Human Morality and Temperament

Jerome Kagan

Harvard University

To be presented at

Nebraska Symposium on Motivation

April 2003

Preparation of this paper was supported, in part, by a grant from the Bial Foundation.

Most human actions are motivated by two different desires: to gain sensory pleasure and to produce evidence indicating that one's behaviors, thoughts, or feelings are in accord with a representation that the agent regards as good. Few persons confuse the state that accompanies the sweetness of chocolate with the sense of virtue that follows a nurturant act toward someone in need. Further, children build sand castles and adults climb mountains because implementing actions that are guided by an idea of perfection is as clearly a biologically prepared disposition as seeking sweet tastes and avoiding pain. The pursuit, and eventual capture, of power, status, wealth, romance, and 20 year old brandy, which contemporary Western society treats as pleasures, can, on occasion, be strategies to affirm one's virtue. In societies where frugality is prized, as was true in Puritan New England, individuals hide their wealth. In contemporary America, where wealth has become a sign of virtue, one is obligated to display it. A winter holiday in the Carribean can serve as a motive to do what one ought to do as frequently as it serves the wish to avoid January blizzards. "I am doing what I should be doing" is often the silent voice behind the louder declaration, "I am doing what I enjoy". The argument that moral standards are derived from sensory pleasure and the reduction of pain cannot explain the universal fact that people become angry when they see others violate standards they believe are right. One reason why most individuals become upset when they see a stranger lie to a tourist, even their own circumstances are unaffected by the act, is that asocial behavior by a stranger violates the observer's personal ethic, leading him to question the moral correctness of his beliefs. Because these beliefs are essential to each day's decisions and conduct, their violation, even by a stranger, threatens the foundation of the observer's reason for loyalty to his ethical code.

The content of every moral standard is tied to particular times and places (Shweder et al., 1997; Edwards, 1987). Fourteenth century Europeans regarded lending money, marital infidelity, and homosexuality as cardinal sins; none is so regarded by contemporary Europeans. Four significant changes in Western ethical assumptions over the past 1000 years are captured in the four currently popular beliefs that there is no absolutely evil act independent of circumstances, all humans are of equal virtue and entitled to equal dignity, human will is weak and is expected to yield to strong temptations, and, finally, no one should be overly concerned with the evaluations others might entertain about the self -- to thine own self be true. Readers familiar with Japanese culture recognize that this last premise violates the traditional notion of omoiyari, which requires each individual to be continually sensitive to the feelings of others and never to perturb another's psyche. Contemporary Japanese adolescents report that being inconsiderate to another is a frequent source of a subjectively felt guilt (Arimitsu, 2002).

Many animal species are distinguished from their close genetic relatives by one or more distinct properties. Spiders weave webs, bees do not; snakes shed their skin, crocodiles do not; prairie voles pair bond, montane voles do not. Some of the

distinctive qualities of humans, compared with chimpanzees, are an opposable thumb and forefinger, a generative language, the ability to retrieve details of events in the distant past, to anticipate desired goals in the distant future, consciousness of self's states and properties, and an omnipresent symbolic evaluation of all events are proper or improper, which defines morality.

MEANINGS OF MORAL

It is always useful to begin with the phenomena named by an abstract word, like moral, rather than assume a unitary or consensual meaning. There are at least four meanings of the concept "moral" when the word is used as an adjective to describe a person. Although some speakers use this adjective to describe behaviors, institutions, events, cultures, laws, and even apes, the usual referent is a human agent.

One meaning refers to a person whose behaviors conform to the standards of the community, or for a young child, to those of the family. A second meaning applies to those whose intentions are to help others in need, to be fair in interactions, to perform as best as one is able, and to seek understanding of what is right. This definition is close to Kant's view. Dostoevsky was imprisoned for five years in an isolated Siberian outpost with peasant convicts who rejected him because of his middle-class origins and moral premises. Although it would have been expedient for Dostoevsky to adopt, temporarily, the values of his debauched fellow prisoners, he continued to honor the moral standards he brought to this harsh setting. Kant would have understood his inability to act in ways he believed were immoral.

A third definition applies to individuals who experience the emotions of empathy with the distress of another and shame and guilt following intentions to violate a standard or following a violation. The fourth, synthetic definition applies to persons who meet the criteria for all three of the above meanings. It is important to appreciate that a person could fit the first definition of morality but fail to fail definitions 2 and 3, fit definition 2 but not 1 and 3, or fit definition 3 and not 1 or 2.

DEVELOPMENTAL PHASES

There seems to be a universal developmental sequence for the separate components of morality.

1. The first stage in the development of a moral agent, usually observed by the first birthday, is defined by the selective suppression of actions being socialized by the family. This phenomena exploits the power of discrepant experience to alert the child. A mother who has just seen her 14 month old spill milk on the tablecloth says in a voice louder and a face sterner than usual, "Don't do that". The unexpected parental behavior creates a state of uncertainty that is assimilated to the schematic category for other hedonically unpleasant experiences, like pain, hunger, and cold. The child quickly learns that spilling food is usually followed by a similar chastisement and a feeling of uncertainty, and, as a result, inhibits such acts. It is probably impossible for any parent to raise a child without interrupting some child actions that are potentially harmful or violate a family standard.

The child's schematic representations for the prohibited actions, always associated with a context, the parental disciplinary reaction, and the feeling of uncertainty become linked to create a conditioned reaction of uncertainty whenever the child is in a situation that has been associated with parental discipline. This first phase of moral development can be likened to a state of a puppy who has been trained to lie down to a command.

2. The next phase, usually observed by the end of the second year, is marked by the anticipatory display of facial expressions or bodily postures implying uncertainty in contexts where no punishments for violations have occurred in the past, suggesting the child possesses a schematic concept for prohibited actions. Most 3 year olds hesitate, or do not perform at all, if a parent or examiner asks them to display a response that would violate a family norm; for example, to pour cranberry juice on a clean tablecloth or to scribble with crayon on a clean page of a new book, even though the child had never displayed these behaviors and, therefore, had not been punished (Kagan, 1981). The refusal implies that the child possesses a concept of "prohibited actions" that includes novel behaviors that have not been prohibited in the past.

This category is applied to objects whose integrity has been flawed. For example, 2 year olds will point to a small hole in a shirt, a missing button, or an ink spot on a chair and, with a serious tone of voice, say, "boo-boo", indicating they regard the flaw as improper. When 14 and 19 month old chilren were brought to a laboratory playroom that contained many toys, some of which were purposely torn or flawed, not one of the younger children, but over one-half of the older ones showed obvious preoccupation with the damaged toy. They would bring the flawed toy to the mother, point to the damaged part, and if they had language, indicate that something was wrong by saying "fix" or "yukky". The recognition of a flaw implies that the child has an initial notion of the proper form or state for an event. I once observed a 2 year old girl who was upset because she was holding a small doll and a large toy bed and could not find a small bed that was more appropriate for the small doll. This girl possessed a schema for the most appropriate bed for the doll.

