there are striking overlaps between theories and it is an important exercise to make translations from one theory to another, just as it is necessary to make translations from one language to another.

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ARTICLE:

by R Gardner
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The Bhagavad Gita and the frontal lobes[1]

Arjuna's treatment

In discussions with fellow UTMB faculty member, anatomist and plastic surgeon, Professor Somes Guha, I realized that *Bhagavad Gita's* fundamental story concerns how Prince Arjuna more than 2200 years ago was treated with a version of the shiver model well known to the readers of *The ASCAP Newsletter.* Arjuna with a high ranking ally, Sri Krishna (a god), overcomes an automatic horror response and becomes free to act in a thoughtful planful way.

These discussions with Dr. Guha also made me realize that the book may help us approach from the behavioral and interactional levels an integration of the various levels of socioqhysiology. It records meaningful values historically valuable for millions of people well over two millenia, obviously striking resonant chords in many human beings.[2] Much of the *Gita's* message entails restraint and inhibition, but a super ego without repression, a kind of a inner freeing from material desire although not abdication of duty and responsibility. Indeed, the issue of human leadership is core to the *Gita.* A humane attitude characterizes the work despite the fact that the plot entails that the prince should become more ready to practice war, not be irresolute as he had previously been. The subtleties of how the frontal lobes and the brain's most widespread neurotransmitter- inhibitory in its action - can be invoked as involved with the actions of Arjuna and all those whose actions have been guided by him and Sri Krishna over the centuries.

The prince well known to be unusually strong physically was leader of an army preparing for an internecine battle. "[T]he prince looked on the array, and in both armies he recognized fathers and grandfathers, teachers, uncles, sons, brothers, grandsons, fathers-in-law, dear friends, and many other familiar faces." A quote details his bodily reaction: *My limbs are weakened, My mouth is parching,*

My body trembles, My
hair stands upright, My skin
seems burning,
The bow Gandiva
Slips from my hand,
My brain is whirling
Round and round.

The freeze-flight response shiver-like in its automatic-ity and physical characteristics has Arjuna doing nothing, but with a considerate, authoritative ally, the godhead, Sri Krishna, and using neocortical action better with the help of an ally, he thinks his situation through and plans accordingly. Assuming human form by being Arjuna's chariot driver, Krishna counsels him in personal decision-making. Their conversation constitutes the *Gita.* After the conversation, war did occur and Arjuna's side triumphed. But far more importantly than that, the thought about his struggles entailed have reverberated since.

Arjuna's freeze-flight response on the battlefield is hardly unique to humans of course. The locus coer-uleus, head nucleus for the norepinephrine system, is low in the brain stem implying that such reactions were an ancient invention for animal survival, well before primates were human, vertebrates mammals, etc. It sends neuronal processes both down the spinal cord (as was the case when that level of development was the acme for ancestral animals) and -- we suspect - up to more recently developing elements (mid-brain, thalamic and hypothalamic structures, basal ganglia and cortex). In the body more generally, the adrenal medulla dispatches similar agents into the blood. So, if this is an inherent and primitive response, but one not always helpful, how does one gain control over it?

Explaining depression to patients as pathologic ISS

When working professionally with troubled persons, I often tell John Price's story of Thorlief Schjelderuppe-Ebbe, a lonely Norwegian boy who discovered peck-order when a child, after he had been often left alone in a country place and the chickens were almost his only companions.[3] Nearly all patients already have at least some awareness of peck order (as well as some acquaintance with loneliness). As part of this story, I additionally tell of John Price's discovery of these descriptions a half-century after Schjelderuppe-Ebbe made them, noting that the low ranking chickens looked like what we call depression in people.

I may also mention Martin Seligman and the dogs he discovered to display what he called "learned helplessness" when they were treated badly with electric shocks.[4] The dogs became unmoving, unreactive, enduring perhaps, so that they may live another day instead of perishing. The behavior pattern persists for a considerable time and is correlated with physiology that may not help the individual. Later, researchers found that rats behave similarly when treated in this manner. This currently represents the most usable animal model for depression - and its recovery. For example, Fred Petty found that medications known to be antidepressant in humans reversed the behavior of the animals when injected into their forebrains with a time-course similar to that of human depression.[5]

I suggest to the patients a physiological explanation for the behavior of all these animals-- including the Norwegian chickens - is that they behave according to a basic plan that we have called involuntary subordinate strategy or ISS -- though when speaking with patients I may not use the term as such. But I especially note that it is probably a normal phenomenon which for the patient has become abnormal. It has become a psychiatric problem, abnormal because its expression is stimulated too much, with wrong timing, or without present day necessity, like to plant a tomato inadvertently stimulating a bulldozer and trampling the garden plot instead.

ISS is like a shiver: Foundation for a treatment strategy

The most important metaphor I develop for the patient - leading to how treatment works - is an elaboration of John Price's shiver model which I usually illustrate as a teacher using chalkboard, one component at a time, starting with the shiver experience itself. Everyone has shivered and seen others, even dogs, shiver, so that the metaphor becomes palpable and understandable. That one shivers for a reason is equally palpable and what one does to remedy the shiver response by getting warmer in various ways requires little imagination.

The differences between humans and other animals are critical to this stage of discussion with patients, having already developed the similarities and achieved agreement that other animals too have social rank hierarchies and that breathing, shivers and other body

structures and functions are held in common. The differences of language, laughter and the extensive-ness of human relationships, though obvious, now need to come to the forefront. So to make this point I point out early on to patients that we have a large brain, three times greater in size, than our nearest primate relatives and our ancestors three million years ago. What happened to bring about that change? What added and potentially helpful functions does the larger mass entail?

For the shiver-ATP model (Table 1), I elaborate three points of the human-non human difference.

