

ASCAP

Volume 13, No. 1 (Cumulative#146)

January, 2000

"The biological tricks that cause consciousness have powerful consequences, but I see consciousness as an intermediary rather than as a culmination of biological development. Ethics and the law, science and technology, the work of the muses and the milk of human kindness, those are my chosen summits for biology."

Antonio Damasio^{1(reference p19)}

Contents

- To & From the Editor.....page 3
- Good-by to Monthly Newsletter
by Russell Gardner, Jr.....page 9
- Proposed Fundamentals of Psychotherapy
by Russell Gardner, Jr.....page 11
- Waller's View of Depression
by Donald F. Klein.....page 13
- Natural Born Killers
by J. Anderson Thomson.....page 15
- Post-Partum Depression & Anxiety
by J.Anderson Thomson & Ed Hagen.....page 20
- Outside the Body
by Howard Bloom.....page 23
- Koerselman-Gardner Dialog: RG comments
by Frank Koerselman & Russell Gardner, Jr.....page 25
- Evolutionary Psychotherapy: Reply to RG
by Frank Koerselman.....page 31
- On Being an Identical Twin
by Suzanne Munro Gardner.....page 33
- Fuzzy Expert System for Psychiatric Application
by Lubomir Kocis.....page 35

- Abstracts & Extracts.....page32
Evolution and food (p. 10), odor & olfactory neurons (p. 14), evolutionary basis of REM sleep, (p. 16), mathematical logic of stories (p. 19), mental-physical interface at the football game (p. 19), 2000 B.C. (p. 19), reframing definition & illustration (p.29), evolutionary-developmental biology future, nostril asymmetry, amygdala-prefrontal interactions in fear, prefrontal cortex in mania, Bazooka protein in fruit fly neurons, DNA sequence of human chromosome 22, Crafoord Prize to Ernst Mayr, Maynard Smith, and George Williams, snake limblessness, memory correlates in prefrontal cortex, phylogenetic classification & universal tree.

Madison Institute of Medicine Madison, Wisconsin, USA

Consider registering for the Course on Clinical Sociobiology, Cafe Cod, July 17-21, featuring Nancy Segal, Jim Brody, John Price & Russell Gardner; contact brody@cs.com for details

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

***The Across-Species Comparisons and Psychopathology (ASCAP) Newsletter* is a function of The ASCAP Society & of The Psychotherapy Section of the World Psychiatric Association**

The Across-Species Comparisons and Psychopathology Society Executive Council:

President: Ivor Jones (1999-2000)
President-Elect: Thomas E. Joiner
1st Vice President: Lynn O'Connor
2nd Vice President: James Brody
Just Past President: Mark Erickson (1998-1999)

Previous Past Presidents:

Michael R. A. Chance - 1991-1992
John S. Price -1992-1993
Paul Gilbert-1993-1994
John K. Pearce-1994-1995
Leon Sloman -1995-1996
Kent G. Bailey-1996-1997
Daniel R. Wilson-1997-1998

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 members and resources of various disciplines so as to enhance the further investigation and study of the conceptual and research questions involved.

This scientific society is concerned with the basic plans of behavior that have evolved over millions of years and that have resulted in psychopathologically related states. We are interested in the integration of various methods of study ranging from cellular processes to individuals in groups.

The ASCAP Newsletter Aims:

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



WPA Psychotherapy Section Officers:

Chairman: Russell Gardner, Jr. (USA)
Co-Chairman: Frank Koerselman (Netherlands)
Just Past Chairman: John S. Price (UK)
Secretary: Mark Erickson (USA)
Committee Members Without Portfolio:
Maria Ammon (Germany)
Piero De Giacomo (Italy)
Axel Schulze (Germany)
Undesignated
(Website Master/Past-Chairman: Ferdo Knobloch)

The World Psychiatric Association is an organization of psychiatric societies aimed at advancing psychiatric and mental health education, research, clinical care and public policy.

The basic members of the WPA are 110 national psychiatric societies, representing more than 140,000 psychiatrists worldwide.

Editor-in-Chief: Russell Gardner, Jr.
214 DuRose Terrace, Madison, WI 53705 USA
Phone: 608 233-2000
Fax: 630 839-5040
E-Mail: rgj999@yahoo.com

European Editor: John S. Price
Odintune Place, Plumpton
East Sussex BN7 3AN, ENGLAND
(01144)1273-890362
Fax: (01144)1273-890614
E-Mail: john.price@lycosmail.com

UTMB Faculty Representative:
Jeffrey Matthews, M.D.
409 747-9723

ADDRESSED TO & FROM ...

Presidential Call for Annual Meeting Papers

Plan to come to the Amherst, MA, ASCAP Society meeting on June 7, 2000, just prior to HBES. Ivor Jones has written to say that he wishes a 'Tucson style of meeting' with formal papers being presented. Therefore please prepare an abstract and plan for a talk lasting from 15 to 30 minutes (depending on how many wish to speak). Send to Russell Gardner, meeting coordinator, at 214 Du Rose Terrace, Madison, WI 53705 USA prior to May 1, 2000. Ivor Jones will lead off with his Presidential Address and chair the meeting, he will introduce the Beck Award winner midday (see below for call for submissions) and Thomas Joiner will give the concluding address at the end as the gavel is passed.

Announcement: Beck ASCAP Award Competition

The Association for Across Species Comparisons and Psychopathology (ASCAP) and The Board of Directors of the Foundation for Cognitive Therapy and Research would like to announce the commencement of the application period for the sixth annual Aaron T. Beck ASCAP Award. This \$1000 award will go to the author of the best paper on a topic relating (broadly) to evolution and psychiatry that is submitted by a student or new investigator (person within

two years of award of degree). The award is intended in part to support the winner's trip to the 2000 meeting of ASCAP which, this year, will be held in Amherst MA on June 7, the day prior to the onset of the meeting of the Human Behavior and Evolution Society. The winner will, at that time, present the paper in oral form (45 mins) and receive a commemorative plaque. Entries are due May 1. Entries must not be previously published. All or part of the winning paper may be published in *The ASCAP Bulletin*. Applicants should submit four copies of their paper to:

Linda Mealey
Psychology Department
College of St. Benedict
St. Joseph, MN 56374 USA

For further information, read the remainder of the announcement below.

Additional questions can be posted to Linda Mealey at the above address, e-mailed to lmealey@csbsju.edu or FAXed to L Mealey at 1- (320) 363-5582. Please distribute this message broadly. Thank you.

Previous winners of the Beck ASCAP award were:
1999: Award not conferred
1998: Bruce Ellis from Vanderbilt University, Nashville, USA with "Psychosocial antecedents of variation in girls' pubertal timing: Maternal depression, stepfather presence, and marital and family

stress."

1997: Edward Hagen, University of California, Santa Barbara, USA with "Delusional and somatoform disorders as possible examples of intraspecific exploitative mimicry in humans."

1996: Souhir Ben Hamida, Northwestern University, Chicago, USA with "Human mate preferences: Implications for the gender difference in unipolar depression."

1995: Nicholas Allen, University of Melbourne, Melbourne, Australia with "Towards a computational theory of depression".

ASCAP President-Elect Honored

Thomas E. Joiner won the APA Distinguished Scientific Award for Early Career Contribution to Psychology in the area of psychopathology. This is a major award in scientific psychology.

Thomas Joiner, Ph.D.
joiner@psy.fsu.edu

Evolutionary Psychotherapy

I have been (the usual but true excuse) extremely busy and pressed by deadlines. Just the stuff you (RG) know well from your academic past. So I have not been able before to react to your responses to my article on Evolutionary Psychotherapy (see page 22 this issue).

I do believe that we could have a nice discussion. Some of your remarks give me the opportunity to clarify some points that I have left unclear. As I see it there is indeed

one issue about which we do have divergent opinions, the importance of interpersonal relations. You stress that point of view more than I do. So we might have an interesting exchange of thoughts on that topic.

I am particularly honoured to be the co-chairman of the Psychotherapy Section of the WPA. I wish to make an appropriate contribution.

Frank Koerselman
F.Koerselman@psych.azu.nl

Inner Sociogram

Evi and I attended in Heidelberg a workshop about the Internal Family Systems Therapy (IFS) approach of Richard Schwartz from Chicago, USA. His technique of identifying and contacting the important inner parts of our Psyche is quite similar to my way of approaching anxiety. This opens a very subtle way to different levels of the mental representational space of our mind.

From the other neuropsychological/neurobiological scientific side evolves a continuously increasing support by data of functional Brain research for this multi-modularity - mainly in the field of cognition comparing schizophrenic and normal persons. This may lead to a different understanding and psychopathological describing - not only for psychiatrists but also for their patients. My "curious experimenter-part" is at the moment just figuring out a way of mapping the patient's subjective perspective of the important "inner parts" like a "inner sociogram". It creates also a quite different therapeutic perspective and relationship. My "critical doubter-part" isn't

sure whether I can convey at least a glimpse of this idea to you, and whether you think it would be interesting for the ASCAP-forum.

On our short-trip hiking and sightseeing around the whole historical Mount Olympus in Greece at the beginning of this month, we were daily confronted with the whole "mishpoke" of the ancient gods. That inspired in me the idea, that those different gods could be seen and understood as metaphors of the most important inner modular parts of ancient man which still fit our contemporary inner representational world.

Axel Schulze
Aljoscha@swol.de

The Gene-Centric Circus and the Shredded Genome

Central to the gene-centric view is that the genome cannot be the unit of selection because it is shredded at meiosis. Dawkins *et al* has this view as one of the central planks within his gene-centric propaganda machine.

The genome can't be selected because it is reduced by 50% every generation in sexual forms, thus each gene, or gene-fragment within it, must be so selected. The logic seems foolproof but perhaps it's just the opposite, it's just full of fools?

Well we have all heard of the conjuring and slight of hand and this is one of the better mental versions of it. With sexual reproduction we have two sets of genetic information that exists within every

cell, like two packs of cards. The two packs are shuffled and one pack only goes into each sex cell so that the new individual at fertilization has the full compliment of two card packs, which however are mixed up via the previous shuffling. Half of any genome only ever goes into each sex cell so that, yes, 50% of each genome only reaches the next individual organism. With magic, always set up a presupposition which is untrue, but you know will be assumed by your audience. Once that goes unchallenged you are home free i.e. establish the false initial premises.

What has been wrongly assumed here? The two packs are different in the first place. They were not, since they were over 90%, exactly the same cards. Genes are heterozygous (two different type faces of jack, aces, sixes of diamonds, etc) or homozygous (two kings, aces, sixes of diamonds that are exactly the same typeface). Less than 1% of the human genome is heterozygous and most of the genome within any species is the same genetic information. Only these heterozygous genes can be so shuffled. Shuffling the homozygous genes means nothing because they are exactly the same cards. Thus only 50% of 1% which is 1/2% of 100% of any genomic information is shredded at meiosis, not 50% of 100% of that genome's information, so that the genome information is hardly shredded at all at meiosis, mostly remaining the same heritable and thus selectable information. That makes an error something like 10000%. Not a bad effort for slight of hand. The gene-centric circus is entertaining, if nothing else....

I dare say that gene-centrics will now play the IBD joker...please somebody,

go ahead and play it?

John Edser
edser@ozemail.com.au

Mistresses & Concubines

I think it useful to make a distinction between these two classes of female companions when engaging in an evolutionary discussion. The distinction, though not the latter term, was still quite evident among the upper classes in Europe in the 17th century.

A man keeps a mistress primarily for companionship and recreation. In former times this was often because he and the wife he'd acquired in an arranged marriage were not compatible and divorce was difficult to obtain. Generally some effort was made to keep from getting the mistress pregnant, but if this failed, a man was expected to make adequate provision for his bastard offspring or be considered a cad (of course, there were plenty of these around). Oneway influential men did this was to convince a respectable man who wanted to get ahead in the world to marry the mistress and legitimize the child, in return for patronage..

A man keeps a concubine expecting to have children by her. From a biological, though not a legal point of view, he is polygamous. The relationship allows him to leave more copies of his genes to posterity than would be the case if he only had one wife. If one considers the early modern period and European aristocracy, the wisdom of this is obvious. With a high overall mortality rate and considerable inbreeding, the chances that a person who might have highly desirable heritable characteristics such as high

intelligence would leave no legitimate offspring were not trivial. The same is actually true in America today, though for different reasons (delayed childbearing, increasing infertility), and personally I think that Bill Clinton's behavior is what one would expect based on an evolutionary analysis of the situation, except that he gets it all wrong and does his utmost not to get pregnant a pretty, healthy, young woman to whom he's attracted.

Martha Sherwood
msherw@oregon.uoregon.edu
from paleopsych@paleopsych.org

Bastards Helpful for Genetic Distance

Man marries for the species; he mistresses for the self. Or does he? "Legitimate" heirs carry on a name, keep the property together...but what about the big picture-biological legitimacy? A man's wife is often of his set, a genetic close-call if not a kissing cousin; a mistress is more likely to be other. So children born of the illegitimate union might be better for the species because more genetically diverse. (A personal example: No Tay-Sachs worries here because one of my Eastern European Jewish great grandfathers sired a child with his non-Jewish mistress; the child, my future grandmother, was brought up lovingly by my great-grand-father's Jewish wife, for whom I'm named... but whose genetic material I'm perhaps better off without.) Why, then, does society have so strong a bias in favor of "legitimate" children, and mistresses aren't

meant to bear fruit at all?

Nancy Werd
paleopsych@paleopsych.org

Evolutionary Rerun Not Carbon Copy

The idea that if one creature does not evolve to fill a niche another one very similar to it will is born out by the existence of the Australia's famous marsupials. Though they are far from placental canids, felines, and rodents elsewhere on the evolutionary tree, many are so similar to these mammals of other continents that they are known as marsupial moles, mice, cats, and wolves. Throw the basic four-leg-ged animal frame into an isolated spot and the interaction of biology with environment produces similar habits and similar shapes. In other words, niches all over the world have underlying regularities. And beasts who may appear distant share a similar biology, Put beast and world together, and no matter how far apart the roots might seem, what emerges is the opposite of arbitrary. The same applies to atoms, stars, and galaxies...so far apart and with such different histories, yet so much alike in form and basic functioning.

Howard Bloom
HowIBloom@aol.com
from paleopsych@kumo.com

Touchy-Feeley

What do you like to do? Or what do you like to *feel*? The question summarizes a dilemma between men and women. That is, women sometimes complain that men are not in touch with their own feelings, that we are always "doing" something. On the

other hand, Geoff Miller argues that male activity is a display that draws female interests, the ladies insist that we be active. Thus, it could be that a woman's complaint about male feelings will (1) occur late in the relationship and (2) are an expression of her giving up on him as a mate while she reclassifies him as a "female" member of her alliances. The following thoughts should be an attractor but probably are not and if not, will reveal the insincerity motives of females who want us guys to "feel."

Guys do and women advertise in the personals often by mentioning things to do. Of course, women have for a long time emphasized the features that males desire, perhaps with an intent to have the greatest number of applicants.

Women also know that men are to be evaluated against each other on the basis of how they *do* things. Thus, we males have contests for throwing, butting, hitting, running, and even for fast talking. (And some women also join those contests!) "Each of us has our own *do* and *feel* lists but less is said about "What do you like to feel?" I like to feel snug on a chilled night, smart in a room of scholars, a bit high on the 2nd mile of a run, and thoroughly at peace after a long talk, finishing an essay or bit of art, or after a bedtime romp. I also enjoy the *feel* of total absorption in a book that lets me see my world as a newcomer, a sense that sometimes occurs after an exceptional movie.

There's another bit of subtle wisdom in the negotiations between a man and a woman. He cannot define her *feel* list for her; she follows her own nature just as a wild creature does when building a

nest or caring for young. By my own nature, I notice and appreciate the texture and cut of her hair and the scent of her perfumes about her neck, lips, and ears. I sense the slump or pride in her stance and the liveliness of her walk, the toss of her curls, and the curve of her mouth to one side or another and the circumstances that lead to each change.

These are the kinds of things that I *do*; I hope they trigger the kinds of things she likes to *feel*.

