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who has raised children), there is an actual plurality of roles; one role converses with another.

Finally, we are in a position to understand the frequent phenomena of what is called "transitivism" in the sick and also in the child. Transitivism consists in attributing to others what belongs to the subject himself. For example, a patient will pity another patient for having had a crisis which, in fact, he himself underwent during the night—as though it were the other who had suffered the crisis. Transitivism is also the attitude of hypochondriacs who look for signs of ill health in the faces of others. All that we are, all that happens to us can furnish us with explanatory categories and in every case plays the role of exploratory tools for knowing the other. Everything that happens to us makes us sensitive to a certain aspect of the other and makes us seek in the other the equivalent of, or something that corresponds to, what has happened to us. This is why Goethe was right in saying that for each of us our circle of friends is what we ourselves are. Our *Umwelt* is what we are, because what happens to us does not happen only to us but to our entire vision of the world. Transitivism is, in other words, the same notion that psychoanalysts are using when they speak of *projection*, just as mimesis is the equivalent of *introjection*.

There are striking examples of transitivism in children, too. Wallon mentions one of them, borrowed from the work of Charlotte Bühler. It is the case of a little girl who, when seated beside her maid and another little girl, seemed uneasy and unexpectedly slapped her companion. When asked why, she answered that it was her companion who was naughty and who hit her. The child's air of sincerity ruled out any deliberate ruse. We have here a manifestly aggressive child who gives an unprovoked slap and explains herself right afterward by saying that it is the other child who slapped her. Psychoanalysts have stressed the childlike attitude that consists in imputing the wrong to the other ("*You're* the one who's lying!"). The child who seemed uneasy was passing through a phase of anxiety, and this anxiety impregnated her entire view of things and people around her—in particular her view of the little girl sitting beside her. This little girl appeared to her to be surrounded by the same anguishing aura. The child was living her anxiety, and the gestures appropriate to lessening it, not as interior events but as properties of things in the world and of others. In the absence of a reduction of the anxiety to its subjective source and a concentration of the anxiety within the child in whom it was actually located, the anxiety was lived as something that has an external as well as an internal origin. Slapping her companion was the little girl's response to the aggression of the anxiety that came from outside.

The child's own personality is at the same time the personality of

the other, that indistinction of the two personalities that makes transitivism possible; this presupposes an entire structure in the child's consciousness. The guilty act of taking the glass, that has just occurred, and the breaking of the glass are now joined in a quasi-magic way. Similarly there is a sort of spatial syncretism—i.e., a presence of the same psychic being in several spatial points, a presence of me in the other and the other in me. In a general way there is an inability to conceive space and time as environments that contain a series of perspectives which are absolutely distinct from one another. The child switches from perspective to perspective, erasing them in the identity of the thing, unaware even of the different profiles or different perspectives in which space can present itself. It is an aspect of the same structure of consciousness that expresses itself in certain childish persons we studied last year [*rabattement*]. The reduction of external perception to what can be seen from a single point of view—in short, the perspective given—is possible only much later. There is also an indistinction between the symbol and what it symbolizes. Words and things are not absolutely distinguished; of this we have already had more than one reminder.

The absence of what we call in the adult the symbolic consciousness, the fusion of sign and referent [*signifié*], the different moments of time and of space in the thing are so many evidences of the same fact.

The syncretic relations with others that show up in the child's conception of personality also show up clearly in the child's use of language. The child's first words, considered by the psychologists and the linguists as standing for sentences (word-sentences), can be the equivalent of entire sentences only through the effects of syncretism. The first word-sentences, as we have already seen, aim just as much at the actions of others as at one's own actions or conducts. When the child (even the very young child) says "hand" (hand-hand), this means his father's hand as well as the hand represented by a photograph or his own hand. This seems to presuppose a kind of abstraction, a recognition of the same object in a plurality of cases. And in fact the object identified is greatly different (for example, there is not a great resemblance between a child's hand and the photograph of an adult's hand). In reality, however, there is no abstraction here. There is simply no radical distinction in the child between his own hand and that of another. The child's extraordinary facility in recognizing the parts of the body in a drawing or an even rougher sketch, the promptness and skill with which he identifies parts of his own body in the bodies of animals that scarcely resemble the human body or familiar domestic animals, the plasticity of vision that allows him to recognize homolo-

gous structures of the body in quite different organisms—all this can be explained by the state of neutral indistinction between self and other in which he lives. The child's own body is for him a way of understanding other bodies through "postural impregnation" (Wallon). The child's person, says Wallon, is in a way scattered through all the images his action gives rise to, and it is because of this that he is apt to recognize himself in everything.

This explains the relative ease with which children understand the modern way of painting and drawing. It is altogether startling to see certain children much more apt to understand this drawing or that painting by Picasso than the adults around them. The adult hesitates before this kind of drawing because his cultural formation has trained him to take as canonical the perspective inherited from the Italian Renaissance, a perspective that works by projection of different external data on a single plane. To the extent that the child is a stranger to this cultural tradition and has not yet received the training that will integrate him within it, he recognizes with great freedom in a number of traits what the painter meant to show. If you like, the child's thought processes are general from the start and at the same time are very individual. They are expressive thought processes that get to the essentials by means of a concrete corporeal recovery [*reprise*] of objects and conducts as given.

This allows us to understand why the use of the word *I* comes relatively late to the child. He will use it when he has become conscious of his own proper perspective, distinct from those of others, and when he has distinguished all of the perspectives from the external object. In the initial state of perception there is consciousness not of being enclosed in a perspective and of guessing—picking out across it an object which is outside—but of being in direct touch with things across a personal-universal vision. The *I* arises when the child understands that every *you* that is addressed to him is for him an *I;* that is, that there must be a consciousness of the reciprocity of points of view in order that the word *I* may be used.

