

A S C A P

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"In all vertebrates from cyclostomes to humans the cerebral hemisphere exhibits a common fundamental design. In nonmammalian forms it includes components that appear to be homologous not only to what in mammalian neuroanatomy has been called "old," but also to so-called "new" structures such as the "neocortex" [better called isocortex]."

Pierre Gloor¹

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ASCAP Society Mission Statement:

The ASCAP Society represents a group of people who view forms of psychopathology in the context of evolutionary biology and who wish to mobilize the resources of various disciplines and individuals potentially involved so as to enhance the further investigation and study of the conceptual and research questions involved.

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

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, and other news.
- ◆ Proposals for new initiatives, joint research endeavors, etc.

The ASCAP Newsletter is a function

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World Psychiatric Association



<http://www.wpanet.org>

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.



The ASCAP Newsletter is the official newsletter of the Psychotherapy Section of the World Psychiatric Association.

ADDRESSED TO & FROM ...

Messages from the ASCAP Editors

by Russell Gardner
& John S. Price

John Price was a visitor for 2 weeks in early October, so we are took the opportunity to discuss editorial and planning issues. Amongst them is the Hamburg ASCAP meeting in Germany, August 1999 (one of the two we are sponsoring in 1999). Since the World Psychiatric Association Congress doesn't meet until the evening of August 6, we have revised our own day-long meeting to 6 August 1998 which is a Friday. Both President Mark Erickson and President Elect Ivor Jones will be there. If you also have plngs to be there please let us know soon so that we may plan accordingly.

Speakers will include President Erickson presenting the keynote address at the beginning of the day and President-Elect Jones will finish the day in what has become our tradition. Other speakers to be invited will include people who are planning to present at the WPA Congress as listed in the August issue of the ASCAP Newsletter and, in a future issue, those invited to present in a symposium organized by Mauricio Cortina.

Other Psychotherapy Section issues on which we have worked include drafting a set of bylaws as we have been unable to surface a previous set but clearly need some working rules. We circulated to the Section Executive Committee the proposal that the subscription to *The ASCAP Newsletter* be raised to \$50 which would automatically include receiving 12 issues of the newsletter, membership in The ASCAP Society, and membership in the Psychotherapy Section of the WPA.

However, for those people for whom such membership is not appropriate and who desire being ASCAP members only, the subscription will remain \$35 as before (and as announced last issue).

We also noted that the Psychotherapy Section website is out of date and requires attention (it was composed prior to the Madrid meeting). Moreover, we found that the U.S. and European ASCAP websites could not be contacted so that these too will need attention in coming months.

With the active participation of Gerald Cory, further active planning is taking place concerning the other ASCAP meeting for 1999, namely, the Paul D. MacLean Festschrift. A

number of the invitations have been issued with some replies. If you have interests in this please let us know.

The date is 16-17 July 1999 and the place will be in Boston at the Back Bay Hilton. Their number is (800) 323-0326 or (617) 867-6150. Reservations have been made for 16-17 July 1999. We anticipate and hope that Dr. MacLean will be our dinner guest on the evening of July 16th or 17th.

The two of us feel as chair and co-chair of the Psychotherapy Section that we would write an article for journal publication. We have noted thafreframing" while a term popular in family therapy is also applicable in many other forms of psychotherapy. For instance, Milton told the following in *Paradise Lost* (1.254):

" *The mind is its own place, and in
itself*

*Can make a Heav'n of Hell, a
Hell of Heav'n."*

Also, we believe that Shakespeare said, "*There is nothing either good or bad, but thinking makes it so.*"

Coincidentally interesting in view of Bob Saba's piece on Alfred Adler in the October, 1998, *ASCAP Newsletter*, we found a note that Adler used the concept in his therapy and from surfing the web,

we discovered that the term has been prominently taken up by Neurolinguistic Programming workers (notably a book by Richard Bandler). We found a number of references in business and politics that used reframing ideas as well.

Are readers familiar with reframing? Do you use it? Have you any clinical examples for us? Or other opinions or material that would be useful for the project? We look forward to your feedback.

We took Frank Carrel out for a luncheon to express our gratitude for his considerable efforts as Managing Editor of *The ASCAP Newsletter*. He has gone beyond the call of duty in the furtherance of the newsletter aims.

Reports from the Field

To Dan Wilson from Russell Gardner:

John Price is here visiting and we realized that we hadn't heard from you for a time. Are you ok? Do you exist? Have you been eaten by the YanomamO? (This referred to a plan of Daniel Wilson to travel with Napoleon Chagnon to visit the Yanomamd to determine if mania existed in their primitive culture; this project entailed hypotheses involving alpha states as basic plans for behavior that are realized pathologically in mania and normally in normal leadership).

Reply from Dan Wilson:

I'm back from America del Sud not having accomplished our primary objectives but with tales to tell and some progress afoot. The details are a bit confusing as it was rather like falling into the set of 'Pulp Fiction' or any other Quentin Tarantino film. I hope to send along a more extensive travelogue for the amusement of ASCAPians in due course.

A set piece was having the US Under Secretary of State and his Assistant arrive late to dinner in Caracas the night before we were to fly off to Yanomamoland. Having been briefed at the Embassy for over nine hours, Mr. Smith averred he "had no idea how unstable Venezuela is." Meanwhile, we were secure in having the Minister of Defense travelling with us as our host. Later that night, however, one of Chagnon's former graduate — now a leftist Venezuelan academic in cahoots with the Liberation Theological Jesuits — had heard Nap was in the country.

So, this person flew up to meet with the Archbishop of Venezuela (with two Che Guevarra style priests in tow). He convinced the Archbishop that our mission was a nefarious one. His Holiness then called his friend, the Minister of Defense. The Minister of Defense then issued 'letters of interdiction' to the US Embassy and our hotel advising us we were welcome as tourists but should

we be found amongst the Yanamamo, we would be subject to arrest and detention.

As it happens, a major part of the State Department visit was to investigate why Venezuela has consistently had far more persons die in incarceration than any other nation in the western hemisphere! The rest of our group arranged to go back to the US but I was still hoping to initiate some field work among the semi-aculturated Pemon Indians of Bolivar state near Brazil. Nappo set this up for me but the next morning headlines read "*Violent Pemon Uprising in Bolivar*".

So, I too, thought this phase of our work was, indeed, a star-crossed affair and took a seat on the flight home. There are many other colorful tales such as the stainless steel, laser-sighted, 18 round semiautomatic Glock 9mm pistol our tour guide quite casually placed on the table as we lunched in a fine Caracas restaurant!

Again, it was sort of late Graham Greene, early Garcia-Marquez. Of course the final indignity was that in all my travels I have never had such squits as upon return from this particular Republica Banana.



PP OCD in Canines

Conrad Fulkerson, M.D. wrote:
CFulkerson@aol.com

I have a 6-year-old male Labrador Retriever with anxiety, stereotyped behavior, and a propensity to licking his extremities when stressed. Our local veterinarian admits to limited knowledge in this regard and the veterinary literature is also limited. There are some veterinary specialists in behavioral interventions and pharmacology but the field seems to significant lag human research and practice.

I would appreciate it if anyone could steer me to resources, literature or share experiences especially with the use of SSRI's and Bupropion in canines. Prozac is reportedly used. What about other SSRI's?

Henry H. Kalir, M.D., Ph.D.
wrote:
kalinhe@umdnj.edu

Dear Dr. Fulkerson,

The dog model of "acral licking" was considered to be the equivalent animal model of OCD, and Clomipramine (as the first approved OCD treatment drug) was found to be efficacious there. I'm sure Fluvoxamine and Fluoxetine would do too.

Future WPA Meetings & Conferences:

Athens, Greece:

24-28 February 1999—WPA Regional Meeting — Preventive Psychiatry.

Contact: Prof. G. Christodoulou

Fax: (30-1)724-2032 **URL:**
<http://www.mednet.gr/announce/wpa-pp.htm>

Hamburg, Germany:

6th-11th August 1999 — XI World Congress of Psychiatry — Psychiatry on New Thresholds.

Contact: Professor W.Gaebel

Fax: (49-40)670-3283

Paris, France:

26-30th June 2000 — WPA Regional Meeting in Paris, France — From Clinical Practice to Research.

Contact: Dr. J. Garrabe

Fax: (33-1)4278-3512

Yokohama, Japan:

24-29 August 2002 — XII World Congress of Psychiatry.

Contact: Professor J. Suzuki

Fax: (81-3)3814-2991

WPA CO-SPONSORED MEETINGS

Casablanca, Morocco:

12 December 1998—XXth Annual Meeting of the Casablanca League for Mental Health — Challenges of Mental Health for the XXIst Century.

