

# THE ASCAP NEWSLETTER

## Across-Species Comparisons And Psychopathology Newsletter

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"Numerous selection pressures, often at odds with one another and acting on mechanisms originally serving old purposes, built by accretion a three-layer Rube Goldberg of a CNS in which the parts, too, are often at odds with one another, and serve old purposes."  
Jerome Barkow<sup>1</sup>

### Newsletter aims

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

The ASCAP Newsletter  
is a function of the  
International Association  
for the Study of  
Comparative Psychopathology<sup>2</sup>

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

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### IASCAP to meet!

We thank Debbie Snyderman, our Thomas Jefferson University member from Philadelphia, who has worked to make the following arrangements.

Mark your calendars for **Saturday, May 21, 1994**. We meet from **9 am to 3 pm in room 139, Jefferson Alumni Hall, 1020 Locust Street, Philadelphia, Pennsylvania for the business meeting of IASCAP**. We expect to arrange our scientific sessions in an ad hoc manner for Sunday and other days during the American Psychiatric Association which meets May 23 through 26, 1994.

The agenda includes renaming of the society with a possible revision of the mission statement. The name of the newsletter will also be at issue. Also, we need more formal rules and regulations for doing business.

An additional business item is how we will accomplish scientific session(s) for this and other get-togethers. Format, (in)formality, future arrangements require decisions and guidelines.

Dr Snyderman tells us that the Jefferson Alumni Hall contains an art museum and that she will arrange for an art historian to give the group a free tour!

## Letters

Nov 10, 1993

*There is a correction in the October ASCAP Newsletter reference #7 in President Paul Gilbert's letter. Anthony Steven's book, The Two Million-Year-Old Self was published this year (1993) by the Texas A&M University Press, College Station, TX, (not U Texas, Austin). To the English, it's probably all the same, but to Texans (as you know), there is an immense difference, like night and day.*

*David Rosen, Texas A&M,  
College Station, TX, USA*

Indeed / should have caught that one! In-group/out-group in Texas is symbolized by the difference between the Aggies (Texas A&M in College Station) and the Orange (University of Texas in Austin). We're sorry about the mis-reference.

## Letters (continued)

3 Dec 1993

*Thanks for printing the announcement of the bibliography.*

*I have subscribed to IASCAP. Incidentally, I do think the 'basic plan' concept has much to recommend it, especially, in comparison with "biogram."*

*I enjoyed the newsletter you sent. I may well submit something on crowd behavior.*

*Hiram Caton, Griffeth U, Brisbane, AUSTRALIA*

I hope you do contribute something on crowd behavior. Note material below on leadership and followership.

Thanks for calling attention to biogrammar initially labeled by Tiger and Fox in their famous The

Imperial Animal.<sup>3</sup> Biogrammar makes an important point, but indeed is not the same as the more inclusive set of basic plan. Rather, T&F describe the concept as "Each species has a repertoire of signals-postures, gestures, movements-to communicate what the animals feel and what they plan to do."<sup>4</sup>

Such comes not only from learning but from what is inherited as repertoire components: "it turns out that while the variations are endless, the themes are restricted in number, and are, in all cultures, the fixed points on which the system turns. The story can be told in many different ways, but the plot and the characters remain the same."<sup>5</sup> This is the pivot around which their book hinges, eg, on a page picked randomly, "What children find easy to learn and enjoy learning reflects the biogrammar with which we are concerned."<sup>6</sup>

Biogrammar refers, in other words, to a set of basic plans that have been culturally misinterpreted along a storyline that ignored human body-heritage, and strove somehow to see people as independent of it.

## Letters (continued)

13 Dec 1993

*...You might be interested to know of a historical contribution on [the] subject [of mania at the intersection of biology and culture].*

*Edward Shorter, History of Medicine Program,  
U Toronto, CANADA*

Shorter E: Mania, hysteria and gender in lower Austria, 1891-1905. History of Psychiatry 1990;i:3-31.

Selected quote from the introduction: *Individuals respond to models offered by the culture of what represents 'legitimate' disease. Their minds do not chose symptoms randomly but in response to cultural notions of what is appropriate for presenting distress. The culture presents a template, or model, for making one's inner distress evident to others or bringing it to the doctor.*

*Thus the social historian of psychiatry must pursue three separate narratives: one, that of underlying biology; second, the story of the stresses*

and life experiences of individual patients; third, the story of changes in the models which the culture holds out for the communication of inner distress.

In the interior of the triangle are the actual psychiatric symptoms, and their history. But this history may be shaped by changing any of the three sides: by demographic changes which alter the composition of the population that is biologically at risk; by social changes which increases or decrease the pressures upon, let us say, young women...; and by cultural changes which modify the kind of behaviour that is expected of individuals....

Footnote: This concept of 'triangle' differs somewhat from the 'biopsychosocial' model that George L Engel has presented for understanding disease. In the triangle, 'psyche' and 'social' commingle at two separate points: at 'personal life history' and 'at cultural representations'. The triangle model has the advantage of permitting us clearly to disentangle the stressful factors in an individual's life history from the cultural forms available to him or her for expressing psychic distress.

#### Letters (continued)

8 Dec 1993

Herewith my bank draft for \$20. Outstanding value for money! You will see that I have enclosed a UK magazine the lead story in which is entitled "The Lust for Leadership." I found the article itself rather a disappointment, but either it or the associated contributions from current leaders (a somewhat mixed bag!) may provide tidbits you may wish to cull. [Excerpts follow this letter].

There is one aspect which I find rather amusing. The article itself largely comprises what I call "consulto-babble" of which Tom Peters is not but the current leading exponent. It is full of stuff about the new kind of leader now needed to deal with a "swirling, contradictory environment." It is not so much wrong, as simply a frothed-up rehash of something academia has known about for 30 years, and the rest of the world since the advent of socially directed cognition. The expression "horses for courses" catches the idea that leadership skills are situation-dependent. Similarly, the afro-American saying "different strokes for different folks" makes clear that there can be no "one

best way" with any people-based enterprise. However, it is unfair to carp; these people have the unalienable right to make a dishonest living. The amusing bit is that, with the exception of Sir Graham Day who has clearly attended the right management conferences, most of the contributions from the established leaders are largely cast in the "old" leadership mould and at some variance with the thesis contained in the article. I am unclear whether this was a subtle means of telling us that the leaders selected are out of touch. More likely, the editors were so immured to the latest management theory "discovery" that they did not notice the contrast.