1. A = **Allies:** people are gregarious; they attach or bond intensively and potentially to many other people; they have extensive ability to elicit allies. They use language and non-verbal cues to exchange informa tion.
2. **T** = **Thought:** humans extensively deploy cognition to solve problems.
3. **P** = **Plan:** people can analyze their circumstances to gain new perspectives on shiver-like involuntary responses and then act to forestall or prevent unfortu nate and maladaptive reflexive or automatic reactions.

Thus, to handle ISS and many other automatic responses as well, any one of us feels benefited by finding someone else to help who is friendly and has our best interests at heart, so as to then think through the problem using language-based conversation, reassured by other indications of involvement, invest ment and friendliness. With such people, one can better plan for what *should* happen the next time the analyzed circumstance appears in one's life. Instead of responding with the equivalent of shivering - auto matically and involuntarily - one can respond more specifically and adaptively to present surroundings, which are better analyzed if done soberly, carefully and while supported. One's conscious thinking-goes better with the help of -other people.

Mania is another shiver-like response Automatic reactions are not restricted to the ISS. One of the most striking is the hyperkinetic, take-over communicational state of mania. A foundation thought that has propelled me for 15 years holds that we are benefited in learning something of the nature of leadership from the natural experiment of mania, a psychiatric disorder, characterized by grandiose planning, impulsive spending, little felt need for sleep, efforts to control the actions of others, pressured speech, increased appetites as for sex, food and liquor and either enthusiasm and euphoria or irritability. I have postulated that this reflects a biological basic plan for charismatic or high profile leadership.[6] When seen pathologically (that is, we call it a psychiatric disorder because it shows no immediate adaptive function), the core outlines of a basic state are lined out in a way that benefits its investigation.

Mrs. LO is a patient I see twice yearly who has had five devastating episodes of mania in her life. As a patient she very carefully takes her lithium which usually works well. She is an impressive person as wife, mother and able worker--though currently employed in a low paying job. When employed in more high powered situations in the years before I knew her, she had escalated to manic episodes and she greatly feared recurrence.

Two years ago, however, she had the one episode of mania that has happened during my association with her. During conversations afterwards (often including her warmly concerned ally of a husband), we dis-cerned on analysis of her situation that her sleep had started getting bad (previously for her this was a sure sign of an impending episode) after her father criticized her. She registered his comment as painful, apt but depleting. Following her sleeplessness, she indeed did escalate into mania and required hospitalization for an episode that involved delusional thinking.

On a follow-up visit more recently, Mrs. LO noted almost in passing that her father had recently criti-cized her again. Formerly, she said, his comment would have gotten to her, but this time it didn't; she "let it go in one ear and out the other." She had decided some time ago, Mrs. LO said, that she can't let his comments affect her in any way so she made sure that it didn't.

I reacted by supposing that I must of course have described the shiver model to her as she was deploy-ing it in her actions. She said I had not, but - all ears - she wished to hear of it as she has a problem

to solve -- her longstanding worry that a challenging job would escalate her to mania still again; she has hesitated to take on significant positions to forestall future episodes. She has been actively working on this life issue as her husband believes that she should risk it and take on a more high powered job, the children are mostly grown, and she knows herself to be highly able. But even the low paying job acquired since last session was for her a risk.

So I pointed out the parallel of shiver and sleeplessness (and subsequent mania); the stimulus of cold was similar to her father's comment. I and her husband were her 'allies' in 'thoughtfully' figuring out her father's role in the ISS-father connection. She then planfully' took what we had discussed and resolved in her own thinking to put a cognitive filter between herself and her father's comments. Knowing that her lower body-brain have an vulnerability to reacting, she consciously and deliberately reduced their impact, buffering their previous meaning.

Prince Arjuna's nickname was "The Conqueror of Sloth" because he was said to never sleep, an interesting characteristic, given that it also characterizes manics. He may have been paralyzed when overlooking the battlefield, but we infer that this was not his usual form of action. Some people when manic don't seem to need sleep, or only little amounts, given what they feel they need to do, in stark contrast to depressed people who desire it but are insomniac, a word not usually employed with the manic. Not that there is any other trace that Arjuna was manic anywhere in the *Gita.* Many leaders stay awake in the midst of needful action. Wellington when fighting Napoleon's army in the Battle of Waterloo stayed awake for days catching only catnaps.[7] I envision manics as evincing a leadership biology (although maladaptively) which is why they stay awake and do not need sleep.[8] It is as though they are generals in the Battle of Waterloo without a battle that anyone else can see.

One need not be a battlefield leader. President Franklyn Roosevelt *"teased Eleanor one morning, "You didn't go to bed at all last night." She responded, "I had been working on my mail without regard to time, and suddenly it began to get light. I decided it was not worth while going to bed. ""*[9]

In the movie, *Crimson Tide,* which takes place on a nuclear submarine, the very authoritarian commander has supreme authority and assumes responsibility for making a horrific attack decision. Eager to exercise that authority and intolerant of subordinates, he goes beyond the rules (like the manic in contrast to Arjuna who shrank from the horror). After a struggle, the commander is demonstrated wrong. In contrast to manics during their acute phase, he at the end exhibits an appreciation of having been resisted. He resembles more an alcoholic who enlists in AA and who must therefore give way and admit - often reluctantly - there exists a power higher than oneself. The ancient attributes of people sorting themselves out on social rank hierarchies can be put in the context of other animals which were our precursors in truly ancient times-- probably millions not tens of thousands of years - long before primates were humans, mammals were primates and vertebrates were mammals. We seem to have wired in our genome the push to assume an alpha state if possible, to strive for being *numero uno,* to triumph over our conspecif-ics.