Jim Brody

JBrody@compuserve.com

Science and Western Atheism

Modern science in Europe drew heavily on and extrapolated from Chinese and Arabic roots. The question that needs to be asked is not so much why science arose only in the west, since it didn't, but why science came to predominate western thinking to a much greater extent than in the Near East and Asia. The irrationality of certain core beliefs of Christianity may indeed afford a clue here. All faiths ask that one accept certain things which cannot be proven, but among major faiths, only Christianity requires that one believes as an essential tenet of faith things which are incompatible with scientific knowledge. Faced with this dilemma, western thinkers drifted towards scientific atheism, reinforced by the availability of empty niches in northern Europe following the population crash in the fourteenth century.

Martha Sherwood

msherw@oregon.uoregon.edu

paleopsych@kumo.com

Regression in deer

If regression is a reasonably common occurrence, particularly under stressful conditions, then we must consider this ancestral behavioural baggage as "normal", as part of us, and not a medical problem - although it may be a social one as it transcends societal norms. Unfortunately, an uncontrollable regression may well be beyond voluntary control. You see, that's what bothered me as I tried to satisfy myself what to refer to medicine and what not. Clearly, a study of human evolution is indeed essential for diagnosing what belongs to medicine and what not.

I will illustrate a classical regression I witnessed in the Munich zoo in Siberian elk (virtually identical to the North American wapiti). However, you will need an introduction to red deer courtship. Red deer males advertise via vocalizations, attracting females and then trying to keep them close by, preventing their escape to a rival, that is another, advertising rival. To keep his harem together, the rutting stag herds his harem using threats, even violence. He also has the problem, of course, of approaching females in order to breed. So his courtship posture and behaviour is the antithesis of his herding postures and behaviour. Logical, and described by Charles Darwin who discovered the principle. He was a good observer! The female when the male approaches in courtship posture, lowers her head and makes at a given time snake-like motions with her head, while opening and closing her mouth rapidly. That stops the bull, he turns, and roars or bugles away from the female. That is, he lets her know that he obeyed her cut-off signal. She is in control! She

orchestrates the bull's advance to mating.

In a pen was a deantlered Siberian elk bull, a female and a calf. The bull had just killed female No. 4, whereupon the staff, belatedly, sawed off his antlers. He had therefore just controlled a harem of five cows. The bull, seeing only *one* cow assumed the herding posture towards her and continually followed, even rushed her, wanting her back with the "harem." This went on unendingly so the female by this time was haggard, skin and bones, not able to escape the bull. By the time I saw her, she no longer used the species-specific "cut off signal", rather, she squatted trying to urinate while opening her mouth as if vocalizing - except no sound emerged. She was trying, therefore, exactly what primitive Old World deer females do upon the courtship of the male: they squat to urinate, and head lowered, they vocalize. A perfect, most meaningful regression. Urination distracts the male into urine-testing, giving the female time to move on. Also, if the courted female is not in estrus or approaching such, the male will look for another female and her urine. Finally, the advanced female elk does not squat while urinating.

Val Geist
geistvr@cedar.alberni.net
from paleopsych@paleopsych.org

Play Need Not be Fun.

Play need not be fun. An example *par excellence* is traumatic reenactment—that stubborn "drive" to re-live our emotional traumas (and if necessary, recreate them). This was the so-called "repetition compulsion" that so perplexed Freud that he postulated an ill-fated "death instinct." I hypothesized

an explanation in evolutionary adaptive terms at the first HBES in 1989 and in a publication the following year. This suggested that if one lives in a dangerous but temporally stable environment, then if one survives a particular trauma (say, attack by a lion), one will be more likely to survive a similar one years later if one continues to rehearse (nightmares, revivifications, traumatizing behaviors: all "play", but often not "fun"). Such reenactment will be dysfunctional or frankly maladaptive only in such rapidly changing environments (like now) that future traumas will bear little resemblance to earlier ones. The essence of the "trauma response" appears to antedate the EEA, and is seen in most mobile species.

John Behrs
intarts@teleport.com

Prefrontal Lobes & Justice

John Skoyles' has demonstrated that culture periodically rewires the brain. In tribal societies like those of the Arab Bedouin, instant or delayed retaliation must happen to retain one's dignity. The same applies in Kent Bailey's neck of the woods, where Jukes and Kalikacks still fight family feuds for decades. It was also true in the Greece of which Sophocles wrote. The entire *Oresteia* of Aeschylus is about this primitive form of vengeance. Blood money instead of revenge later became a standard practice among the northern tribes of Germans and Celts, tribes. Blood money was a big cultural improvement, one requiring repression of the animal urge to pounce

with talons exposed and shred the enemy. Then more formal kinds of justice arose in Europe, forms of justice begun long before in the days of Hammurabi, forms of justice enshrined in law and courts. Court-based law demanded an even greater suppression of the instinct to avenge a crime, a slight, an infraction, or a loss than did blood money. It demanded, in fact, a form of gratification postponement which, thanks to the research of the last few decades, we can now pinpoint to a specific part of the brain—the prefrontal cortex. John Skoyles, Jim Brody, and Russell Gardner all explore the manner in which this very human bit of brain manages to rein in the animals by performing "executive functions."

That restraint, that exercise of neural inhibition, makes possible large scale societies which, despite wars and atrocities, are ten times as peaceful as tribal and clan-based groups. Or so says the arithmetic on this subject in *The Lucifer Principle* (Bloom H: Atlantic Monthly Press, 1995).

But when chased by a bear, no room exists for prefrontal deliberations. That's time to shove the prefrontal cortex up to a tree branch where it can watch the animals do what they are so good at—flee, and do it with a grace and cleverness which instantly tells the bear that you master the situation, not he. The animal inside of you joys in its control of the dilemma, in having won the game and in having gained the delight of demonstrating its hierarchical superiority to the foiled befuddled grizzly.

Howard Bloom
HowIBloom@aol.com

Newly-Found Molecule Sculpts Circuits In Brain

Scientists at Johns Hopkins and the National Cancer Institute have found a "missing link" brain chemical that rises and falls quickly in response to stress, fear or an upbeat mood — and then sculpts nerve circuits in the brain accordingly. The finding suggests an unusual pivotal role in the brain for an already-known class of molecules.

"What we believe we've found is a link between what happens to a person on a daily basis and the way the brain responds, from an emotional standpoint, over the longterm," says Hopkins neuropathologist Vassilis E. Koliatsos, with the research team. The report appears in the 12/21/99 issue of the *Proceedings of the National Academy of Sciences*.

Scientists have long known that a chemical called BDNF (for brain-derived neurotrophic factor) acts as a neurotrophin — a class of molecules that prompts growth of nerve cells and their proper "wiring" during development. In large amounts in an embryo's brain, for example, BDNF choreographs cells' proper migration to form the cerebellum. "But we also see BDNF in adult brains," Koliatsos says, "and we never suspected the pivotal role it may play there." In this as well as in earlier work by team researcher Laura Mamounas, the scientists showed that BDNF works specifically on a network of nerves that communicates through serotonin.

Serotonin is the molecule most closely implicated in depression, and raising levels of it in the brain is the goal of many antidepressants. Brain researchers also know that serotonin plays a part in impulsive behavior, aggressiveness, eating disorders and schizophrenia. The serotonin network holds the brain's major pathways dedicated to mood, sleep and appetite. The study shows that BDNF, working directly on the serotonin system, can regulate behavior of the sort linked with that system. "We don't have any other molecular signal in psychiatry that likely has such a direct behavioral impact," says Koliatsos.

Further, because research at Hopkins and elsewhere shows, in animals, that BDNF levels vary with experience — it goes down in stressful situations; it goes up when depression leaves; it goes up during exercise — the scientists suggest the molecule may link the environment and the mood/appetite centers of the brain. "BDNF has all the right features to be the critical signal by which environmental and psychosocial interactions impact on the brain," says Koliatsos. "It's very rapid, it's sensitive, and it affects a system critical for emotional life and behavior. If I had to make a signal that could write messages on the brain from the environment, that would be BDNF."

In the study, the researchers genetically engineered mice in order to shed light on BDNF's role in the brain. The mouse serotonin

system closely resembles humans. By destroying or "knocking out" the normal BDNF gene and by selective breeding, team neuroscientists W. Ernest Lyons and Lino Tessarollo created mice with half the normal amount of BDNF. Mice with no BDNF died shortly after birth. The altered mouse brains at first looked normal, but two sets of experiments showed the serotonin system was damaged: one showed unusual amounts of the protein receptors for serotonin, a classic sign that serotonin activity has dropped below normal. Another test showed activity of a specific gene normally turned on by healthy nerve cells was sluggish - a sign of injury.

In addition, the BDNF-deprived mice appeared noticeably more aggressive and impulsive. "They were much more likely to fight with other mice at the drop of a hat," says Lyons. Further, he adds, the mice had become almost twice normal size because of compulsive, almost bulimic eating. "There's an impulsive quality to their eating and to their aggression that ties into the damaged serotonin system. Impulse control is a well-documented casualty of low serotonin." This same impulsivity is seen in depressed people who commit suicide, which suggests these mice could be a model for testing drugs to lessen suicide or bulimia.

When the researchers treated the mice with Prozac, which increases available serotonin, the fighting and compulsive eating stopped.

ARTICLE:

by Russell Gardner, Jr.

Good-bye to Monthly Newsletter

This issue is slow in arriving at your door. I decided in the final stages of its composition that I had to cease publication of this monthly newsletter. This was not impulsive as the possibility had been on my mind, especially as the decade drew to a close. I did a personal self-assessment and time-study after retiring from university, because my other writing is still not emerging as it must. While there are several issues causing this, the task of generating the monthly issue, more weighty than I knew because it has been such fun, plays a role I had not previously realized.

But my ambivalence was so great that the December issue was not the terminal one, though it almost was and the timing is correct for about now. We now have formally taken leave of UTMB's involvement. Officials there indicated they are transferring the funds belonging to The ASCAP Society and the Psychotherapy Section of the World Psychiatric Association to the nonprofit Madison Institute of Medicine whose name you see on the first page as our official home in Wisconsin. MIM will help with the distribution of the bulletins I mention below. As they are in the information exchange business, they may also have other ideas of how to help. Certainly they are a wonderfully collegial group of people and other Madison people may allow us to experience a discussion group modeled on Birmingham one so important for Michael Chance, John Price, John Birtchnell, Paul Gilbert and other pioneers who have fostered the ASCAP mission.

The final decision did happen, however, as January's issue came together, but I then took an additional week thinking about it in order to accomplish the task as correctly as possible. The thinking has now happened but the delay extended things a bit further because I'm having trouble writing this. Suzie tells me that I seem less burdened than before I made the decision, but taking leave of it turns out to be no easy thing to do.

The omnibus newsletter will be replaced by two focused but less regularly appearing bulletins. One will

manage The ASCAP Society's Annual Meeting and the Beck ASCAP Award. (See the To and From section of the January issue that contains the call for papers by the current ASCAP President, Ivor Jones, and announcement of the Beck ASCAP Award by Linda Mealey). The other bulletin will handle the affairs of the Psychotherapy Section of the WPA, extending the dialogs and opinion-pieces seen this issue, for instance.

Until more decisions are made on the part of the respective governing bodies, there will be no charge for these publications. Each will involve issues distinctive to the organizations (of course many of you plan to belong to both, but a problem with the multi-purpose newsletter entailed material that wasn't necessarily interesting to both groups). Until sorted out, I will assume the same organizational distribution as was active in 1999.

Thus, only the newsletter as an omnibus instrument will cease as well as the current system of subscription. I am doing this unilaterally, not consulting first with the ASCAP Executive Committee as I have principally done the newsletter to this point and must shoulder myself the burden of making a go-no go decision. Any other way would be unfair. Suzie of course has been a good ally as a willing nonjudgmental ear. Now I hope that the ASCAP Society group will come up with new plans, and am very interested in what develops.

A number of you have sent in your 2000 ASCAP subscriptions/dues. These will not be deposited, but rather returned or voided. If you sent in checks or credit card numbers, they won't be used. I apologize to those whose material for publication has been in the pipeline because now it won't be published.

So the cessation should be viewed as a selective discontinuation of a particular activity rather than a dampener on the overall movement symbolized by the ASCAP Society and its newsletter and labeled

variously, sociophysiology or clinical sociophysiology (my personal favorites, as you know), evolutionary psychology or psychiatry, clinical sociobiology, or animal behavior normal and abnormal.

I wish in this discontinuation to not communicate discouragement, upset or anger. I like all of the ASCAP subscribers I have met and believe I would like those known only by name. Life has stages, however. Moreover, goals for which I had hoped at ASCAP's onset have come to pass, at least in part. Significantly, progress has occurred in the overall movement towards a basic science of psychiatry.

My personal state of knowledge is much greater than it would have been had there been no newsletter. For this I thank all the authors, letter-writers, email correspondents, friends, supporters. But now a number of other activities command my involvement, such as authoring a book on the biology of leadership, editing the MacLean Festschrift with Jerry Cory, co-authoring a book with Carolyn Reichelt on sociophysiology, leadership of the Psychotherapy Section and of a psychiatry think-tank committee at GAP. Such work will hopefully result in a wider-spread transmission of the message than ever possible with the newsletter by itself.

Hagop Akiskol, our fellow traveler but also friendly critic, has urged that we get the message out much more widely (including via articles in the *Journal of Affective Disorders* that he edits); ASCAP authors have submitted their offerings in modified form to that and other journals and books have stemmed from work exercised first in ASCAP pages, exactly as I'd hoped. But now I personally need to work on pages other than ASCAP's. My brain swarms with ideas and I'm eager to concretize them on the screen and paper.

I recognize that a need may persist for a publication that deals generally with clinical issues for those who think about evolution in their work with people and animals. Like a phoenix, such may rise from the ashes of the monthly newsletter in its present form. I hope it does and applaud such initiative.

In summary, the ASCAP Newsletter has now entailed

146 issues, twelve calendar years of monthly issues plus two more at either end, December, 1987, the first, and January, 2000, this current last one. The goals and objectives survived more or less intact. The publication fostered a society that meets yearly and via the Beck ASCAP Award fosters the initiatives of new members of our field. A connection with the World Psychiatric Association stemmed from its existence. Now with focused and less demanding bulletins two organizations should be fostered, The ASCAP Society and the Psychotherapy Section of the WPA.

Sears B: *Enter the Zone: A Dietary Map*. New York, NY: HarperCollins, 1995, pp. 99-100.

Extract: Humans weren't around [500 million years ago), but eicosanoids were. In fact, eicosanoids represented one of the first hormonal control systems for living organisms to interact with their environment. This is why some of the eicosanoids sponges make are the same ones that humans make today. This is why every living cell in the human body is capable of making eicosanoids,... conserved during the last 500 million years of evolution....

About 450 million years later came the appearance of paired endocrine hormones like insulin and glucagon, hormones that require a secreting gland and use of the blood stream to reach their target tissues. These hormones required a preexisting biological control system to regulate them, and since eicosanoids were already around, eicosanoids got the job. In that sense, eicosanoids represented the central processing unit that controls virtually all other hormonal actions -just as a microprocessing chip controls ...computers....

Insulin responses evolved to cope with the uncertainty of food supply under extreme, potentially famine-like conditions. If animals... are forced to go long periods between meals..., then the ability to store nutrients can make the difference between life and death.

When times are leaner- between meals.... or during fasts - declining insulin levels mean a corresponding increase in the levels of glucagon. This in turn tells the liver to release stored carbohydrates in a controlled, measured way.

Fundamentals of Psychotherapy

The ASCAP Newsletter has functioned for the Psychotherapy Section. In the future I expect to communicate to section members but with a less frequent and more focused publication, ideas about which I would welcome. But in this final edition of the newsletter, I wish to put forth some challenges that consider how psychotherapy might be viewed evolutionarily (thereby merging the aims of the two groups the newsletter represents). To follow below are five points that seem to be core components of psychotherapy as viewed from an across-species perspective.

Let me first note some assumptions with which I disagree including that I assume in this brief essay the falsity of the assumption that drug therapy is the core analogy for how the treatment works is false. Rather drug therapy and psychotherapy are both members of a larger set of interpersonal relationships of a beneficent nature.

Drug and other medical treatments (e.g., surgery) are frequently powerful and determine outcomes for patients but the fundamental interaction is a more general conspecific exchange that might benefit from exploration. Rather, drug, physical and occupational therapies as well as medical treatments of other kinds represent examples besides psychotherapy of more general treatment interactions. Our question is how can we understand treatment more generally as a human interaction? How can we understand it? Is there agreement that these various treatments, whatever called, specific sets of a more general kind of interaction between people?

