For evolutionary psychiatrists, psychologists and others interested In sociophysioiogical Integration

ASCAP

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"It was, I think, the French writer, Andr6 Maurois, who some years ago declared that he had found the missing ***link between the ape-man and civilized man — it is us, he said."*** ***Leonard Freedman*** [1]

Across Species Comparison and Psychopathology (ASCAP) Newsletter Aims

♦A free exchange of letters, notes, articles, essays or ideas in brief format
♦Elaboration of others' 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 ofbehavior 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 eel-lular processes to individuals in groups. The ASCAP Newsletter is a function of the ASCAP society.

Contents

Concerning paleobiology, sociophysiology, interpersonal and group relations, and psychopathology

ADDRESSED TO & FROM ...

WE NEED A PATRON

Bravo! For overcoming the hurricane and for Erica Ainsbury's return made possible, but may I clarify the refocus of our policy. There is a difference between using the information coming from politics, and wanting to influence events in politics. It is essential to include information coming from politics in order to be able to achieve our mission statement so I cannot agree with Michael Coe's position.

If on the other hand we want to bring our message to such bodies as the United Nations or the World Health Organization, we can contribute to the *Journal of Politics and the Life Sciences* which they consult.

Now concerning the recruitment of more subscribers as a way of financing *The ASCAP Newsletter.*
1.I don't think we will get enough.
2. If we even double the number of subscribers and half of them want to contribute, accommodating them as contributors will become increasingly difficult and ultimately more expensive, defeating the object of the enterprise.
3. Diversifying control will in any event introduce problems of information flow; and
4. Will make synthesis, which is our next task, more difficult.
5. So, I suggest, we need a patron.

Michael Chance
Birmingham, ENGLAND

KEY ISSUE

Just read December *ASCAP.* As usual, a fine job. I see that Freedman's Festchrift was an occasion for people summing up what they have learned - most valuable. HBES papers can be ephemera by comparison. The issue of species typical vs. individual differences is a key issue.

John Pearce
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NEWSLETTER NAME

I thought Kalman Glantz's letter in last month's Newletter a bit sharp, but very much to the point. My guess would be that if you went for something like "Evolution and Mental Health", perhaps without reference to its being a newsletter, you could finish up out-Murdoching Murdoch as a publisher.

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NARROW INTERPRETATION

I agree with Michael Coe (Letters, November, 1995) that a requirement for using the *ASCAP* style for submissions seems a good thing. Many others of his ideas for preserving *ASCAP* Newsletter's unique and appealing features should stimulate debate.

I must, however, disagree on the inadmissibility of "politics and social issues"; to assert that ethological examination of these matters is "probably outside the *ASCAP* mission" is to interpret too narrowly the Society's concern with the evolution of behaviourthrough basic plans and their consequences "in psychopathologically related states", at all levels from "cellular processes to individuals in groups."

David Stevens
London, ENGLAND

DYING OF LOW MORALE

Last night Larry Hollingworth of the United Nations appeared on a UK news programme, speaking about the last airlift of goods into Sarajevo. He summed up the importance of what had been done as follows: *"We were only bringing in 10-11% (of what was really needed); but this was crucial to keeping up morale. Without it people would just have curled up and died instead of hanging on and dying of starvation".*

In the UK this will have been seen and heard by well over ten million viewers; if it was syndicated, the number could be ten times that. I doubt that any but a tiny fraction will have the slightest doubt as to the accuracy of Hollingworth's implied claim that you can die of low morale. Why then does it pose so much difficulty forsociobiology?
Mike Waller
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WHAT IS THE QUESTION AND WHAT IS THE ANSWER?

As seen by the comments of Kalman Glantz last issue and Mike

Waller's general agreement this issue, the name and mission of *ASCAP* are in serious question. The argument holds that the name should be "mental health and evolution" or something like that to have greater credibility for new subscribers. Kalman notes that there are no academic departments of sociophysiology who would be naturally attracted to the subject. The readers of *ASCAP* are often clinicians so that a natural expanded audience of such missives (if we want greater numbers and we do as we are under some financial duress, though note Michael Chance's letter this issue) are people who want more information and advice for practicing their clinical work with the reality of our evolutionary past well in mind.

I hear the advice and certainly feel the pressure. There are many *mismatchians* in the group (to echo Kent Bailey's term for comparing reactions maladaptive in our modem world to their adaptive counterparts in the era of evolutionary adaptedness). A standard statement for many clinician treaters who read *ASCAP* holds that the patient can be relieved of guilt because he or she is doing what comes naturally, despite the strictures of the machine and computer ages. Carrying forth this metaphor in other ways may help with one's patients. I'm certainly not against this and value mismatchians members (see Kent Bailey's landmark essay this issue).

But my view has always been a broader one and has guided my interest in the novel nomenclature. Current names don't accurately describe it. For instance, mental health is bad from two perspectives: mental involves the mind-body split which should be diffused not highlighted and health is a euphemism concealing the fact that most of us work with those who are ill, not healthy or well. That doesn't mean that the healthy sociophysiologically well-functioning person isn't interesting; indeed, he and she are especially, so that we can compare the ill with the normal to elaborate genetic, brain and behavioral mechanisms.

I thought that I'd provide this issue some writings bearing on these issues that I am doing for other purposes. The first is an excerpt from Chapter 4 of the book I am writing entitled *Biology of Leadership.* If sociophysiology is the answer, one could ask what is the question. The excerpt, entitled *"A Psychiatric Educator Felt Competitive,"* provides what I have considered the question.

Now to the answer. Kalman mentions that there are currently no departments of sociophysiology. He is right but some years from now, I would like to see such develop. This is a lofty aim, but a modest grandiosity may be in order. If it isnt sociophysiology, something of that nature will have be installed because the present system is so deficient.

In any event, I was pleased to be invited recently by the editor of the journal, *Biological Psychiatry,* to write an editorial for that journal. I have drafted one and put its outline in this issue. I named the proposed editorial: *"Psychiatry Needs a Basic Science Titled Sociophysiology."* Initially I thought that I would await your commentary, but then considered that to the extent that it advertises *The ASCAP Newsletter,* I should probably get it off immediately. Please think about it, however, and debate it in the best spirit of mutual cooperation and ally-ship that *ASCAP* represents.

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ANNUAL MEETING ISSUES

The annual meeting will be Sunday, May 5,1996, in New York City. Our president, Leon Sloman, made initial arrangements. The timing is just prior to the huge American Psychiatric Association meeting. The APA's opening ceremonies commence that evening. He has contacted APA personnel and they will help us define a room for our meeting, to be announced later.

I plan to work with the CME office of UTMB for Category 1 AMA credits for the meeting. For this to happen we need to define speakers and topics. This is an interesting issue as the small group format of our previous meetings has been so successful. There is quality in small numbers and we certainly contrast with the highly structured mega-meeting of the APA. But generally we have had some informally defined speakers anyway with easy discussion of the topic as the talk goes on as our main format. So we are defining that

except for the primary speakers, each person will have about 5 minutes to sketch in his or her area and then the round-table discussion will take place. If we have many people attend, the format may have to be modified, but here is some of the preliminary program for your planning. Let us know your name and title if you intend coming. First to notify will be first brought forth. Please let us know by March 15,1996 so that we can do the proper paperwork with our CME office.