Ethologist Jane Goodall says, *"Dominance as a concept will surely always have its ups and downs in the behavioral literature and in discussions between scientists, but there is absolutely no question that the [male] chimpanzee does have an inherent, powerful, and compelling desire to work his way up through the dominance hierarchy. So much so that when we have the odd individual, as we do at Gombe, who does not seem particularly Interested in his social rank, we regard him as distinctly unusual and want to burrow into his childhood to see if we can find clues there as to why he shows the surprising lack of the dominance drive. "*[10]

The *Bhagavad Gita* tells us (though hardly in exactly these words) that we have also coded into our human genome the capacity to overcome that push and drive. We can harness it. But let us discuss further the generic leadership push that needs to be controlled.

Enthusiasm, boldness, or demonism Human leadership can be classified many ways but the high profile, charismatic, and dramatic forms resemble what in the western tradition John Locke of the late 17th century called enthusiasm. He said, *"Enthusiasm, though founded neither on reason nor divine revelation, but rising from the conceits of a warmed or over-weening brain, works yet, where it once gets footing, more powerfully on the persuasions and actions of men, than either of these two, or both together... Though the odd opinions and extravagant actions enthusiasm has run men... enough to warn [them] against this wrong principle... yet the love of something extraordinary, the ease and glory... above the common and natural ways of knowledge, so flatters many men's laziness, ignorance, and vanity, that... it is a hard matter to get them out of it. Reason is lost upon them, they are above it.* "[11] Locke knew that it was very pleasant to be in charge.

Coming somewhat before Locke, Francis Bacon had described something similar as boldness. He suggested that boldness fascinates and binds people hand and foot, certainly those shallow in judgment or weak in courage, but also wise men at moments of weakness. Bacon stated, "Boldness is ever blind; for it seeth not dangers and inconveniences."[12] Bacon's counterpart for Locke's reason was judgment. With their contrasts between enthusiasm *versus* reason and boldness versus judgment, Locke and Bacon alluded to key differences between what I have called high profile versus low key leaders.

This differentiation echoes in reading the *Gita.* In Chapter 15, entitled, "Divine and Demonic Tendencies", Krishna, quotes "demonic" types as saying,""/ *wanted this and today I got it. I want that: I shall get it tomorrow. All these riches are now mine: soon I shall have more. I have killed this enemy. I will kill all the rest. I am a ruler of men. I enjoy the things of this world. I am successful, strong and happy. Who is my equal? I am so wealthy and so nobly born. I will sacrifice to the gods. I will give alms. I will make merry." This is what they say to themselves, in the blindness of their ignorance."* He goes on to say, *"They are addicts of sensual pleasure, made restless by their many desires, and caught in the net of delusion. They fall into the filthy hell of their own evil minds. Conceited, haughty, foolishly proud, and intoxicated by their wealth, they offer sacrifice to God in name only, for outward show, without following the sacred rituals. ... [They are] full of egoism, vanity, lust, wrath, and consciousness of power. They loathe me, and deny my presence, both in themselves and in others."*

Overcoming the push to be in charge

So in some of the grand works of humankind as the classic *Bhagavad Gita* and the writings of Bacon and Locke, we see the enthusiastic, the bold, and the demonic harnessed by conceptual restraint and the help of other people helping one think things through. Locke was the progenitor of the grand American anti-royalist experiment with democracy. Thomas Jefferson used Locke's reasoning and paralleled his own line of argument with that of Locke's *Second Treatise of Government* when he composed the *Declaration of Independence.*[13] Historian Ralph Barton Perry described Locke as *"the greatest and most representative exponent of the thought of the Enlightenment -which, arising in England in the seventeenth century, gave a distinctive character to the mind of Europe and America in the century that followed. "*[14] Washington read Locke at bedtime. Washington's famous self restraint stemmed partly from his personality, surely, but also from his appreciating the values articulated by Locke. Garry Wills details how the icons of the new American Republic echoed the values of restraint in the development of the unique world experiment of American democracy.[15]

But despite these ideals, pushes to untrammeled power have hardly disappeared. In Alcoholics Anonymous, we know that for the alcoholic to recover, he/she must admit helplessness with the alcohol, that a greater being is needed, that one must conquer one's sense of being entitled to the beverage. One must deliberately give way to the atmosphere of the group (not hold for stubborn independence nor anxiously worry about the future). This is an opposite extreme from the leader who gives way to no-one, but commands absolutely. Such humans may exist, but the saying that "absolute power corrupts absolutely" is perhaps an accurate one, given how extraordinarily

gregarious we humans are, perhaps in good part to the large frontal lobes. All religions require an obeisance to a superior being(s) and seem to decry overwhelming authority and to value the humble attitude. We inhibit our wishes to be pleasurably in charge, and plan for a relaxed hedonic future with our fellows. That this must be a personal decision is an important issue for the human/non-human comparison. It implies that the alcoholic in his or her mind at least, is a person very much in charge of something, that this is a problem and that the power must be yielded or shared.

The counterparts in the *Gita* to Locke's reason and Bacon's judgment, and its opposites to the above demonic qualities are the principles of the Hindu religion as revealed in the *Bhagavad Gita,* and summarized only briefly here: subservience to Krishna and disconnection from personal ambition and passions. But not inaction, not abject submission. For example, in Chapter 5, Krishna states:

Action rightly renounced brings freedom:
Action rightly performed brings freedom:
Both are better
Than mere shunning of action.
The practice of yoga relates to such.

Yoga means binding, balancing and enhancing mental powers. The *Gita* would have us predict that instead of using less blood-flow (as with reduced or absent thought and the neuroimaging of clinical depression), the person who is doing yoga as advised in the *Gita* would have greater flow.

