

## **EMOTION: A VIEW FROM BIOGENETIC STRUCTURALISM**

by

Charles D. Laughlin\* \*\* Jason Throop is a graduate student in anthropology at UCLA.  
His research has focussed on exploring transpersonal and experiential approaches to  
the study of self and emotion in anthropology.

International Consciousness Research Laboratories

and

Carleton University

and

Jason Throop\*\*

Department of Anthropology

UCLA

Abstract: Both the universalist and relativist extremes in anthropological theories of emotion fail to account for the neuro-developmental dimension of the acquisition of culture. Moreover, because emotional categories refer mainly to experiential events, it is tempting for Euroamerican scientists, imbued as they are with mind-body dualism, to opt for either a mind-oriented account (cognitive, relativist, culturological) or a body-oriented account (feeling, universalist, biological) of emotion. However, from a biogenetic structural perspective, emotion is viewed as a social-experiential phenomenon which is produced by structures that develop from neural networks universal to the human brain (i.e., are neurognostic) during the ontogenesis of the individual and which is expressed according to enculturated, but neuroendocrinologically patterned ways. Emotion refers to a number of complex

neuropsychological events that are constructed by parallel processes operating at several levels of the nervous system. A theory of emotion which combines Ernst Gellhorn's model of autonomic-somatic integration with Paul MacLean's notion of the triune brain is developed. Cortical (especially prefrontal) level processes are shown to be involved in producing the meaning aspect of emotional experience and are the most susceptible to enculturative influence, while those at the phylogenetically older subcortical (limbic, midbrain, autonomic, endocrinological and metabolic) levels that are involved in the affective aspects of emotion are much less susceptible to cultural variation. A neurophenomenological perspective is suggested as the best approach to ethnographic fieldwork pertaining to our informants' experiences of emotion.

## INTRODUCTION

The controversy between the universalist and constructionist accounts of emotion is a long-standing one in anthropology, that is likely to be with us for a long time to come. The reason for the perdurability of this debate lies in the fact that much of anthropology reflects in its theories and in its research strategies a tacit Euroamerican cultural bias toward mind-body dualism (see Bunge 1980 on this issue). This Cartesian bias is a fundamental attitude that holds that minds and bodies are different "substances" or domains of existence. Scientists reflecting this polarization will tend to fall into one of two camps, the universalists who see phenomena as being determined by the genome and the constructivists who conceive of no physical constraints to mental phenomena at all. In the anthropological study of emotion this polemic has resulted in universalist views where emotion is understood to be psycho-physiological essences or processes for which culturally specific interpretations/models serve merely as rough markers and labels and constructivist views in which emotion is understood to be inextricably tied to linguistically based conceptual models and schemas that are embedded within particularized indigenous knowledge systems (see Lutz and White 1986:408; Mesquita and Frijda 1992:179; Spiro 1984, 1993)

Of course, there will always be people who transcend this tacit dualism and who will develop a more unified mode of thinking. The trouble is that very few people can be persuaded to another point of view because the attitude to which they have been conditioned makes perfect sense to them within the context of their own experience -- as Edmund Husserl might well have put it, their universalist or constructivist view of emotion is part of their "natural attitude" toward their private world of experience.

Henry A. Murray said somewhere, "in some ways all human beings are alike, in some ways some human beings are alike, and in some ways no human beings are alike." But many anthropologists, perhaps because of their own personal histories or training, narrowly focus on one of those perspectives -- the particular, the communal or

the universal -- to the exclusion of the other perspectives. They may focus their energies on the ways all humans are alike to the exclusion of intercultural and interpersonal variance (the universalists), or they may focus on the ways some humans are alike to the exclusion of universal patterns of similarity and structure (the constructionists, cultural relativists, postmodernists, etc.). It seems to be very difficult to persuade some anthropologists to take a position from which all perspectives may be considered as lying on a gradient from particular to universal.

Nevertheless, in this chapter we wish to summarize one possible theoretical perspective that does meet Murray's criteria for a mature science of humanity, and the requirements set out by Alexander Hinton (1993 and elsewhere in this volume) for a "process approach" to emotion. In outlining this perspective we will make no effort to review the literature on the constructionist-universalist debate because this has already been done by Hinton in the introduction to this volume, as well as by Besnier (1990), Leavitt (1996), Levy and Wellenkamp (1989), Lutz and White (1986), Lyon (1995), Mesquita, Fridja and Scherer (1997), Russell (1991) and Shweder and LeVine (1984). We will first offer a brief description of our theoretical approach for those not already familiar with the work of our group, and then will proceed to use these notions to model the phenomena classed as "emotion." We will then introduce both Ernst Gellhorn's model of autonomic-somatic integration and Paul MacLean's idea of the triune brain, and then will combine these into a single perspective that may better account for the different phylogenetic and architectonic levels contributing to our experience of emotion in consciousness.

### BIOGENETIC STRUCTURALISM

Biogenetic structuralism presents a theoretical approach to the study of humanity that requires the embodiment of consciousness (Laughlin and d'Aquili 1974, Laughlin, McManus and d'Aquili 1990). The approach is grounded upon the axiom that "mind"

and "brain" are two windows upon the same scope of inquiry. "Mind"<sup>1</sup> refers to a kind of inside-out view of consciousness and "brain" to a kind of outside-in view of the same scope. What this means is that, whether observable at the moment or not, for every mental event there is an activity within the nervous system mediating that event. As far as we can ascertain, there exists no such thing as a mental phenomenon that is not mediated by neural activity. Of course, all sorts of neural activity goes on which does not result in our experience of phenomena (e.g., regulation of heart rate, blood pressure, muscle tonus, hormone levels, etc.).

Because biogenetic structuralism requires the embodiment of consciousness, it is an interdisciplinary project that necessitates the merger of, at a minimum, anthropology, psychology and the neurosciences. We have developed the view that the universal structures of consciousness, including structures subserving language, cognition about time and space, certain psychopathologies, as well as affect and emotion, are due to the genetically predisposed organization of the nervous system. It seems to us preposterous that the invariant patterns of behavior, consciousness and culture being discussed in various structuralist theories could be located anywhere other than in the nervous system. After all, every thought, every image, every emotion and every action is demonstrably mediated by the nervous system.

Moreover, it seems important to anthropology to develop a theoretical perspective that: (1) is non-dualistic in modelling mind and body, (2) is not reductionist in the positivist sense (i.e., that the physical sciences can give a complete account of all things mental and cultural, or *visa versa*), (3) is informed by all reasonable sources of data about human consciousness and culture, and (4) keeps in mind that our bodies are the products of an ongoing process of evolution.

---

<sup>1</sup>. "Consciousness" and its constituent processes are considered a subset of "mind." There are mental faculties that operate unconsciously, but all conscious operations are also mental operations.

## The Lifeworld

An individual's everyday, lived experience, or lifeworld<sup>2</sup>, is mediated by the individual's nervous system. A principal function of the cerebral cortex of the human brain is the growth of models of the world that are comprised of networks of living neurons. These models, and the cells that comprise them, are entrained (i.e., become interconnected via dendritic, axonic, synaptic and endocrine pathways and processes) into momentary, dynamic patterns of organization that act to mediate the flow of the lifeworld. The total system of models entrained to mediate each moment of the lifeworld are called the conscious network, while the total set of neural models that may be potentially entrained to conscious network is the cognized environment.

Virtually all models making up the cognized environment develop from nascent neural structures already mediating the lifeworld of the fetus and infant. We call these nascent structures neurognostic structures, or simply neurognosis (Laughlin 1991, 1996, Laughlin and d'Aquili 1974:83, Laughlin, McManus and d'Aquili 1990:44-75). The term also applies to the genetically conditioned development of these structures. In other words, neurognosis refers to both the initial organization and function of neural models, and to the lawful processes of their growth, interconnection and development (see Changeux 1985, Edelman 1987, Edelman and Mountcastle 1982, Varela 1979).

Let us emphasize this point, for it will become integral to our view of emotion. Neurognostic development is exquisitely ordered by processes inherent to the ontogenesis of the organism. There is no such thing as the development of neural tissues that is not constrained and guided to some extent by genetically constrained processes. Thus, there can be no such thing as "pure" cultural relativity in either the

---

<sup>2</sup>. The concept of the lifeworld, or Lebenswelt, originated with the last major work of Edmund Husserl (1970:103-189), and was later developed in works by Merleau-Ponty (1964), and Schutz (Schutz and Luckmann 1973, 1989; see Spiegelberg 1982:144). It means the "reality that is lived," including knowledge about the world that is pre-given in experience.

structure or function of emotion. There is indeed interpersonal and cross-cultural variance in the experience, conception and expression of emotion, but this variance should be understood as transformations upon universal structural properties operating in human ontogenesis, rather than as culturally relative patterns influenced solely by history, enculturation or linguistic tradition.

An example of neurognosis that is germane to our discussion of feeling and emotion is the phenomenon of the phantom limb. As everyone knows by now, people who lose a limb from an accident, surgery or in battle may experience sensations as if the limb were still there. Particularly serious is the experience of chronic pain in the absent limb experienced by some people.<sup>3</sup> An obvious explanation for this distortion of the lifeworld is that what is being experienced by the unfortunate person is the cognized limb -- that is, the internal neuropsychological model of the limb, a part of their cognized body, which remains largely intact in cortical and subcortical tissue. But there is an added dimension to this story. Ronald Melzack (1992), one of the researchers that have worked out the gating theory of pain, has also shown that some people who are born without limbs may still experience pain in a phantom limb. Our explanation for this seemingly anomalous fact is that the cognized body -- the internal system of neural models of one's body -- is neurognostic, and according to the neurognostic body image, the person has all of their limbs. And the pain that is felt is in relation to the neurognostically perfect body image, not the actual body.

### Reality

The cognized environment -- the total assemblage of neural models that, when entrained within the conscious network, mediate an individual's lifeworld -- may be

---

<sup>3</sup>. In this chapter we are treating pain as an emotion, even though some people in Euroamerican culture would exclude pain. This exclusion is more cultural than real, and it makes both biological and cross-cultural sense to include pain in our deliberations.

contrasted with the individual's operational environment which includes both the real nature of that individual as an organism and the individual's external environment.<sup>4</sup> The primordial, biological function of the cognized environment is the adaptation of the individual to its operational environment. The emphasis upon adaptation is important, for we make the fundamental assumption that the operational environment exists in a reality forever beyond (is transcendental relative to) the capacity of any individual or social group to fully comprehend it. That is, the cognized environment is a point of view, a system of knowledge about the operational environment, and there is always more to know about the operational environment, or any aspect of it, than can be known by any particular individual or group.

