

Research Topic White Paper #1
Institute for Research on
Unlimited Love
Altruism, Compassion, Service

HUMAN DEVELOPMENT AND UNLIMITED LOVE

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I. Introduction: Topic Area Description

This research area will focus on the analyzing and synthesizing of biological, psychological, sociological, spiritual and religious aspects of the human developmental trajectory that may serve to foster unlimited love and altruism. At the outset we must stipulate the assumption inherent in this treatment of unlimited love and genuine altruism; namely that the human has the capacity to give unlimited love in a genuinely altruistic way. This stands in contrast to the thought of some theologians who believe that unlimited or agapic love is outside man's capabilities and comes into the world only as a gift to the blessed among us from God in an all or nothing fashion. The Human Development approach on the other hand would contend that, while it is true that God may be the source of all love, the human capacity to give it to others is a continuous variable. It is a capacity that can be fostered, enhanced and nurtured or conversely undermined or even destroyed in the course of an individual's biopsychosociospiritual hermeneutics.

Human development as an area of inquiry is probably the broadest topic to be studied in the IRUL. A full and deep treatment of it will require forays into the evolutionary biology of the brain, the neuroscience of development and the endocrinology, sociology, anthropology and health impact of human separation and attachment dynamics in dialogue with man's religious and spiritual natures. Of course the major focus of our gaze, among these other visual fields, must be on the psychiatry and psychology of human development. Nevertheless the effort in this area will benefit from a flexible and interactive give and take with other research area consultants given the importance of their areas for human development. This will be particularly true in the synthetic projects proposed.

We expect that the audience likely to submit applications for the Human Development RFP funding will come from many different disciplines. This is reflected in the above comments on the areas of study that will be needed to provide a full and deep treatment of the topic in an analytic and synthetic way. Thus we would expect to hear from developmental psychiatrists and psychologists with interests in each aspect of the life cycle. But we would also be likely to hear from basic and cognitive neuroscientists, neuropsychiatrists, behavioral neurologists, neuroendocrinologists, neuroimagers, psychoanalysts, evolutionary biologists and psychologists, family theorists, sociologists, anthropologists, anthropological theologians, and practitioners and caregivers.

Why is this area of human development important to our understanding of other—regarding love and its manifestations? The answer to this question lies embedded in the following key question: How does biophysically based “love”—the kind that flows from the parent-child bond and then from spousal and family and social group attachments—which is the result of brain evolution and individual human development, give rise to unlimited or metaphysical love, unbuckled from the limits of physical love, yet capable of making the physical world better?

Of course this is similar to that “mother” of all brain teasers—the “mind-body problem.” How does mind with its unlimited mental vistas emerge from the if: then decision hierarchies and the electrochemical tedium of the biological brain? For generations, this has been considered an excellent example of a “bad” philosophical problem in that we do not know enough about the brain let alone the mind to begin to

answer it. Indeed Thomas Huxley coined the term “agnosticism” to describe his take on the mind-body problem and on all of metaphysical philosophy, which included psychology, for that matter. What we cannot measure in time and space is unknowable and therefore unworthy of scientific commentary. This encapsulates Huxley’s agnostic view of the mind-body question.

Perhaps Huxley would become more interested in the question of how humans can develop unlimited love and genuine altruism if he understood how far the neuroscience and psychiatry of infant, childhood and adult attachment have come after what was called “the decade of the brain” and as we enter what might be called “the millennium of the mind.” This area is very fertile scientific ground these days for a number of reasons. Bowlby’s concepts on attachment, separation and loss have been operationalized by researchers like Waters (1990) and Main (1985) as have object relations descriptions of “transitional relationships.” The term “transitional” has the connotation of moving and flowing toward something. It instills the notion of moving toward the peak of unlimited love into the discussion of human development.

Object relations theory sees man’s psychological maturation as a function of developmental transitions involving the successful negotiation of separation challenges through the auspices of solace providing, caregiving transitional figures (Horton, 1984). The prototypical figure or object is the mother or parent and all future good and bad objects will be more or less perceived and appreciated relative to this prototypical figure. It is the job of the transitional figure to provide the attachment solution to the age appropriate, developmental separation challenge. Thus for example, with good-enough mother-child attunement, Piagetian object permanence will emerge as an attachment solution to the separation challenge inherent in a mother’s disappearance from view. This socioaffective imprinting of secure base attachment that begins in the emotional calm of a mother’s love for her child has the power to reduce separation anxiety and to color our future cognitive world. This affects our assessments of the basic goodness or badness of our environments and contributes to our response selections accordingly. As our development proceeds, in increasingly complexified ways, we are motivated to immobilize or mobilize, avoid or approach, separate or attach...not love or love, partly due to the transitional objects we have memorized and integrated.

And we are beginning to understand which areas of the brain are responsible for these mind states. MacLean’s mammalian behavioral triad -- maternal nurturance, the stereotypical separation cry and play-- has an important heuristic role to play in our understanding of human development and the nature of unlimited love. One can appreciate that expositions of unlimited love and its characteristics by those who live it, such as Jean Vanier, partake of elements of this triad of mammalian behaviors that serve to specify our evolutionary social survival strategy and heritage as mammals. Vanier understands love in seven specific attitudes or motivations: to reveal, to understand, to communicate, to celebrate, to empower, to be in community and to forgive (Vanier J, 1999). All can be traced to the triad which has its prominent neuronal constructs in a part of the brain we call the thalamocingulate connection or more technically the basal ganglia thalamocortical (anterior cingulate[ACA]/medial orbitofrontal[MOF]) circuit which forms a key component loop in the brain’s motivation circuitry.

The triad needs the thalamocingulate for its expression and it’s the ACA that is largely responsible for our response selection, after planning for execution takes place in

our linked up pre-frontal cortex (PFC). Damasio (1994) believes the ACA is the brain's "fountainhead region." He surmises that the ACA, probably in combination with the PFC and the supplementary motor area, is the region where "emotion/feeling, attention, and working memory interact so intimately that they constitute the cause for the energy of both external action (movement) and internal action (thought animation, reasoning)" (Damasio, 1994, p.71). We can now tease apart the emotional and cognitive components of the important Brodmann area 24 of the ACA using various forms of the Stroop Color-Word Naming Task (SCW) and functional magnetic resonance imaging (fMRI). Indeed the cognitive conflict or interference instigated by the SCW can be linked with changes in brain chemistry. Regional brain N-Acetyl aspartate (NAA) level, a marker of neuronal density and function identified by in vivo proton magnetic resonance spectroscopy (pMRS), has been shown to co-vary with cognitive interference levels (Grachev et al, *Molecular Psychiatry*, 2001). A reduction of NAA in the right ACA has been shown in high interference SCW subjects as compared to low interference subjects.

It is of interest in our discussion to point out that in a preliminary study, the ACAs and the right MOF cortex (which is neurogenically and apoptotically molded during early mother-infant attunement, misattunement and reattunement) light up with activity when mothers listen to the separation cries of their babies while in the fMRI machine (Lorberbaum et al, *Depression and Anxiety*, 1999). It has also been suggested in an fMRI study that there is a neural basis of romantic love, with increased activity restricted to the ACA and the medial insula, caudate and putamen bilaterally (Bartels and Zeki, *Neuroreport*, 2000). In 2000, our group at the Mind-Body Medical Institute and at Massachusetts General Hospital published the first neuroimaging report on meditation (Lazar et al, *Neuroreport*, 2000). Using fMRI we found that meditation activates the ACA along with the dorsolateral PFC, parts of the parietal cortex involved in attention, amygdala, midbrain, hypothalamus and the hippocampus /parahippocampus in the majority of subjects. In 2001, Newberg and colleagues used single photon emission computerized tomography (SPECT) to confirm similar findings showing increased regional cerebral blood flow (rCBF) activation in the dorsolateral PFC, ACA, orbital frontal cortex and thalamus during meditation (Newberg et al, *Psychiatry Research*, 2001). Moral-personal (e.g., the footbridge dilemma) and moral-impersonal (e.g., the trolley dilemma) conditional reasonings can also be studied using neuroimaging. In September 2001, Greene and his colleagues at Princeton reported that moral-personal conditions more so than moral –impersonal conditions were associated with increased fMRI activations in the MOF and in the posterior cingulate cortex (Greene et al, *Science*, 2001). The accompanying editorial in *Science* argues that moral reasoning may rely on emotions (Helmuth, *Science*, 2001). This emotion flows from the limbic system's brain motivation circuitry, which is sculpted in all of us developmentally by virtue of our transitional relationships.

Of course these and other areas of the brain can be examined using separation and attachment probes and self-regard and other-regard scenarios as surrogates for the most important challenges in individual human development. As suggested above we are now blessed with the tools to study quintessential higher human thought and behavior. When someone makes a response selection in favor of unlimited love, what areas of that person's brain activate and deactivate? And what peculiar neurochemistry abides in someone in that state and what of the person with an apparent trait for genuine altruism?

And by what peculiar trajectory of transitional states of separation-attachment does someone wind up with the biology and psychology and spirituality to give unlimited love of a kind that is truly a whole greater than the sum of its parts?

And by the same token, what can we learn from the equally human development of the narcissistic or sociopathic individual?

Stephen Post has written of Jean Vanier's description, in his book *Becoming Human*, of the 7 year-old girl afflicted with blindness and autism named Claudia. In a community filled with love she was able to finally feel solace and communion—in other words a secure base of attachment. Vanier sees clearly the developmental trajectory of this little girl as she transitions from loneliness and insecurity through community and love to the healing inner peace of attachment.

In the topic area of human development then, we will seek to study the benefactors and the benefits of unlimited love—how they develop in the complex matrix of influences that make us human. The following ten questions will serve to guide this enquiry. If we can learn more about this process, perhaps we can, in an informed way, help each other select responses reflective of unlimited love.

References:

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II. Key Research Questions

Question 1

What are the variables in parent (mother) –child attunement and attachment that produce a gradient toward healthy and even extraordinary other (object) love as opposed to a gradient toward narcissism and even sociopathy? Another way to put the positive question is: How does parental love received become transduced in the child to the capacity to give love?