Guillaume points out that in the early months of the second year the child is first seen to acquire a large number of names of persons. Finally, around the sixteenth month, he acquires his own name, which at first he uses only in very limited cases, i.e., in answering questions like "What is your name?" or to designate the situations in which he is placed along with other children—for example, in the distribution of gifts. In this case the child can employ his own name because of the collective operation in which he is involved just like one of the others. The use of his own name in these circumstances does not indicate that he is conscious of his privileged perspective, which seems to escape

him completely at sixteen months or thereabouts. For example, when he wants to say "I want to write," he uses the infinitive, without a subject. Guillaume's son said "write" for "I want to write," but he said "Papa write"; that is, he used the subject only when the subject was another person. When it was he himself who was involved, he never expressed the subject at all. And the "Paul writes" that he finally came to say grew somehow within the formula "Papa writes." The use of his own name was learned from the use of other people's names.

Use of the pronoun *I* comes still later than use of the proper name, at least as it is understood in its full meaning, i.e., in its relative meaning. The pronoun *I* has its full meaning only when the child uses it not as an individual sign to designate his own person—a sign that would be assigned once for all to himself and to nobody else—but when he understands that each person he sees can in turn say *I* and that each person is an *I* for himself and a *you* for others. It is when he understands that even though others call him *you* he can nonetheless say *I*, that the pronoun *I* is acquired in all its significance. Thus it is not because a child of around nineteen months finds he has used the sound "I" that we say that he has acquired the use of the pronoun. In order for it to have been a real acquisition, he must have grasped the relations between the different pronouns and the passage from one of their designata to the others. In other cases the sound "I" is used mechanically, like the body [*physique*], but it is not used in its fullest linguistic and grammatical meaning. Only at nineteen months did Guillaume's son use *me* or *I* in their fullest senses. At nineteen months he used *mine* and *yours* in a systematic way; at twenty months he used *mine, yours, his, everybody's*.[21] At this moment the operation of distribution is conceived in the same way whether it is addressed to the child or to others. The use of *I* takes the place of the child's first name and occurs regularly only at the end of the second year. While the name is an attribute of the person alone, the pronoun designates either the speaker or the person he is speaking to. The same pronoun can serve to designate different persons, while each person has only one proper name.

3. *The "crisis at three years"*

THIS CRISIS HAS BEEN well described by Elsa Köhler in her book on the personality of the three-year-old as well as by Wallon in *Les origines du caractère chez l'enfant.*

At around three years the child stops lending his body and even his thoughts to others, as we have seen happen in the phase of syncretic

21. *"A moi," "à toi," "à lui," "à chacun."*

sociability. He stops confusing himself with the situation or the role in which he may find himself engaged. He adopts a proper perspective or viewpoint of his own—or rather he understands that, whatever the diversity of situations or roles, he is *someone* above and beyond these different situations and roles.

The acquisition of perspective in drawing (which will occur later) can serve us here as a symbol; it will only be possible for a subject to whom the notion of an individual *perspective* is a familiar one. The child cannot understand what it is to portray the things before him as one sees them from a single viewpoint, unless he has come to the idea that he sees them from a single point instead of living in them. There must thus be a kind of duplication of the immediately given sensory spectacle in which the child was at first engulfed and of a subject who is henceforth capable of re-ordering and re-distributing his experience in accordance with the directions chosen by this thought processes. Wallon indicates a certain number of typical attitudes by which one can disclose the advent of this distance between the child on the one hand and the spectacle of others and the world on the other. It is at around the age of three years that one sees in the child the deliberate decision to do everything all alone. Wallon also shows the change in the child's reactions to the look of the other. Up to the age of three years, in general, except in pathological cases, the other's look encourages the child or helps him. Beginning at three years a whole quite different set of reactions is seen to arise; they bring to mind certain pathological reactions. The other's look becomes an annoyance for the child, and everything happens as though, when he is looked at, his attention is displaced from the task he is carrying out to a representation of himself in the process of carrying it out.

This is related to certain pathological phenomena.[22] Wallon mentions the case of a hemiplegic described by Davidson, in whom a convulsive laugh broke out, shaking him all over, whenever he was looked at. Wallon also mentions the case of a subject whose job was testing automobiles. When alone the subject drove skillfully at ninety miles an hour, but when he had a passenger he was tormented by irrepressible tics. This extreme sensitivity to the other's look had shown up very early in this subject—after convulsions at the age of two and a half years. Wallon again recalls the case of general paralytics who, when looked at, show questioning, approving, or satisfied expressions, as though it were absolutely necessary that their faces show something, as though the other's look demanded these expressions of them.

Some subjects who are perfectly normal are afraid of seeming insignificant when being photographed. We can also mention idiots who howl when anyone looks at them. If the three-year-old child is inhibited by the other's look, it is because from this point on he is not simply what he is in his own eyes; he feels himself also to be that which others see him to be. The phenomenon of the specular image, mentioned earlier, becomes generalized. The specular image teaches the child that he is not only what he believed he was by inner experience but that he is in addition that figure he sees in the mirror. The other's look tells me, as does the image in the mirror, that I am *also* that being who is limited to a point in space, that I am that visible "stand-in" [*doublure*] in whom I would recognize only with difficulty the lived *me*. To be sure, as we have seen, this *me* scarcely distinguishes itself from the other before the age of three years. But for this very reason there was never any question of being controlled or inhibited by others; and when this phenomenon appears, it is because the indistinction of myself and the other is at an end.

The ego, the *I*, cannot truly emerge at the age of three years without doubling itself with an *ego in the eyes of the other*. In the case of this phenomenon it is not a question of shame, in the sense in which it exists later on as the shame of being naked (which appears only around the age of five or six), any more than it is the fear of being reprimanded. It is simply a question of the fear experienced by the child when he is looked at.

At the same age the child wants attention and will go to the point of misbehaving in order to get it. Conducts of duplicity that until now were absent are seen to emerge at this time. The child interferes with the play of others for the sake of his own pleasure. He also changes his attitude toward giving. When he gives an object away, he often does it while saying that he does not like the object any more. A thoughtless gift, given earlier, disappears. The child takes things away from others solely for the fun of it; as soon as he has taken them he abandons them. The gift is transformed in the transaction.

In sum, the child constantly calls into play the relation of "me-and-other," which as a result ceases to be a unity, an undifferentiated system, as it is in the preceding phase.