3. A state of empathy with a person or animal in distress is also observed at the end of the second year (Zahn-Waxler et al., 1979; Lamb, 1988). Empathy requires the ability to infer the thoughts and/or feelings of another. Two year olds are capable of inference, for by the middle of the second year they will infer that a nonsense word -- "zoob", for example -- might be the name of an unfamiliar object and their speech behavior implies an ability to infer the private feeling states of others. Two year olds have experienced the unpleasant state that follows criticism, aggression, teasing, and can infer these psychological states in others. As a result, children now restrain behaviors that harm another. This restraint will be acquired even if the child had never been aggressive and aggressive actions had never been punished.

The capacity for inference also explains why children will refuse to attempt tasks that are too difficult to master. When an examiner modeled three coherent actions with props and then said, "It is your turn to play", many 2 year olds cried because they inferred that the adult wanted them to imitate the same acts and they sensed their inability to do so (Kagan, 1981). The distress implies that the child inferred that failure to perform correctly would evoke adult disapproval. This inference requires some comprehension of the meaning of ought and a category of improper actions.

Parents from diverse cultures recognize that before the third birthday children are aware of standards on prohibited behavior. The Utku Eskimo of Hudson Bay call this awareness ihuma (translated as reason); the Fijians call it vakayalo (a sense of what is proper) (Kagan, 1984).

It is relatively easy to explain how children learn that destroying property is prohibited, but harder to explain how they learn that kindness to others is appropriate, because young children do not often display kindness often and, therefore, cannot receive consistent praise for such behavior. It is likely that children create these ideals from semantically based generalizations for particular acts of kindness, as well as from semantic antonyms for the undesirable states. There is no schema that represents the opposite of an act of cruelty, but kind is the antonym of cruel.

4. Signs of a feeling of shame following a violation of a standard can be

observed by the end of the second year, but more often during the third year (Lewis, 1992). Shame requires not only an inference of another's thoughts -- another person is entertaining critical evaluation of the self -- but also an initial awareness of self. One sign of self-awareness is recognizing one's reflection in the mirror; another is manipulating the behavior of others, and a third is verbal reference to self in productive speech (Kagan, 1981; Lewis & Brooks-Gunn, 1979).

5. The next phase of moral development, which usually occurs in the third year, involves the acquisition and application of the semantic concepts good and bad to objects, events, actions, people, and self. Although G. E. Moore (1903) argued that the meanings of good and bad are given intuitively and cannot be defined objectively, most citizens and philosophers are unhappy with this degree of permissiveness and have tried to defend a definition on rational grounds. I suggest that the semantic term "good" is applied to four related, but, nonetheless, distinct, states. Good refers: (1) receipt of praise or affection; (2) the avoidance of punishment and feelings of shame or guilt, (3) semantic consistency between an action and a standard, and (4) sensory delight. By contrast, receipt of criticism, anticipation of punishment, semantic inconsistency between actions and standards, and sensory displeasure belong to the semantic

category "bad".

It is important to ask whether the different brain states evoked by the events called good (or bad) share any feature, or features, that might represent a unitary visceral schema or brain state. Although, theoretically, it is possible that a particular circuit is activated whenever the semantic network for good (or bad) is provoked (and, therefore, that a common visceral schema is activated), it is just as likely that there is no common brain state and that the only shared feature is the semantic term.

Children now assume that some intentions, actions, and persons are good or bad because they are part of the semantic network for the concept. Children oscillate with respect to their membership in the categories good and bad, depending upon what has happened in the past few hours or days.

A mother in one of our studies found her 3 year old boy pinching himself with force. To her request for a reason for the self-inflicted pain, the boy replied, "I don't like myself". This boy was aggressive with children in the neighborhood and was aware that both children and their parents disapproved of him. Many parents have noted that their 4 year old children deliberately misbehave in order to be punished and then often ask their parents, "Do you love me"? One 4 year old girl who told her mother she had done something naughty explained that she had a dream in which her infant brother had died after being stung by a bee.

A very small number of children eventually settle on one category for the self. Chronic sexual abuse can persuade a child that she is unredeemably bad. Some of these unfortunate children feel minimal levels of shame or guilt when they violate a community standard, even though they know that the action was bad. A very small proportion become unusually aggressive. Mary Bell, an 11 year old British girl who murdered two preschool boys, had been sexually abused at an early age by her mother's male clients and was aware of her father's criminal career (Sereny, 1998). This girl's categorization of self as bad made it easier for her to murder without the passion of anger or the desire for material gain. Fortunately, most children are uncertain about their virtue and dread the onset of shame or guilt.

6. The next phase, usually observed by 3 to 6 years of age, is characterized by feelings of guilt following an action that violates a personal standard (Kochanska et al. 2002). Guilt differs from shame because it requires the child to be able to relate past to present and to appreciate that an action by self that harmed another could have been suppressed .

Integration of past with present is usually observed by the fourth birthday. One study affirms this claim. An examiner presented a coherent narrative in three separate parts on three separate days to groups of 3 and 4 year old children. On the first day, the examiner showed the child a puppet called Clem and said that Clem liked to eat frogs, and presented the child a bright orange toy frog. On the second day, the examiner led the child to a corner of the room containing a small toy house with three locked doors. The experimenter showed the child how to use a red key to open the door in the house in order to find the orange frog seen on the previous day. On the third day, the examiner led the child to a different part of the room where they found a set of three keys, one of which was the red key used to unlock the door the previous day. Five days later, the examiner returned, produced the puppet and said, "Clem is hungry. Can you give Clem something to eat?" Two-thirds of the 4 year olds, but only one-fourth of the 3 year olds went immediately to the house that contained the frog. Apparently, the 4 year olds retrieved their memory of the events that occurred in the second day and integrated it with the present situation; the 3 year olds were less likely to do so. However, if the entire narrative was presented within the same session, with no delays, 3 year olds performed as well as 4 year old children (Loken, Leichtman, & Kagan, unpublished).

The automatic habit of relating the present moment to representations of the past motivates the child to wonder about causal connections between events.

A seminal feature of the interval between 3 and 6 years is the disposition to assume causal connections. Thus, when children harm a person or damage property they relate that outcome to a prior intention, or a clumsy or impulsive posture. They are vulnerable to a feeling of remorse because they realize they could have suppressed the behavior that violated the standard.

In addition, preschool children feel guilt if they behave in ways that are inconsistent with their social category. Children acquire social categories for self, always gender and age, and often religion and ethnicity. As adults, they will add the categories of social class, nationality, vocation, spouse, parent, and friend. Each has a set of obligatory actions appropriate for the category. Boys know they should not wear girls' clothes, even though some boys had never done so and, therefore, had never been punished for such behavior. The relative salience of each category in controlling behavior depends on the local context. The category for gender, for example, is ascendant on the playground; the category for religion is ascendant at a church service.

If the child believes a category is appropriate for self and, in addition, experiences vicarious affect when a member of that category has an emotional experience, the child is regarded as identified with the person or category. However, a child need not be identified with every category he believes is appropriate for him.