Significance: The issue of early attunement predicated adult predispositions to self and other regard is seminal to any discussion of human development of altruism and unlimited love. Leaving aside the possibility that the maternal-fetal relationship is also important for brain structural development and later functioning, there is evidence that the mother-infant dyad is the major modality for the emotional, separative breaking through of the initial narcissistic union into the cognitive structure of a toddler's individuation accompanied by the need to find a new level of communion with the mother. This separation-individuation process foreshadows future challenges and crises that will call for attachment solutions, with object constancy as a prototype and the integration of objects as a future psychological mechanism. Successful attunement-

misattunement-reattunement as opposed to the unsuccessful version (e.g., Gordon Parker's "affectionless control"), may have certain structural and functional consequences for the brain-mind that will affect the human development of other regarding love as opposed to narcissism. Some child psychiatrists have referred to this hierarchical developmental progression as the "moralization of attachment."

Possible Methodologies:

- a. Biological: Hypothalamic-pituitary-adrenal (HPA) and thyroid axis studies; aminergic metabolite studies; platelet transmitter studies; cytokine studies; neuropeptide studies (opioids; endogenous morphine; oxytocin, vasopressin); galvanic skin responses; cold pressor test; EEG and qEEG; sleep architecture; neuroimaging (SPECT, fMRI and pMRS, PET); MRS with N-Acetyl aspartate; heart rate variability studies and cardiac responsiveness; and neuromedical and mental status evaluations.
- b. Psychosocial: Neuropsychological tests especially for frontal lobe and ACA functioning; Ainsworth Strange Situation; Berkeley Adult Attachment Interview (AAI); Attachment Self-Report; Social Adjustment Scale(SAS); Psychopathic Personality Inventory(PPI); Questionnaire Measure of Emotional Empathy (QMEE); Interpersonal Reactivity Index (IRI);Aggression Questionnaire (AQ); Minnesota Multiphasic Personality Inventory (MMPI); Cook-Medley Hostility Inventory (CMHI); Self Report for Borderline Personality Scale (SRBPS); Personality Beliefs Questionnaire (PBQ); Defensive Function Scale of DSM-IV – has altruism, suppression, humor, anticipation, and sublimation at the mature end; social desirability scales; Stilwell Conscience Interview; Parental Bonding Scale (PBS), Loyola Generativity Scale (LGS).
- c. Cultural: cultural attraction models; operationalization of the distribution of mental representations and public productions which form the large scale regularities we call "culture," as the cumulative effect of micro-processes in human populations (Sperber D. *Explaining Culture. A Naturalistic Approach*. Blackwell Pubs, Cambridge, MA, 1996). Presumably these micro-processes are comprised of biological and psychosocial components in individuals who at their outset shared the universal human need for "secure base attachment," which Bowlby saw as our "environment of evolutionary adaptedness." The anthropological methodology would be based on the assumption that in forming mental representations and public productions, to some extent all humans, and to a larger extent all members of the same population at a given time, are attracted in the same directions. (See Oliner studies on cultural as well as religious aspects of rescuers and bystanders.) Cross-cultural studies will be essential to tease apart what is uniform and what is discriminative across cultures.
- d. Religious/Spiritual **Behavioral Assessment**: Spiritual beliefs and religious practices may foster altruistic behavior and unlimited love or they may not. Instruments to quantify these variables are available. They include: Religious Coping Index (RCI) of Koenig; the INSPIRIT and IPPA of Kass; Belief Questionnaires of Linda George. Moral (Kohlberg) and Spiritual (Fowler)

Developmental Schemas may also be useful methodologies to consider especially when juxtaposed with psychosocial development (Erikson etc.). Meditation studies now employ functional neuroimaging as well as other technologies such as heart rate variability via ambulatory ECG monitoring.

- e. Hermeneutical: Subjective accounts and discursive analyses (Main M. Introduction to the special section on attachment and psychopathology: 2. Overview of the field of attachment. *J Consult Clin Psychol* 1996; 64:237-243) of them to approach intersubjectivity may be useful in approaching direct knowledge of unlimited love rather than more observational knowledge. A good example of this methodology is the work of Dan McAdams using the Life Story Interview (LSI) and the Thematic Aperception Test (TAT) to study generativity and themes of agency and communion in adult autobiography (Mansfield ED, McAdams DP. Generativity and themes of agency and communion in adult autobiography. *Pers Soc Psychol Bull* 1996; 22:721-731).

[These various categories can be envisioned as part of a matrix of influences on the human development of unlimited love and altruism that will be available for use in answering all 10 questions. Research in this area will involve one or more categories in the matrix. There will likely be a preference for more categories when interactive associations and effects are sought.]

An example of a study using methodology that can be used to address Question 1: Waters E, Merrick S, Treboux D, Crowell J, Albersheim L. Attachment security in infancy and early adulthood: a twenty year longitudinal study. *Child Dev* 2000; 71:684-689. Sixty white middle class infants were examined in the Ainsworth Strange Situation (SS) at 12 months of age; 50 of these participants were recontacted 20 years hence and interviewed using the Berkeley Adult Attachment Interview. Interviewers were blind to the original SS classification. Seventy two percent of the infants received the same secure vs. insecure attachment classification in early adulthood. ($p < .001$) Eight of 18 or 44% of the infants whose mothers reported negative life events changed attachment classifications from infancy to early adulthood. As predicted by attachment theory, a negative life event such as loss of a parent, parental divorce, life-threatening illness of parent or child, parental psychiatric disorder, and physical or sexual abuse by a family member was an important factor in category change. Only 22% or 7 of 32 infants whose mothers reported no such events changed classification ($p < .05$). Results suggest that, as Bowlby hypothesized, individual attachment security differences can be stable over time yet remain open to change in light of experience. A variety of research designs, measurement strategies and study intervals will be needed to clarify the factors and mechanisms that produce stability and change.

[One could envision making additions to this study design from the matrix. For example, a longitudinal study could start with the SS test in infancy and 20 years hence finish with the AAI and a moral reasoning/self vs. other regard scenario choice subjects would need to make while undergoing fMRI.]

Background: There is very interesting work to suggest that the right medial orbitofrontal (MOF) cortex and the anterior cingulates (limbic cortices) are involved both in the parent and child in the experience of both attunement and misattunement. This is thought to have consequences for how the limbic cortices are sculpted. (Schore AN. The experience dependent maturation of a regulatory system in the orbital prefrontal cortex and the origin of developmental psychopathology. *Development and Psychopathology* 1996;8:59-87). Young children must experience “secure base attachment” in order to do the work of individuating in a healthy way. As they develop they need moderate arousal energy (the R MOF is particularly important in modulating the autonomic nervous system and visceral functions as are the ACAs) in order to promote appropriate interactions with surroundings. “Particular socioaffective imprinting experiences” (Schore) of attachment during which the mother’s limbic output, particularly that of the MOF region, will provide a premotor template for the imprinting of the child’s developing corticolimbic regions, may be of major importance. Loving socialization and attunement quality will impact on the child’s MOF/ACA development. Mothers appear to accomplish attunement with moderate arousal by initiating and participating in mirroring and refueling, which increases arousal; shame socializing interactions which brake arousal; and interactive repair relations which re-establish optimal arousal after attachment lapses. This is the “goal corrected system” for secure base attachment that Bowlby referred to. When mothers are attuned (and granted this is easier when temperaments are in harmony), secure base dyadic attachment and basic trust that life, self and object have worth and meaning, will have a better chance of developing. The attraction to a loving stance in the world may increase. When there is chronic misattunement, insecure-avoidant and insecure-resistant conditions in children may emerge. The question is whether these insecure states would raise the threshold for other regarding love and reduce the chances of a child becoming a “causa efficiens” of love.

Key Research Studies:

- 1.1 Wiesenfeld AR, Whitman PB, Malatesta CZ. Individual differences among adult women in sensitivity to infants: evidence in support of an empathy concept. *J Pers Soc Psychol* 1984;46:118-124. Emotional and physiological responsivity to 5-month old infant signals (smiling, quiescent, crying) was assessed in individuals who differed markedly in their level of empathy (18 high empathy and 20 low empathy subjects). High empathy subjects had larger electrodermal responses, matching facial responses, more extremes of happiness and sadness, a stronger desire to pick up the infants and a trend toward higher cardiac responsiveness. High empathy individuals may be more emotionally responsive to infant emotional stimuli and hold different values concerning caregiving behavior.

[Neuropeptide and HPA studies could be added to this methodology as could functional neuroimaging. The RCI and the INSPiRiT and the IPPA could be instruments included to study the variables of religious behavior and spirituality in effecting empathy and caregiving. The PBI could also be employed to get retrospective data on the quality of the subjects’ parenting.]

1.2 Zahn-Waxler C, Friedman SL, Cummings EM. Childrens' emotions and behaviors in response to infants' cries. *Child Dev* 1983; 54: 1522-1588. Variations in reactions to young infants' preterm and full term cries were studied in 60 late preschool to preadolescence age children. Each child overheard a cry in an adjacent room, followed by the entry of a mother, carrying her infant and looking for the "crying" infant's bottle. An interview of each subject followed. Self-reports of empathy, verbalized intentions to help, actual helping responses, and observer ratings of negative emotion were measured. Negative emotion occurred in all age groups. Prosocial behaviours increased with age. Negative emotions were inversely correlated with prosocial responses. Type of cry could be distinguished but made no difference in responses.

1.3 Hinchey FS, Gavelek JR. Empathic responding in children of battered mothers. *Child Abuse Negl* 1982;6:395-401. 32 mothers and their preschool children (50% female) were the subjects in this study assessing the empathic abilities of children whose mothers were victims of conjugal abuse. Half of the mother sample had been abused. Home Climate Questionnaire was used to test the instability of familial relationships. Abusive husbands were found to be more verbally aggressive with their children though not physically abusive toward them. A 2 way MANOVA revealed that children of battered mothers showed significant downward effects on 3 out of 4 measures of empathy-- role-enactment, social inference and role-taking. Marital discord of this type may have early and pervasive influences on the empathic abilities of children.

[A longitudinal approach with subsequent measurements of empathy using the QMEE for example could be grafted onto this design along with measures of altruism and a hermeneutical approach (LSI) to life history and other regarding love.]

1.4 Singer LM, Brodzinsky DM, Ramsay D, Steir M, Waters E. Mother-infant attachment in adoptive families. *Child Dev* 1985;56:1543-1551. The quality of attachment relationships in adoptive and non-adoptive mother-infant pairs was assessed using data from 2 separate samples using the SS paradigm. Infants were 13 and 18 months of age. No differences in mother-infant attachment between nonadopted and adopted subjects. No relation was found between attachment quality and perceived social support, infant developmental quotient, infant temperament, number of foster homes experienced by the infant, or infant age at placement.