These remarks lead us to ask ourselves to what extent the crisis at three years brings about a transformation and a total re-structuration in the child and whether the state of undifferentiation, of pre-communication, of which we have been speaking until now, is visibly abolished. Wallon himself writes that the already surpassed forms of activity are not abolished. Syncretic sociability is perhaps not liquidated in the third-year crisis. This state of indistinction from others, this mutual impingement of the other and myself at the heart of a situation

22. Cf. Henri Wallon, "La maladresse," *Journal de Psychologie Normale*, vol. 25 (1928), pp. 61–78.

in which we are confused, this presence of the same subject in several roles—all are met with again in adult life. The crisis at three years pushes syncretism farther away rather than suppressing it altogether. Certainly after three years a neutral or objective ground is set up between me and the other; a "lived distance" divides us, as Minkowski says. There is no longer that dizzying proximity of others which made possible certain disorders, certain hallucinations, as well as transitivism.

The child understands, for example, that there is a way of accusing the other that amounts to a confession. Unlike the child, an adult will no longer say, "*You're* the one who's lying." The adult understands that certain resentments disclose in the person expressing them precisely the faults for which he reproaches another. He must be capable of certain meannesses in order to suspect others of them. The adult is conscious of transitivism and the projections whereby we lend others our own ways of being. But if transitivism is thus pushed out of a whole sector of his life, does this mean that it has completely disappeared? The indistinction between me and the other does not inevitably reappear except in certain situations that for the adult are limiting situations but are quite important in his life.

Could one conceive of a love that would not be an encroachment on the freedom of the other? If a person wanted in no way to exert an influence on the person he loved and consequently refrained from choosing on her behalf or advising her or influencing her in any way, he would act on her precisely by that abstention, and would incline her all the more strongly toward choosing in such a way as to please him. This apparent detachment, this will to remain without responsibility arouses in the other an even more lively desire to come closer. There is a paradox in accepting love from a person without wanting to have any influence on her freedom. If one loves, one finds one's freedom precisely in the act of loving, and not in a vain autonomy. To consent to love or be loved is to consent also to influence someone else, to decide to a certain extent on behalf of the other. To love is inevitably to enter into an undivided situation with another.

From the moment when one is joined with someone else, one suffers from her suffering. If physical pain is involved, in which one can participate only metaphorically, one strongly feels his inadequacy. One is not what he would be without that love; the perspectives remain separate—and yet they overlap. One can no longer say "This is mine, this is yours"; the roles cannot be absolutely separated. And to be joined with someone else is, in the end, to live her life, at least in intention. To the very extent that it is convincing and genuine, the experience of the other is necessarily an alienating one, in the sense

that it tears me away from my lone self and creates instead a mixture of myself and the other.

As Alain has said, to love someone is to swear and affirm more than one knows about what the other will be. In a certain measure, it is to relinquish one's freedom of judgment. The experience of the other does not leave us at rest within ourselves, and this is why it can always be the occasion for doubt. If I like, I can always be strict and put in doubt the reality of the other's feelings toward me; this is because such feelings are never *absolutely* proved. This person who professes to love does not give every instant of her life to her beloved, and her love may even die out if it is constrained. Certain subjects react to this evidence as though it were a refutation of love and refuse to be trusting and believe in an unlimited affirmation of the basis of an always-finite number of professions.[23] The ensnaring love of the child is the love that never has enough proofs, and ends by imprisoning and trapping the other in its immediacy.

The normal, non-pathological attitude consists in having confidence above and beyond what can be proved, in resolutely skirting these doubts that can be raised about the reality of the other's sentiments, by means of the generosity of the *praxis*, by means of an action that proves itself in being carried out.

But if these matters are as we have depicted them, all relations with others, if deep enough, bring about a state of insecurity, since the doubt we mentioned always remains possible and since love itself creates its own proper truth and reality. The state of union with another, the dispossession of me by the other, are thus not suppressed by the child's arrival at the age of three years. They remain in other zones of adult life. This is a particular case of what Piaget has called *displacement* [*décalage*]. The same conduct, overcome at a certain level, is not yet (and perhaps will never be) overcome at a higher level. Transitivism, which has been surpassed in the realm of immediate daily life, is never surpassed in the realm of feelings. That is why, as the psychoanalysts have shown, syncretic sociability can be found in the sick to the extent to which they regress in the direction of the conduct of children and show themselves incapable of making the transition to *praxis*, to the selfless, outgoing attitude of the adult.

We might ask what kind of relationship must be established between the crisis at three years mentioned by Wallon and the Oedipal phase of development which certain psychoanalysts locate at the same moment and which accompanies the emergence of the super-ego, the true "objective" relation, and the surpassing of narcissism.

23. The word *abandonniques* appears in the text at this point without explanation.—*Trans.*

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The Need for a New Medical Model: A Challenge for Biomedicine

George L. Engel

At a recent conference on psychiatric education, many psychiatrists seemed to be saying to medicine, "Please take us back and we will never again deviate from the 'medical model.' " For, as one critical psychiatrist put it, "Psychiatry has become a hodgepodge of unscientific opinions, assorted philosophies and 'schools of thought,' mixed metaphors, role diffusion, propaganda, and politicking for 'mental health' and other esoteric goals" (*1*). In contrast, the rest of medicine appears neat and tidy. It has a firm base in the biological sciences, enormous technologic resources at its command, and a record of astonishing achievement in elucidating mechanisms of disease and devising new treatments. It would seem that psychiatry would do well to emulate its sister medical disciplines by finally embracing once and for all the medical model of disease.