.... I was most impressed (awed would perhaps be the better word) by your review of the literature in explaining your attachment to the current ASCAP terminology. I have had a go at renaming ASCAP while retaining the acronym. My best effort is Association for the Study of Cellulo-genetic Attitudinal Pathologies. Unfortunately, this might lead to the conclusion (assuredly false) that all ASCAPers have in common is an attitude problem. Now if you asked me what I think ASCAP ought to stand for, that would be much easier: Association for the Study of Contingent Anti-personnel Processes, of course....

Mike Waller, Glenclyne, UNITED KINGDOM

Caulkin S: The lust for leadership. Management Today November, 1993, pp 38-41

Selected quotes: Leadership has long been the subject of speculation by historians and the military. But as business has become imbricated in Western cultures...., it has eagerly co-opted the idea of leadership as its own.... Leadership has become the Holy Grail of management, endlessly sought, endlessly elusive. Figures are lacking, but of books and courses on the making of leaders there is no end....

And the sum total of all this activity? 'We know very little about it,' says Andrew Campbell, co-director of the Ashridge Strategic Management Centre, cheerfully, 'All the research adds up to a profound recognition that leaders have followers, and where there are followers there are leaders. But since we can't tell which creates the other, it's very difficult to know which levers to pull.'

If, indeed, the levers can be pulled at all. On the

crucial question of whether leaders are born or made, Peter Drucker, for one, has always been categorical that leadership, being innate, can't be taught or promoted....

In fact, all that can be said with certainty about leadership is that it has absolutely zero inherent connection with good and that it works - sometimes with catastrophic results.... In short, a great many leaders are people to whom normal human beings would hesitate to give house room....

[T]he leader as a business superman - a charismatic, driven, Olympian authority - remains an obsession.... [but] other models of leadership exist. Japanese companies by and large do not feel the need for Nietzschean leaders, and ... their model for followership is different, too....

Michael Black... [notes] 'Leadership may be a charisma, a gift, but it is a gift that requires recognition of the severe limitations of one's power as a leader.'...In [the] memorable phrase, 'Leadership is in the eye of the follower.' ...Sums up Robert Kelley of Carnegie Mellon University, 'Followership dominates our lives and our organizations, but not our thinking, because our preoccupation with leadership keeps us from considering the nature and importance of the follower.'...

Effective followers...require a light touch. Leaders in an organization of effective followers are facilitators of change, conductors of an orchestra, in Drucker's description, rather than square-jawed decision-makers of the past. They treat followers as co-equals except in strict line terms. In turn, that fits followers for one of their most important (although usually unstated) functions: to keep leadership on the straight and narrow....

The crisis of leadership is only partly the quality of the leaders themselves, much more the crude, market-driven model by which we are reduced to judging them. And don't look to leaders on their own to fix this problem. 'Expectations create leaders, not vice versa,' says Michael Black. Leaders are them, but they are also us.

**Two leaders provide definition in response to Management Today's invitation to define leadership. Management Today's Nov, 1993, p42.**

John Major (Prime Minister): [T]wo qualifications above all which I consider to be vital to good leadership. First... courage of their principles and clear long-term objectives... Second, good

leaders never forget the people who work for them. The difference between passive obedience and active loyalty can make the difference between success and failure.

Sir Peter Inge (Chief of the General Staff): [Definition... 'A person or thing that leads or a person followed by others.' ... [L]ist of essential qualities necessary in a leader... Personality and character... Courage... Willpower... Knowledge... Initiative... I would add two qualities. They are unselfishness and showing that you enjoy being a leader.

Robins RS, Dorn RM: Stress and political leadership. *Stress* 1993;12(1):3-17.

Abstract: The literature on stress and political leadership typically views such potential stressors as time-pressure, severe consequences for bad decisions, inadequate information, and conflicting demands as negative influences on political performance. We know, however, that many politicians thrive on or even require such circumstances. Drawing on medical, historical, psychiatric, psychological, and political science literature, this essay proposes that there are at least three major types of leaders in regard to potential stressors: sturdy warriors (who cope with or who even enjoy and are helped by events commonly reacted to others as stressors), battle-hungry warriors (who are psychologically drawn to potential stressors and "cannot function," well or badly, without them), and frail warriors (who are unable to cope with stressors). Subcategories, including psychological and political dynamics, are provided.

## Letters (continued)

9 Dec 1993

Congratulations on another excellent issue of ASCAP. I vote strongly for retaining the name even though what it stands for no longer applies very much. For me ASCAP stands for "as foolscap"... the sort of thing that one writes down informally and passes around for discussion.

I also like your discussion of basic plans. As far as the social hierarchy goes, we must have a basic plan for relating to the person above us, and

a separate basic plan for relating to the person below us. Then I think we have a second order basic plan, at a higher logical level, which is concerned with switching from one basic plan to another, when we are overtaken by the person below, or ourselves overtake the person above.

Here we get into the problem about the multiple number of relationships that people have and therefore the basic plan that you have for one person is not the same as the basic plan you have for other people. Therefore it is difficult to see why the basic plan should affect one's general behaviour rather than one's behaviour in a specific relationship.

I think the answer to this is that there is always a single "key person" or "key rival" who is the person usually either immediately above or immediately below in the hierarchy, with whom one's relationship is being threatened or likely to change. If you are feeling confident, then your key rival is the person who ranks above you, and your behaviour is governed by the basic plan for challenging the person above. If you are being threatened by the person below, then your behaviour is governed by the basic plan of relating to the person below. When your relationship with the "key rival" changes then your behaviour is governed by the second order basic plan, and you become depressed if you are switching to an up-hierarchy basic plan and you become elated if you are switching to a down-hierarchy basic plan.

This model gives us two intensities of mood change in either direction, one for the first order basic plan and one for the second order basic plan. Possibly this underlies the difference between neurotic and psychotic depression and between confident personality and hypomania.

John Price, U Wellington, NEWZEALAND

### **Response and challenge: can John Price explain American football?**

by R Gardner

John Price, in this effort to discuss switches from one basic plan to another, gives us an extraordinarily spare model of a three person level of hierarchy, given the complexity of the social networks to which we belong. With the spareness is a sense of unrealism.

Like Frans de Waal's chimpanzees, but much more so, we humans have alliances.<sup>7</sup> Ritual agonistic behaviour in the form of put-downs, verbal jousting, fights and the like occur somewhat differently for humans than for chimpanzees, with the fact that we have (using Merlin Donald's phrasing) gone two steps beyond the episodic culture of the great apes to a mimicry and myth as well.<sup>8</sup>

Smaller brained large primates keep track of former encounters, but the encounters are episodes that add or detract from current standing, whereas proto-humans apparently used memory and action to commemorate important events and plan new ones more metaphoric and ceremonial than less planful activities of the chimpanzee or australopithecine. Evolution of verbal language to explain and anticipate such things further expanded the repertoire of methods to deploy less-basic plans; this allowed considerable tinkering with the more basic ways of doing things.