[Nature and quality of attachment and attunement in mothers of adoptees vs nonadoptees can be further explored using other elements in the matrix and employing a prospective design to look at measures of empathy and altruism development. A retrospective design to see how being adopted has impacted on these variables would also be of interest.]

1.5 Hesse E, Main M. Disorganized infant, child, and adult attachment: collapse in behavioral and attentional strategies. *J Am Psychoanal Assoc* 2000; 48:1097-

1127. In addition to Insecure-avoidant and Insecure-resistant infant categories in the SS condition, there is also the disorganized/disoriented (Group D) category that has correlates in child and adult attachment. The infant D category is assigned when there are noted interruptions and anomalies in organization and orientation during the SS. The D category is felt to be independent of temperament. In this study former infant D subjects at age 6 were found to be controlling (D-Controlling) toward their parents. Drawings and separation related narratives suggested the persistence of fear and disorganization (D-Fearful). As adults these same subjects were found to show marked lapses in reasoning and disjointed discourse in the discussion of loss or abuse during the AAI. They were coded as “Unresolved/disorganized” (U/d) as far as their adult attachment status. U/d status in adult parent predicts risk of infant D attachment. The authors propose that Bowlby’s theory is expanded with the proposal that certain forms of frightening parental behavior will stimulate contradictory biological tendencies and behavioral propensities to both approach and avoid the parent. Maltreated infants may thus experience tremendous dissonance leading to disorganization. They surmise that infant D attachment may sometimes signify a second generation effect of unresolved parent responses to trauma. Furthermore infant D attachment appears to predict disruptive/aggressive and dissociative disorders in childhood and adolescence and U/d adult attachment often appears in psychiatric and criminal cohorts.

[Another example of a longitudinal design, this time using the SS, AAI and discursive analysis, that can be adapted and enriched by the addition of other matrix components. Comparisons of the trajectories toward altruism and unlimited love on the one hand and narcissism and sociopathy on the other may be made using cohorts of infants initially categorized as secure attachment and those categorized as infant D.]

- 1.6 George C, Main M. Social interactions of young abused children: approach, avoidance, and aggression. *Child Dev* 1979; 50:306-318. 10 abused toddlers (ages 1-3 years) were compared with 10 matched controls in a daycare setting during social interactions with both caregivers and peers. Abused toddlers more frequently physically assaulted peers; “harassed” and threatened caregivers verbally and non verbally; and were much less likely to approach their caregivers in response to friendly gestures. When approached in a friendly manner, abused toddlers more frequently avoided peers and caregivers or combined approach movements with avoidance movements.

[Attempts to link prosocial behaviors (see #2 above) in older children to early childhood attachment experiences would be of interest. It would be of interest also to see what possible intervening variables and corrective emotional transitional relationships are powerful enough to change the trajectory of a child from one of avoidance or disorganized approach and aggression to one of mature

attachment, empathy and prosocial decisionmaking—all of which may be antecedent to the capacity for adult altruistic love.]

1.7 Main M, Goldwyn R. Predicting rejection of her infant from mother's representation of her own experience: implications for the abused-abusing intergenerational cycle. *Child Abuse Negl* 1984; 8:203-217. Child battering parents appear to pass on 3 primary behavioral characteristics to their children: aggression dyscontrol, aversive unsympathetic response to other's distress, and self-isolating tendencies. These behaviors can appear in toddlerhood. The toddlers of relatively rejecting mothers in normal samples also appear to develop these behaviors to a lesser degree. The authors surmise that there may be a psychological continuum from "normal" rejection to the actual experience of abuse. They go on to present preliminary findings from their ongoing study of social development in normal nonabusive families. 30 AAI interviews were done with mothers and the apparent experience of a subject's own mother as rejecting was observed in the laboratory to correlate with the subject's rejection of her own infant. These mothers also showed cognitive distortions in recalling their childhoods, reflected in idealization of a rejecting parent, poor recall of childhood, and incoherency in discussing attachment experience.

[Studies like these, of normal mothers and adults, can make use of attachment measures combined with variables from the matrix of components above to stratify propensities to develop the capacity for unlimited love and mature defenses vs. the risks for narcissism and other cluster B personality disorders (Antisocial, Borderline, Histrionic as well as Narcissistic) and immature defenses.]

Question 2

Do those high on altruism or empathy scales do better at choosing "attachment solutions" during separation stress or challenge?

Significance: At each important juncture in human development there is a naturally occurring or contingently applied separation challenge, which requires some form of response selection on the part of the individual. Many influences impact on the response including genetic endowment, perinatal experience, temperament, mother-infant attunement, parent- family relations, childhood events, peer interactions, neighborhood and culture, socioeconomics, religious belief etc. Regardless of these complexifying systemic influences, they will be processed in the brain, as sensorimotor-analyser effecter, according to what Kraemer calls a "psychobiology of attachment" (Kraemer GW. A psychobiological theory of attachment. *Behavioral Brain Sciences* 1992; 15:493-541). Thus the separation challenge of separation-individuation is met with the attachment solution of object constancy and about at the same time at age 2, the child develops the unique human competence to empathize, with its obvious relevance to morality (Kagan J. Morality, altruism and love. Presented at the Conference: Empathy,

Altruism and Agape. October 1-3,1999. Cambridge, MA); the separation challenge of adolescence is met with the rapprochement of early adulthood; the separation challenge of the illness experience is met with the attachment solution of the doctor-patient relationship and the buffering of social attachments (both of which provide healing effects). Those who have arrived in adulthood with high levels of empathy (a multidimensional construct with physiological, emotional, cognitive, communicative and relational components) or altruism may have a propensity to seek attachment solutions to separation challenges. This may account for the adaptational nature of what may be considered the mature psychological defense of altruism and it's role in positive psychology (Vaillant GE. Adaptive mental mechanisms. Their role in positive psychology. *Am Psychol* 2000;55:89-98). At the same time when one receives loving and consistent attachment as a solution to one's separation challenge, even if there have been grave deprivations in the past, there may be the chance to experience what Kohut has called a "corrective emotional experience" to heal even very early misattunement scars. We know that Francene Benes has established in her neuropathological studies that myelination occurs throughout life and particularly in the superior medullary lamina, which serves as a highway between the parahippocampus and the anterior cingulated cortex [Benes F. Brain development, vii. Human brain growth spans decades. *Am J Psychiatry* 1998; 155:1489]. We also know that the neurogenesis/apoptosis equation is effected by stress, so there are neuronal constructs to support this psychological developmental view [McEwen BS. The neurobiology of stress: from serendipity to clinical relevance. *Brain Res* 2000; 86: 172-189]. It may be that the mirroring, refueling and imprinting roles of parental figures we encounter at pivotal times throughout life have the neurobiological influence to effect changes in behavior in the direction of loving choices for others.

Key Research Studies:

2.1 Stilwell BM, Galvin M, Kopta SM, Padgett RJ, Holt JW. Moralization of attachment: a fourth domain of conscience functioning. *J Am Acad Child Adolesc Psychiatry* 1997; 36: 1140-1147. The authors attempt to define discrete developmental levels of understanding, regarding ways in which normal children and adolescents link remembered and current attachment experiences to their moral belief system and to study the correlation between this progression and previously identified stages of conscience conceptualization. Interviews with 132 normal 5 to 17 year old volunteers using the Stilwell Conscience Interview with its' moralization of attachment section were performed. ANOVA and covariance showed a correlation between the 5 attachment levels and the 5 moral conceptualization stages. The authors conclude that in normal development, the moralization of attachment is a domain of conscience functioning (akin to Kagan's concept of the human uniqueness in applying the categories good and bad to objects in association with self-awareness of guilt and the development of conscience). It appears to follow a 5 stage hierarchical developmental progression: 1) the child's sense of security and empathic responsiveness become paired with a sense of moral obligation; 2) the child incorporates caretaker rules; 3) the child understands how empathy modifies strict rule-following; 4) the older child chooses idols and ideals reflecting earlier learning in attachment

relationships; 5) the adolescent visualizes self as a moral standard bearer or as a teacher.

[One can study how moralization of attachment level affects responses to a separation challenge vignette. Any of a number of components from the matrix can be studied in relation to the attachment level profiling. In adult practitioners of unlimited love retrospective analysis of their own moralization of attachment would be of interest. The intersection of spiritual development a la Fowler with the moralization of attachment would also be important to study.]

2.2 Eisenberg N, Carlo G, Murphy B, Van Court P. Prosocial development in late adolescence: a longitudinal study. *Child Dev* 1995; 66:1179-1197. Researchers looked at change in prosocial moral reasoning longitudinally over 15 years. The interrelationships among moral reasoning, prosocial behavior, and empathy-related emotional responses were examined in 17 to 20 year olds. Higher level reasoning increased in adolescence and early adulthood and was higher in females than in males. There was some evidence of relations among prosocial reasoning, prosocial behavior, sympathy, and perspective taking.

[Applications here would be similar to above.]

2.3 Hay DF, Castle J, Davies L, Demetriou H, Stimson CA. Prosocial action in very early childhood. *J Child Psychol Psychiatry* 1999; 40: 905-916. Sixty six children at 18, 24, and 30 months and then again 6 months later were observed for their sharing activity with familiar peers at home. Most children shared less as they grew older, but the oldest girls shared more, usually with other girls. Boys were more likely to show reciprocity in sharing. Individual differences were relatively stable over time and sharing was linked to sensitivity to a peer's distress. In boys higher rates of sharing were associated in mother's ratings with negative ratings of personality traits.

[Future longitudinal studies in this vein could focus on associating sharing at this age with prior mother-child attunement as well as with future prosocial behaviors including altruistic acts. Would also be fascinating to investigate the negative reinforcement mothers may give their sons regarding prosocial behaviors when their children start to interact with peers, perhaps taking it as a sign of weakness.]

2.4 Litvack-Miller W, McDougall D, Romney DM. The structure of empathy during middle childhood and its relationship to prosocial behavior. *Genet Soc Gen Psychol Monogr* 1997; 123: 303-324. This study was an investigation of the structure and development of empathy during middle childhood and its relationship to "altruism" understood in terms of prosocial behaviors such as making monetary donations and volunteering time. A cohort of 478 second, third and sixth grade students completed an altruism questionnaire and a social desirability scale as well as the Interpersonal Reactivity Index. Students were also rated by teachers on their prosocial behaviors

such as sharing. Results showed that empathy has 4 components: perspective taking, fantasy, empathic concern, and personal distress. Girls were more empathic than boys; older children showed more empathic concern than younger children. Only empathic concern and perspective taking were significant predictors of prosocial behavior.