A verse instructing on yoga reads (Sri Krishna speaks):

So, with his heart serene and fearless,
Firm in the vow of renunciation,
Holding the mind from its restless roaming,
Now let him struggle to reach my oneness,
Ever-absorbed, his eyes on me always,
His prize, his purpose.

In this verse Arjuna's high ranking ally advises him to be a winner by a relationship to the Godhead, to be absorbed and attentive to him as "his prize, his purpose." But he should be active and striving in this not so much subordinate but a working-together role - greater good from the greater strength of more than one, and a most powerful ally at that (who is stronger than a god?). Yet Sri Krishna has the human form of a subordinate to Arjuna, his chariot driver, in a process in the social rank that evens hierarchical arrangements.

This reminds us of Goodall's[16] and de Waal's[17] chimpanzees. Alpha status in these animal groupings is usually reached when the striving animal has allies amongst other chimpanzees. The allies get something out of being less than alpha but instead allies of the top ranker. In the case of the *Bhagavad Gita,* Krishna's advice is for the hero, Arjuna, around whom the book revolves, to be an ally.

But the human terms in which this is expressed much more subtly may correlate with our expanded human brain and our wholesale use of an inhibitory neu-rotransmitter (there is more GABA in our brain than any other neurotransmitter).

William McNeill proposes that we relate to authorities with the device of military drill; he recalls of his own experience as a young recruit, "What I remember now, years afterwards, is that I rather liked strutting around, and so, I feel sure, did most of my fellows."[18] As a new recruit, he ranked very low, was made to practice drills in the hot Texas sun because equipment was sparse and there was little else they could do. But that didn't seem to matter. He looked forward to when they moved together in time. He felt himself an ally of those overall in charge, superior in subtle ways. However active these inhibitions are, hisdopamine receptors (biochemicals active in the pleasure center) were undoubtedly stimulated as well.

The frontal lobes

The frontal lobes are the largest components of human brain and are the most recently. When damaged (at least in parts), they produce disinhibition. In Antonio Damascio's *Descartes'Error: Emotion, Reason, and the Human Brain,*[19] he describes the famous patient Phineas Gage who had been an excellent leader at the age of 24 years. As foreman of crew, he pleased both his men and his employers at a New England railroad construction site a century and a half ago. He sustained a terrible but life-preserving injury to his

anterior-most frontal lobes, however, when a pointed metal rod three inches thick arrowed its way through his head from an explosion when he was blasting rock. His skull has been preserved at Harvard so that the precise area of damage could be specified on the cover of *Science* by Hanna Damascio, an imaging expert who along with husband Antonio and other colleagues showed his lesion to be bilateral, not on the left only as it had seemed for 150 years.[20]

Antonio states, "Gage lost something uniquely human, the ability to plan his future as a social being." The patient lived for more than a decade after the accident, but could no longer lead humans, although he did care for and drive horses, which is what he mostly did subsequently, even following an employer to Chile for most of a decade. Contemporaries thought of him as intellectually normal: he could remember, cogitate, ambulate, speak, etc. But his speech was profane and filled with fanciful stories. He was no longer honest. He couldn't plan and carry through independently.

The frontal lobes are known fortheir relational, attentional, inhibiting, planning and executive functions. Patients with lateral frontal deficits are notorious for their "sticky sets," their inability to change their mind or program of action. At its worse, perseveration occurs, the reiteration of words as they are unable to go to another word or idea, or they echo another person's words or even postures (echolalia and echopraxia). People with damage to the orbital frontal cortex are disinhibited and therefore do socially inappropriate things, such as untoward sexual advances or public performance of excretory functions. People with left lateral frontal lesions can't plan well. Patients with Asperger's syndrome have right frontal deficits and are awkward people who relate poorly, not able to capture what other people are experiencing.[21] On the other hand, people whose posterior brain is damaged or undeveloped may do very well in socializing, story-telling and planning arenas even though severely handicapped by their limited stores of information. The famous Russian neuropsychologist Alexander Romanovich Luria tells of a patient with whom he followed for decades. Terribly injured in his parietal lobes during World War II, Zasetsky each day laboriously worked with his still intact frontal parts to write out his story although he had to relearn all language skills and expository details remained maddeningly elusive.[22] He related extremely well, surely in part completing the task for his doctor who indeed eventually wrote a book about him.

A mental retardation syndrome named Williams Syndrome exhibits a deletion on the long arm of chromosome 7. Posterior but not frontal brain areas are markedly diminished in volume as a result of a dysregulation of normal cell death (apoptosis).[23] Yet patients are unusually adept at small talk and keeping conversations going (when young, they are known as the "cocktail party children"). They have remarkable language despite severe cognitive deficits. One such patient "drew people to him as though he had a magnet in him." He knew song lyrics and could recite multiplication tables despite the inability to add even two-digit numbers.

Paolo Nichelli and colleagues at the NIH had nine people read Aesop's fables on a computer screen while positron emission tomography (PET) examined which parts of their brain were differentially more active. They were instructed to monitor four conditions: font changes, grammatical errors, a semantic feature associated with a character, and the moral of the fable. They learned that both right and left prefrontal cortices were consistently and selectively activated in all of the conditions. Appreciating the moral, however, meant that a distributed set of brain regions were activated which included the temporal in addition to the frontal lobes. We would hope that if morals can be explored and better understood, that processes involving greater control over the body will be in the future. The *Gita* suggests parallel study of yoga may be in order.

Referring again to Damascio's book, he develops the idea here (as he and his colleagues have elsewhere) that most people have "somatic markers" - gut feelings for right ar.d wrong. You feel bad in your stomach when seeing something bad, such as death, mutilation, disgusting scenes. Critical connections exist in the frontal lobes and one can develop an "acquired sociopathy" if one has frontal lobe damage. When this has happened, viewing a horrific scene

simply fails to activate the usual emotional response to it in these people, who perhaps don't now, or in nonacquired sociopathy, may never have had that connection. He suggests that without that coding, one develops callous attitudes more easily.