Consider from the following how instant communication has added to the potential of myth. This is relevant beyond emphasizing the horizontal dimension of Birtchnell (propensities towards closeness to versus distance from other people) in these considerations: I tried to apply the story-line of John's in various scenarios with which I am very familiar and I can't put the figures involved in an agonistic framework separated from their larger social structure.

Thus, I provide an example from American football which I follow as a fair-weather fan (I support the team if they win; otherwise, I appreciatively lose interest, appreciatively because I then have more time to do other things than listen or watch the games and read about the scores. I am now doubly cursed and have no time for myself: at this time, Houston has two extraordinarily successful sports teams ~ in football and basketball).

The football team (Houston Oilers) has been notable for several years under the low key leadership of Jack Pardee, who delegates considerably, never seems upset, stays very much quietly in command. He has a talent for explanations that minimize conflict and maximize cooperation and goodwill. His offensive coordinator for years has been Kevin Gilbride who executes (and is the chief engineer of a controversial offense). Pardee brought it from his former job, but other teams currently don't use it. Gilbride is respected for having survived a kidney removal for cancer with dignity and "Let's get on with business" attitude. He is a perennial candidate for head coach positions.

But losses in the clutch were disillusioning. Last year in the playoffs, the Oilers were many points ahead until the final minutes of the game when the defense collapsed in a particularly dramatic fashion in a humiliating loss. The defense coordinator was promptly fired and a new highly controversial figure was hired instead. This was Buddy Ryan who had been the defensive coach of a Superbowl team before. He then became a head coach, but was fired after indifferent success as the overall boss.

Now the defensive unit is coached with high intensity and an intricate schema; the outcome is that they are unusually aggressive, swarming, and intelligently confusing to the opponents. Buddy Ryan is not only antagonistic to other teams but to the offensive unit of the same team, disdaining the special offense unique to the team, catathetically calling it the "chuck and duck" rather than the more usual and respectful "run and shoot." He is a master at the condescending put-down: mocking, devastating humor.

The season started inauspiciously: 1 win with 4 losses. Team morale was very low; but then the defense seemed to learn Buddy's system (he is more easily "Buddy" whereas Gilbride remains "Gilbride" - I refer here to information seeping in from car radio daily talk shows). To me, offense was good too, but not as impressive as the defense. The result has been many team records: 11 straight wins, division championship, and good prospects for post-season playoffs which happen in January. Buddy claimed the credit and suggested that he should symbolically carry Gilbride up the stairs as that was how the defense had carried the offense this year (myth-making through mimetic imagery).

In the last game of the regular season, the otherwise high quality team scored nothing, a rarity: testimony to Buddy's system. In the middle of the game, however, the offense made some controversial decisions resulting in a fumble, decisions with which Buddy disagreed. National television, knowing the drama of this coordinator controversy, zeroed in on the two of them and amazingly caught Buddy going after Gilbride with his right fist. This has captured local and national media with far more attention than that received by the game and the triumphant end of the season. The radio talk shows were filled with nothing else.

Buddy has apologized only to his defensive unit, saying that he was sorry to have diverted attention from their triumph. Jack Pardee has remained

avuncular and calm, saying that the team would handle it privately. He is now credited with genius for having held the team together.

Some details have become available about the conflict: after the fumble in a nontraditional, non-conservative play, the other team threatened to score and Buddy said to Gilbride, "Why don't you play *professional* football?" Gilbride responded with an obscenity, probably, "Fuck you." At this point, Buddy swung at him (in itself laughable, as he always appears pugnacious but is small, gray, and rotund compared to the tall, athletic Gilbride who always appears with unruffled brown hair).

How do we understand these events from John Price's schema? Like Robert Southwell whose story is summarized later, Buddy does not accept that he is anything but alpha status. Notable, however, is he never directly challenges Pardee, only his counterpart on the offensive unit. His manifest rebellion is probably a factor in the feistiness of his defensive unit which loves him. Success is powerful as is also his winning formula, apparently.

Buddy has made no secret of his avid desire to be head coach again. But if newspaper experts are correct, he has little chance with the franchises so far recruiting: he is too controversial and potentially embarrassing. But of course, some owners might desire that the coach be colorful as this enhances media presence and consumer interest. The sports pundits freely predict that if the Oilers win the Superbowl, Buddy will get another go at the head coach business.

This diversion into American football emphasizes that even in the human game/play setting, the complexities are so much greater than the spare scenario outlined by John. What are the *many* basic plans simultaneously deployed by Buddy, Jack Pardee and Gilbride in the multiple levels of their interactions with one another and with their audiences and their player-constituencies, not to mention the rich oilman owner (from its onset three decades ago) who is a one-person constituency with the ability to not only hire but fire? He deplored the fight, but grinned saying that he has never had a better defense, and maybe this is the way the organization ought to work.

So there is a challenge here! How can the basic plans and the less basic plans be specified? In this case, the switch is not the issue, but the simple description.

## Rustlers' Rhapsody

by J S Price

I would like to follow up my comments on RG case IA (ASCAP Dec 1993) with a case of depression from fiction, which illustrates, I think, the usefulness of the 3-level model of escalating and de-escalating alternative agonistic strategies.

The depressive episode afflicts the hero of the spoof *Western Rustlers Rhapsody*. Written and directed by Hugh Wilson, the film is a fantasy on the pre-1947 B movie Westerns starring Rex O'Herlihan (the "singing cowboy") and his horse, Wildfire. The film illustrates the occurrence of a depressive episode following defeat in a ritual agonistic encounter; also the formation of an asymmetrical affiliative bond and an exercise in the theory of logical types that would have delighted Bateson and the Palo Alto group.

The hero comes to town and defends the good guys (sheep herders) against the bad guys (cattlemen), adopting, along the way, the town drunk as his "side-kick". The cattlemen hire their own "gun" and eventually there is an eyeball-to-eyeball confrontation between the gunmen. But the "frame" of the confrontation is expanded to a higher logical level. They metacommunicate about the rules of the encounter. They agree that, since they are taking part in a Western, and since in Westerns the good guy always wins against the bad guy, the winner will be the one who convinces the other that he is the good guy. Therefore, instead of exchanging shots, they exchange bits of proof that they are the good guy and the opponent is the bad guy.