45 minute presentations:
Presidential address:

- Leon Sloman - Mutual compat ibility of attachment and agonistic models of depression
- Winner of the Aaron T. Beck ASCAP Award

15 minute presentations (or more if we have limited registrants):

- John Price - Resident-intruder animal model of depression
- Dan Wilson - Entrapment and shame processes in depression and mania
- Kent Bailey - Four factor model: Depression and other inhibition states
- Russell Gardner - Sociophysiology as the basic science of sociophysiological medicine
- Aaron T. Beck - Depression, anger, hostility and evolution

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ANNOUNCEMENTS:

Thirteenth Biennial Conference of the International Society for Human Ethology
The International Society for Human Ethology (ISHE) is planning its biennial meeting. It will be held between the 5th and 10th of August, 1996, in Vienna, Austria, the general topic being *Cognition, Communication andEvolu-tion.*

If you are interested, please contact Karl Grammer, LBI for Urban Ethology, c/o Institute for Human Biology, University of Vienna, Althanstrasse 14, A-1090, Austria. Tel: (+43) 131 336-1253. Fax: (+43) 131 336-788. E-mail: kari.grammer@univie.ac.at. If you are connected to the World-Wide-Web, you may find more information on the conference and on ISHE at http://evolution.hunmb.univie.ac.at.

The Danish Society for Human Ethology has established a home page: Human Ethology, http://www.icafe.dk/sci/cirip/humanethology.html. The page announces the activities of the society and reports Danish research in the field.

Please remember to announce the **Aaron T. Beck Award Essay Competition. THE DEADLINE OF MARCH 1** FOR ENTRIES IS FAST APPROACHING!

The *ASCAP Newsletter* welcomes **contributions. Please E-mail to ascap@beach.utmb.edu, or mail hard copy and 3.5" HD diskette to Russell Gardner, Jr., c/o Linda Crouch, Dept of Psychiatry & Behavioral Sciences, University of Texas Medical Branch, Galveston TX 77555-0428, USA. WordPerfect, Microsoft Word or ASCII format preferred. Diskettes will be returned to you.**

ARTICLE:

by M Waller
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Comment on the Sloman/Miller exchange

I want in this article to take up some points raised by Tim Miller in October and others raised by Leon Sloman in November. Tim's contribution was an outstandingly robust response to comments I made in May to the effect that neuroticism has little or no adaptive value. Imparting as it does phenomena such as depression, anxiety, self-doubt, embarrassment, shame and guilt etc., it seemed to me self-evident that it was a one-way channel out of the gene-pool. As such, I saw it as a key facet to the putative self-destruct mechanism which so interests me. Tim came back all guns firing. In a very powerful piece of writing, he made clear just what neuroticism can do for you: *"avoidance of warfare; avoidance of fights; quicker submission to dominant competitors; avoidance of predators, snakes, spiders, tall trees, precipitous cliffs, dangerous waters, etc; more vigilant child-guarding; more intense demands of loyalty and sexual fidelity from sexual partners"* etc etc .....

This counterattack seems overwhelming and the best option for me is a tactical withdrawal. In Evelyn Waugh's *Scoop* whenever the meglomaniacal Lord Copper's advisors wish, delicately, to persuade him of the limits of his argument, they intone the magic formulae "Up to a point Lord Copper, up to a point". I want to say something along these lines to Tim. Yes, it is true that a limited degree of neuroticism can be both a motivator and a guardian. But to see this as the whole story is surely like treating the fact that aspirin is a valuable medicine as the whole truth. As we all know, in large quantities it most certainly isn't. And what are the implications of high levels of neuroticism? This is a quotation from William Glasser I have used before:

(The patient) could barely get along. He had no energy, no desire even to eat. He wanted to fade into oblivion. He felt that nobody could possibly respect him, that he was of no value to himself or anyone else.[1]

I don't want to labour the point, but this chap most certainly would have been avoiding high trees, precipitous cliffs, snakes etc. He hadn't the energy to go anywhere nearthem. However, his mating/child-rearing didn't work out according to plan; his wife left him. I have once before made the point that, given the horrors to which humanity is exposed and the ultimate inconsequentiality of our existence, rose-coloured spectacles have clear adaptive advantages. It may therefore be functional to accentuate neuroticism's positive side. Yet a detached view suggests something strongly reminiscent of the Yerkes-Dobson law: up to a point increases in both physiological arousal and neuroticism improve performance, but beyond that point further increases cause performance to deteriorate. This is a pattern which I think sits very comfortably with my ideas of a comparator mechanism. This requires us to form peer groups in order to evaluate our own performance. If, in our own estimation, we are performing relatively badly, we are initially spurred on to compete harder, to find a useful service role, or to go off and do something different. But if none of these strategies work out, like Glasser's patient, we start to experience the psychosomatic consequences of failure. In a very real sense, it seems to be "do or die", and it is the "die" aspect which I think continues to pose an unresolved challenge to evolutionary theory.

> ...It in our own estimation, we are performing badly, we are initially spurred on to compete harder...

It is a challenge with which Leon sought to deal in the November Newsletter. Since the happy day on which

John Price introduced me to *ASCAP,* I have recognised Leon's views as being the nearest to my own. Having some grounding in economics, I tend to talk of success and failure having "multiplier" effects on both mental and physical well-being. Leon uses the term "deviation amplification" to describe the same phenomenon. In private correspondence I have suggested to Leon just how radical the notion of a self-destructive device (the failure side of the equation) having survived the extreme rigours of natural selection, is. This may have been a contributory factor in Leon's re-think in which he now views psychopathol-ogy as arising from a want of positive mental attributes rather than being something specifically favoured by natural selection. This want arises because a healthy mental state has to be learned during a process which Leon terms the "cycle of adaption".

This seems to me to be an attractive idea. There is an obvious parallel with muscle growth. Most humans are born with the potential for full muscular development. Given adequate nourishment and exercise, that potential will be largely realised. Given a poor diet and little or no exercise, the muscles atrophy and wither, the individual is crippled. Under such circumstances it makes no sense to argue that atrophied muscles are selected for; they are simply the result of inadequate developmental opportunities. Similarly, if a healthy personality has to be built up over time, why should we look further in seeking to explain chronic depression and other psychopathologies than a failure(s) in this developmental process?

I don't underestimate the power of this analogy, but it doesn't fully satisfy me. What impresses me, and has hitherto impressed Leon, about the maladaptive cycle is its mirror-like relationship with the adaptive cycle. I repeatedly do things well, my self-esteem rises, I am suffused with a sense of well-being, my libido is stimulated, my immune system increases in effectiveness, my general health improves and I am spurred on to greater efforts and greater success. Then I start repeatedly to fail. My self-esteem falls, I start to feel overwhelmed with a sense of failure, I lose interest in sexual activity, my immune system becomes de-creasingly effective, my general health declines, I become lethargic and that which I do attempt seems bound to fail. Were humans machines, and we all Martian engineers, the function of this double-headed monster would seem obvious: the biological enshrine-ment of one of the most basic military maxims, "reward success and punish failure". There is such a transcendental harmony in this - no matter how horrible the implications - that the parallel I introduced of a fully developed muscle and one wasted from want of exercise and nutrition, now seems woefully misplaced.