Children feel obligated to maintain semantic consistency between the features of each category to which self belongs and the evaluation of self's actions relevant to that category. If the interpretation of a behavior generates inconsistency with the features of the category, uncertainty may occur. Social psychologists might say that all individuals try to avoid the dissonance created by cognitive inconsistency between beliefs. Thus, moral behaviors are maintained not only by worry over possible punishment or the anticipation of shame, but also by this novel source of uncertainty.

7. The process described above is extended, over the next half dozen years, to the beliefs, feelings, thoughts, and intentions that are features of a social category. That is, youth experience uncertainty following detection of a semantic inconsistency between the network of features that defines a social category to which self belongs and the network of features that define self's beliefs, feelings, thoughts, and intentions. Thus, the comparison at ages 10 to 12 years is between sets of symbolic representations, rather than between a representation of the category and a behavior; the latter is more characteristic of the younger child. This extension is made possible by the talents Piaget called formal operations. Adolescents, but not 8 year olds, are capable of understanding inconsistencies

among propositions that refer to hypothetical events. The detection of an inconsistency can be accompanied by guilt. For example, the recognition of an inconsistency between self's desire to be a good person and disloyal thoughts toward a friend (for example, I hope my friend fails the examination) can elicit a moment of guilt.

The obligations linked to semantic representations of social categories warrant some additional discussion because it is not clear why children, youth, and adults initially regard these categories as possessing moral force, and why many of these categories have lost some of their moral power over the last half century.

I believe that two different sources contribute to the moral suasion of these categories. The young child's initial words are for real objects and events with fixed features (for example, "milk", "dog", "ball", and "fall"). Almost all objects called dogs should bark and have fur. If not, they are less than ideal dogs.

Thus when children learn the names for social categories -- "boy", "girl", "friend", "Catholic", "Hispanic" -- they are prepared to believe that these words, too, name unchanging psychological characteristics belonging to those who are members of those categories. Boys, for example, should be brave, control signs of fear, and defend against being dominated. Children believe they "ought" to be loyal to the psychological features that define the categories to which they belong, and will experience as much dissonance if they stray from these obligation as they would if they saw an animal without fur who never barked but was called a dog. This cognitive contribution to morality resembles, but is not identical to, the philosophical position that claims that reason is the foundation of conscience.

A second reason for the moral influence of social categories is that membership in some categories can enhance the individual's feeling of virtue. Eighteenth century Puritan New Englanders felt more virtuous than the native Indians. Many residents of Boston in the 1830s were proud of their municipal category because Americans regarded this city as the hub of the young nation. With the exception of New England Patriot fans in January of 2001, far fewer current Boston residents feel virtuous because they live in this place. More boys in contemporary Latin America, compared with American boys, derive virtue from their gender category because parents and teachers communicate an asymmetry of privilege to the sexes. Very few American mothers would say to their daughter, "Pick the glass up for your brother"; such a requests are common in many South American homes.

Thus, two different psychological processes motivate children and adolescents to be loyal to the ethical requirements that are linked to their social category: the conviction that the category is a real entity whose properties should be preserved and the sense of enhanced virtue that can accompany category membership.

Some of these social categories have lost a great deal of their moral power but for different reasons. First, the media broadly disseminate the fact that some individuals violate the obligations of their categories. Semantic categories, which are often coordinated with schemata, vary in the degree of variation among the features of the events that are members of the categories. Hammers and spoons have little variety in their features compared to flowers and dogs. The categories female and child have less variety than executive and athlete.

The less varied the category the stronger the imperative to be loyal to its properties and associated ethical restraints. Americans are informed regularly that a small proportion of mothers abandon their children, fathers abandon their families, teachers and doctors go on strike, scientists fabricate evidence, workers call in sick, corporate executives lie, priests abuse young boys, and 60 year olds wearing sneakers and blue jeans divorce their wives of 30 years to marry 25 year old women. The broad advertisement of these category violations dilute their coherence and psychological power. A serious change in the understanding of the category "bird" would occur if there were suddenly an increase in the number of birds that neither sang nor . . . flew.

The erosion of the ethical obligations attached to a category motivates individuals to look elsewhere for guidance for action. Humans require a reason for choosing one goal over another. The criterion being used by increasing numbers is the enhancement of self's pleasures, power, and status. It took only five centuries for western Europeans to replace spirituality as the goal of life, first with rationality, and later with sensual delight. Although Adam Smith urged self interest 250 years ago, a careful reading of his writings reveals that he expected all persons to want the approval of others and that assumption guaranteed civility and conformity to social norms. He could not have anticipated that many persons in this century would disregard the attitudes of neighbors or treat them as constraining their behavior in any way. Too many modern citizens would smile upon learning that Francis Hutcheson, the eminent 18th century philosopher, was certain that humans experienced the greatest happiness when they were kind to others.

Second, many categories have lost their ability to transfer enhanced virtue to their members. For example, modern husbands are supposed to accommodate to the desires of their wives and share in all family responsibilities; Christians should acknowledge the sacred spirituality inherent in all of the religions. As a result, the categories "husband" and "Christian" have become less potent sources of virtue for their members. Our society's desire to honor a commitment to an egalitarian ethos, which we celebrate, requires denial of special privilege to categories that, two centuries earlier, were sources of virtue. Nineteenth century white, Christian males whose parents and grandparents were born in America could reassure the self of its goodness simply because they were members of this category. The rebellion against this private self satisfaction, which accelerated in the 1960s, denied this symbolic prize to any social category. Every American must attain virtue through personal accomplishments. The hostility to elite categories, which is a property of egalitarian societies, dilutes the moral privilege that some extract from their social categories. The clash between the mother and the daughter over the father's pompous arrogance in Eugene O'Neill's play, "Touch of the Poet" contrasts the strength the wife took from her husband's illusion of importance with the daughter's recognition that he was a fraud.

One inevitable consequence of the weakening of a person's social categories as a basis for deciding how to behave,and whether one is living life properly, is an increased reliance on self's feelings as the only criterion for selecting a behavior to display or a goal to seek. The culture cooperates by reminding everyone of Jefferson's declaration that seeking happiness is life's assignment and, by implication, a moral obligation. The ascendance of this imperative required some tainting of the social categories.

Because the accumulation of wealth, which usually requires individual effort and talent, seems to be a possibility for most citizens, while gaining admission to an elite college or the opportunity to study the cello seems easier for particular class groups, gaining material signs of wealth has become a primary index of virtue in contemporary America. No goal as glittering as true equality of dignity can be had without a price.

8. Finally, children between 5 and 10 years gradually acquire an understanding of the concepts of fairness and justice. Obvious examples include the belief that the severity of punishment should match the seriousness of the crime; the amount of praise should match the quality or benevolence of the act; and the difficulty of a task assigment should match the competence of the person. The concept of fairness might have a partial origin in the more basic notion of "appropriate for the situation". The latter could have an origin in the frequent instances in which the child must adjust his actions to fit a situation. For example, children have learned they should speak louder in a noisy environment; exert greater muscle force if an object is heavy; and adjust their effort to fit the difficulty of the task.

