For evolutionary psychiatrists, psychologists and others interested in sociophyslological integration

ASCAP

Volume 10, No. 1 (Cumulative #110) January 1997

'The DNA of organisms embodies virtually unlimited information about their evolutionary history."

Francisco J. Ayala[1]

Contents

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

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ASCAP Society Mission Statement:

The ASCAP 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.

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.

The ASCAP Newsletter is a function of the ASCAP Society.

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Previous volumes are available. For details, contact Frank Carrel, the Managing Editor of *The ASCAP Newsletter,* at the address above.

The WWW Address for the The ASCAP Home Page is:

http://psy.utmb.edu/ascap The alternate WWW address is:

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ADDRESSED TO & FROM ...

Planning for the Annual Meeting of The ASCAP Society

by Russell Gardner & Kent Bailey (Program Committee)

Date: 4 June 1997 **Time:**

8:30 am to **4:30** pm

Place: Tucson, Arizona, U.S.A. We expect that the precise place to be linked to the Human Behavior and Evolution Society Meeting which begins 6:00 p.m. on 4 June 1997, and ends 4:00 p.m. on 8 June 1997. More announcements on this later.

Theme: Evolutionary psychotherapy.

Plan: The Society President (Kent Bailey) will invite speakers for 30 minute slots, each to speak for 15 minutes so that ample discussion time can ensue. The two exceptions will include the presidential address itself which will have a 45 minute slot and the Aaron T. Beck ASCAP award winner who will have a full hour. Although we will use these formalities to provide a structure, the emphasis will be on discussion and problem-solving in the general spirit of the newsletter. To foster the discussion being as informed as possible, we will publish the presentation abstracts in the May issue of *The ASCAP Newsletter.*

DARWIN'S SANDWALK from E-Mail

In response to the question:

Is there a Darwinian explanation for the intellectual passions displayed by people like Darwin?

Mike Waller wrote:

Strictly speaking Darwin's appearance in 1809 speaks only of the adaptedness of his forebears, not his own. With regard to his immediate ancestors little seems to need explaining. Their success in medicine and/or the industrial revolution contributed handsomely both to their own perpetuation and, subsequently, that of Charles.

As both grandfathers coupled a strong propensity to philosophise (or theosophise)with more practical expressions of their high intelligence, in terms of Mendelian theory it is perhaps not surprising that Charles came out AA in the former.

Thereafter, it was surely no more than natural selection acting on random variation. As Charles seems to have been all too aware, he would not have had to have been born all that much earlier (in an historical sense) for the directions in which his mind naturally gravitated to have been very distinctly maladaptive.

Even in his own time, Darwin was unquestionably pretty cute at recognising the limits beyond which it was unwise to express radical opinions.

And who knows? Over evolutionary timescales, the viability of "radical thinking" as an evolutionary option may still prove to be distinctly ephemeral. Either one radical idea too many may take us all out; or groups of people with somewhat strongly held opinions (select your own example) may take out the radical thinkers.

Happy New Year,

Mike Waller
mwaller@comparator.win-uk.net

It'll Probably Be a Boy

Post-conference Sunday
afternoon-let down And
tired; hungry from a week
at cafeteria -I set myself at a
restaurant's
sidewalk table On a
shaded street of the
summer college town.

"What can I get for you, sir?"
"Wine", I laughed In mock
desperation,"... and
then we'll see what else."
The other outdoors diners
noisily left, And a different
girl brought out
my glass of wine.

The wine was right, the evening
balmy June-And quiet now, I
ordered a feast
(as curative To boring fare),
and it was served
by one, And then the
other girl, as
though to worthiness.

"This is pleasant! Is your
service always so good?"
"Oh no," she laughed, "but we
have no one else Right now,
and you seemed to
need attention." How my
spirits rose! How fresh
the world became!

I basked long in their gracious-
ness - a second glass -
And as I paid my check, I
handed her
An extra twenty-dollar bill:
"Please share this."
She flushed red: "We can't take
that!" Misread, I blushed too.

"No, listen. If you're as lucky as
I, one day "When
college and waiting
tables are long behind you,
"Someone young will notice that
you need refreshing, "Then
pass this thanks along,
it'll cost you a fifty then."

She laughed again at that and
took the bill. We paused a
moment, rapt, a
spark between us, And then
her nod: "It'll probably
be a boy..." "Yes," I smiled,
"...it probably
will."

Glenn Cochran
pithycus@ix.netcom.com

ANNOUNCEMENT

MEMETIC EVOLUTION

The first book-length treatment of memetic evolution theory endorsed by Richard Dawkins is now available from Basic Books. It contains numerous concrete examples from areas of family structure, mating, sexual morality, religion, health ideas, and national controversies. Its title is:

THOUGHT CONTAGION
How Belief Spreads Through Society The New Science of Memes

More information, including the opening chapter, table of contents, and a related paper, is at:
http://www.mcs.net/~aaron/thoughtcontagion.htmL

Aaron Lynch
aaron@mcs.net

From the ***Thought Contagion*** web page:

Thought Contagion examines a powerful class of beliefs, called memes, that "program" for their own re-transmission-ultimately affecting whole societies. By their strong effects on how we live, such beliefs secure self-propagation by inducing proselytism, abundant childraising, dropout prevention, and competition suppression.

Memes harnessing these human functions most effectively win out over weaker variants. Evolving like life forms, through evolution by natural selection, thought contagions vie for ever stronger influence in human lives. Especially powerful in matters of religion, sexuality, reproductive issues, family life, and health, thought contagions already reach deeply into our personal lives.

Filled with never before published science, *Thought Contagion* delivers a major expansion in realm of serious memetic applications. Specifically, it provides a large inventory of non-trivial meme analyses~the kind of insights where the theory offers far more than a re-phrasing of the established social sciences. *Thought Contagion* thus stands to become a standard reference in an exciting new field, a founding book in a new understanding of the human condition.

Written for lay readers, *Thought Contagion* nevertheless proffers no time-wasting "fluff." Even the most widely read memeticists and world-class scientists will enjoy fresh new insights from the very first paragraph, and lasting throughout the book.

Barnes and Noble, Borders, and other fine bookstores have copies on display in New Nonfiction, New Hardcover, Science, Cognitive Science, Philosophy, and possibly Psychology, Sociology, or Social Science sections. You may have to ask your bookseller where to find it in your local

store. On-line ordering at Amazon books is available at a price of $21.60.

On-line Chapter: An on-line version of Chapter 1 introduces Thought Contagion Theory and applies it to such topics as: Amish farming, masturbation taboos, arms races, apocalyptic religion, militant Islam, Mormonism, and more.

Originality: In a world where the phrase "new paradigm" has become cliche, and where "high concept" books form a crowded genre, *Thought Contagion* officially opens a new branch of knowledge in the Library of Congress catalog system. They might have called the subject "Memetics," but with the word still missing from American dictionaries, they called it "Contagion (Social Psychology)". The book now stands alone in this newly created category.

ADVANCE PRAISE

"One of the most important new ideas of our times is that of "memes, '-the vision of ideas as autonomous entities, leaping from brain to brain in much the same way that viruses leap from body to body, spreading and replicating and 'infecting'the population of 'hosts'. This catchy metaphor has become increasingly powerful and deep, and Aaron Lynch's book is in the vanguard of efforts to clarify it and make it vivid for lay audiences."

"The very meme of 'memes' is thus taking hold and spreading through the human ideosphere, and it is my hope that ***Thought Contagion*** *will be a primary vector in this global epidemic. Luckily for us potential hosts, it is both benign and fascinating."*

- Douglas R. Hofstadter

"When I get down to writing The Selfish Meme, Aaron Lynch's admirable ***Thought Contagion*** *will undoubtedly be a prime source book for intriguing examples and penetrating analyses."*

- Richard Dawkins

"Memetics is a radical science, modeled on genetics, that cuts against the grain of conventional and habitual thinking; Lynch does a fine job of covering its pros and cons, exploring its range and making it accessible to nonexpert readers."