Contact: Professor D. Moussaoui, University Psychiatric Centre Ibn Rushd, rue Tank Ibn Ziad, Casablanca, Morocco

Fax: +212-2-294707

E-Mail: psych@casanet.net.ma

Granada, Spain:

15-17 March 1999 — The Community Care of the Long Term Mentally Ill Patients.

Contact:

Professor F. Torres-Gonzales
Grupo de Investigacion Salud Mental, Granada Sur Hospital Universitario 18012 Granada, Spain **Fax:** +34-958-275214.
URL: <http://www.moebius.es/psiquiatria-granada99>

Aix en Provence, France:

4—7 July 1999 — International Society for Adolescent Psychiatry Congress — Personality and Behavioral Disorders in Adolescents; Developmental and Psychosocial Perspectives.

Contact:

Dr. A. Braconnier Centre Philippe Paumelle 11 rue Albert Bayet 75013 Paris, France **Fax:**
+33-1-45832877.

Athens, Greece:

6-10 November 1999 — XX Congress of the International Association for Suicide Prevention.

Contact:

Professor C. N. Stefanis
University Mental Health Research Institute c/o Easy Travel 19 Aiagnosopoulou Street 10673 Athens, Greece **Fax:**
+30-1-3625572.

Darwin in the Clinic: An Evolutionary Perspective on Psychodynamics Found in a Single Case Study

Although classical psychoanalytic technique is falling into disuse, Freud's legacy concerning elements of the mind: the unconscious, id, ego and superego, along with dynamic processes like repression and the defense mechanisms, is still common currency in the theory and practice of much psychotherapy. Another window on the mind, one that opens out onto an evolutionary perspective, offers other insights on the workings of the human mind. This view also posits a mind consisting of specific mechanisms, but they are considered modules that evolved in response to adaptive challenges during our evolutionary past. Such modules are information processing, evaluative, and decision-making mechanisms that solved problems having to do with survival and reproduction in the physical and social environment of ancestral time. Since both psychodynamic and evolutionary thinking about the human mind describe species-typical mental mechanisms, the question naturally arises: are psychodynamic constructs, such as the defense mechanisms, actually evolved mental modules fostered by natural selection because they served inclusive fitness during human evolutionary history?

The word *mechanism*, when used in the psychoanalytic sense, such as in the term defense mechanism, refers to personality structures, to the organization of thoughts and feelings for maximization of emotional comfort, that is, minimization of anxiety. It refers to intrapsychic processes. When the same word is used in the Darwinian sense, as with the term adaptive mechanism, it means behavioral tendencies, mediated by emotive and cognitive underpinnings, which were honed by natural selection to meet adaptive challenges during our evolutionary past. In other words, psychodynamic thinking focuses on personality organization with the goal of subjective comfort, and Darwinian thinking is concerned with outward

behavior with the goal of fostering inclusive fitness. However, although different purposes are cited by these disciplines, psychodynamic mechanisms that regulate personal comfort would have died out if they hadn't also fostered inclusive fitness. So our question is: are the mechanisms described by psychodynamic theory actually proximate mechanisms for adaptive behavior?

Several authors suggest that psychodynamic mechanisms do exemplify evolved, adaptive mechanisms as defined by evolutionary psychologists. Leak and Christopher argue that the id, ego, and superego are evolutionary sound divisions of personality as are the concepts of the unconscious and defense mechanisms.¹ Nesse and Lloyd come to similar conclusions as they examine repression, the defenses and mental conflict.² Badcock also finds evolutionary value for the unconscious, primary narcissism, infantile sexuality, identification, and other psychoanalytic concepts.³

Reconciling the two fields of psychoanalytic theory and evolutionary psychology represents a challenge. Both embody differences of opinion about fundamental issues. For example, evolutionary psychologists disagree about whether putative psychological mechanisms need to be demonstrated as serving inclusive fitness under contemporary conditions as well as, circumstantially, for those of the evolutionary past. Another debate concerns how one should think of some human psychological attributes: as specific evolved mechanisms put in place by natural selection, or as artifacts arising as a consequence of general selection for a large, complex (smart) brain. Disagreement also reigns about whether populations separated for thousands of years have evolved different preferences for solutions for adaptive problems or, alternatively, if observed differences

reflect the outcome of selection among various possible strategies on an individual level due to early life experience. Even more fragmented is the world of psychodynamic theory, or rather, theories. It can't even be said there is debate since only minimal cross-talk exists between schools of thought. But perhaps the various drive, ego, self and object based theories would attain more cohesion with the addition of a Darwinian perspective to their different assumptions.

In the meantime, anyone seeking to reconcile Darwinian principles with psychodynamic thinking is bound to do it in accordance with the theoretical system that makes the most sense to him/her. My manner of working adheres most closely to the object relations framework. This is Freud's intellectual legacy as developed by Melanie Klein, Donald Winnicott, Ronald Fairbairn, Harry Guntrip, Wilfred Bion; and more contemporarily, Otto Kernberg, James Grotstein, Thomas Ogden, and Jeffrey Seinfeld. So I tend to organize material in terms of splitting, identification, projection, and introjection with a focus on aggression rather than sexuality. I find that the dynamics that these concepts describe organize observations in a very satisfying way, and in my experience, their assumption during treatment has been clinically efficacious. Moreover, if these dynamics are universal mechanisms, fundamentally the same from person to person, differing only in the details of content and intensity, then they can be considered candidates for evolved mental modules. As such they must have served the inclusive fitness of their bearers during the environment of evolutionary adaptedness.

Reconciling psychodynamic and Darwinian principles can be approached by comparison of the principles themselves. Alternatively, a case example can be used to identify the particulars of a cognitive and emotional organization, to extract the operative principles, and then to analyze how they might have originally served adaptive functions. This might provide insight into the validity and the function of putative psychodynamic mental modules, and, in addition, suggest how individual experience regulates them. For mental modules

that cope with specific adaptive problems may differentially activate depending on circumstances. Mating systems, for example, are all designed to maximize, on average, the inclusive fitness of the participants, but they vary in forms reflective of ecological and demographic contingencies. In addition, some researchers have found that parenting styles and consequent infant attachment patterns correlate with mating patterns in particular cultures. They suggest that such matching of parent-infant attachment patterns and mating interaction patterns may have evolved as proximate regulatory mechanisms.⁴

I here describe a case study where I organize the clinical material in terms of splitting and identification and their ramifications. I will note the likely social impact of these psychological processes during early childhood when, presumably, they began. I will then explore how these same dynamics and their social repercussions might have occurred during ancestral times. Finally, I will suggest that certain psychodynamic mechanisms arise and elaborate in young minds because they serve the survival and well-being of the contemporary child as they did the offspring of our ancestors and that they, therefore, reflect evolved offspring strategies that respond to conflicts of interest between parents and offspring.

To be designated an evolved mental module, in addition to regulating personal anxiety, I assume that a psychodynamic mechanism must be demonstrated to have overt manifestations that affect the roles of other people so as to benefit the person in question. With identifying characteristics sufficiently altered to prevent identification, we will explore the case of someone here called Jane, an attractive, unmarried artist I worked with for several years beginning when she was 30 years old.

When she first came to see me Jane presented as tentative and hesitant, usually coming into the room with what looked like apprehension. When asked about this, she reported that she was generally that way due to sensitivity about intruding too suddenly into another "person's space". Her

conversations tended to have a wispy, vacant quality and she referred to herself as a loving and spontaneous, free spirit. She approved of this "spiritual" aspect of herself. She respected the qualities it represented namely, kindness, tolerance, generosity and forgiveness.

Jane related events about her life with an emphasis on ill-treatment by friends and relatives which included betrayal and verbal abuse, and, when she was a little girl, physical abuse by her alcoholic mother. But along with these complaints she habitually defended anyone who disappointed or hurt her, including her mother, as "really a beautiful person" who had troubles of his/her own and was therefore not blameworthy. Although she certainly believed that people ought to be decent to one another and didn't think anyone should be mean to her, outrage about the discounting and insult she encountered was conspicuously absent. Instead she worried about the well-being of the perpetrators.

Jane's response to mistreatment appeared to extend from her early relationship with her mother. Abused children are well known to cling to and defend the abusing parent. Utterly dependent on their primary caretakers, they can't afford to reject them.