Since the cattlemen, knowing the metarule, have hired their gunman for his virtue rather than for his shooting, the hero is beaten, and his immediate defeat behaviour recalls Leon Sloman's description of losing at tennis. As his opponent counts down to the draw, he looks uncomfortable and says, "I can't fight you today ... I'll fight you tomorrow ... maybe Thursday ... yeah, Thursday'd be good", whereupon he slinks off to his campsite outside town where he throws away his guns and expresses ideas of low profile and unworthiness: "I'll get some new clothes, understated stuff, lots of browns (he is presented as a very flashy dresser), and I'll have to sell Wildfire, he's too good a horse for me now."

The victor of the contest, for his part, shows ritual restraint, "If he's backed down, I couldn't go after him, it wouldn't be nice."

The depressive phase is brought to an end by the elicitation of strong anger, when the bad guys shoot his side-kick, and he then rallies the sheep farmers for a final showdown.

What lessons can we draw from this tale? One is that we need all three modular levels to describe the interaction, so that the three level diagram of escalation/de-escalation in July's ASCAP (1993) is better than the two level diagram in the June issue, thus vindicating Leon's insistence on the importance of anger (both in prolonging depression and, as in this case, relieving it). Also it emphasizes that the thymic de-escalation of depression can be over-ridden by escalation in either of the other two modules. As therapists, we are more likely to encourage escalation in the deliberative module, if we see that with help the patient can win his battle, and that yielding is not needed in any of the modules.

		Alternative strategies	
		ESCALATING	DE-ESCALATING
	CORTEX (deliberative)	(A) Fight to win	(B) Submit
Brain level	LIMBIC (emotional)	(C) Get angry	(D) Feel chastened
	STRIATUM (thymic)	(E) Mood elevation	(F) Depression

I am not sure to what extent the elicitation of anger has been discussed in the treatment of depression. Clearly it could be a two edged weapon, as the provoking stimulus might well make the depression worse; in modular terms, the stimulus could have intensified thymic (paleomental) de-escalation because of the loss of RHP caused by the death of an ally and the insult inflicted by his shooting. It might have induced de-escalation in the affective module too, leaving only grief and humiliation. But in fact it produced such intense escalation in the affective module (in the form of anger) that this module over-rode the de-escalation of the thymic module and led to overall escalatory (assertive) behaviour, thus eliminating the one-down position vis-a-vis the cattlemen's hired gun which had led to the depressive episode in the first place. It was a true escalation of the fight - he did not recontest the one-to-one encounter

with pistols, but rather escalated to a group-to-group encounter with rifles; he also shot his opponent in the head and killed him, in contrast to his usual policy of shooting people in the hand.

Can ASCAP readers suggest any other fictional (or biographical) examples of depression following a ritual agonistic encounter?

### **On not signaling submission**

by R Gardner

Following on John Price's contribution, this bears on the following *contrary* example from fictionalized history: not depression but non-depression followed torture.

#### *A Christmas present*

I've been reading the stories of saints in a Christmas present from a colleague: McClung J: Mischief and Mercy: Tales of the Saints. Berkeley, CA: Tricycle Press, 1993.<sup>9</sup> Jean McClung is a Texas physician who has thought much about torture, abuse and the sequelae they produce in the personal development of people. She has also examined history and the context of these stories, manifestly retellings and fictional. These include Mary Magdalene, Amador and Veronica, Valentine, Saint Nicholas of Myra, Paul the Simple, Dymphna, Wencelas, Francis of Assisi and Clare, Robert Southwell, Junipero Serra, Jean Vianney, and (!?) Judas. I recommend the book: forceful, attractive, self-disclosing, interesting - good stories. Not for the faint of heart: the saints and Dr McClung's knowledge of them makes for an unblinking view of history.

#### *Involuntary submission*

But my larger reason for referring to Jean's book in these pages is that I discovered in it an illustration of the difficulties inherent in studying submission. We have argued in these pages repeatedly that submission, yielding, and defeat are part of an ancient and deeply encoded behavioral pattern. Indeed, reviewers of refereed journals are beginning to accept for publication articulations of that point of view. By ancient, we mean evolutionary history hundreds of millions of years old, not just the hundreds or thousands of years of human recorded history. Behavioral pattern means that the behavior results from a fairly basic plan: genomically encoded, realized in the neurons of

many vertebrate species, not as basic as the eukaryotic cell nor the first glued together multicellular animals, even as old as fish.

But if this is true, it is also true as John Birtchell and Seymour Itzkoff have stressed, humans *are* different. Their brains are three-times bigger than the brains of Australopithecines and of non-human primates. The increased size, with its concomitant hazards for child-bearing, accomplishes things helpful for survival that the smaller brains did not have. One facet is gregariousness: as animals go, we connect to and depend on each other very much. Also, we people plan a lot and do so with the aid of stories: I know of no other animals with the articulated story-lines of humans. Third, to relate, we communicate with subtlety ~ not always as friends, but as enemies too.

#### *Southwell*

Now back to the stories of the saints: Robert Southwell was a Jesuit priest in Elizabethan England who in public defiance of the Queen insisted that the pope not the monarch was the head of the Church. "His imagination was caught by the life and death of Edmund Campion, the first English Jesuit martyr, who was, like Southwell, a poet and essayist."

Southwell, product of a prominent Norfolk family, also became a martyr, noting at his trial that he had lived the same number of years as our Lord. We have learned from Frank Sulloway that he is likely to have been a younger son: although not evident from the book, from personal conversation with Jean, we learn that we are correct. Southwell's father and older brother were nominal Catholics willing to attend Anglican services on ceremonial occasions.

Southwell clearly participated in story-lines that dominated his life. He was one of the three hundred Jesuits who smuggled themselves to the island from France in disguise to provide sacraments to Catholics there, and died as a result.