There are also other reasons for rejecting the idea that we are subject to psychopathologies merely because we missed, or were denied, the positive learning opportunities essential in laying down the cycle of adaptation. I dont for a moment under-estimate the importance of such experiences and the extent to which well laid in place, they can help insulate us from the vicissitudes of life. But I also know that even the most robust can be broken. Individuals who may hitherto have displayed, strongly, Leon's cycle of adaption, hit hard enough, start to manifest maladaptive behaviour. The cause may be traumas such as divorce, the loss of a valued career, or the death of a child; but the effects seem to me to fit far more comfortably with the notion of a latent mechanism being newly activated, than with that of the sudden unlearning of a mental approach acquired over a lifetime.

The same message can be taken from Seligman's work on "learned helplessness".[2] Their hapless subjects did not have to be pre-selected on the basis of already showing maladaptive tendencies. My understanding is that any animal, subjected to treatment which convinces it that it has lost control over its own destiny, starts to behave in ways that would almost certainly be lethal in the natural world. In short, the mental states, behaviour, and physiological changes which accompany self-defined failure are unlikely to be a random precipitate left as success evaporates. They are much more likely to be a ruthlessly selected composite which, once activated, does exactly what natural selection has strongly favoured it fordoing.

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ARTICLE:

by K Bailey

Mismatch theory 1: Basic principles

In Santa Barbara this past June, I had the opportunity to discuss mismatch theory on a panel assembled by Charles Crawford of Simon Fraser University in Bumaby, British Columbia. Along with Professor Crawford and myself, S. Boyd Eaton and Randy Nesse presented papers. Several *ASCAP* members asked for copies of my paper following the program, and I told them to look for something in the *Newsletter.* My plan is to publish a series of brief essays on the topic, starting with this one.

Mismatch theory is based on five fundamental assumptions:

1. Human morphology and behavior originally evolved in zones of time called EEAs (environments of evolu tionary adaptation).
2. The human species ceased to evolve, to any great degree, beyond late *Homo sapiens* 40,000 years ago.
3. Massive cultural and environmental change has occurred in the past 40,000 years.
4. Current human beings often find their naturally evolved selves mismatched or at odds with current physical, social, and cultural environments.
5. The frequency and magnitude of mismatch for a given individual is positively correlated with levels of both physical and psychological pathology.

Following this logic, modem human beings may occasionally find themselves in circumstances that are similar to the EEAs of human phylogeny, but, more often we are likely to experience situations highly dissimilar to ancestral ones. When our circumstances closely match ancestral ones, then it is probable that the perceptual/motivational/behavioral intercoordinations will be much like ancestral ones, and, moreover, "adaptive" outcomes are likely. Thus, when in environments that resemble ancestral environments, and when we allow our human nature to express itself without significant interference by way of will power, moral prohibition, or some other cognitive constraint, then adaptable proximal processes will naturally lead to ultimately adaptive consequences. Said yet another way, when we either seek out or accidently encounter EEA-like situations, and when our evolved hardware (structural underpinnings of our adaptations, mechanisms, design characteristics, etc.) and software (analogous functional underpinnings) are within normal limits, and when our learned dispositions and conscious choices do not significantly interfere with the "natural" process, then evolutionarily adaptive outcomes are likely.

But even when our current environmental circumstances are highly similar to ancestral EEAs, behavioral outputs will not necessarily be "matched" with ancestral ones, nor will the outcomes be necessarily adaptive. But we probably will choose to behave naturally much of the time when in EEA-like situations, and adaptive outcomes will be more likely than would be the case in circumstances highly dissimilar to original ones. The approach taken here is highly cognitive, and rests on the assumption that human beings are wired to behave naturally in natural circumstances, but that wiring can be cognitively overridden on occasion. We humans are designed to easily resort to evolutionary default values, but one of the truly distinctive traits of *Homo sapiens* is the potential to "transcend" natural prerogatives.

...one of the truly distinctive traits of *Homo sapiens* is the potential to "transcend" natural prerogatives...

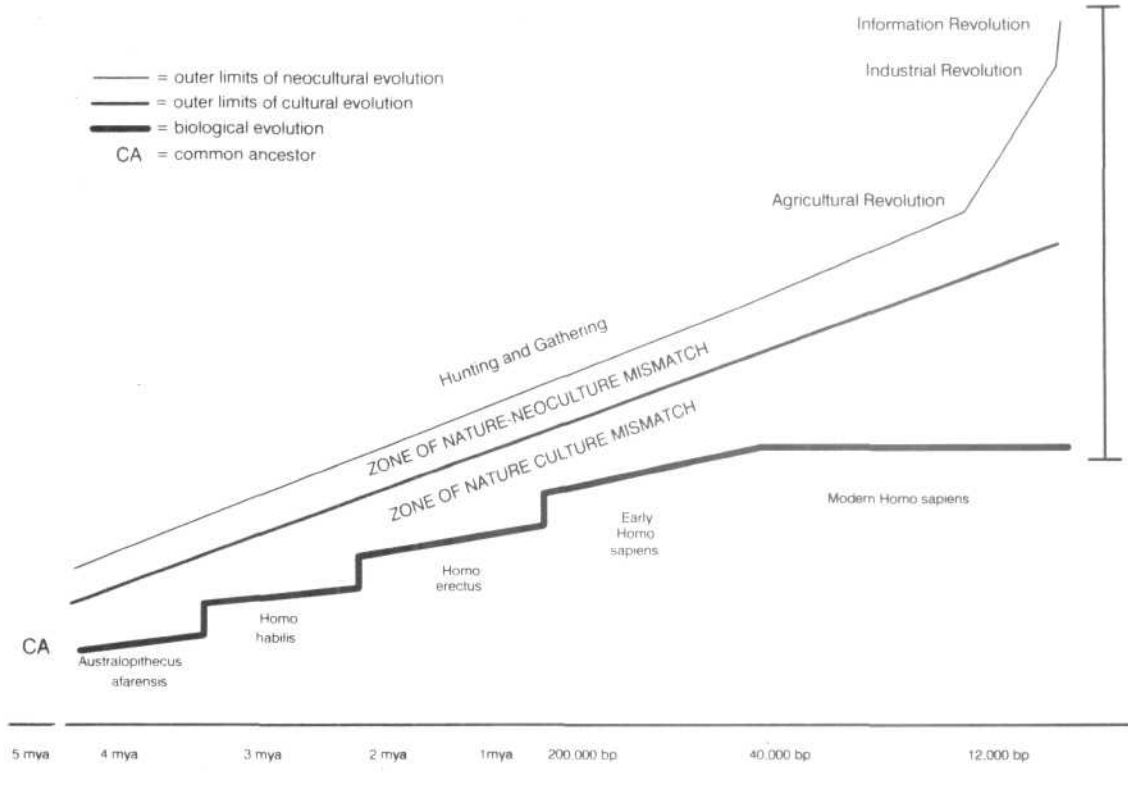
We see that a full "match" between EEA-like circumstances is not inevitable even when the current environment:ancestral environmental match is nigh-perfect, for there is still the problem as to whether the individual's internal environment (i.e., human nature) is allowed to "match" the hypothetical

modal behavior of our ancestors *during* evolution. All of this implies that a full match is somewhat rare even in the most favorable external environments. Thus, I argue that human nature rarely expresses itself as it did in the EEA, at least at the level of complex social behavior. Of course, our coronary, hepatic, pulmonary, metabolic, and many other vital functions of the body must effect a constant flow of body-environment "matches" and failure to do so will quickly lead to a shut down of body processes and a quick death. At the vital level, there is little freedom or optionality, but there is considerable "freedom" at the social and psychological levels.