Rage and resentment are the usual responses to mistreatment because they are useful for group living species in the overall. However that set of responses, if deployed automatically, would be maladaptive in circumstances of exploitation or brutalization by those who are vitally needed. So a child in need of continued nurture by an unsatisfactory parent would benefit by putting aside rage and resentment and behaving in a manner that solicited vital care. Therefore selection for an overriding set of mechanisms under certain circumstances would have been favored. Indeed there is good reason to believe that evolved infant and child strategies for coping with less than enthusiastic parents might well have been installed as an active component of youthful social management.

Jane's mother was violent toward her daughter, perhaps because of an alcoholic haze, but child abuse isn't dependent upon substance abuse. In fact there is considerable evidence for assuming that violence and neglect of children to the point of infanticide has a long history. From her studies of maternal psychology Janet Mann has concluded that social and psychological circumstances can have a powerful effect upon maternal thinking and decisions about investment in particular offspring, with sometimes disastrous results for the children.⁵ Offspring are a big investment for the human female: nine months of pregnancy, several years of breast-feeding (certainly for our hominid ancestors), and many more of nurture advance each conception into a viable descendant. Under certain adverse conditions maternal commitment to some infants invites wasted effort and would constitute a net reproductive loss. Sickliness of the infant, lack of social support or necessary resources, health of the mother, or the number of other children could all make investment in one particular child a mistake in the long run. Natural selection therefore would have favored individuals able to cut their losses.

We don't need to go into prehistoric times to find infanticide as a common remedy for "excess" offspring. There are hundreds of references to it as a common practice by ancient writers and of its sanction by custom. Stories of the Middle Ages are rampant with the incidence of infanticide by outright murder or neglect.⁶ And we are currently besieged with news reports of babies found abandoned, alive and dead. In the overwhelming majority of cases the mothers of these unfortunate children are single and without resources. Are they responding to an evolved mechanism activated by an assessment of unpromising reproductive circumstances and capable of overriding the mechanisms of maternal devotion? History tells us there's nothing automatic about maternal devotion. Perhaps natural selection saw to that.

It may even be that prevalence of infanticide during hominid evolution served to foster suspicion about parental intention into young minds. At least one

clinician believes that she routinely finds an unconscious fear of infanticide in her child patients. Dorothy Bloch has concluded that children are universally predisposed to a fear of infanticide and any violence that they witness whether toward them or another activates this fear. Dr. Bloch remarks that, since fear of infanticide comes up so often in her work with children, she is left with a choice between believing that the children's parents actually do want to kill them, or that children come equipped with this specific fear at the ready.⁷ She finds the latter choice more palatable, but she doesn't support her argument with an evolutionary perspective. Such a perspective would suggest that if mother nature built a capacity for maternal choice after the birth of offspring, she might also have built a counterstrategy that includes wariness into the young psyche. One that is activated when certain maternal behaviors signal that parental reproductive interest may be better served by sacrificing the child. Indeed, whether we posit that infanticide is an evolved possibility installed into the human mind or not, the quality and quantity of maternal attention certainly varies and the child's manner of interacting with its mother figures importantly in this variability.

Children's first concern (not necessarily conscious) is to get sufficient resources. They also have a myriad of developmental tasks beyond staying alive and healthy. So if natural selection could produce infantile personality characteristics including behaviors that positively impact maternal responsiveness, it would certainly have elaborated them into mechanisms to cope with inconsistent parenting. These mechanisms would organize the variable experience, satisfying and frustrating or frightening, of the primary figure upon whom a child is physically and emotionally dependent. One such mechanism might include repression of awareness of parental ambivalence as was evident in Jane's rationalization of parental (and subsequent important person's) abuse. Self-deception of this kind would have enabled her to behave devotedly as abused children frequently do, and thereby solicit nurture.

REPRESSION AND REACTION FORMATION:

If Jane, as a very young child, consciously perceived her mother as unreliable and abusive, her behavior, such as avoiding her mother or displaying anger or resentment, might have caused greater danger of neglect or injury. A better strategy was to seduce her mother into continued nurture with a demeanor of worshipful devotion supported by repression of the negative aspects of their interactions. I don't refer to memory loss, for Jane readily recalled the facts of what occurred along with the assessment that they were bad for her and wrong by society's standards. But their emotional meaning was lost to awareness. She clearly reported what happened to her when she was a child, but the only feelingful comments related to an often mentioned, solicitous concern for her mother's well-being.

It appeared that Jane's experience of her mother disconnected grief and narcissistic rage from awareness. Through repression and reaction formation she changed these to oversolicitous devotion. That disturbing aspects of feeling-life become repressed is a basic assumption in psychoanalytic thought. Since certain aspects of reality get excluded from consciousness, repression is fundamental to all defense mechanisms including reaction formation. Defense mechanisms reduce guilt, shame and associated anxiety, but that they might also adaptively structure behavior in social interactions is usually not considered.

Some taking an evolutionary perspective suggest that repression is an evolved process stemming from skills in deceiving others; a critical skill for group living, highly social animals competing for resources. One who believes his own lie will be more convincing. Moreover, self-deception isn't limited to one's own motivation. One can equally well deceive oneself about another's intentions.⁸ Conscious awareness about another's treachery may not always be wise, for it might show. If the other is vitally needed, as a parent is for a child, repression of knowledge of parental ambivalence may prove adaptive. Certainly it was Jane's tactic.

Because it permits the child to continue to behave endearingly in the face of abuse and neglect, I speculate that she exhibited a counterstrategy of hominid young to female reproductive strategies that call for sacrificing an individual child.

Reaction formations that enhanced devoted behavior on the part of abused or neglected young may also have been installed by natural selection early on. This entails not only repression but also behavior inconsistent with the repressed material, indeed opposite to it. Instead of disappointment, grief, resentment or even suspicion concerning her mother's attitude toward her, Jane adopted a doting, protective role. By becoming her mother's sympathetic ally and comforter Jane found a useful niche in what I presume to be her mother's infantile emotional structure. The usual niche of appealing to her mother as a dependent child in need of sensitive parenting hadn't worked. What likely happened exemplified the familiar reversal of nurture where a child behaves parentally toward the parent by offering warmth the parent misses in her own life.

Jane's commitment to her mother was an emotional asset for her mother, but an evolutionary perspective obliges consideration of the inclusive fitness impact of such reversal of nurture. A mother who continues to support an ill-timed offspring compromises her lifetime reproductive success. However, under the conditions of our evolution, unwanted offspring could redeem that compromise by reducing maternal costs with behavior that serves the health and well-being of the mother and/or her subsequent offspring.

On one level or another, strategies and counter-strategies are grist for the natural selection mill. If maternal reproductive strategies include decision making mechanisms that allow the neglect or elimination of ill timed offspring, then natural selection would have encouraged offspring behavior which could tip the balance toward personal survival. Similarly if offspring behavior assists the mother, then mechanisms in the maternal mind that encouraged and exploited that behavior would

also have been favored. Indeed, several first born women I have worked with who suffered maternal neglect or abuse ended up functioning parentally for younger siblings and for the mother. Future research might show that where neglectful or abusive mothering is present, it isn't unusual for the child, perhaps especially an eldest child, to take a parental role toward the family.

So far we have noted the occurrence of repression and reaction formation in Jane's case and speculated on how they might have evolved as adaptive mechanisms. Now we can examine the actual organization of her experience, her particular nature of repression and reaction formation. For that we move to another psychoanalytic concept, albeit a somewhat controversial and variously defined one, that of splitting.

SPLITTING:

Splitting commonly refers to a tendency to vilify and idealize others. But for many theorists and clinicians splitting also occurs for a single object. Rather than perceiving others as complex whole objects, the immature mind splits them up into multiple entities. Aspects of things or people associated with pleasure can be embraced and separately categorized from unpleasant aspects that can be rejected. To support differential responsiveness splitting of objects is considered a normal organizing principle in the immature mind not yet able to conceive of variable single objects. Some theorists also suggest that since it's the *experience* of the object that's split, the sense of self splits along with it.

So the split-off categories consist of a bad object-bad feeling-bad self amalgam with the converse amalgam of good object-good feeling-good self. The reason that the bad and good feeling aspects are elaborated into a sense of bad-self and good-self respectively is that the distinction between sense of existent-self and subjective-self seems beyond the conceptually immature mind. In other words, one *is* what one feels.

Splitting begins with the initial, primary object (mother, usually), and continues through life in a style based on the splitting characteristics set up in that first relationship. Two mothers, one responsive and satisfying, and another who is absent, unresponsive, hurtful or frustrating are perceived. Both correlate with splitting of the subjective sense of self. The capacity to split the maternal figure and integrate the split-off parts into separate aspects of the psyche is usually explained only in intrapsychic terms.