What we said above about the phantom limb phenomenon offers a good illustration. Our view is that the "phantom" limb is in reality the person's cognized limb (part of their cognized environment), although their real limb (part of their operational environment) is missing. We are experiencing our cognized bodies most of the time, not our actual, operational bodies. Our own body exists in a reality that transcends our

---

<sup>4</sup>. We are indebted to Roy Rappaport (1968) for the concepts of cognized and operational environments. It is clear from Rappaport's (1979:97-144, 1984:337-352) later writings that the meanings we have constructed for these terms are even closer to his thinking than we initially thought. We originally interpreted him as simply equating cognized environment with the native worldview and the operational environment with the world as viewed by science. And of course, we consider scientific views of the world as also being cognized environments. Rappaport's (personal communication, May, 1993) thinking does not differ from this view. For our own development of these crucial concepts, see Laughlin and Brady (1978: 6), d'Aquili et al. (1979: 12ff), Rubinstein et al. (1984: 21ff), and Laughlin, McManus and d'Aquili (1990:82-90). A important link can also be made between the concept of cognized environment and Irving Hallowell's (1955) much earlier notion of a 'behavior environment' which he described as that environment the individual actually experiences (ie. perceives, feels and acts in) as distinguished from the physical or geographical environment which according to some Western thought exists as a separate reality distinct from human perception, feeling and action. For Hallowell the behavioral environment is thus "the world of the individual as experienced by him [her] and in terms of which he [she] thinks, is motivated to act, and satisfies his [her] needs." (1955:88)

limited capacity to know or experience it in any total way. In other words, our real body is transcendental relative to our knowledge and experience of it. What is real to most of us is the body we experience as part of our lifeworld. The potential discrepancies between our `real' and `cognized' bodies can be attributed to the fact that our ability to acquire knowledge about our `real' body is circumscribed by: (1) the limits of spatial discernment and discrimination, (2) the capacity to apprehend and anticipate temporal and causal relations, (3) the ability to reveal and model the hidden forces operating in the operational environment (see Elster 1984: Chap. 4), and (4) the tendency of the cognized environment to seek closure of knowledge relative to the transcendental enormity of reality and in the interests of producing meaning in the lifeworld (see Laughlin 1992, 1994).

### Intentionality

As we have known since at least the 19<sup>th</sup> century, the moment-by-moment organization of the lifeworld is essentially intentional in its organization (Searle 1983, Gurwitsch 1940). This phenomenological fact is very important to our understanding of the role of emotion in the organization of the lifeworld. Intentionality means that neural networks tend to organize themselves, both spatially and temporally, around an object. The focal object, be it a percept, category, feeling, sensation, image, thought, etc., is also mediated by a neural network and constitutes, for the moment, the nexus of cognitive, affective, metabolic and motor operations for the organism (Neisser 1976:20, Biederman 1987).

Intentionality in humans and other big brained mammals derives from an intense interaction of the prefrontal cortex with the sensory association cortex and subcortical tissues. This intentional interaction is both neurognostic and ubiquitous to human consciousness, regardless of an individual's cultural background (Laughlin, McManus and d'Aquili 1990:105). Subsidiary structures entrained as a consequence of the dialogue between prefrontal and sensory cortical and subcortical processes may be

located over a wide expanse of neuroendocrine tissues. And the functions they perform while mediating the lifeworld, including emotion, often occur non-serially. This simultaneous activity of many systems producing unitary experience has been called parallel distributed processing (see Rumelhart and McClelland 1986, McClelland and Rumelhart 1986). The point is that while we experience our lifeworld as a totality, there are actually hundreds, and even thousands of neural networks operating in parallel fashion to mediate that experience and whose products "come together" in dialogue with prefrontal intentional processes. We are rarely aware of the myriad structures mediating the experience of our self and our world -- only that our embodied self and our world are "already there" in consciousness.

It is also important to understand that intentionality is not a passive response to stimuli in the external or internal operational environment, but is literally a dialogue between patterns of sensory activity and models already dwelling within the vast society of cells that is the nervous system. That is why we emphasize that the conscious network is a feed-forward process. The brain is always anticipating what it will experience and is acting in concert with the rest of the body so as to produce the experience it desires (Skarda and Freeman 1987, Pribram 1981, Pribram and McGuinness 1975, Laughlin, McManus and d'Aquili 1990:107). And part of the anticipatory package, as it were, involves emotion (Gray 1982). We will often cognitively and perceptually operate and act in the world in order to produce a desired emotional effect; i.e., to experience love, excitement, anger, lust, surprise, etc., or to avoid experiencing anxiety, pain, anger, unhappiness, etc.).

## EMOTION

The term "emotion" refers to phenomena that everyone on the planet experiences, and yet it is notoriously difficult to define and research (Izard 1993:71; Parkinson 1995:8; Scherer 1988:1, 5, Stuss and Benson 1983: 113-115). Emotional phenomena are internal states which can only be accessed directly by introspection,

and indirectly by self-reports, technological devices (e.g., electroencephalography), or by inference from facial expressions, body postures or behavior (see Ekman 1982, 1994, Izard 1980, Scherer 1988, Plutchik and Kellerman 1986, Ohman and Birbaumer 1993). And as may be obvious from an entrainment model of consciousness, what an individual means by "emotion" depends upon which aspects of experience are being adumbrated and conceptualized. For instance, as Izard (1990:627) has pointed out, while William James's early and influential theory of emotion<sup>5</sup> recognized expressive, neurophysiological and experiential dimensions, James focussed most of his attention on the experiential component, which meant for him "feeling." It is thus imperative that in our use of the term 'emotion' we clearly outline those aspects of experience that we as anthropologists are focussing upon in the context of our research. Are we referring to sensations alone, or are there perceptual and cognitive associations included? Are we referring only to the raw interoceptive elements of "feelings" of, say, anxiety or arousal, or are the object of the feelings and the cognitive associations with the object being included, as in "angry at..." or "anxious about...?" Clearly, the question of emotion cannot be simply reduced to biology when there are aspects of socialization and cultural meaning involved (McNaughton 1989:5-16, 169-174). Moreover, attempts to define emotion based solely upon either linguistic, behavioral or physiological attributes are of little use to science (Ohman and Birbaumer 1993:4-5), especially to a naturalistic science like anthropology which has to account for the phenomenon as it spontaneously arises among people in their daily lives, and not merely under contrived experimental conditions.

Emotional intentionality in the lifeworld of humans and other big-brained

---

<sup>5</sup> James's theory of emotion is based on the view that it is the feeling of bodily changes as they occur in the viscera that contributes most significantly to the experienced emotion (Ellsworth 1994, Myers 1986:331-32). As Gerald Myers points out, for James "...an emotion is identical not with bodily changes but with the feeling of such changes [as they occur]" (1986:235; emphasis added)

mammals is mediated by a complex interaction among prefrontal cortex, sensory and association cortex, and subcortical tissues, the latter including the limbic system (which mediates certain affects like anger, fear, depression, etc.), the thalamus (which accomplishes the gating of information between cortical and subcortical areas), the hypothalamus (involved in arousal, regulation of endocrine and autonomic nervous system activities and information about internal states) and, via the inferior temporal lobe, the hippocampus (involved in perceptual recognition and memory; see Gray 1982, Fuster 1980, Stuss and Benson 1983, 1986).

The most important area of the brain in terms of understanding the integration of the parallel distributed systems that mediate an emotional state is the prefrontal cortex. If a human sustains severe prefrontal damage, especially if their frontal-limbic connections are injured, they may manifest lengthy periods of flat affect and apathy, punctuated by bouts of intense, uncontrolled emotion (Stuss and Benson 1983, 1986:121ff). Much of this disruption of affect probably is due to a deficit in intentional processing. It is as though the patient can no longer pay enough attention to care about anything or invest a continuity of affect in it (Fuster 1980:121). Many of the areas of the nervous system integrated by the prefrontal cortex are represented by association areas in the prefrontal poles. For example, the limbic system which mediates many of the affective components of emotional states is fully represented by areas in the prefrontal cortex (Nauta 1973).

It was once thought that emotion was very much a simple matter of top-down control from the associative cortex to subcortical tissues. It was believed that there were essentially two emotions, negative and positive, and that the complex variation of emotion experienced and expressed by human beings was the result of cognitive attribution of these bipolar affects to specific objects (e.g., see Schacter and Singer 1962). But we now know that stimuli from the sensory systems are sent directly to the limbic structures, and that under certain circumstances, emotional responses remain

unimpaired even when higher cortical functions have been (see LeDoux 1986, 1989).

#### MacLEAN'S MODEL

One way to make this complexity more understandable is to realize that the organization of the thousands of parallel networks making up the different parts of the central nervous system evolved during different periods of phylogenesis. Neuroscientist, Paul MacLean (1973), speaks of the human central nervous system as a triune brain; that is, the brain is made up of three parts, the reptilian (including the brain stem and hypothalamus), the old mammalian (primarily the limbic system) and the new mammalian (the cerebral cortex) brains, each carrying out one or more of the processes that may be entrained to an "emotional" state. If the semantic field labelled by an emotional label is fairly extensive -- say, incorporating somatic, arousal, autonomic, affective, perceptual and cognitive aspects of experience -- the range of neurophysiological entrainments may include structures from all three of MacLean's "brains." These entrainments might include the phylogenetically "reptilian" autonomic, proprioceptive, interoceptive, reticular activating, and endocrine systems, as well as "old mammalian" midbrain and limbic structures such as the cingulum and external capsule (which are connected to virtually all areas of neocortex), and "new mammalian" higher cortical systems (prefrontal poles, inferior temporal lobe, etc.) mediating the experience of sensory objects, expression, memory and intentionality (see Heath 1986:7-8).

It appears to be true that the more phylogenetically archaic the neurophysiological system -- say, in the "reptilian" brain -- the less varied will be its development across individuals and across cultures. By the same token, the more phylogenetically recent the system -- say, in the "old" or "new mammalian" brains -- the more variation may occur during development. This means that how cross-culturally variant an emotion appears will depend in part upon which level of neurocognitive functioning one is referring to as "emotion" (see Wierzbicka 1986 on cultural variation). The somatic, autonomic, arousal, and endocrine functions mediating the mood element

of "depression," for example, will vary little other than in intensity of sensation cross-culturally<sup>6</sup>, whereas the cognitive and perceptual associations entrained to these lower functions that are associated with the interpretive aspects of "depression" may vary greatly (i.e., what one is "depressed about;" see Kleinman and Good 1985).

### GELLHORN'S MODEL

We have found that the most useful neuropsychological model of emotion from an anthropological point of view is Ernst Gellhorn's theory of autonomic-somatic integration (Gellhorn 1967, Gellhorn and Loofbourrow 1963; see Lex 1979 for a summary).<sup>7</sup> According to Gellhorn's model, the somatic system that controls emotion is comprised of two complementary (sometimes antagonistic) systems, each of which entrains functions located at every level of the nervous system. In other words, each of Gellhorn's two energy systems cross-cut each of MacLean's three "brains." One system is called the ergotropic system and the other the trophotropic system. Let us briefly describe each system.