- Publishers Weekly

BRIEF CONTENTS
Detailed Table of Contents also available.

Please E-mail any contributions to ascap@utmb.edu, or mail hard copy and 3.5" HD diskette to: Russell Gardner, Jr., c/o Frank Carrel, Department 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. Thank you.

ARTICLE:

by Russell Gardner, Jr.

Terminology for What We Do, A Case, and Reply to Annette Hollander

Let's newly focus. What should I call what I do when I work with patients? Psychotherapy if one to one? Is it family or marital or conjoint or group therapy if I see more than one person? Medical management or pharmacotherapy if I use medications? There exists an artificiality of considering differently effects upon other people depending on how many are in the consulting room or precisely what is done when we know that the effects are many and hard to delineate.

One effort at integration describes one's practice as deploying the biopsychosocial model, Engel's effort at integration by combining three views of the elephant over three decades old now. I feel, understand, and approve of the power and impact of this idea, but I also feel it unnatural and unhelpful to consider my efforts as a psychiatrist in the separated domains of biology *versus/or/and* psychology *versus/or/and* social. They are inextricably blended and the very act of labeling them as separate discriminates against a proper medical appreciation of sick people and the varied influences acting upon them.

For one example only, people exhibiting placebo effects have their condition derogated to "psychological" or "psychosomatic" with therefore reduced legitimacy. Yet, when I give a medication I am aware that about 30% of patients respond with a therapeutic response from getting the drug, quite independently from its intended pharmacologic action. This is true of any drug, not just a psychiatric one. I can make this statement because studies show a 30% placebo response rate to a non-active drug masquerading as a real one. This shouldn't be perjorative; the etymology of placebo stems from "pleasing" and apparently patients wish to please and are geared from our human biology to respond in a manner directed by an influential interested other person. So this is inextricably bio and psycho and social, not the latter two separated out, making responding patients liars.

At this essay's end, I will suggest that we call the work we do "sociophysiological therapy," preceding that suggestion with a case. I will suggest that what is called "evolutionary psychotherapy" is encompassed as well. Annette Hollander has wondered why should we leave out the psycho part. Ferdo Knobloch has written on integrated psychotherapy, for instance. I will explain the omission as well but first here is the recent (and ongoing) story of Bonnie Davis and her family (all names are pseudonyms).

Mrs. Davis's body and family. Now 50 years old, Bonnie Davis had been in my office seven years before. She had then been in an unhappy marriage because husband John Davis incessantly drank, treated her miserably and fought constantly with their young adult daughter named Rachel. Mrs. Davis worked painfully to the conclusion that since he did not seem able to change, she must divorce him. She finally did. Her pain stemmed from loving him still.

Now days before the current office visit, I had known Mrs. Davis to have been recently hospitalized for persistent vomiting. This was primary, although, very obese, she also had cardiac problems. The family doctor felt that the gastrointestinal symptoms were surely psychosomatic because they had their onset precisely four months before, when John Davis had re-entered the family by coming to the household of the daughter and her family (which included the patient; she had lost their own house from his financial shenanigans in the alcoholic years before). Recently his diabetes mellitus, chronic obstructive pulmonary disease

and hypertension caused problems. Frightened of his disease progression, he stopped drinking and smoking, but he had a slow healing decubitus ulcer on his heel that required a cleanliness unavailable were he to return to the pet-ridden, seldom-cleaned house of his brother where he had been living. By contrast, Rachel, now 30 years old, was a compulsive housekeeper where conditions were very clean despite her three small children.

But *deja vu,* Mr. Davis and Rachel fought continually again. Great tension prevailed, troubling not only the patient who met criteria for major depression, but others in the household as well. These included the grandchildren, the quiet, nurturant son-in-law who stayed out of the way, and Johnny or John Jr., son of Bonnie and John Davis, Sr., a single man in his late twenties who slept there and contributed to the household while spending most of his time away because he had two full time jobs. The family was grateful for his money. While Rachel was ever feisty, Johnny and his father had always gotten along well as the son was always quieter, more submissive. Johnny saw himself as the healer or therapist in the family but helpless to do any good. When I met him on one occasion in an early family session, he sardonically wished me luck; he saw no way out and felt the situation hopeless.

Mrs. Davis, as she told the family's story, mentioned almost casually, that she herself had a brain tumor. It was benign and the family doctor did not think it to be causing much problem though it was being worked up further. After our session, an endocrinologist saw her and disagreed, noting that she had the classical appearance of hypothyroidism. She was a textbook case; he took photographs for future teaching demonstrations. The tumor, therefore, may indeed not have been expanding rapidly but it seemed to have shut off her pituitary. Sure enough, the vomiting immediately responded to adrenal and thyroid hormone replacement. Pending appropriate cardiac status, plans for tumor removal are now in place. In addition to hormone replacement, relief from the vomiting and most of the symptoms of cardiac failure, bolstered by a plan of action, her mood also improved with antidepressant medication.

But while the above complex medical story was unfolding, we in our sessions particularly focused on considerable distress stemming from the family conflict. I asked that all come and overtime, the adults of the household did, not everyone together, but always the core dramatists: Bonnie and John Davis with daughter Rachel. They and I have met fora number of sessions at approximately monthly intervals.

The drama initially proceeded as I gathered it had many times before. Big, loud and dominating, Mr. Davis seated near me told of injustices in his life, family and illnesses. Rachel called him on differently perceived facets of the story and challenged him on his dominance which didn't seem to her warranted; shouting matches ensued with Mrs. Davis painfully cringing, frequently tearful.

Mr. Davis told how he had to work early in life as he had a stern and ungiving mother, grandmother and older sister who mercilessly lorded over him. He bitterly resented his family of origin and declaimed pride for his independence. He admitted and regretted alcohol use and its unfortunate consequences. But he asserted that unless he were loud and dominating, his needs would be unmet; also, he had been a money-earner all his life and resented being impoverished at present.

Feeling equally frustrated and additionally confused in her feelings, Rachel admitted freely she often yelled in frustrated rage at home and that for respite she frequently went for bingo in evenings. Her husband thought this was fine; he is an accommodating person who dearly loves his children and did not in the least feel her Bingo respite to be neglectful of them.

But Bonnie Davis found herself taking sides with her former husband (home together neither able to work, they talked and talked). In defense of the grandchildren, both perceived their daughter as an overly harsh mother. This never amounted to abuse

nor neglect, but John Davis attentively watched for when Rachel might step over the line enough so that he could have reason to call children's protective services.

Deploying allies, thought and planning (ATP). I intervened actively, sometimes writing on the white board prominent in my office. I did my best to give everyone equal respect and tried to feel each person's pain. I admired how each person in the family loved the kids. I endeavored to be an Ally but this included taking charge. I stood up and waved my arms in helping them Think through the problems which I suggested were partly from misplaced assumption of authority. John Davis was not the leader in charge though he acted as though he was. I helped them Plan for the future by suggesting ways to focus less on personal blame and more on issues. I guided an exercise in which we worked out what the real social rank hierarchy was according to resources and territory: who owed whom for what?

This was a cost-benefit analysis of Mr. Davis's staying at the house. We talked of actual dollars and cents, trying to assign benefit to any babysitting efforts and cost to his disruptions. Though seldom there, Johnny of course ranked highly given his hard work and financial contributions. Impoverished, ill and without public assistance, Mr. Davis didn't do so well so I sat very close to him as though, it seemed to me, we were on adjacent barstools talking about the unjust world, even as his wife and daughter listened in. He asserted his preference she be nice to her second son (feeling the child to be unfairly picked on). Additionally, both Rachel and her father met criteria for major depression so I wrote antidepressant prescriptions for both of them too, though not the same drug. In a later session we worked out a contract from templates on my computer put there for such reasons. We made multiple copies each of which was signed and carried away by everyone.