GABA may very well have a seminal role on the way to Nirvana, or freedom from the manic or any "bonded" state of mind, if you will, such as depression. Cultivation of GABA paths may help; we need neocortical activity not the absence of it such as in major depression. The value systems that Sri Krishna describes seems to me to be uniquely human. The practice of yoga involves thoughtful emboldened action, not simple inhibition alone. He advises action as a result of personal concentration.

Arjuna was a remarkable audience, actively listening and making use of what he heard. And so was the Godhead an appreciator of his boss-charge's concerns. "Sri" refers to a term of deference and respect. It seems to have been deserved and to also have been even more deserved by being exhibited towards Krishna's constituent, the soldier-leader, Arjuna. As good parents do with their children, he listened and fostered a hedonic atmosphere. He helped his charge develop, helped him contain unruly internal forces, which in his case were frontal lobe problems (the somatic marker horror of what he anticipated in the battle) by levering even additional frontal lobe capacities towards a personal state of Nirvana and emboldened proper action even in the terrible circumstances of internecine war.

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ARTICLE.-

by C Russell & WMS Russell

Population crises and population cycles

1. Introduction: Crises and cycles in animals and man

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Among lower animals, high fertility and competition prevail. Three great trends of evolutionary progress have been:

1. Reduction in fertility
2. Development and extension of parental behaviour, and
3. Sociability towards and adoption of individuals not closely genetically related.

These trends have culminated in cultural evolution in the co-operative societies of higher primates and cetacea (whales and dolphins), and ultimately in the achievements of man.

Despite their relatively low fertility, mammalian populations are still liable to outgrow their environmental resources (animal prey or plant food populations), and are in danger of irretrievably depleting them. To avert this, there has evolved a behavioural and physiological response to population crisis. When a mammalian population becomes dangerously dense, but before it can deplete its resources, the stimulus of overcrowding leads to a complete reversal or regression of behaviour. Co-operation and parental behaviour are replaced by competition, dominance and aggressive violence. The effect of crowding on aggression in wild rabbits, for instance, is shown in **Table 1.**

Table 1

AGGRESSION IN GROUPS OF 6 WILD RABBITS EACH

Size of Enclosure (square yards)	Number of Aggressive Acts per Hour
450	26
225	42
123	88

(from Russell & Russell 1984)

Females and young, demographically most important, are most likely to be killed, and thus the population is reduced. In the elaborate societies of higher primates, the effects may be quite complex, involving the replacement of friendly leaders by aggressive bullies, lethal mob attacks on persecuted individuals, and war between bands. But the end result is the same --mortality of females and young, and a reduced population. The stress of crowding and of the resulting violence impairs both the immune and the reproductive systems. Hence epidemics complete the crash of the population, and reproduction is slowed for three or four generations, giving the resources ample time to recover. In some mammal species, crisis and crisis response recur in a regular fashion, leading to cycles of population growth and collapse, oscillating about a fixed mean, as shown for the snowshoe hare in **Figure** 1.

Population crisis response and population cycles have been equally prominent in the history of human societies, but with certain differences related to the unique character of our species. In man, thanks to our advancing technology, successive advances in food production have made possible growing populations, though with every such advance, population soon outgrew the current level of resources. Hence human population cycles have generally been superimposed on a rising curve, producing a saw-tooth graph. Since the cycles in different societies have not been in phase until recently, the graph for a very large region may look smooth, but in small regions such as Spain, or large homogenous regions such as China, the saw-tooth effect is clear, as shown in **Figure** 2. Because advances in food production amounted to sudden disturbances in the relations between human populations and their environments, the crisis responses in man have not been able to achieve their evolutionary function in time, and hence each full-scale crash, when it came, has generally involved famine, and often resource damage, as well as massive violence and very high death-rates from disease, in just the manner described in the classical works of Robert Malthus. Finally, since the coming of

Figure 2
Population cycles of China and Spain (after McEvedy & Jones, 1978)

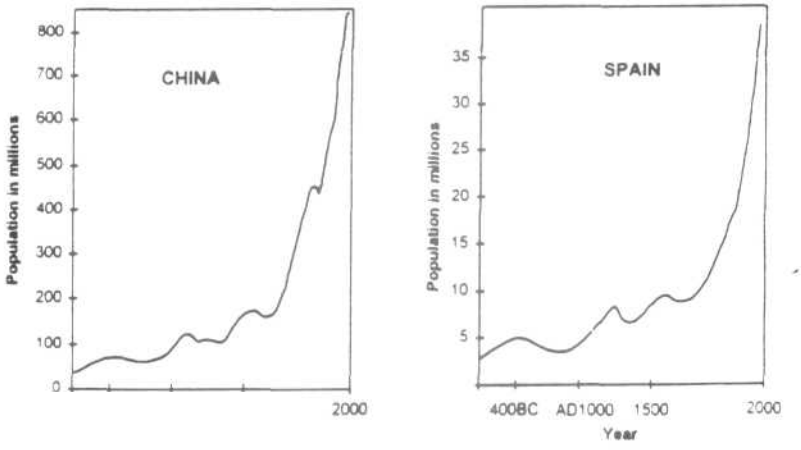
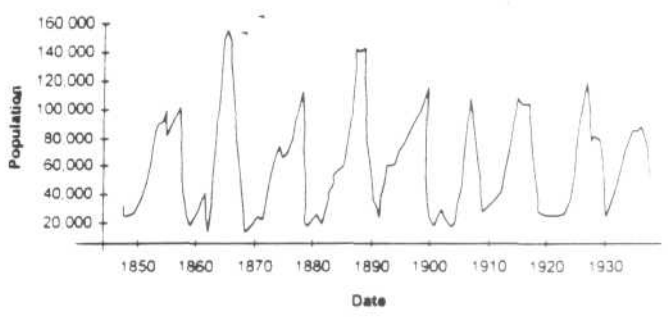