Of a beneficent kind. Indeed, teaching as a human activity may be highly related to treatment (curiously, the word, doctor means teacher as it relates to such terms as docile and docent that refer to similar teacher-student relationships); special education teaching may represent an bridging concept, both teaching as we generally understand this and treatment of an impaired population. Of course, the work of

shamans, curanderos and witchdoctors represent variants seen in other cultures.

Another taken-for-granted assumption includes the idea that research limitations may have flowed from faulty conceptualizations of treatment and therapies as homogeneous interventions echoing the delivery of "pure chemicals" as drugs taken in the body. The metaphor may overly limit the interaction and constrain the practitioner.

Problems of establishing homogeneity and meaningfulness in psychotherapies have clearly limited full study of the phenomena involved. For instance, "manualized therapies" instruct the practitioner to follow a set of instructions when dealing with patients. This may bias the therapists' behaviors towards unduly stereotyped interactions as exemplified by the finding that those who followed the manual least well were most successful.

A most general statement of psychotherapy.

So to create a level playing field for discussion, I throw out the following as mutually interactive core ingredients to all therapies (and beneficent interactions). I believe they include the fact that they are:

- 1. Comprised of conspecific interactions of a formalized nature;**
- 2. Demonstrate hierarchical differences between the helper and individual being helped;**
- 3. Imply nurturant intents on the part of the helper (although, also, goods are exchanged in a contractual format, e.g., fees or salaries);**
- 4. Cultural storylines inform both parties of the nature of their interaction and the expected outcomes; and**
- 5. The sense of being helped contributes in a major way to positive outcomes (e.g, the placebo effect refers to the tendency of patients to please their doctors);**

6. One's self-story line, as in one's personal myth, unconscious conflicts and determinants of behavior, the "clay" with which the depth psychotherapist works, may emphasize the person as a machine independent of others, but in fact is intensely social.

Conspecific interactions of a formalized nature.

The use of the term "conspecific" implies that psychotherapeutic interactions can be compared to interactions of individuals of other species. Are there relationships amongst conspecifics of other species that shed light on the refined human activity? Examples may include the interactions of alpha animals to others of a benign grouping typified by a relaxed not hostile atmosphere, parents to offspring that they nurture, herd or like group behaviors; at times, when the therapy does not help, other models for the relationship may have substituted for the original more and, when analyzed in this manner, may furnish counter-examples for appropriate treatment. Such include hostile hierarchical behaviors, predator-prey relations, out-group xenophobic, reversal of parent-offspring roles, or mating behaviors.

Hierarchical differences between the helper and individual being helped. There are probably very few truly peer relations, although the idea of equality originating in Classical Greece has furnished extraordinary implications for early Christianity and democratic governing schemes after the Renaissance. Children do not equal parents, patients doctors, nor students teachers. If equality is approached the goal or "intent" of the relationship may be subverted. At the same time, "respect" as an attribute of the therapist expressed to the person helped has enormous power and if not present, results in lesser or negative effects.

Nurturant intents on the part of the helper (though goods are exchanged in a contractual format, e.g., fees and salaries). This attribute implies that the human exhibits neoteny, retention of child characteristics into adult life. Hence the patient or client (the latter term emphasizing the fiscal contract) is a "child" to the therapist's or doctor's "adult." The formalized nature of this implies that the person helped provides goods to the therapist though this may vary greatly in various cultures.

Cultural storylines inform both parties of the nature of their interaction and the expected outcomes. Skepticism about doctors and treatments more generally have emphasized the importance of checking the assertions made with appropriately gathered data that examines the effects in question. Many treatments have been faulted for their inadequate documentation of positive effects (and lack of negative effects). The use of powerful drugs with significant bodily effects both positive and negative along with negative outcomes for alleged psychotherapies have fostered support for scientific examination. In the heyday of psychoanalysis when such documentation was less an issue for the public (or seen as impossible to achieve), the cultural storyline of effectiveness was assumed and many people got better as a result; this leads to the next point. This was prior to the derivation of powerful drugs and the effect of science in society more generally has led to the new criteria for such practitioners.

One's self-story line may emphasize the person as a machine independent of others, but in fact is intensely social. The extraordinary greater size of the human brain has resulted in greatly enhanced communication with others. We can safely conjecture that imagined actions and action sequences were an important adaptive feature of humans struggling with ice age and other environmental challenges. These were always, we estimate, offshoots of conversations with other ancestors as hunting, moving, fighting and other activities were engaged in or contemplated. This resulted in reprogramming action tendencies in the form of memes not just genes. How the individual brain operates in thinking and contemplation remains an important metaphor but we should emphasize the distinctiveness of the human brain stems from its metaphoric capacity: self-talk is a conversation with different parts of the self "as though" conversations with different individuals takes place.

Waller's View of Depression

Mike Waller (December 1999 issue) cited me as concerned for rigorous hypothesis testing.¹ Although such testing is certainly desirable, it should be noted that prior to making the expensive, time-consuming effort to address a particular hypothesis scientists are regularly concerned about plausibility as well as the comparative fit of competitive hypotheses to the available data. These concerns prompt me to view Waller's hypothesis about the utility of severe pathological depression and suicidality as implausible and inconsistent with known facts.

One of the oldest debates relevant to psychopathology is the question of the continuity or discontinuity of the characteristics of mentally ill people with those expressed by normal people. Since it is an elementary semantic fallacy to assert that things characterized by the same name are the same thing, there must be positive grounds for asserting a commonality between the sobering effects of a disappointment and the manifestations of a clinical depression. Waller provides no grounds for asserting this commonality except superficial resemblance. This is not to deny that disappointment often results in pursuit discontinuation and moving towards alternative pursuits. There are reasons to believe that such an adaptive reactivity is not a useful parallel.

The argument for implausibility depends on evidence of discontinuity with adaptation. I will just list some of the most obvious. The clinically depressed person does not usually become channeled into doing some more competent activity. It is their persistence in incompetence, despite the existence of a rewarding environment, that marks a pathological reaction. How often have we heard patients say, "I just can't understand it. I have everything in life to live for and I'm miserable and can't get anything done."?

Second, such mysterious complaints are often embedded in a syndrome of other behaviors and

affects that do not seem disappointment-relevant. Food has no flavour. Sexual drive disappears. The simple joys of family life are obliterated. They have early morning awakening, etc. When presented with an opportunity to radically improve their RHP, they take no advantage of it. Peculiarly, such states often recur and disappear for no apparent reason. Therefore, even at the level of simple behavioral description, the analogy between disappointment-reactions and clinical depression seems implausible.

When one realizes that such syndromes are regularly believed by tricyclic antidepressants but are not substantially relieved by stimulants, whereas disappointment-reactions are frequently helped by stimulants but not by antidepressants, the conceptual gap gets even wider, and in my view, becomes unbridgeable. However, Waller persists in the belief that disappointment reactions provide a stepping stone to explain the persistence of the unequivocally maladaptive. On this basis he appeals to kin selection in the form of a fable about a generalized loser who casts a blight upon the reproductive success of his wider kin group. Therefore, maladaptive depression followed by suicide actually brightens the reproductive success of the kin group. Is that plausible? In my observation of tight in-groups (e.g., Orthodox Jews), having a schlemiel in the family is a misfortune, but having a suicide does indeed blight a family's chance for reproductive success. Such an anecdotal observation should not be persuasive, but Waller provides no better evidence than a tangential reference to social class and stigma. One would hope for something more pointed such as evidence that schlemiels frequently suicide.

One might refer to such articles as the meta-analysis by Harris and Barraclough with regard to suicides that concludes that, "Virtually all mental disorders have an increased risk of suicide excepting mental retardation and dementia.... The suicide risk is highest for

functional and lowest for organic disorders."² The comparatively low rate of suicide among the mentally retarded (who have it worse than the average schlemiel) with a seriously diminished RHP, renders Waller's hypothesis implausible.

The literature on risk factors for suicide is truly enormous and I don't claim to have made a thorough review. The responsibility is on those who propose a hypothesis to establish the plausibility of that hypothesis and that has not been done. What has been asserted without evidence can be denied without evidence.

Waller could also have pursued the implications of his hypothesis of the evolutionary utility of suicide. Wouldn't it follow that such a group selectionist approach would be most effective if it weeded out the unfit in adolescence? However, suicide in adolescence is more commonly associated with impulsive conduct disorder than depression.

As a sometime propounder of implausible hypothesis, e.g., the spontaneous panic attack is a false suffocation alarm, I hope it is clear that I am not saying that implausibility is a sufficient reason for hypothesis rejection if in fact that hypothesis can explain otherwise inexplicable phenomena (e.g., acute dyspnea as a regular feature of the acute panic attack is not a regular characteristic of fear), but that's not the case here.

References:

1. Waller M: Response to March issue on depression and social rank hierarchy. *The ASCAP Newsletter* 1999;12(12):8-11.
2. Harris EC, Barraclough B: Suicide as an outcome for mental disorders: a meta-analysis. *Br J Psychiatry* 1997;170:205-228.

Duchamp-Viret P, Chaput MA, Duchamp A: Odor response properties of rat olfactory neurons. *Science* 1999;284:2171-2174

Abstract: Molecular biology studies of olfaction have identified a multigene family of molecular receptors that are likely to be involved in odor transduction mechanisms. However, because previous functional data on peripheral coding were mainly collected from inferior vertebrates, it has been difficult to document the amount of specificity of odor interaction mechanisms. As a matter of fact, studies of the functional expression of olfactory receptors have not demonstrated the low or high specificity of olfactory receptors. In this study, the selectivity of olfactory receptor neurons was investigated in the rat at the cellular level under physiological conditions by unitary extracellular recordings. Individual olfactory receptor neurons were broadly responsive to qualitatively distinct odor compounds. We conclude that peripheral coding is based on activate arrays of olfactory receptor cells with overlapping tuning profiles.

Aaron T. Beck

From Goode E: Pragmatist embodies his no-nonsense therapy. *New York Times*, Jan 11, 2000, p. D1



ARTICLE:

by J. Anderson Thomson

Natural Born Killers

The University of Virginia Law School hosted two seminars with three of the leaders of evolutionary psychology, David Buss, Martin Daly, and Margo Wilson. They presented their ideas and discoveries about homicide.

In April 1999 David Buss was a guest in the Psychology Department, and he spoke about his well-known work on evolved human sexuality. A separate seminar was arranged at the Law School for him to present his ideas on homicide. Buss presented an expanded version of the controversial talk at the HBES meeting the summer of 1998 in which he posited evolved homicide modules of the mind, with murder and dead bodies as intended outputs. He also gave a preview of some of the material he presented at HBES in Salt Lake City in 1999, which contained the results of his and his graduate student, Joshua Duntley's empirical research.

Buss began by pointing out that we have had several models of violence and homicide. There is a social learning model, which believes that such things as TV and the media can precipitate violence. There are cultural theories of violence: culture of violence paradigms, a culture of honor theory, and culture specific gender norms. Other theories of violence have included such things as phases of the moon and temperature extremes. Also, homicide has been seen as an automatic indicator of psychopathology, as if there would never be a normative aspect of killing.

Buss thinks these models are wrong or inadequate and miss the obvious conclusion one could draw from the ubiquity of homicide - there are homicide mechanisms in the mind with the intended output not being generic violence, but a dead body. He contrasts this with what he calls Daly and Wilson's agnosticism hypothesis, in which if there is a dead body, it is a "slip up."

As evidence against the dead body being a "slip up" he cites comparative animal, paleontologic, and cross cultural evidence.

Lions, wolves, langurs, chimps, hyenas, honey pot ants, and stingless bees are among the many species that kill their conspecifics. The dead body is intended.

The paleontologic evidence shows that fractures found in many skeletons were probably caused by human violence. There are high rates of cranial trauma and arrow wounds. Male skeletons predominate, and there are many left-sided wounds, which suggests a right-handed attacker.

All cultures, primitive and modern, show deadly violence. There is tribal warfare, blood revenge in foraging societies, and intrasexual homicide, spouse killing, and infanticide in all cultures. Across cultures there are homicides that are, from the outset, not "slip ups." These include warfare homicides, premeditated murder, and rage homicides. The last are exemplified in the law by the "rational man" argument in which there is an intuitive understanding of the reason for the killing, such as the cuckolded husband acquitted in Texas for murdering the wife's lover when caught in the act.

Buss notes that there are, and have been historically, considerable benefits to homicide: vanquishing a rival or intrasexual competitor; gaining access to a rival's mates or resources; eliminating cost inflicting individuals, for example, stepchildren; cultivating reputation; or eliminating sources of strategic interference.

Buss and Duntley hypothesize there were recurrent natural selection pressures where the benefit outweighed the cost for dead bodies to be a designed output of homicide mechanisms of the mind. They think there were many distinct and recurrent pressures where the benefit was greater than the cost such that these homicide modules may be large in number and specific in that each homicide mechanism may have a distinct function.

Buss hypothesizes that these mechanisms are probably sensitive to low cost contexts such as an exploit-

able victim or anonymity. They are sensitive to high benefit yields such as the destruction of a key intrasexual rival or someone powerful like a king. In a sparse environment, access to resources would be highly beneficial. Buss thinks the homicide mechanisms are computational, with self-assessment procedures, mind reading, and deception. "Will the victim anticipate? Will there be a likelihood of retribution? Will I have the ability to control resources if I win? What are the reputational implications?"

Buss thinks research will show there are decisional rules contingent upon these cost benefit calculations. And, emotions, like extreme rage, motivate the behavior. The output is a dead body.

Buss speculates there will be numerous evolved homicide modules. They include: intrasexual rival murder; mate homicide; infanticide; protection of kin; stepchild homicide; tribal warfare (males only); parricide; suicide; siblicide; euthanasia; damsel in distress; and rape revenge.

With regard to war, Buss thinks that women dislike war because there is no benefit to them. Their children and mates are killed, and they may be kidnapped and raped. However, men may have evolved to like war because the average reproductive gain is the same, even if all but one man is killed. If ten men go to war and their are fifteen women as prize, the reproductive gain is the same no matter how many men perish.

He believes that the cost assessment procedure will be different for women even though they may have fantasies of homicide. (What we have thought of as fantasies of homicide, may be what Buss thinks is "scenario building" to make cost/benefit assessments.)

As with Buss's idea that intense male sexual jealousy is evidence for short term mating strategies in females, he thinks there are antihomicide modules in the mind, which provide evidence for homicide as a recurring phenomena.

In the most entertaining part of his lecture, he noted why it is worse to be dead than you might have thought. There is damage to the victim: Your future reproduction is elimi-

nated. Your loss is the rival's gain. You lose access to your mate's residual mate value. And, you lose additional mating chances with her and other women.

There is damage to your offspring: You cannot invest in your children. You cannot protect your children from exploitation. You lose the ability to influence your children's mating. And, your children become stepchildren, which puts them at risk.

There is also damage to your kin group. There is loss of protection. There is possible loss of reputation and your group is seen as vulnerable and exploitable. You lose kin mating influence. With your death, kin ties between two families may be severed with potential loss of alliances.

He notes that the cost of being killed and the risk of being killed probably occurred with predictable frequency so that antihomicide modules of the mind evolved as well.

Similar to the homicide modules, he thinks that antihomicide mechanisms would be sensitive to high cost contexts, e.g. vulnerable and no support from kin allies. They would be sensitive to context; you'd fear those whose strategies you blocked. You'd fear those who stood to gain from your death.

There are computational and mind reading elements regarding likely attackers: What is your opponent's intent? And, are there deception detection mechanisms involved? (Is this related to paranoia?). There might be scenario building, decision rules, and emotions, such as fear, that would be involved.

As examples of possible anti-homicide modules, he suggested intrasexual rivalry homicide avoidance, mate homicide avoidance, and infanticide avoidance in the child. The last might be reflected in stranger anxiety and the smile reflex.

In conclusion, he thought that homicide was a recurrent feature in the selective environment in evolutionary history and that the dead bodies in homicides are designed and not "slip ups". Buss thinks there will be empirical evidence to support the comparative, paleontologic, and

cross-cultural evidence.

On the 28th of October 1999, Martin Daly and Margaret Wilson presented at a large conference on family violence sponsored by the University of Virginia's Center for Children, Families, and the Law. This was the main reason for their visit to Charlottesville, and their talk on violence was a nice prelude to their seminar on homicide at the Law School.