Given this freedom, and given that modern humans live in environments drastically different from ancestral EEAs, we see that human nature-environment matches are quite unlikely at the social and psychological levels - we humans are simply highly mismatched creatures most of the time. Try monitoring your behavior for a single day, and then try to estimate how many of your social and psychological outputs were "adaptive" - that is, reasonably well matched both environmentally and behaviorally. It will be quickly evident that the modem human being is anything but a robot running off evolved programs irrespective of current context or current frame of mind. I suggest that much of human behavior is non-adapted, contra-adapted, or maladapted to most of the situations encountered in a given day; it is not a question of whether the modern human is mismatched or not, but a question of whether or not a sufficient number of *matches* are achieved and pathological mismatches are avoided to be psychologically healthy and happy. It's all relative, and I suspect that a person who is highly mismatched statistically (e.g., an overweight, type-A smoker who works 15 hours a day in a loud, contentious newsroom) might be quite healthy and happy due to a relatively few, high quality "matches" (has a loving and supportive mate, goes fishing every weekend, and sleeps a good eight hours every night). Indeed, one of the great challenges of

Figure 1

ZONES OF MISMATCH BETWEEN BIOLOGICAL AND CULTURAL EVOLUTION



mismatch theory is to specify the quality and quantity of "matches" that are necessary for the good life.

The widening nature-culture mismatch

Human beings have become more and more mismatched over the past 40,000 years, but the rate of mismatch as grown at a geometric pace in recent times. Persons living in modern technological cultures experience the greatest degree of nature-culture mismatch in the history of the human race, and future generations may expect progressively greater degrees of mismatch. Figure 1 depicts the expected zones of potential nature-culture and nature-neoculture mismatch, proceeding from the earliest known hominids, prehumans, early humans, and on to the age of modern *Homo sapiens.* In Figure 1, *culture* refers to the shared beliefs, customs, values, and symbols of a particular people. Human nature feeds into culture and vice versa. Culture is based on a willingness to conform to group demands and requirements. Virtually everyone in a cultural group conforms, in some degree, to group prerogatives.

Neoculture is erected upon relatively recent technological advances in human history. It is associated with the brightest nonconformists and often transcends traditional culture. Neoculture is global and offers benefits to particular cultures (scientific knowledge, medical advances, air travel, etc.), ambiguous "advances" such as automobiles, TV, and the microwave oven, and liabilities in the form of environmental pollution and degradation. Also, neoculture tends to be exclusionary and the province of the very bright few. Futurists tell us that the information age is here, and the world of the next millenium will be ruled by the neoculturalists. And the implicit goal of the neoculturalists is to distance us more and more-through technology- from our own human natures.

Throughout 99% of human evolution, our human ancestors were hunter-gatherers, and during that time biological and cultural evolution were fairly closely matched. Culture was presumably little more than the natural extension of social and tribal functions, with minimal emphasis on transgeneration storage, formal-ization, and symbolization of rituals, concepts, and ideologies for their own sake. In early human phytogeny, "neoculture" was based on technological innovation in natural matters of hunting, gathering, food processing and storage, shelter construction, and perhaps weapons development and refinement. Such innovations were probably instituted by a small minority of the brightest, most curious, and luckiest members of the band, but a substantial segment of those in the regular cultural mainstream could learn to master the new technology.

Throughout the 3 to 4 million years of hunting and gathering, our biological natures, cultures, and mini-neocultures probably evolved along together in mutual sympathy and balance, but with the apparent leveling off of biological evolution 40,000 thousand or so years ago the processes of *nature-culture separation* were set into motion. Culture and neoculture began to take on lives of their own apart from their originators, and the vast accumulation of knowledge and technological know-how began to feed on itself rather than the infrequent and lucky inventions of the very few.

As a more natural emanation of biological evolution, culture was characterized by a fairly modest plane of ascent over the course of modem *Homo sapiens,* whereas neoculture tended to ascend very sharply following the agricultural, industrial, and information revolutions (Figure 1). Rapid technological advance is the defining characteristic of our age, and it is probable that more neocultural growth has occurred in the past 50 years than in all prior human history. And it is probable that the next 50 years of technological progress will vastly overshadow anything we have seen so far.

Conclusion

When viewed in some depth, the concepts of "matching" and "mismatching" become surprisingly complex. At first blush, mismatch theory seems to be one of those simple and elegant formulations that accords with common sense and is exactly what it appears to be. In the next installment, I will argue two basic points: (a) first, that the mismatch idea is a fairly complex concept, and (b) mismatch theory, in and of itself, is not sufficiently comprehensive to serve as a major model of either psychopathology or psychotherapy. G3

ARTICLE:

by R Gardner
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A psychiatric educator felt competitive

The idea of a basic science

Two decades ago the development and implementation of a pre-clinical behavioral science series of course offerings became my responsibility as the psychiatrist responsible for instruction in the two years of a "basic science" component of a medical school educational program. This small medical school was in the throes of expansion and change. I was pleased to have the charge. I had high interest in brain and behavior and I was a physician trained in a kind of practical clinical science that seemed relevant. That is, a psychiatrist educated in the evaluation and management of troubled people hopefully becomes more knowledgable about interactions of people more generally.

But the offering that I and fellow faculty provided in the following years seemed a scattered poor excuse for a basic science of psychiatry though I hasten to add that this was not due to sloth: it was much in line with U.S. national norms, and our students increased their scores dramatically on national examinations. But I was troubled by those overall norms. Of course I necessarily implemented them and for that matter participated on national committees in writing and selecting items for tests.

Neuroscience, sociology, and psychology all got taught; but at least with respect to psychiatry, the information was fragmented and only peripherally useful for later instruction in the specialty, except perhaps for medical interviewing, a formal case of human relating. With that there was practical benefit: the students felt more self-assured and competent when seeing patients. I think it eventually made them better doctors regardless of which specialty they chose.