But I do not accept such a premise. Rather, I contend that all medicine is in crisis and, further, that medicine's crisis derives from the same basic fault as psychiatry's, namely, adherence to a model of disease no longer adequate for the scientific tasks and social responsibilities of either medicine or psychiatry. The importance of how physicians conceptualize disease derives from how such concepts determine what are considered the proper boundaries of professional responsibility and how they influence attitudes toward and behavior with patients. Psychiatry's crisis revolves around the question of whether the categories of human distress with which it is concerned are properly considered "disease" as currently conceptualized and whether exercise of the traditional authority of the physician is appropriate for their helping functions. Medicine's crisis stems from the logical inference that since "disease" is defined in terms of somatic parameters, physicians need not be concerned with psychosocial issues which lie outside medicine's responsibility and authority. At a recent Rockefeller Foundation seminar on the concept of health, one authority urged that medicine "concentrate on the 'real' diseases and not get lost in the psychosociological underbrush. The physician should not be saddled with problems that have arisen from the abdication of the theologian and the philosopher." Another participant called for "a disentanglement of the organic elements of disease from the psychosocial elements of human malfunction," arguing that medicine should deal with the former only (*2*).

The Two Positions

Psychiatrists have responded to their crisis by embracing two ostensibly opposite positions. One would simply exclude psychiatry from the field of medicine, while the other would adhere strictly to the "medical model" and limit psychiatry's field to behavioral disorders consequent to brain dysfunction. The first is exemplified in the writings of Szasz and others who advance the position that "mental illness is a myth" since it does not conform with the accepted concept of disease (*3*). Supporters of this position advocate the removal of the functions now performed by psychiatry from the conceptual and professional jurisdiction of medicine and their reallocation to a new discipline based on behavioral science. Henceforth medicine would be responsible for the treatment and cure of disease, while the new discipline would be concerned with the reeducation of people with "problems of living." Implicit in this argument is the premise that while the medical model constitutes a sound framework within which to understand and treat disease, it is not relevant to the behavioral and psychological problems classically deemed the domain of psychiatry. Disorders directly ascribable to brain disorder would be taken care of by neurologists, while psychiatry as such would disappear as a medical discipline.

The contrasting posture of strict adherence to the medical model is caricatured in Ludwig's view of the psychiatrist as physician (*1*). According to Ludwig, the medical model premises "that sufficient deviation from normal represents *disease*, that disease is due to known or unknown natural causes, and that elimination of these causes will result in cure or improvement in individual patients" (Ludwig's italics). While acknowledging that most psychiatric diagnoses have a lower level of confirmation than most medical diagnoses, he adds that they are not "qualitatively different provided that mental disease is assumed to arise largely from 'natural' rather than metapsychological, interpersonal or societal causes." "Natural" is defined as "biological brain dysfunctions, either biochemical or neurophysiological in nature." On the other hand, "disorders such as problems of living, social adjustment reactions, character disorders, dependency syndromes, existential depressions, and various social deviancy conditions [would] be excluded from the concept of mental illness since these disorders arise in individuals with presumably intact neurophysiological functioning and are produced primarily by psychosocial variables." Such "nonpsychiatric disorders" are not properly the concern of the physician-psychiatrist and are more appropriately handled by nonmedical professionals.

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In sum, psychiatry struggles to clarify its status within the mainstream of medicine, if indeed it belongs in medicine at all. The criterion by which this question is supposed to be resolved rests on the degree to which the field of activity of psychiatry is deemed congruent with the existing medical model of disease. But crucial to this problem is another, that of whether the contemporary model is, in fact, any longer adequate for medicine, much less for psychiatry. For if it is not, then perhaps the crisis of psychiatry is part and parcel of a larger crisis that has its roots in the model itself. Should that be the case, then it would be imprudent for psychiatry prematurely to abandon its models in favor of one that may also be flawed.

The Biomedical Model

The dominant model of disease today is biomedical, with molecular biology its basic scientific discipline. It assumes disease to be fully accounted for by deviations from the norm of measurable biological (somatic) variables. It leaves no room within its framework for the social, psychological, and behavioral dimensions of illness. The biomedical model not only requires that disease be dealt with as an entity independent of social behavior, it also demands that behavioral aberrations be explained on the basis of disordered somatic (biochemical or neurophysiological) processes. Thus the biomedical model embraces both reductionism, the philosophic view that complex phenomena are ultimately derived from a single primary principle, and mind-body dualism, the doctrine that separates the mental from the somatic. Here the reductionistic primary principle is physicalistic; that is, it assumes that the language of chemistry and physics will ultimately suffice to explain biological phenomena. From the reductionist viewpoint, the only conceptual tools available to characterize and experimental tools to study biological systems are physical in nature (*4*).

The biomedical model was devised by medical scientists for the study of disease. As such it was a scientific model; that is, it involved a shared set of assumptions and rules of conduct based on the scientific method and constituted a blueprint for research. Not all models are scientific. Indeed, broadly defined, a model is nothing more than a belief system utilized to explain natural phenomena, to make sense out of what is puzzling or disturbing. The more socially disruptive or individually upsetting the phenomenon, the more pressing the need of humans to devise explanatory systems. Such efforts at explanation constitute devices for social adaptation. Disease par excellence exemplifies a category of natural phenomena urgently demanding explanation (*5*). As Fabrega has pointed out, "disease" in its generic sense is a linguistic term used to refer to a certain class of phenomena that members of all social groups, at all times in the history of man, have been exposed to. "When people of various intellectual and cultural persuasions use terms analogous to 'disease,' they have in mind, among other things, that the phenomena in question involve a person-centered, harmful, and undesirable deviation or discontinuity . . . associated with impairment or discomfort" (*5*). Since the condition is not desired it gives rise to a need for corrective actions. The latter involve beliefs and explanations about disease as well as rules of conduct to rationalize treatment actions. These constitute socially adaptive devices to resolve, for the individual as well as for the society in which the sick person lives, the crises and uncertainties surrounding disease (*6*).

Such culturally derived belief systems about disease also constitute models, but they are not scientific models. These may be referred to as popular or folk models. As efforts at social adaptation, they contrast with scientific models, which are primarily designed to promote scientific investigation. The historical fact we have to face is that in modern Western society biomedicine not only has provided a basis for the scientific study of disease, it has also become our own culturally specific perspective about disease, that is, our folk model. Indeed the biomedical model is now the dominant folk model of disease in the Western world (*5*, *6*).