These eight features of morality emerge from different developmental functions, including (1) conditioning, (2) capacity for inference, (3) integration of past with present, (4) self-awareness, (5) creation of semantic categories for social roles, (6) Piagetian reversibility, (7) detection of inconsistency among semantic networks and, finally, (8) acquiring concepts of the ideal and fairness. The concept of "morality", therefore, is not a unitary human characteristic.

Conventional vs. Moral Standards. The popular distinction between conventional and moral standards captures an important difference in the psychological profile activated in a moral context. Violation of a conventional standard is less likely to be accompanied by guilt because the individual believes that, had society not disapproved of the particular behavior, its display would automatically lose membership in the category "bad". Two obvious examples for Americans are wearing a hat at the dinner table and eating with one's fingers.

By contrast, most children believe that unprovoked aggression to another, deceiving a close friend, and failure to care for a sick relative who needs help are binding and not arbitrary imperatives. Therefore, their violation usually creates guilt, even if adults in authority positions proclaimed that such behaviors were permissable. Historical events can change a conventional standard to a moral one, as well as the reverse. Most White American college students in 1902 regarded the suppression of insulting racial comments as a conventional ethical standard. Large numbers of contemporary American students regard suppression of bigotry as morally binding. A majority of Americans in 1902 regarded a wife's adulterous affair as a violation of a moral standard; this behavior has become conventional among many contemporary adults.

A study of adults undergoing fMRI brain scanning while responding to a variety of moral dilemmas that required an agent to act in a way that would harm one person directly, even though the act saved many others, revealed the link between emotions and violations of moral standards. These dilemmas produced greater cerebral blood flow in the medial frontal and posterior cingulate gyrus -- two areas that mediate emotion -- than dilemmas in which an agent's behavior did not harm any person directly, even though one victim was harmed and many were saved (Greene et al., 2001). It appears that most subjects had a more intense emotional reaction when an agent harmed one person directly in order to save others (for example, the agent pushed a person in front of a train) than when the agent's action did not harm anyone directly but led to the same outcome.

<u>Temperament</u>

There is, of course, individual variation in each of the properties that describe a moral agent. Some children acquire a conditioned state of uncertainty more easily than others; some have richer inferences of other's states; some have more elaborated semantic networks; and some experience more frequent feelings of shame, guilt, or uncertainty. The research of Kochanska and her colleagues reveals that infants who show restraint to a maternal request are more compliant in the second year (Kochanska et al., 1998), and fearful toddlers show greater signs of conscience at 4 and 5 years than fearless ones (Kochanska, 1997; see, also, Kochanska et al., 2001, 2002). Work in my laboratory on temperamental biases in children is also relevant.

Although most children are capable of feeling uncertainty, fear, anxiety, shame, empathy, and guilt there are individual differences in the frequency and intensity of each of these moral emotions. Some portion of this variation is attributable to the child's temperament, where temperament refers to heritable variation in profiles of behavior and mood that emerge early in development (Fowles & Kochanska, 2000; Kochanska, 1997). Kochanksa and colleagues (2002) observed a group of middle-class children from 22 to 56 months of age. The measures of interest were the children's reactions when they unintentionally damaged property in the laboratory. The children who had been more timid and fearful in a special setting designed to measure fearfulness were most likely to show signs of concern after damaging property.

Infants differ on a number of behavioral characteristics; the most obvious are motor activity, irritability, ease of regulating distress, smiling and laughter, and the intensity of a fear reaction to an unfamiliar event. When variation in any of these characteristics is the partial result of inherited biological processes, rather than only experience, the disposition is called temperamental.

Scientific studies of human temperaments are in an early stage; hence, we do not know the causes of these many biases. I believe that many, but not all, temperamental categories are the result of heritable variation in the concentration of the more than 150 molecules that affect brain function and/or the density and location of their receptors. This fact implies the possibility of many temperaments, for there is a large number of possible neurochemical patterns. Some candidates that could mediate temperamental types include variation in norepinephrine, corticotropin releasing hormone, GABA, dopamine, serotonin, and opioids, and their receptors. Consider an example. Gaba-ergic and serotonergic circuits are usually inhibitory. Hence, infants born with a compromise in either of these circuits should be less able to modulate extreme states of excitation. This hypothesis has some support. The promoter region for the serotonin transporter gene has many alleles and unusually irritable 2 month olds differ from relaxed, less irritable ones in one of these alleles. In addition, Japanese and European populations differ in the frequency of this allele and

Japanese infants are far less irritable than European-Caucasian infants.

Two temperamental categories studied most extensively refer to young children's typical reactions to unfamiliar events or situations, whether emotional restraint, caution, and avoidance, on the one hand, or spontaneity and a tendency to approach, on the other. There are two reasons for the interest in these two temperamental types. First, the behaviors that define each are easily quantified. Second, apparently similar variation has been observed within every vertebrate species studied. Intraspecific variation in the tendency to approach or to avoid unfamiliar events or places has been documented in mice, rats, wolves, dogs, cats, cows, monkeys, birds, and fish.

Children who are unusually shy, timid, or avoidant with unfamiliar people, objects, and situations, because of an inherited temperamental bias, are called inhibited. Children who are sociable and approach unfamiliar people and situations because of their temperament are called uninhibited. An estimate of the heritability of inhibited and uninhibited profiles, based on a large sample of monozygotic and dizygotic twins, approached 0.5.

We believe that the variation in the excitability of the amygdala, due to neurochemistry, makes a contribution to these two temperaments for a primary function of the amygdala is responsiveness to unexpected or discrepant events, whether or not they are threatening.

High and Low Reactive Infants

My colleagues and I have been studying infant predictors of the behavioral profiles of inhibited and uninhibited children that emerge in the second year. These two categories can be predicted from variation in motor activity and distress to unfamiliar stimuli in 4 month olds. Because the amygdala is activated by unfamiliar events, and is the origin of the projections to structures that potentiate both motor activity and crying, infants born with a neurochemistry that renders the amygdala excitable to unfamiliarity, should show higher levels of activity and crying to unfamiliar stimuli (See Figure 1). These infants are biased to become inhibited toddlers. Infants born with a different neurochemistry that raises the threshold of the amygdala to unfamiliar events should show minimal activity and little distress to the same stimuli and become uninhibited children. This hypothesis is supported by the fact that newborns who showed an increased rate of sucking when the liquid they were receiving through a nipple unexpectedly turned sweet became the most inhibited toddlers two years later (LaGasse et al. 1989). The unexpected change in taste sensation would excite the amygdala; therefore, the infants who showed the large increase in rate of sucking probably had a lower threshold of excitability in this structure.

We studied a group of 500 healthy Caucasian children born at term to middle-class families who were first observed when the infants were 4 months old. Each infant was classified into 1 of 4 temperamental groups based on their behavior to a battery of unfamiliar visual, auditory, and olfactory stimuli. Infants who showed a combination of frequent vigorous motor activity and crying were classified as high reactive (22 percent of the sample). Infants who showed an opposite profile of infrequent motor activity and infrequent crying were classified as low reactive (40 percent of the group). Infants who showed low motor activity but a great deal of crying were classified as distresssed (25 percent). Infants who showed frequent motor activity but did not cry were classified as aroused (10 percent).