As the sessions went on, the tone reduced, times at home took generally quieter turn. Then a blowout! More than usually frustrated one day, John Davis got drunk and stayed out fortwo days. Upon return, re-entry was barred. Mrs. Davis explained to understanding police that they were no longer married and that drunkenness was not tolerated. In his motel room, he developed respiratory problems which in turn caused another brief hospitalization. Reconciliation ensued, but then taking everyone off guard, Johnny roared in major disapproval, saying that should that happen again, he was immediately moving from the house along with his contribution to expenses. This unexpected aggression from the lion's cub with high relative resources (R) took everyone aback and everyone behaved.

To the amazement of all, Mr. Davis asked Rachel one evening to take him with herto the much criticized Bingo. He had a great time. His daughter dreaded the scene she expected him to make, but he was a model citizen and she had a great time too. Since then I've learned that Rachel had been second baseman on a championship softball team that, with other longshoremen, Mr. Davis had formed 15 years before and led for the four years of her eligibility. The men had chosen their girl athletes carefully and they won everything in sight.

He said, "I have nothing now because I gave to everyone too generously." To my surprise, his daughter said, "That's true," then telling how generous he was back then to her impoverished teammates, even as their father-daughter dissension began then because he leaned over backwards to *not* show his daughter favoritism, offending her repeatedly. I noted to myself that though they may be somewhat friendlier now, but very wary still.

APT in action. From the beginning I defined and explicitly used the sociophysiological shiver-ATP metaphors. I used the white board to diagram that John Price's idea that shivering in response to cold is a lower brain-body response that we share with many other animals and that shivering is parallel to many other automatic responses, such as the quick and primitive anger and defeat responses demonstrated in the family members. I discuss then what contributions stem from the bigger brain of the human being (three times bigger than those

of chimpanzees, gorillas and prehuman ancestors of 2 million years ago). I summarize that added brain weight allows us to work well with Allies: friendly other people with whom one can talk; when this happens, one Thinks better and once automatic angry episodes on anyone's part (shiver) are analyzed, one can Plan better to avoid the precipitants in the future.

Part of such planning often involves medications. Antidepressants undoubtedly helped Mr. and Mrs. Davis overcome their sense of defeat and hopelessness. Interestingly, they weren't a factor with Rachel because she hates medications and didn't in fact consume those prescribed. She felt less depressed anyhow in a way that we would have attributed to the medication if she had taken it. Johnny declared he would in any event leave the house in several months which now everyone thought appropriate enough. Money had faded as an issue as Rachel returned to work. She felt gratified that people at a job from which she had left in a rage some years before were in fact eager to have her back and sought her return. Both Mr. and Mrs. Davis were glad to help with childcare.

I believe that gentle dominance on my part behaving as a professional ally helped sort things out: the senior John, ill and rejected, had behaved inappropriately as a dominant to achieve nurturant ends: "Take care of me, damn it!" I had been nurturant even as I pointed out the hard reality that he no longer alpha lion at least in that house. But his wife and even Rachel cared for him more as he became quieter. Moreover, the new alpha lion, Johnny, made it clear that he wanted no nonsense, even as he appropriately enough declared his independence from family of origin and made plans to branch out on his own. Relinquishing responsibility, John Davis, Sr. appropriately let me be the family therapist. Medications helped. I assumed this related to the extent that they elevated the personal synaptic serotonins of the parent pair in contrast to the depleted state of people who have experienced frustration with consequent aggression. Of course, Bonnie Davis's story also testifies to the importance of one's master endocrine gland for her sociophysiological well-being. The pituitary serves enormous health related purpose as through the thyroid and adrenal glands that it stimulates downstream. Too much or too little of either secretion are implicated in the symptoms psychiatrists treat.

Recently in the main hospital, I saw Rachel. She told me that her mother was there, at that very moment awaiting a cardiac catheterization. I stopped by the room. Mr. Davis sat at the foot of her bed and Rachel in the bedside chair. John Davis announced with his loud and characteristic laugh, "Hey, family therapy can begin now!" Emerging from the bathroom, attired in a lovely nightgown, Bonnie looked thinner, happy, even radiant, even as the gurney for the cardiac cath lab arrived in the doorway.

Sociophysiological therapy. I personally feel that calling this the biopsychosocial model in operation does injustice to the integrated richness of the phenomena that have transpired over the past half year in this family's life. There is nothing unbiological about the psycho- and the social components and they shouldn't be split.

I like the idea of calling it sociophysiological treatment instead. The physiological variables of hormones, medications and illness affected the social arrangements of this family. The passionate and all-too-alike father-daughter pair had a partial reconciliation probably important for their respective life storylines that could not have resulted without his illness combined with her compulsive housecleaning. On the other hand, interpersonal or social variables affected the physiological well-being of all concerned, including Johnny who, less trammeled by factors in his family of origin, was finally striking out on his own, probably thereby raising his synaptic serotonin without need of serotonergic drugs to do so. Rachel who like her mother is very overweight, was dieting with greater effect at the end of the period summarized.

Now for some interpretations of all this: would Paul Wohlmuth say that a "routine" of family life got

changed in a developmentally appropriate way, so that new routines could take the place of the old ones? The role I played was similar to the role of other cars or vehicles merging on the freeway, influencing them in a relatively nonconflictual way. The freeway is only partly "free" of course, but constrained by the routine, rules and others also occupying the space. Part of the genius of humans as compared to animals of other species is the reprogramming capacity so that one can learn to drive and entrain other routines as well, some of them clever ways to not shiver (such as turning up the thermostat or huddling together for warmth).

Would Kalman Glantz, John Pearce, Tim Miller and Kent Bailey say that evolutionary psychotherapy had taken place? Perhaps their metaphors would not specifically apply. After all, I made no mention of the era of evolutionary adaptation (EEA) and mis-match problems. On the other hand, I feel that evolutionary ancient basic plans activated for communicating dominance, competition and parenting had caused the family's behavior and that my playing the doctor role as an appropriately caring therapeutic authority amended the family's maladaptive expressions and allowed human-specific forms of social rank hierarchy to happen more effectively. How could one say this *isn't* evolutionary psychotherapy? A shaman in an tribal society 20,000 years ago might have behaved similarly to repair and realign a family's routine even without the modern serotonergic drugs.

But I don't like the disembodied "psycho-" and following early Darwin, don't like the striving towards perfection implied by the term, "evolution." Rather, I feel that what happened here, or in any interaction with a patient by persons with my medical specialty, would best be called **sociophysiological therapy.** The whole specialty should be called **sociophysiological medicine.** I'm eager to hear where I have gone wrong in this thinking as readers react to this essay. In concluding, I'll anticipate some of the comments by discussing the problem Annette Hollander, ASCAPian from New Jersey, had with sociophysiological treatment. She said," I don't understand why the psyche can't be retained."

Is anything lost with an omitted psyche? Annette finds that she usually works one-on-one (as of course I do also) and that repair of damage from troubled childhoods or accommodation to circumstances outside one's control are extraordinarily meaningful. Isn't this psychic repair? Moreover, no-one else is in the consulting room but therapist and patient. Why, she wonders, should one omit that level? If I've left out parts of her argument, I'm sure that she will fill them in. But I will reply to what I remember.

I have been very impressed with the reasons for the human three-times-larger brain. Most feel this is a social brain, that social factors apparently requiring much more computing power are so compelling that the difficulties of human childbirth make it worthwhile. Language in its verbal and nonverbal aspects, extraordinary memory for faces, abilities to cooperate as well as to compete are all amplified and put into a kind of virtual space long antedating digital computers and compact disks. We see this in the human avidity to hear and tell stories. Using stories, humans reprogram how they behave, which is generally in conjunction with a personal storyline (or someone else's, as when one is a slave or servant or is subject to a tyrant. But the personal storyline can change, can modulate, can accommodate. Like the martyred saints, one can pursue a personal storyline though physically restrained.