Topcliffe was the chief of the Queen's anti-Jesuit police. Topcliffe found Southwell particularly a problem as Dr McClung portrays in a mythical letter she has the martyr write:

*To know Topcliffe in a nutshell is to know his invention which he calls "Topcliffe's rack," which in fact has affinities with the torture of the pulleys as well as with the Roman rack.... It is typical of Topcliffe that he loves this device so because it*

*leaves no marks and thus can cause no scandal.*

*He carries a special hatred for me because he believes me to possess a certain grace of speech and bearing which most certainly must have been plundered in its entirety from him at the very beginning of the aforementioned conspiracy against him. He is the only human being I have known that I would call ugly. This has nothing to do with the way God made him, but with the anger and hatred that inhabit his every movement, his every sentence, the very bones of his face. I told him once from the rack when he was cursing the fair look in my face that God could make him beautiful if he would just give God time to work on him. That was the time he left me there to die and I would have done except that [his assistant] cut me down.*

*For myself, what prison has done to me is the precise opposite of destruction. It has mended me into a wholeness I never believed could be mine. Of course my body is broken, but somehow that does not signify much. I fight the pain...there is much anger to bear and contain. I have thought that perhaps Topcliffe racked me so many times-ten times he hanged me up on his rack-because he noticed that throughout the first four times, I was so angry thinking about Anne [Bellamy-she was tortured and raped] and the way she had been used and deliberately broken, that in some sense I was not properly attending to the pain.*

*Please pray God also to forgive me for my unfeeling politeness to Topcliffe which has been an enormous comfort to my soul, but which enrages Topcliffe and thus provides, I fear, further occasion for him to sin.*

*Southwell wasn't depressed*

Human uniqueness thus allowed Southwell to be defiant even though Topcliffe was the nominal dominant. With authority felt from the Lord, he could tell Topcliffe in a paternally dominant manner that the torturer too could be attractive, which only enraged the rack-maker more. Southwell implied condescendingly he was doubly dominant: he admitted superior attractiveness and he said he had connections to the superior being.

Topcliffe required submissive signals which Southwell never gave. Southwell retained his passively dominant stance and communicated his anger subtly in ways that made his expressions hard to decipher clearly. Topcliffe could conceal the torn muscles of his victims and thus cause less public scandal, but Southwell could mostly conceal his defiant unsubmission, communicating just

enough - and unmistakably - that Topcliffe was driven to put him on the rack still further.

How different the scenario if Southwell had like his father and brother given token submissive signals. Dr McClung notes that Elizabeth's 300 sacrifices in 45 years paled against the same number of deaths in only five years brought about by Mary Queen of Scots. She didn't require much: only some attendance of special services and no open defiance.

Think how differently things would have worked if Southwell had been clinically depressed: no defiance, no overt anger expressed to superiors, deadened facial expressions with subtlety gone, little concern for social niceties, feeling pained without any torture, without interests, low self-esteem, and manifest dysphoria. Rather his joyfulness, psychological disconnection (dissociation) from the torture itself, conscious and continued anger, subtle rebellion - all these conspired to help him live out his personal story-line of becoming a martyr. If he had properly implemented involuntary submission, he could have gone about other business and probably would have died a less notable death, including the possibility of suicide.

*Did Southwell look depressed?*

The other issue, however, is the difficulty in defining the submissive state: how can one deny that Southwell was submitting? He was forced to be so, he was imprisoned, his non-submissive behaviors were subtle. If we were rats and watched by some over-seeing researchers who didn't know our language and subtle communications, I suspect they would have difficulty in deciphering the meaning.

Because we are fellow creatures, however, and know how such stories work and how people operate, we comprehend and grasp how the subtle communications operated even four centuries ago, but the entire scenario demonstrates how the three-times bigger brain and its functions complicate things for the investigator. Involuntary submission may be 300 million years old. The new neurons exploding brain size between 100 and 1 million years old are the probable source of story-telling and the other unique aspects of humanness. They have both complicated and facilitated a method of self examination (science) that is only about 300 to 3000 years old. But story-telling ~ in Dr McClung's book wonderfully engaged in - helps gain an initial entry into the problem so that science-thinking can go somewhat further on.

## **Sociobiology of we-they: persecutory delusions & proximate causation<sup>10</sup>**

by Russell Gardner, Jr.

### *Case of EO*

EO was a 45 year old married real estate broker who began to act in an evasive and bizarre manner, troubling her family who eventually brought her to a psychiatrist. She explained that she was under surveillance by the FBI (or some federal agency -- which one she was uncertain) and that digging had recently occurred in her backyard for the purpose of burying dead bodies; she feared she would soon be one of them.

EO was unclear about the motivations of her persecutors and why she was targeted, but she was extremely frightened and certain of the threat. She did not have an obvious brain syndrome (she was oriented, could calculate and remember; she had no evident biochemical nor imaging abnormalities of her brain). She was finally diagnosed as having a "delusional disorder" as she was considered to have "simple persecutory delusions" but not the more extensive psychopathology of a schizophrenic patient.

She was given a medication, haloperidol, an antipsychotic drug which blocks transmission of the neurotransmitter dopamine which exists notably in the frontal cortex and in subcortical gray matter downstream from the frontal cortex. After several days, the fear abated and while the certainty of the past experience continued as a bad memory, its importance for present action dwindled.

This is a familiar story to any clinician who works in a psychiatric or mental illness setting. Patients with these convictions are garden variety, at least several on the roster of any inpatient psychiatry service at any one time, simple not because pathophysiology is clear, but because familiarity may breed contempt. Persecutory delusions stem from many causes, ranging from brain syndromes such as those arising from injury, degenerative diseases, intoxications, or withdrawal from drugs. They also occur where causes are less known, as in mania, depression, and schizophrenia. In schizophrenia the presence of persecutory delusions and auditory hallucinations are known as "positive symptoms" - in contrast to the "negative symptoms" of withdrawal, apathy and poor personal hygiene.

I propose that the phenomena of persecutory delusions presents a potential entry to a exploration of how we-they/in-out-group proximate mechanisms are encoded in the brain. Understanding how EO's brain functions during her illness compared to when she is not ill and how brain structures and constituent chemicals are affected in persecutory delusions more generally may exemplify an approach to proximate analysis of sociobiological explanations -- or sociophysiology.

Sociophysiology is proposed as a subset of sociobiology, dealing with mechanisms within the brain and cell that guide or determine various social communications and communicational sets. One such is that of being an out-group member with the expectancy set of harm and danger on the one hand, and with precarious in-group fellow-travelers to look to for help and comfort.

### *Background*

In Sociobiology, E.O. Wilson stated: "The strongest evoker of aggressive response in animals is the sight of a stranger, especially a territorial intruder. This xenophobic principle has been documented in virtually every group of animals displaying higher forms of social organization."<sup>11</sup> Eibl-Eibesfeldt in his Human Ethology suggests that "Xenophobia is a universal quality. A certain demarcation is ... a prerequisite for group formation and maintenance."<sup>12</sup> Small children typically exhibit fear of strangers as a feature of normal development before their first year is over.