#### The Ergotropic System

The ergotropic system subserves our so-called fight or flight responses. That is, the ergotropic system is comprised of all the neural networks at every level of our nervous system (from the cortex on down) that mediate our adaptation strategies relative to desirable or noxious stimuli in the environment. Anatomically, the ergotropic system incorporates the functions of the sympathetic nervous system (one half of the autonomic nervous system), certain of the endocrine glands, portions of the reticular

---

<sup>6</sup> This point may well underlie the observations of such scholars as Levy (1984a:223) who assert that while aspects of "emotional feeling" such as intensity certainly vary to some degree from one culture to the next, the "qualitative character of the emotional feeling [however] probably has the same shape, the same initial stimulus characteristics [cross-culturally]." [emphasis in original]

<sup>7</sup> Gellhorn and his associates have worked within the theoretical formulations first outlined by W.R. Hess (1925).

activating system in the brain stem, the posterior hypothalamus, and portions of the limbic system and frontal cortex. The principle function of the ergotropic system is the control of short-range, moment-by-moment adaptation to events in the environment. The system is designed to come into play when the possibility of responding to stimuli arises. It is so constructed as to shunt the body's metabolic energy away from long-range developmental activities (like tissue reconstruction, digestion, etc.) and into carrying out action in the world directed either at acquisition or avoidance of stimuli of interest to the organism.

Under generalized ergotropic arousal a number of organic responses may be experienced, including shivering, constriction of the surface veins and capillaries (paling of the skin), dilation of the pupil of the eye, increased heart rate and blood pressure, increased muscle tension, decreased salivation ("dry mouthed"), constriction of the throat, increased rate of respiration, erection of body hair ("hair standing on end"), and desynchronization of cortical EEG patterns (indicating disordered or disharmonic cortical functioning). These responses, all of which subserve adaptation in one way or another, are commonly associated in experience with positive (say, lust or excitement) or negative (say, fear or revulsion) affect. Objects or events associated with responses will typically be perceived as desirable or undesirable, attractive or repulsive, friendly or hostile, beautiful or ugly. The ergotropic system prepares the organism to obtain objects (like food, water or a mate) required for the continued survival of the organism or species, and to avoid objects (like poisons, dicey situations and predators) dangerous to survival. A fundamental problem in nature is how to eat without being eaten. The ergotropic system in humans is the product of millions of years of selection for neurogenesis that solves that problem.

### The Trophotropic System

The trophotropic system is far less dramatic in its activities, but is nonetheless the system responsible for regulating the vegetative functions, such as reconstruction

and growth of cells, digestion, relaxation, sleep, and so on. Again, the trophotropic system includes structures at every level of the nervous system from the neocortex on down. More specifically, the trophotropic system incorporates the functions of the parasympathetic system (the other half of the autonomic nervous system), various endocrine glands, portions of the reticular activating system, the anterior hypothalamus, and portions of the limbic system and frontal cortex. It is the trophotropic system that controls the somatic functions responsible for the long-term well-being, growth and longevity of the organism. This system operates to maintain the optimal internal balance of bodily functions for continued health and development, both of the body and consequently of the mind.

Under the influence of the trophotropic system, a variety of physical and mental responses may be experienced, like warmth and "blushing" at the surface of the body due to release of sympathetic constriction of veins and capillaries, constriction of the pupil of the eye, decreased heart rate and blood pressure, relaxation of tension in the muscles, increased salivation, relaxation of the throat, slowing and deepening of respiration, erection of the penis and clitoris, and synchronization of cortical EEG patterns (indicating harmonized higher cortical functions). Relaxation (reduced arousal) and its concomitants are commonly associated with disinterest in events in the environment, with dispassionate concentration upon some object, or peaceful enjoyment of being. Judgements as to desirability or undesirability of the object are suspended. The relaxed person is typically experiencing a clarity of consciousness, lack of discursive thought and fantasy, and a comfortable, warm, acceptant relationship with the environment. The fundamental function of relaxation is perhaps less obvious than that of ergotropic arousal, but is nonetheless crucial to the survival of the organism. It is mainly during relaxation, and particularly during undisturbed sleep, that the body processes nutrients and resources required by the immune system, and uses these to repair and grow. In other words, when the body is not finding food and avoiding

becoming food (ergotropic reactivity), it is reconstructing and developing itself (trophotropic reactivity).

### Complementarity

The ergotropic and trophotropic systems have often been described as "antagonistic" to each other. This means that the increased activity of the one tends to produce a decreased activity in the other. This is the case because each system is physically designed to inhibit the functioning of the other under most circumstances. If a person gets excited about something (angry, anxious, afraid, strongly desirous, etc.) the ergotropic system not only produces the requisite physiological, emotional and behavioral responses, it also puts a damper on the trophotropic system which was previously subserving digestion and other metabolic activities. Likewise, when a person relaxes (say, after a heavy meal), the trophotropic system actively dampens the activity of the ergotropic system. A summary of the reciprocal functions of the two systems may be studied in Table 1.

\*\*\*\*\*

TABLE 1

A Summary of Some Functions of the  
Trophotropic and Ergotropic Systems

<u>Trophotropic System</u>	<u>Ergotropic System</u>
Storage of vital resources	Expenditure of vital resources
Digestion and distribution of nutriments	Digestion stopped
Bronchi leading to lungs constricted and coated with mucus	Bronchi opened
Heart rate and blood pressure reduced	Heart rate and blood pressure increased
Collection of waste by-products	Endocrine system releases chemicals that increase efficiency of muscles
Constricts pupils	Dilates pupils
None	Erection of body hair
Synchronized EEG	Desynchronized EEG
Erection of penis and clitoris	Ejaculation
Increased salivation	Decreased salivation
Respiration slower and deeper	Respiration faster and shallower

\*\*\*\*\*

The relationship between the two systems would be better described as complementary, rather than antagonistic, for each serves the short and long range well being of the organism. It is really a matter of balance of functions, the trophotropic system maintaining the homeostatic balance so necessary for health and growth while the ergotropic system facilitates the moment-to-moment adaptation of the organism to its environment. As such, they are not anatomical mirror images of each other. The "wiring" of the ergotropic system is designed to arouse the entire body for potential response to threat. Under normal conditions, when the ergotropic system is activated, the entire body/mind become aroused. Properly functioning, it is a turned on - turned off kind of system. By comparison, the trophotropic system is "wired" for the fine tuning of organs in relation to each other as the demands of internal maintenance shift and change. Its resources can be activated for one organ or body part, or it can turn on globally as during sleep when the entire skeletal musculature is "turned off".

The point to emphasize is that whereas the trophotropic system is designed for continuous activity, the ergotropic system is designed for sporadic activity. We are "wired" for short, infrequent bursts of adaptive activity interspersed with relatively longer durations of rest, recuperation and growth. Prolonged ergotropic reactivity may cause depletion of vital resources stored up by the trophotropic system in various organs, and may cause fatigue, shock, body damage, decline in immune system functions, and in extreme cases, death (Selye 1956, Antonovsky 1979).

### Tuning

The particular balance of ergotropic and trophotropic activities under particular environmental circumstances is susceptible to learning (Thomas 1968, Hofer 1974, L.E. Roberts in Schwartz and Shapiro 1978), and there is evidence that their characteristic balance under stress is established as early as pre- and perinatal life (Grof 1976, Richmond and Lustman 1955, Wenger 1941, Thomas 1968, Chamberlain 1983, Verny 1981). The learned ergotropic-trophotropic balance relative to any environmental

stimulus is called tuning (Gellhorn 1967: 110ff). When we say that someone "gets up-tight around authority figures," we are referring to a discrete ergotropic-trophotropic tuning relative to people perceived to be in authority. Or when we say that someone "calmed-out when he got a back-rub," we are referring to a different discrete tuning relative to being stroked.

A learned change in the characteristic ergotropic-trophotropic balance relative to a stimulus is called retuning (Gellhorn 1967, see also Miller 1969). Events like football games, rock concerts and combat patrols that previously elicited excitement (ergotropic reactivity) may after returning be met with a relaxed response (trophotropic reactivity). Some researchers have argued that ritual control of ergotropic-trophotropic balance forms a basis for primitive healing techniques and for evoking alternative phases of consciousness (Gellhorn and Kiely 1972, Lex 1979).

#### COMBINING GELLHORN'S AND MacLEAN'S MODELS

Gellhorn's theory of emotion effectively integrates the human nervous system into a single, bipolar network of complimentary functions subserving the interests of adaptation and internal coordination. MacLean's notion of the triune brain also provides a holistic view of the nervous system, but recognizes the evolutionary emergence of different neural organizations at different levels of processing. Thus it seems to us that it would be interesting to consider emotional states in relation to a model that combines Gellhorn's and MacLeans work within the current understanding of parallel distributed processing leading to unitary consciousness of the lifeworld.

\*\*\*\*\*

TABLE 2

Combining Gellhorn's  
Theory of Autonomic-Somatic Integration  
with MacLean's Model of the Triune Brain

<u>MacLean's Triune Brain:</u>	<u>Gellhorn's Model:</u>	
	<u>Trophotropic System</u>	<u>Ergotropic System</u>
New Mammalian	Clear consc- iousness, rumi- nation tualization	Adaptational meaning, plan- ning, concep-
Old Mammalian	Neutral affect, bliss	Affects, core emotions, facial expressions
Reptilian	Relaxation	Arousal, clivity to act pro-

\*\*\*\*\*

In Table 2 we show how the two models may be usefully combined, and suggest some of the neurocognitive operations that may be carried out by distributed networks comprising the ergotropic and trophotropic systems at each of the three levels of evolutionary development. Each of the cells could be much elaborated, but this is sufficient we think to give the gist of the idea. An individual or culture may focus on and conceptualize an "emotion" that connotes operations in one or more of these cells. But one must keep in mind that these cells are not intended to represent exclusive categories of operation, particularly since most emotional states will be a tuning of more or less ergotropic and more or less trophotropic reactivity. And of course, there is no really clear-cut division between the levels of the triune brain.

The combined model should be used as a heuristic for evaluating just what neural processes may be indicated in any particular native category of emotion. For example, an individual can refer very specifically to the experience of sympathetic reactivity on the surface of his/her skin as "bliss" without inferring anything about what he/she is feeling blissful about.<sup>8</sup> The meaning of "bliss" in this instance would refer quite narrowly to activities at the lowest, or "reptilian" level of processing. On the other hand, if an individual is asked how they are feeling today, they might answer "I'm in bliss!" It is doubtful that they are referring to sensations of bliss on their skin. Instead, they would be using the word "bliss" to refer to being very happy, a more global state than the former, and one that involves operations at all three levels of processing. The paramount role of both personal history and culture in determining the meaning of emotional categories and labels relative to the various operations modelled here should be obvious.

#### CULTURE, MEANING AND EMOTION

For our present purposes, "culture" may be defined as patterns of socially controlled conditioning of ergotropic-trophotropic tuning relative to the demands of environmental circumstances and tradition. The evolutionary roots of culture are to be found, of course, in the flexibility of adaptational entrainments in the early hominid species, a flexibility also evident in the adaptations of living primates and other non-human animals (see Bonner 1980). The part of the brain most responsible for this flexibility is the "new mammalian" brain; that is, the neocortex. The natural operation of the nervous system in higher species of mammals is to construct systems of ergotropic-trophotropic entrainment adaptively appropriate to varying environmental situations. Where these situations recur, the patterns of entrainment are reinforced

---

<sup>8</sup>. Indeed, insight meditators in the Buddhist tradition are taught to isolate such sensations and explore them.

and become relatively static patterns of "meaning" produced primarily by neocortical models (see Ogden and Richards 1923:56-57). Using C.H. Waddington's term, neural models become relatively fixed in organization and structure, and thus produce creodes; i.e., become regularized, recursive and predictable in organization, content, function, response and interaction relative to the object of consciousness (Waddington 1957; see also Piaget 1971, 1985). This is why it is accurate to say that the natural motivation of the human brain is toward an "effort after meaning," rather than an "effort after truth."<sup>9</sup> Thus, each moment of consciousness is a unitary field within which sensory form and meaning merge in an exquisitely ordered process of pattern recognition and signification (Gibson 1969, Grossman 1987). This field is renewed in each subsequent moment of consciousness in a fluid stream of form and meaning.<sup>10</sup> And each creode may entrain emotional operations at any or all levels of evolutionary origin.