Overall, however, the offerings provided no good sense of the normal from which psychiatric illness deviated. This implicit criterion seemed to have been implanted in my mind from somewhere and it caused me, as said already, a vague discomfort. Certainly psychiatry is a medical specialty and its practitioners use powerful medications in its practice, with near miraculous effects at times, as when the miserable self-regard of a person suicidally depressed dramatically resolves and optimism and capability return. Or delusions vanish - enemies disappear, dissolve away in the woods - after a patient so afflicted takes a medication for weeks or even days.

The most interesting specialty in a mess

Psychiatry for me was the most exciting and interesting specialty in medicine; but there was this issue of its basic science. I realized later that the something-that-didn't-compute, the something that to me was missing, came from an excellent pathology course in my medical school education where the excitement of how scientific medicine works came fully alive.[2] One could understand pathology in the vascular, gastrointestinal, urinary and neural systems because consequences of ill health happened when tubes were blocked or broken, or circuits were interrupted. Like a detective, one could figure out what was happening and there was a logic in providing a remedy. Physiology, anatomy and biochemistry were straightforward affairs that explained disease conditions. Matters are not fully worked out and some diseases resist the investigative effort, but the framework of understanding was there and one knew the domain of study. Pulmonary medicine had its physiology of the lungs and biochemistry of breathing. Gastrointestinal medicine had a base of information about the mouth, salivary glands, intestines, rectum, liver.

Put slightly differently, when something goes wrong in the body, pathophysiological explanations instruct on how a something that now malfunctions had usually worked right. If there was stomach pain because a hole was eaten by stomach acid in the lining of the duodenum, one could understand that. How interesting that there is acid there at all and that a usually protective coating is diminished for some reason in the face of illness. There is always more to learn of

course, such as why did this person become a patient at this time? The last question of course may involve a psychiatrist kind of inquiry and in fact I had spent some time on the wards of general, not officially psychiatric, medicine. How people got along with other people makes a difference for all illness and patienthood as does other stress, depression and inability to think and remember when toxic from disease or drugs.

So the educator's question persisted. When medications work in psychiatry, or other interventions make differences in how people behave and feel, what normal functions are brought back into line, comparable to reduced acid in the stomach for the former sufferer of peptic ulcer? If cardiovascular physiology is the normal counterpart version of cardiovascular disease, what word should precede physiology for psychiatry? And I was not unmindful of the following comment made not by a physician, but a paleoanthropologist, the person who found the 3 million year old Lucy in Ethiopia and confirmed that our prehuman ancestors walked upon two legs long before we had expanded brain capacity. Donald Johanson said, *"The time to get involved in a science is when it is in a mess.... That is when young people, coming in, have the best chance of doing something interesting-of helping to unscramble the mess.* "[3]

Problems with the psyche

Psychiatry and psychology have the same prefix, and their suffixes define healing (medical help) in the one (-iatr), and knowledge of the psyche/mind in the other (-ology). Psychology was therefore a natural candidate. But this didn't work, although talented psychologists were among the best of the co-faculty members who worked with me in the courses we did provide. Psychology is a wide field and one that works at its scientific approaches with system and data gathering, but the contents of most of it weren't very helpful for the student on the clinical clerkships.[4]

Most of psychology didn't have its central focus on the brain. True, neuropsychology had been a part of the scene, but this discipline related less to psychiatry than to neurology and neurosurgery. Practitioners of neuropsychology localize brain deficits from various standardized or clinical tests. But neuropsychology did not explore the problems of psychiatric patients without obvious deficits. People disturbed by dementia have deficits, but most nondemented patients do *not* exhibit big or any brain damage; sometimes they do, but most not. This may be a function of technology. As imaging research proceeds and technology improves, more may become apparent, but problems of method dilute the excitement. For example, in early studies at least, small but seemingly significant differences between patients and controls disappeared when social class and education were kept the same in the two groups compared, or when methodological issues are clarified.[5]

Not that the problems weren't *somehow* rooted in the brain - even though unclearly the result of deficits. For anyone, patient or normal, what we do, say, think, feel is rooted in the brain. This must be true for people unduly depressed, anxious and delusional as well, lesions or not. But the prefix neuro- refers generally to results from defineable lesions such as brain tumors, strokes and the sequelae of head injury. These may have significant effects that are psychiatric in nature, but neurologists are often not interested in the more complex functions. Some, calling themselves behavioral neurologists, are highly similar to neuro-psychia-trists, and this is good as they are interested in less definable - or not quite definable yet - conditions that preoccupy us on the psychiatry wards and out-patient clinics.

Top-down and bottom-up

Patricia Churchland has advocated that we need top-down and bottom-up approaches when investigating behavior and brain, conceptually as well as practically. She states: *"[T]op-down strategies (as characteristic of philosophy, cognitive psychology, and artificial intelligence research) and bottom-up strategies (as characteristic of the neurosciences) for solving the problems of mind-brain function should not be pursued in icy isolation from one another. What is envisaged instead is a rich interanimation between the two, which can be expected to provoke a fruitful co-evolution of theories, models, and methods, where each informs, corrects, and inspires the other* "

A patient is diabetic. We think top-down when we realize that hunger without weight gain, incessant thirst and sugar in the urine is caused by too much glucose constantly in the blood. Behavior on the top is illuminated by the molecules on the bottom. On the other hand, measuring sugar in the urine on incidental urine screening (bottom) shows us that perhaps there is something to worry about on top (covert diabetes); this is bottom-up thinking.

A woman lawyer gradually became notorious in her family because she was no longer orderly. Her apartment was a mess (think of messiness as a top phenomenon). Later she was found to have a grapefruit sized tumor in her brain located in the right frontal cortex, that part of her brain above and behind her right eye. Her skull there had become paper-thin. The tumor was the down-explanation of the messiness as a person's executive planning and attentional processes diminish with damage to that area of brain. Or if the view had been bottom-up, such as an incidently discovered change in her skull, a doctor might have determined that something was wrong and made consequent inquiry about behavioral changes. Professor Churchland avoided the prefix psych-. Better perhaps, she probably simply ignored it. What with the welter of things she had to do, she like the neuropychologists went directly to neuroscience and cognitive issues. But her thoughts are applicable to our concerns: a true basic science of psychiatry should also have a free flow between a top realm of behavior, thoughts, preoccupations, feelings and communications and the bottom workings of the brain and body down to cells and molecules.

A more adequate basic science would have knowledge about normal body functions interwoven with information about the structures that mediate the functions. So far, the analysis for disciplines with psyche in the prefix has been largely top-up, subject to secondary conceptual problems: abstract concepts are thought of as real, organs of behavior are assumed to exist without neuronal verification.[7] Ameliorative medications are potential top-down and bottom-up linkages of course, as are analysis of definable lesions causing difficulties, as with the woman lawyer. But the problems inherent in these issues echo the twentieth century history of psychiatry.

Top-up: the analyst leader

The most charismatic psychiatry professor teaching during my specialty training asserted that the psychoanalytic theories of Freud were psychiatry's basic science. I liked and respected this teacher, but this statement hadn't seemed correct because even then I was steeped in brain issues and the theories didn't come from there although Freud, a neurologist in fact (not a psychiatrist), had written a not-to-be-published-in-his-lifetime *Project for a Scientific Psychology* in 1895.[8]

Frank Sulloway has emphasized Freud's background in biology by his biography's subtitle: *Freud: Biologist of the Mind.*[9] Sulloway is an expert on a number of scientific revolutions in the last several centuries. He considers the changes from psychoanalysis as failed science. It was never a method to collect data that would confirm ordisconfirm hypotheses; rather psychoanalysis removed itself from the rude and vigorous debates of science.