[In addition to doing longitudinal studies as mentioned for #3 above, studies designed to tease out physiological reasons for a more predominant “tend and mend” approach in females as opposed to a more “fight or flight” approach in males when faced with distress would be of interest. Oxytocin vs. vasopressin? (Uvnas-Moberg K. Oxytocin may mediate the benefits of positive social interaction and emotions. *Psychoneuroendocrinology*.1998; 23: 819-835). Estrogen receptors (ER-alpha) and their effects on brain blood flow increase? (Duckles S et al. *J Appl Physiol* 2001.)

2.5 Davis MH, Mitchell KV, Hall JA, Lothert J, Snapp T, Meyer M. Empathy, expectations, and situational preferences: personality influences on the decision to participate in volunteer helping behaviors. *J Pers* 1999; 67: 469-503. Evidence suggests dispositional empathy is associated with the degree of help observers will provide to those in need. These researchers studied whether empathy affected one’s willingness to enter situations in which needy “targets” will be found. They hypothesized that dispositional empathy influences such situational preferences. They also hypothesized that this influence is mediated by the expected emotions one feels are likely to emerge in such situations. In study 1 hypothetical situation judgements supported both hypotheses. In study 2 when participants were led to believe their decisions would actually lead to encountering needy targets, both propositions were also supported. The model also found support in study 3 which examined actual community volunteer experiences.

[Further study might focus on the biological and psychological factors involved in this almost chemotactic gradient toward the emotional state attendant to responding with love and attachment solutions to those in need. Many of the strategies and tools outlined in the matrix can be used in pursuit of this understanding.]

Question 3

Is the generativity that develops in later adult life on a continuum of human development with other-regarding love and unlimited love?

Significance: When adults give of themselves and their wisdom to the next generation, they are not necessarily contributing to the persistence of their personal germline. Yet they are giving of themselves to others often in an effort to enhance the next generation’s survival advantage. One can look at this as the selfish desire to perpetuate one’s memes if not one’s genes. On the other hand one can explore the

possibility that generativity flows from other-regarding love for the youth of the species—perhaps another echoing of the bonds of the parent-child. This line of inquiry might examine the connections between Erikson’s 7th stage of middle adulthood and Kohlberg’s post conventional moral development stage 6 of personal principles culminating in Fowler’s 6th stage of spiritual development focused on universalizing faith, love and the needs of others.

Key Research Studies:

3.1 McAdams DP, Diamond A, de St Aubin E, Mansfield E. Stories of commitment. The psychosocial construction of generative lives. The authors studied the internalized life stories of 40 highly generative people and 30 less generative people, matched for demographic factors. Generative individuals tended to reconstruct the past and anticipate the future as variations on a prototypical commitment story. The protagonist in this story: a) experiences an early family blessing or advantage (becomes a standard bearer?); b) is sensitized to the suffering of others at an early age; c) has a stable, clear and compelling ideology to guide him; d) seeks to create good outcomes out of bad circumstances; e) sets goals for the future to benefit society. Commitment stories may fuel a modern adult’s generativity. Interpretations of stories that inspire people using nomothetic conventions may be a fruitful new research area.

[The functional neuroimaging activation of the brain motivation circuitry with special attention to the PFC and the ACA would be of interest during recounting of a prototypical commitment story in generatives and non-generatives]

3.2 Mansfield ED, McAdams DP. Generativity and themes of agency and communion in adult autobiography. *Pers Soc Psychol Bull* 1996; 22:721-731. Seventy subjects ages 25 to 72 were administered the TAT and a Life-Story Interview (McAdams,1993) in an effort to study reconstructions of their autobiographical pasts in terms of “agency” and “communion”. Seven scenes (peak experience, turning point, earliest memory, important childhood/adolescent/adult memories, and any other memory) were judged on 4 themes of agency and communion. Greater levels of communion were found in the highly generative especially in terms of dialogue and care/help themes. They also showed greater agency/communion integration.

[Markers for higher agency/communion integration might be searched for using tools in the matrix at various stages in human development. If people truly only individuate in community and self-realize only through the experience of self-giving (Williams DD. *The spirit and forms of love*. Harper and Row, NY, 1968), then it would be important to understand how this synthesis in highly generative loving individuals takes place, perhaps resulting in capacity for unlimited love.]

3.3 McAdams DP, Hoffman BJ, Mansfield ED, Day R. Themes of human agency and communion in significant autobiographical scenes. *J Pers* 1996; 64: 339-377. Three studies looked at the coherence in personality across autobiographical

memories, social motives and daily goals. The TAT, autobiographical exercises and the Life- Story Interview were used. Individual themes of self-mastery, status, achievement and empowerment were correlated with TAT measurements of achievement and personal strivings associated with strength and success. Themes of love/friendship, dialogue, care/help and community were correlated with intimacy motivation, needs for affiliation and nurturance and personal strivings associated with warm relationships.

[Physiological and endocrinological correlates of individual themes measured with these instruments would be of great interest. It would also be interesting to measure physical and emotional pain tolerance as a function of autobiographical themes. The ACA may be involved in response selection and motivation as well as pain apperception.]

3.4 McAdams DP, Reynolds J, Lewis M, Patten AH, Bowman PJ. When bad things turn good and good things turn bad: Sequences of redemption and contamination in life narrative and their relation to psychosocial adaptation in midlife adults and in students. *Pers Soc Psychol Bull* 2001; 27: 474-485. Oral life narratives from 269 midlife adults and written life narratives from 125 college students were analyzed for redemption (bad turned to good) and contamination (good turned to bad) imagery. Adults scoring high on generativity showed significantly higher levels of redemption and lower levels of contamination sequences. Redemption sequence scores correlated with well-being.

[This study raises many cart and horse questions. Does generativity lead to redemption or does redemption lead to generativity? Is generativity related to optimism built on experience of redemption as opposed to pessimism built on contamination event experience? Or as John Wooden would say: "Things turn out best for those who make the most of how things turn out". Does the experience of religious belief change contamination to redemption and inspire generativity? The RCI, INSPIRIT, IPPA and Belief questionnaires could be enlisted in studies like these. An analysis of important transitional relationships and experiences across the life cycle might help establish causality.]

3.5 Peterson C, Seligman ME, Vaillant GE. Pessimistic explanatory style is a risk factor for physical illness: a thirty-five year longitudinal study. *J Pers Soc Psychol* 1988; 55:23-27. Pessimistic explanatory style (the belief that bad events are caused by stable, global and internal factors) was evaluated in 99 graduates of Harvard College in the years 1942-1944 at age 25 via open-ended questionnaires. Physical health between the ages 45 to 60 was predicted by explanatory style with pessimism correlating with poor health in middle and late adulthood.

[Does generativity, if related to optimism, predict better physical health as well as well being? Longitudinal studies of physical health and generativity and other regarding love would be of importance.]

3.6 Ackerman S, Zuroff DC, Moskowitz DS. Generativity in midlife and young adults: links to agency, communion and subjective well-being. *Int J Aging Hum Dev* 2000;50:17-41. This study of 58 young adults revealed that generativity was independently predicted by agentic (power) and communal (love) interpersonal orientations, with agency a stronger predictor for young men and communion a stronger predictor for young women. Among 98 midlife adults studied, generativity was correlated with positive affect, life satisfaction and work satisfaction and was independently predicted by agentic (in men) and communal (in women) traits. Generativity may be a stronger predictor of well-being in midlife adults.

[Studies on gender differences in generativity, empathy and altruism development would be welcome. Focus could be on psychosexual features of development as well as neurohormonal influences]

3.7 Vaillant GE, Vaillant CO. Natural history of male psychological health, XII: a 45-year study of predictors of successful aging at age 65. *Am J Psychiatry* 1990; 147: 31-37. A predictor of mental health was maturity of defenses before age 50. These include altruism, suppression, humor, anticipation, and sublimation while immature defenses include hypochondriasis, fantasy, dissociation, acting out, projection and passive aggression. A warm childhood environment predicted physical health at age 65 but not mental health.

[Studies of a longitudinal nature like this can be adapted to include hard measures of generativity and altruism]

3.8 Vaillant GE, Davis JT. Social/emotional intelligence and midlife resilience in schoolboys with low tested intelligence. *Am J Orthopsychiatry* 2000; 70: 215-222. In this prospective fifty-year study, 73 inner city boys with mean IQ of 80 were compared at age 65 with a sample of 38 boys with IQ of 115. Half of the low IQ sample had incomes as high and children as educated as those men with high IQs. These resilient low IQ men were more likely to be generative, use mature defenses and enjoy warm object relations.

[Studies aimed at social/emotional versus cognitive/intelligence promoters of the human capacity for unlimited love would be of importance.]

3.9 Younnis J, McLellan JA, Yates M. Religion, community service, and identity in American youth. *J Adolesc* 1999; 22: 243-253. Data from nationally representative samples were reviewed and led to the conclusion that many contemporary youth who take religion seriously are more engaged in their schooling but also in the betterment of their communities and the development of identities that presage healthy lives.

[Markers of religious development and behavior can be correlated with evidence of altruistic and loving attitudes and actions.]

Question 4

Is there anything we can learn about the human development of altruistic or unlimited love capacity from a greater understanding of the development of cluster B personalities built on the core of entitlement?

Significance: One of the enduring problems all societies face is the tremendous physical, emotional and economic burden of narcissistic and sociopathic personalities. These personalities have a great difficulty mounting an other-regarding love response in any social situation. Indeed a lack of empathic understanding makes such love well nigh impossible. It has been known for a long time for example that sociopathic individuals cannot produce a galvanic skin conductance response when faced with a scene that normally evokes an empathic response. If we could pinpoint the variables that, due to their presence or absence, increase the gradient toward entitlement, immature defenses, and lack of love as opposed to other-regard, mature defenses, and love, we might have a deeper insight into factors that reduce the former tendencies and increase the latter ones.