They started with a definition of evolutionary psychology. "Psychological processes and mechanisms are products of evolution by selection and should be intelligible as means to the end of fitness in past environments. Basic human motives, likes and dislikes, attentional priorities, and cognitive processes exist to promote: success in reproductive competition and nepotistic distribution of benefits. There is a psychological bias towards kin. All attributes of an organism are nepotistic (Hamilton). They defined a conflict of interest as when the fitness interests of one person are in conflict with or will do damage to others' fitness interests.

They looked at homicide as an assay of conflict. Unlike self-report data, homicides reflect a genuine and ecologically valid measure of conflicts, and they are minimally biased in reportage. They think that homicides serve as severe and extreme manifestations of conflict, but they may be also considered the extreme end of the distribution of normal violence. And, they share commonalities of motive, cause, and risk factors with non-lethal violence.

They note (in contrast to Buss), that to apply evolutionary psychology need not assume killing is or ever was adaptive. They treat homicide as an assay of conflicts that are usually non-lethal, and like any psychology, evolved processes are operative.

Prior to Daly and Wilson, data on family violence was confusing, and the evolutionary implications obscured, because genetic relatedness was not taken into account. If a spouse killed a partner, or a sibling-in-law, it was recorded as "family." Daly and Wilson's consideration of genetic relatedness yielded the findings for which they have gained such deserved attention.

Daly and Wilson offered data, using the coefficient of relatedness, showing that when two people murder one person, the co-accused are more related than the victim and killer.

Within a house, a spouse and non-relative are at greater risk of being killed than a genetic relative is. At maximal risk of homicide are the youngest children or infants, often killed by stepparents. To the surprise of Daly and Wilson, there was little risk to adolescents (whom we'd all like to kill).

Stepchildren are less likely to finish high school, less likely to finish college, and receive less investment from parents.

Daly and Wilson believe that parental solicitude evolves to track cues of the child's nepotistic value (NV). The nepotistic value is the expected future inclusive fitness in the environment of evolutionary adaptation.

They believe filicide is a reverse assay of parental solicitude. It declines as a function of the child's age. The decline is sharpest and most concentrated in the first postpartum years.

The likelihood that a child grows up to kill the mother increases with the age of the mother at the child's birth. They did not speculate why.

They believe that mate solidarity functions very much like kin solidarity. The correlated fitness interest imparts commonality of interests. They believe the basis of mate solidarity is unlike blood kinship in that it is more easily undermined; desertion or adultery can abolish the fitness correlation.

Separated wives are more likely to be killed by their husband than a wife who is still at home, e.g. Nicole Brown Simpson, O.J.'s ex-wife.

The youngest wives are at greatest risk, especially those with an older husband rather than with a same age husband. Violence is greater when there is a wide age disparity between spouses and within common-law unions.

Wives are also at greater risk if they have only children

from a previous union in the home with a new husband; the risk is reduced if they have children with the new husbands.

On the following day, Daly and Wilson presented to the same group at the University of Virginia Law School, which had heard David Buss in April. The title of their talk was "Inequity, Risk Taking, and Violence."

They believe the male mind set contains components of risk taking, including a willingness to engage in behaviors in which someone will end up dead. Victim characteristics are similar to perpetrator characteristics: male, armed, and willing to engage in confrontation. The confrontations are competitive: over women, over resources, and over status and reputation. There is often a social display aspect: in bars, dancehalls, etc., where there are spectators.

They repeated their view that homicide is a conflict assay.

They thought that risk is often operationalized as an outcome variance. To take a risk is to accept an increased chance of a bad outcome in pursuit of a desired outcome. If risk averse actions fall short, then increased variance in access to means of reproduction favors increased competitive effort: over generations (natural selection) and within lifetimes.

With regard to sex differences in risk acceptance, in polygamous species, including ancestral humans, male fitness variance exceeds female fitness variance. Men have both a higher ceiling of potential fitness and a higher probability of dying without issue. They can have many or no children. This selects for greater risk acceptance by males.

Fifty percent of homicides in the U.S. are male on male violence over issues of "face." Family rates of homicide seem the same across cultures. Male/male violence is high when homicide rates are high.

The risk of childlessness and necessity to compete drives male/male violence. Women and older men tend to commit homicide only when taking risks to protect children.

In homicides in which the victim and the killer are unrelated and the same sex, the proportion which is male ranges from 97 to 100% and these include both primitive and modern cultures.

Young men engage in male/male homicide, and the rates peak in the mid-twenties. The victims are in the same age distribution, and this is true even when the rates of homicide are different. They gave examples of Chicago, where the homicide rate is 800/1,000,000, versus Canada, where it's 50/1,000,000. The age distributions are identical.

They quoted from Hirschi and Gottfredson in 1983 who said "age distribution of a crime is invariant across social and material conditions... the change in the crime with age cannot be explained by change in social situation of people over the course of life." Daly and Wilson thought that this couldn't be true. They found that marital status affects whether young men commit male/male homicide. Young divorced men have the same rate as single men, and widower males have the same rate as single men.

They noted that testosterone goes up after divorce and goes down when married. Divorced men may revert to a biological single status.

Females value males by resources. In all age categories unemployed men have higher rates of homicide than employed men do. There is little data about the assets per se of the men.

Inequitable access to resources aggravates the risk of homicide. Cross-national rates of homicide in industrialized nations are predicted not by the median family income but by the degree of inequity. Daly and Wilson utilized Lorenz curves and Gini coefficients, which are measures of inequity. The Chicago neighborhoods with the greatest inequity (difference between rich and poor) were in the poorest neighborhoods, and they had the highest homicide rates. This was different from Canada where the poorest provinces actually were the most equitable and had low homicide rates.

They noted in Chicago that life expectancy had a 20-year difference for males and 10 year difference for women

between the poorest and richest neighborhoods.

They also reported from statistics from Chicago that homicide rates were highest where life expectancy was lowest. They raised the questions: What is this picking up? What is being tracked by men in these neighborhoods as they grow up? Are they in some way responding to the perception of short futures in their calibrations of taking potentially deadly risks?

At the end of the seminar they were asked about David Buss' idea of homicide modules. Martin Daly thought that the dead bodies were "by-products of motives that lie elsewhere". He felt that Buss was asking important questions: Are there parts of the mind that are dedicated to killing, and are they dedicated to specific kinds of killing?

Margo Wilson thought that with a gun, which is in effect a novel environment, you now do damage before assessment of damage might have led to backing off. She thought this a more likely context in the EEA. Injure and withdraw might have been the norm in the EEA. With guns one now kills instantly. One hardly wants to be the second one to shoot, so one will use deadly violence immediately or sooner than one might have in the EEA.

Margo Wilson also thought there was clear evidence for infanticide mechanisms or modules with the dead bodies as intended output. She thought with male/male violence there might be dead bodies as the intended output. She took exception with Buss's idea of a specific evolved mate homicide mechanism. She could not conceive of recurrent selection pressures where the benefit was greater than the cost of killing a mate. There would be the loss of reproduction and retaliation by kin.

The seminars were superb. We can only hope that Buss, Daly, and Wilson will be together and discuss these ideas in a presentation at the 2000 HBES meeting in Amherst, Massachusetts.

Panksepp, Jaak: *Affective Neuroscience: The Foundations of Human and Animal Emotions*. New York, NY: Oxford University Press, 1998, pp. 135

Extract: [!]It is remarkable how far down in the brain stem the executive mechanisms for REM sleep are situated: The heart of the major concentration of REM-initiating neurons lies caudal to the ARAS [ascending reticular activating system] waking mechanism. Brain mechanisms that evolved earlier are typically lower within the neuroaxis and in more medial positions than more recent additions. Are we to believe that REM mechanisms are somehow older than waking ones? However unlikely this may seem on the face of it, the above brain localizations coax us to consider such an absurdity....

"[A]lthough REM is an ancient brain function in mammals, to the best of our knowledge, fish and reptiles exhibit no such state. REM sleep is also rudimentary in birds, occurring only in brief and infrequent episodes. Indeed, one ancient egg-laying mammal, the echidna (... [with] an enlarged frontal lobe and no corpus callosum), apparently exhibits no REM sleep. Using this evolutionary context as a background, it is unlikely that REM evolved de novo within the lower brain stem of early mammals... [M]ore reasonabl[y]... the brain mechanisms that now mediate REM in essentially all mammals [probably] subserved some other type of brain function in ancestral creatures. Indeed,... we might surmise that what is now known as the REM mechanism originally controlled a primitive form of waking arousal. With the evolution of higher brain areas, a newer and more efficient waking mechanism may have been needed, leading to the emergence of the ARAS. The more ancient form of arousal may have gradually been overridden and relegated to providing a background function such as the integration of emotional information that seems to occur during dreaming. People who hold dream experiences in great esteem may be correctly affirming the importance of the affective information that is encoded in through our ancient emotional urges for the proper conduct of our waking activities."

1. Damasio A: *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*. NY: Harcourt Brace, 1999, p.28

ARTICLE:

by J. Anderson Thomson & Ed Hagen

Post-Partum Depression & Anxiety

Andy Thomson to ASCAP: I'm forwarding an e-mail exchange with Ed Hagen that might interest you and ASCAP readers. Ed said was OK to publish it. He is off to Yanamamo land for 3 months. His paper on Post Partum Depression was finally published in *Evolution and Human Behavior* which is what prompted this exchange.

First we provide the abstract of the newly published paper:

Hagen EH: The functions of postpartum depression. *Evolution & Human Behavior* 1999; 20:325-359.

Abstract: *Evolutionary approaches to parental care suggest that parents will not automatically invest in all offspring, and they should reduce or eliminate investment in their children if the costs outweigh the benefits. Lack of paternal or social support will increase the costs born by mothers, whereas infant health problems will reduce the evolutionary benefits to be gained. Numerous studies support the correlation between postpartum depression (PPD) and lack of social support or indicators of possible infant health and development problems. PPD may be an adaptation that informs mothers that they are suffering or have suffered a fitness cost, which motivates them to reduce or eliminate investment in offspring under certain circumstances, and that may help them negotiate greater levels of investment from others. PPD also appears to be a good model for depression in general.*

Andy Thomson reacts to Ed Hagen:

My copy of the Sept 99 issue of *Evolution and Human Behavior* arrived yesterday. Congratulations on the publication of your article. I hope you are pleased and proud. You should be.

I read the published article and a few other ideas occurred to me. (Thank you very much for the kind

acknowledgement at the end.) On page 346 you remark that diminished ability to concentrate and hypersomnia are precisely the opposite of what one would expect. One thing that you and Paul and evolutionary psychology has made me do is inquire beyond the old question to depressed patients, "How is your concentration?" and take their report of loss of concentration as evidence of depression, period. I all too often did that, especially as my job has veered to medication (inevitably antidepressant) evaluation/management of patients in therapy with someone else.

Concentration in depression

When one inquires carefully about concentration, patients talk of not being able to concentrate on their usual job (school, work, etc.). They are concentrated on their interpersonal world. Their ruminations in fact are an increased concentration on their social injury. The negative affect forces them, whether they or social partners want them to or not, to stop business (or school) as usual and focuses their attention on their interpersonal world/niche. It is helpful to them to point out that their concentration is actually not impaired, but that their mind is forcing them, against their conscious will, to concentrate on a social situation they'd rather ignore or find too painful.

This is consistent with the serotonin story (Barry Jacobs) with its primary function being gross/repetitive motor facilitation and suppression of information processing. Serotonin goes down or is less effective and you stop activity and start to information process like crazy (rumination). Serotonin pumps turn off only during REM sleep. Early morning waking, insomnia, is the way the body has to keep them on, compensate, and maybe help think about one's problems when all is quiet, no alarms.

I now routinely ask what people think of when they wake early or cannot get to sleep. They'll initially say they don't remember, or brush it off, but if one nudges, one discovers they are ruminating about their interper-

sonal world and the source of conflict/injury. Great tool to help identify the crucial conflicts. It's clear in my post-partum depression (PPD) patients who, as you would predict, are concerned about the infant's future, husband's support, kin support, and so forth.

Do SSRI's short-circuit needed thought?

A woman professional student got put on an SSRI. She had gotten severely depressed and had ruminated about her attractiveness relative to others (recent rejection from high status male whom she had gone after, including sleeping with, for the explicit purpose of defeating some rivals) On the medication, she improved dramatically and said the main thing she noticed was not being concerned what her rivals thought of her. She could "concentrate" on her studies again and was most grateful.

But, it left me uneasy. With the drug, I'd made her feel like all was well, when the crucial conflicts in her life had not been dealt with. Her depression was in effect a threat to defect from professional school, about which no one except her cared, hence all her distress. But her mind was treating the professional school class/section like a kin group and she was deploying a depression to deal with conflicts there that had to do with mate selection and retention.

Hypersomnia, more common in women depressives than men, may represent stopping unproductive activity, amounting to defection and thereby saving resources.. John Pearce has some excellent ideas on the oversleeping/overeating in women depressives as opposed to men that have to do with hunger/resource scarcity adaptation.

Agitation.

On page 349 you are not certain about how agitation would fit in with the defection hypothesis. I think it is consistent. PPD women are embarking, unconsciously, on a high-risk, potentially dangerous strategy: defection from a newborn. That will turn on vigilant mechanisms. Consciously they don't know what or why they are doing it, and it scares them like hell, fearful of the child's survival, husband/kin retaliation,

anger, abandonment instead of or accompanying the needed increase in investment. Agitated non-PPD depressions seem the same to me. The individual is trying a high risk defection/niche change extortionary negotiation and it is potentially dangerous, hence anxiety mechanisms triggered.

John Pearce also has some ideas on why women are more anxious than men, more depressed therefore, and have more agitated depressions.

Again, congratulations.

Ed Hagen reacts to Andy Thomson:

Cool, it's out. We're off to the field in about a week and half, so things are getting a bit hectic around here. I'll be gone for about 3 months.

Thanks for your comments about concentration 'problems'. That has been exactly my experience as well. It is only true that depressed individuals can't concentrate on what they 'think' they should concentrate on, rather than on what they really should be concentrating on. In those arenas, in fact, they commonly complain that they are concentrating too much. If only they could somehow turn off their brains, everything would be better.

I also share your concerns about the effects of SSRI's- they short-circuit a very necessary re-evaluation of current circumstances. I can't remember if I left that part in the paper or not.

As for my comments on agitation, I agree completely that it has to do with anxiety. But that merely begs the question, why is psychomotor agitation associated with anxiety? In particular, why the 'physical' agitation? It could be the priming of the fight-or-flight response, but that argument would have to be made carefully (which I didn't have the space to do).

Actually, I have made a bit of theoretical progress with the close association of anxiety and depression. It was pretty obvious in retrospect. Anxiety is NOT merely vigilance. A hunter can be vigilant towards signs of prey without being the least bit anxious. Nor

is anxiety merely vigilance towards potentially costly circumstances. I look both ways when crossing the street without feeling anxious. Anxiety triggers when the current fitness enhancing strategy appears to no longer be fitness enhancing, but neither is there an obvious alternative strategy.

Consider an individual walking through the woods (strategy 1). He spots a bear drinking from a stream, and freezes (strategy 2). When he is certain the bear is not looking, he stealthily withdraws (strategy 3). At no point was this individual necessarily anxious.

When strategy 1 became costly, an obviously better strategy was immediately apparent (2); at the appropriate time, strategy 3 was engaged. This individual was vigilant, and, because he was walking in the woods, perhaps even had a heightened vigilance, but was never anxious.

Now consider the following scenario: A man is walking through the woods (strategy 1) when he hears some suspicious noises. Should he continue walking along his current path (2)? Should he turn back (3)? Should he hide (4)? The current strategy (1) has suddenly become potentially costly, but there is no obvious alternative strategy. This man needs to increase vigilance towards costs, but he also needs to try and find a less costly strategy. This is anxiety. When you are 'trapped' in a costly strategy with no obvious exit strategy, then you become anxious. What this means is that you increase vigilance towards potential costs, you re-evaluate the benefits that were to be gained from this strategy, AND you prioritize the seeking of a better strategy. When the costly strategy and associated barriers are social, we find ourselves in precisely the circumstances that depression was designed to solve. Thus, when one is 'trapped', anxiety triggers. If anxiety doesn't solve the problem AND the circumstances involve social strategies, then depression will trigger as well. This is why anxiety and depression have such high rates of comorbidity: they are responses to the same problem. achieved."