Freud's were *metaphors* from biology, not hypothetical story-lines with concurrent attempts at top-down integration. Freud gave up on top-down/bottom-up integration because he felt there was too little information about how the brain functioned at that time. He was perhaps right; we don't know what would have happened had he taken another path. Present day imaging technology was not even a dream, for example. He had determined that cocaine had powerful effects and learned of addiction in an associate. In any event, Freud decided to work only in the domains in which he could make comfortable conclusions. His consulting room where he worked with his patients felt to him the place where he had data with the certainty he needed. Descartes had operated similarly when he distinguished between mind and body. He felt certain of "I think, therefore I am," and could not be confident of anything else. Curiously and paradoxically, the illusory facets of Descartes' sense of mind were revealed for all to see with the enormous twentieth century popularity of Freudian psychoanalysis with the fact of many unconscious determinants of behavior. But Freud with his great self-confidence

communicated his own sense of personal knowing as a dominant source of knowledge more adequate than the more modest and slowly moving scientific method.

But whether or not he was a scientist in his full blown career, Freud was, however, very current on neuro-science developments in the *Project* and used the then new neuron theory of Cajal and Sherrington as a fundamental premise in this last effort to involve the brain in his thinking. He used concepts from the English neurologist J. Hughlings Jackson, who had emphasized system dissolution in various disorders and suggested that dreams were the key to insanity.[10] Freud had earlier written on childhood paralyses and aphasia.

But with *Interpretations of Dreams* in 1900 - psychoanalysis was a twentieth century development -Freud went the top-up route. He concentrated on making sense of his patients without the benefit of neuronal information. Stephen Jay Gould as a paleontologist speaks of the homage he must pay, at times resentfully, to Charles Lyell: *"he doth bestride my world of work like a colossus.* "[11] A similar statement is probably true of Freud for the psychotherapists of the twentieth century; like Gould for Lyell, there may be the wish to repudiate him and his reasoning retrospectively may be seen as corrected by new evidence, as in sleep-dream physiology, where we now know that dreams do not occur just before awakening but in rapid eye movement sleep that takes place overtime. But with his having been there and his having written those many still well read volumes, nothing could develop in the same way again.[12]

The famous Russian neuropsychologist, Alexander Romanovich Luria, confided about his own development, "/ *finally concluded [about psychoanalysis] that it was an error to assume that one can deduce human behavior from the biological "depths" of mind, excluding its social "heights.* "[13] Group, family and marital therapists have considered social and communica-tional factors at great length and know their power, but in contrast to Luria may or may not have affiliations with medicine or biology. Some may have been medically trained at some juncture, but their observations and clinical interventions go well beyond the single body, but not usually inside it. Often aimed at family dysfunction, theirthinking stays at a supra-top level. The stay focused on the social determinants of a person's communications. Investigators of crowd behavior work at similar level.

..*A finally concluded that it was an error to assume that one can deduce human behavior from the biological "depths" of mind, excluding its social heights...*

For these workers, the attention focuses not on the individual body but on groupings of people, and the writings of these practitioners generally take the physiological apparatus for granted, as outside their domain of interest. Family therapists may be so impressed by the power of interventions that medications seem pale in comparison. Those clinicians of this kind that I know, however, feel that drugs are the appropriate treatment if the psychiatric disorder of the individual patient in a family warrants them. But as any of us knows from personal experience, family units featuring long standing relationships have people relating intensely. People are tremendously influenced by their families. I have a book on my office shelf entitled, *Families are Good for You.* Close relationships have the capacity to make people well or ill. We are a gregarious species.

Psychoanalytic and other psychotherapeutic conceptions do facilitate therapies. But as another of my psychoanalyst teachers pointed out, this really happens only after one knows the theory already.[14] Novices don! benefit much early on; difficulties in learning psychoanalytic theory, for example, stems partly from its being based on energy metaphors of last century.[15] Moreover, particular theories of psycho-

therapy seem less important than in what actually happens between the people involved in the psychotherapy. Theory is outweighed by what is done, how the two people relate.

Take the two-person situation: does the therapist have a definite path to follow for the patient? The therapist as a result of the ideas from his or her education will hold basically that there must be some error in the patient's thought (cognitive and rational-emotive therapies), or that there must be some unconscious features to the problem (psychodynamic therapies). Philadelphian Lester Luborsky has published a manual for supportive-expressive therapy putting all this into reasonably explicit terms.[16] Manuals for other therapies are similar. Psychiatrist Gerald Klerman and psychologist Myrna Weissman have authored a manualized, short term therapy called "interpersonal therapy" that echoes in a practical fashion some of the sociophysiological issues of this book.[17]

Whateverthe schema learned, the therapist uses it to help clarify the problem in terms acceptable to the patient and the patient's cultural group. Jerome Frank likens the role of psychotherapist to that evident in many other cultures using different names, such as medicine man or shaman.[18] In this the therapist needs to be a sympathetic leader to the patient, with an ability to tune into the patient's concerns and problems and to then provide an answer congruent with the myths and belief systems of the culture. Significantly, the title of Frank's book includes the word "persuasion." Indeed for persuasion, an influence of one person on another, to happen most effectively, the therapist must be a follower too, an empathic receiver of information the patient has to provide. The clinician must be attuned to the nuance of posture and wavering, so that topics only hesitantly brought into the open are done so safely, without harm to the vulnerable person. Leadership/followership issues are much involved in complicated ways with psychotherapy.

Bottom-down

There is nothing unphysiological about psychotherapy, a theme of neuroscientist Eric Kandel. In the future, he suggests, we may look for changes in the brain as a result of the special relationship that psychotherapy is. Indeed, a study revealing such effects was published in the *Archives of General Psychiatry.*[19] The special form of relating that psychotherapy represents can cause brain alterations. Dramatic discoveries with the various kinds of brain imaging now available make this reality more powerful to any of us.

Kandel is a psychiatrist who went an opposite route to that of Freud. He gave up seeing patients; instead he learned neurobiology, becoming one of the premier neurobiologists of the world, ascending to lead editor and author of the most comprehensive textbook on the subject.[20] His direct research activities, therefore, are mostly bottom-down. Of course, with respect to practitioner issues, he is no longer relevant to most psychiatrists.

Except that he is a charming respectful speaker who hasn't forgotten his origins. He wonderfully keeps a psychiatric audience alert and alive to neuroscience developments and leads it to new visions of the field. Kandel remains aware of his professional origins and the troubled people he dealt with as a resident in psychiatry and does some bottom-up thinking. His model for behavior is that of a "fear-response" of the California sea-slug: it pulls back its foot when electrically shocked, and can learn when the shock impends. Kandel likens this response to human anxiety. He is very aware of the fossils within: of the fact that some of our body features have been unchanging from the early days of biological life.