In our culture the attitudes and belief systems of physicians are molded by this model long before they embark on their professional education, which in turn reinforces it without necessarily clarifying how its use for social adaptation contrasts with its use for scientific research. The biomedical model has thus become a cultural imperative, its limitations easily overlooked. In brief, it has now acquired the status of *dogma*. In science, a model is revised or abandoned when it fails to account adequately for all the data. A dogma, on the other hand, requires that discrepant data be forced to fit the model or be excluded. Biomedical dogma requires that all disease, including "mental" disease, be conceptualized in terms of derangement of underlying physical mechanisms. This permits only two alternatives whereby behavior and disease can be reconciled: the *reductionist*, which says that all behavioral phenomena of disease must be conceptualized in terms of physicochemical principles; and the *exclusionist*, which says that whatever is not capable of being so explained must be excluded from the category of disease. The reductionists concede that some disturbances in behavior belong in the spectrum of disease. They categorize these as mental diseases and designate psychiatry as the relevant medical discipline. The exclusionists regard mental illness as a myth and would eliminate psychiatry from medicine. Among physicians and psychiatrists today the reductionists are the true believers, the exclusionists are the apostates, while both condemn as heretics those who dare to question the ultimate truth of the biomedical model and advocate a more useful model.

Historical Origins of the Reductionistic Biomedical Model

In considering the requirements for a more inclusive scientific medical model for the study of disease, an ethnomedical perspective is helpful (*6*). In all societies, ancient and modern, preliterate and literate, the major criteria for identification of disease have always been behavioral, psychological, and social in nature. Classically, the onset of disease is marked by changes in physical appearance that frighten, puzzle, or awe, and by alterations in functioning, in feelings, in performance, in behavior, or in relationships that are experienced or perceived as threatening, harmful, unpleasant, deviant, undesirable, or unwanted. Reported verbally or demonstrated by the sufferer or by a witness, these constitute the primary data upon which are based first-order judgments as to whether or not a person is sick (*7*). To such disturbing behavior and reports all societies typically respond by designating individuals and evolving social institutions whose primary function is to evaluate, interpret, and provide corrective measures (*5*, *6*). Medicine as an institution and as a discipline, and physicians as professionals, evolved as one form of response to such social needs. In the course of history, medicine became scientific as physicians and other scientists developed a taxonomy and applied scientific methods to the understanding, treatment, and prevention of disturbances which the public

first had designated as "disease" or "sickness."

Why did the reductionistic, dualistic biomedical model evolve in the West? Rasmussen identifies one source in the concession of established Christian orthodoxy to permit dissection of the human body some five centuries ago (*8*). Such a concession was in keeping with the Christian view of the body as a weak and imperfect vessel for the transfer of the soul from this world to the next. Not surprisingly, the Church's permission to study the human body included a tacit interdiction against corresponding scientific investigation of man's mind and behavior. For in the eyes of the Church these had more to do with religion and the soul and hence properly remained its domain. This compact may be considered largely responsible for the anatomical and structural base upon which scientific Western medicine eventually was to be built. For at the same time, the basic principle of the science of the day, as enunciated by Galileo, Newton, and Descartes, was analytical, meaning that phenomena to be investigated be resolved into isolable causal chains or units, from which it was assumed that the whole could be understood, both materially and conceptually, by reconstituting the parts. With mind-body dualism firmly established under the imprimatur of the Church, classical science readily fostered the notion of the body as a machine, of disease as the consequence of breakdown of the machine, and of the doctor's task as repair of the machine. Thus, the scientific approach to disease began by focusing in a fractional-analytic way on biological (somatic) processes and ignoring the behavioral and psychosocial. This was so even though in practice many physicians, at least until the beginning of the 20th century, regarded emotions as important for the development and course of disease. Actually, such arbitrary exclusion is an acceptable strategy in scientific research, especially when concepts and methods appropriate for the excluded areas are not yet available. But it becomes counterproductive when such strategy becomes policy and the area originally put aside for practical reasons is permanently excluded, if not forgotten altogether. The greater the success of the narrow approach the more likely is this to happen. The biomedical approach to disease has been successful beyond all expectations, but at a cost. For in serving as guideline and justification for medical care policy, biomedicine has also contributed to a host of problems, which I shall consider later.

Limitations of the Biomedical Model

We are now faced with the necessity and the challenge to broaden the approach to disease to include the psychosocial without sacrificing the enormous advantages of the biomedical approach. On the importance of the latter all agree, the reductionist, the exclusionist, and the heretic. In a recent critique of the exclusionist position, Kety put the contrast between the two in such a way as to help define the issues (*9*). "According to the medical model, a human illness does not become a specific disease all at once and is not equivalent to it. The medical model of an illness is a process that moves from the recognition and palliation of symptoms to the characterization of a specific disease in which the etiology and pathogenesis are known and treatment is rational and specific." Thus taxonomy progresses from symptoms, to clusters of symptoms, to syndromes, and finally to diseases with specific pathogenesis and pathology. This sequence accurately describes the successful application of the scientific method to the elucidation and the classification into discrete entities of disease in its generic sense (*5, 6*). The merit of such an approach needs no argument. What do require scrutiny are the distortions introduced by the reductionistic tendency to regard the specific disease as adequately, if not best, characterized in terms of the smallest isolable component having causal implications, for example, the biochemical; or even more critical, is the contention that the designation "disease" does not apply in the absence of perturbations at the biochemical level.

Kety approaches this problem by comparing diabetes mellitus and schizophrenia as paradigms of somatic and mental diseases, pointing out the appropriateness of the medical model for both. "Both are symptom clusters or syndromes, one described by somatic and biochemical abnormalities, the other by psychological. Each may have many etiologies and shows a range of intensity from severe and debilitating to latent or borderline. There is also evidence that genetic and environmental influences operate in the development of both." In this description, at least in reductionistic terms, the scientific characterization of diabetes is the more advanced in that it has progressed from the behavioral framework of symptoms to that of biochemical abnormalities. Ultimately, the reductionists assume schizophrenia will achieve a similar degree of resolution. In developing his position, Kety makes clear that he does not regard the genetic factors and biological processes in schizophrenia as are now known to exist (or may be discovered in the future) as the only important influences in its etiology. He insists that equally important is elucidation of "how experiential factors and their interactions with biological vulnerability make possible or prevent the development of schizophrenia." But whether such a caveat will suffice to counteract basic reductionism is far from certain.