The point here is that it also permits various personal adjustments to situational contingencies, and that splitting is a personal adjustment mechanism that is also a proximate cause of adaptive behavior in the Darwinian sense. Personal adjustments in the interest of physical and psychic comfort and the mechanisms that bring them about will only persist if they are also adaptations in the ultimate sense of inclusive fitness.

Assumptions about splitting as described here reflect the thinking of Otto Kernberg (1984),⁹ James Grotstein (1985),¹⁰ Jeffrey Seinfeld (1990),¹¹ and others. If they are valid, they arise in the immature, relatively dendrite sparse infant brain so some questions come to mind. Is splitting merely an artifact of a rudimentary human mind, existing as a reification of difference enhancing, information processing mechanisms, as Mach bands do in the visual system? In other words is it simply a spandrel in the S.J. Gould sense? Or does the perceptual distortion of reality, which we call splitting, foster survival and reproduction and therefore have been promoted as an adaptation?

Perhaps what started as a seemingly trivial spandrel is truly an adaptation. Indeed this may happen a lot. Selection is opportunistic and spandrels are as good a target for directed elaboration as any. The suggestion here is that splitting is a developmentally normal evolved mechanism that can also support more extreme repression, idealization, and reaction formation as strategies to deal with ambivalent parenting.

Evolved psychological mechanisms are more or less active because of early experience. Jane's mother was satisfying at one moment, and punishing, terrifying and frustrating the next. In reaction to the extremes of her experience of her mother, the internalization of the maternal figure was split and polarized into extremes as well. One pole was the "beautiful person" she clung to as an idealized figure. This was supported by insulation of the good figure by Jane's disassociation from negative emotions and offhand justifications about her mother's own difficult early life. Dwelling on this truncated, positive version of her mother gave Jane a focus for loving feelings and a sense of safety.

However it didn't end there. To idealize another is to denigrate the self, and Jane did just that. She laundered the maternal by absorbing the negative. Jane was in the throes of a powerful identification with the negative split-off residues of idealization. She regularly reported that she felt dirty and that her life was squalid. Her manner of dress and description of her apartment and friends reflected this conviction. She was most comfortable among unsuccessful friends and acquaintances. Among successful people, she felt out of place and like a contaminating element.

This was at the root of her apprehensive, wispy manner. She was afraid of damaging a vitally needed other (mother, therapist, patrons, lovers) with her toxic, bad-self, originating from identification with the bad aspects of her mother. Jane commonly described her own mean impulses and fantasies as proof that she was a "bad" person.

Among people she admired for their success, she defended herself against bad-self and inferiority feelings by adopting a superior, judgmental attitude. Most often this was internal, but she would sometimes become "free and spontaneous", a mode in which she was flamboyant in a hostile fashion designed to send the message that she was in stuffy, uptight company. Moralizing hostility is her defense against her inferiority feelings and her outlet for stores of rage.

Even after she came to recognize the role her rage played as a defense against shame resulting from ill-treatment by her mother, she still clung to self-sacrificing idealization. Jane "forgives" her mother who is really a beautiful person, and very supportive of her. Actually her mother *is* currently supportive of her and she *has* acknowledged previous mistreatment of Jane and offered apologies and evidenced sorrow about it. Yet Jane resists discussion of it with her. Confronting this subject appears to terrify her. The thought of authentic discussion with her mother brings her the image of her mother dying in a hospital bed. Her mother does have potentially serious health problems, yet the image seems to reflect something more.

My best guess is a combination of anxiety and revenge. Her semiconscious fear is that if she confronts her mother with her anger it will kill her. Her preference, also semiconscious, is to continue to contain the "badness" and express hostility in the self-sacrificing form of counterculture "degeneracy". Since her lifestyle is a disappointment to her mother, this also constitutes revenge. A second anxiety may stem from the fact that the only operating personality she has known has been wrapped around badness and it frightens her to let it go.

In any case, the attachment to shame is tenacious in this case. An idealized and protective view of an inadequate or dangerous mother by a child permits solicitous behavior aimed at self-defense and procurement of essential resources. The splitting away of the badness is a necessary part of this, but how do we account for ensuing containment within the child? How might such a psychological mechanism have proved adaptive for our ancestors?

Ronald Fairbairn coined the term *moral defense*. In a reworking of Freud's concept of superego he posited a structure of several parts. Of these several parts one is an image of an ideal object, and others consist of bad objects.¹² Fairbairn's concept of the moral defense is the protection of the parental image at the child's own expense by idealizing the external object and internalizing the

bad aspects of the object. He writes,..." the child would rather be bad himself than have bad objects; and accordingly we have some justification for surmising that one of his motives in becoming bad is to make his objects 'good'. In becoming bad he is really taking upon himself the burden of badness which appears to reside in his objects.

By this means he seeks to purge them of their badness; and, in proportion as he succeeds in doing so, he is rewarded by that sense of security which an environment of good objects so characteristically confers."¹³ In other words by taking the badness upon himself the child may believe in the hopeful view that the parent is good and that he has control of the situation because he need only be good and the parent will be good as well.

My work with Jane appears to confirm Fairbairn's concept of the moral defense. An evolutionary perspective might make such a conclusion more concrete. Clinging to bad objects may be in the emotional economics of idealization and reaction formation that buys an unwanted child's life. Natural selection may have fostered elaboration of a discriminative cognitive capacity to split reality as a proximate mechanism mediating repression, idealization and reaction formation in a child at risk. Further, this evolved capacity for illusion may have flourished in the human species by enabling an unwanted child to survive and flourish by assuming a "*helper at the nest*" role.

These suggestions stem from applying an evolutionary perspective to a psychodynamically oriented single case study. They raise interesting questions that could lead to further study — questions about how the behavioral aspects of a child's psychological organization of the mother figure impacts the respective Darwinian benefits to mother and child.

Although these suggestions emerge from an object relations point of view, I assume that other theoretical schools might similarly inform an evolutionary perspective, as an evolutionary perspective might inform clinical theory and practice, to the benefit of both, c8

Human Evolution by Natural Selection and Climatic Variability

Current orthodoxy with regard to human evolution by natural selection is based upon an ancestral savanna habitat. Some researchers also postulate a pivotal cognitive breakthrough c. 100,000 BP(?) -30,000 BP(?). For example, one hypothesis is that independent modules of the brain became integrated c. 60,000 BP - 30,000 BP, dramatically expanding human intellectual potential: ". . . *the big bang of human culture*" was "when the final major re-design of the mind took place ... With these new design features the specialized intelligences of the Early Human mind no longer had to work in isolation"."

Human technological and artistic development c. 60,000 BP - 30,000 BP is presented as key evidence for a cognitive breakthrough. However, technological progress among humans can be deceptive. After all, the industrialization of the last two centuries was built upon numerous small insights. A sudden cognitive breakthrough played no part, notwithstanding the attractiveness of the idea to a later archaeologist looking solely at the rapid, massive transformation in the archaeological record. Artistic endeavour may be no more than a consequence of greater leisure made possible by cumulative technological advance.

Other researchers favour a more conventional Darwinian explanation involving long-term adaptation to a particular environment. In one hypothesis, a decisive role in human evolution by natural selection is assigned to climatic variability in the tropics.^{2,3} The evidence for more climatic variability during the last 750,000 years than in any previous epoch is well authenticated. Moreover, climatologists are finding empirical evidence of, and theoretical reasons for, greater Pleistocene tropical climatic variability, especially cooling.⁴ For example, "A series of climate simulations ... leads to an enhanced cooling, particularly in the tropics. This is in agreement with recent geochemical evidence from

fossil corals, ground waters, and ice".⁵ Marked climatic fluctuations occurred in periods as short as two hundred or so years (six or seven human generations).