Key Research Studies:

4.1 Sandoval AM, Hancock D, Poythress N, Edens JF, Lilienfeld S. Construct validity of the Psychopathic Personality Inventory (PPI) in a correctional sample. *J Pers Assess* 2000; 74: 262-281. The authors looked at the relationship between the PPI and 4 theoretically related constructs of empathy, aggression, work ethic and borderline personality disorder (BPD). The relationship between heroism and the PPI was also investigated in the sample of 100 male inmates. Other questionnaires used were the Questionnaire Measure of Emotional Empathy, The Aggression Questionnaire, the Protestant Ethics Scale, the Borderline Personality Self-Report, and the Activity Frequency Scale. PPI was negatively c/w empathy and positively c/w aggression and BPD. PPI was not significantly negatively c/w work ethic and no significant relations with heroism were found on exploratory analysis.

[Studies contrasting empathy and aggression measures and the variables (e.g, maternal nurturance, head trauma, abuse) that predict them across the life cycle in regard to their effects on psychopathy versus altruism would be of interest]

4.2 Soldz S, Vaillant GE. A 50-year longitudinal study of defense use among inner city men: a validation of the DSM-IV defense axis. 306 inner-city men were rated from interviews at age 47 and these ratings were analysed by cluster analysis with 5 clusters emerging. Correlates of cluster membership were looked at employing data from the 50-year longitudinal study of these men. Cluster 1=

greatest use of mature defenses c/w best psychosocial and health variable functioning. Cluster 2 and 3 = primarily neurotic defenses c/w intermediate outcomes. Clusters 4 and 5= primarily immature defenses c/w worst functioning. Cluster 4= action immature c/w sociopathy, alcohol, marital instability. Cluster 5= projection-fantasy immature c/w less sociopathy, alcohol and marital instability.

[DSM-IV hierarchy of non-psychotic defenses can be added to the analysis of the human development of altruism and sociopathy.]

4.3 Mayes LC, Cohen DJ. The social matrix of aggression. Enactments and representations of loving and hating in the first years of life. *Psychoanal Study Child* 1993; 48:145-169. A psychoanalytic study of the development of aggression, which is seen as having a major role in the shaping of the child's predominant modes of viewing and experiencing the world. Any developmental theory of aggression must deal with the central question of how aggression toward another mixes with desire for another in the formation of early capacities for object relatedness. Aggression is first experienced, shaped, refined, and remodeled in the context of nurturing or non-nurturing relations. It is modified in the first 5 to 6 years of life. Therefore the capacity to interpret the intentions of others and attribute affects, beliefs and other mental states to others is crucial to these modifications. Experiences of violence, abuse and deprivation influence the child's experience of his and other's aggression and prevent the normal modulation, through attunement mechanisms, of aggression. (Neuropsychiatric disorders of early childhood will also prevent this modulation.)

[Object relations theory and psychoanalytic approaches can inform the investigation of aggression and empathy development.]

4.4 Beck AT, Butler AC, Brown GK, Dahlsgaard KK, Newman CF, Beck JS. Dysfunctional beliefs discriminate personality disorders. *Behav Res Ther* 2001; 39: 1213-1225. The Personality Belief Questionnaire (PBQ) was completed at intake by 756 psychiatric outpatients who were also assessed for 5 personality disorders using blinded interviewer standardized clinical interviews. Subjects with avoidant, dependent, obsessive-compulsive, narcissistic, and paranoid disorders endorsed PBQ beliefs that are theoretically linked with their particular disorders.

[The PBQ can be a useful tool in studies looking at the differences in aggression and empathy in various adult personalities.]

4.5 Krueger RF, Hicks BM, McGue M. Altruism and antisocial behavior: independent tendencies, unique personality correlates, distinct etiologies. *Psychol Sci* 2001; 12:397-402. These researchers bridge the gap between the literatures of altruism and sociopathy by focusing on 3 fundamental questions. First: Are altruism and antisocial behavior opposite ends of a single dimension, or can they co-exist in the same individual? Second: Do altruism and antisocial behavior have the same or distinct etiologies? Third: Do they stem from the same or distinct

aspects of a person's personality? Their data suggests that they are uncorrelated tendencies arising from different sources. Altruism was linked to familial environments, non-familial unique environments, and personality traits of positive emotionality. Antisocial behavior was linked to genes, unique non-familial environments, and personality traits of negative emotionality and a lack of constraint.

[More study linking the literatures of altruism and sociopathy is needed. If they are on separate tracks how can the altruism track be "greased" and the sociopathy track be impeded?]

Question 5

What are the neuropsychiatric elements of the human development of love?

Significance: Much of the significance of this question has already been discussed in the *Introduction*. The neurobiology of brain development, the ratio of neurogenesis to apoptosis, effects of separation and stress and attachment and security on structure and function can all now be cross-referenced with neuroimaging strategies and neurochemical assays to give a more complete picture of the neurodevelopment of love.

Key Research Studies:

5.1 Bartels A, Zeki S. The neural basis of romantic love. *Neuroreport* 2000; 11:3829-3834. The activity in the brains of 17 subjects who were deeply in love was scanned using fMRI, while they viewed pictures of their partners, and compared with the activity stimulated when they were viewing pictures of 3 friends of similar age, sex and duration of friendship as their partners. The activity attributed to romantic love was restricted to the ACA and the medial insular cortex and in the subcortex, to the caudate and the putamen, all bilateral in distribution. The posterior cingulate gyrus and the amygdala were deactivated.

[Studies such as this can be used to start to tease apart the brain activation differences between romantic love and unlimited love. Subjects could have been tested not only with pictures of partners but pictures and stories to evoke altruistic or agapic affects.]

5.2 Carter SC, Macdonald AM, Botvinick M, Ross LL, Stenger A, Noll D, Cohen JD. Parsing executive processes: Strategic vs. evaluative functions of the anterior cingulate cortex. The researchers tested ACA functioning during the executive processes of cognition using the Stroop color naming task and event-related fMRI. It is known that the ACA serves a strategic function involving response selection for action. This involves the ability to diminish the competition between potential responses to a stimulus. Another theory holds that the ACA performs an evaluative function, reflecting the degree of

response conflict elicited by a potential task, in the service of executive control as part of a circuit with the dorsolateral PFC, which then goes on to implement strategic processes. In this study of 12 healthy, young, right-handed male subjects, the ACA was significantly more active when conflict was high and control is low than when conflict is low and control is high. This suggests that the ACA serves an evaluative function.

[Use of this protocol could be used to study response selection in standardized scenarios requiring altruistic decision-making, manipulating conflict and control variables.]

- 5.3 Grachev ID, Kumar R, Ramachandran TS, Szeverenyi NM. Cognitive interference is associated with neuronal marker N-acetyl aspartate in the anterior cingulate cortex: an in vivo (1) H-MRS study of the Stroop Color-Word (SCW) task. 15 normal subjects were studied with the SCW as a cognitive interference task. SCW scores were significantly c/w low NAA in the right ACA ($P < 0.01$). Spectroscopic brain mapping of NAA, the marker of neuronal density and function, to SCW task measures may differentiate between high and low interference in normals.

[Studies using pMRS and NAA markers of neuronal density and function (reduced in diseases such as SLE, MS, and Alzheimer's) can begin to pinpoint the linkage between human development of capacity to love and neuronal developmental capacity along with the forays into whether nurturing love history builds neuronal capacity along with the capacity to love.]

- 5.4 Carter CS, MacDonald AW, Ross LL, Stenger VA. Anterior cingulate cortex activity and impaired self-monitoring of performance in patients with schizophrenia: An event-related fMRI study. *Am J Psychiatry* 2001; 158: 1423-1428. 17 schizophrenic and 16 matched control subjects were studied with fMRI while doing a continuous performance task. The ACA of schizophrenics showed lower error-related activity and less performance adjustment reflecting poorer evaluative functioning and poorer internal monitoring of performance.

[Studies of whether schizophrenic subjects process empathy and altruism and evaluate other-regarding responses in the same way as those not afflicted could be done using fMRI. Autism sufferers and how their social attachment deficits effect their functional neuroimaging and spectroscopy results under conditions of empathy etc. could also be examined and provide insights into abnormal, normal and extraordinary processes. Affective disorders and their effects should also be studied using various components of the matrix.]

- 5.5 Dehaene S, Changeux JP. Reward-dependent learning in neuronal networks for planning and decision making. The authors present a model of evaluation

and decision-making in PFC circuitry based on an elementary reward mechanism involving the dopamine (DA) brain motivation circuitry. Mesocorticolimbic DA exerts a global modulatory action on prefrontal synaptic efficacies. Reward signals function as effective selection signals that either maintain or suppress currently active prefrontal representations and working memory as a function of their current adequacy. Neuronal network computer simulations can be made of this variation-selection model that successfully account for the main features of several PFC integrity neuropsychological tasks.

[Raclopride DA receptor displacement studies using PET could be used to study the DA brain reward mechanisms involved in decisions to love.]

- 5.6 Biederman J, Hirshfeld-Becker DR, Rosenbaum JF, Herot C, Friedman D, Snidman N, Kagan J, Faraone SV. Further evidence of association between behavioral inhibition and social anxiety in children. *Am J Psychiatry* 2001; 158: 1673-1679. Behavioral inhibition was determined through standardized interviews in 129 children of parents with both panic disorder (PD) and major depression (MDD); 22 children of parents with PD; 49 children of parents with MDD; and 84 control children. Social anxiety disorder is more common in children with behavioral inhibition. Noninhibited children were more likely to have disruptive behavior disorders.

[Behavioral inhibition or non-inhibition should be looked at as a developmental variable in regard to the capacity to be empathic, altruistic and loving.]

- 5.7 Greene JD, Sommerville RB, Nystom LE, Darley JM, Cohen JD. An fMRI investigation of emotional engagement in moral judgement. *Science* 2001; 293: 2105 The authors hypothesized that the crucial difference between the moral processing of the trolley dilemma and the footbridge dilemma lies in the latter's tendency to engage people's emotions in a more connected way than the former does. Thus it is more taxing emotionally to push someone to his death than to hit a switch that will cause a trolley to produce similar consequences. These differences in emotional engagement affect people's judgements. They went on to create 60 moral scenarios that were divided into moral and non-moral categories and the moral scenarios were further divided into moral-personal (footbridge-like) and moral –impersonal (trolley-like). They did fMRI on 9 normal subjects and found that areas of the brain (medial frontal, cingulate and angular gyrus) thought to mediate emotions became more active in the moral-personal conditions.

[Protocols can be established to uncover the relationships between moral-personal-altruistic and moral-personal-selfish cognitive/emotional decision-making dilemmas in the area of the brain we call the limbic cortex. The effects of religious upbringing and spiritual beliefs could easily be tracked.]