So I see no reason to perpetuate the disembodied psyche as a part of ourterminology. There are never only two people in a room: the place crowds with the populated storylines of both participants, including those professional storylines of the therapist. They are hopefully aided by previous experience and professional guidelines. In APT, which most psychotherapist and medical helpers generally practice whether called that or not, we are our patients' allies. When we do that effectively, people think better and plan better. There is no way to separate this from the social facets of the situation; insertion of the psyche metaphor started in the nineteenth century seems to me a false distinction. In summary then, although psyche is so embedded in our thinking that it seems impossible to root out, its disembodied nature means that it *should* be discarded. *c8*

ARTICLE:

by David Wilson & Ferdinand Knobloch

David Sloan Wilson - Ferdo Knobloch Exchange Debate

From: David S. Wilson - dwilson@binghamton.edu
To: Ferdo Knobloch - knobloch@unixg.ubc.ca

Dear Dr. Knobloch:

Many apologies for becoming silent after the HBES meetings. I periodically get swept away by other things, but now respond to the following from you:

" *You kindly offered to send me some references related to my Poster. It seems to me that there are two kinds of group selection: e.g. that one you described in "Levels of selection", the result of didactic interactions among its members, and "social system selection", where an "invisible hand" is at work. Have I missed something? (I have not time yet to study Boyd & Richerson, but what I suggest is broader than "cultural"."*

I don't regard these as two kinds of group selection. It is common for a research tradition to start with simple interactions and then add more complex interactions as needed. Population genetic theory started by modelling evolution at a single locus, even though this is a far cry from real genetic systems.

Similarly, group selection models began with simple social interactions (e.g..altruistic behaviors) even though real social interactions are far more complex and synergistic. It is true that the complexity will add new dimensions to group selection theory.

However, the basic process of group-selection is the same in both cases — Regardless of whether the system of interactions is simple or complex, it will not evolve into an adaptive system unless you have a population of groups, that vary in a heritable fashion, with some contributing more than others to the formation of new groups.

In the past, people who have emphasized the complexity of social systems, emergent properties, etc., have failed to appreciate the need fora natural selection process. They have assumed that functional organization simply arises out of complex interactions as emergent property.

It is true that complex interactions can produce striking PATTERNS as an emergent property, similar to the colorful computer art that is generated by complex systems of equations. However, pattern is not functional organization. To evolve functional organization at the system level, you need a process of natural selection at the system level. It is as simple as that. There is no point in distinguishing kinds of group selection until this simple point can be grasped.

With respect to references, Boyd and Richerson should be required reading, and not just their book but their more recent papers that are cited in my BBS paper with Elliott Sober. You are right that their work goes beyond the subject of "culture". Two other people are Linda Caporeal -caporl@rpi.edu and Peter Corning - iscs@aol.com). Both emphasize complex systems interactions and also have a decent appreciation of natural selection. Chris Boehm and Kevin MacDonald (both cited in BBS paper) also provide excellent glimpses of social groups in the real world.

Ferdinand Knobloch's response:

Thank you for your response to my brief paper and for your permission to have it published in ***ASCAP.***

Since I am not professionally involved in biology, but rather am a psychiatrist who draws inspiration about people in groups from my work with therapeutic communities and in turn attempts to understand

it in terms of other primate studies, I am open to the possibility that something important has escaped me. (I am looking forward to your new book.)[1]

I am also aware that the broad conceptual frame-work I am suggesting goes far beyond the known facts. I apologize if my only partially-formulated presentation of the meta-selection idea has led to misunderstandings.

When fully formulated, it will be apparent that I am attempting to discredit the self-interest model (e.g., Dawkins, p. 3: "we are born selfish")[2] and raise doubts about the conceptualization of reciprocal altruism (e.g., to make a distinction between 'reciprocal altruism' and 'social exchange').

However, if you understood me, then your answer puzzles me. I will first briefly repeat my argument (better understood in relation to my article[3] and subsequent discussion[4] in *The ASCAPNewsletter,* and then outline my objections to your comments.

1. Natural selection has favored well-organized human groups. But in organizing a group to accomplish its functions, both ***task*** functions (such as being able to mount successful raids or to survive them) and ***group-maintenance*** functions (such as group cohesion, leadership, peacemaking, altruism for the group and individuals) are costly, and the costs are not accounted for by kin altruism and reciprocal altruism. In political states, govern ments establish norms and collect revenues (taxes) from citizens. It seems that evolution established equivalents of both norms and taxes.

2. Acting as the equivalent of a superordinate breeder, the group-as-a-unit performs its meta-selection through its hierarchical power structure and dispenses rewards and costs (including punishments), both material and symbolic. The outcomes are several:

a. The adaptation of members to the hierarchy and its requirements;

b. The development of social ("Machiavellian") intelligence including social exchange algorithms (and flexibility in accepting the present system's exchange rates and the justice derived from them);

c. The development of altruism toward the group and toward individuals that goes beyond reciprocity;

d. The de-emphasis of the difference between kin and non-kin (reflected in Freud's transference); and,

e. The perfection of cheating and defenses against cheating.

The meta-selection pressure by the society has been performed by the leadership, by peers, but also by subordinates (see de Waal: they influence the choice and shaping of the leadership in chim-panzees) and by sex partners. Frank described the pay-offs for honest and altruistic people, but the essential mechanism of meta-selection is missing from his description.

(Note: Altruism brings net rewards, not piece by piece. An illustrative parallel: research findings show that in bad marriages, reciprocity is counted; in good marriages, it is not. In most human social transactions, an element of altruism is expected-and sometimes successfully pretended.)

3. ***Group schema.*** Group process takes place in the frame of genetically programmed group schema (superordinates, peers, subordinates, sex partners), shaped by individual experience (imprint-ing?). This process goes on even if the individual is alone day and night, and is propelled by a modified social exchange.

Images of authorities, from parents to God, rein-force the norms of society as conscience, and contribute to the development of self-deceptive strategies, such as repression. Group schema, implying a continuous process of self-indoctrination

aided by rich symbolic tools, powerfully speeded up the meta-selective process.

DISCUSSION:

This returns to Dr. Wilson's E-Mail with point-by-point responses:

Dr. Wilson: "I do not regard these as two kinds of group selection."

Response: How come? I believe that what you described[5] are dyadic interactions in different groups with different ratios of A/S (altruistic, selfish). Although A decreased in each group, the number of A in all groups combined increased due to the success of groups with a higher proportion of altruists. In contrast, I am describing meta-selection — in which the hierarchical groups as a whole establish new rules of selection.

If I am right, the group selection I am talking about is a different kind of selection: similarto sex selection, it is intraspecies selection. I call it social system selection, or, in short, meta-selection: social systems establish new rules of selection, affecting differential survival for themselves and of individuals socialized in various ways.

Dr. Wilson: "It is common for research tradition to start with simple interaction and then add more complex interaction as needed...."

Response: But can we do that if we deal with the group as a whole? Can an engineer contemplating structural properties of a bridge derive it from its molecules? I am puzzled understanding that this is the same D.S. Wilson who wrote: "Biology and many branches of the human sciences are dominated by an individualistic tradition that treat groups and communities as collections of organisms without themselves having the properties implicit in the word 'organism'".[5]

Dr. Wilson: "In the past, people who have emphasized the complexity of social systems, emergent properties, etc., have failed to appreciate the need for a natural selection process. They have assumed that functional organization simply arises out of complex interactions as emergent property."

Response: I have not talked about some mythical "emergence," but rather about groups with power structures, with leaderships which pressure, dictate, award and punish and which teach their group ideology. Social psychologists know that even strangers in a group make decisions as a group in a way that's different from the decisions of any single individual. And here we have to do with hierarchical structures of tremendous power which, despite great differences across environments and cultures, mold groups and individuals in the same direction.

Dr. Wilson: "To evolve functional organization at the system level, you need a process of natural selection at the system level. It is as simple as that. There is no point in distinguishing kinds of group selection until this simple point can be grasped."