Human physiology is consistent with climatic variability having a profound effect on human evolution by natural selection. Humankind "is much better adapted to resist a shortage than a surplus of food" and "does not die quickly of starvation". Absence of food for fourteen days "involves no serious impairment of physiological function and leaves no permanent effect on health". "Most people with primary undernutrition recover rapidly, once they have a free access to food." A healthy, non-obese male can lose usually up to 25% of his weight "without immediate danger to life" and, in extreme conditions, has bodily reserves which could last just over fifty days. Humans are adapted specifically to cope with prolonged shortages. Thus, after 5 or 6 weeks of starvation "adaptive mechanisms come into play which slow down the breakdown of protein to only about 20 g/day".⁶

In his book, *The Sickening Mind*, Martin poses the deeply puzzling question of why prolonged stress reduces the efficiency of the immune system.⁷ For this reason, humankind is often less able to fight disease at the most critical time. Paradoxically, the severe stress brought on by a diagnosis of cancer actually reduces the body's ability to fight the illness. On the other hand, and much more understandably, brief periods of stress "often enhance certain aspects of immune function".⁷

The effect of prolonged stress on the immune system is "mediated by complex chemical and neural mechanisms which appear to have evolved specifically for this purpose" and cause the "immune function to drop below normal levels". Prolonged stress stimulates the production of certain hor-

mones which suppress the immune system and, thereby, increase vulnerability to disease.⁷

In the context of climatic variability, however, the partial suppression of the immune system brought about by prolonged stress is an adaptive evolutionary response. The capacity to cope with food shortages is enhanced. On the assumption that long-term stress was a reliable indicator of prospective semi-starvation, the conservation of energy following from the partial suppression of the immune system would be a sensible precaution. Naturally, the response is inappropriate in present-day Western society, when prolonged stress is caused largely by social and other factors unrelated to nutrition.

In an earlier ASCAP Newsletter article, a theory of conservation withdrawal, which had been partly anticipated by others, was suggested for clinical depression.⁸ The hypothesis was based upon the Involuntary Subordinate Strategy proposed by Price, J., Sloman, L., Gardner, R., Gilbert, P. and Rohde, P.⁹ The contribution was that during human evolution by natural selection prolonged stress was a reliable indicator of actual or impending food crises. Certain individuals were, in effect, shut down (became clinically depressed) to minimize food consumption. The symptoms of clinical depression were constrained by this scenario into ones which conserved energy by generating feelings of hopelessness and lethargy.

The preceding theory of conservation withdrawal was called standby to highlight the key elements. The explanation of the reduced efficiency of the immune system as a result of prolonged stress and the standby theory of clinical depression are analogous. Both syndromes contributed to surviving conditions of semi-starvation or worse during periods of marked climatic deterioration in the ancestral environment. Potts' research has established as fact that hominids were exposed to the harsh effects of ecological instability.³

The specificity of human physiology is full of clues concerning humankind's evolutionary origins. Human responses to cold are those of a tropical

species. Humankind is heavily dependent upon water and, without clothes, is poorly insulated. For these reasons, humans are adapted primarily to well-watered environments with a high, broadly constant, day and night temperature c. 28° C and little wind, in effect well-watered, tropical forest margins.

These niches tend to be small in size and relatively uncommon. In this tropical environment, human progenitors could minimize their energy requirements with regard to insulation and muscularity in order to finance the brain. The human brain entails a fearsome overhead cost in an environment subject to periodic shortages. Although the brain is only some two percent of body mass, the organ uses some twenty percent of the oxygen intake, while "fully 15 percent of the blood propelled into the aorta with each contraction of the left ventricle" goes directly to the brain.¹⁰ Humankind's modest physique is also a plausible adaptation to recurrent food shortages during periods of aridity. Newman's preliminary work on the implications for human evolution by natural selection of present-day human physiology, although a generation old, is highly illuminating.¹¹

The climatic variability hypothesis of human evolution by natural selection is also postulated upon the assumption that humankind was the product of an unlikely combination of two rare events. The two occurrences, detailed subsequently, were a most unusual collection of potentialities (pre-adaptations) combined with a geographically small but abundant habitat. The significant potentialities (pre-adaptations) were:

1. Initial primate intelligence,
2. An active lifestyle,
3. Free hands and the possibility of technology resulting from bipedalism, and
4. Social living out of a home base in conjunction with food sharing.

The geographically small but abundant habitat was the well-watered margins of tropical forest, which

enabled local access to forest, more open woodland and savanna. The modest size of this specific, localized environment kept human numbers small. No other species had the necessary aggregation of characteristics to compete within this niche. This environment happened to reward individual and collective problem-solving by bipedal apes, for example in matters of social organization and technology.

The challenges to survival became increasingly, but gradually more severe as the environment was subject to ever more extreme climatic fluctuation. The drier interludes did not change significantly basic human physiology, for example the marked dependence upon water and a naked skin for cooling by evaporation. However, the oscillations in climate enabled an evolutionary response in favour of greater intelligence and an increasing role for flexible, learned behaviour. The potentialities of the environment allowed the brain to be self-financing. The energy expended on the brain was exceeded by the energy gained from a higher, more efficient food extraction, which, in time, involved special processing, for example cooking and grinding.

Intelligence was maximized by collective decision-making and the sharing of knowledge and experience. Communication and reasoning were enhanced by the use of a complex language. Climatic variability ensured the language was open and flexible, allowing for the creation of new words and concepts to describe the ever-changing environment.

Ultimately, humankind could cope with a task as intellectually daunting as the transformation of its habitat from tropical forest to semi-desert in six or seven generations. In this scenario, the critical tasks were to discover new food sources and to modify the social organization to match the new environmental constraints, especially in relation to the selection of marriage partners. Indeed, the severity of the challenge spawned specialist personalities particularly adept at solving certain categories of problems.

Humankind is remarkably homogeneous in behaviour, and one theoretical framework (humankind possessing the attributes of a gatherer and hunter) can account for all social situations, both historically and world-wide.² The existence in one small geographical area until very recently (in geological terms) of a tiny, initial human population is a simple explanation of human global uniformity. Genetic research has confirmed this conclusion.

The claim that c. 1 million BP "*morphology like that of homo sapiens had begun to differentiate in Africa*", strengthens the climatic variability hypothesis.¹² Furthermore, "*the earliest modern humans seem to have existed considerably earlier than has been assumed*", and a "*basically modern morphology already existed in eastern Africa more than 200,000 years ago and probably as early as 300,000 years ago*".¹³ The preceding conclusions are supported by work on the modern human cranial shape.¹⁴ All this research is consistent with the hypothesis that humankind had a long-term, independent evolution.

As a consequence of long-term exposure to climatic variability, humankind has a sophisticated capacity for coping with environmental change, which is called the scale.²⁻¹⁵ Some important elements of the scale are:

1. Universal but very distinct emotional responses to abundant or scarce environments,
2. Individual and collective social reasoning and problem-solving,
3. A preponderance of learned social behaviour, and
4. Powerful, but non-coercive instruments of social control.

Moreover, this scale faculty interrelates directly, but subtly with the other two principal attributes of humankind's gatherer and hunter behavioural patterns:

1. A community's shared interpretation of the world (worldview), and
2. The spiritual other world (dreamtime).

The attributes of scale, worldview and dreamtime reveal a remarkable interrelatedness.^{2,15} For example, as the environment deteriorates, the worldview is modified to accept greater discipline, while the dreamtime becomes progressively more intense. If the human mind were the product of a sudden cognitive breakthrough, this coherence of behaviour could have been brought about only by chance. The odds against this happening are astronomical. Especially, when this highly fortuitous outcome is deemed to have occurred independently, several times, within a few thousand years of each other, in geographically separate parts of the world.

The archaeological record and genetic evidence suggest a growth in human numbers from tiny beginnings some time between 140,000(7) BP to 60,000(?) BP.¹⁶ A plausible hypothesis is that the initial expansion from a tiny, parent group resulted from cumulative technological breakthroughs (for example fire, clothes and tools) together with, perhaps, favourable climatic interludes.

Accordingly, three major technological breakthroughs are posited to be found in the human record, the:

1. Gatherer and hunter expansion, eventually worldwide,
2. Commencement of agriculture, and
3. Advent of industrialization.

The level of human technology c. 100,000 BP is, at present, a matter of conjecture. If humans preferred well-watered terrain, the damp soil of these locations may not have preserved wooden or bone tools, baskets and fibres (nets for hunting). In forest margins, suitable stone may have been less common and perishable bone and wood the more favoured material.

Thus, the slowness of technological advance c. 100,000 BP may be more apparent than real. In any event, technological progress may have been hampered by few numbers in relatively hostile

environments. Among small populations, human technology may even lose sophistication, as happened to the Aboriginal inhabitants of Tasmania.

The absence of across species comparisons with large-brained mammals handicaps the understanding of human evolution by natural selection. However, geneticists have shown that a significant increase in the brain size of two large-brained hominids (humankind and Neanderthals) did occur independently.

The analysis of Neanderthal mitochondrial DNA (mtDNA) "*implies that the Neanderthal divergence [from humankind] is of considerable antiquity, dating to 555,000 to 690,000 years ago. This is about four times greater than the time back to the common ancestor of modern human mtDNA (120,000 to 150,000years)*".¹⁷ On the basis of these results, Neanderthals cannot be ancestral to humankind. For this reason, conditions in the African Pleistocene become pivotal to understanding human evolution by natural selection.