- 5.8 Lorberbaum JP, Newman JD, DubnoJR, Horwitz AR, Nahas Z, Teneback CC, Bloomer CW, Bohning DE, Vincent D, Johnson MR, Emmanuel N, Brawman-Mintzer O, Book SW, Lydiard RB, Ballenger JC, George MS. Feasibility of using fMRI to study mothers responding to infant cries. 7 subjects were scanned and 4 had data suitable for analysis. The ACA and the right medial orbitofrontal cortex showed significantly elevated activity with the recorded infant cries as compared to white noise.

[Need more study on the developmental effects of the mother –infant dyad on the construction of the infant brain but also on the neuronal dynamics in certain regions of the mother’s brain along with the consequences for unlimited love capacity and behavior.]

- 5.9 Uvnas-Moberg K. Oxytocin may mediate the benefits of positive social interaction and emotions. *Psychoneuroendocrinology* 1998; 23:819-835. There are many articles from the Karolinska Institute documenting the anti-stress calming and growth effects (decreased BP, increased withdrawal latency to tail flick, decreased cortisol, increased insulin and increased CCK), of the neuropeptide, oxytocin, which is known to initiate affiliation in mammals (Insel).

[Oxytocin-related affiliation behavior and propensity to develop empathy and altruism should be creatively investigated in animal and human models. Vasopressin, endogenous opioids (Panksepp) and perhaps opiates (the s-tetrahydropapaveroline alkaloid has been isolated in human brain by Sango et al, *Neurosci Lett* 2000; 283: 224-226; Stefano et al. Endogenous morphine. *TINS* 2000; 23: 429-435.) are also **compounds** of strong interest with regard to reward and love]

- 5.10 Stefano GB, Fricchione GL, Slingsby BT, Benson H. The placebo effect and relaxation response: neural processes and their coupling to constitutive nitric oxide (cNO). *Brain Res Rev* 2001; 35: 1-19. An hypothesis is advanced based on research on norepinephrine (NE) processes and control via cNO, that cNO is an antibiosenescent gaseous neurotransmitter with modulating allostatic effects at the level of the brain, immune and vascular systems. When cNO mechanisms prevail, as opposed to inducible NO mechanisms, relaxation favoring belief in the future ensues and has a salutogenic effect which might account for the placebo response. Non-noxious attachment oriented stimuli may bolster the cNO effect through central mechanisms. This may occur through the auspices of oxytocin in the hypothalamus, which stimulates NE which then stimulates nitroxidergic neurons to produce cNO.

[NO mechanics can be studied using an amperometric probe in human subjects before and after altruistic love choices. It may also be of interest to

see if religious believers have baseline elevated cNO levels indicating a favorable internal environment to make loving choices.]

- 5.11 Lazar SW, Bush G, Gollub RL, Fricchione GL, Khalsa G, Benson H. Functional brain mapping of the relaxation response and meditation. *Neuroreport* 2000; 11: 1581-1585; Newberg A, Alavi A, Baime M, Pourdehnad M, Santanna J, d'Aquili D. The measurement of regional CBF during a complex cognitive task of meditation: a preliminary SPECT study. *Psychiatry Res* 2001; 10: 113-122. Experienced meditators were found in these 2 studies to activate the ACA and frontal regions involved in focused attention and also areas of the brain reward circuitry.

[Future studies of meditation might focus on the potential for activation of these regions to facilitate other-regarding love response selections even in high conflict/low control settings that might correspond to what we consider “unlimited love”.]

5.12 Jones NA, Field T, Davalos M. Right frontal EEG asymmetry and lack of empathy in preschool children of depressed mothers. Preschool children of depressed and nondepressed mothers were studied in terms of EEG and empathic reactions to emotion-producing stimuli. Children of depressed mothers showed right frontal EEG asymmetry which c/w negative affect and showed less empathy in response to a crying infant as well as to their own mother's simulated distress. They also spent more time asking for help and were slower in completing a teaching task with their moms while their depressed moms showed less approval and spent less time with them.

[The effects of postpartum depression and maternal depression during childhood on the abilities of children to develop empathy and altruism should be studied and EEGs can be helpful tools.]

Question 6

What are the evolutionary constraints on the human development of other-regarding love?

Significance: Theories such as Hamilton's theory of kin selection, which suggests that individuals should show less aggression and more altruism towards closer kin, and other factors such as limited population dispersal with varying effects on altruist to non-altruist ratios and on the degree of competition between relatives, need to be taken into account when considering the vectors that affect the human development of altruistic love, even if one postulates a qualitative, emergent change in those blessed with the capacity to love in an unlimited manner.

Key Research Studies:

- 6.1 Chen S, Lee-Chai AY, Bargh JA. Relationship orientation as a moderator of the effects of social power. *J Pers Soc Psychol* 2001; 80: 173-187. Individuals were dichotomized to a communal vs. exchange relationship orientation. The hypothesis was that communals associate power with social responsibility goals while exchangers link power with self-interest goals. Power was primed unobtrusively using semantic cuing in Study 1 and using naturally occurring, environmental cues in Studies 2 and 3. Across studies, communals responded in socially responsible ways, while exchangers were self-interested responders.

[Research might take a group of relatives and separate them into communals and exchangers and investigate presumed evolutionary contributors and relationship orientations to power instigated choices.]

- 6.2 Korchmaros JD, Kenny DA. Emotional closeness as a mediator of the effect of genetic relatedness on altruism. *Psychol Sci* 2001; 12: 262-265. Ultimate and proximate causes of altruism were studied, especially the role of emotional closeness as a mediator of the effect of genetic relatedness. College students were asked to choose which of their family members they would most likely provide with life-saving assistance. As predicted emotional closeness was an important proximal cause of altruism that partially mediates the effect of genetic relatedness on the willingness to act altruistically.

[This relates to the importance of emotion in evaluating moral dilemmas. There is an emotional bonding modification of evolutionarily based propensities in humans that if extrapolated might account for the ability to transcend genetic relatedness altogether. The role of religiously inspired bonds to “our fellow man” might be studied in this regard.]

- 6.3 Mikulincer M, Shaver PR. Attachment theory and intergroup bias: evidence that priming the secure base schema attenuates negative reactions to out-groups. *J Pers Soc Psychol* 2001; 81: 97-115. The authors performed 5 studies to examine the effects of priming the secure base schema on intergroup bias. Studies 1-2 also examined the effects of dispositional attachment style, while Studies 2-5 examined a mood interpretation. Study 3 looked specifically at the mediating role of threat appraisal while Studies 4-5 focused on the effects of secure base priming while inducing a threat to self-esteem or cultural worldview. Secure base priming, which was not dependent on attachment style and not explained by mood induction, was most powerful at lessening negative evaluative reactions toward outgroups. The effects of secure base priming were mediated by threat appraisal and occurred even under conditions of threatened self-esteem and cultural worldview. The authors state that attachment theory has an important contribution to make to our understanding of ingroup-outgroup dynamics.

[The degree of effect penetration of individual secure base attachment on the capacity to expand the circle of inclusion in an ever-widening group considered worthy of altruistic love, may be the evolutionary rate limiting step of the entire

human project. Studies designed to prime the secure base attachment of individuals to see whether this can truly reduce intergroup bias are essential to our study of the human development of unlimited love.]

- 6.4 Kurzban R, Tooby J, Cosmides L. Can race be erased? Coalitional computation and social categorization. PNAS 2001; 98: 15387-15392. Experiments are reported that suggest that categorizing individuals by race is not inevitable; encoding by race is instead a reversible byproduct or side effect of neurocognitive computational machinery that evolved to detect coalitional alliances. Coalitional alliance recognition is highly normalized. By changing the cues of coalitional affiliation, race drops down as a significant categorizing device. In this study subjects were found to mix up recalled statements as coming from one person or another on interracial teams of basketball players more on the basis of which team they belonged to than on the basis of which race they belonged to. “These results suggest that racism may be a volatile and eradicable construct that persists only so long as it is actively maintained through being linked to parallel systems of social alliance”.

[This study suggests that in addition to priming secure base attachment, changing the cues of coalitional alliance may be a way to expand the ingroup and reduce intergroup bias. Studies combining the 2 approaches would be most interesting.]

Question 7

What can be learned about the human development of unlimited love from “religious altruism” in the medical context?

Significance: Clinicians performing psychiatric assessments of potential living-unrelated organ donors (LURDs) must evaluate the motivations behind the act, which strictly in terms of its physiological implications is entirely altruistic. A subset of these individuals may offer us a group to study in terms of the determinants of healthy altruistic love. Patient volunteers and other volunteers in the medical setting can have powerful other-regarding effects that may also be of interest.

Key Research Studies:

7.1 Dixon DJ, Abbey SE. Religious altruism and organ donation. Psychosomatics 2000; 41: 407-411. The authors describe clinical cases to illustrate that oftentimes LURDs conceptualize their offers exclusively in terms of their religious beliefs and not in terms of kinship or emotional intimacy with the intended recipients. The negative reactions of some doctors to the offers reveal the readiness with which religious beliefs can be pathologized. It also reflects how a restrictively biological understanding of relationships can unduly restrict the clinical understanding of healthy altruism. See also: Neumann ME. “Stranger donation”—the next level of altruism? Nephrol News Issues 2000; 14: S13-s14.

[More study should be made of LURDs and the religious altruism of many of them. Any of the matrix variables can be applied in this research in an attempt to better understand how their capacity to love in such a way develops and comes to pass in the offer of donation.]

7.2 Sullivan GB, Sullivan MJ. Promoting wellness in cardiac rehabilitation: exploring the role of altruism. *J Cardiovasc Nurs* 1997; 11: 43-52. The authors propose, based on research implicating social isolation in increasing the risk of cardiac events, that the use of volunteer, patient driven support groups may provide an effective approach to improve social support and enhance “altruism” in patients with coronary disease. They suggest that “altruistic behavior” may benefit the giver and the recipient of the care and urge more study.

[This population could be studied to see what factors prompt an increase in altruistic behavior after experiencing the suffering of illness and what effects this increase may have.]

7.3 Seelig BJ, Dobelle WH. Altruism and the volunteer: psychological benefits from participating as a research subject. *ASAIO J* 2001; 47: 3-5. The authors submit that superficially altruistic behavior in research subject volunteers serves multiple psychological functions. In interviews with subjects who had volunteered 20 years earlier they found lasting self-esteem.

[Psychological benefits from “altruistic” behaviors can be examined in these studies.]