Response: If I understand correctly, you do not accept my suggestion of differential survival of groups variously organized and which, *as **units,*** establish new rules of selection. True, it is not natural selection, but it ***is*** social system selection which may go back deep into primate history (perhaps some ten million years?). It is also group selection, but of a higher order—the selecting power is the hierarchical social system as a whole, and it was perhaps partially discovered several times before (e.g., by wolves — is this why dogs allegedly have consciences and cats do not?).

Just as sex selection may work counter to the natural selection process (the sexy tails of peacocks increasing the danger of becoming prey), so meta-selection may work counter not only to natural selection, but also counter to sex-selection (e.g., society may press for the choice of higher-ranking, but unattractive, or old, men). *c8*

ARTICLE:

by Claire Russell & W.M.S. Russell

Population Crises and Population Cycles 5. The Northern Mediterranean: Rome and After

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Editor's Note: This is the 5th installment to this article. The other 4 installments were in our March, October, November, and December issues of *The ASCAP Newsletter.* The reference list for this article and the articles before appear along with this month's article.

The central position of Rome in Italy and Italy in the Mediterranean enabled the independent farmers of the Roman Republic to form a league of Italian states and conquer the population-crisis-ridden societies of North Africa, much of Western Area, the Aegean, and finally the divided tribes of half-civilised Gaul and Britain. By 167 B.C., Rome had extracted some 80 tons of gold from the dry belt, and sums of this order came in annually when the Empire was established. This enormous wealth in loot and taxes enabled Rome to develop a brilliant civilisation with a wonderful literature and an impressive legal system.

But, perhaps uniquely in history, this *coincided* with a grave population crisis in Italy, which set in at once as a result of very rapid population growth. The height of overpopulation was reached in the city of Rome itself, which passed the million mark by the end of the 1 st century B.C. **(Table 1**) Eighty (80%) of the city population were ex-slaves from all over the Empire, who were housed in 10-story wooden fire-traps at a density twice that of modern Paris, and who developed a mass culture, in which the first use for the new invention of blown glass was the mass production of mugs stamped with the names of favourite gladiators. The population crisis in Italy lasted for some 3 centuries **(Table 2),** during which the republic was replaced by a monarchy. In this unique combination of renaissance and crisis, it was typical that Cicero, who created the vocabulary of Western civilisation, was twice forced into exile, had his house burned down, and was finally murdered.

By the late 1st century A.D., the dry belt provinces of the Roman Empire had recovered from their prolonged crisis, and at first the resulting revenue increase also benefited Rome itself, where housing conditions were temporarily improved after the great fire of 64 A.D. For half a century, there was a relief period. But continued population growth (e.g., **Figure 3** of the article in the *ASCAP* December issue), led to a devastating crisis **(Table 3),** with a notable decline in culture and art. In about 210 A.D., the brilliant Christian writer, Tertullian, observed that human numbers were a burden to the earth, which could now hardly support them, and that famine, epidemics, and wars were the means of cutting back excessive human population growth. In the 4th century A.D., there was some recovery, but only at the cost of the Empire becoming largely a hydraulic society, with distinctions between slaves and free workers disappearing. A final catastrophic crisis in the 6th century A.D., culminated in the plague pandemic of 542-543 A.D., which killed 40% of the Empire's population, and ended Latin and classical Greek as living languages.

By the late century A.D., the dry belt surplus wealth that had supported Roman civilisation had drifted back to North Africa and Western Asia, where the surplus was actually produced and where trade with the Far East was concentrated: "much more than half of the silver and much more than two-thirds of the gold which had circulated in Roman territory... has left the [Northern] Mediterranean world" (Fritz Heichelheim, 1956). By then, Italy had lost its privileges, and the effective capital shifted to Nicomedia in (modern) Turkey and then to Constantinople. In 476 A.D., the Western Empire disintegrated into barbarian kingdoms, and the population shrank back to the low level permitted by the local surplus. In the East, the Byzantine Empire, now a totally hydraulic state, went through

several vicissitudes and population cycles before its conquest by the Turks in 1453 A.D.

Except in Greece, the Northern Mediterranean environment was little damaged in ancient times. When Europe recovered from its Dark Ages, the countries of the region remained important cultural centres until the late 15th century A.D. But then the incipient population crisis brought to power in Spain, a gangster group of transhumant sheepowners, the Mesta. This Mafia-like organisation ruled Spain for over two centuries, with its Murder Incorporated branch, the Spanish Inquisition (their personnel overlapped). With the Inquisition to eliminate its opponents, the Mesta destroyed most of Spain's forest and farmlands. Well might Don Quixote mistake the sheep flocks for armies! In Southern Italy, since the 13th century A.D., transhumant sheep-rearing had been encouraged by the rulers there for its tax yield, but the damage vastly increased when the region was totally controlled by Spain after 1504, with even more sheep than in Spain itself. **(Table 4)** By the 18th century A.D., the Northern Mediterranean countries were backwaters.

In the 19th century A.D., these countries began to revive, by benefiting from the achievement of North-western Europe (including Northern Italy), the subject of our next paper. But as poor relations, they also suffered from pollution export, and later from mass tourist development. The swollen growth of modern Athens **(Table 5),** now one of the world's most polluted cities, was produced by foreign investment, starting in the 1920's. By 1973 A.D., a conference of Mediterranean states showed the whole region to be in desperate state of pollution arid environmental devastation. The success of plans to improve the situation will depend on the achievement of very substantial reduction, by voluntary birth control, of the populations of this region, to whose past glories and grandeurs so much is owed by human civilisation. *c8*

Table 1: The Population of Rome

With some fluctuations (certainly a drop after the great fire of 64 A.D.), Rome probably maintained its population of 1 million up to about 150 A. D. Thereafter it declined steadily, as a result of the population crises and as a symptom of the decreasing wealth and importance of the Western Empire. Constantinople, capital of the Eastern Empire, was officially founded in the ancient Greek city of Byzantium in 330 A.D. It grew rapidly, probably outstripped Rome by 400 A.D., and reached 1 million by the early 6th century A.D. The Empire was divided in West and East in 395 A.D., and the Western Empire collapsed in 476 A.D.

Date (B.C. & A.D.)	Probable Population of Rome (rounded)
270 B.C.	180,000
130 B.C.	375,000
60 B.C.	600,000
14 A.D.	1,000,000
367 A.D.	320,000
452 A.D.	140,000

Table 2: Population Crisis in Italy, 200 B.C. - 100 A.D.

There were regular censuses of male Roman citizens of military age from the 5th century B.C., and some censuses of all male citizens from 28 B.C. to 72 A.D. (besides occasional censuses in the provinces of the Empire). From these and other evidence it is probable that the total population of Italy (including the Po Valley), rose from about *4* ***million*** in 225 B.C., to about *12* ***million*** in 47 A.D., partly by growth of the free population and partly by the import of slaves, who became Roman citizens if freed on Roman territory. The table illustrates the resulting population crisis. The Social War was between Rome and her Italian allies (Latin socii).

Crisis Incidents	**Dates (B.C. & A.D.)**
Food Shortages	BC: 180,165,142,135-131,129,125-124,75,67,58-56, 42-36,23-22, 18 AD: 5-9, 19, 32, 40-41, 51, 62, 64, 68-70
Violence in Rome	BC: 133, 121, 100, 87, 75, 67, 58-57, 53-52, 41-36 AD: 51,69
Slave Revolts	BC: 198, 196, 185, 143, 141, 135-132, 104-100, 73-71
Civil Wars	BC: 88-82, 78-77, 63-62, 50-45, 43-36, 32-30 AD: 68-70
Social War	BC: 91-88
Tyranny	BC: 82-78,43 AD: 23-41, 50-54, 62-68, 88-96
Epidemics	BC: 187, 182-180, 165, 142, 43, 22, 18 AD: 5-9, 65, 79

Table 4: Armies of Sheep

Number of Transhumant Sheep

Dates (A.D.)	**SPAIN (Fiqures from Klein, 1920)**	**Southern ITALY(Figures from Toynbee, 1965)**
1463		600,000
1477	2,694,032	
1496		1,700,000
1526	3,453,168	
1578		3,500,000
1586		4,500,000
1684		5,500,000

Table 3: Population Crisis in the Roman Empire (160 A.D. - 330 A.D.)