The increase in brain size leading to Neanderthals is parallel evolution to humankind. The ensuing similarities in social behaviour between these separate evolutionary events are very striking, for example both "*species*" buried their dead, cared for sick colleagues and improved technology. Neanderthal speech may have evolved more than 300,000 years ago.¹⁸

The discovery of three skillfully-crafted wooden spears made c. 400,000 BP will necessitate a reassessment of early (proto-Neanderthal?) technology.¹⁹ The spears were highly engineered, for example the piercing end was made from the hardest section of wood while grooves at the tip may indicate stone points. The find was associated with bones which suggest hominids of this era, who have been presented, on occasion, as little more than scavengers, were, in reality, skilled toolmakers and hunters. In this case, sophisticated technology predates any evidence of artistry or trade.

According to archaeologists, and in contrast to humankind, Neanderthal behaviour was stereotyped, while its habitats were restricted to cold climates.²⁰ The key difference between humankind and the Neanderthals could be that the latter never developed the ability to cope with climatic variability (the scale). The one-way adaptation to the cold did not demand the same flexibility and imagination as mastering alternatively abundant (wet) and scarce (arid) tropical environments. The archaeological record indicates that Neanderthal populations tracked their favoured habitat, relocating in response to marked climatic shifts.

In the context of the evolution by natural selection of hominid social behaviour, the comparison between an environment whose temperature alone fluctuates with one which is alternately wet and dry is suggestive. For instance, a tropical environment which switches between wet and dry offers an opportunity for both a behavioural (the scale) and technological response.

On the other hand, a habitat which oscillates between, for example, cold and cool is, prima facie, less conducive to the emergence through evolution by natural selection of a capacity to cope with ecological instability. The facet which inhibits a scale adaptation in these circumstances is that a cold-adapted hominid can only cope with a warmer environment by losing insulation, essentially body fat. Only genetic change as a result of evolution by natural selection can achieve this outcome. Consequently, a response to a milder habitat in terms of the emergence of a scale faculty is a less likely outcome for a cold-adapted hominid.

Some bone evidence implies that Neanderthals suffered from recurrent, severe food shortages, even starvation. The Neanderthal combination of a big brain, great muscularity and adaptation to the cold necessitated a correspondingly large, high value food supply, especially meat. The consequence can be predicted to be a low population density combined with a significant vulnerability to food shortages, both of which would have militated against Neanderthal survival.

In apparent contrast to the Neanderthals, humankind evolved by natural selection to be a cooperative problem-solver who could amend deliberately its social organization to match environmental needs. This aspect introduced a novel, collective, deliberate element into evolution by natural selection, but not a new principle.

Certainly, group selection in the sense that collective decision-making and an adjustable social organization compromised individual survival was not a factor. Rather, individuals who cooperated in their decisions and freely shared their knowledge and understanding were more likely to survive, because these individuals, working as a team, took better decisions. The group dynamic was creative and not just a question of unthinking imitation.

The ensuing reflective, innovative society was more than the sum of its parts. In this sense, human evolution by natural selection cannot be explained without referring to social entities, which have their own reality of, for example, social values and technological traditions. These facets of human behaviour and its evolution by natural selection cannot be explained solely in terms of contributions from individuals.

The four main additional points made in this article compared to our previous articles are as follows. First, human physiology supports the view that humankind evolved by natural selection in a variable, sometimes extreme environment. In particular, the idea of climatic variability offers plausible explanations to human responses which otherwise seem highly maladaptive. Thus, the weakening of the immune system as a result of prolonged stress is seemingly inexplicable unless viewed in the context of an energy conservation strategy. The idea is eminently testable. Does prolonged stress cause the slowing down of other human physiological systems? A detailed study of human physiology in the context of climatic variability ought to make a productive study.

Second, the climatic variability theory of human evolution by natural selection is consistent with the

small initial populations of humankind revealed by archaeological research and genetic studies. Furthermore, a straightforward hypothesis derived from climatic variability can be proposed which accounts for human behavioural and intellectual capacities. The coherence of these behavioural attributes (scale, worldview and dreamtime) suggests a long-term evolution, and this aspect is supported by published research.

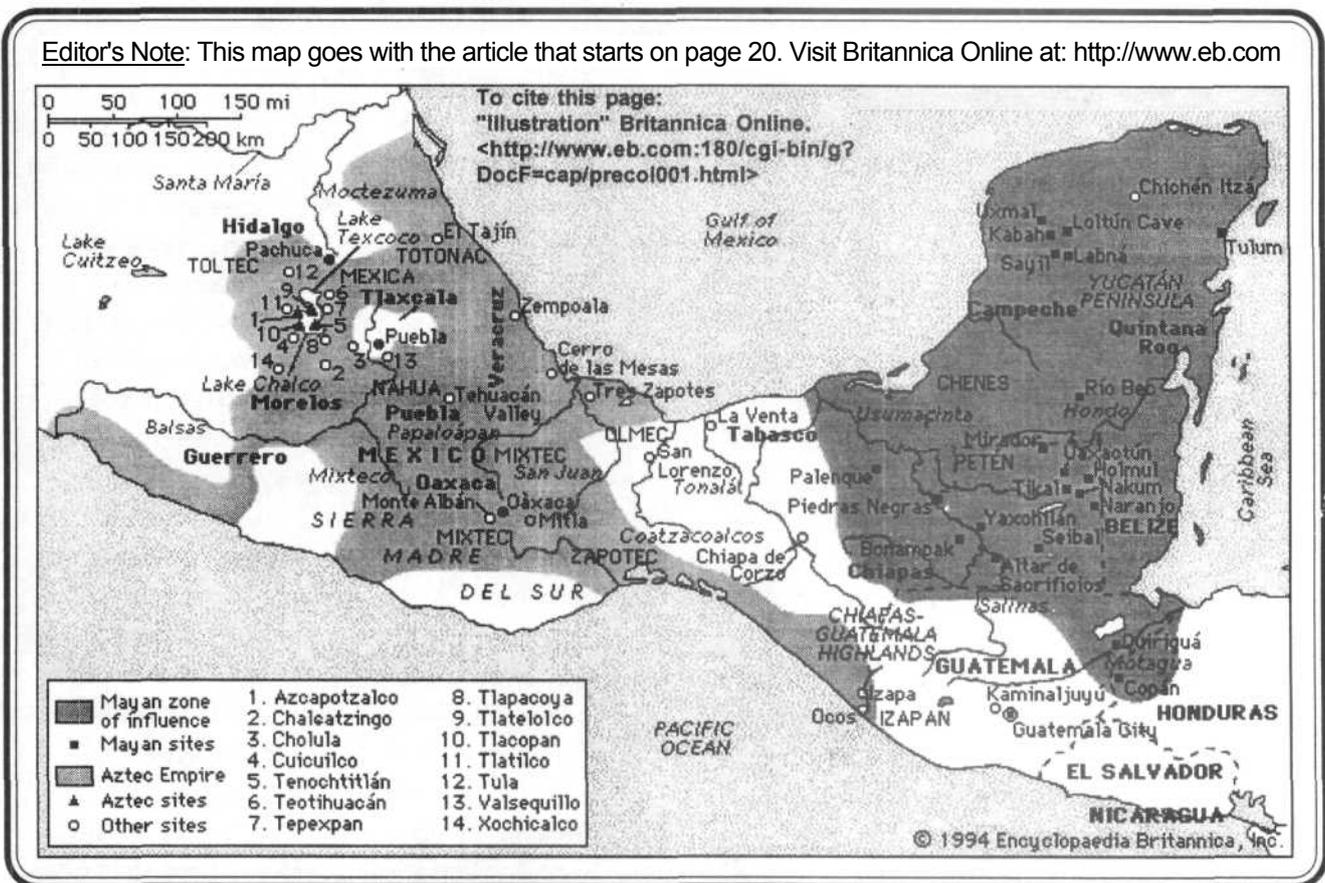
Third, the role of human technology during the last 100,000 years may have been underestimated by researchers. Cumulative technological developments are powerful instruments for change, as the present era so strikingly testifies. Nevertheless, the current consensus favours some kind of non-Darwinian cognitive breakthrough some 30,000 or so years ago to explain the global expansion and inventiveness of humankind. In our view, an alternative explanation based upon a cumulative advance in human knowledge and skills is perfectly tenable. Accordingly, the hypothesis that evolution by natural selection working in the context of climatic variability explains completely the physical and

mental characteristics of humankind is consistent with the facts.