Culture, in the guise of attitudes, responses, social expectations, meanings, perceptions, images and interpretations -- all mediated by neocortical models -- may exercise a tremendous control over the experience of all forms of feeling and emotion. It is well to re-emphasize that enculturation has its greatest influence upon the formation of neocortical models. For example, one might naively presume that the one feeling state that enculturation might not influence would be the experience of pain. Yet numerous studies have demonstrated that one of the best predictors of the experience and response to both acute and chronic pain is cultural identity (Zborowski 1952, Bates 1987, Bates, Edwards and Anderson 1993, Pugh 1991). So even with this seemingly

---

<sup>9</sup>. We are indebted to Earl W. Count (personal communication) for this distinction which he attributes to I.A. Richards.

<sup>10</sup>. In the interests of clarity, let us be more explicit about the relationship between "meaning" and "information." Meaning is information that participates in organizing the life-world. Information is the literal "in-forming" (a la Varela 1979), or entrainment of neural networks mediating any regulatory or control function of the nervous system, whether that function participates as meaning or not.

most "knee-jerk" of feelings, enculturation has an influence upon the intensity, response and interpretation of pain, as well as its causes and appropriate responses, including emotional responses to pain. Indeed, programs for reducing the intensity of chronic pain require that cultural variables be understood and addressed in order to maximize success (Bates, Edwards and Anderson 1993:110). Again, the experience of pain depends upon the totality of conscious network entrainments, and not just the raw signals from nociceptors interpreted as "pain."

We must resist the common temptation to conceive of the object of intention and emotional attribution as being "out there" in any objective sense. Remember, the object of these intentional operations is also provided by the activity of the nervous system and mediated by models that have developed in tandem with the entrained "meanings" that are associated with the object.<sup>11</sup> The focal object is, for the moment, the nexus of cognitive, affective, metabolic and motor operations for the organism (Neisser 1976: 20ff).

This intentional coordination of associations with any object of consciousness will always involve ergotropic-trophotropic tuning, regardless of the cultural background of the subject. For instance, there will always be a characteristic level of arousal and of sympathetic-parasympathetic tuning associated with emotional facial expressions (Ekman, Levenson and Friesen 1983). But whether or not an "emotional" state is recognized by the subject depends upon the cultural tradition involved. For instance, Buddhist psychology considers "feeling" (vedana; see Bhikkhu Bodhi 1993:80) to be a universal property of all states of consciousness, but the Buddhist system recognizes "neutral" affect, as well as positive and negative affect, as feeling. In other words,

---

<sup>11</sup>. Ours is not a solipsistic theory. The object of consciousness may well be "out there" in the environment as a noumenon in the operational environment. We may be interacting with a real object in the world, but that object is still being constituted before consciousness by neural structures.

when there is neither positive or negative affect present to consciousness, the Buddhist system still interprets a feeling state to be present. By contrast, Euroamerican cultures tend to recognize emotion only when there is a positive or a negative affect discernable to consciousness.

### Simple and Complex Entrainments

There appears to be a handful of core emotions, like anger, fear, happiness, surprise and sadness, that are more or less recognisable from facial expressions and body language across cultures (Ekman, Levenson and Friesen 1982, Levenson, Ekman and Friesen 1990, Izard 1996), and even across species, as Charles Darwin (1965) recognized in the nineteenth century. But as Heider (1991 and in this volume) has pointed out, mapping different languages onto even these core emotions can prove difficult. A number of cultural factors can intervene to confound the already complex relationship between affect and language<sup>12</sup>.

First, if a culture routinely does not discuss the emotional aspect of experiences, they may fail to have words for some emotions, even though they experience them. Levy (1973, 1984a) has explored this factor in his influential work on emotions in Tahiti where he designated those emotions that are highly elaborated conceptually within any particular culture as 'hypercognized' and those for which little or no such emphasis is placed as 'hypocognized'. Second, natural categories in perception tend to have fuzzy semantic boundaries (see Laughlin 1993a, 1993b on this issue). Thus in our own culture, the meaning of "love" in the three different semantic contexts, "I love this

---

<sup>12</sup> As Fridja et. al. (1995: 126) note, the complex relationship between language and emotion can be at least partially accounted for by the fact that the emotion words of any one particular culture can refer to any combination of a number of different elements of an emotion, including: 1) the eliciting event; 2) individual appraisal - perception of personal or cultural meaning; 3) ensuing affective evaluation; 4) resulting changes in action readiness and body involvement; 5) behaviour; 6) subjective experience - the emotional feeling; and/or 7) individual evaluation of the total reaction.

painting," "I love my son," and "I love my wife," usually refers to three different systems of affective entrainment. Moreover, different cultures may manifest different semantic boundaries for essentially the same emotion, depending upon what perceptual, cognitive and situational contents are associated with the concept (see Fridja et. al. 1995). And third, the expression of certain negative emotions may be treated as taboo in any specific culture. For instance, among some Inuit groups, the emphasis in interpersonal communication is upon maintaining peace at all costs. People will usually dissemble in order to de-escalate negative confrontations (see Briggs 1970 on the Inupiaq). Here the cultural proscription against the expression of negative emotion does not mean that these emotions are not experienced by individuals within a particular culture. As Hollan (1988:58) discovered in his work among the Toraja of Indonesia where the emotion of anger is also conceptualized in very negative terms and where there is a strict prohibition against any overt display of this feeling "the relatively successful [cultural] control of overt hostility and aggression do not mean that the Toraja never become angry." In fact, Hollan points out that the Toraja do indeed experience anger but the discrepancy between the feeling of anger and the culturally mediated negative interpretation is mitigated by an individual's ability to perform strategies of emotional management similar to those methods that were described by the sociologist Arlie Hochschild as 'emotion work'<sup>13</sup> (Hollan 1992:59).

There also seem to be other emotions that involve a much more complex system of entrainment -- that is, a more complex linkage among cognitive, affective and somatic

---

<sup>13</sup> Hochschild's concept of "emotion work" describes the processes by which an individual can consciously shape their feelings to coincide with culturally and socially constructed norms, judgements, and values - what she calls "feeling rules" (1975:287, 1983, 1990). In Hochschild's view then, "emotion work" consists of a conscious process of trying to evoke, shape, as well as suppress feelings which are experienced as discrepant when compared to the "feeling rules" established in any particular culture (1979:561). In our model "emotion work" can thus be viewed as a conscious process of 'retuning.'

functions -- and may thus appear to be even more culturally variant. An example of a complex emotion having great cultural variation is humiliation. The complex affective associations attending humiliation may range from anger to despair, depending upon cultural conditions and personal development (Miller 1993:159-161), and thus manifest tremendous variation in experience, expression and language cross-culturally.

To give a more culturally specific example, among the Navajo with whom Laughlin has lived, the "core" emotions are expressed in fairly straightforward terms; e.g., "to become fearful," nasdzid, "to become angry," ba hachi, "sadness," ch'iinaij, etc. But the closest one can get to expressing "ecstasy" is the word adiniitla, which also may be used to connote "hysteria," "convulsion," and "fit" in various contexts. And even with words connoting the "core" emotions, other connotations may be dragged into the gloss. The word usually used by Navajo to express "joy," or "happiness," il hozho has an enormous range of connotations. The root meaning of hozho is "harmony" or "beauty" and is the most important and profoundly ramified concept in the cosmology and the healing system of the Navajo people. Entire books have been written about the concept and its philosophical associations (see e.g., Farella 1984).

Moreover, as mental health workers in Navajo will attest,<sup>14</sup> there is no term that clearly glosses "depression" in the Navajo language. Health workers have had to work up a series of questions from which they infer the presence of depression. Phrases like taadoole'e ho'diil'a may be used to describe the syndrome, but they only approximate certain aspects of the syndrome -- in this case the phrase refers to "something is bothering you." Or there may be recourse to such terms as ch'iinaij, "sadness, dejection," which come as close affectively as one can get in the language. In any event, mental health workers have had to be creative in selecting a range of

---

<sup>14</sup>. We are indebted to Dr. Phil Summerville and Ms. Linda Torres of the Indian Health Service in Shiprock, New Mexico, for this insight.

terms that monolingual Navajo clients can apply to describing what they are experiencing.

It is important in terms of a pan-human theory of emotion that we realize that just because the Navajo lack a traditional term that precisely labels a semantic field similar to the English term "depression" does not mean that they do not experience depression (see Kleinman and Good 1989 for various positions relative to this issue). They do indeed experience depression, as well as the sequelae of depression -- alcohol abuse and suicide. They simply do not categorize the various aspects of the syndrome in the way we do in English, and they are traditionally reticent when speaking about emotional aspects of their experience, especially negative emotions associated with unhappiness.

It may be helpful to thus understand human emotions as ranging experientially along a spectrum in which there are focal points of 'discrete emotions' that are separated from one another by 'fuzzy boundaries'. As the developmental psychologist Paul Harris has noted, by envisioning emotional experience as a spectrum "we can reasonable conclude that the terms of different languages do pick out the same focal points of landmarks within that spectrum, and [that] they vary in the extent to which they differentiate some local area of the spectrum" (1995:353). Support for the notion of a spectrum of emotional experience can further be found in the work of Levy (1984b:409) who has drawn some important comparisons to Berlin and Kay's (1969) work on the colour spectrum, and similarly in the much earlier work of Hildred Geertz who has expressed an analogous idea in her assertion that "In the course of the growth of a given person, this potential range of [universal] emotional experience becomes narrowed, and out of it certain qualitative aspects are socially selected, elaborated, and emphasized" (1957:225).

### Emotion, Ritual and Facial Feedback Theory

It seems to us to be commonsense to think of emotional expression as internally generated and externally expressed (through posture, body language, and facial

expressions). And this is the case when the emotional expression is being initiated from internal affective processes that are eventually entrained to, and expressed by, somatic systems. However, it is important to understand that neural pathways are now known to be reciprocal in the nervous system, and the causation of emotion may be upon occasion in the opposite direction. That is, somatic systems may in certain circumstances evoke affective systems. This is an important consideration with respect to the question of how ritual activities may produce the emotional aspects of intended states of consciousness -- a question that came to interest Gellhorn toward the end of his life (Gellhorn and Kiely 1972).