The Requirements of a New Medical Model

To explore the requirements of a medical model that would account for the reality of diabetes and schizophrenia as human experiences as well as disease abstractions, let us expand Kety's analogy by making the assumption that a specific biochemical abnormality capable of being influenced pharmacologically exists in schizophrenia as well as in diabetes, certainly a plausible possibility. By obliging ourselves to think of patients with diabetes, a "somatic disease," and with schizophrenia, a "mental disease," in exactly the same terms, we will see more clearly how inclusion of somatic and psychosocial factors is indispensable for both; or more pointedly, how concentration on the biomedical and exclusion of the psychosocial distorts perspectives and even interferes with patient care.

1) In the biomedical model, demonstration of the specific biochemical deviation is generally regarded as a specific diagnostic criterion for the disease. Yet in terms of the human experience of illness, laboratory documentation may only indicate disease potential, not the actuality of the disease at the time. The abnormality may be present yet the patient not be ill. Thus the presence of the biochemical defect of diabetes or schizophrenia at best defines a necessary but not a sufficient condition for the occurrence of the human experience of the disease, the illness. More accurately, the biochemical defect constitutes but one factor among many, the complex interaction of which ultimately may culminate in active disease or manifest illness (*10*). Nor can the biochemical defect be made to account for all of the illness, for full understanding requires additional concepts and frames of reference. Thus, while the diagnosis of diabetes is first suggested by certain core clinical manifestations, for example, polyuria, poly-

dipsia, polyphagia, and weight loss, and is then confirmed by laboratory documentation of relative insulin deficiency, how these are experienced and how they are reported by any one individual, and how they affect him, all require consideration of psychological, social, and cultural factors, not to mention other concurrent or complicating biological factors. Variability in the clinical expression of diabetes as well as of schizophrenia, and in the individual experience and expression of these illnesses, reflects as much these other elements as it does quantitative variations in the specific biochemical defect.

2) Establishing a relationship between particular biochemical processes and the clinical data of illness requires a scientifically rational approach to behavioral and psychosocial data, for these are the terms in which most clinical phenomena are reported by patients. Without such, the reliability of observations and the validity of correlations will be flawed. It serves little to be able to specify a biochemical defect in schizophrenia if one does not know how to relate this to particular psychological and behavioral expressions of the disorder. The biomedical model gives insufficient heed to this requirement. Instead it encourages bypassing the patient's verbal account by placing greater reliance on technical procedures and laboratory measurements. In actuality the task is appreciably more complex than the biomedical model encourages one to believe. An examination of the correlations between clinical and laboratory data requires not only reliable methods of clinical data collection, specifically high-level interviewing skills, but also basic understanding of the psychological, social, and cultural determinants of how patients communicate symptoms of disease. For example, many verbal expressions derive from bodily experiences early in life, resulting in a significant degree of ambiguity in the language patients use to report symptoms. Hence the same words may serve to express primary psychological as well as bodily disturbances, both of which may coexist and overlap in complex ways. Thus, virtually each of the symptoms classically associated with diabetes may also be expressions of or reactions to psychological distress, just as ketoacidosis and hypoglycemia may induce psychiatric manifestations, including some considered characteristic of schizophrenia. The most essential skills of the physician involve the ability to elicit accurately and then analyze correctly the patient's verbal account of his illness experience. The biomedical model ignores both the rigor required to achieve reliability in the interview process and the necessity to analyze the meaning of the patient's report in psychological, social, and cultural as well as in anatomical, physiological, or biochemical terms (7).

3) Diabetes and schizophrenia have in common the fact that conditions of life and living constitute significant variables influencing the time of reported onset of the manifest disease as well as of variations in its course. In both conditions this results from the fact that psychophysiologic responses to life change may interact with existing somatic factors to alter susceptibility and thereby influence the time of onset, the severity, and the course of a disease. Experimental studies in animals amply document the role of early, previous, and current life experience in altering susceptibility to a wide variety of diseases even in the presence of a genetic predisposition (11). Cassel's demonstration of higher rates of ill health among populations exposed to incongruity between the demands of the social system in which they are living and working and the culture they bring with them provides another illustration among humans of the role of psychosocial variables in disease causation (12).

4) Psychological and social factors are also crucial in determining whether and when patients with the biochemical abnormality of diabetes or of schizophrenia come to view themselves or be viewed by others as sick. Still other factors of a similar nature influence whether or not and when any individual enters a health care system and becomes a patient. Thus, the biochemical defect may determine certain characteristics of the disease, but not necessarily the point in time when the person falls ill or accepts the sick role or the status of a patient.

5) "Rational treatment" (Kety's term) directed only at the biochemical abnormality does not necessarily restore the patient to health even in the face of documented correction or major alleviation of the abnormality. This is no less true for diabetes than it will be for schizophrenia when a biochemical defect is established. Other factors may combine to sustain patienthood even in the face of biochemical recovery. Conspicuously responsible for such discrepancies between correction of biological abnormalities and treatment outcome are psychological and social variables.

6) Even with the application of rational therapies, the behavior of the physician and the relationship between patient and physician powerfully influence therapeutic outcome for better or for worse. These constitute psychological effects which may directly modify the illness experience or indirectly affect underlying biochemical processes, the latter by virtue of interactions between psychophysiological reactions and biochemical processes implicated in the disease (11). Thus, insulin requirements of a diabetic patient may fluctuate significantly depending on how the patient perceives his relationship with his doctor. Furthermore, the successful application of rational therapies is limited by the physician's ability to influence and modify the patient's behavior in directions concordant with health needs. Contrary to what the exclusionists would have us believe, the physician's role is, and always has been, very much that of educator and psychotherapist. To know how to induce peace of mind in the patient and enhance his faith in the healing powers of his physician requires psychological knowledge and skills, not merely charisma. These too are outside the biomedical framework

The Advantages of a Biopsychosocial Model

This list surely is not complete but it should suffice to document that diabetes mellitus and schizophrenia as paradigms of "somatic" and "mental" disorders are entirely analogous and, as Kety argues, are appropriately conceptualized within the framework of a medical model of disease. But the existing biomedical model does not suffice. To provide a basis for understanding the determinants of disease and arriving at rational treatments and patterns of health care, a medical model must also take into account the patient, the social context in which he lives, and the complementary system devised by society to deal with the disruptive effects of illness, that is, the physician role and the health care system. This requires a biopsychosocial model. Its scope is determined by the historic function of the physician to establish whether the person soliciting help is "sick" or "well"; and if sick, why sick and in which ways sick; and then to develop a rational program to treat the illness and restore and maintain health.