Finally, as has been pointed out many times, the rarity of large-brained species is, prima facie, puzzling in view of the manifest advantages to humans of their brains. Why did large brains take four billion years to evolve and, then, only appear in two terrestrial species (humans and Neanderthals)? Part of the answer is that large brains are extraordinarily expensive. The cost can only be recovered in the very exceptional circumstances of variable environments. However, across species comparisons are instructive in the context of large brains and can be undertaken between humans and Neanderthals. These studies may throw interesting light on both species' intellectual abilities and behavioural characteristics. In particular, the additional social and technological creativity of humans may be traced to their faculty for coping with climatic variability. c8

Editor's Note: See a "complementary" abstract on Palaeoclimatology on page 24 of this issue.

Editor's Note: This map goes with the article that starts on page 20. Visit Britannica Online at: <http://www.eb.com>



ARTICLE:

by Claire Russell and W.M.S. Russell

Population Crises and Population Cycles 10. Swidden Farming and the Maya

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Over very large areas of the wet tropics, in rain forest or adjacent regions lacking such advantages as volcanic soil or river-borne silt, soils tend to have plant nutrients washed out of the topsoil, becoming acid and infertile: this is true, for instance, of 78% of soils in the Amazon basin. Nevertheless, an excellent form of farming has evolved in such regions all over the world. An area of forest is cleared, the resulting litter spread over it, dried and burnt, and a variety of crops planted. After a few years yields decline, and the area is allowed to revert to forest fallow for a much longer period (**Table 1**). This admirable system, called swidden farming (from the Old English word for a burned clearing), uses no agricultural chemicals and can yield food energy up to twenty times the energy invested.

However, because so little of the land is producing food at any given time (**Table 1**), the system demands much land per family, and a correspondingly low density of population. In different regions, with better or worse soils, terrains etc., different critical densities of population have been calculated (**Table 2**). If the critical density in a district is exceeded, there has to be more land under crops, and this can only be done by shortening the fallow period in each cycle. With a shorter fallow, the forest cannot fully restore fertility, yields decline, and yet more land is needed, in a vicious cycle.

Eventually the forest cannot recover at all. The now unprotected soil is invaded by tough grass weeds, or eroded away altogether by wind or water. Some tropical soils, for instance in the Amazon basin, are lateritic, that is with virtually no elements in the topsoil except iron and aluminium. Exposed to the sun without plant cover, such soils may bake into a hard substance that can never again grow crops: the Khmers of Cambodia (see the eighth paper) used laterite as a building material. In all these ways land goes right out of crop production, reduc-

ing the population carrying capacity of the district: by this time land hunger will have led to serious violence (**Table 2**). Population crises thus take a rather special form in swidden farming regions.

With such low critical population densities, swidden farmers live in either very small or widely separated villages, in "*a pattern of dispersed settlement and scattered population*" (Harris, 1972). This does not normally permit the appearance of cities and civilization. But one great civilization was based on swidden farming — the Maya, of what are now Guatemala, Belize, Honduras and Southern Mexico. In its heartland alone, across the base of the Yucatan peninsula, this civilization numbered some 80 cities and over 200 lesser centres.

During the heyday (300-600 A.D.), "*the Maya... reached intellectual and artistic heights which no others in the New World, and few in the Old, could match at that time*" (Coe, 1971). In mathematics, they evolved place value and the zero symbol independently of, and probably earlier than, the corresponding invention in India. In astronomy, their calculations for the motions of Venus were accurate to an error of one day in 6000 years. Their calendar was capable of greater accuracy than the Gregorian calendar introduced in Europe in 1582 A.D. and still in use today. Besides splendid buildings, sculptures and paintings, they regularly set up dated monuments inscribed with historical records and astronomical data.

These achievements were based on a pattern of settlement quite unlike the urban concentrations usual among civilised societies. Tikal, perhaps the greatest Mayan city, had a very modest population of about 10,000, scattered over 16 square kilometres: contrast the Sumerian city of Uruk, with 100,000 people within the 4.5 square kilometres enclosed by its ramparts. The Mayan city was the only kind that could be based on the "*dispersed*

settlement and scattered population" characteristic of swidden farmers.

The Maya practiced swidden farming with maize and beans as the main crops. They sometimes grew manioc on ridges in periodically flooded swamps. But there is no evidence that they practiced artificial irrigation or the large-scale cultivation of permanently cleared plots. Their spread-out cities and city-states were a cultural adaptation to the low land productivity of swidden farming. But even this much concentration was only attained at the cost of exceeding the critical population density for the region.

During the Classic period (300-600 A.D.), the population of the Central Mayan area grew steadily. At Barton Ramie in the Belize Valley, there was a four-fold increase in house occupation. At Uaxac-tun, Tikal and Dos Aguadas, population densities probably reached 386,625 and- 888 per square kilometre, respectively. These are comparable to the disastrous density of South-East Nigeria in the 1960's (Table 2).

To feed their growing populations, the Classic Maya must have shortened their fallows with the inevitable results. During the Late Classic Period (600-900 A.D.), all the signs of overpopulation crisis make their appearance. Burials at Tikal show a sharp drop in stature, suggesting malnutrition due to food shortage. The people of Tikal constructed a massive defensive embankment and ditch, ten kilometres long, across the main route to the neighbouring city of Uaxactun. This defensive work was 4.5 kilometres from the city centre, and was clearly intended to defend agricultural land. Warfare, hitherto very infrequent, was becoming common and intense. At Bonampak, wall paintings depict prisoners being tortured. Elsewhere there are signs of peasant revolt: at Piedras Negras, the dais of the rulers was deliberately smashed.

In the course of the eighth and ninth centuries, the cities ceased to raise their dated monuments. The cities were being abandoned. A few illiterate

peasants still camped in abandoned city centres: at Piedras Negras, they re-erected an inscribed monument upside-down. But the civilisation had collapsed, and aerial surveys and-excavations show a drastic fall in population; during the 9th and 10th centuries. *"Since the end of the 10th century A.D., most of the area has been a green wilderness"* (Coe, 1966). Much of the Peten region is visited only by gatherers of chicle, the raw material for chewing gum.

The present depopulation of the region (cf. Table 2) is mainly due to the lasting damage done to the land when the Maya swidden farmers exceeded their critical population density. Lateritic areas are denuded of trees, and *"the insect life in the humus of the present forests in Peten is far from as abundant as in virgin forests, which is a further proof that the forests of this district have been entirely cleared away and have had great difficulty in recovering"* (Gourou, 1966). The clay filling various lakes in this region probably came from eroded soil. Both grassland formation and the danger of soil erosion have been reported in swidden farming districts with rising populations in modern Guatemala and Mexico.

In Northern Yucatan, outside the Central Area, and in the Southern mountains, some large settlements persisted until the Spanish conquest. However, in the tenth century, the whole Mayan region, weakened by overpopulation, succumbed to invasion by less civilised peoples from the North. The composite culture so formed was impoverished and stress-laden. Technology and the arts declined, and *"the most complete absence of hieroglyphic texts during that period is evidence that there was an intellectual regression"* (Thompson, 1966).

The Post-Classic communities lived in walled fortresses, and kept their populations down by chronic warfare and large-scale human sacrifice. The sudden collapse of Classic Mayan civilization in the Central Area, and its more lingering decay in the outer lands, provide a spectacular example of the disastrous results of exceeding critical population densities in the wet tropics. c8

Table 1: The Traditional Swidden Cycle in Various Places

(from W.M.S. Russell, 1988)

<u>Region</u>	<u>Years under Intensive Cropping</u>	<u>Years under Forest Fallow</u>
<u>New World</u>		
Brazil (Kuikuru Tribe)	1	25 2-8
Guatemala (near Lake Peten)	12	
<u>Far East</u>		
Sri Lanka (Ceylon)	13	8-20 10-12 12
Sumatra	2	or more
Sarawak	1	8-10
Philippines (Hanunoo Tribe)	24	15-20
New Guinea	1	
<u>Africa</u>		
Liberia	12	8-15 12-15
Sierra Leone	2	10-15
Ghana	13	8-14
Nigeria (rain forest)	12	Up to 30
Nigeria (savannah woodland)	4	10-15
Central Zaire (Congo)	2-3	

The system is adapted to making the most of and perfectly conserving the tropical environment. During the long forest fallow, the tree cover protects the plot from erosion, the deep tree roots bring back to the surface nutrients washed down by the tropical rains, leguminous plants (up to 50% of all species in the forests of Ghana and Central America) counteract the loss of nitrogen, and dead plant matter is constantly being returned to the soil and recycled by bacteria for the use of living plants. While one plot is under fallow, the other plots will be cultivated elsewhere for equally short periods, so that at any given time 80%-90% of the land is "unproductive", though it is doing an essential job of restoring fertility.