Question 8

What do we know about how we can teach altruistic behavior and empathy?

Significance: If we are not to be fatalistic about the capacity to develop unlimited love (you either have it or you don't) we need to learn more about the best strategies on how to build it in individuals. One way to try to do this is to perhaps teach empathy and altruism as prerequisites for unlimited love.

Key Research Studies:

8.1 Hatcher SL, Nadeau MS, Walsh LK, Reynolds M, Galea J, Marz K. The teaching of empathy for high school and college students: testing Rogerian methods with the Interpersonal Reactivity Index (IRI). *Adolescence* 1994; 29: 961-974. 104 H.S. and college students were given the IRI (which measures cognitive and emotional components of empathy) before and after a standard course of Rogerian-based peer facilitation skills training. Greater developmental readiness for learning empathic communication was statistically increased in the

college sample. College females began with higher empathy scores but both genders were equally teachable.

[Training in empathy can be combined with measurement of several of the matrix parameters before and after.]

8.2 Coulehan J, Williams PC. Vanquishing virtue: the impact of medical education. *Acad Med* 2001; 76: 598-605. The authors describe a group of medical students that is “immunized” against detachment, self-interest and objectivity in favor of doctoring empathy, compassion and altruism. The immunization factors include personal characteristics (gender, belief system, non-medical commitments) and medical school features (family medicine, communication skills training, medical ethics, humanities and social issues in medicine). To be effective these latter features must be prominent and well integrated into the curriculum and culture.

[Research might focus on a longitudinal survey of empathy and altruism attitudes and capacities across the medical education experience]

8.3 Walther E, Muller D, Schott O. Automatic social behavior: how does activation of the concepts of egoism and altruism influence helping behavior? *Z Exp Psychol* 2001; 48: 248-257. Altruistic, egoistic and neutral prompts were used in advance of activating helping behaviors. The altruistic and neutral prompts showed no difference but the egoistical prompt led participants to a higher latency and less help response more often than participants in the other 2 conditions.

[The power of media and other messages in the prompting of altruistic vs selfish behaviors would be an interesting area to study]

8.4 Dunn J. Sibling influences on childhood development. *J Child Psychol Psychiatry* 1988; 29: 119-127. Siblings play a major role in the development of aggressive behavior, in a child’s style of conflict behavior and in cooperative fantasy play. Family factors are closely involved in the quality of sibling relationships.

[Sibling relationships should be examined for clues to the development of capacity to love]

8.5 Poresky RH, Hendrix C. Differential effects of pet presence and pet bonding on young children. *Psychol Rep* 1990; 67: 51-54. Mothers rated their young children’s companion pet bond and social competence. A researcher assessed the children’s empathy, cooperation and intelligence during home visits. Children’s pet bonds were c/w social competency and empathy scores.

[Loving relationship with a companion animal is another factor that may foster the capacity for loving social attachment and this could be further examined.]

Question 9

Is there a genetics of love that we need to pay attention to?

Significance: There are certainly genetic endowment considerations when we come to the capacity to develop empathy, altruism and unlimited love. These will eventually need to be studied, but the field is likely to be among the most complex given the degree of certainty that these attributes are multi-sited genotypically and multi-determined phenotypically. Nevertheless there are some hints out there.

Key Research Studies:

9.1 Pitkow LJ, Sharer CA, Ren X, Insel TR, Terwilliger EF, Young LJ. Facilitation of affiliation and pair-bond formation by vasopressin receptor gene transfer into the ventral forebrain of a monogamous vole. *J Neurosci.* 2001; 21: 7392-7396. Researchers used an adenovirus vector to deliver the gene for the vasopressin receptor (V1aR) into the ventral pallidum of the male prairie vole brain. The gene caused the voles to overexpress V1aR, thereby increasing the density of vasopressin binding to the receptor. This intervention increased measures of vole pair bonding such as time spent in female partner's cage. This is the first study to demonstrate that complex social behaviors, such as social attachment, can be increased by viral vector gene transfer.

[Other mammalian social attachment behaviors that more closely model empathy or altruism may be used to study gene effects.]

9.2 Olson JM, Vernan PA, Harris JA, Jang KL. The heritability of attitudes: a study of twins. *J Pers Soc Psychol.* 2001; 80:845-860. The authors replicate earlier claims that part of the variance in indices of social attitudes is secondary to genetic loading. They examine a survey of 195 pairs of MZ twins and 141 pairs of same sex DZ twins looking at the genetic basis of individual differences in attitudes. Six of the 30 attitudes looked at in a principal components analysis showed significant heritability coefficients. For example there is heritability of athletic prowess; this leads to a genetic predisposition to athletic success and furthermore, mediated by athletic success, a positive social attitude toward athletics then develops.

[Could this be the same to some degree for heritability of the capacity to love, followed by success in loving and a positive attitude toward unlimited love?]

Question 10

How powerful are the effects of religious experience, belief and/or behavior on the capacity to love in the way that Millard Fuller might call “practical Christianity.”?

Significance: The true message of all the world’s great religions is to love one another. In Christianity it comes down to us as part of the great commandment—to love one another as one loves oneself. This message is fueled by our spiritual belief in a God who loves us and is symbolized in the rituals of religious behaviors. Religious experience (and some might qualify this as needing to be “authentic”) of awe and oneness and heightened perception of the spiritual may be among the most powerful motivators of extraordinary love. It should be noted here that certain neurological conditions, in particular temporal lobe epilepsy, are known to stimulate religious experiences, which underscores the need to address the question of authenticity. Nevertheless there is the anecdotal belief that this all enhances our capacity to be altruistic and loving, culminating in “greater love than this no man has but to give his life for another.” But is there more than anecdotal evidence for this?

Key Research Studies:

10.1 Hays JC, Meador KG, Branch PS, George LK. The Spiritual History Scale in four dimensions (SHS-4): validity and reliability. *Gerontologist* 2001; 41: 239-249. 30 elderly volunteers were studied with semi-structured interviews followed by structured interviews of a random sample of 157 elderly subjects. Principle components analysis of the SHS-4 suggested 4 factors with favorable psychometrics. These were “God Helped” in health-impaired (health related behaviors associated); Lifetime Religious Social Support (good social support and health related behaviors); Cost of Religiousness (predicted depressive symptoms and poor social support); and Family Religiousness (not related to late-life health).

[The SHS-4 could be used to stratify an elderly cohort and then search for correlations with empathy, altruism and other-regarding love.]

10.2 Krause N, Ingersoll-Dayton B, Liang J, Sugisawa H. Religion, social support, and health among the Japanese elderly. *J Health Soc Behav* 1999; 40: 405-421. The researchers analysed the relationships among religion, support giving and health, with data on 2,153 elderly people who were interviewed in 1996. Greater involvement in religion was associated for men only, with providing help to others more often. Subjects who provided assistance to others more often rated their health more favorably.

[More studies documenting the relationship between religion and the human development of self-giving behavior are needed]

10.3 Saver JL, Rabin J. The neural substrates of religious experience. *J Neuropsychiatry Clin Neurosci* 1997; 10:475-476. The authors propose a “limbic marker hypothesis” for religious numinous experience based on clinical and laboratory findings in temporal lobe epilepsy, near-death experiences and hallucinogen use. The temporolimbic region of the brain tags certain internal or external sensory stimuli as depersonalized, derealized, vitally important, connected and harmonious, joyous etc. This then thought to activate comprehension of these experiences within a context of religious meaning.

Question 11

Do conditions of “brokenness” free us from inauthentic or routinized existence and provoke a response of other regarding love?

Significance: There is a literature in psychiatry and psychoanalysis (Franz Alexander, Heinz Kohut) that describes the power of the “corrective emotional experience”, encountered by a wounded individual during the course of psychotherapy with a caring therapist, to heal past trauma and allow the individual in turn to become more caring. There is also a literature in existential philosophy and existential psychiatry that talks about man’s essential “brokenness” –a condition of inevitable struggle, suffering, guilt and death. (Karl Jaspers) Our “brokenness” is revealed in these “limit conditions” and leads to the “limit questions” that all redound to whether life is meaningful (Viktor Frankl). But meaning for the human has developed in a social context due to the survival strategy of social attachment that has evolved. How then do we remain as individuals in attachment in the face of these ever-present limit conditions?

In the midst of this pain of existence, there is a message in code or cipher as Jaspers would call it that speaks to us of the deep reservoir of spirituality and religion that has evolved and seemingly is permanently present in the human. From this reservoir we can draw strength, when broken, to mobilize and approach toward a Creative Presence. The existential threats presented by the limit conditions of our “brokenness” can be met by the solution of attachment to God who completes us. The corrective emotional experiences we benefit from in our transitional relationships with our caregivers, help us deal with our limits and our pasts and perhaps serve as ciphers of our deepest relationship with God. The practical significance of this may be that there are concrete changes in loving attitude and behavior in recipients of that transitional love.

Key Research Studies:

11.1 Kriebel A, Tress W. Love and partnership in adulthood: a continuation or correction of early childhood experiences? A review of theoretical concepts. *Z Psychosom Med Psychoanal* 1987; 33: 276-293. The authors address the question of whether or not and if so to what extent a mature, adult ability to love depends on relevant early experience, or whether it functions as a corrective to unfavorable emotional experience in early childhood. The empirical studies reviewed point to a possible involvement of corrective and compensatory mechanisms for unfavorable early experiences of a medium degree of severity. By the same

token, warm affection from parents based on needs during the first years of life provides a basis for the adult's ability to love and form partnerships.

[Studies may be designed to measure empathy, altruism and other-regarding love in subjects stratified according to their Parental Bonding Inventory scores. A study of the effects of a loving adult caregiving relationship on these measures could also be designed].

11.2 Khantzian EJ. Reflections on group treatments as corrective experiences for addictive vulnerability. *Int J Group Psychother* 2001; 51: 11-20. Group therapy is presented as a unique corrective emotional experience for those with addictive disorders who have problems with self-regulation and the psychological suffering that ensues.

[Measurements of empathy, altruism and love may be taken before and after group therapy in those with addictive disorders. The same study can be done with those undergoing faith-based approaches to care.]

11.3 Spinner DA. The evolution of culture and cohesion in the group treatment of ego impaired children. *Int J Group Psychother* 1992; 369-381. The author looks at the effect of fostering an indigenous group culture in children who have volatile affects and impulses. A sense of normality and commonality with the development of a structure and language for affiliation, play and mutual identification can create a holding environment to begin a dialogue of communication that is essential for creating a corrective emotional experience.