The boundaries between health and disease, between well and sick, are far from clear and never will be clear, for they are diffused by cultural, social, and psychological considerations. The traditional biomedical view, that biological indices are the ultimate criteria defining

disease, leads to the present paradox that some people with positive laboratory findings are told that they are in need of treatment when in fact they are feeling well, while others feeling sick are assured that they are well, that is, they have no "disease" (*5, 6*). A biopsychosocial model which includes the patient as well as the illness would encompass both circumstances. The doctor's task is to account for the dysphoria and the dysfunction which lead individuals to seek medical help, adopt the sick role, and accept the status of patienthood. He must weight the relative contributions of social and psychological as well as of biological factors implicated in the patient's dysphoria and dysfunction as well as in his decision to accept or not accept patienthood and with it the responsibility to cooperate in his own health care.

By evaluating all the factors contributing to both illness and patienthood, rather than giving primacy to biological factors alone, a biopsychosocial model would make it possible to explain why some individuals experience as "illness" conditions which others regard merely as "problems of living," be they emotional reactions to life circumstances or somatic symptoms. For from the individual's point of view his decision between whether he has a "problem of living" or is "sick" has basically to do with whether or not he accepts the sick role and seeks entry into the health care system, not with what, in fact, is responsible for his distress. Indeed, some people deny the unwelcome reality of illness by dismissing as "a problem of living" symptoms which may in actuality be indicative of a serious organic process. It is the doctor's, not the patient's, responsibility to establish the nature of the problem and to decide whether or not it is best handled in a medical framework. Clearly the dichotomy between "disease" and "problems of living" is by no means a sharp one, either for patient or for doctor.

When Is Grief a Disease?

To enhance our understanding of how it is that "problems of living" are experienced as illness by some and not by others, it might be helpful to consider grief as a paradigm of such a borderline condition. For while grief has never been considered in a medical framework, a significant number of grieving people do consult doctors because of disturbing symptoms, which they do not necessarily relate to grief. Fifteen years ago I addressed this question in a paper entitled "Is grief a disease? A challenge for medical research" (*13*). Its aim too was to raise questions about the adequacy of the biomedical model. A better title might have been, "When is grief a disease?," just as one might ask when schizophrenia or when diabetes is a disease. For while there are some obvious analogies between grief and disease, there are also some important differences. But these very contradictions help to clarify the psychosocial dimensions of the biopsychosocial model.

Grief clearly exemplifies a situation in which psychological factors are primary; no preexisting chemical or physiological defects or agents need be invoked. Yet as with classic diseases, ordinary grief constitutes a discrete syndrome with a relatively predictable symptomatology which includes, incidentally, both bodily and psychological disturbances. It displays the autonomy typical of disease: that is, it runs its course despite the sufferer's efforts or wish to bring it to a close. A consistent etiologic factor can be identified, namely, a significant loss. On the other hand, neither the sufferer nor society has ever dealt with ordinary grief as an illness even though such expressions as "sick with grief" would indicate some connection in people's minds. And while every culture makes provisions for the mourner, these have generally been regarded more as the responsibility of religion than of medicine.

On the face of it, the arguments against including grief in a medical model would seem to be the more persuasive. In the 1961 paper I countered these by comparing grief to a wound. Both are natural responses to environmental trauma, one psychological, the other physical. But even at the time I felt a vague uneasiness that this analogy did not quite make the case. Now 15 years later a better grasp of the cultural origins of disease concepts and medical care systems clarifies the apparent inconsistency. The critical factor underlying man's need to develop folk models of disease, and to develop social adaptations to deal with the individual and group disruptions brought about by disease, has always been the victim's ignorance of what is responsible for his dysphoric or disturbing experience (*5, 6*). Neither grief nor a wound fits fully into that category. In both, the reasons for the pain, suffering, and disability are only too clear. Wounds or fractures incurred in battle or by accident by and large were self-treated or ministered to with folk remedies or by individuals who had acquired certain technical skills in such matters. Surgery developed out of the need for treatment of wounds and injuries and has different historical roots than medicine, which was always closer in origin to magic and religion. Only later in Western history did surgery and medicine merge as healing arts. But even from earliest times there were people who behaved as though grief-stricken, yet seemed not to have suffered any loss; and others who developed what for all the world looked like wounds or fractures, yet had not been subjected to any known trauma. And there were people who suffered losses whose grief deviated in one way or another from what the culture had come to accept as the normal course; and others whose wounds failed to heal or festered or who became ill even though the wound had apparently healed. Then, as now, two elements were crucial in defining the role of patient and physician and hence in determining what should be regarded as disease. For the patient it has been his not knowing why he felt or functioned badly or what to do about it, coupled with the belief or knowledge that the healer or physician did know and could provide relief. For the physician in turn it has been his commitment to his professional role as healer. From these have evolved sets of expectations which are reinforced by the culture, though these are not necessarily the same for patient as for physician.

A biopsychosocial model would take all of these factors into account. It would acknowledge the fundamental fact that the patient comes to the physician because either he does not know what is wrong or, if he does, he feels incapable of helping himself. The psychobiological unity of man requires that the physician accept the responsibility to evaluate whatever problems the patient presents and recommend a course of action, including referral to other helping professions. Hence the physician's basic professional knowledge and skills must span the social, psychological, and biological, for his decisions and actions on the patient's behalf involve all three. Is the patient suffering normal grief or melancholia? Are the fatigue and weakness of the woman who recently lost her husband conversion symptoms, psychophysiological reactions, manifestations of a somatic disorder, or a combination of these? The patient soliciting the aid of a physician must have confidence that the M.D. degree has indeed rendered that physician competent to make such differentiations.