The behavioral reactions of these four groups to unfamiliar people and situations were evaluated on two occasions in the second year. The 14 and 21 month olds who had been categorized as high reactive when they were 4 months old were more likely than other children but especially more likely than low reactives to display high levels of fear to these unfamiliar events (See Figure 2). The children were observed again at 4 1/2 years in a play session with two unfamiliar children of the same sex and age while the three mothers sat on a couch in a playroom. Each child was classified as either inhibited, uninhibited, or neither based on their behavior with the children and their reactions to unfamiliar events that occurred after the play session. The data revealed that many more high than low reactives were inhibited in this setting.

The presence of anxious symptoms, especially extreme shyness, worry about the future, storms, animals, or loud noises, nightmares, and occasional reluctance to go to school were evaluated when the children were 7 1/2 years old. About one-quarter of the entire sample possessed one or more of these anxious symptoms. However, 45 percent of the high reactives, but only 15 percent of low reactives, possessed anxious symptoms (See Figure 3).

These children were evaluated when they were 11 years old with a battery assessing both behavioral and biological variables. Four classes of biological variables, each potentially under the influence of the amygdala, were measured. These variables were (1) asymmetry in the magnitude of desynchronization of alpha frequencies in the EEG; (2) magnitude of the evoked potential from the inferior colliculus to a series of clicks; (3) sympathetic tone in the cardiovascular system; (4) magnitude of a negative waveform in the event-related potential between 400 and 1000 msec. to discrepant visual scenes.

Children who had been high reactive infants should show greater EEG activation in the right, compared with the left, hemisphere because states of uncertainty, often due to greater visceral feedback, are usually associated with greater activity in the right amygdala. The ipsilateral projections from the amygdala to the cortex should lead, in turn, to greater loss of alpha power on the right side and, therefore, right, rather than left, hemisphere activation.

High reactives should show a larger brain stem evoked potential from the inferior colliculus -- called Wave 5 -- because the amygdala primes the inferior colliculus via the locus ceruleus and the central gray. Hence, a more excitable amygdala should be accompanied by a larger Wave 5.

High reactives should show greater sympathetic tone in the cardiovascular system because amygdalar activity enhances sympathetic tone in the heart and circulatory vessels. Finally, high reactives should show a larger event-related potential to discrepant visual scenes because the amygdala, which is responsive to discrepant events, projects to the locus cereleus and the ventral tegmentum. These brain stem structures send axons to the cortex to enhance synchronization of pyramidal neurons and, as a consequence, produce a larger waveform.

All four predictions were affirmed. The high reactives were more likely than low reactives to show right parietal activation in the EEG, a larger evoked potential from the inferior colliculus, greater sympathetic tone in the cardiovascular system, and a larger EEG waveform between 400 and 1000 msec.

to discrepant visual scenes (See Figure 4). In addition, twice as many high as low reactives were extremely shy and emotionally subdued as they interacted with the examiner in the laboratory setting (See Figure 5).

About one in four 11 year olds who had been high reactive infants, and 1 in 4 1 in 4 who had been low reactive infants, developed a behavioral and biological profile in accord with theoretical expectations for their temperament. By contrast, only 1 in 20 infants developed a profile of behavior and biology at age 11 that violated expectations.

Relation of Morality to Temperament

The children who had been high reactive infants should be more vulnerable than others to bouts of guilt because of greater sympathetic activity and, therefore, greater visceral feedback to the amygdala and the ventromedial prefrontal cortex. However, a verbal report of guilt can occur with or without an appropriate change in physiology at the time of the violation. That is, some children might say they feel guilty, but this confession might not be correlated with a temperamental vulnerability or accompanied by a physiological reaction at the time the moral failure occurred.

The 11 year old children were asked in their home setting to rank 20 items descriptive of their personality from most to least characteristic of self. One item was, "I feel bad if one of my parents says that I did something wrong". There was no difference between high and low reactives in the mean rank assigned this item (mean rank was 10). However, the high reactives who ranked this item as characteristic of self (a rank less than 10) showed more indirect signs of amygdalar reactivity than the low reactives who ranked the item as equally characteristic of self. High reactives who placed this item in ranks 1-9 (48% of the group) had a mean standard score greater than .00 across 7 biological variables that reflected cortical and autonomic arousal (these 7 variables included Wave 5, ERP waveform to discrepant scenes, right hemisphere activation, and sympathetic arousal). The low reactives who admitted to equally frequent feelings of guilt (41%) had a mean standard score less than .00 (only 17% of this group of low reactives had a mean standard score greater than .00; chi square (1) = 18.7, $p < .001$).

The fact that only high reactives who admitted feeling bad following criticism showed signs of cortical and autonomic reactivity suggests, but does not prove, that these children are especially vulnerable to bouts of guilt. Most children can be socialized to feel shame or guilt following violation of a standard, but a small proportion are especially vulnerable to these emotions because of their temperament.

There was a significant positive correlation among high reactive girls between the rank assigned to the guilt item, on the one hand, and an index of high sympathetic tone in the cardiovascular system ($r = .38, p < .05$), and the mean standard score across the 7 biological variables, on the other ($r = .42, p < .01$). This result implies that high reactive girls who admit to more frequent bouts of guilt possessed a more reactive sympathetic nervous system..

The mothers were asked to rank 28 statements describing their child from most to least characteristic of their son or daughter. One item referred to the child's behavior when chastised: "Is sensitive to punishment". The high and low reactive girls, but not boys, differed in the rank given this item. Seventy-three percent of high reactive, but only 58 percent of low reactive, girls were given ranks below the median value of 12, indicating that mothers of high reactive girls perceived them as sensitive to criticism. Of greater interest is the fact that the high reactive girls described as sensitive to punishment showed greater right parietal activation than high reactive girls who were less sensitive ($t(28) = 4.92, p <.05$). Right parietal activation was the one biological variable that best differentiated high from low reactive girls.

The high reactive boys described as sensitive to punishment had significantly larger Wave 5 values than high reactive boys described as less sensitive ($t(26) = 2.28$, $p < .05$), and Wave 5 best separated high from low reactive boys. Thus, the biological variables that most effectively distinguished between high and low reactives (for each sex) were precisely the measures that differentiated the high reactives described as sensitive to chastisement from those who were less sensitive. Summary

This paper has tried to make two points. First, the concept of morality refers to a developmental cascade of phenomena whose essential features are: (a) inhibition of punished acts; (b) a representation of prohibited actions, (c) the emotions of uncertainty, empathy, shame, and guilt, (d) the semantic concepts of good and bad, (e) accepting the moral obligations of social categories and (f) the concepts of fairness and the ideal.

The inhibition of prohibited actions and the cognitive representation of prohibited behaviors, as well as the affect states that follow violations, appear by the end of the second year of life. The concepts of good and bad appear early in the third year, the experience of guilt and awareness of the categories appear by 4 to 6 years. The notions of fairness and the ideal mature during the school years.