Gray J: Numerical concoctions. Review of Once Upon a Number: the Hidden Mathematical Logic of Stories, by John Allen Paulos, Penguin, 1999. Nature 1999;402:724-5.

Extract: Sadly, we do not make our way through life the way professors of statistics... would have us do. ... Juries fail to give equal weight to all evidence... psychics do well, though doing no better than chance; fraudsters separate the credulous from their money.

To his credit,... Paulos, a mathematician... thinks the problem lies in the way we build up stories we use to get us through life, the explanations we concoct and the way we feed quantifiable information into the mix.

Reiser MF: *Mind, Brain, Body: Toward a Convergence of Psychoanalysis and Neurobiology*. New York, NY: Basic Books, 1984, p. 8.

Extract: [W]hat occurs in the interface between the mental and physical realm, as they are simultaneously involved in cognitive processes and in activating stress response systems... [?]

We ... illustrate the serious gap of our knowledge at this interface.... [P]icture the following scenario: It is Sunday afternoon during the football season, and hundreds of thousands of people.. are watching a television broadcast of an important... game. With the score tied, in the closing play, a long pass thrown deep into the end zone is intercepted and run all the way back down the field - scoring the winning touchdown for [one] team. Three middle-aged men watching this rousing finish may drop dead from cardiac arrest. Now, and, here is the point, if the pass had not been intercepted but had been caught by a player from the passing team (scoring the winning touchdown), three other middle-aged men would be the ones to suffer cardiac arrest.... [S]omehow the meaning ... determines the occurrence of actual electrophysiological events in the victims' brains and then hearts.

Outside the Body

Neurophysiologist Walter J. Freeman, in his *Societies of Brains: A Study in the Neuroscience of Love and Hate* (Erlbaum, 1995) reports on page 85 that "some individuals terrorized by explosions, falls, and other violent events, have reported hearing repeated screams, and only later realize that the cries were their own...." Sounds like a very strange notion—that "we" should make a loud and piercing sound, and that our "self" should remove itself completely, disavowing any affiliation with the person whose mouth has flown open and whose larynx has shredded the air with the razor of a shriek. At first thought it makes no sense. Why would a "self" put a distance between itself and the person within whom it lives and with whom it claims to be identical? And how would it manage such a trick?

Let me try to sketch a quick answer to the question. First off, we already know that the self is a detachable add-on only loosely connected to the body it thinks it commands. Digestion, the thumping of the heart, the distribution of the blood supply, the constant death of cells and their replacement by new ones, these and a host of other chores are handled constantly with no participation from the self at all. Decisions to act show up in the cerebral cortex roughly a third of a second before they pop up on the radar screen of consciousness. They are announced to the self considerably after the fact. Then, as Michael Gazzaniga and his fellow split-brain researchers have shown, the self makes up a story to cover for its ignorance. It not only takes credit for deciding to do what, in fact, it only knew was being done once the act was underway, but it supplies a reason for this decision, often one that's phony as can be. How does it get away with such effrontery? More important, why does it bother? Why is expensive cerebral real estate and valuable energy used to create an explainer that often doesn't know its derriere from its duodenum? Here's a quick sketch of an answer to the questions I've just plomped onto the table. A social group is a learning machine which functions much like a neural

net. Neural nets give power and connections to those nodes which are contributing to the solution of a problem at hand and cut much of the juice and most of the ties to a node which is going off in the wrong direction. The nodes in neural nets of humans are, well, humans. Individual humans, that is. Those of us who seem to be on top of things get power and influence. Everyone crowds around them, presenting them with a rich supply of connections and of what those connections provide—influence. Very neural netty. What's more, folks on top of things are rewarded internally with the chemical cocktails which produce confidence and delight—serotonin, dopamine, and a rich mix of others. Managing to have things under control brings yet another bonus—an uptick in the protective power of the immune system.

On the other hand, folks who've lost their grip and can't seem to get a handle on things are treated in the opposite manner. They usually get less of society's wealth, less of the immune system's health, fewer connections, and very little influence. "Nobody loves you when you're down and out." Making things worse, the folks who can't get a grip are poisoned by their own internal liquids. They're hit with glucocorticoids and other stress hormones which do such wretched things as removing their sense of confidence and ruining their health.

It's all hideously unjust, but it's the way the neural net learns. So where does the conscious self fit into this picture? And why in the world would it occasionally distance itself from the very person in whom it lives? Here's a suggestion or two. Self and consciousness are social interfaces. They're the makeup artists who, as T.S. Eliot put it "prepare a face to meet the faces that you meet." That face not only meets others, it meets the components inside our body which decide to gift us with chemicals of health and contentment or punish us with a far more bitter brew. Since neural nets give power and popularity to those who can show they're on top of things, it's critical that

the self look like it's got a handle on even the most unlikely of our actions. Even when we slip up, the self works hard to make the mistake seem like either something we did for a good reason, or like it was not our doing at all, but the fault of someone else. To bring us what we need to survive, the self has to appear to be under control at all times. But sometimes we are not in control—in fact, we are wildly out of whack. In some of those instances, the self attempts to pull off the illusion that it still has a socially acceptable handle on things in the oddest way. It steps free of the body in which it's housed and says, "hey, that's not me."

This, I'd propose, is what's happening when humans in the grip of instinctual panic scream, listen to the noise, and say "that's gotta be someone else." It's also what's going on when a Jewish concentration camp victim puts Nazi designs on his prison outfit and, as Anna Freud put it, undergoes "identification with the oppressor." Or when a kidnap victim like Patty Hearst abandons her previous self and goes whole hog into joining her captors. "That pathetic victim so obviously under the thumb of others isn't me. They are in control, so I must be one of them." It also happens when we are hit with catastrophic pain (as I was when thwomped by an enormous kidney stone at the age of 20) and feel that we've floated up to the ceiling and are watching the body writhing uncontrollably on the floor from a haughty distance.

The basic algorithm of a neural net is the one expressed by Jesus in the book of Matthew—"To he who hath it shall be given. From he who hath not, even what he hath shall be taken away." The self is the part of us that knows this very well, and tries its best to make it look like we indeed do hath. What hath we? The ultimate currency of a neural net, a handle on things. We are in charge. We have control. That screaming fool who's lost it obviously can not be me.

References:

Libet B: The neural time factor in conscious and unconscious events. *Ciba Found Symp* 1993; 174: 123-37

Gazzaniga MS: Organization of the Human Brain. *Science*, 1 September 1989: 947-952.

Gazzaniga MS: *Nature's Mind: The Biological Roots of Thinking, Emotions, Sexuality, Language, and Intelligence*. New York: Basic Books, 1992.

Gazzaniga MA, Eliassen JC, Nisenson L, Wessinger MC, Fendrich R, Baynes K: Collaboration between the hemispheres of a callosotomy patient. Emerging right hemisphere speech and the left hemisphere interpreter. *Brain*, August 1996 (Part 4): 1255-62.

Gazzaniga MS: Brain and conscious experience. *Advances in Neurology* 1998;77:181-92.

Gazzaniga MS: *The Social Brain: Discovering the Networks of the Mind*. New York: Basic Books, 1985.

Bruno Bettelheim: Individual and mass behavior in extreme situations. *Journal of Abnormal and Social Psychology*. 1943;38:417-452.

Blum HP: The role of identification in the resolution of trauma: the Anna Freud memorial lecture. *Psychoanalytic Quarterly*, October 1987:609-27.

Freud A: *The Ego and Mechanisms of Defense*. New York: International Universities Press, 1946.



ARTICLE:

by Frank Koerselman & Russell Gardner

The Koerselman-Gardner Dialog: RG comments

Responses to EVOLUTIONARY PSYCHOTHERAPY by Frank Koerselman

Introduction and stage setting by Russell Gardner.

In the September, 1999, issue of *The ASCAP Newsletter*, Frank Koerselman put forth a statement about evolutionary psychotherapy. I stated that I would provide some dialog questions so his statement presented full and uninterrupted then is here reiterated but now punctuated by questions that I pose. I hope rather than feeling stressed and unpleasantly challenged that he will rather be stimulated to say more. Happily, after reading it, he responded and his statement follows this one. I hope that is, that this opens an open discussion hardly limited to the two of us.

Thus, I hope that here the WPA Psychotherapy Section Chairman (RG) and Co-Chairman (Frank Koerselman) engage in open no-hold-barred dialog (though with hedonic playful tone We hope to model for section members (and anyone else interested as well) discussion that fosters rubber meeting the road (to use an American expression) with traction and forward progress. My aim in responding below is not the destruction of Frank's points but rather pointing out areas that require further explanation and exploration. Psychotherapy is a complex twentieth century phenomenon that for its maximum twenty-first effect needs better explanations and explication. Frank began this process at the Hamburg meeting and I hope this to further our collective thinking.

Eventually I hope that we arrive at description of elements basic to any psychotherapy: in core human terms, what elements does it encompass? How are these combined and recombined? (Also see the end of my ASCAP & psychotherapy section essay that begins this issue).

FK: Psychotherapy resembles a tree that has grown many different branches. One young and promising branch seems to be Evolutionary Psychotherapy.

RG: What are the essential differences between evolutionary psychotherapy and any other kind? To continue the metaphor what is the trunk? What is meant by a term that includes evolutionary as a modifier other than references to the idea that the therapist alludes to evolutionary history as determining present day behavior? I am not completely happy with the word "evolutionary" as it conjures instant negative reactions on the part of people who otherwise might be happy consumers of the product, and because Darwin didn't like it, as he thought it implied evolving to perfection? To me at this point, evolutionary psychotherapy means explanations of behavior that entail innate dispositions rationalizing otherwise unclear, pathological and/or mysterious processes.

FK: To evaluate its position and potential it is useful to consider what psychotherapy really encompasses. There is, of course, a wide range of definitions. It is not necessary to go into details now.

RG: Although one must acknowledge that angels and devils lie in details. I'll suggest that a formal contract with differentiated statuses of helper and helpee are involved. It might be useful to review Jerome Frank's formulation again at some point; also Harry Stack Sullivan approached the matter from basic points of view, as in his book on psychiatric interviewing that I read assiduously early in my education as a psychiatrist.

FK: Suffice it to choose a practical vantage point. One could say, then, that psychotherapy is the application of systematic communicative techniques aimed at changing mental dysfunctions.

RG: The allusion to "communicative techniques" reverberates with my feeling that psychotherapy is misnamed: it truly reflects interpersonal problems that are dealt with interpersonally, with an ally when it works right, not tinkering as one does on a car (a machine conceptually independent of all other machines). The term mental dysfunction echoes a usual assumption of independence; so I feel that a better term would be communicational or social dysfunctions.

FK: Central to this definition is the concept of mental functions. Cognitive science makes clear that any mental function plays its role in information processing.

RG: Just to carry through the previous thought, are we sure that mental functions aren't all social and communicative at core, even though they may occur in an individual brain. We are intensely involved with other people at all points of our lives, even if alone we have the memory or anticipation of other people known intensely or casually — or never even met. This doesn't challenge the importance of information processing, only emphasizing that information processing is not a solitary human endeavor.

FK: Information processing encompasses many different steps. Most important are

Situation,
Interpretation,
Registration, and
Action.

Situation refers to any relevant input that, tested against memory content, gives rise to a signal in the form of emotion. From emotion springs the tendency to do something, to act or react.

RG: So situation relates immediately to emotion. Emotion generally focuses on the individual's experience. But to remain consistent in my emphasis on social communication, usually emotion communicates as Paul Ekman³ and Iraneus Eibl-Eibesfeldt⁴ have shown. Moreover the communication that emotion encodes stays constant across cultures. Thus brain-mediated experience is truly communal.

FK: This sequence maybe short-circuited, for instance via the spinal reflex arc, but even when the impulse reaches the brain, it can take the 'low' or immediate and the 'high' or conscious road, as Le Poux calls it. So, emotion' may refer to a sudden sensation or affect as well as to more stable or elaborate mood. In purely cognitive, planned action it is even possible that no emotion will be felt at all. Of essential importance is the meaning of the emotion: what significance does it render to the input-situation?

RG: I would argue and suspect that I would not encounter opposition from Frank that meaning has implications depending on the life story of the person and his/her

relations. Meaning (to be redundant with my theme) is intensely interpersonal.

FK: Cognition, emotion and action principally serve a certain goal. They aim at something, they are about something. This 'aboutness' is called intentionality. Intentionality is a general feature of any normal biological function. Intentionality connects the organism to its environment. We see something, we eat, grasp, think or feel something. Intentionality is to be found at any biological level. Even lymphocytes, for instance, act purposefully in destroying bacteriae. They thus save the individual to live on in order to transfer his genes into the community. Intentionality of mental functions essentially refers to meaning. Any situation can only become meaningful when connected to a motivation.

RG: Ernst Mayr makes similar points as he defends the case of biologists against the earlier attacks of the physicists.⁵ Reproducing molecules imply intentionality. But this a different anticipation of the future than is that of conscious planning of people which relies on the DNA having made some CNS structures that anticipate the future using memory and deliberation (and I argue that better planning occurs when talking things over with other people). The brain of humans which is larger than that of their primate relatives seems to have a lot to do with not only the social relations of the person where the brain resides but also with anticipation of events with other people.

FK: Intact intentionality is conditional to healthy adaptation. In disease the intentional relation between the organism and its environment is basically disturbed.

RG: Just to see if I understand this point: if I have peptic ulcer the usual function of the stomach (to digest food without pain) is interrupted and I cannot function well in the environment. This is what I suggest is DNA-level intentionality, not the CNS level that we imply when speaking of psychiatric disorders.

FK: Psychiatric disorders can be characterized by disrupted intentionality of mental functions. In some instances intentionality may be altogether lost, in other cases it will mainly be distorted. So, in schizophrenia nothing seems able anymore to elicit desire, happiness or sorrow. Instead, the patient is connected to the world by means of non-existent

voices in which he doesn't recognize his own thoughts. Depressed patients often feel disconnected from their habitual surroundings, suffering most from their inability to feel anything. Patients with anxiety disorder on the other hand react with fear to situations that represent no real danger.

RG: This is CNS level — not DNA level — intentionality, right?

FK: Sometimes environmental situations may be so overwhelming that even normal mental functions fall short to process them. Life-threatening traumatic experiences may produce a state of numbness in which the affective link between subject and environment is broken. This may result in a posttraumatic stress disorder. In such a case loss of intentionality is the cause of a psychiatric disorder.

RG: This is a metaphor of breakage. Interest in what is going on is lessened and that interest is the usual intentionality of the person. Did I get that right? Yet maybe breakage is less precise as the metaphor than one of emphasis: the PTSD patient is better off if he/she doesn't connect too powerfully with other people or with anticipation of future trauma; he/she emphasizes distance in their connections. This is not the same as breakage.

FK: In other cases, e.g. in schizophrenia, bipolar disorder and the like, the disease itself breaks down the ability to uphold an adequate cognitive, emotional, i.e. intentional bond with one's situation. Here loss of intentionality is secondary to the disease process.

RG: Cognitive and emotional = intentional. You imply that everything thought and felt has a future orientation.

FK: In other words, it is a symptom rather than a cause. This may, of course, have consequences for treatment. In cases where disruption of intentionality (because of the impact or longevity of environmental factors) is primary, treatment may in principle be causative. In other instances treatment is mainly to be regarded as revalidation. In both conditions, however, systematic and well-directed communicative interventions aimed at restoring intentionality may be of particular importance. By definition such interventions would represent psychotherapy. The central goal of

such a psychotherapy is restoration of intentionality. More specifically this means restoration of the meaning or significance of relevant situations. So, the question is now: how can we reconstruct meaning and significance?

RG: Joe Weiss and the San Francisco school (including ASCAPian Lynn O'Connor) agree with you.⁶ Their idea is that person has a life plan and one's intent in psychotherapy is to foster that plan, remove interferences with the plan (or life story-line) that others like parents of young adults, for instance, may have fostered (the young adult is prevented from leaving the parental home, for instance) as a result of parental need.

FK: Emotion may be regarded as the indicator of the quality of a given situation. Emotions help us to recognize a situation as positive or negative. The decisive criterion in this respect is motivation, that is the meaningful interest we give to this situation. Depending on its interest the one situation may be much more urgent than a second one. What makes the difference?