One of the more intriguing and controversial theories relating affect and facial expression is the so-called facial feedback hypothesis (see Ekman, Friesen and Ellsworth 1972, Tomkins 1982). According to this view, responses of the facial musculature to stimuli in the world may actually penetrate to and evoke the systems controlling affect, rather than affect as an initial visceral response being a bit later expressed by the face. If true, the facial feedback hypothesis could account for a number of ritual phenomena of interest to those studying performance, especially those performances involving the wearing of masks (see Young and Laughlin 1988, Webber, Stephens and Laughlin 1983). Elements in ritual such as wearing masks, dancing, undergoing ordeals, ingesting psychotropic substances, and the like, may operate as drivers that eventually produce the socially desired emotional state in the participant.

This also may help us to understand the emphasis placed in many cultures upon developing proper posture, facial expression and behavioral repertoire preparatory to realizing the extraordinary states of consciousness -- including affect -- with which the postures, etc., are culturally associated. For instance, this emphasis upon body posture and facial expression is common to both Hindu and Buddhist Tantric yoga techniques. Other examples can be found in the exaggerated facial expressions practised in western clowning and Japanese Kabuki theater, practices requiring the

painting of the face into a mask in such a way that expressions are controlled by facial musculature.

We are not endorsing the more extreme forms of the facial feedback hypothesis (see Buck 1980), but rather are suggesting that affective, as well as perceptual, cognitive, and other neuroendocrine systems may be entrained from both the "inside-out" and from the "outside-in." We suspect that in some situations, affect is evoked by facial musculature, and in other situations, facial expression is an expression of affective systems.

### Development and Emotion

As we have seen, neurognosis develops. There are undoubtedly core emotions in the neurognostic repertoire of the human brain. But as we have also seen, conscious network may consist of relatively simple or relatively complex systems of entrainment. Just how complex a particular pattern of entrainment may be depends upon many factors influencing the development of the individual, including early pre- and perinatal factors (Laughlin 1991), enculturation, routinization of emotionally laden circumstances, conditioning relative to particular objects, spiritual motivation, etc.

The development of the cognized environment is usually uneven<sup>15</sup> and patchy with some systems remaining relatively open and growing while other systems become creodes and closed to further development. Emotionally traumatized creodes are the classic example of arrested development where certain objects become associated with intense negative affect and arousal early in childhood and remain so thereafter, unless reopened by some kind of therapeutic experience. Phobic reactions to certain objects or experiences provide another example of arrested development.

But these are merely extreme examples of arrested development. Most

---

<sup>15</sup>. Jean Piaget (Piaget and Inhelder 1969) referred to this unevenness of development as the presence of decalanges.

emotional development becomes "arrested" after some point in development and relatively closed to further growth. Most of our emotions become bound up in creodes. We thus become fairly predictable in our emotional responses to particular objects and events (i.e., our emotional reaction to loved ones, a Wagnerian leitmotif, domestic disorder, red sports cars, etc.). Yet there is always the possibility of opening up emotional creodes to growth and change. Traumas and phobias can be "cured" and new emotional entrainments may become established under a new developmental regimen. After all, our neural networks are living tissues, not mechanical microchips, and new entrainments may be established under the right therapeutic conditions.

### Development of Higher Emotions

Many of the world's spiritual traditions explicitly target emotional creodes for further development. Some clearly distinguish between "lower" and "higher" emotion -- that is, between mundane emotional states and emotional states associated with, or conducive to, higher knowledge. For example, Buddhist psychology teaches that maturing self-awareness is a process that begins with awareness of the body (kayanusatī; kaya = "body" and sati = "awareness"), progresses through awareness of feeling or emotion (vedananusatī; vedana = "feeling"), and on to more advanced levels of awareness (Bhikkhu Bodhi 1993:80). "Feeling" is considered to be an attribute (cetasika) universal to all states of consciousness. But, as was pointed out above, this is because "neutral" feeling is included as an emotional state.

More mature states of awareness in Buddhist contemplation require that the practitioner cultivate a quality of consciousness termed "equanimity" or "one-pointedness" (ekaggata), a state that may be learned through the practice of loving-kindness (metta; see Bhikkhu Bodhi 1993:89, Laughlin 1985).<sup>16</sup> The state of

---

<sup>16</sup>. This is the Theravadin teaching of the Four Divine Abodes (Brahma vihara). The realization of each abode is sequential, beginning with the full activation of undifferentiated beneficence (metta), followed by the realization of compassion for the suffering of all beings everywhere (karuna), then the realization of sympathetic joy for

consciousness characterized by equanimity is one in which both positive and negative emotional reactions to objects of consciousness have been transcended. One learns to simply "watch" whatever arises before the mind without emotionally reacting to things. This is considered the requisite state of mind from which to access still more mature states of consciousness, as well as the eventual realization of nirvana.

Creative activity and insights of all kinds are often, if not always accompanied by positive affect (Hadamard 1945; Ommaya 1993). In Laughlin's own personal experience, the attainment of intuitive insights, whether they be realized during meditation or during the pursuit of intellectual problems, are often accompanied by bliss states of various intensity (sometimes with the intensity of full blown ecstasy). In this regard, Ayub Ommaya (1993:15) notes the importance of the research done by Marcus Raichle (1992) using PET scans and showing that novel speech acts are accompanied by limbic system activity, while redundant speech acts are not. This demonstrates the intimate involvement of limbic-affective components in creative operations and activities. Those who are in touch with their creative faculties know that, no matter what their field of endeavor, there is an aesthetic-emotional quality that permeates the creative act, or the apprehension of a creative solution.

What we mean to suggest here is that, because the limbic system so thoroughly and reciprocally connects with virtually the entire neocortex of the human brain, the range of entrainments of "emotional" states is virtually unlimited. Affective qualities will often permeate conscious network, and how these affects are experienced, and perhaps expressed, will be shaped by the pattern of entrainment in which they arise. And as the conscious network develops -- that is, as the set of possible entrainments

---

the growth and well-being of all beings everywhere (mudita), and then the balance of both compassion and joy producing the state of equanimity (ekeggata). It is said that without realization of these states, the realization of liberation is impossible. Note that this entire practice involves learning new and more mature emotional states.

comprising conscious network develop -- so too will the limbic and other systems mediating the emotions develop. The more mature the consciousness, the more mature will be the emotions experienced by that consciousness. Thus, linguistic categories of emotion in any language will typically have very fuzzy semantic boundaries indeed.

And in societies in which advanced states of consciousness are sought, a considerable range of affects may be labelled by a single term. For instance, in the Navajo quest for the realization of "beauty" (hozho), one person using the term may simply mean they are feeling happy while another person may be reporting that they are feeling well after a bout of sickness, and yet another person may be expressing their realization of an advanced state of totality and flow (see Csikskentmihalyi 1975, Turner 1979:154, Laughlin, McManus and d'Aquili 1990:299-300). Indeed, unless the culture specifically provides distinct labels for advanced states of emotional maturity, as is the case for Buddhist psychology, in all likelihood the native terms will carry a considerable semantic load, perhaps connoting a range of emotional entrainments from the most immature to the most mature known to that culture. Consider the fact that in English the term "love" can connote a range of feeling states from infantile infatuation, through "unconditional positive regard," to saintly compassion.

## DISCUSSION

What we have done in this chapter is sketch the outlines of an entrainment model of emotion which allows us to move past the simplistic formulations of the universalist-constructivist polarity. While acknowledging the universality of certain core emotions, we nonetheless have shown that from a neuropsychological point of view there can be no such thing as an emotion that does not involve developmentally flexible structures of the nervous system. We have also suggested that emotions are not always expressible in any particular natural language, and that there exists a range of maturity in the development of emotional states that may or may not be clearly

distinguished by a culture's semantic categories.

We have emphasized the importance of the fact that all emotions are ultimately rooted in the neurognostic structure of the nervous system. The models of Ernst Gellhorn and Paul MacLean have been combined to form a matrix for distinguishing the various parallel distributed processes that may be mediating states we call "emotion." It is perhaps easier to see from this matrix that emotional neurognosis is the reason why we anthropologists feel that we are able to so easily comprehend and share most of the emotional experiences had by our hosts in other cultures. Neurognosis is also the reason why we can empathize with what other animals are feeling, and why animals of different species can correctly interpret the emotional content of each others' body posture, facial expressions and communications (see Masson and McCarthy 1995 on this issue). And the more the emotion involves older mammalian and reptilian level processing, the more easily may these affects and their expressions be interpreted. As any clinician knows, if a client is video taped during a psychotherapy session, and the tape is later played with the sound turned off, the clinician may more accurately determine what the underlying emotional state of the client is, than if the clinician only pays attention to what the client is saying.

Where our interpretation of other peoples' emotions may be significantly erroneous is in situations in which entrainment of new mammalian, higher cortical modelling provides a major component of the experience. These are the processes that are associated primarily with the meaning content of emotion.<sup>17</sup> Processes at this level -- especially those involving prefrontal cortical processing -- are the most susceptible to enculturative influence. Those at the phylogenetically older, or "reptilian"

---

<sup>17</sup> There may indeed be culturally labelled "emotions" that are so heavily mediated by higher cortical processes that lower level processes are very attenuated. This is what William James might have been getting at when he referred to the "subtler emotions"; i.e., aesthetic feelings, and some types of bliss. This is an interesting hypothesis, but so far as we are aware, there are as yet no neuropsychological data to support the idea.

and "old mammalian," (limbic, midbrain, autonomic, endocrinological and metabolic) levels are involved in the more primitive, non-cognitive aspects of emotion and are much less susceptible to cultural variation. We have suggested that how universal or culturally relative an emotion appears to be in any particular culture depends upon how ramified are the processes included within the semantic field of the cultural label.

This biogenetic structural perspective also has a lot to offer the debate over the existence of so-called "culture-bound syndromes" (Simons and Hughes 1985). These are forms of psychopathology that occasionally appear to be culture-specific. These syndromes include such exotic behaviors as the running amok and killing people in Malaysia and other South Pacific cultures, or the pibloktog, or "arctic hysteria," among the peoples living in the far north. And of course, these syndromes include emotional attributes in both their cultural and their psychiatric definitions.

But as Hughes (1990:142) has noted, just how unique a syndrome appears depends upon the level of abstraction at which the concept of the disorder is considered. It is clear from a study of these disorders that there are no affects that are unique to the particular cultures involved. Rather, it is the details of the behavioral complex and the meaning associated with the behaviors that appear so exotic. For example, Malay people seem to suffer from an anxiety-related syndrome they term latah (Kenny 1978). The latahs are usually older females known to become very agitated when repeatedly startled and appear to go into a trance-like state. The latah is a recognized social role in Malay society<sup>18</sup> and on the surface seems to be quite unique. But on closer scrutiny we find that people in other societies vary in their susceptibility to the startle response (Grillon, Ameli, Foot, and Davis 1993) and the only thing that is unique about the Malay latah is the cultural coding of susceptible individuals, and perhaps the acting out of cultural expectations (Simons 1985).

---

<sup>18</sup>. Ronald Simons has produced a movie of this syndrome entitled "Latah: A Culture-Specific Elaboration of the Startle Reflex."