Between 100 A.D. and 160 A.D., settlement increased in many parts of the Empire. This suggests that the population of the Empire rose from about *100 million* in 50 A.D. (UNESCO estimate) to about *120 million* (Gibbon's inspired guess) in 150 A.D. The table illustrates the population crisis that followed. There are no food shortages mentioned after 189 A.D. in the scanty historical records for the period, but they must have been very common, except during and shortly after the reign of the North African Emperor Septimius Severus (193 A.D. - 211 A.D.). Violence in Rome and elsewhere was so common that 26 out of the 37 Emperors of the period were murdered or killed in civil battles, not to speak of their relatives, their high officials, and the dozens of pretenders. Besides the barbarian incursions, there was sporadic warfare with the Parthian, later the Persian Empire.

Crisis Incidents	Dates (A.D.)
Food Shortages	AD: 161, 189
Barbarian Incursions	AD: 167-175, 178-180, 205-209, 234-237, 245-259, 262-271, 275-279, 286-292, 322
Civil Wars	AD: 192-197, 217-218, 238, 249, 253, 260-268, 271-274, 280, 284-285, 293-296, 306-324
Major Persecutions of Christians	AD: 165-167, 177, 202-211, 235-238, 249-251, 257-260, 303-313, 320-324
General Tyranny	AD: 180-192, 211-217, 218-222, 235-238
Epidemics	AD: 165-180, 189, 251-266, 271

Table 5: The Disproportionate Growth of Modern Athens

(Figures for 1920 from Gomme, 1933; remainder from Aivazis, 1983)

Date (A.D.)	Population of Athens	Population of Greece	Athens as % of Greece
1920	428,824	5,536,375	7.75%
1940	1,124,000	7,335,000	15.30%
1971	2,530,000	8,745,000	28.90%
1981	3,016,457	9,706,687	31.07%

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ARTICLE:

by Koenraad Kortmulder

R-gap homeostasis: Some Observations on Animal Behaviour

Why study fish? Why study vertebrates, except perhaps some higher primate species, in connection with human behaviour? I think because they may deepen one's insight in two ways:

(a) by extending the time scale of historical (evolutionary) explanation,[1] and

(b) by widening the field of horizontal comparison.[2]

Regarding (a); Some behaviour patterns are as old as vertebrates, e.g. rhythmic locomotion. This may help explain why rhythmic movement plays such an important part in all vertebrate and human behaviour.

Regarding (b); Vertebrates are an homogeneous group, taxonomically, and with respect both to general anatomy and behaviour. The same systemic patterns may recur in all taxa because the same basic elements (e.g. contagiousness of mood, conspecific recognition, stress, or behavioural flexibility) are present in all of them.

For instance, contagiousness, conspecific recognition and a tendency to prolong certain forms of interaction may explain the occurrence of formalised duels in fish and terrestrial vertebrates and, more specifically, why these duels converge on a small number of symmetrical choreographies: *vis-d-vis,* parallel facing same direction, antiparallel (head-to-tail) and rhythmic exchanges of charge and broadside. Other examples are in the behavioural modes described below.

Gardner and Price's contribution on "Homeostasis of R-Gap: Theory, Preliminary Study, and Early Results" (ASCAP July 1996) brought to my mind some observations I have made on barbs. I think most of what I want to tell might have been observed in other vertebrates as well, but barbs happen to be my main experimental animal, and these little fish without parental care or pair formation are a good model of some basic vertebrate behaviour.

Agonistic interaction between two males may occur in four modes:

(1) Non-territorial, non-hierarchical mutual (threat) display. This is the most symmetric mode: the males are equally balanced, and both visit all parts of the available space similarly. From this, three asymmetric modes may develop:

(2) Balanced territorially, with each male being master on its own ground. This mode is symmetric as for the equal balance between the males, but asymmetric in that their patterns of movement through space are now different; consequently, the system differs according to whether one looks at it from one male's view point or from the other.

(3) Homeostatic dominance-submission. Adoption of the appeasement posture by the subordinate male suffices to stop the dominant male's aggressive behaviour. For much of the time, the two individuals appear as if equally bal anced, namely when they do not interact, or when they have bouts of mutual display on an equal footing. Such bouts may be quite common, but, they invariably end with the subordinate male appeasing.

(4) Runaway dominance-submission. This is the most asymmetric of the three modes. Escape behaviour stimulates chasing and the other way around in a vicious circle. The males may still have bouts of mutual display, but these invari ably end in renewed chasing.

So far about the modes. What about dynamics?

Quite often, starting from either mode (2) or (3), males may develop a relationship in which each has a territory, but one male (A) may enter B's territory and beat him there. Instead of remaining in mode (3) or (4), however, male A retreats to its own original grounds and allows B to reoccupy his. As a rule, such a relationship keeps fluctuating between the modes (2) and (3) or (4). The return from modes (3) or (4) to (2) looks surprising at first, especially because it is obviously not effectuated by male B becoming stronger or more persistent, but primarily by A restraining itself.

Similar restraint was observed in an anecdotal case, observed in great detail by Enja Feuth-de Bruijn and myself. Two male *Barbus oligolepis,* in a 60x35cm tank shared with three females, had divided the space between them in two roughly equal territories. They were perfectly balanced and continually in mode (2). They indulged in long, irregularly spaced periods of mutual display, as is usual in mode (2).

Our observation sessions covered at least ten hours spread over a period of two to three weeks. In that period, we observed two or three occasions when, during display bouts, the balance between the males became precarious. A final tipping of the balance did not, however, occur, and we both agreed that it was actively prevented by *both* males, that is, also by the stronger of the two restraining itself. As the group remained intact and stable for many months at a stretch, crises as described must have occurred routinely.

I surmise - though I cannot prove it - that also in cases where mode (3) is stable (as has been observed), some active restraint on the part of the dominant individual is involved in preventing mode (3) from sliding into mode (4).

In summary, we have three homeostatic systemic states: mode (2) not going to (3) or (4), mode (3) not going to mode (4), and a mixture of modes (2) and (3) or (4) which keeps fluctuating back and forth. My dynamic interpretation was as follows:[1,2]

First, there is a tendency towards tension reduction through symmetry breaking. Tension is generated, both in and between individuals, by the combination of insecurity and uncertainty. There are, consequently, two main paths to relaxation: moving away from hostile confrontation towards behaviourally expanded states such as play, courtship or reconciliation, which provide a sense of security, or by increasing certainty through breaking of the symmetry of the opponents. The latter may be achieved either through territoriality (which deals with the movements of the rivals in space) or through dominance-submission (dealing with their movements relative to one another).

Whereas dominance-submission is analogous to the creation of an R-gap, territoriality has its parallels in a differentiation of tasks or competences in humans. We may term the latter *R-differentiation.* We may keep in mind that the tendency to reduce tension is responsible for the occurrence of the modes with broken symmetries to begin with.

Second, in any of the modes, but particularly in (2) and (3), there is a tendency to have spells of more equally balanced interaction (in the fish: mutual display as described) with tension increasing, and then subsiding again. This results in fluctuations within the prevailing mode, towards mode (1) without ever reaching it, and back again.

Third comes a tendency to be in a mode as close as possible to mode (1), that is, (2) rather than (3) or (4), and (3) rather than (4), in other words to maintain an optimal starting position forthe fluctuations in the direction of mode (1).