RG: So you are focusing on what makes people choose situations? It's not intuitive how this works as with a patient. I assume that this refers to why the patient choose to consult the clinician's office, such as feeling down and upset, for instance. Does the clinician ask what situations were chosen?

FK: Here some principles apply:

Principle 1: The quality of a situation is determined by the subject's motivation.

Principle 2: Not all motivations are equally important. Biological motivations get priority.

Principle 3: The importance of a biological motivation is determined by its contribution to the subject's (inclusive) fitness.

RG: This is now sounding evolutionary. Of course I can't help but wonder at the use of the word, biological, as all living, relating and thinking are as biological as are the workings of the gut and bladder.

FK: Generally people do not realise which motivations are biological. The urgency of a full bladder is self-evident but usually not extensively reflected on. Evolutionary fitness is

not a conscious aim. Yet it represents hard-wired, genetically transmitted life-orientations.

RG: In some ways this is agreeing with what I said above about living, relating and thinking being as biological as gut and bladder.

FK: For the sake of transparency we can divide such orientations into three major themes:

1. Self-preservation. Principally self-preservation is a basic biological motivation. It steers people with the aid of painful and pleasurable 'somatic' sensations. Staying well and alive obviously is a necessary precondition to transmitting one's genes to next generations.

RG: This represents the lower levels of Maslow's hierarchy of needs.

FK: 2. Reproduction. This theme comprises all sub-themes like sex, mating, giving birth etc.

RG: These are less basic only because they can be deferred and aren't as omnipresent all the time. But in fact, sex occurs even on single cell levels as the genetic mixing allows organisms to combat action of infectious agents and deleterious mutations. Sexual reproduction is extremely basic.

FK: 3. Territory. One needs a place to procreate and care for children. Territory therefore is an essential requirement to implement any striving towards (inclusive) fitness.

RG: Yes, and this too is very basic.

FK: As a theme territory can be divided into five sub-themes:

Territories have to be conquered on as well as defended against 'enemies' from outside.

RG: As De Waals has shown, allies are very important.

FK: Living within a territory one also has to struggle for a position that will greaten the chances for strong offspring. So, hierarchy is a main sub-theme.

RG: And submission has importance so as to lay low now and come back again for another day, a recurrent theme in *The ASCAP Newsletter*.

FK: To be safe within the territorial group requires firm bonds. Attachment and conformism fulfill this need.

RG: You in essence make the allies point here. Group bonding has great importance on an adult level too, as shown in religious groupings.

FK: Raising offspring requires care from mother to infant and from father to mother. Reciprocal care guarantees within-territorial equilibrium.

RG: Families are a great source of allies.

FK: Assigning roles and tasks is a necessary precondition to raising offspring as well as to economic welfare.

RG: This reflects cultural story-lines according to which humans live.

FK: These themes bearsomeresemblanceto the division of motivations as proposed by McGuire and Troisi. They also comprise central themes like affiliation and rank described by Stevens & Price in 1996. Other evolutionary themes could be mentioned as well. The selection is mainly guided by theoretical background and practical purpose: all three above-mentioned themes are relevant to evolution and are recognizable in anybody's daily life. From moment to moment these themes force people to some adaptational action. Such action may in principle be active or passive, aggressive or defensive. It may consist of fight or flight. Or it may be aimed at negotiation, at 'quid pro quo'. It may, in other words, be reciprocal. So, apart from themes we can discern three different 'modes':

- 1. Active, aggressive,*
- 2. Passive, defensive,*
- 3. Reciprocal*

Together, theme and mode form an adaptational 'program'.

RG: How about actively passive in the sense of taking in information. I'm thinking of an undisputed leader who listens carefully (follows) his subordinates who have crucial information. I believe humans with their disproportionately

large brains are quite complex and deploy combinations of the "modes" to which you allude. You make the same point below as you further adumbrate the principles, such as Principles 5 and 6.

FK: We may reasonably assume that such adaptational programs have been selected throughout evolution. Ultimately, successful programs must have shaped relevant parts of our brains. They have become 'wired in'. Yet, it would be far too simple to propose a one-to-one relation between situation and program. The bewildering amount of challenges that even our earliest ancestors must have had to respond to presupposes at least some further principles:

Principle 4. Evolutionary successful programs have survived.

Principle 5. Several programs may fit to one situation.

Principle 6. Some programs fit better than other ones.

From these principles we can understand that one situation is able to turn on different programs in different people. In some cases the activated program may obviously be out of scope, meaning that no one could ever expect it to enhance (inclusive) fitness. Such a program would represent a 'disturbance', 'disorder' or 'disease'. In other cases the active program may just be adequate enough but not optimal. One would not be justified to call it a disorder but it wouldn't serve adaptation in the best way either. So, therapeutically it seems useful to identify which program is currently turned on. The question is: how can we know that?

RG: I like the idea of an activated program that is "out of scope." A good program but one not right for the time and situation. Mania, depression and out-of-proportion fears (anxiety) might be examples.

FK: Any program that is successful in a given situation will result in a positive emotion. In the same way failure will produce negative emotion. The quality of the emotion gives us the cue which 'theme' is turned on. Let us consider an example:

Suppose that you try to open your car in the dark. Unfortunately you drop your keys. When you finally think you have found them you realise you put your hand in dog shit and soil yourself. Immediately you will have a strong emotion consisting of repulsion and fear of contagion. As

soon as you can you will clean yourself as long as is needed to no longer smell anything, although it may take a long time before you are really sure that nothing is left.

RG: What a powerful story! The example certainly evokes emotional response as one identifies with the poor suitor.

FK: Such a situation is easy to recognize. The activated theme is 'self-preservation' by eliminating contamination, and the mode is 'defence'. The transition from fear to relief represents the difference between failing and succeeding in preserving your health.

And yet, things may turn out to be a bit more complicated. Suppose that the negative feeling does not disappear after you have washed your hands over and over again. Could it be that we are dealing with the wrong theme and the wrong mode? Suppose again that you were not alone when the incident happened to you. Try to imagine the facial expression of the other person, whom you've been trying to impress all evening.

RG: Yes, the situation has taken on clearly interpersonal meanings. The other person might laugh at you or with you with quite different results in how you feel. At you would indicate they assume a superior position or out-group stance (you change from a suitable suitor, for instance, to a soiled commodity, worthy only of scorn and condescension, especially if you do not handle it with aplomb).

FK: No washing will clear you from the fear of having lost your face. So, in continuing to clean yourself from possible contamination without feeling better, you are in fact dealing with the wrong theme and the wrong mode. The correct theme would have been 'hierarchy' (or even mating and future 'reproduction' depending on who the other person was). The better reaction would have been to laugh or to scold at dog owners.

RG: This would have made the dog owner the out-group and the two people together experiencing offensive event allies and in-group.

FK: The better 'mode', so to say, would have been 'aggression'. So, between situation and reaction you just

activated the wrong program, and thus disrupted intentionality. Maybe something like this happened before when you were young, and your neuro-circuits were still developing. Could it be that you kept washing to remove contamination never to realize your fear of humiliation? Could you just have developed 'obsessive compulsive disorder'?

RG: You illustrate "unconscious dynamics" that in fact reflect interpersonal processes.

FK: So, if this were true, how should we have handled it therapeutically? Let us recapitulate the steps we followed in the above story. First of all we described a situation. Then we noticed your (re)action and put down what emotion you felt. From your emotion we tried to infer what evolutionary program you had turned on, and we concluded to 'self preservation' as your current motive. So we made clear the intentionality of your action at stake. And yet, we were wrong, because we believed you. We missed the point that you just couldn't stop what you were doing, because you could not get any relief. Your behaviour was just not intentional, because you lost the link between what you were doing and your real motivation. After reviewing the facts (and discovering new ones) we had to conclude that your behaviour was steered by a different evolutionary program. That made it possible to reconnect your behaviour to a more relevant evolutionary motive, or, in other words, to establish a more meaningful intentionality. Evolutionary psychotherapy is looking for the better program, that is finding the relevant evolutionary theme.

RG: So if this illustrates what FK means by "evolutionary psychotherapy," the therapist clearly explains and rationalizes, puts the information into a sensible context. The therapist is clearly an ally — which goes without saying — in that the reaction is not critical but informational and meant to be helpful and considerate, not scolding as the person being courted that fateful night seems to have been when the patient encountered those dog feces. Rather the therapist helpfully points out that the relevant evolutionary theme would make a difference.

FK: But, one could ask, what difference does all of this make in comparison with the established psychothera-

pies? The answer is: in many respects there are more similarities than differences, but there is indeed a deference and it is essential. Just like Interpersonal Psychotherapy (IPT), Evolutionary Psychotherapy chooses a focus, using a restricted set of themes, but, unlike IPT, the focus has to be evolutionary relevant. Just like Cognitive (Behavioral) Therapy (CT/CBT) Evolutionary Psychotherapy is correcting erroneous beliefs, but, unlike CBT, it aims at cognitive schemes that are pertinent to evolutionary themes. And, just like Psychodynamic Therapy, Evolutionary Psychotherapy pays attention to early life history and transference interactions, but, unlike psychoanalysis, it does not lose evolutionary meaning.

RG: Having a better or best explanation is crucial to your definition as evolutionary psychotherapy is juxtaposed to IPT and CBT (I personally like IPT is interpersonal, i.e., focused on communication). Psychodynamic psychotherapy entails in addition the phenomenon of transference. This means that the helpee relates to the helper as he/she had related to previous important people, often family members. Certain inherent reactions characterized the previous relationship, for instance, a belittling scornful parent may have made the dog feces incident more powerful because the person with the dirty hand assumed that lady he was courting was scornful even if she was simply quiet. Assuming the therapist would be similarly scornful may have been a powerful learning experience as therapy went on.

FK: So, on the basis of a rapidly growing evolutionary psychobiology, a new Evolutionary Psychotherapy can be established. When applied to mental health its aim should be to reestablish the intentional bond between action and motive by identifying the relevant evolutionary theme. But much work has to be done. First of all, we will have to develop protocols of Evolutionary Psychotherapy. Secondly we should formulate our hypotheses in such a way that they are testable and falsifiable. And finally, we will have to prove the efficacy of our approach. But the enterprise seems warranted. If we believe that no human being can be disconnected from his biological roots, it must make sense to reconnect biological intentionality.

RG: I agree with this and point out only that our models have to be clear and agreed-on.

Evolutionary Psychotherapy: A reply to Russell Gardner

It is my pleasure to react to Russell Gardner's challenging remarks in debate format to the article that I wrote. He points at passages in my article in need of some clarification, and also lends approval as well as (mild) critique.

Let me start with the clarification. If psychotherapy, so Russell asks, could be compared with a tree, what is the trunk? Well, from the very beginning psychotherapy has been the talking cure'. That is what I call the trunk. Neither of these two words can be omitted. Verbal communication (including, of course, facial and psychomotor expression) is essential to psychotherapy. For doctors talking is one of their available instruments. Psychiatrists, for instance, can also apply electrical and magnetic currents, as well as chemical substances. Every doctor will, hopefully, talk to his patient while prescribing drugs, but in the case of psychotherapy the talking should be curative in itself, with or without medication. In the past century several theories have been developed to explain the trick. These are all branches of the psychotherapy tree. They are called with names like psychoanalysis, or cognitive, behavioral and interpersonal therapy.

What justifies the outgrowth of a new branch called 'evolutionary'? If I have not been able to answer that question satisfactorily in my article, let me try to give some further, albeit concise, clarification. Psychotherapy is about psychopathology. Psychopathology is about inappropriate cognition, emotion and behaviour. That is, psychopathology is characterized by disconnection from, or wrong connection to actual reality. That is what I mean by disturbed intentionality. So, how can we reconnect mental functions to reality? We can try to correct erroneous cognitions, we can change the interpersonal behavioral repertoire, we can also teach the patient to tolerate painful but appropriate emotion, and we can clarify the ontogenetical benefit of reactions that now have become displaced.

That is, we apply cognitive or interpersonal psychotherapy, behavioral or psychoanalytic therapy. But in doing so (as we should) we risk forgetting the significance of our *phylogenetic* make-up, or the importance of 'ultimate' (instead of 'proximate') clarification of behaviour. In the course of evolution man has been programmed to respond to circumstances and challenges that are different from those we do face in our days. And although living organisms, including ourselves, are extremely adaptable, it nevertheless is very well possible that there is a structural mismatch between some ingrained old adaptation program and real life challenges. Such a program might be activated by one's individual life history, but without apt 'archeological' knowledge we as therapists will miss the mark. We won't be able to help the patient to 'reconnect', not only to his situation but also to the given possibilities and restrictions of his being an evolved living organism. Such a message may by nature be conservative and politically incorrect (as John Price recently pointed out) but nonetheless true. So there is all the more sense in identifying an 'evolutionary' branch of psychotherapy.

Certainly, that is something Russell Gardner endorses as well, judging from his approving comments on my discourse on evolutionary 'programs'. So, although happy with his support I better skip the praise. For indeed we seem to have a difference of view that might be rather relevant. On several occasions Russell criticizes my neglect (in his view) of the interpersonal stance. I think he is right in pointing at it, not in criticizing. True, human beings are relational in that they tend to live in societies. And also true, psychotherapy is between (at least) two people. But is it also true that such is essentially characteristic of human life, as well as of psychotherapy? I do notice that 'interpersonality' is the current point of view, not only of the specific 'branch' of IPT but also of psychoanalysis. And yet I seriously doubt. I tend to believe that

interpersonality is just one aspect of people's life. Other dimensions are at least equally important. People do not only relate to other people. Most people also relate to time and place, to body and death, to nature and 'God'. One quality of mental health might be the capacity to be alone (as Anthony Storr so elegantly showed in his 1989 book 'Solitude'). Of course, most people do not live alone. How could they, sharing the globe with six billion other people? In prehistoric time they must have needed each other even more than in our days. But that is not to say that interpersonality is the ultimate aim in itself. Interpersonal relations are perhaps not primary. Perhaps they get significance from more ultimate goals. Just at this point the evolutionary viewpoint could shed light on such (ultimate) goals.

So, what is the consequence for the relation between psychotherapist and patient? Is it indeed the relation itself that cures? Here we touch upon an old discussion. What is more specific: the chosen theory or method, or the 'aspecific' therapeutic relationship? Evidence suggests the second possibility, but I am not sure that all aspects of the question are indeed well identified. I would guess that the therapeutic relationship as well gets its significance from its serving a more ultimate goal. Perhaps the effective psychotherapist is first and for all a teacher whose professional ability it is to show his patient the road to understanding his modest place amidst eternal 'evolutionary' laws. I don't suggest that we know, but I do believe that we have a good point to further investigate.

Extracts of an Instance of Reframing Without It Being So Labeled:

Hoffman, Lynn: *Foundations of Family Therapy: A Conceptual Framework for Systems Change*. New York, NY: Basic Books, 1981, p. 272.

Extract of definition of reframing: "[T]he technique by which the therapist restates a situation so that it is perceived in a new way."

Searles, Harold F.: *Countertransference and Related Subjects: Selected Papers*. New York, NY: International Universities Press, 1979, pp.83-85.

Extract: I have been reassured to find, as time has gone on, that [an] esthetic appreciation [of a patient's strangeness] is a form of scientific interest which, in contrast to my earlier, so anguished therapeutic dedication, enables me to be of maximal use to the patient. For example, I used to feel, for years, desperately and urgently to relieve the indescribably severe confusion of one of my chronically schizophrenic patients, and it was with guilt bordering on self-loathing that I began to realize that I was actually fascinated by the vivid, intricate, so-unconventional nature of her confusion itself. At first my interest in this felt unclear, perverse, unworthy of any physician; but gradually, I came to feel that I was facing a genuine work of creative art which was after all, as I now clearly see, the product of the highest forms of the patient's intelligence and creative originality. As for her, she showed every evidence of finding much more useful my appreciative, unanxious, and unguilty studying of her confused verbalizations than she had found my desperate attempts to somehow shut them out....

[A]s one becomes freer from omnipotent guilt about the patient and his illness, companion gratifications in the realm of humor and playfulness—all necessary ingredients of the phase of the mutually enjoyable therapeutic symbiosis I have described in a number of papers. Time after time I have found that the patient benefits most from our sharing of humorous playful moments together. When I can leave off my deadly serious dedication, and be amused at the patient's craziness, he can come to laugh with warm and loving amusement at the delightfully crazy foibles of his mother, whom he had been desperately dedicated, heretofore, to curing, at an introjected level, in his own so-tragic craziness. When one is working in this new spirit with the patient one is very close to him, openly showing how much one likes and enjoys being with him. His formerly maddening symptoms are now only part of the background music in an atmosphere of contentment.