Another example may be found in the malgri syndrome of the Lardil peoples who inhabit Mornington Island off of Queensland, Australia (Cawte 1974). The Lardil make a clear distinction between things having to do with the sea and things having to do with the land. They exhibit intense anxiety -- a virtual paranoia -- about being attacked by spirits called malgri. The spirits will attack if a person enters the sea with something on their bodies associated with land, and visa versa. All considered, this is a classic culture-bound syndrome, for no one other than Lardil are afraid of malgri spirits. Most of us would feel no anxiety about dipping our hands into a pool of fresh water without first making sure no salt water was on our hands. Yet the anxiety the Lardil feel is presumably the same affect as one of us might feel about touching a snake or getting too close to a precipice. What is "culture-bound" is the whole bundle of entrainments mediating the total experience of the syndrome.

Our entrainment view of emotion is also in keeping with current evidence regarding the physiology of anxiety and fear. Joseph E. LeDoux of New York University (1986, 1989) has shown that the network producing fear and anxiety involves the lateral nucleus of the amygdala, a body of tissue lying near each of the poles of the temporal lobes that are connected by large tracts to other areas of the limbic system and to sensory and prefrontal cortex, and that have been long known to be associated with fear and rage. These areas receive stimulation from the sensory areas directly, and interact with many other areas of cortex and subcortical centers. But they do not require higher cortical inputs in order to initiate emotion-related responses. Michael David of Yale University School of Medicine (1992, 1993, Kim and Davis 1993) has shown that the amygdala is connected directly to the brain stem and may initiate startle and other anxiety related actions independent of cortical inputs. Moreover, damage to relevant amygdaloid nuclei will suppress anxiety and related responses.

#### CONCLUSION

In conclusion, one of the major methodological problems facing the ethnology of

emotion is the lack of self-awareness of many ethnographers. Ethnographers are often unable to discern the various nuances and combinations of arousal, affect, body activity, imagination and cognition that make up their own emotional experiences. They may thus be poorly prepared to comprehend the emotional experiences of their hosts and informants. We believe that the very best grounding for understanding the complexity of emotion is a neurophenomenological approach;<sup>19</sup> that is, an approach that combines mature self-awareness with an understanding of how the nervous system works. The problem with ethnological treatments of emotion cross-culturally is that ethnographers often have no direct access to the native's experience of emotion, and thus they tend to over-inflate the importance of the semantic analysis of language. And of course this strategy biases the results of research to the products of higher cortical activity.

We can think of no better example of this exaggeration of affective distinction than the decades-long debate, begun originally by Margaret Mead and Ruth Benedict, over whether cultures may be clearly distinguished into shame or guilt cultures (see Creighton 1990). And of course the Navajo have been construed as a textbook example of a "shame culture" (Leighton and Kluckhohn 1948). According to the shame vs. guilt theory claim, negative feelings about doing something wrong only arise for the Navajo relative to social relations, and only if other people find out what they have done -- this as opposed to people in a "guilt culture" where the focus of negative feeling is supposedly on the individual identity so that one feels one has failed one's own internalized expectations, whether or not other people know about the wrong doing.

Shame and guilt of course are Euroamerican concepts that have been neatly dichotomized and projected onto other cultures whole cloth. The fact of the matter is, if Laughlin's friends in Navajoland are any evidence, Navajos are indeed a very socially

---

<sup>19</sup>. See Laughlin, McManus and d'Aquili (1990:24-33) for a discussion of "mature contemplation" and its possible role in ethnography.

oriented people and will feel intense shame if they have been publicly caught-out doing something wrong. If they speak about it, they might say something like baa ya nisin, “I feel ashamed (or humiliated)” (shame = ya, feel = nisin). But this does not mean that Navajos do not also experience an internalized self-blame corresponding to Mead and Benedict’s definition of guilt.<sup>20</sup> They certainly do. There is no Navajo term that cleanly glosses as “guilt,” but they may speak in terms of something that is lodged in their minds and weighs them down, perhaps even making them sick. For example, one may say baa shini’ dah si’a, which approximately means “it’s about something that is sitting (or positioned) like a solid object on (or in) my mind” (Johnson Dennison, personal communication).<sup>21</sup> Moreover, healing in Navajo understanding commonly

---

<sup>20</sup> While Mead and Benedict distinguished between shame and guilt as external and internal sanctions respectively, an important theoretical shift took place in the early 1950s in redefining shame and guilt toward a psychoanalytic perspective that directly contradicted and later effectively replaced Mead and Benedict’s earlier views (see Lebra 1971:242; Cairns 1993; Creighton 1990). Engineered by Piers and Singer (1953), this “new” theoretical shift understood both shame and guilt as equally internalized forms of self-blame. For Piers and Singer, guilt was thought to be tied to transgressions caused by “id” impulses resulting in a dissonance between the ego and the functioning super-ego, while shame was seen as connected to personal shortcomings and the failure to reach goals presented by the ego-ideal (1953:23-24). In the discipline of psychology Piers and Singer’s revolutionary formulation was expanded upon in a much heralded work by Helen Block Lewis (1971) who argued that shame and guilt can not only be distinguished structurally but also phenomenologically. According to Lewis, even though both shame and guilt are ultimately registered as experiences of the self, a major phenomenological difference between the two emotions is that in shame it is the “whole self” that is the primary focus of evaluation while in guilt it is not the “self itself” but the acts or behaviours attributed to the self that are focussed upon (1971:30, 40). More recently this theoretical position is perhaps best viewed in the work of Michael Lewis who, building on both Piers and Singer and Helen Block Lewis, understands guilt to be a perceived failure resulting from the violation of standards and ensuing “self-blame” that is focussed on specific actions of the self, while shame is in contrast a perceived failure resulting from the violation of standards and ensuing “self-blame” that is focussed on the “whole self” (1992:65-72).

<sup>21</sup> Baa shini’ dah si’a literally means “concerning an elevated solid object sitting (or hanging, or positioned) in my mind” where baa means “about” or “concerning,” shini’ means “my mind,” dah means “up, at an elevation above the surface of the ground,” and si’a means “it (a rock, hat, mountain, house, or other solid object) sits, lies, or is in

involves the patient becoming aware of their “guilt” -- of the weighty blame, memory and associated negative feelings in their mind -- and transforming the “guilt” into something akin to Mead and Benedict’s view of shame. With the acknowledgement of the wrong doing in a more public way, say between the patient and the medicine man, the guilty feelings can be alleviated and healed, perhaps in conjunction with a healing ceremony.

Our hunch is that those theorists who insist upon an extreme dichotomy between pure shame and guilt cultural types are trapped by what might be called “etic-itis” -- the temptation to let our theoretical constructs run away with us and dominate our empirical exploration of complex human nature. They also appear to have an inability to parse the various levels of neuropsychological structures that are mediating the complex experiences that become conceptualized as an emotion. This is why our group has long advocated training ethnographers in phenomenological methods. An ethnographer who has attained mature self-awareness will be capable of the kind of phenomenological parsing<sup>22</sup> required to realize the various levels of experience grouped within concepts of emotion. He or she will know from direct experience the actual role that higher cortical imagery, conceptual and linguistic operations play in their experience of emotion. They will not be fooled by theories that, for example, naively claim that emotions are the byproducts of language -- views incidentally that also tend to deny that pre-linguistic infants, or fetuses, as well as non-human animals have emotional experiences (see Laughlin 1991, Laughlin and Spack 1994 and Masson and McCarthy 1995 on this issue).

---

position” (Johnson Dennison, personal communication). Hence, the connotation of the phrase is approximately “it’s about something weighing heavily on (or in) my mind.” The Navajo concept of mind is one of an experiential space which is located in the body, and which is dynamic and associated with the concept of “wind” (see McNeley (1981). Thus, “guilt” is the experience of negative feelings weighing down the mind over a significant period of time.

<sup>22</sup> Edmund Husserl used the term “reduction” for this kind of parsing.

In any event, we hope that we have successfully made the case for an entrainment model of emotion. Emotional states may be initiated from any of a number of sites -- from expression and posture, from generalized arousal, from deep limbic nuclei, from perceptual or cognitive cortex, and from the environment via the senses. Moreover, because consciousness is essentially intentional, the affective aspects of emotion can combine with sensory and cognitive-interpretive processing such that states of consciousness are experienced in which affect and meaning merge in a field of experiential totality.

An adequate anthropology of emotion should be sufficiently versed in the relevant fields of developmental psychology and neuroscience, as well as show some cognizance of the transpersonal aspects of emotion. Failure to recognize the developmental dimension of emotion can lead to simplistic, "hard-wired," universalistic notions of emotion, while failure to appreciate the intricate complexity of the neurophysiology of emotion may lead to the unrealistically extreme, cultural-relativistic views of constructivism. And inclusion of a transpersonal perspective allows us to form a picture of the full range of human emotion from the most infantile to the most enlightened of human beings, and the reflection of this range of emotion in various cultural traditions.

NOTES

## REFERENCES

Antonovsky, A. (1979) *Health, Stress, and Coping*. San Francisco: Jossey-Bass.

Bates, Maryann S. (1987) "Ethnicity and Pain: A Biocultural Model." *Social Science and Medicine* 24(1):47-50.

Bates, Maryann S., W. Thomas Edwards, and Karen O. Anderson (1993) "Ethnocultural Influences on Variation in Chronic Pain Perception." *Pain* 52:101-112.

Berlin, B. and Kay, P. (1969) *Basic Color Terms: Their Universality and Evolution*. Berkeley: University of California Press.

Besnier, Niko (1990) "Language and Affect." In Bernard J. Siegle, Alan R. Beals and Stephen A. Tyler, eds., *Annual Review of Anthropology* 19:419-51. Palo Alto, CA: Annual Review Inc.

Biederman, Irving (1987) "Recognition-by-Components: A Theory of Human Image Understanding." *Psychological Review* 94(2):115-147.

Bhikkhu Bodhi (1993) *A Comprehensive Manual of Abhidhamma (The Abhidhammattha Sangaha of Acariya Anuruddha)*. Kandy, Sri Lanka: Buddhist Publication Society.

Bonner, J.T. (1980) *The Evolution of Culture in Animals*. Princeton, NJ: Princeton University Press.

Briggs, J. (1970) *Never In Anger*. Cambridge, MA: Harvard University Press.

Buck, R. (1980) "Nonverbal Behavior and the Theory of Emotion: The Facial Feedback Hypothesis." *Journal of Personality and Social Psychology* 38:811-824.

Bunge, M. (1980) *The Mind-Body Problem: A Psychobiological Approach*. Oxford: Pergamon.

Cairns, Douglas L. (1993) *Aidos*. New York: Clarendon Press.

Cawte, John (1974) *Medicine Is the Law*. Honolulu: University Press of Hawaii.

Chamberlain, David B. (1983) *Consciousness at Birth*. A review of the literature obtainable from Chamberlain Communication, 5164 35th Street, San Diego, CA 92116.

Changeux, Jean-Pierre (1985) *Neuronal Man: The Biology of Mind*. Oxford: Oxford University Press.

Creighton, Millie (1990) "Revisiting Shame and Guilt Cultures." *Ethos* 18:279-307.