Second, some of the variation in the intensity and frequency of the moral emotions are attributable to the child's temperament. Eleven year old children who had been high reactive infants and admitted to feelings of guilt when they violated a family standard were cortically and autonomically more aroused than the low reactives who reported equally frequent experiences of guilt. Further, high reactives who were perceived by their mother as highly sensitive to punishment were biologically more aroused than high reactives perceived as less sensitive. Both universal developmental phenomena tied to brain maturation, as well as temperamental variation associated with neurochemistry, contribute to the complex phenomena that comprise the moral domain.

Kant believed that people acted morally because acceptance of the categorical imperative required proper behavior -- reason was the guardian of social harmony. Peirce and Dewey, by contrast, argued that anticipation of the emotions of anxiety, shame, or guilt motivated loyalty to the community's ethical standards. The tension between these two positions is seen in modern industrialized societies where the balance between the feeling of virtue that follows enhancing another and the pleasure that follows the enhancing of self has shifted toward favoring the latter state. Increasing numbers of Americans do not regard their gender, vocation, place of residence, social class, or religion as distinctive sources of virtue. As a result, they are freed from the moral obligations that had been attached to these categories in the past, and use only the anticipation of sensory delight and ego enhancement as guides for action and sources of reassurance that they are managing their lives properly.

Although it is likely that future scientists will synthesize a drug that blocks feelings of guilt without affecting the knowledge that an act is wrong, it is less certain that broad use of this drug would eliminate loyalty to the mutual obligations that make a society habitable. Nonetheless, a posture of vigilance is appropriate, for humans, unlike gorillas, can hold representations of envy, hostility, and anger, even toward those they have never met, for a very long time. Therefore, empathy and the anticipation of guilt or shame may restrain rudeness, dishonesty, and aggression when reason fails.

References

Arimitsu, K. (2002). Structure of guilt eliciting situations in Japanese adolescents. The Japanese Journal of Psychology 77:148-156.

Edwards, C. P. (1987). Culture and the construction of moral values. In J. Kagan & S. Lamb (Eds.). The Emergence of Morality in Young Children. Chicago:University of Chicago Press, pp. 123-151.

Fowles, D. C. & Kochanska, G. (2000). Temperament as a moderator of pathways to conscience in children: Psychophysiology 37:788-795.

Greene, J. D., Sommerville, R. B., Nystrom, L. E., Darley, J. M., & Cohen, J. D. (2001). An fMRI investigation of emotional engagement in moral judgment. Science 293:2105-2108.

Kagan, J. (1981). The Second Year. Cambridge, MA: Harvard University Press.

Kagan, J. (1984). The Nature of the Child. New York: Basic Books.

Kochanska, G. (1997). Multiple pathways to conscience for children with different temperaments. Developmental Psychology 33:228-240.

Kochanska, G., Tjebkes, T. L., Forman, D. R. (1998). Children's emerging regulation of conduct. Child Development 69:1378-1389.

Kochanska, G., Coy, K. C., Murray, K. T. (2001). The development of self-regulation in the first four years of life. Child Development 72:1091-1111.

Kochanska, G., Gross, J. N., Lin, M, Nichols, K. E. (2002). Guilt in young children. Child Development 73:461-482.

Lamb, S. (1988). The emergence of moral concern in the second year of life. Unpublished doctoral dissertation. Harvard Graduate School of Education.

LaGasse, L. Gruber, C., & Lipsitt, L. P. (1989). The infantile expression of avidity in relation to later assessment. In J. S. Reznick, Perspectives on Behavioral Inhibition. Chicago: University of Chicago Press, pp. 159-176.

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

Lewis, M., Brooks-Gunn, J. (1979). Social Cognition and the Acquisition of Self. New York: Plenum.

Loken, E., Leichtman, M., & Kagan, J. (unpublished manuscript).

Moore, G. E. (1903). Principia Ethica. Cambridge: Cambridge University Press.

Sereny, G. (1998). Cries Unheard. New York: Holt.

Schweder, R. A., Much, N. A., Mahaptra, M., & Park, L. (1997). The big three of morality (autonomy, community, and divinity) and the big three examples of suffering. In J. A. Brandt & P. Rozin (Eds). Mortality and Health. New York: Routledge & Kegan Paul (1997).

Zahn-Waxler, C., Radke-Yarrow, M. & King, R. A. (1979). Child rearing and children's prosocial intentions toward victims of distress. Child Development 50:309-330.

Figure Captions

1. Projections to and from the amygdala.

2. Fear at 14 and 21 months for high and low reactive infants.

3. Percent of high and low reactives with anxious symptoms at 7 1/2 years of age.

4. Mean standard score for right parietal activation, Wave 5, sympathetic tone, and magnitude of the event-related potential to discrepant scenes.