Critics of biological deterministic science such as geneticist Richard Lewontin and colleagues have criticized sociobiology for biological determinism.<sup>13</sup> Nowhere is this more true than in the realms of prejudice and genocide. They feel that sociobiologists by assuming a biological causation worsen the bad effects of xenophobia. They seem to discourage investigation. Without wanting to harm things, many of us feel that study is nevertheless warranted: tyrannical leaders and we-they phenomena may have been augmented by some deterministic scientists, but certainly existed long before the science did. Psychologist Kent Bailey has argued that bad things don't go away by ignoring them.<sup>14</sup> Historian William McNeill argues that science is *less* vulnerable than other human activities to the vicissitudes of dominating leadership; inquiry is warranted.<sup>15</sup>

Sociobiology often focuses upon ultimate or evolutionary causal mechanisms and uses data

from population biology to investigate evolutionary fitness and how natural selection might have operated. The approach to proximate causal mechanisms via psychopathology resembles a view of proximate causation of movement evident from muscles seen after removal of skin, or of stomach acid when measured through a stomach fistula. The biology of in-out group distinctions may be examined through delusions. Psychiatrist Brant Wenegrat for instance, in highlighting adaptive features of we-they/us-them patterns of social behavior indicated a relationship between such and paranoia, notably persecutory delusions.<sup>16</sup>

Focus upon the sociophysiology of in-out group communicational propensity states may be useful. What are the brain and cellular mechanisms that contribute to we-they distinctions and the basic biology of leaders, followers, and enemies? How can one begin? Knowledge of such brain physiology may be assisted by research in neuropsychiatry.

#### *The generic drama*

A close look at the drama presented by EO is perhaps instructive for understanding the neuronal machinery that may exist not only in her pathological instance, but for anyone given the circumstances of being a fearful out-group member in a strange territory. Such a person may find it adaptive to be wary, to expect persecution, to in their mind flexibly assign new people to enemy status, and to expect persecution, labeling the persecutors as closely as possible. EO was set for defensive action, ready to run, scramble, anything to avoid that grave.

In all cases, persecutory delusions feature vaguely known enemies ~ even if specifically labeled they are often vague nevertheless - *somehow*, the FBI or CIA is after one. Something not vague, however, is that the persecutors are alien, dangerous and powerful. Each patient feels that he or she is an out-group member with respect to other people whose voices are often heard and whose intent is evil. The patient is often desperate, certain the other people have malicious intent. The patient is unshakable in face-to-face discussion if doubt or question is raised.

EO described a malevolent they - though unclear exactly of their identity, she had some impression of a federal agency, one of which she specified. She was clear and unambiguous, however, that there was great danger, that her life was at stake, and that she might be buried soon.

(There had been some recent digging near her backyard for placement of utilities -- clinicians speak of a "core of truth" in persecutory delusions.)

One thing is very clear talking to patients who have this kind of thinking: they have no uncertainty about persecution. The persecutor(s) is/are malevolent and hostile though perhaps vague in identity. The patient senses that the enemies have focused upon him or her. Not only are these not friendly (to the patient) members of an in-group of bonded people, but previously friendly people often take on new, alien characteristics. Thus, she spoke with me and with others of the hospital treatment team about the dangers she perceived, but there were indications that she was not completely clear that we - or her husband -- were definitely part of her in-group. Perhaps we were malevolent too. Part of her psychiatric disorder was her increasing sense of isolation separated from "we" ~ she was less able to bond with potential other people in fact willing to help rather than hurt.

#### *We-they in the brain*

*Frontal lobes.* Much data is currently produced in psychiatry using new techniques for brain examination using CAT scans and MRIs for anatomy and the physiological measures of PET, SPECT and functional MRI. Many findings are subtle as yet and new machines are improved quickly sometimes rendering today's results outdated. But amongst the more definite early findings are enlarged ventricles in some patients with persecutory delusions, those with schizophrenia. The anterior horn of these cavities within the brain are within the frontal lobes and imply lessened brain substance.

Identical twins discordant for schizophrenia have demonstrated such findings when their studies are compared; the patients have bigger ventricles and smaller hippocampi in their temporal lobes. They also have reduced frontal lobe function and a frontotemporal deficit has been hypothesized by Daniel Weinberger of the NIMH to explain the schizophrenic illness. We here focus on the frontal lobes and related structures and wonder if we-they distinctions in normal people are analyzed and prepared for there.

The Russian neuropsychologist A R Luria who examined many war-injured patients after World War II and neurobiologist J M Fuster of UCLA, a current leading investigator and writer, explain that the frontal lobes are the highest centers for motor action. They provide motor set and mediate motor

memory. There are strict counterparts to more posterior parts of the brain that serve in sensory analysis functions. Well established back-front connections are detectable in an orderly fashion. They are differentiated: lesions on the frontal convexity (just the other side of one's temples) cause deficient executive planning; lesions on the anterior-medial tip cause apathy. Fuster states, "frontal memory is, above all, memory for action. An even more characteristic frontal function is preparatory set.... from elaborate planning to readiness for impending movement, set is a necessary precursor of deliberate action."<sup>17</sup>

EO was not apathetic and she was poised and set for action. She communicated that from her position in her chair: not relaxed, ready to escape. She was planning overtime, though her plans had to remain multiple-option given the ambiguity of the precise threat. Her panic, however, and perhaps some deficient neuronal function did not allow an adequate we-they functional analysis, but analyzing she was, overtime. She was not in fact the equivalent of a Bosnian Muslim, nor a black person newly moved to a white neighborhood where blacks had never been before. According to her family, the people in her backyard were probably from the utilities department of her city. But the action of her neurons, I presume, may have been similarly preparing her body for action, behaving in a manner very similar to the way counterpart neurons behave in a persecuted person living now in Bosnia or in Vidor, East Texas, where integration is being attempted, but not yet successfully.

Evidences of frontal lobe syndrome are highly variable and many people with small lesions show no change whatsoever. Personal rigidity and stereotypies may increase. Intelligence measured formally may seem completely normal, despite general personality change with lack of initiative and energy. Complex intelligence is lower, however, if attention is paid to complex sequencing tasks. For many response tendencies, the frontal lobes are inhibitory. When the frontal cortex over the eye-balls (orbital cortex) is damaged, patients are often disinhibited, prone to do sexual or aggressive things and to respond to impulses. For example, a patient with a tumor in this region urinated in the corner of his formal dining room in the presence of horrified company.

*Laughter.* One of the evidences of orbital dysfunction in some patients is another social dysfunction more focused upon we-they distinctions. *Witzelsucht* is a coarse, demeaning, mocking humor. Some patients with this lesion consider the doctors

to be their enemies and threaten lawsuits.