Csikskentmihalyi, M. (1975) *Beyond Boredom and Anxiety*. San Francisco: Jossey-Bass.

D'Aquili, Eugene G., Charles D. Laughlin and John McManus, eds. (1979) *The Spectrum of Ritual*. New York: Columbia University Press.

Darwin, Charles (1965) *The Expression of the Emotions in Man and Animals*. Chicago: University of Chicago Press.

Davis, Michael (1992) "The role of the amygdala in fear and anxiety." *Annual Review of Neuroscience* 15:353-375.

Davis, Michael (1993) "Fear-Potentiated Startle: A Neural and Pharmacological Analysis." *Behavioral Brain Research* 58(1-2):175-198.

Eccles, John C. (1989) *Evolution of the Brain: Creation of the Self*. New York: Routledge.

Edelman, Gerald M. (1987) *Neural Darwinism: The Theory of Neuronal Group Selection*. New York: Basic Books.

Edelman, Gerald M. and Vernon B. Mountcastle (1982) "The Mindful Brain: Cortical Organization and the Group-Selective Theory of Higher Brain Function. Cambridge, MA: MIT Press.

Ekman, Paul, ed. (1982) *Emotion in the Human Face* (2nd edition). Cambridge: Cambridge University Press.

Ekman, Paul (1994) *The Nature of Emotion: Fundamental Questions*. New York: Oxford.

Ekman, Paul, Wallace V. Friesen and P.O. Ellsworth (1972) *Emotion in the Human Face*. New York: Pergamon.

Ekman, Paul, Robert W. Levenson and Wallace V. Friesen (1983) "Autonomic Nervous System Activity Distinguishes Among Emotions." *Science* 221:1208-1210.

Ellsworth, Phoebe C. (1994) "William James and Emotion: Is a Century of Fame Worth a Century of Misunderstanding?" *Psychological Review* 101(2):222-29

Elster, Jon (1984) *Ulysses and the Sirens*. Cambridge: Cambridge University Press.

Farella, John R. (1984) *The Main Stalk: A Synthesis of Navajo Philosophy*. Tucson, AZ: University of Arizona Press.

Fridja, N.H., Markam S., Sato K., and Reinout W. (1995) "Emotions and Emotion Words." Pp. 121-143 in J.A. Russell et. al. (eds.), *Everyday Conceptions of Emotion: An Introduction to the Psychology, Anthropology, and Linguistics of Emotion*. Boston: Kluwer Academic Publishers.

Fuster, J.M. (1980) *The Prefrontal Cortex: Anatomy, Physiology, and Neuropsychology of the Frontal Lobe*. New York: Raven.

Geertz, H. (1959) "The Vocabulary of Emotion: A Study of Javanese Socialization Processes." *Psychiatry* 22:225-36.

Gellhorn, Ernst (1967) *Principles of Autonomic-Somatic Integrations*. Minneapolis: University of Minnesota Press.

Gellhorn, Ernst and W.F. Kiely (1972) "Mystical States of Consciousness: Neurophysiological and Clinical Aspects." *Journal of Nervous and Mental Diseases* 154: 399-405.

Gellhorn, Ernst and G.N. Loofbourrow (1963) *Emotions and Emotional Disorders*. New

York: Harper and Row.

Gray, Jeffrey A. (1982) *The Neuropsychology of Anxiety: An Enquiry into the Functions of the Septo-Hippocampal System*. Oxford: Clarendon Press.

Grillon, Christian, Rezvan Ameli, Michael Foot, and Michael Davis (1993) "Fear-potentiated startle: Relationship to the level of state/trait anxiety in healthy subjects." *Biological Psychiatry* 33(8-9):566-574.

Grof, Stanislov (1976) *Realms of the Human Unconscious*. New York: Viking Press.

Gurwitsch, Aron (1940) "On the Intentionality of Consciousness." in Martin Farber, ed. *Philosophical Essays in Memory of Edmund Husserl*. Cambridge, MA: Harvard University Press, pp. 65-83.

Hadamard, J. (1945) *The Psychology of Invention in the Mathematical Field*. New York: Dover.

Hallowell, A.I. (1955) "The Self and Its Behavioral Environment." in *Culture and Experience*. Philadelphia: University of Pennsylvania Press.

Harris, P. (1995) "Developmental Constraints on Emotion Categories." in J.A. Russell et. al. (eds.), *Everyday Conceptions of Emotion: An Introduction to the Psychology, Anthropology, and Linguistics of Emotion*. Boston: Kluwer Academic Publishers, pp. 353-372 .

Heath, Robert G. (1986) "The Neural Substrate for Emotion." in Robert Plutchik and

Henry Kellerman, eds. *Emotion: Theory, Research, and Experience*. New York: Academic Press.

Heider, Karl G. (1991) *Landscapes of Emotion: Mapping Three Cultures of Emotion in Indonesia*. New York: Cambridge University Press.

Hess, W.R. (1925) *On the Relations Between Psychic and Vegetative Functions*. Zurich: Schwabe.

Hinton, Alexander Laban (1993) "Prolegomenon to a Processual Approach to the Emotions." *Ethos* 21(3):417-451.

Hofer, M.A. (1974) "The Role of Early Experience in the Development of Autonomic Regulation." In *Limbic and Autonomic Nervous Systems Research* (ed. by L.V. DiCara). New York: Plenum.

Hochschild, Arlie (1975) "The Sociology of Feeling and Emotion." in Marcial Millman and Rosabeth Moss Kanter (eds.), *Another Voice: Feminist Perspectives on Social Life and Social Structure*. Garden City: Doubleday/Anchor, pp. 280-307

Hochschild, Arlie (1979) "Emotion Work, Feeling Rules, and Social Structure." *American Journal of Sociology* 85:551-575

Hochschild, Arlie (1983) *The Managed Heart: Commercialization of Human Feeling*. Berkeley: University of California Press

Hochschild, Arlie (1990) "Ideology and Emotion Management: A Perspective and Path

for Future Research.” in Theodore D. Kemper (ed.), *Research Agendas in the Sociology of Emotion*. Albany: SUNY Press, pp 117-142

Hollan, Douglas (1988) “Staying ‘Cool’ in Toraja: Informal Strategies for the Management of Anger and Hostility in a Nonviolent Society.” *Ethos* 16:52-72

Hollan, Douglas (1992) “Emotion Work and the Value of Equanimity Among the Toraja.” *Ethnology* 31:45-56

Hughes, Charles C. (1990) "Ethnopsychiatry." in *Medical Anthropology: A Handbook of Theory and Method*. New York: Greenwood, pp. 132-148.

Husserl, Edmund (1931) *Ideas: General Introduction to Pure Phenomenology*. New York: The MacMillan Company.

Husserl, Edmund (1970) *The Crisis of European Sciences and Transcendental Phenomenology*. Evanston: Northwestern University Press.

Izard, C. (1980) "Cross-Cultural Perspectives on Emotion and Emotion Communication." In H. Triandis, ed., *Handbook of Cross-Cultural Psychology*. Boston: Allyn and Bacon, pp. 95-126.

Izard, C. (1990) “The Substrates of Emotion Feelings: William James and Current Emotion Theory.” *Personality and Social Psychology Bulletin* 16(4):626-35

Izard, C. (1993) “Four Systems for Emotion Activation: Cognitive and Noncognitive Processes.” *Psychological Review* 100:68-90

Izard, C., Dougherty L.M., and Abe j. (1996) "Differential Emotions Theory and Emotional Development in Adulthood and Later Life" Pp 27- 41 in Carol Magai and Susan H. McFadden (eds.), Handbook of Emotion, Adult Development, and Aging. San Diego: Academic Press

Kenny, Michael (1978) "Latah: The Symbolism of a Putative Mental Disorder." Culture, Medicine, and Psychiatry 2:209-223.

Kim, Munsoo and Michael Davis (1993) "Electrolytic Lesions of the Amygdala Block Acquisition and Expression of Fear-Potentiated Startle Even With Extensive Training But Do Not Prevent Reacquisition." Behavioral Neuroscience 107(4):580-595.

Kleinman, A. and B. Good (1989) Culture and Depression: Studies in the Anthropology and Cross-Cultural Psychiatry of Affect and Disorder. Berkeley: University of California Press.

Laughlin, Charles D. (1985) "On the Spirit of the Gift." Anthropologica 27(1-2):137-159.

Laughlin, Charles D. (1991) "Pre- and Perinatal Brain Development and Enculturation: A Biogenetic Structural Approach." Human Nature 2(3):171-213.

Laughlin, Charles D. (1992) Scientific Explanation and the Life-World: A Biogenetic Structural Theory of Meaning and Causation, Report No. CP-2. Sausalito, CA: Institute of Noetic Sciences.

Laughlin, Charles D. (1993a) "Fuzziness and Phenomenology in Ethnological Research: Insights from Fuzzy Set Theory." *Journal of Anthropological Research* 49(1):17-37.

Laughlin, Charles D. (1993b) "The Fuzzy Brain." *Social Neuroscience Bulletin* 6(2):20-21.

Laughlin, Charles D. (1994) "Apodicticity: The Problem of Absolute Certainty in Transpersonal Anthropology." *Anthropology & Humanism* 19(2):1-15.

Laughlin, Charles D. (1996) "The Properties of Neurognosis." *Journal of Social and Evolutionary Systems* 19(4):375-400.

Laughlin, Charles D. and Eugene G. d'Aquili (1974) *Biogenetic Structuralism*. New York: Columbia University Press.

Laughlin, Charles D. and Ivan A. Brady (1978) *Extinction and Survival in Human Populations*. New York: Columbia University Press.

Laughlin, Charles D., John McManus and Eugene G. d'Aquili (1990) *Brain, Symbol and Experience*. New York: Columbia University Press.

Laughlin, Charles D. and Tracey Spack (1994) "Animal Consciousness: The View from Biogenetic Structuralism." paper presented before the Society for the Anthropology of Consciousness, Tempe, AZ.

Leavitt, John (1996) "Meaning and Feeling in the Anthropology of Emotions." *American Ethnologist* 23(3):514-539.

Lebra, Takie (1971) "The Social Mechanism of Guilt and Shame: The Japanese Case." *Anthropological Quarterly* 44:241-255.

LeDoux, Joseph E. (1986) "Sensory Systems and Emotion: A Model of Affective Processing." *Integrative Psychiatry* 4(4):237-243.

LeDoux, Joseph E. (1989) "Cognitive-Emotional Interactions in the Brain. Special Issue: Development of Emotion-Cognition Relations." *Cognition and Emotion* 3(4):267-289.

Levensen, Robert W., Paul Ekman and Wallace V. Friesen (1990) "Voluntary Facial Action Generates Emotion-Specific Autonomic Nervous System Activity." *Psychophysiology* 27(4):363-384.

Levy, R.I. (1973) *Tahitians: Mind and Experience in the Society Island*. Chicago: University of Chicago Press.

Levy, R.I. (1984a) "Emotion, Knowing, and Culture." Pp. 214-37 in R.A Schweder and R.A. LeVine (eds.), *Culture Theory: Issues on Mind, Self, and Emotion*. Cambridge: Cambridge University Press.