Table 2: Critical & Actual Population Densities of Swidden Farmers

(from W.M.S. Russell, 1988)

Some Estimated Critical Population Densities

Africa (savannah woodland)
India
Borneo
Africa (rain forest)
Java

**Number of
Individuals per
Square Kilometer**

10
11
13
40
50

Some Estimated Critical Population Densities

World Average (1957)
Guatemala (Lake Peten area, 1959)
Brazil (1946)
Philippines (Hanunoo Tribe, 1955)
New Guinea (Chimbu Highlands, 1960)
Nigeria (parts of the South-East, 1963)

per Square Kilometer

6
0.6
2
20
202

Swidden farming districts sometimes closely adjoin those hydraulic agriculture, and the difference in population density is then very striking. At the edge of the Red River delta in Vietnam, at the border between the 2 systems, population density rises suddenly from 2 to 575 per square kilometre.

The Hanunoo can safely achieve a relatively high density because they are probably the most skillful swidden farmers in the world. Their soil classification stands up to modern scientific analysis, and they can recognise 1,600 different kinds of plants. The population density in the Lake Peten area is so low because (as shown later in the text), Mayan overpopulation permanently damaged the land.

Tuber crops give a very high yield of food energy and are relatively undemanding of soil fertility, so they may permit swidden farmers temporarily far to exceed their critical densities, but the result is then very severe forms of the vicious cycle of swidden overpopulation crisis. In parts of the New Guinea highlands in the 1960's there was serious soil deterioration and extensive fighting for land. In 1967, the Nigerian Civil War broke out, to end in 1970 with a disastrous famine in the South-East, which (like all overpopulated regions), suffered the worst from the war and lost it.

Swidden farming (often called "shifting cultivation"), has been irrationally blamed for the degradation of tropical lands, when the "real" cause is the breakdown of the system under overpopulation, "*the overcrowding of the planet... out of which all the other evils that afflicted the human race arose.*" (H.G. Wells, 1923)

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ABSTRACTS b EXTRACTS ...

Kramer MS; Cutler N; Feighner J; Shrivastava R; Carman J; Sramek JJ; Reines SA; Liu G; Snively D; Wyatt-Knowles E; Hale JJ; Mills SG; MacCoss M; Swain CJ; Harrison H; Hill RG; Hefti F; Scolnick EM; Cascieri MA; Chicchi GG; Sadowski S; Williams AR; Hewson L; Smith D; Carlson EJ; Hargreaves RJ & Rupniak NMJ: Distinct mechanism for antidepressant activity by blockade of central substance P receptors. *Science*, 1998;281(5383):1640—1645.

Abstract: The localization of substance P in brain regions that coordinate stress responses and receive convergent monoaminergic innervation suggested that substance P antagonists might have psychotherapeutic properties. Like clinically used antidepressant and anxiolytic drugs, substance P antagonists suppressed isolation-induced vocalizations in guinea pigs. In a placebo-controlled trial in patients with moderate to severe major depression, robust antidepressant effects of the substance P antagonist MK-869 were consistently observed. In pre-clinical studies, substance P antagonists did not interact with monoamine systems in the manner seen with established antidepressant drugs. These findings suggest that substance P may play an important role in psychiatric disorders.

Fienberg A.A; Hiroi N; Mermelstein PG; Song W-J; SnyderGL; Nishi A; CheramyA; O'Callaghan JP; Miller DB; Cole DG; Corbett R; Haile CN; Cooper DC; Onn SP; Grace AA; Ouimet CC; White FJ; Hyman SE; Surmeier DJ; Girault J-A; Nestler EJ & Greengard P: DARPP-32: Regulator of the efficacy of dopaminergic neurotransmission. *Science*, 1998;281 (5378):838—842.

Abstract: Dopaminergic neurons exert a major modulatory effect on the forebrain. Dopamine and adenosine 3',5'-monophosphate-regulated phosphoprotein (32 kilodaltons) (DARPP-32), which is enriched in all neurons that receive a dopaminergic

input, is converted in response to dopamine into a potent protein phosphatase inhibitor. Mice generated to contain a targeted disruption of the DARPP-32 gene showed profound deficits in their molecular, electrophysiological, and behavioral responses to dopamine, drugs of abuse, and anti-psychotic medication. The results show that DARPP-32 plays a central role in regulating the efficacy of dopaminergic neurotransmission.

Hasegawa I; Fukushima T; Ihara T & Miyashita Y: Callosal window between prefrontal cortices: Cognitive interaction to retrieve long-term memory. *Science*, 1998;281(5378):814—818.

Abstract: A perceptual image can be recalled from memory without sensory stimulation. However, the neural origin of memory retrieval remains unsettled. To examine whether memory retrieval can be regulated by top-down processes originating from the prefrontal cortex, a visual associative memory task was introduced into the partial split-brain paradigm in monkeys. Long-term memory acquired through stimulus-stimulus association did not transfer via the anterior corpus callosum, a key part interconnecting prefrontal cortices. Nonetheless, when a visual cue was presented to one hemisphere, the anterior callosum could instruct the other hemisphere to retrieve the correct stimulus specified by the cue. Thus, although visual long-term memory is stored in the temporal cortex, memory retrieval is under the executive control of the prefrontal cortex.

Cox CL; Zhou Q & Sherman M: Glutamate locally activates dendritic outputs of thalamic interneurons. *Nature*, 1998;394:478—482.

Abstract: The relay of information through thalamus to cortex is dynamically gated, as illustrated by the retinogeniculocortical pathway. Important to this is the inhibitory interneuron in the lateral geniculate nucleus (LGN). For the typical neuron,

synaptic information arrives through postsynaptic dendrites and is transmitted by axon terminals. However, the typical thalamic interneuron, in addition to conventional axonal outputs, has distal dendrites that serve both pre- and postsynaptic roles. These dendritic terminals participate in curious and enigmatic triadic arrangements, in which each contacts a relay cell dendrite and is contacted by a glutamatergic retinal terminal that innervates the same relay cell dendrite.

Here we show that agonists of the metabotropic glutamate receptor (mGhR; activate dendritic terminals of interneurons in the absence of action potentials, thereby inhibiting the postsynaptic relay neuron. Somatic recordings from LGN interneurons reveal that there is no response to mGluR agonists, suggesting that their dendritic terminals are electrically isolated from their somata and axons, consistent with anatomical modelling of these cells. Our results offer insight into the functioning of triadic circuitry and indicate that thalamic interneurons can perform independent computations expressed through axonal as opposed to dendritic outputs.

Charles C: Palaeoclimatology: The ends of an era. *Nature*, 1998;394:422-423.

Abstract: So-called "millennial—scale" climate variability refers to abrupt flips between a cold and a warm global climate at intervals of a few thousand years. The cause has generally been held to lie in oscillations of water flow in the North Atlantic. At a conference devoted to the topic, however, the Pacific entered the picture as the possible driving force behind these climate changes, raising the intriguing prospect that there might be a millennial—scale El Nino.

Dehaene S; Naccache L; Le Clec'h G; Koechlin E; Mueller M; Dehaene-Lambertz G; Van De Moortele P-F & Le Bihan D: Imaging unconscious semantic priming. *Nature*, 1998;395:597—600.

Visual words that are masked and presented so briefly that they cannot be seen may nevertheless facilitate the subsequent processing of related words, a phenomenon called masked priming. It has been debated whether masked primes can activate cognitive processes without gaining access to consciousness. Here we use a combination of behavioural and brain-imaging techniques to estimate the depth of processing of masked numerical primes. Our results indicate that masked stimuli have a measurable influence on electrical and haemodynamic measures of brain activity. When subjects engage in an overt semantic comparison task with a clearly visible target numeral, measures of covert motor activity indicate that they also unconsciously apply the task instructions to an unseen masked numeral. A stream of perceptual, semantic and motor processes can therefore occur without awareness.

Marchetti K; Nakamura H & Gibbs HL: Host-race formation in the common cuckoo. *Science*, 1998;282(5388):471—472.

The exploitation of a new host by a parasite may result in host-race formation or speciation. A brood parasitic bird, the common cuckoo, is divided into host races, each characterized by egg mimicry of different host species. Microsatellite DNA markers were used to examine cuckoo mating patterns and host usage in an area where a new host has been recently colonized. Female cuckoos show strong host preferences, but individual males mate with females that lay in the nests of different hosts. Female host specialization may lead to the evolution of sex-linked traits such as egg mimicry, even though gene flow through the male line prevents completion of the speciation process.

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