Humor is an interesting communication for study of we-they sociophysiology. On the one hand, it has bonding qualities as when one is in an audience having a good time, or in making friends with a child. But it often functions to heighten in-out-group distinctions on the other hand. Mocking laughter is painful to the recipient. A man who stopped at a Houston streetlight was held up. He tried to back up quickly but stepped on the wrong pedal in his excitement; he was shot when he would be robber, a young man with a gun, thought the man had mocked him.

As known from previous discussion in these pages, a deletion in chromosome 15 seems to cause dysregulation of laughter. This points to the possibility that a genome-behavioral analysis will someday be possible for this communicative behavior.

*Basal Ganglia.* The frontal lobes are connected downstream with the basal ganglia, especially the caudate nucleus, the head of which is like the fat part of a comma. Its small cells are the receiver of messages from the frontal cortex and in an orderly manner it is divided as is the cortex. From it messages go still further downstream to the larger cells of the globus pallidus in a kind of funneling process. From there the focused messages go to the thalamus which is extremely well connected with the frontal cortex. A reverberating circuit probably normally operates such that each link in the chain is critical. Lesions in the structures downstream from the cortex produce the same behavioral difficulties as the cortical lesions themselves. The circuit is one that must usually function in all of its parts: there is no little man in the cortex alone that guides and determines.

*Dopamine.* The basal ganglia contain much dopamine, many times as much as surrounding tissue. The frontal cortex contains it too, especially in the orbital area. Antipsychotic drugs reduce dopamine's action as a neurotransmitter. As we saw with EO, she was no longer delusional after their use. Presumably, the dopamine circuits were less active in her brain.

### *Implications*

*Specific implications.* The frontal lobes and downstream structures containing dopamine are probably associated with we-they sociophysiology. Persecutory delusions illustrate the approach.

*General implications.* Use of psychopathology as an index to sociophysiology more generally might point to group, individual, organ, cellular and molecular analyses of communicative behaviors. Determining the normal variants of psychopathological communicational propensity (ready for action) states is the subject matter of sociophysiology.

The assumption is made that fears and behaviors seen in psychotic states reflect adaptive states from millenia past as well as in our present. Learning more of this should include cellular-molecular mechanisms on one hand and adaptive purposes of the whole organism on the other. Investigation of brain areas should include deficit-influenced behaviors as well as medications remedying the communicational state.

This paper suggests:

1. when pathological behavior shares characteristics with normal behavior, these links may point to mechanisms in common;
2. moreover, the form of the symptom may indicate important areas of normal behavior accessible to study so that enhanced examination of other examples can be made, including its neurobiology;
3. brain areas involved may be inferred by studies of the related pathologies, studies of deficits, and across-species comparisons;
4. study of psychotropic drugs that ameliorate pathological symptoms allows hypothetical inferences about the biochemical and brain mechanisms of the normal counterparts of the pathologies;
5. study of sociophysiology as a basic science for the medical study of psychopathology might benefit by using the very phenomena of psychopathology rather than keeping the two areas isolated from one another.

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Whittington PM, Leach D, Sandeman R: Evolutionary change in neural development within the arthropods: axonogenesis in the embryos of two crustaceans. Development 1993; 118:449-461

Introduction: *The relationship between development and evolution has attracted the attention of biologists for over a century. Early workers in the*

*field were struck by the observation that early embryonic events tend to be conserved during evolution and that differences between related organisms generally arise as a result of modifications to relatively late developmental processes. On the other hand, there are a number of well documented cases of radical change during early development in closely related organisms. Such observations raise a number of questions. Why are early developmental processes conserved in some cases while in others they are open to change? Are there any evolutionary trends in the developmental changes that do occur and to what extent do these trends stem from intrinsic properties of developmental programs?*

*A striking example of evolutionary conservatism is provided by the early development of insect central nervous system (CNS). A set of early differentiating neurons can be recognized in the CNS of the grasshopper embryo, which is also present, virtually unchanged, in the CNS of the evolutionary distant fruitfly and moth embryos. These neurons can be confidently considered homologous, as at least 9 neurons, which occupy corresponding positions in the different insects, have identical axon outgrowth (although some minor differences exist in the latter respect). It therefore appears highly likely that there is a conserved basic plan within the insects for the development of CNS axon pathways....*

*[T]his set of central neurons, which is conserved in insects, is also present in the embryo of the freshwater crayfish *Procambarus*.... '[A]ll arthropod nervous systems seem to be constructed using the same embryonic plan'. It seems very unlikely that a set of 9 neurons in corresponding positions in the insect and crayfish nervous system could have convergently acquired identical morphologies. The claim that these insect and crustacean neurons are homologous therefore appears to be well-founded. More recently this finding was advanced, together with a reported strong similarity between insect and crayfish embryos in the pattern of neural expression of the segmentation gene engrailed, as evidence that these two groups 'share a relatively recent common ancestor', showing that this finding has considerable phylogenetic, as well as developmental significance....*

*[T]he embryo of the centipede *ethmostigmus rubripes*, a representative of the myriapods, the arthropod group widely held to be most closely related to the insects, shows little resemblance to insects in its mode of formation of CNS axon*

tracts. In this arthropod, the pioneering axons in the CNS arise from neurons located in the brain, with neurons located in the segmental ganglia beginning axonogenesis only later in embryogenesis. Furthermore, the pattern of axon growth from segmental neurons in the centipede has little in common with that reported in insects.

Given these recent findings in the myriapods ... [and the idea of an arthropod embryonic plan], we considered it necessary to readdress the question of conservatism between the insects and the crustacea in nervous system development.

Summary: It has been previously suggested that there is a conservative program for neural development amongst the arthropods, on the basis that a stereotyped set of cells involved in establishing the axon tracts in the CNS of insect embryos is also present in crayfish embryos. We have examined the spatiotemporal pattern of axon growth from a set of early differentiating central neurons in the embryo of two crustaceans, the woodlouse *Porcellio scaber* and the freshwater crayfish *Cherax destructor*, and we have drawn comparisons with insect neurons whose somata lie in corresponding positions within the CNS. While many of the woodlouse and crayfish neurons show a similar pattern of axon growth to their insect counterparts, the axon trajectories taken by others differ from those seen in insects. We conclude that this aspect of early neural development has not been rigidly conserved during the evolution of the crustaceans and insects. However, the extent of similarity between the insects and crustaceans is consistent with the idea that these groups of arthropods share a common evolutionary 'Bauplan' for the construction of their nervous systems. While the pattern of early axon growth in the woodlouse and crayfish embryos is sufficiently similar that many neurons could be confidently recognized as homologues, several differences were noted in both the relative order of axon outgrowth and axon morphologies of individual neurons.