So, this is my picture: the second and third tendencies oppose the first. In anthropomorphic terms, the animals strike a balance between freedom from tension and a fair quota of excitement. In most vertebrate animals, however, an anthropomorphic interpretation of the sort would seem inappropriate. In fact, it may not even be necessary to invoke the cognitive aspects of limbic excitation, reptilian brains and what not either, since relatively simple

dynamic systems of the physical or chemical levels can do the same sort of self-organisation. I do not suggest that the whole brains are not involved, but rather that complicated brains in interaction can produce relatively simple behavioural rules, similar to those of relatively much more simple dynamic systems, with which they may belong to one universality class of dynamic systems with symmetry-breaking bifurcations.

What about the other path to relaxation, through behavioural expansion? Is there any connection between the tendencies to periodically increase tension on the one hand, and play, affectionate behaviour or reconciliation on the other? I think there is. The *Barbus* males I have described above may switch to courting the females in the group whenever the latter become receptive. The switch is certainly more easily made by males in mode (2) or (3) as compared to mode (4), and perhaps most easily in mode (1). Higher vertebrates, in such cases, may engage in play when the opportunity presents itself.

It is interesting to compare the tendency of even rival males to engage in equally balanced interaction with the same tendency in play, where it is much more obviously present. In play, self-handicapping, *i.e.* the stronger or larger animal putting itself into a unfavourable position or restraining its power, represents the selection of a mode conducive to interaction on equal footing. The play interactions themselves are then comparable to the spells of intense mutual display in rival situations.

I guess humans could also work to stay in mode (3) because they, consciously or subconsciously, want to stay out of (4). I think such deliberation is not appropriate to animal behaviour, except perhaps a chimp or two.

I guess my proposal would yield largely the same predictions as Gardner and Price's, except perhaps that I would expect the 'weaker' party to also cooperate to maintain homeostasis. If a stronger fish can restrain itself in order to maintain a mutual territorial relationship, why should the weaker not be capable or prepared to do the same in case of the stronger one suffering a (relatively small) decrease in strength? This would certainly apply to pair-forming animals, and I guess also to the rival relationships I have described -within limits, of course, because even fish are only human. Apart from this, my proposal may suggest one more: If one could distinguish R-differentiation besides R-gap in humans too, one would predict that increased R-differentiation within a couple would allow the R-gap to be lowered. It would perhaps not be difficult to find anecdotic examples of this. An experimental testing would be feasible, wouldn't it? OS

ABSTRACTS & EXTRACTS...

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SPECIAL ISSUE: ANIMAL MODELS -- PSYCHOSOMATIC RESEARCH

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Use of animal models in peptic ulcer disease

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Animal models provide insight into psychosomatic factors in diabetes

Catecholamines, stress, and disease: A psychobiological perspective

Psychosocial factors, sex differences, and atherosclerosis: Lessons from animal models

Enduring effects of infant feeding experiences on adult blood pressure

Transgenic and null mutant animals for psychosomatic research

Hofer, M.A. & Myers, M.M.: Editorial: Animal models in Psychosomatic research. *Psychosomatic Medicine* 1996;58:521-523

Extract: Why publish an "Animal Models" issue of *Psychosomatic Medicine?...* Because *Psychosomatic medicine* has always been in the position of having to convince a skeptical majority of physicians and scientists, the role of animal studies has been crucial in demonstrating and validating Psychosomatic principles.

Weiner, H.: Use of animal models in peptic ulcer disease. *Psychosomatic Medicine* 1996;58:524-545

Abstract: Considerable progress has been made in the understanding of the formation of gastric erosions by the use of animals. The role of gastric acid secretion in their pathogenesis has been clarified. Gastric erosions are associated with the presence of acid in the stomach and slow gastric contractions. With several different experimental procedures, the animal's body temperature falls; preventing the fall averts erosions. A fall in body temperature or exposure to cold are associated with the secretion of thyrotropin-releasing hormone (TRH), and both increased and decreased concentration of corticotropin-releasing factor (CRH) in discrete regions of rat brains. Thyrotropin-releasing hormone when injected into specific sites in the brain produces gastric erosions and increases acid secretion and slow contractions, whereas CRH has the opposite effects. One of the major sites of interaction of the two peptides is in the dorsal motor complex of the vagus nerve. Thyrotropin-releasing hormone increases serotonin (5-HT) secretion into the stomach. Serotonin counter-regulates acid secretion and slows contractions. Many other peptides injected into discrete brain sites stimulate or inhibit gastric acid secretion.

Moynihan, J.A.. & Ader, **R.: Psycho-neuroimmunology: Animal models of disease.** ***Psychosomatic Medicine*** 1996;58:546-558

Objective: Psychoneuroimmunology, which investigates the bidirectional communication between the central nervous system and the immune system, has been greatly advanced by the use of animal models. The objective of this paper is to describe animal models of disease that can or might be utilized to elucidate neural-immune interactions that alter pathogenesis.

Methods: This paper reviews animal studies that have demonstrated a link among the brain, behavior, immunity, and disease, highlighting models in which the potential contribution of CNS-immune interactions has not yet been explored.

Results: Animal studies allow for careful control of environmental stimuli, genetic background, and immunological challenge. As such, they are an important component of psychoneuroimmunology research. Models in which one might study the role of psychosocial factors in immunologically mediated disease processes, as in the case of other pathophysiologic processes, profit from an ability to manipulate both stressful events and the magnitude of the challenge to the immune system.

Conclusions: Animal studies in psychoneuroimmunology highlight the complexity of the interactions among behavior, the brain, the immune system, and pathogen. The genetic background of the animal (both in terms of central nervous and immune system responses), its previous history, the nature of the stressor, the nature of the pathogen and the type of immune response generated are some of the interacting factors that determine the magnitude and direction of stress-induced changes in disease outcome.

Greenberg, D., & Smith, G.P.: The controls of fat intake. ***Psychosomatic Medicine*** **1996;58:559-569**

Objective: To present evidence on the control of the size of fatty meals in the context of the result of interactions of orosensory positive-feedback and postingestive negative-feedback mechanisms activated by fat stimuli in rodent models of feeding and of obesity.

Method: We examined the effects of orosensory stimuli and postingestive stimuli in Sprague-Dawley rats, and in the genetically obese Zucker (fa/fa) rat. We used the sham feeding rat preparation to isolate the orosensory stimulating and postingestive satiating properties of oils. The negative-feedback satiating properties of fats were elicited by intestinal infusions of fats. The Zucker rat is an animal model of obesity with abnormal control of meal size and increased intake of fats. Using this model we further examined the interaction of orosensory and postingestive stimuli in the control of meal size.

Results: The orosensory properties of fats are sufficient to drive sham feeding and are not dependent on the postabsorptive metabolic consequences of oils in normal and Zucker rats. The satiating action of fats must act at preabsorptive sites because reduction of intake occurs before absorption of fat. The satiating potency of fats is dependent upon their specific chemical conformation and is mediated by endogenous cholecystokinin and afferent fibers of the abdominal vagus. We have found that oils produce significantly more orosensory positive feedback in obese Zucker rats than in lean rats in experimental tests of preference. This is probably the major abnormal mechanism responsible for the increased preference for fats that is characteristic of obese rats because we have not identified any significant decrease in the postingestive satiating potency of fats in obese Zucker rats.

Conclusions: Fat intake is controlled by both orosensory and postingestive stimuli in normal and genetically obese rodents. In the Zucker rat the investigation of this model of genetic obesity has produced data that is congruent with the preference for high fat foods in obese people and suggests

further experiments directed toward a deeper understanding of the controls of fat intake and how they are disordered.

Hofer, M.A.: On the nature and consequences of early loss. *Psychosomatic Medicine*
1996;58:570-581

Objective: To describe how an animal model system can be used to explore basic questions about the nature of loss and the effects of early loss on later vulnerability to disease.

Method: The physiological and behavioral responses of infant rats to separation from their mothers are first described and then analyzed experimentally into component mechanisms.