ARTICLE:

by Suzanne Munro Gardner

On Being an Identical Twin

I here comment on growing up as a twin as well as some observations on being one. I am an identical twin; my sister is Lisa and we were our parents' only children.

From my perspective being a twin has been and is a positive experience. As a child I always had a playmate, always someone to go places with, I never felt alone when she was there. I could always ask her anything or talk with her about anything even if it seemed stupid or embarrassing. This would be similar to what non-twins have in a best friend relationship.

My twin and I were protective of each other around other kids. I didn't then and don't now want her to suffer or be in distress; it seems almost like what a parent might feel for a child. Lisa and I are the exact flesh and blood and there is a sensation of her being an extension of me. As all children do, we had disagreements but we always expressed this by arguing with each other - never physically hitting each other.

In terms of sibling rivalry, I didn't feel competitive. We wanted the other to succeed and it didn't feel as if that was at the other's expense. I have clear memories of asking our mother which of us she loved the best and she always said she loved us both the same. Looking back now, I realize how devastated I would have been if she had expressed a preference - either way.

There are some aspects of growing up as a twin that might be considered by some as less than positive. I do not consider them as drawbacks, but other issues connected to being twins. Schoolmates regarded us a unit. Since we were each other's best friend and seen as such we didn't experience while growing up, any other best friend relationships. When a schoolmate got friendly with us both, she related to us equally, e.g., when calling, she would talk with whomever happened to answer. I felt anxious as an adolescent when I had to go someplace new alone, for example, if Lisa were sick. It felt like part of me was missing if she wasn't there. Because of our physical similarity, we got stared at in public as others saw us and whispered amongst themselves about us. In terms of individuation, our parents tried to foster

differentiation. We seldom dressed in the same outfits as children. As we grew older, our parents requested different classes when available in junior high and high school. They also encouraged us to go to separate colleges, and we did, knowing that it would be best for each of us to be on our own and start interacting with the world as a separate individual. It felt like we would be "cheating" or taking the too easy way out if we did everything together, as if using each other as crutch. But it was not an easy process.

I remember that Lisa had to attend a college freshman week earlier than my college's orientation so she had to travel alone overnight on the train to get there. I knew that I would have been very anxious if I had had to do that then. My parents drove me out to college a few weeks later so that transition was easier for me. During college I remember being conscious of the "who am I?" discovery process - as a maturing young adult would experience and with the additional discoveries of experiencing myself as a separate individual apart from the twinship. This process is critical for anybody, but especially so for twins to forge their own identities and form opinions on their own.

However, I was then, and feel still, very identified as a twin - just knowing Lisa was there was a real comfort and that helped counter feelings of homesickness during the transition to college life. I also think being a twin allowed me to have close relationships with other women but I'm very aware that none of these has the priority for me that my relationship with Lisa does. I also think growing up with another person just like me helped foster listening skills, and comfort with intimacy and close contact.

The first dramatic blow to the unit of our twinship was at age 22 years when Lisa got engaged to someone she'd met in college. I was depressed as I realized that I would have to share her with someone else and I could not be #1 in her life anymore. As it turned out in both our lives, with our respective spouses, they have graciously shared themselves with each of us and are tolerant of Lisa and my being and doing things together. I know that both husbands have felt left out or abandoned temporarily, especially if Lisa and I haven't seen each other for several months which had been the case for many years. Now we're entering a new

phase because we have just moved to where Lisa and her husband live so the need for us to maximize togetherness every minute is less intense now.

There was a life-period when I lived alone 2000 miles from Lisa. This continued the process of developing my sense of self; I became much more self-reliant, able to look to myself as a resource. Being independent felt good, but I also felt as if I had the best of both worlds. I still knew Lisa was there for me if I needed her with access to her any time though she might not be so available to another.

During long periods of separation such as these, however, we did not go into great detail about our emotional lives on the telephone - as if we were letting each other forge our own emotional development away from family strictures or expectations. We were, and are, generally very tolerant of each other. There is always the feeling of certainty regarding the basic foundation of our connectedness. I can't imagine anything that would drive a wedge between us such that we wouldn't speak to each other, situations which I know have occurred between other twins.

I read Nancy Segal's book, *Entwined Lives* and subtitled *Twins and What They Tell Us About Human Behavior*. I found myself surprised by some of her findings, e.g., she mentioned "the dreaded question for second-born twins," one not obvious to myself or Lisa. Asking Lisa, she thought a bit, first suggesting, "who is smarter?" only then picking upon Nancy's question, "who's older?" When Lisa and I are asked this, we tell and I then laugh, telling that I lord it over her 10 minutes each year on our birthday.

Another issue Nancy raises in her book is that some identical twins have difficulty with ordinary language development because they've constructed their own language and therefore been less attentive to normal usage. My sister and I had a few special words that we used in certain contexts. Once we spontaneously made up an interchange of gobblety-gook in front of a slightly younger cousin of ours, as though we were communicating between ourselves and leaving him out. I doubt he knew we were talking nonsense; I think he thought we understood what the other was saying. But in terms of Nancy Segal's reports of identical twins' own sustained language, Lisa and I had none of that nor any difficulty with later language skills. But I do have another comment

on our language use: in growing up, we experienced life activities as a pair and our language reflected this. For example, in referring to parents I would tend to use the pronoun "our" instead of "my." We'll also respond to each other's names.

Nancy Segal also refers to situations in which the mothers of some twins feel very left out because their twins have bonded so tightly. In one such family, the mother got pregnant again to have a single child whom the mother could presumably connect closely and that next birth produced a second set of twins. In our family's case, I don't think my mother ever felt excluded by Lisa and me. We related to her openly, both singly and as a pair.

Lisa and I have always had similar tastes in terms of likes and dislikes, books, movies and so on. I think she is the more creative and artistic one and I tend to be more analytical. We also seem to have certain characteristics that are mirror-imaged. For example, our hair-whorls are reversed; she hops on her left foot and I on my right; her left front tooth protruded slightly while my right one did. When we clasp our hands in front of us, her right thumb is on top, but my left one is. We both, however, are right-handed.

In terms of how others see us, people comment on how similar our mannerisms, voices and laughs are. Also, when one of us meets a close friend of the other's, there seems to be a faster and closer intimacy than would ordinarily occur at a first meeting of two people. On several occasions, a friend of my sister's meeting me for the first time will say "It's just like talking to her," and vice versa, for Lisa with a friend of mine.

In concluding I have a family story to relate about when we were infants that bears on the dreaded birth order question mentioned by Nancy Segal. We were born prematurely and put in incubators until our weights increased. My mother had a difficult labor ending in a Caesarian section and her older sister, my aunt, came in from out of town to help. We went home from the hospital before our mother did and our aunt and father took care of us. We had elastic beaded bracelets on our wrists or ankles to tell us apart and the story goes that my aunt in bathing us for some reason removed the bracelets. So it remains unclear to the family whether she replaced them correctly. As you read this, you may have been hearing from Lisa rather than Susie.

Fuzzy Expert System for Psychiatric Application

Introduction

In medical diagnosis working with exact definitions, descriptions or assertions is seldom possible. Rarely is there rarely a sharp boundary between diseases. Psychiatry exemplifies this well. A large number of linguistic expressions are vague and relationships between diseases and symptoms are imprecise.

Psychiatry greatly needs computer assistance. But many authors claim that existing computer programs, mainly based on statistical or decision-tree methods, are not satisfactory. Main reasons for this failure are the lack of standard medical definitions and the lack of a good data validation basis. The **fuzzy approach** is based on a linguistic description of the state of psychiatric patient and of relevant pathologies. In this way the computer uses the same terminology as the psychiatrist.

Fuzzy Sets are a mathematical concept conceived by L.A. Zadeh in 1965, but in the background one can see a concealed wish to improve the relationship between humanity and the computer. But if there are points of similarity between computers, which are logical machines, and the thinking of people, with their emotions and intuitions, there are also differences. If the capabilities of humans and computers could be put together, a remarkable system would be possible. Whether or not fuzzy sets can serve as a go-between depends on the extent of their applications. The outstanding feature of fuzzy sets is the ability to express the amount of ambiguity in human thinking (including natural language) in a comparatively undistorted manner. Therefore, the fields of applications involve problems connected to the very heart of mankind.

We now know that real-world knowledge is characterized by **incompleteness** (implying that the human process of cognition is infinite), **inaccuracy**

(as stated in Heisenberg's Uncertainty Principle), and **inconsistency** (as may have been anticipated by Goedel's Theorem). Fuzzy set theory make it possible to define inexact medical entities as fuzzy sets. It offers a linguistic approach that excellently approximates medical texts. In addition, fuzzy logic provides reasoning methods capable of making, approximate inferences. These facts suggest that fuzzy set theory might be a suitable basis for the developments of a computerized diagnosis system. Current developments and applications of some medical expert systems on the basis of fuzzy set theory and fuzzy logic show that this is indeed the case. The application of fuzzy sets, firmly tied to human thinking and behaviour, could be called human simulation. Therefore, study of humans themselves is very important for getting accurate results. The greatest goal for the use of fuzzy logic is to take in the good points of human beings but also compensate for their shortcomings.

Goals of the Research

The goals of this work are to:

Design an assisted fuzzy expert system for psychiatry based on fuzzy theory and knowledge representation in the form of fuzzy "if... then" rules, which may contain uncertain linguistic expressions. The system will serve to recognize the diagnosis for patients with psychiatric disorders. Create a database of patients with psychiatric disorders for simulation and testing the system. Computer codes were written in language Borland C++. The system was implemented in the hospital setting.

Structure of the thesis here summarized in the adaptation of Chapter 1.

Thematically the thesis consists of three parts. The first part (Chapters 2 - 6), contains the basic concepts, definitions of fuzzy set theory and methods

of determination of membership functions, development of fuzzy logic, a survey of applications in medical diagnosis, detailed description of fuzzy logic systems, fuzzy reasoning (methods of implication, correlation, and defuzzification).

The second part (Chapters 7-9) of the thesis pay focuses on fuzzy approaches in medical diagnosis, detailed description of fuzzy methods by means of fuzzy pattern recognition, fuzzy weighted reasoning algorithm, fuzzy neural network, fuzzy knowledge engineering. This part contains an introduction to medical diagnosis in psychiatry, and the way the fuzzy expert system is designed.

The last part (Chapters 10-12) holds the design, simulation and experimental results. This is the original part of the thesis presented by realization of computer assisted diagnostic system for psychiatry using fuzzy theory. In Chapter 10,1 describe the designed system, such as new evaluation scale, knowledge representation in the form "if... then" rules, interpretation methods, aggregation and defuzzification methods. It also represents the computer simulations, and choosing the best methods. Chapter 11 includes experimental results handled in cooperation with the Day Psychiatric Hospital in Bratislava, where we observed the ability of the system to recognize the diagnosis of the patients with psychiatric disorder. In order to increase the scientific validity of the system's results, we tested 50 subjects regardless of age and sex.

The last section of this part (Chapter 12) evaluates the behavior of the designed system and holds proposals for future activity in this area of science.

Analysis of the Current Development in the Field

As far as the use of knowledge engineering in medical diagnosis goes, since Shortliffe published his system called MYCIN , which had as its object diagnosis and treatment of symptoms of bacterial infection, in 1976, more than 20 systems have been proposed. MYCIN has been put to use for medical diagnosis and treatment, but in its development it has been tied to the system called TEIREIAS by R. Davis, and

furthermore, in 1980 W. Can Melle constructed the system called EMYCIN, the structure of which goes beyond medical diagnosis and can be used very widely.

During the last few years, fuzzy technologies have become a "multi-paradigm discipline, involving not just dynamic system theory but also decision-making approaches gleaned from the field of artificial intelligence." "Intelligent machines," which use fuzzy reasoning and control strategies, appeared in many technical areas, such as robotics, consumer electronics, industrial control, expert systems.

Instead of conventional, complex mathematical descriptions for a process model, fuzzy technology uses "common sense rules" to describe problem solving strategies. Applying these methods, computers are enabled to handle problems which could formerly be solved only by human experts. In medical applications, **fuzzy technology can be utilized to support complex monitoring of the patient state, as well as supervisory control and control processes linked to the patient.**

The domains in biomedical technology are:

- a. medical decision support systems
- b. a complex control system, which is applicable also to other devices, e.g. for blood gas or substrate exchanges, for an artificial heart, etc...

These two domains are merging through application of fuzzy technologies, e.g., both use separate domain-specific knowledge and problem solving methodology and both include the concepts of the knowledge base and the inference engine. However, there are some important differences between modeling human decision making processes and designing a controller. An expert system should make the same decisions as most of the domain experts would in a similar situation. This is an important point, because each expert in a special field has a unique problem solving strategy, depending on education and experiences gained in the past.

Especially in the medical domain, where complex biologic and dynamic systems with high intra-and inter

individual differences are treated by experienced physicians, a "gold standard" for patient treatment can not be derived. By contrast to these difficulties, fuzzy control is normally applied to technical devices, where the "right function" can be defined by the control engineer.

Since the early 1980s expert systems for medical diagnosis support have been proposed, i.e., medical expert systems such as SPHINX, which uses a "fuzzy pattern matching" module for the reasoning of evocation rules. PNEUMONIA assesses the etiology of pneumonia from clinical, radiological, and laboratory data. ONCOLOG is mainly concerned with diagnosis and protocol follow-up in pediatric oncology K.P. Adlassnig et al. developed an expert system called CADIAG-2 (Computer Assisted Medical Diagnosis) in which diagnoses are made with the ambiguity left in . Expert system EXPERT was developed by Weiss and Kulikowski in 1981 for rheumatology and ophthalmology, also in 1994 Shyi-Ming Chen implemented a medical diagnostic expert system for gastro-intestinal system.

Fuzzy technologies are also applied in pattern recognition, i.e., for the analysis of ultrasonic images, and automatic processing of bioelectric signals such as ECG, EEG. Most of these systems work off-line as consultants, i.e., the physician enters the data needed for evaluation and problem solving. In the absence of a "gold standard", the knowledge acquisition process takes as a reference the consensus of experienced medical specialists.

Fuzzy Logic Systems

Fuzzy logic (FL) systems is a name for the systems which have a direct relationship with fuzzy concepts (like fuzzy sets, linguistic variables, and so on) and fuzzy logic. Reasoning with uncertain and imprecise information is of central concern in both FL and general artificial intelligence (AI). However, for a long time FL was not considered as being a part of mainstream AI. The reasons for this are many and complex. First, FL is "different" from conventional AI approaches. Most AI systems are based on classical predicate logic and are symbolic in nature. In contrast,

FL systems are based on multi-valued logic and are numerical in nature. Second, for most of the 70s and 80s the dominant emphasis within AI was the building of knowledge-based systems using conventional rule-based technology.

The basic configuration of fuzzy logic system is divided into three parts: fuzzifier, inference mechanism and defuzzifier. The fuzzifier maps crisp points to fuzzy sets, and the defuzzifier maps fuzzy sets to crisp points. The fuzzy rule base and fuzzy inference engine in the of "IF ... THEN" rules. The fuzzy logic system with fuzzifier and defuzzifier has many attractive features. First, it is suitable for engineering systems because its inputs and outputs are real-valued variables. Second, it provides a natural framework to incorporate fuzzy IF-THEN rules from human experts. Third, there is much freedom in the choices of fuzzifier, fuzzy inference engine, and defuzzifier, so we may obtain the most suitable fuzzy logic system for a particular problem.

Fuzzy Logic and Medicine

There are three main reasons for the use of fuzzy set theory in expert systems: The interfaces of the expert system on the expert side as well as on the user side are with human beings. Therefore communication in a "natural" way seems to be the most appropriate, and "natural" means, generally, in the language of the expert or user. This suggests the use of linguistic variables. The knowledge base of an expert system is a repository of human knowledge, and since much of human knowledge is imprecise in nature it is usually the case that the knowledge base of an expert system is a collection of rules and facts which, for the most part are neither totally certain, nor totally consistent. The storage of this vague and uncertain portion of the knowledge by using fuzzy sets seems much more appropriate than the use of crisp concepts and symbolism. As a consequence of what has been said in point two the "management of uncertainty" plays a particularly important role. Uncertainty of information in the knowledge base induces uncertainty in the conclusions and therefore the inference engine has to be equipped with computational capabilities to analyze the transmission of uncertainty from the premises to

the conclusions and associate the conclusion with some measure of uncertainty that is understandable and properly interpretable by the user.