Rather than the route taken by Freud and othertop-up followers including family therapists or by Kandel of mostly bottom-down work, shuttles of top-down and bottom-up approaches seem needed. These would interweave behavior and body and in so doing juxtapose functions and the structures carrying out the functions. Perhaps this had been implied by those pathology professors from whom I had learned early and then carried in my own 'Freudian preconscious' to this other specialty. Challenges are greater for the basic science of psychiatry; blocked or broken tubes are less simply the cause of problems.

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ARTICLE:

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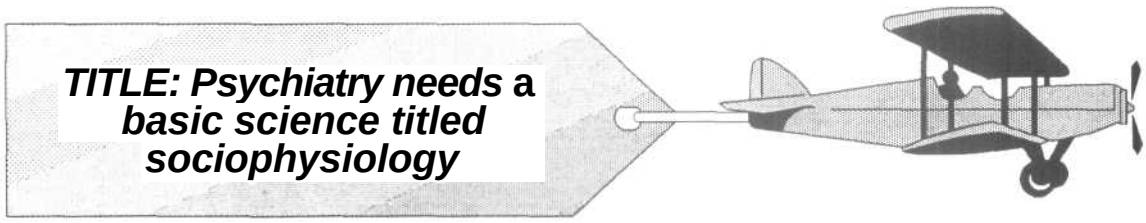
Outline for submitted invited editorial for the Journal Biological Psychiatry



1. Basic sciences for medical specialties have been modeled for nearly four centuries by Harvey's formula tion of a normal circulation of blood.

2. Congestive heart failure, for instance, had no meaning in the pre-Harvey formulation of Galen which held for 14 centuries.
a. Galen thought blood formed in the liver and was distributed to the body via the vessels; he made no distinction between veins and arteries and paid little heed to the heart except that he thought holes must exist in its septum to allow the blood to pass through.
b. Despite lack of verification, these holes were presumed to be somehow present for well over a millenium because the theory held it to be so.[1]

3. "Iatrophysicists'who insisted on measurement educated Harvey in Padua at the end of the 16th century.
a. One of his teachers formally described venous valves but had no idea about their function.
b. Harvey recalled how water buckets on windmills worked in the east England where he grew up and formulated his circulation theory, buttressing it by dissecting 80 species of animals.[2]
c. From experiment, he postulated capillaries before the microscope was invented.

4. After 25 years he finally published his metaphorical circle theory which then stimulated spirited rebuttals and damaged his practice even as it eventually laid the foundation for understanding pathophysiology as deviation from normal physiological and biochemical function.

5. In psychiatry we have had two powerful paradigms of investigation during the twentieth century.

6. Freud in the first half focused on elaborate formula tions of symptom generation and highlighted pathology as variance from normal function.
a. But though he was a neurologist, he felt unable to connect behavioral observations with then known neural function and he delinked his formulations from the brain.
b. Sulloway has pointed out that Freud also didn't found a scientific system for making observations that could be replicated.[3]
c. Dogma and authority therefore disproportionately held sway in the psychoanalytic movement.

7. The second half of the twentieth century reacted to this. Recognizing the methodological problems of psychoanalysis and learning in addition that applica tion of unproven dogma to patients could be harmful, Eli Robins and his colleagues at Washington Univer sity aimed at measurement and objective description without theoretical prejudgment (like the iatrophysicists).[4]
a. Non-theory was preferrable to wrong theory that directed harmful practice.
b. Pathogenetic formulations should be eschewed unless clear data supported them.

8. New techniques of genome and brain investigation now, however, allow the possibility of conceptualizing psychiatry's basic science in a manner parallel to other medical specialities.
a. These include neuroimaging and other neuroana-

tomical research, genome decoding, and ligand-receptor analyses.
b. Across-species comparisons have more meaning as conserved molecular structures are increasingly delineated and allow new insights into human-non human contrasts and comparisons.
c. Precisely focused medications with known effects not only in psychiatric disorders but in animal behavior allow extrapolations to normal behavior.
d. For example, fluoxetine, a selective serotonin-reuptake inhibitor that treats depression, also elevates the social status of subordinate monkeys.[5]

9.1 propose that the phenomenology of psychiatric syndromes be examined with an eye to what functions are altered. I further suggest that these are social in nature.
a. The structures of the human brain that involve psychiatric illness are largely concerned with relations with other people.

(i) The schizophrenic patient hears others who aren't physically present or delusionally believes that others are out to harm him; or if negative symptoms hold sway, is unduly disconnected from other people.

(ii) A manic patient maladaptively presumes power, entitlements and responsibilites similar to high ranking people.[6]

(iii) Depression means the patient feels little worth compared to others.[7]

(iv) Phobic and panic patients are typically relieved if another person is near.

10. Indeed, ways that the brain behaves maladaptively as seen in psychiatric disorders may be pointers to normal brain and genome systems, as with social rank hierarchy or in-out group perceptions.[8]

11. Social rank hierarchical functions as these are mediated normally in the brain might be examined with respect to how they are differently activated in the manic and depressed patient.
a. In- and out-group phenomena are important for the delusional patient who fundamentally emphasizes the out-group status he possesses.
b. Alienation and bonding are powerful normal social forces that surely have brain mechanisms.

(i) For instance, marching and dancing together may be an as yet little studied bonding mechanism.[9]

12. The signal of laughter has the two-edged meaning of either alienating or bonding.[10]
a. When mocking in quality, laughter has the powerful effects on the target of condescension (status-diminution) or out-group definion.
b. Conversely, when mutual the signal bonds people as they react together to humorous stimuli, for ex ample.
13. Physiological study of this social signal may facilitated by the natural experiment of Angelman Syndrome
a. This is characterized on the one hand by profound mental retardation, lack of language, but incessant laughing,[11]
b. and on other hand by a deletion in chromosome 15q11-13.[12]
c. The genes somehow involved with releasing this powerful communication are being identified with increasing precision.[13]

(i) For instance, part of a $GABA_A$ receptor gene is lacking in the minimal deletion causative of the syndrome.

14.1 suggest that medical preclinical curricula should include what is known presently about the normal sociophysiological systems that underlie nonpathological behavior as well as pathological behavior when the systems are perturbed.
a. Structures for incorporating new data should be part of this framework. Psychiatric disorders are better explained to students (and to patients) as an unfolding science in which deviations from normal biology are measured.
b. This presents our specialty better rather than "biochemical imbalance" or "medication-deprivation syndromes" which represent our present explicit or implicit formulations.
c. *The ASCAP (Across-Species Comparisons and Psychopathology) Newsletter* is an informal, monthly, 20-page publication in its ninth volume that considers such issues in detail.[14]

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ABSTRACTS & EXTRACTS...

Creel S, Creel NM & Monfort SL: Social stress and dominance. Nature 1996;379:212.

Castellani B & Rugle L: A comparison of pathological gamblers to alcoholics and cocaine misusers on impulsivity, sensation seeking, and craving.