Results: These studies have revealed an extensive layer of processes underlying the psychological constructs generally used to understand the response to loss. Hidden within the observable interactions of parent and offspring, we found a number of discrete sensorimotor, thermal, and nutrient-based events that have unexpected *long-term regulatory effects on specific components of infant physiology* and behavior. Release from all of these inhibitory and excitatory regulators together during maternal separation constitutes a novel mechanism by which the experience of loss can be translated into a complex patterned response. Evidence for early regulatory processes has also been found in monkey and human mother-infant interactions. Here they may well constitute the building blocks from which attachment and object representations develop. We and others have found long-term effects of loss, and of selective replacement of regulators, on behavioral development and on later vulnerability to disease.

Conclusions: The results give us a new understanding of early attachment as a developmental force and of human grief as a risk to health.

Surwit, R.S. & Williams, P.G.: Animal models provide insight into psychosomatic factors in diabetes. *Psychosomatic Medicine*
1996;58:582-589

Objective: To review the literature regarding the use of animal models in research addressing psychosomatic aspects of diabetes.

Method: We examine the key findings in animal model vs. human research in the area of stress and diabetes. Previous research has suggested that stress is a potential contributor to chronic hyperglycemia in diabetes. Stress affects metabolic activity via the stimulation of a variety of hormones that can result in elevated blood glucose levels. In patients with diabetes, due to a relative or absolute lack of insulin, stress-induced increases in glucose cannot be properly metabolized. Additionally, regulation of these stress hormones may be abnormal in diabetes.

Results: Human studies on the role of stress in the onset and course of type II diabetes are few and are limited by the constraints and logistics of examining life stress in humans. However, animal research allows for tight experimental control and the manipulation of factors that may contribute to the development and/or course of diabetes, such as stress, eating behavior, the nutrient content of food, and physical activity. Disease processes can be examined at a mechanistic level in animals which is typically limited in human research.

Conclusions: There is a large body of animal work to support the notion that stress reliably produces hyperglycemia in type II diabetes. Furthermore, there is evidence that the autonomic nervous system plays a role in the pathophysiology of this condition in both animals and humans. Examination of eating behavior and nutrient content of food in animal models of diabetes has shed light on the role of these factors in the development of diabetes, as well as obesity. Finally, genetic research using animal models of diabetes will provide new directions for research in humans to delineate the genetic contribution to the development of diabetes.

McCarty, R. & Gold, P.E.: Catecholamines, stress, and disease: A psychobiological perspective. Psychosomatic Medicine 1996;58:590-S97

Objective: Research on the relationship between physiological responses to stressful stimulation and the onset of psychosomatic illnesses has been an area of intense interest for many years. Studies using animal models have contributed significantly to this field of inquiry by taking several complementary approaches.

Method: Three specific research strategies taken in our laboratory will be highlighted here. Each involves studies in conscious, freely behaving animals.

Results: Genetically selected animals have been exposed to acute stressors to unmask neuroendocrine and autonomic abnormalities related to disease susceptibility. In addition, studies of aged animals suggest that exaggerated physiological responses to acute stress may underlie some age-related pathologies.

Finally, a series of studies has revealed that exposure of laboratory animals to stressful stimulation may exert long-lasting influences on the ways in which these subjects respond in the future to the same or novel stressors.

Conclusions: These findings illustrate how studies with laboratory animals have the potential for refining the questions that are posed in research with clinical populations and for providing insight into the underlying physiological mechanisms of individual variability in disease susceptibility and the development of appropriate therapeutic interventions.

Kaplan, J.R.; Adams, M.R.; Clarkson, T.B.; Manuck, S.B.; Shively, C.A.; & Williams, J.K.: Psychosocial factors, sex differences, and atherosclerosis: Lessons from animal models. ***Psychosomatic Medicine*** **1996;58:S98-611**

Objective: Premenopausal women, compared with men, are relatively spared from coronary heart disease and the underlying atherosclerosis. Our purpose has been to elucidate the reason for this difference and to explore the role of behavioral factors in this phenomenon.

Methods: Studies employed socially housed cynomolgus macaques *(Macaca fascicularis)* fed an atherogenic diet and subjected to behavioral observations. Ovariectomy, with or without hormone replacement, was used to test specific hypotheses about estrogen's role in the protection of females from atherosclerosis and coronary heart disease.

Results: Female macaques, like women, are resistant to atherosclerosis. However, this resistance is modified by social status-dominant monkeys develop little atherosclerosis, whereas subordinates resemble males in the amount of lesion that occurs. Subordinate females also are characterized by hypercortisolemia, behavioral dysfunction, and impaired ovarian function; the resulting low concentrations of circulating estrogen perhaps explain their accelerated atherosclerosis.

Notably, atherosclerosis is exacerbated in ovariectomized monkeys but is suppressed in association with pregnancy, a hyperestrogenic state. Moreover, exogenous estrogen (an oral contraceptive) inhibits atherosclerosis in premenopausal social subordinates.

Conclusions: To the extent that our results apply to women, they highlight the potential importance of behavioral stressors and their effects on estrogen activity in the premenopausal development of atherosclerosis. The triad of hypercortisolism, ovarian impairment, and psychiatric morbidity found in monkeys also occurs in women and may represent a high-risk state for disorders of the cardiovascular system and, perhaps, other estrogen-sensitive tissues.

Myers, M.M.: Enduring effects of infant feeding experiences on adult blood pressure. ***Psychosomatic Medicine*** **1996;58:612-621**

Objective: Vulnerability to psychosomatic diseases is influenced by events early in life. The objective of this article is to discuss animal research that demonstrates relationships between feeding experiences and growth in infancy and risk of hypertension in adulthood.

Method: Subjects were spontaneously hypertensive rats (SHR) and their normotensive Wistar Kyoto progenitors. Initial experiments involved observations of the behaviors of rat mothers and their infants and follow-up measurements of blood pressures. Further studies focused on measurements of infant blood pressure during feeding, and recent investigations manipulated weight gain and sex hormones early in life.

Results: Infant rats whose mothers were seen nursing more often had increased blood pressure as adults. Each time rat mothers delivered milk to their young, the nursing pups' blood pressures rose dramatically. These feeding-induced increases in blood pressure have been observed in the young of many species including humans. They are mediated by autonomic nervous system activity and are larger in SHR pups. Finally, animals that gain weight rapidly as infants as a consequence of being reared in small litters had higher adult blood pressure; but, this effect is seen only in intact males.

Conclusions: Adult physiologic traits can be influenced by the joint actions of genetic predisposition and essential psychosocial interactions during early development. Animal models can stimulate new ideas, provide important confirmations and elaborations of hypotheses from human investigations, and afford experimental approaches for identifying mechanisms underlying the transduction of behavioral experience to disease susceptibility.

Crnic, L.S.: Transgenic and null mutant animals for psychosomatic research. ***Psychosomatic Medicine*** **1996;58:622-632**

Objective: Progress in the use of genetically altered animals for psychosomatic research is reviewed.

Method: Analysis of the strengths and weaknesses of these models, particularly from a developmental and behavioral prospective is used to assess the validity of these models.

Results: Genetically altered animals can be used to create models of the estimated 5000 human diseases in which genetic predispositions play a role, as well as models for diseases that do not involve gene defects, such as human immunodeficiency virus (HIV) infection. In addition, these models have already contributed immensely to our understanding of basic biology and the biology of behavior. Replication of human gene defects in mice has provided direct models of human disease, but there are various factors that sometimes prevent the gene defect from producing the human disease in mice. However, even in this case, the models can contribute to understanding the basic biology of the disease.

Conclusions: While genetically altered animals have revolutionized the understanding of single gene disorders, their promise has not yet been fulfilled for multigenic behavioral disorders. Newer techniques to allow control of the tissue and stage of development at which a gene is expressed are likely to enhance the usefulness of these models for psychosomatic research.

New models of disease for testing psychological impacts on illness and specific ways of altering neurotransmitter function will be discovered. While these models will be extremely useful to psychosomatic medicine, the nature of this discipline of necessity involves emphasis on individual experience, and thus will never be amenable to exclusively genetic analysis.