5. Percent of high and low reactives who were uninhibited or inhibited with the examiner at 11 years of age.

Figure 1

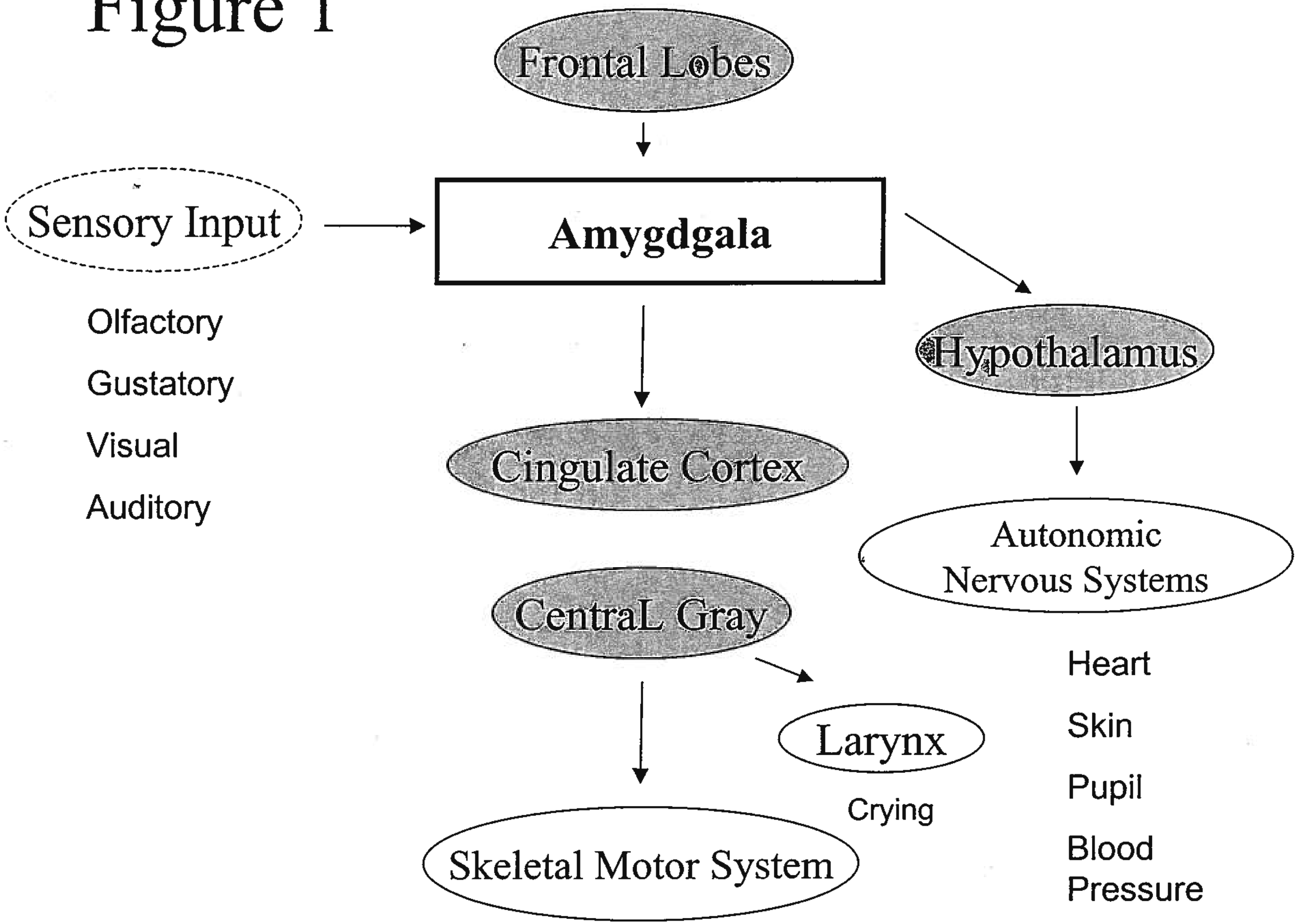
Frontal Lobes
Sensory Input
Amygdgala
Olfactory
Gustatory
Visual
Auditory
Hypothalamus
Cingulate Cortex
Autonomic
Nervous Systems
CentraL Gray
Heart
Skin
Pupil
Blood
Pressure
Larynx
Crying
Skeletal Motor System