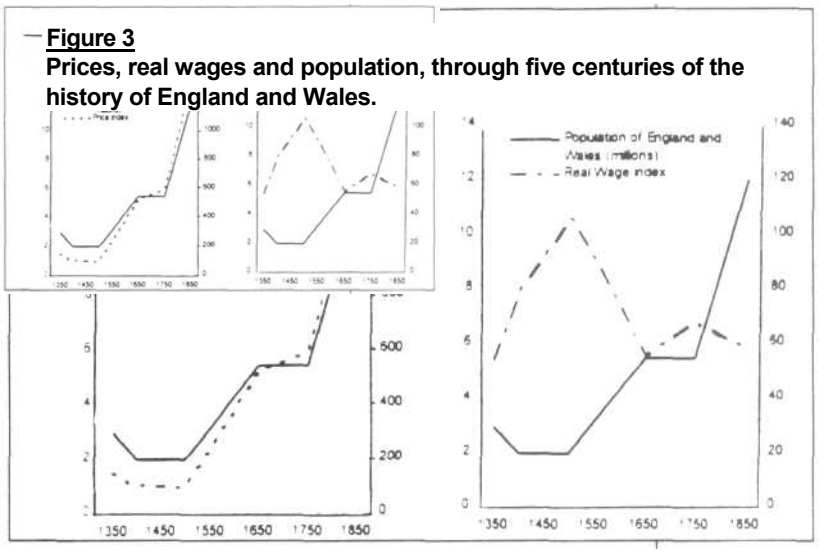
Figure 1
Population cycles of the snowshoe hare, based on pelts received by the Hudson Bay Company (after Kormody, 1969)



settled agriculture and cities, human societies have obviously been far larger and more complex than those of any mammal, and the characteristics of crisis periods when population crash brought the population down to a better balance with current resources, have been correspondingly complex, and can be described under various headings.

The economic effects of population crisis in man have included a rise in prices, a fall in real wages, and massive unemployment, often met by massive building projects which further drained the society's resources. Relief periods have been marked by lower prices, higher real wages, and better levels of employment. The relation of population to prices and real wages over five centuries of history in England and Wales is shown in **Figure 3.**

Figure 3
Prices, real wages and population, through five centuries of the history of England and Wales.



The social effects of population crisis have included sharper differences between classes and greater difficulty in moving between them, whereas relief periods have seen greater equality and social mobility. Politically, crisis periods have been marked by tyranny and oppression, relief periods by intelligent leadership and greater freedom, especially in Europe, where the ground level of population density was (until recently) much lower than in other civilisations.

All these complex effects have of course promoted the original behavioural crisis response of competition, domination and violence, especially against women and children. Famine and malnutrition have combined with stress to produce enormous death-rates from epidemics, completing the crash of the population, so that longevity declined markedly during crisis and recovered during relief periods, as shown for England in **Table** 2. In climatically vulnerable regions, there has also been lasting resource damage during crises, and in the present world-wide crisis this too is becoming world-wide.

Table 2

The table (from Russell & Russell, 1976) shows the changing life expectation of males before, during and after the fourteenth-century population crisis in England.

Dates (AD)	Expectation of life for males in medieval England in years
Before 1276	35.3
1276 to 1300	31.3
1301 to 1325	29.8
1326 to 1345	30.2
1346 to 1375	17.3
1376 to 1400	20.5
1401 to 1425	23.8
1426 to 1450	32.8

The following nine papers of this series will illustrate these generalisations by considering the crises and cycles in the history of a number of human societies, and the eleventh item will be a classified bibliography for the whole series. *c8*

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ABSTRACTS & EXTRACTS ...

Roy A, Segal NL, Centerwall BS & Robinette D: Suicide in twins.

Roy A, Segal NL & Sarchiapone M: Attempted] suicide among living co-twins of twin suicide victims.

Segal NL & Roy A: Suicide attempts in twins whose co-twins' deaths were non-suicides.

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Roy A, Segal NL, Centerwall BS & Robinette D: Suicide in twins. *ArctiGen Psychiatry* **1991 ;48:29-32.**

Abstract: Suicide appears to cluster in families, suggesting that genetic factors may play a role in this behavior. We studied 176 twin pairs in which one or both twins had committed suicide. Seven of the 62 monozygotic twin pairs were concordant for suicide compared with two of the 114 dizygotic twin pairs (11.3% vs 1.8%). The presence of psychiatric disorder in the twins and their families was examined in a subsample of 11 twin pairs, two of whom were concordant for suicide. Eleven of these 13 twin suicide victims had been treated for psychiatric disorder, as had eight of their nine surviving cotwins. In addition, twins in 10 pairs had other first- or second-degree relatives who had been treated for psychiatric disorder. Thus, these twin data suggest that genetic factors related to suicide may largely repre-

sent a genetic predisposition for the psychiatric disorders associated with suicide. However, they leave open the question of whether there may be an independent genetic component for suicide.

Roy **A, Segal NL & Sarchiapone M: Attempted suicide among living co-twins of twin suicide victims. *Am J Psychiatry* 1995; 152(7): 1075-1076.**

Abstract: *Objective:* The authors hypothesized that significantly more living monozygoticthan dizygotic co-twins of twin suicide victims would themselves have attempted suicide. *Method:* They determined the absence or presence of an attempt at suicide at any time among 26 living monozygotic co-twins and nine living dizygotic co-twins of twins who had committed suicide. *Results:* They found that 10 of the 26 surviving monozygotic co-twins but none of the nine surviving dizygotic co-twins had themselves attempted suicide. *Conclusions:* Although monozygotic and dizygotic twins may have some differing developmental experiences, these results contribute to findings of previous studies of suicide in twins in suggesting that genetic factors may play a role in suicidal behavior.