Levy, R.I. (1984b) "The Emotions in Comparative Perspective." Pp. 397-412 in K. Scherer and P. Ekman (eds.), *Approaches to Emotion*. Hillsdale: Erlbaum.

Levy, R.I. and Wellenkamp J.C. (1989) "Methodology in the Anthropological Study of Emotion." in A.R. Plutchik and H. Kellerman (eds.), *Emotion: Theory, Research, and Experience*. Vol. 4. New York: Academic Press, pp. 205-232.

Lewis, H.B. (1971) *Shame and Guilt in Neurosis*. New York: International University

Press.

Lewis, M. (1992) *Shame: The Exposed Self*. New York: The Free Press.

Lex, Barbara (1979) "The Neurobiology of Ritual Trance." In *The Spectrum of Ritual* (ed. by E.G. d'Aquili, C.D. Laughlin and J. McManus). New York: Columbia University Press.

Lutz, Catherine and Geoffrey M. White (1986) "The Anthropology of Emotions." In Bernard J. Siegle, Alan R. Beals and Stephen A. Tyler, eds., *Annual Review of Anthropology*, Vol. 15. Palo Alto, CA: Annual Review Inc.

Lyon, M.L. (1995) "Missing Emotion: The Limitations of Cultural Constructionism in the Study of Emotion." *Cultural Anthropology* 10(2):244-63.

Masson, Jeffrey Moussaieff and Susan McCarthy (1995) *When Elephants Weep: The Emotional Lives of Animals*. New York: Dell Publishing.

McClelland, J.L. and D.E. Rumelhart, eds. (1986) *Parallel Distributed Processing, Vol 2: Psychological and Biological Models*. Cambridge, MA: MIT Press.

McNeley, James K. (1981) *Holy Wind in Navajo Philosophy*. Tucson, AR: University of Arizona Press.

Melzack, Ronald (1992) "Phantom Limb." *Scientific American* 266(4):120-126.

Merleau-Ponty, Maurice (1964) *The Primacy of Perception*. Evanston, IL: Northwestern

University Press.

Mesquita, B. and Frijda, N.H. (1992) "Cultural Variations in Emotions: A Review." *Psychological Bulletin* 112 (2):179-204.

Mesquita, B. and Frijda, N.H. (1997) "Culture and Emotion." in J.W. Berry, P.R. Dasen and T.S. Saraswathi (eds.), *Handbook of Cross-Cultural Psychology: Volume 2 - Basic Processes and Human Development*. Boston: Allyn and Bacon, pp. 257-297 .

Miller, N. (1969) "Learning of Visceral and Glandular Responses." *Science* 163: 439-445.

Miller, William Ian (1993) *Humiliation*. Ithaca: Cornell University Press.

Myers, G.E. (1986) *William James: His Life and Thought*. New Haven: Yale University Press

Nauta, W.J.H. (1973) "Neural Associations of the Frontal Cortex." *Acta Neurobiologiae Experimentalis* 32:125-140.

Neisser, Ulric (1976) *Cognition and Reality: Principles and Implications of Cognitive Psychology*. San Francisco: Freeman.

Ogden, C.K. and I.A. Richards (1923) *The Meaning of Meaning* (8th edition). New York: Harcourt Brace Jovanovich.

Ohman, Arne and Niels Birbaumer (1993) "Psychophysiological and Cognitive-Clinical

Perspectives on Emotion: Introduction and Overview." in *The Structure of Emotion: Psychophysiological, Cognitive and Clinical Aspects* (ed. by N. Birbaumer and A. Ohman). Seattle: Hogrefe and Huber.

Ommaya, Ayub K. (1993) "Emotion and the Evolution of Neural Complexity, Part 2." *WESScom: The Journal of the Washington Evolutionary Systems Society* 3(1):8-17.

Parkinson, B (1995) *Ideas and Realities of Emotion*. New York: Routledge

Piaget, Jean (1971) *The Biology of Knowledge*. Chicago: University of Chicago Press.

Piaget, Jean (1985) *The Equilibration of Cognitive Structures*. Chicago: The University of Chicago Press.

Piaget, Jean and B. Inhelder (1969) *The Psychology of the Child*. New York: Basic Books.

Piers, G. and Singer, M.B. (1953) *Shame and Guilt: A Psychoanalytic and a Cultural Study*. New York: W.W. Norton.

Plutchik, Robert and Henry Kellerman (1986) *Biological Foundations of Emotion*. Vol 3 of *Emotion: Theory, Research, and Experience*. New York: Academic Press.

Pribram, Karl H. (1981) "Emotions." in *Handbook of Clinical Neuropsychology*, ed. by S.K. Filskov and T.J. Boll. New York: Wiley.

Pribram, Karl H. and D. McGuinness (1975) "Arousal, Activation, and Effort in the

Control of Attention." *Psychological Review* 82:116-149.

Pugh, Judy F. (1991) "The Semantics of Pain." *Culture, Medicine and Psychiatry* 15:19-43.

Raichle, M.A. (1992) "Cortical Information Processing in the Normal Human Brain." in *Diseases of the Nervous System: Clinical Neurobiology*. ed. by A.A. Asbury, G.M. McKhan, and I.W. McDonald. New York: Saunders.

Rappaport, Roy A. (1968) *Pigs for the Ancestors*. New Haven: Yale University Press.

Rappaport, Roy A. (1979) *Ecology, Meaning, and Religion*. Richmond, CA: North Atlantic Books.

Rappaport, Roy A. (1984) *Pigs for the Ancestors* (second edition). New Haven, CT: Yale University Press.

Richmond, J.B. and S.L. Lustman (1955) "Autonomic Function in the Neonate: I. Implications for Psychosomatic Theory." *Psychosomatic Medicine* 17: 269ff.

Rubinstein, Robert A., Charles D. Laughlin and John McManus (1984) *Science As Cognitive Process*. Philadelphia: University of Pennsylvania Press

Rumelhart, D.E. and J.L. McClelland, eds. (1986) *Parallel Distributed Processing, Vol. 1: Foundations*. Cambridge, MA: MIT Press.

Russell, J.A. (1991) "Culture and the Categorization of Emotions." *Psychological*

Bulletin 110(3):426-450.

Schacter, S. and T.E. Singer (1962) "Cognitive, Social and Physiological Determinants of Emotional States." *Psychological Review* 69:379-397.

Scherer, Klaus R., ed. (1988) *Facets of Emotion: Recent Research*. Hillsdale, NJ: Lawrence Erlbaum.

Schutz, Alfred and Thomas Luckmann (1973) *The Structures of the Life-World*. Evanston, IL: Northwestern University Press.

Schutz, Alfred and Thomas Luckmann (1989) *The Structures of the Life-World: Vol. II*. Evanston, IL: Northwestern University Press.

Schwartz, G.E. and D. Shapiro (1978) *Consciousness and Self-Regulation, Vol. 2*. New York: Plenum.

Searle, John R. (1983) *Intentionality: An Essay in the Philosophy of Mind*. Cambridge: Cambridge University Press.

Selye, H. (1956) *The Stress of Life*. New York: McGraw-Hill.

Shear, Jonathan (1990) "Mystical Experience, Hermeneutics, and Rationality." *International Philosophical Quarterly*. 30(4):391-401.

Shear, Jonathan (1994) "On Mystical Experience as Support for the Perennial Philosophy." *Journal of the American Academy of Religion*. LXII(2):319-42.

Shweder, Richard A. and Robert A. LeVine, eds. (1984) *Culture Theory: Essays on Mind, Self, and Emotion*. Cambridge: Cambridge University Press.

Simons, Ronald C. (1985) "The Resolution of the Latah Paradox." in R. Simons and C. Hughes, eds., *The Culture-Bound Syndromes: Folk Illnesses of Psychiatric and Anthropological Interest*. Dordrecht: D. Reidel.

Simons, Ronald C. and Charles C. Hughes (1985) *The Culture-Bound Syndromes: Folk Illnesses of Psychiatric and Anthropological Interest*. Dordrecht: D. Reidel.

Skarda, C.A. and W.J. Freeman (1987) "How Brains Make Chaos in Order to Make Sense of the World." *Behavior and Brain Sciences* 10:161-195.

Spiegelberg, Herbert (1982) *The Phenomenological Movement: A Historical Introduction* (3rd edition). The Hague: Martinus Nijhoff.

Spiro, Melford (1984) "Some Reflections on Cultural Determinism and Relativism with Special Reference to Emotion and Reason." in R. Shweder and R. LeVine (eds.), *Culture Theory*. Cambridge: Cambridge University Press, pp. 323-346 .

Spiro, Melford (1993) "On a Feminist/Constructivist View of Emotion." Unpublished Manuscript.

Stuss, D.T. and D.F. Benson (1983) "The Emotional Concomitants of Psychosurgery." in *Neuropsychology of Human Emotion* (ed. by Kenneth M. Heilman and Paul Satz). New York: Guilford Press.

Stuss, D.T. and D.F. Benson (1986) *The Frontal Lobes*. New York: Raven.

Thomas, C.C. (1968) *Early Experience and Behavior*, Springfield, Illinois.

Tomkins, S. (1982) "Affect Theory." in *Emotion in the Human Face* (2nd edition by Paul Ekman). Cambridge: Cambridge University Press.

Turner, V. (1979) *Process, Performance and Pilgrimage*. New Delhi: Concept Publishing House.

Varela, Francisco J. (1979) *Principles of Biological Autonomy*. New York: Elsevier North Holland.

Verny, T. (1981) *The Secret Life of the Unborn Child*. New York: Dell.

Waddington, C.H. (1957) *The Strategy of the Genes*. London: George Allen and Unwin.

Webber, Mark, Christopher D. Stephens and Charles D. Laughlin (1983) "Masks: A Reexamination, or Masks? You mean they affect the brain?" in *The Power of Symbols* (ed. by N.Ross Crumrine and Margorie Halpin). Vancouver: University of British Columbia Press.

Wenger, M.A. (1941) "The Measurement of Individual Differences in Autonomic Balance." *Psychosomatic Medicine* 3: 427.

Wierzbicka, Anna (1986) "Human Emotions: Universal or Culture-Specific?" *American Anthropologist* 88:584-594.

Young-Laughlin, Judi and Charles D. Laughlin (1988) "How Masks Work, or Masks Work How?" *Journal of Ritual Studies* 2(1): 59-86.

Zborowski, M. (1952) "Cultural Components in Response to Pain." *Journal of Social Issues* 8:16-30.

---

\* Charles Laughlin is a professor of anthropology at Carleton University in Ottawa, Canada. He is co-author of a number of books, including Biogenetic Structuralism (1974) and Brain, Symbol and Experience (1990). The author wishes to thank Dr. Alexander Hinton, Professor James McNeley, Dr. Phil Summerville, Judy Barber, Tracey Spack and Johnson Dennison for their kind help in this project. Address correspondence to Department of Sociology & Anthropology, Carleton University, Ottawa, Ontario, CANADA K1S 5B6. Ph: (819) 459-1121, e:mail: claghli@ccs.carleton.ca.