Figure 2

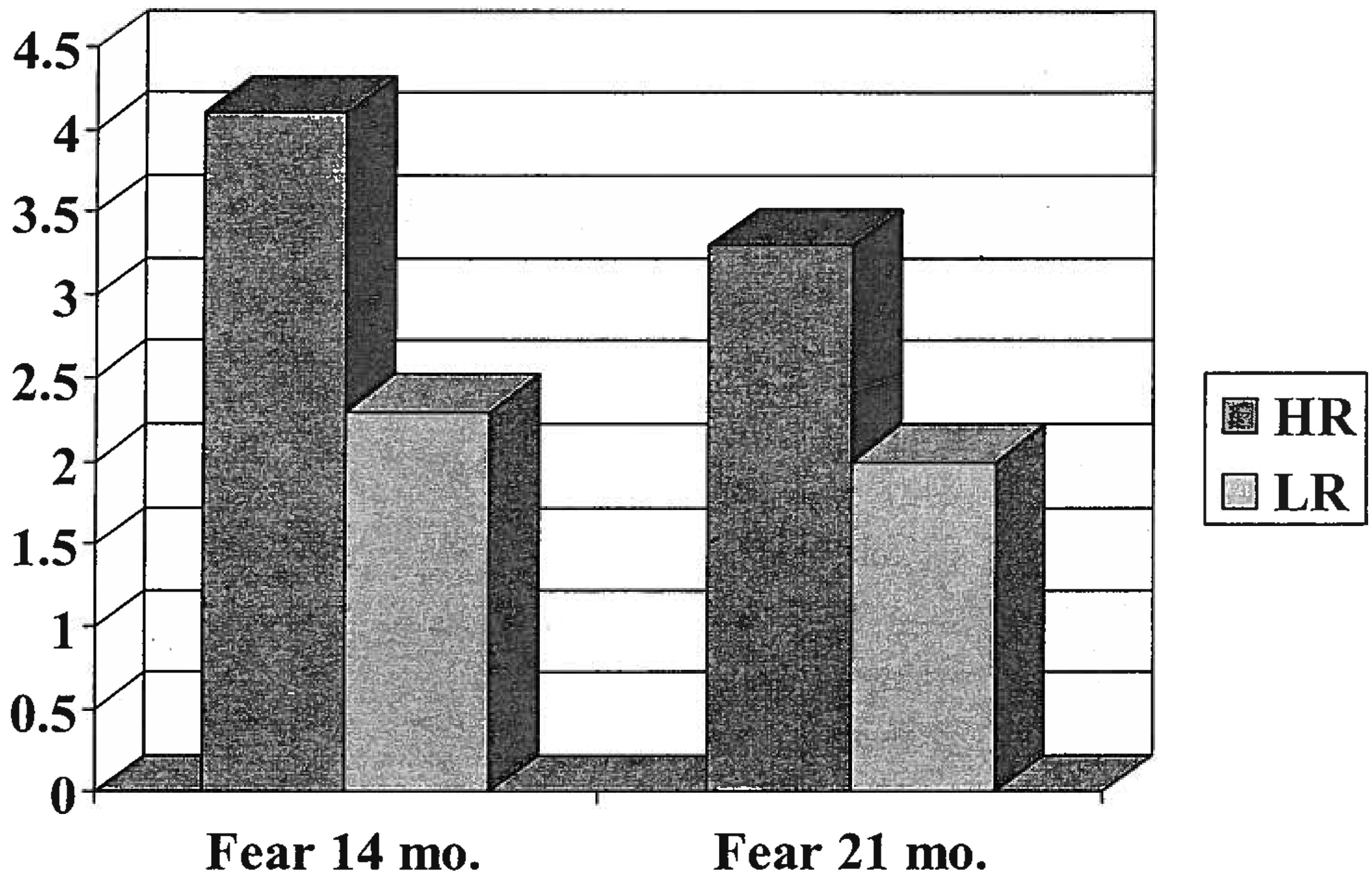

Figure 3

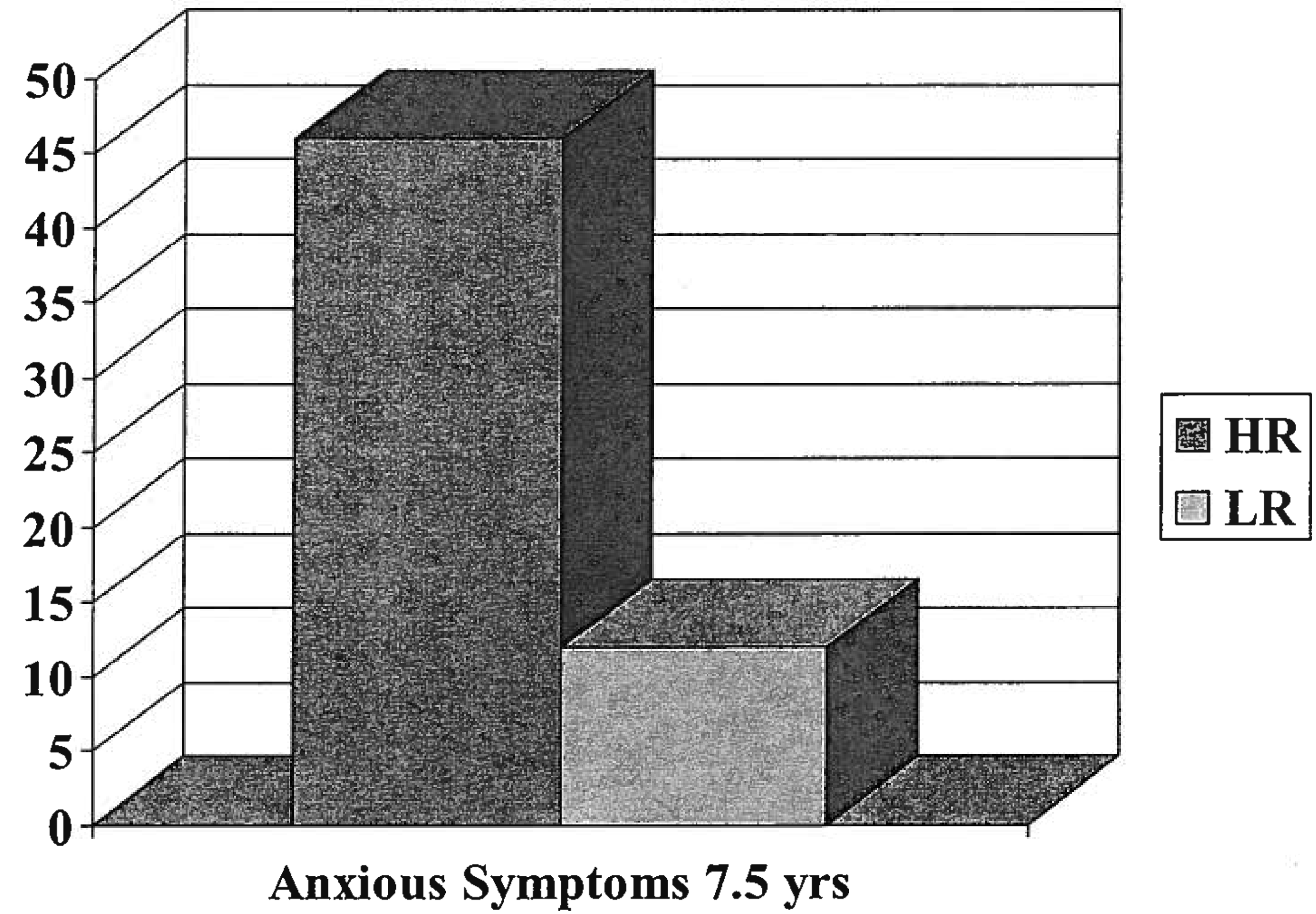

Figure 4

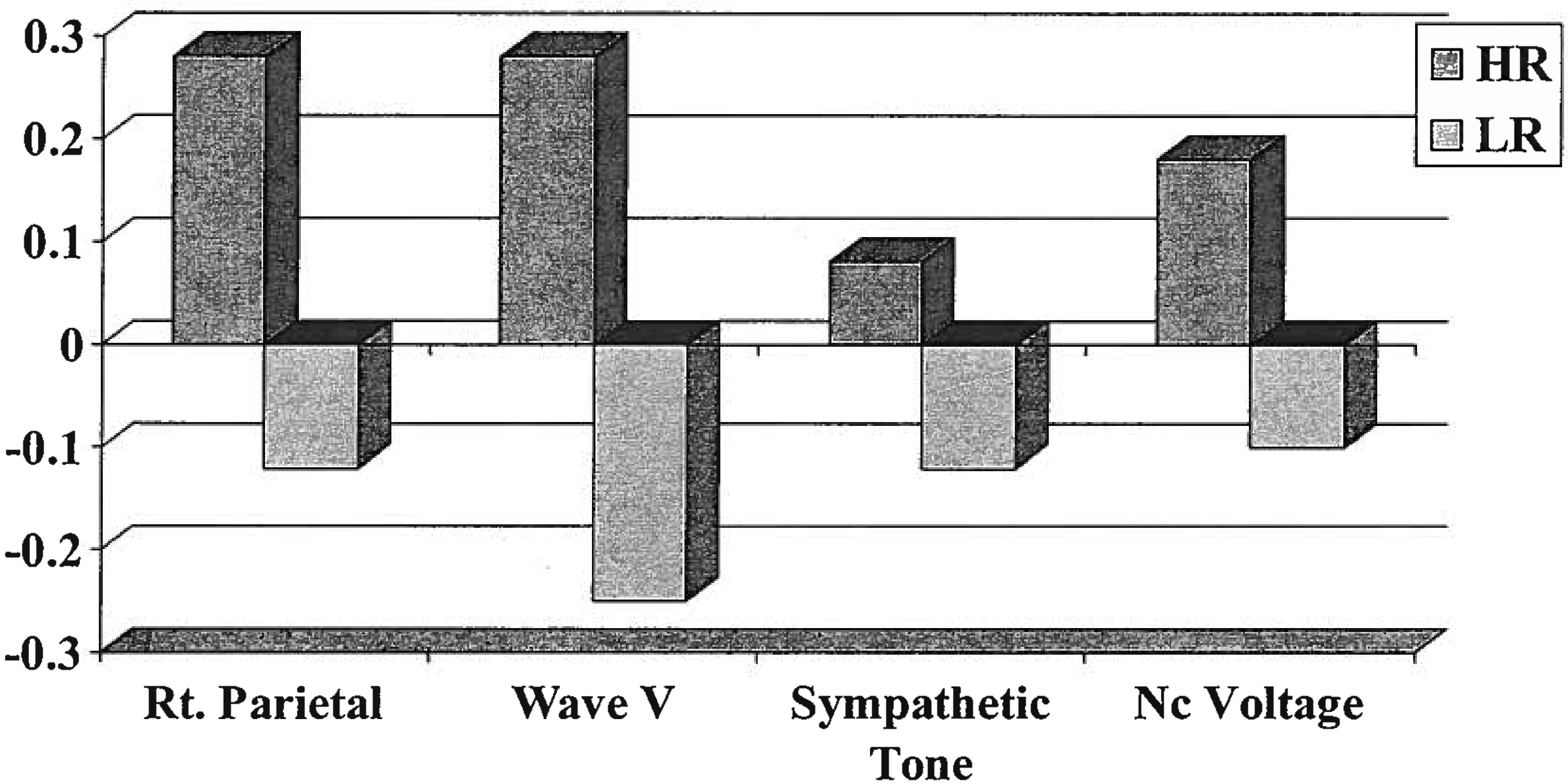
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
HR
LR
Rt. Parietal
Wave V
Sympathetic Tone
Nc Voltage

Figure 5

$x^2(1)=9.7$, $\underline{p} < .01$