Segal NL & Roy A: Suicide attempts in twins whose co-twins' deaths were non-suicides. *Person Individ Diff* 1995;19(6):937-940.

Summary: Familial similarity for suicidal behavior has been interpreted by psychosocially oriented researchers as reflecting extreme grief following loss. This view would anticipate a higher frequency of attempted suicide among bereaved MZ than DZ twins (regardless of cause of death), given their generally increased social closeness. Alternatively, support for a genetic influence on suicidal behavior has been provided by findings of greater concordance among monozygotic (MZ) than dizygotic (DZ) twins, and among biological than adoptive relatives. This approach predicts that the occurrence of suicidal attempts among bereaved MZ and DZ twins whose co-twins deaths were *non-suicides* should not differ and should be low in frequency, given an absence of predisposing genetic factors. Attempted suicide was compared in 166 MZ and 79 DZ twins whose co-twins' deaths were non-suicides. Suicidal attempts (during the first two months following the loss) were recalled by 3 MZ twins (1.8%) and by 3 DZ twins (3.7%), a difference that was not significant. The present study, together with previous twin and adoption studies, supports the view that concordance for suicide among family members reflects a common genetic predisposition to suicidal behavior.

Steinmetz H, Herzog A, Schlaug G, Huang Y & J ncke L: Brain (a)symmetry in monozygotic twins. *Cerebral Cortex* 995;5:296-300.

Abstract: Origin and ontogenesis of human brain laterality are unknown. Using *in vivo* magnetic resonance morphometry we measured cerebral hemispheric asymmetry of the planum temporale, a structural substrate of functional laterality, in pairs of monozygotic twins concordant or discordant for handedness. In both groups, intraclass (i.e., within twin pair) correlations were low. The right-handers showed leftward asymmetry whereas the left-handers lacked asymmetry. The discordance for lateralized brain anatomy can be accounted for by ontogenetic models assuming twinning of an asymmetrical germ or differential action of nongenetic factors within twin pairs in utero. The findings confirm a coupling of lateralized structure and function of the human brain. At least in monozygotic twins, early epigenetic factors must play a role in anatomofunctional laterality development.

Eisenberg L: The social construction of the human brain. *Am J Psychiatry* 1995;152(11):1563-1575.

Abstract: *Objective:* The purpose of this article is to review the development of concepts about the contribution of nature and nurture to brain structure and mental function, and to derive the implications of these

changing concepts for clinical practice. *Method:* The literature of the past five decades, as refracted by the author's personal experience in academic psychiatry during that interval, is reviewed. *Results:* Psychiatric theory has swung through mighty arcs in recent years but has begun to re-equilibrate. Fifty years ago, psychoanalysis dominated the academic scene; for the past two decades, reductionist biological determinism has held the fort. Neither position is tenable. To subscribe to either is possible only by ignoring conflicting evidence. Worse, it means short-changing patients, whose disorders do not come neatly packaged into "organic" and "functional" compartments. Development is neither predestined in the genome nor completely malleable to shaping by the environment. Children inherit, along with their parents' genes, their parents, their peers, and the communities they inhabit. *Conclusions:* Contemporary psychiatric research conclusively demonstrates that mind/brain responds to biological and social vectors and is jointly constucted by both. Major brain pathways are specified in the genome; detailed connections are fashioned by, and consequently reflect, socially mediated experience in the world. Just at the time when integration at the level of theory is coming into sight, comprehensive patient care is endangered by for-profit corporate managed care, which is transforming medical visits into commodities on a production line. Physicians and patients must join in a coalition to protect quality, ensure access, and build continuity into all of medical care.

Tejedor-Real P, Mico JA, Maldonado R, Roques BP & Gibert-Rahola J: Implication of endogenous opioid system in the learned helplessness model of depression. *Pharmacol Biochem Behav* 1995;52(1):145-152.

Abstract: The involvement of opioid system on the learned helplessness model of depression was investigated. Animals preexposed to inescapable shocks were treated with either Met-enkephalin, Leu-enkephalin, morphine, imipramine, naloxone, RB 38A (a mixed inhibitor of enkephalin degrading enzymes), or RB 38B (a selective inhibitor of neutral endopeptidase EC 3.4.24.11). Stimulation of opioid system by either opioid agonists or enkephalin catabolism inhibitors reversed the escape deficit induced by shock pretreatment. In contrast, administration of naloxone potentiated the effect of inescapable shocks. Imipramine reduced the number of escape failures in this test, and this effect was antagonized by naloxone. These results point to the involvement of the endogenous opioid system in this model of depression.

Koopmans JR, Boomsma DI, Heath AC & van Doornen LJP: A multivariate genetic analysis of sensation seeking. *Behavior Genetics* 1995;25(4):349-356.

Abstract: The genetic architecture of sensation seeking was analyzed in 1591 adolescent twin pairs. Individual differences in sensation seeking were best explained by a simple additive genetic model Between 48 and 63% of the total variance in sensation seeking subscales was attributable to genetic factors. There were no sex differences in the magnitude of the genetic and environmental effects. The different dimensions of sensation seeking were moderately correlated. The strongest correlations were between the subscales Thrill and Adventure Seeking and Experience Seeking (r= 0.4) and between Boredom Susceptibility and Disinhibition (r= 0.4 in males, *r*= 0.5 in females). A triangular decomposition showed that the correlations between the sensation seeking subscales were induced mainly by correlated genetic factors and, to a smaller extent, by correlated unique environmental factors. The genetic and environmental correlation structures differed between males an females. Forfemales, higher genetic correlations for Experience Seeking with Boredom Susceptibility and Disinhibition and higher correlations among the unique environmental factors were found. There was no evidence that sex-specific genes influenced sensation seeking behavior in males and females.