Experimental Part

We have examined designed fuzzy expert system for psychiatry in Day Psychiatric Hospital in Bratislava. We observed 50 subjects, who regardless of age and sex were divided into two groups. The first group(A) consists of 25 patients with different mental disorders, denoted anonymously as Patient1, ..., Patient25. This represented the simulation group. The second group (B) consist of 25 people with no mental disorders, denoted as Healthy1.....Healthy25. Each patient individually was given 50 questions to test his psychiatric status.

The first experiment was made in the group of 25 patients suffering various psychiatric disorders, Patient1, ..., Patient25. The system confirmed presence of psychiatric disorder in all tested patients.

The second experiment was made in the group of 25 subjects, considered healthy at that time, Healthy1, ..., Healthy25. The system confirmed absence of psychiatric disorder in all tested subjects.

Summary of Results

According to the results obtained from simulations, and experimentations, we conclude as follows:

The designed fuzzy system for psychiatry is able to make a diagnosis on an expert level. In a group of 25 patients suffering various psychiatric disorder, Patient1, ..., Patient25, the system confirmed presence of psychiatric disorder in all tested patients. In 25 subjects, considered healthy at that time, Healthy1, ..., Healthy25, the system confirmed absence of psychiatric disorder in all tested subjects.

The following combination: min-max method for implication with correlation minimum and centroid method for defuzzification, seems to be the best combination for a given problem. The use of fuzzy set theory to solve the diagnostic problem in psychiatry,

proves to be a very good choice and have outstanding and relevant practical applications.

Conclusions and Proposals

This research thesis dealt with the problem of application of fuzzy sets theory in medicine. **The main scientific contribution of this topic was the design of an unique system for solving and designing a fuzzy expert system for psychiatry, based on fuzzy set theory and knowledge representation in the form "if.....then" rules.**

The original part of this thesis is the theoretical and practical realization of the system for application of the fuzzy theory in medicine based on fuzzy theory and knowledge representation in the form "if.....then" rules.

Most decision support systems in medicine have been developed in hospital environments for use in hospitals. Only a few are meant for use by general practitioners (GPs) in primary care . The GPs are, however, in much greater need of the decision support systems for well known reasons: they face a greater variety of problem, they see diseases at an earlier stage, laboratory and other resources are restricted, and they have few colleagues immediately available for consultation.

The designed system will run in any computer version, and it is suggested to be used as consultation system for general practitioners (GPs).



ABSTRACTS & EXTRACTS...

Holland PWH: The future of evolutionary developmental biology. *Nature* 1999;402:C41-C44..

Abstract: Combining fields as diverse as comparative embryology, palaeontology, molecular phylogenetics and genome analysis, the new discipline of evolutionary developmental biology aims at explaining how developmental processes and mechanisms become modified during evolution, and how these modifications produce changes in animal morphology and body plans. In the next century this should give us far greater mechanistic insight into how evolution has produced the vast diversity of living organisms, past and present.

Extract: [T]he discovery in 1984 of a shared DNA sequence motif—the homeobox—in a variety of genes that control development in the fruitfly *Drosophila*... confirmed that genes with distinct functions in *Drosophila* development were evolutionarily related, that is, they had all derived from the ancestral gene in some remote and simpler ancestor.

Even more dramatic was the demonstration that previously unknown genes in other types of animal, including vertebrates, also possessed the homeobox motif....

[B]y 1989 the evidence for common developmental mechanisms was becoming simply overwhelming.... [T]he fruitfly and mammalian gene clusters, the Hox genes, still had a similar and fundamental role in their respective organisms—to specify the identity of different regions along the head-to-tail axis...

Sobel N, Khan RM, Saltman A, Sullivan EV, Gabrieli JDE: The world smells different to each nostril. *Nature* 1999;402:35.

Extract: The flow of air is greater into one nostril than the other because there is a slight turbinate swelling in one. The nostril that takes in more air switches from the left to right one and back again every few hours,

but the effect on this switching on the sense of smell has been unclear. Here we show that this difference in airflow between the nostrils causes each ... to be optimally sensitized to different odorants, so that each nostril conveys a slightly different olfactory image to the brain....

We used an olfactometer to produce an equally proportioned mixture of the high-sorption odorant L-carvone and the low-sorption odorant octane. The mixture was always the same but the subjects were told that it was slightly different for each trial.

Subjects sampled the mixture by sniffing with one nostril (the other... was occluded) and made a judgement about the relative proportions of the two components in the mixture (for example, 55% octane and 45% L-carvone). The task was repeated for the second nostril and the judgements compared.... We found that 17 of 20 subjects (binomial, $p=0.001$) thought the mixture contained more octane when they used the low-airflow nostril, and more L-carvone when they used the high-airflow nostril.

The nostril with the higher airflow reverses periodically, so we tested eight subjects after the nostril with greater airflow switched, and found that the perception of the same mixture reversed in seven of eight subjects (binomial, $p=0.035$). Odorant perception was therefore dependent on airflow rate....

Garcia R, Vouimba R-M, Baudry M, Thompson RF: The amygdala modulates prefrontal cortex activity relative to conditioned fear. *Nature* 1999;402:294-296

Abstract: Animals learn that a tone can predict the occurrence of an electric shock through classical conditioning. Mice or rats trained in this manner display fear responses, such as freezing behaviour, when they hear the conditioned tone. Studies using amygdalaectomized rats have shown that the amygdala is required for both the acquisition and expression of

learned fear responses. Freezing to a conditioned tone is enhanced following damage to the dorsal part of the medial prefrontal cortex, indicating that this area may be involved in fear reduction. Here we show that prefrontal neurons reduce their spontaneous activity in the presence of a conditioned aversive tone as a function of the degree of fear. The depression in prefrontal spontaneous activity is related to amygdala activity, not to the freezing response itself. These data indicate that, in the presence of threatening stimuli, the amygdala controls both fear expression and prefrontal neuronal activity. They suggest that abnormal amygdala-induced modulation of prefrontal neuronal activity may be involved in the pathophysiology of certain forms of anxiety disorder.

Blumberg HP, Stern E, Ricketts S, Martinez D, de Asis J, White T, Epstein J, Isenberg N, McBride A, Kemperman I, Emmerich S, Dhawan V, Eidelberg D, Kocsis JH, Silbersweig DA: Rostral and orbital prefrontal cortex dysfunction in the manic state of bipolar disorder. *Am J Psychiat* 1999; 156:1986-1988.

Abstract: High-sensitivity [¹⁵O]H₂O positron emission tomography and a word generation activation paradigm were used to study regional cerebral blood flow in five manic and six euthymic individuals with bipolar disorder and in five healthy individuals. Decreased right rostral and orbital prefrontal cortex activation during word generation and decreased orbitofrontal activity during rest were associated with mania. The data support the presence of rostral and orbital prefrontal dysfunction in primary mania. These findings, when seen in the context of the human brain lesion and the behavioral neuroanatomic literatures, may help to explain some of the neurobehavioral abnormalities characteristic of the manic state.

Schrober M, Schaefer M, Knoblich JA: Bazooka recruits Inscuteable to orient asymmetric cell divisions in *Drosophila* neuroblasts. *Nature* 1999;402:548-551.

Abstract: Asymmetric cell divisions can be generated by the segregation of determinants into one of two

daughter cells. In *Drosophila*, neuroblasts divide asymmetrically along the apical-basal axis shortly after their delamination from the neuroectodermal epithelium. Several proteins, including Numb and Miranda, segregate into the basal daughter cell and are needed for the determination of its correct cell fate. Both the apical-basal orientation of the mitotic spindle and the localization of Numb and Miranda to the basal cell cortex directed by Inscuteable, a protein that localizes to the apical cell cortex before and during neuroblast mitosis. Here we show that the apical localization of Inscuteable requires Bazooka, a protein containing a PDZ domain that is essential for apical-basal polarity in epithelial cells. Bazooka localizes with Inscuteable in neuroblasts and binds to the Inscuteable localization domain *in vitro* and *in vivo*. In embryos lacking both maternal and zygotic *bazooka* function, Inscuteable no longer localizes asymmetrically in neuroblasts and is instead uniformly distributed in the cytoplasm. Mitotic spindles in neuroblasts are misoriented in these embryos, and the proteins Numb and Miranda fail to localize asymmetrically in metaphase. Our results suggest that direct binding to Bazooka mediates the asymmetric localization of Inscuteable and connects the asymmetric division of neuroblasts to the axis of epithelial apical-basal polarity.

Dunham I, Shimizu N, Roe BA, Chisoe S (& multiple other authors): The DNA sequence of human chromosome 22. *Nature* 1999;402:480-495.

Abstract: Knowledge of the complete genomic DNA sequence of an organism allows a systematic approach to defining its genetic components. The genomic sequence provides access to the complete structures of all genes, including those without known function, their control elements, and, by inference, the proteins they encode, as well as all other biologically important sequences. Furthermore, the sequence is a rich and permanent source of information for the design of further biological studies of the organism and for the study of evolution through cross-species sequence comparison. The power of this approach has been amply demonstrated by the determination of the sequences of a number of microbial and model organisms. The next step is to obtain the complete

sequence of the entire human genome. Here we report the sequence of the euchromatic part of the human chromosome 22. The sequence obtained consists of 12 contiguous segments spanning 33.4 megabases, contains at least 545 genes and 134 pseudogenes, and provides the first view of the complex chromosomal landscapes that will be found in the rest of the genome.

Loder N: Tiny chromosome is rich in genes and medical promise. *Nature* 1999;402:448.

Extract: [Chromosome] 22 is one of the smallest of our 23 pairs of chromosomes ... is likely to be quite gene-rich.... [C]hromosome 22 has been implicated in schizophrenia, chronic myeloid leukaemia and trisomy 22, the second most common cause of miscarriages. At least 27 diseases involve some genetic component on the chromosome...

About half of its genes, however, have yet to be characterized. Their sheer variety, in terms of differing lengths, is of considerable interest. But the relevance of this won't be known until we have more information from the other chromosomes....

[R]esearchers have an almost continuous sequence for a whole chromosome.... [T]here are still 11 irritating unsequenced gaps, accounting for 3 percent of the sequence.... [This means] they've gone as far as possible with routine methods.

Diesmann M, Gewaltig M-O, Aertsen A: Stable propagation of synchronous spiking in cortical neural networks. *Nature* 1999;402:529-533.

Abstract: The classical view of neural coding has emphasized the importance of information carried by the rate at which neurons discharge action potentials. More recent proposals that information may be carried by precise spike timing has been challenged by the assumption that these neurons operate in a noisy fashion — presumably reflecting fluctuations in synaptic input — and, thus, incapable of transmitting signals with millisecond fidelity. Here we show that precisely synchronized action potentials can propagate within a model of cortical network activity that

recapitulates many of the features of biological systems. An attractor, yielding a stable spiking precision in the (sub)millisecond range, governs the dynamics of synchronization. Our results indicate that a combinatorial neural code, based on rapid associations of groups of neurons co-ordinating their activity at the single level, is possible within a cortical-like network.

Stenseth NC: The evolutionary synthesis *Science* 1999;286:1490.

Extract: [T]he Royal Swedish Academy of Sciences awarded the 1999 Crafoord Prize to three giants in ... evolutionary biology: Ernst Mayr..., John Maynard Smith... and George C. Williams.... The Crafoord Prize (considered the Nobel Prize in field for which no Nobel is awarded) was established in 1980 to promote basic scientific research in mathematics and astronomy, the geosciences, and the biological sciences.... Mayr firmly established the modern synthesis. He promoted the idea of a "biological species," in which species are "groups of actually or potentially interbreeding populations that are reproductively isolated from other such groups."

[T]he notion of evolution for the good of the species.... was soon rejected and the original Darwinian emphasis on the importance of the individual in the selection process was substantiated. The other prizewinners — George C. Williams and John Maynard Smith — contributed significantly to this rejection, as did William D. Hamilton (an earlier Crafoord Prizewinner). ... William's book ... proposed that the evolution of a trait must confer an immediate selective advantage on an individual.... Taking a mathematical approach, Maynard Smith introduced game theory to ...evolution.

Collectively, the three prizewinners have participated in the two greatest advances in evolutionary biology this century: the establishment of the modern synthesis and the realization that individual selection is more important than group selection. Mayr was instrumental in incorporating evolutionary thinking into systematics and biogeography. Williams and Maynard Smith laid the foundation for what is called the adaptationist program. This program states that evolution can be

Cohn MJ, Tickle C: Developmental basis of limblessness and axial patterning in snakes. *Nature* 1999;399:474-479.

Abstract: The evolution of snakes involved major changes in vertebrate body plan organization, but the developmental basis of these changes is unknown. The python axial skeleton consists of hundreds of similar vertebrae, forelimbs are absent and hindlimbs are severely reduced. Combined limb loss and trunk elongation is found in many vertebrate taxa, suggesting that these changes may be linked by a common developmental mechanism. Here we show that Hox gene expression domains are expanded along the body axis in python embryos, and that this can account for both the absence of forelimbs and the expansion of thoracic identity in the axial skeleton. Hindlimb buds are initiated, but apical-ridge and polarizing-region signalling pathways that are normally required for limb development are not activated. Leg bud outgrowth and signalling by Sonic hedgehog in pythons can be rescued by application of fibroblast growth factor or by recombination with chick apical ridge. The failure to activate these signalling pathways during normal python development may also stem from changes in Hox gene expression that occurred in snake evolution.

Romo R, Brody CD, Hernandez A, Lemus L: Neuronal correlates of parametric working memory in the prefrontal cortex. *Nature* 1999;399:470-473

Abstract: Humans and monkeys have similar abilities to discriminate the difference in frequency between two mechanical vibrations applied sequentially to the fingertips. A key component of this sensory task is that the second stimulus is compared with the trace left by the first (base) stimulus, which must involve working memory. Where and how is this trace held in the brain? This question was investigated by recording from single neurons in the prefrontal cortex of monkeys while they performed the somatosensory discrimination task. Here

we describe neurons in the inferior convexity of the prefrontal cortex whose discharge rates varied, during the delay period between the two stimuli, as a monotonic function of the base stimulus frequency. We suggest this as 'monotonic stimulus encoding', and we suggest that the result may generalize: monotonic stimulus encoding may be the basic representation of one-dimensional sensory quantities in working memory. Thus we predict that other behavioural tasks that require ordinal comparisons between scalar analogue stimuli would give rise to monotonic responses similar to those reported here.

Doolittle WF: Phylogenetic classification and the universal tree. *Science* 1999;284:2124-2128.

Abstract: From comparative analyses of the nucleotide sequences of genes encoding ribosomal RNAs and several proteins, molecular phylogeneticists have constructed a "universal tree of life," taking it as the basis for a "natural" hierarchical classification of all living things. Although confidence in some of the tree's early branches has recently been shaken, new approaches could still resolve many methodological uncertainties. More challenging is evidence that archaeal and bacterial genomes (and the inferred ancestral eukaryotic nuclear genome) contain genes from multiple sources. If "chimerism" or "lateral gene transfer" cannot be dismissed as trivial in extent or limited to special categories of genes, then no hierarchical universal classification can be taken as natural. Molecular phylogeneticists will have failed to find the "true tree," not because their methods are inadequate or because they have chosen the wrong genes, but because the history of life cannot properly be represented as a tree. However, taxonomies based on molecular sequences will remain indispensable, and understanding of the evolutionary process will ultimately be enriched, not impoverished.

Nissen, Hans J. (Lutzeier, Elizabeth & Northcutt, Kenneth J.: translators): *The Early History of the Ancient Near East: 9000 - 2000 B.C.* Chicago, IL: The University of Chicago Press, 1988, p. 14: "The date 2000 B.C. is, of course, not a historical caesura. It merely signifies the end of a long span of time that, in spite of many diversions *and* occasional periods of regression, saw steady progress toward more complex organizational structures. At the same time, it signifies the beginning of a phase of consolidating what had been.