Hickie I & Lloyd A: Are cytokines associated with neuropsychiatric syndromes in humans?

Petty F: GABA and mood disorders: A brief review and hypothesis.

Shively CA, Fontenot MC & Kaplan JR: Social status, behavior, and central serotonergic responsivity in female cynomolgus monkeys.

Jablonka E & Szathmary E: The evolution of information storage and heredity.

Hirano H, Day J & Fibiger HC: Serotonergic regulation of acetylcholine release in rat frontal cortex,

Cloutier S, Beaugrand JP & Lague PC: The effect of prior victory or defeat in the same site as that of subsequent encounter on the determination of dyadic dominance in the domestic hen.

Russell Gardner crunched a letter to the editor of *Nature*

Creel S, Creel NM, Monfort SL: Social stress and dominance. *Nature* 1996; 379(18 Jan issue):212

The investigators investigated the social stress consequences of dominance. Do glucocorticoid hormones elevate in dominants of two carnivores that live in complex societies in wild? They studied dwarf mongooses and African wild dogs of both sexes from the Serengeti National Park in Tanzania.

Most investigations of stress in subordinates have been of captive animals. The exception has been Sapolsky's wild baboons where subordinates had chronically elevated glucocorticoid levels; other studies of animals in the wild, however, didn't confirm any subordinate-dominant difference, perhaps because "In the wild, subordinates can often avoid aggressive interactions, while dominants initiate aggression to reinforce social status."

For the male and female dominants of both of species, this was clearly true from observation. The investigators noninvasively collected urinary cortisol levels in 740 samples from 179 mongoose animals and faecal corticosterone levels from 216 samples from 56 dogs. Both males and females were studied. The animals were apparently trapped because this was considered a stressor for the animals.

Results showed that both male and female *dominants had significantly higher glucocorticoid levels* (p values ranged from <.01 (dogs) to <.001 (female mongooses)).

They conclude that "Broader data are needed to resolve the differences among species (including humans) and social contexts. Nonetheless, our

findings show that social stress can be a cost that offsets the benefits of dominance."

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idsorders. Environmental factors, including stress and excessive alcohol use, may increase GABA, causing symptoms of depression or mania. Treatment, or the passage of time, then returns GABA to its presymptomatic baseline as the symptoms remit. This hypothesis, applicable to a subset of mood disordered persons, is testable.

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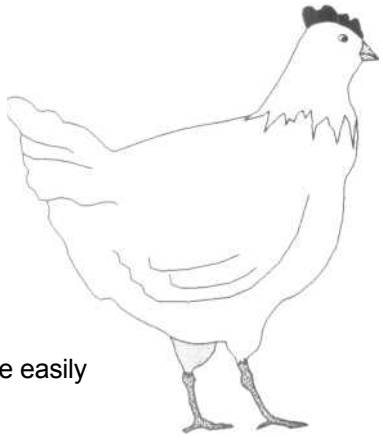

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[1] The following stems from a book manuscript in preparation entitled *Biology of Leadership: Tales of Tinkering.*
[2] The teacher's names were Seymour Glagov and Donald Rowley. The chairman of the Department of Pathology at the University of Chicago School of Medicine at that time was Robert Wissler.
[3] Johanson D, Edey M: *Lucy: The Beginnings of Humankind.* NY: Warner Books, 1981, p. 39.
[4] Some of it was of course. Indeed, I teamed with a psychologist in producing a book for ways to facilitate tasks that needed to be accomplished on medical rehabilitation: O'Niell GW, Gardner R Jr: *Behavioral Principles in Medical Rehabilitation: A Practical Guide.* Springfield IL: Charles C Thomas, 1983.
[5] Risch C: Psychiatry Grand Rounds, UTMB, 1992.
[6] Churchland PS: *NeurophHosophy: Toward a Unified Science of the Mind/Brain.* Cambridge MA: The MIT Press, 1986p. 3. [7] This is formally known as reification.
[6] Freud S (translator and general editor of 24 volumes: Strachey J): *The Standard Edition of the Complete Psychological Works of Sigmund Freud. Volume 1. (1886-1889)* (Translator and Editor: Richards A): *Pre-Psycho-Analytic Publications and Unpublished Drafts.* London: The Hogarth Press, 1966.
[9] Sulloway FJ: *Freud: Biologist of the Mind.* Cambridge, MA: Harvard U Press, 1979, 1992.
[10] Taylor J (Ed): *Selected Writings of John Hughlings Jackson. Volume 2. Evolution and dissociation of the nervous system. Speech. Various papers, addresses and lectures.* London: Staples Press, 1958.
[11] Gould SJ: *Time's Arrow Time's Cycle: Myth and Metaphor in the Discovery of Geological Time.* Cambridge, MA: Harvard U Press, 1987, p.179.
[12] Fisher S, Greenberg RP: *The Scientific Credibility of Freud's Theories and Therapy.* NY: Basic Books, 1977. These authors review scientific literature concerning tests of Freud's hypotheses. They state (p. 395-6) "When we add the totals resulting from our search, balancing the positive against the negative, we find that Freud has fared rather well. But like all theorists, he has proved in the long run to have far from a perfect score. He seems to have been right about a respectable number of issues, but he was also wrong about some important things."
[13] Luria AR (Editors Cole M, Cole S): *The Making of Mind: A Personal Account of Soviet Psychology.* Cambridge, MA: Harvard U Press, 1979, p. 24.
[14] This teacher was William Grossman, M.D.
[15] Rabinbach A: *The Human Motor: Energy, Fatique, and the Origins of Modernity.* Berkeley, CA: U Cal Press, 1990, p. 63-4. Anton Rabinbach notes that Freud was profoundly influenced in his conceptual model by a pervasive 19th century model of energy in which "The powerful and protean world of work, production, and performance is set against the decrescent order of fatigue, exhaustion, and decline.... The metapsychology of the early Freud was influenced by his teacher, the physiologist Ernst Brücke.. later... Freud introduced the idea that the human organism resists the excess expenditure of energy and strives toward the elimination of tension, not unlike the principle of inertia. In his commitment to the energy model, Freud's theory may represent the apotheosis of nineteenth-century modernity as well as the beginning of its twentieth-century abandonment and dissolution.
[16] Luborsky L: *Principles of Psychoanalytic Psychotherapy. A Manual for Supportive-Expressive Treatment.* New York, NY: BasicBooks, 1984.
[17] Klerman GL, Weissman MM, Rounsavilte BJ, Chevron ES: *Interpersonal Psychotherapy of Depression.* NY: BasicBooks, 1984. [18] Frank JD: *Persuasion and Healing: A Comparative Study of Psychotherapy.* Revised Ed. Baltimore: The Johns Hopkins Press, 1961, 1973.
[19] Baxter LR, Schwartz JM, Bergman KS, et al: Local cerebral glucose metabolic rate in obsessive-compulsive disorder: a comparison with rates in unipolar depression and in normal controls. *Archives of General Psychiatry* 1992;49:681-689.
[20] Kandel ER, Schwartz JH, Jessell TM: *Principles of Neural Science Third Edition.* NY: Elsevier, 1991.

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