Frahm J, Merboldt K-D, Hanicke W: Functional MRI of human brain activation at high spatial resolution. Magnetic Resonance in Medicine 1993;26:139-144

Quotes from the Introduction: The sensitivity of a gradient echo MRI signal to dephasing of spin in local magnetic field gradients provides a means to detect differences in tissue oxygenation that are

due to variable amounts of paramagnetic deoxyhemoglobin in the cerebral blood pool. Recently, the effect has been exploited to study brain function in normal subjects with use of both EPI and FLASH sequences and at field strengths ranging from 1.5 to 4.0-T. The observed signal increases about 6 s after the onset of a specific task reflects a transient hyperoxemia that may be understood as an overcompensation of only a mild enhancement of oxygen consumption by a much larger increase in regional blood volume as suggested by positron emission tomography. Preliminary MRI studies of brain activation on the basis of oxygenation difference maps include the visual system, the motor-sensory system, and areas associated with language processing.

Since the physical effect in functional MRI of brain oxygenation is due to a transient shift in magnetic susceptibility normally expected to increase with voxel size and echo time, MRI activation studies have hitherto been performed at rather coarse spatial resolution and with the use of long gradient echo times.... This work demonstrates that the resulting voxel sizes of 40 to 80 milliliters can be further reduced by more than one order of magnitude without compromising the "activation contrast" during task performance.

Abstract: Functional activation maps of the human visual cortex were obtained at a spatial resolution almost two orders of magnitude better than achievable by positron emission tomography and within measuring time of a few seconds. Transient alterations in the concentration of paramagnetic deoxyhemoglobin were conveniently detected at 2.0-T with use of RF-spoiled FLASH MRI sequences employing gradient echo times of 6 to 60 ms and voxel sizes of 2.5 to 391.

Quotes from Discussion section called 'The effect of voxel size: In contrast to what might be expected for global magnetic inhomogeneities, the net signal change between states of high and low concentrations of deoxyhemoglobin increased rather than decreased by reducing the slice thickness. ... Here, a reduction of the slice thickness from 8 to 4 mm consistently doubled the intensity difference between images in the dark and activated state regardless of the matrix size.

Quotes from Discussion section called 'The correlation of anatomy and function': For the first time the MRI approach allows a noninvasive correlation of brain anatomy and function at the same level of high spatial resolution. Moreover, studies with a temporal resolution of seconds may be carried out

*in individual subjects and within a single examination of a few minutes of total investigational time. Although yet limited in the number of subjects, the available data reveal a remarkable intrasubject reproducibility of the activation maps. Considerable interindividual differences in the anatomy of the calcarine [visual] cortex are closely followed by the functional activation pattern. Not surprisingly, the major effects are confined to the outer layers of the cortical gray matter along the various sulci. The structural variability in the visual system clearly underlines the necessity to perform activation studies on individual subjects without any attempt to average results with the help of geometrically "standardized" brain as often employed with positron emission tomography data.*

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Benzing WC, Kordower JH, Mufson EJ: Galanin immunoreactivity within the primate basal forebrain: evolutionary change between monkeys and apes. *J Comp Neurol* 1993;336:31-39.

*Galanin (GAL) is a 29-amino acid peptide... GAL protein and mRNA have been shown to be widely distributed throughout the mammalian central nervous system and in particular GAL is intimately associated with basal forebrain cholinergic neurons.... [D]istribution of GAL protein varies within the basal forebrain across a variety of mammalian species.*

Basal forebrain cholinergic structures notably include the nucleus basalis of Meynert and the diagonal band of Broca.

In rats: GAL colocalizes within cholinergic neurons of medial septal/vertical limb of diagonal band complex but **not** in the nucleus basalis.

In new and old world monkeys GAL colocalizes in virtually all large cholinergic neurons, whereas in humans, it does **not** exist within any of the large cholinergic neurons (although a small population of small cells possess GAL).

Abstract: *Galanin immunoreactivity (GAL-ir) is differentially expressed within the basal forebrain of monkeys and humans. Most monkey magnocellular basal forebrain neurons colocalize GAL-ir. In contrast, virtually no human magnocellular basal forebrain neurons express GAL-ir. Rather, an extrinsic galaninergic fiber plexus innervates these neurons in humans. The present study examined the expression of GAL-ir within the basal forebrain*

*of apes to establish the phylogenetic level at which this transformation occurs. The staining patterns of GAL-ir within the basal forebrain of both lesser (gibbons) and great (chimpanzee and gorilla) apes were compared to that previously observed within monkeys and humans. All apes displayed a pattern of basal forebrain of GAL-ir indistinguishable from humans. GAL-ir was not expressed within ape basal forebrain magnocellular neurons as seen in monkeys. Rather like humans, a dense collection of GAL-ir fibers was seen in close apposition to magnocellular perikarya. In addition, a few GAL-ir parvocellular neurons were scattered within the ape basal forebrain. These data indicate that the evolutionary change in the expression of GAL-ir within the primate basal forebrain occurs at the branch point of monkeys and apes.*

Quotes from the Introduction: *In general, the distribution of neuroactive substances is organized along a general mammalian plan. However, GAL, like a few other notable exceptions clearly deviates from this rule....*

Quotes from the Discussion: *[L]ike humans, apes displayed a major galaninergic fiber pathway that coursed through the substantia innominata en route to the hypothalamus, bed nucleus of the stria terminalis, and the vertical limb of the diagonal band.... Although the pattern of GAL-ir within the ape basal forebrain was strikingly discordant with the monkey, the hypothalamus and bed nucleus of the stria terminalis displayed similar patterns of cell body and fiber staining between the two primates, indicating the specificity of this finding....*

*The evolutionary pressures underlying the phylogenetic transformation of GAL-ir within the basal forebrain of the hominoid superfamily remain a mystery at this juncture....*

*The importance of GAL-ir fiber innervation is hypertrophied within the basal forebrain in patients with Alzheimer's disease. In fact, it has been suggested that the hyperinnervation of cholinergic basal forebrain neurons by GAL-ir fibers may accentuate the cholinergic hypofunction described in Alzheimer's disease, a putatively uniquely human disorder.... it is unclear how differences in chemical anatomy ...of individual brain regions in higher primates relate to the nuances of human brain evolution and the coevolution of human behavior.*

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