III. Annotated Bibliography

1. Bowlby J. Attachment and loss. Vol.1 Attachment, 1982 (revised); Vol.2 Separation, 1973; Vol.3 Loss, 1980. Basic Books, NY.

Using an approach informed by ethology, biology, and control theory as well as psychology, Bowlby arrived at several main propositions. First of all, emotionally significant attachment bonds between individuals serve a basic survival function and therefore have a primary status. Second, an understanding of these attachment behaviors can be arrived at using cybernetic theory wherein each partner's CNS contains a system designed to maintain proximity or accessibility of one to the other. Third, working models of self and other and interaction patterns develop over time in each partner's mind allowing for efficient operation of the relationship. Fourth, instead of developmental stages to which one becomes fixated or to which one regresses, Bowlby favored a theory of developmental flow pathways.

The emotional bonds that form between parent and child serve several functions including care seeking and caregiving. This human capacity to seek and secure comfort and solace from attachment is not to be seen as regressive dependency but rather as an

important characteristic of adaptive character behavior and reflective of mental health. At times the individual in a mature bond will be care seeking while at other times he will be caregiving. Man's "environment of evolutionary adaptiveness is one of secure base attachment." "When individuals of any age are feeling secure they are likely to explore away from their attachment figure."

Bowlby writes: "The key hypothesis is that variations in the way these bonds develop and become organized during the infancy and childhood of different individuals are major determinants of whether a person grows up to be mentally healthy."

The origins of the human capacity to love can be uncovered in security of the attachment bond.

2. Winnicott DW. Human nature. Schocken Books, 1988.

In Winnicott's concept of transitional phenomena a breakthrough was made in the understanding of how internal psychological structure interrelates to the external world. He examines "the transition between the child's infantile solipsistic world of self-absorption and the emerging capacity to relate to objects," in the words of psychoanalyst, WW Meissner.

Winnicott himself writes: "How important then are these early transitional objects and techniques! Their importance is reflected in their persistence, even crude persistence over the years. Out of these transitional phenomena develop much of what we variously allow and greatly value under the headings of religion and art and also the little madneses which are legitimate at the moment, according to the prevailing cultural pattern."

Love is encountered in the re-attachment offered us in our transitional relationships.

3. Horton PC. Solace. The missing dimension in psychiatry. Yale University Press, 1981.

Solace serves as "the driving force behind transitional activities throughout life." It has its wellspring in the connection between the maternal primary process presence and the latent oceanic experience. Horton contends that the penultimate goal of transitional relatedness throughout the life cycle is the re-experiencing of the maternal primary process presence. And the ultimate goal is the Holy Grail of that oceanic experience of oneness (not aloneness but attachment) itself. In this context "transitional solace is qualitatively separable from and more psychologically basic than all other pleasures and joys."

Caregiving love takes place in the transitional space between threatened separation and attachment hope. In self-giving love the object of it experiences the solace of attachment, which gets reflected back to the giver. Illness of all types represents a separation threat and calls for the self-giving love of psychiatrists and all medical caregivers.

4. Vaillant GE. *Adaptation to life*. (New Edition). Harvard University Press, 1995.

Vaillant is the Director of the longest running study of adult development-The Grant Study of Adult Development. This study examines the use of what are called "ego mechanisms of defense." These are the mental processes we use to deal with the psychological conflicts of our inner life when instincts, the external world, important objects and our superegos collide. Through the employment of questionnaires, interviews, and other methods of assessment the Grant Study investigators looked at the effectiveness of mature vs immature defenses used by the 98 Harvard College 1939-42 sophomores in the study over the 50 years of follow-up. The author concludes that mental health is a way of reacting to problems, not an absence of them. Mature defenses are found to be used by those men who were healthiest both physically and psychologically.

Among the most mature defenses is altruism, which seems to be an adaptive strategy to be cultivated.

5. MacLean PD. *The triune brain in evolution. Role in paleocerebral function*. Plenum Press, NY, 1990.

The importance of the relationship between separation and attachment in evolution is perhaps best supported in light of the evolution of the brain from reptile to mammal-like reptile (therapsid) to mammal. (Indeed scalable architecture studies in mammalian brains reveal that cerebrotypes have evolved through directed selection pressure [Clark DA, Mitra PP, Wang SS. Scalable architecture in mammalian brains. *Nature* 2001;411:189-193.]). Mammals as opposed to reptiles on the whole have a social attachment survival strategy. MacLean reveals why this is so, based on neuroanatomy and neurophysiology. Important in this discussion is what MacLean calls the "mammalian behavioral triad." This triad consists of: 1. Maternal nursing and care; 2. the separation cry of the infant for the mother; 3. play among conspecifics.

Whereas reptiles and mammals share prototypical parts of the brain including brain stem, basal ganglia, rudimentary amygdala, hippocampus, and septum, only mammals have an advanced anterior cingulate cortex, insula and prefrontal cortex.

While much controversy persists in the field of brain evolution (others to read include Ann Butler and Harvey Karten) MacLean's work is notable for its combination of data and creativity in addressing the question of how attachment is mediated in mammal, primate and human brains with importance for our understanding of empathy, altruism and love.

6. Clark WR and Grunstein M. *Are we hardwired?* Oxford University Press, Oxford, 2000.

Using studies of identical twins reared apart, the authors report their impression that approximately 50% of human behavior has a genetic basis. They focus on individual behavioral traits like aggression (study of 300 MZ and DZ twin pairs reared apart showed a significant heritability of 47% for direct physical assault), mental function, eating disorders, sexual preference, alcoholism and drug abuse. They stress that very few elements of behavior depend upon a single gene. It is the gene complex, often across chromosomes, along with protein foldings, that prompts most of our heredity based actions. Genes and environment cooperate. Heredity affects how we appraise our surroundings. Our environmental appraisals in turn alter the structure of the brain.

The individual human development of unlimited love is presumably the product of gene-protein-environment interaction just as human species development is the product of gene-culture evolution. A thorough understanding of the capacity for unlimited love will require genetic studies on this aspect of human behavior.

7. Damasio A. *Descartes'error. Emotion, reason and the human brain.* Grosset/Putnam, NY, 1994.

Damasio proposes that the elicitation of innate primary emotions require the amygdala and the anterior cingulate cortex as primary sites. These emotions can become responsible for certain internal brain responses, muscular movements and visceral responses brought about by the autonomic nervous system and hypothalamic changes that ensue. It will be these bodily responses stimulated through emotional memory in concert with the brain's responses to "emotional memory" that will form what he terms "somatic markers"-essential signals to aid the conscious reasoning apparatus in attaining a favorable pleasurable outcome (positive attachment).

Somatic markers associated with loving of others may facilitate and reinforce the decision to approach others in a self-giving way. This may be a fertile area to study.

8. Llinas R and Churchland PS (eds). *The mind-brain continuum: sensory processes.* MIT Press, Cambridge, 1996.

The brain can be viewed as a "reality emulator". It can embed a "type of reality emulation that evolved to specify internally the salient aspects of the surrounding world." (Llinas and Pare, 3). This is necessary to effect any directed movement, for without this sensory analysis there would be no predictive image of an event. This premotor template is a prerequisite to produce purposeful behavior and to eventually produce consciousness. In this regard, the CNS is a self activated process whose intrinsic order is the brain's core activity. Sensory experience and motoric effects modify this core activity. Emotions can be thought of as "examples of internally generated intrinsic events that are clearly premotor templates in primitive forms." (Llinas and Pare, 5.) The nervous system thus evolved as a neuronal network of complexified, segregated and integrated circuits (Alexander basal ganglia-thalamocortical circuits) to mediate sensory- motor relations initially in simple reflexive ways. Cognition is not a learned property of the brain but

rather an a priori property developed over eons to perform an analyzer function in the complexified sensori-motor analyzer-effector organ we call the brain.

Certain realities and the beliefs that accompany them will be nurtured in the important transitional relationships of childhood with implications for the brain as reality emulator and for future premotor templating. Certain attachment experiences may promote the capacity to form premotor templates of other regarding love.

9. Mayr E. This is biology. The science of the living world. Belknap Press, Harvard University, Cambridge, 1997.

Mayr explains that, while individual selection pressures gave rise to "inclusive fitness" and "reciprocal altruism," it was selection pressure on human cultural groups that gave rise to "genuine altruism." Enlarging of the group in the face of challenge was selected for. This required extending concern for well-being to non-relatives. Cultural norms for behavior towards non-relatives followed, counteracting the selfish tendencies of individuals in the group. Thus the constraints of altruism directly benefit the group as a whole. But for each individual human with the power of conscious reasoning, a decision must be made. Human altruistic behavior can thus involve the deliberate choice of ethical agape love over selfish behavior rather than relying on instinctual inclusive fitness. "This adaptive shift from an instinctive altruism based on inclusive fitness to a group ethics based on decision-making was perhaps the most important step in humanization." (Mayr)

The decision to love in each individual has its antecedents in the evolutionary struggle to meet separation challenges with attachment solutions. This is impacted upon by gene-culture evolution, which then provides feed-back on individual decisionmaking.

10. Williams DD. The spirit and the forms of love. Harper and Row, NY, 1968.

The late process theologian Daniel Day Williams argues that self-love, i.e., self-affirming love, is nothing more than a desire to belong. Self-hood at a deep level is a desire to 'feel at home in the world' and so to be in community; thus we have a paradox that self-hood (having our own being) is essentially an offer of communication. This realization suggests that love is in essence mutuality. Self-affirming love and self-giving love are harmonious. One individuates in community.

Williams writes: " I use the term agape to refer to the self-giving and forgiving love which God has decisively expressed in the world in his redemptive activity in Jesus. I mean by the human loves all our experiences of organic feeling and sympathetic attachment for things and persons in the world." (Williams, 205)

In self-love and self-assertion there is always "both the pole of autonomy, the affirmation of self-integrity and independence, and the pole of symbiosis, which requires conformity and relatedness to the other. Both autonomy and symbiosis require

communication and response....Belonging involves communication and no self can exist without some fulfillment of this fundamental need. (Williams, 206)

And with this developmental understanding, "we now see human loves in a new light. Agape is not another love, which is added to the others. Neither is it their contradiction. It is the love which underlies all others, leads them towards the discovery of their limits, and releases a new possibility in the self which is created for communion." (Williams, 210)

In this understanding, one can envision the creative power of God and of religious belief in building the human capacity to love.