Sirigu A, Zalla T, Pillon B, Grafman J, Agid Y & Dubois B: Selective impairments in managerial knowledge following pre-frontal cortex damage. Cortex 1995;31:301-316.

Abstract: Script generation was investigated in patients with lesions in the prefrontal (n = 9) and posterior (n = 8) cortical regions and in normal subject s (n = 16). Three different activities ranging in degree of familiarity were studied. Frontal patients did not differ from patients with posterior lesion and Normal subjects in the number of actions evoked, mean evocation time, or centrality. Impairments in script information processing were observed only in patients with prefrontal lesions, and for the three types of scripts. Specifically these patients made errors in ordering actions in the correct temporal sequence, failed to close scripts and to remain within the stated boundaries, and made deviant estimates of action importance. The results suggest that pre-Trontal cortical lesions provoke a selective impairment in managerial knowledge that may contribute to difficulties in the formulation and execution of plans.

Schenk S & Snow S: Sensitization to cocaine's motor activating properties produced by electrical kindling of the medial prefrontal cortex but not of the hippocampus. *Brain Research* 1994;659:17-22.

Abstract: A substantial body of evidence has accumulated that implicates NMDA systems in the neural changes that are associated with the development of both electrical kindling of limbic sites and sensitization to the behavioral effects of repeated stimulant exposure. This study sought to establish whether electrical kindling of the brain was a sufficient condition for inducing sensitization to cocaine's motor activating effects and, if so, whether the cross sensitization was a result of kindling of a specific locus. Rats receive daily electrical stimulation of either the medial prefrontal cortex or the hippocampus. Other rats received the electrode implants and were handled daily but received no electrical stimulation. Stage 5 seizures developed in response to the stimulation in 32-35 days. Once this criterion of kindling was established and following a 14 day waiting period the effectiveness of cocaine (0.0, 5.0 or 10.0 mg/kg) in elevating horizontal motor activity was determined. For all 3 groups (sham controls, prefrontal cortical and hippocampal stimulated rats) cocaine produced a dose-dependent increase in horizontal activity. The sham controls and hippocampal rats did not differ in the magnitude of the cocaine-produced effect. However, rats that had received stimulation of the prefrontal cortex showed heightened levels of cocaine-induced activity that were particularly apparent in response to 10.0 mg/kg cocaine. These data suggest that kindling of the prefrontal cortex had sensitized rats to the behavioral effects of cocaine. Since the NMDA system has been implicated in both electrical kindling and sensitization produced by repeated stimulant exposures it is possible that the development of behavioral sensitization is a result of increased sensitivity of specific glutamatergic inputs that arise from a prefrontal cortical substrate and project to cocaine-sensitive sites.

Turton MD, O'Shea D, Gunn I, Beak SA, Edwards CMB, Meeran K, Choi SJ, Taylor GM, Heath MM, Lambert PD, Wilding JPH, Smith DM, Ghatel MA, Herbert J & Bloom SR: A role for glucagon-like peptide-1 in the central regulation of feeding. *Nature* 1996;379:69-72.

Abstract: The sequence of glucagon-like peptide-1 (7-36) amide (GLP-1) is completely conserved in all mammalian species studied, implying that it plays a critical physiological role. We have shown that GLP-1 and its specific receptors are present in the hypothala-mus. No physiological role for central GLP-1 has been established. We report here that intracerebro-ventricular(ICV) GLP-1 powerfully inhibits feeding in fasted rats. ICV injection of the specific GLP-1 -receptor antagonist, exendin (9-39), blocked the inhibitory effect of GLP-1 on food intake. Exendin (9-39) alone had no influence on fast-induced feeding but more than double food intake in satiated rats, and augmented the feeding response to the appetite stimulant, neuropeptide Y. Induction of *c-fos* is a

marker of neuronal activation. Following ICVGLP-1 injection, *c-fos* appeared exclusively in the para-ventricular nucleus of the hypothalamus an central nucleus of the amygdala, and this was inhibited by prior administration of exendin (9-39). Both of these regions of the brain are of primary importance in the regulation of feeding. These findings suggest that central GLP-1 is a new physiological mediator of satiety.

Kapur S, Craik FIM, Tulving E, Wilson AA, Houle S & Brown GM: Neuroanatomical correlates of encoding in episodic memory: Levels of processing effect. *Proc Natl Acad Sci.* 1994;91:2008-2011.

Abstract: Cognitive studies of memory processes demonstrate that memory for stimuli is a function of how they are encoded; stimuli processed semantically are better remembered than those processed in a perceptual or shallow fashion. This study investigates the neural correlates of this cognitive phenomenon. Twelve subjects performed two different cognitive tasks on a series of visually presented nouns. In one task, subjects detected the presence or absence of the letter a; in the other, subjects categorized each noun as living or nonliving. Positron emission tomography (PET) scans using O-labeled water were obtained during both tasks. Subjects showed substantially better recognition memory for nouns seen in the living/nonliving task, compared to nouns seen in the a-checking task. Comparison of the PET images between the two cognitive tasks revealed a significant ativation in the left inferior prefrontal cortex (Brodmann's areas 45,46,46, and 10) in the semantic task as compared to the perceptual task. We propose that memory processes are subserved by a wide neurocognitive network and that encoding processes involve preferential activation of the structures in the left inferior prefrontal cortex. G3

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