A Challenge for Both Medicine and Psychiatry

The development of a biopsychosocial medical model is posed as a challenge for both medicine and psychiatry. For despite the enormous gains which have accrued from biomedical research, there is a growing uneasiness among the public as well as among physicians, and especially among the younger generation, that health needs are not being met and that biomedical research is not having a sufficient impact in human terms. This is usually ascribed to the all too obvious inadequacies of existing health care delivery systems. But this certainly is not a complete explanation, for many who do have adequate access to health care also complain that physicians are lacking in interest and understanding, are preoccupied with procedures, and are insensitive to the personal problems of patients and their families. Medical institutions are seen as cold and impersonal; the more prestigious they are as centers for biomedical research, the more common such complaints (*14*). Medicine's unrest derives from a growing awareness among many physicians of the contradiction between the excellence of their biomedical background on the one hand and the weakness of their qualifications in certain attributes essential for good patient care on the other (*7*). Many recognize that these cannot be improved by working within the biomedical model alone.

The present upsurge of interest in primary care and family medicine clearly reflects disenchantment among some physicians with an approach to disease that neglects the patient. They are now more ready for a medical model which would take psychosocial issues into account. Even from within academic circles are coming some sharp challenges to biomedical dogmatism (*8*, *15*). Thus Holman ascribes directly to biomedical reductionism and to the professional dominance of its adherents over the health care system such undesirable practices as unnecessary hospitalization, overuse of drugs, excessive surgery, and inappropriate utilization of diagnostic tests. He writes, "While reductionism is a powerful tool for understanding, it also creates profound misunderstanding when unwisely applied. Reductionism is particularly harmful when it neglects the impact of nonbiological circumstances upon biologic processes." And, "Some medical outcomes are inadequate not because appropriate technical interventions are lacking but because our conceptual thinking is inadequate" (*15*). How ironic it would be were psychiatry to insist on subscribing to a medical model which some leaders in medicine already are beginning to question.

Psychiatrists, unconsciously committed to the biomedical model and split into the warring camps of reductionists and exclusionists, are today so preoccupied with their own professional identity and status in relation to medicine that many are failing to appreciate that psychiatry now is the only clinical discipline within medicine concerned primarily with the study of man and the human condition. While the behavioral sciences have made some limited incursions into medical school teaching programs, it is mainly upon psychiatrists, and to a lesser extent clinical psychologists, that the responsibility falls to develop approaches to the understanding of health and disease and patient care not readily accomplished within the more narrow framework and with the specialized techniques of traditional biomedicine. Indeed, the fact is that the major formulations of more integrated and holistic concepts of health and disease proposed in the past 30 years have come not from within the biomedical establishment but from physicians who have drawn upon concepts and methods which originated within psychiatry, notably the psychodynamic approach of Sigmund Freud and psychoanalysis and the reaction-to-life-stress approach of Adolf Meyer and psychobiology (*16*). Actually, one of the more lasting contributions of both Freud and Meyer has been to provide frames of reference whereby psychological processes could be included in a concept of disease. Psychosomatic medicine—the term itself a vestige of dualism—became the medium whereby the gap between the two parallel but independent ideologies of medicine, the biological and the psychosocial, was to be bridged. Its progress has been slow and halting, not only because of the extreme complexities intrinsic to the field itself, but also because of unremitting pressures, from within as well as from without, to conform to scientific methodologies basically mechanistic and reductionistic in conception and inappropriate for many of the problems under study. Nonetheless, by now a sizable body of knowledge, based on clinical and experimental studies of man and animals has accumulated. Most, however, remains unknown to the general medical public and to the biomedical community and is largely ignored in the education of physicians. The recent solemn pronouncement by an eminent biomedical leader (*2*) that "the emotional content of organic medicine [has been] exaggerated" and "psychosomatic medicine is on the way out" can only be ascribed to the blinding effects of dogmatism.

The fact is that medical schools have constituted unreceptive if not hostile environments for those interested in psychosomatic research and teaching, and medical journals have all too often followed a double standard in accepting papers dealing with psychosomatic relationships (*17*). Further, much of the work documenting experimentally in animals the significance of life circumstances or change in altering susceptibility to disease has been done by experimental psychologists and appears in psychology journals rarely read by physicians or basic biomedical scientists (*11*).

General Systems Theory Perspective

The struggle to reconcile the psychosocial and the biological in medicine has had its parallel in biology, also dominated by the reductionistic approach of molecular biology. Among biologists too have emerged advocates of the need to develop holistic as well as reductionistic explanations of life processes, to answer the "why?" and the "what for?" as well as the "how?" (*18*, *19*). Von Bertalanffy, arguing the need for a more fundamental reorientation in scientific perspectives in order to open the way to holistic approaches more amenable to scientific inquiry and conceptualization, developed general systems theory (*20*). This approach, by treating sets of related events collectively as systems manifesting functions and properties on the specific level of the whole, has made possible recognition of isomorphies across different levels of organization, as molecules, cells, organs, the organism, the person, the family, the society, or the biosphere. From such isomorphies can be developed fundamental laws and principles that operate commonly at all levels of organization, as compared to those which are unique for each. Since systems theory holds that all levels of organization are linked to each other in a hierarchical relationship so that change in one affects change in the others, its adoption as a scientific approach should do much to mitigate the holist-reductionist dichotomy and improve communication across scientific disciplines. For medicine, systems theory provides a conceptual approach suitable not only for the proposed biopsychosocial concept of disease but also for studying disease and medical care as interrelated processes (*10*, *21*). If

and when a general-systems approach becomes part of the basic scientific and philosophic education of future physicians and medical scientists, a greater ...diness to encompass a biopsychoso...al perspective of disease may be anticipated.

Biomedicine as Science and as Dogma

In the meantime, what is being and can be done to neutralize the dogmatism of biomedicine and all the undesirable social and scientific consequences that flow therefrom? How can a proper balance be established between the fractional-analytic and the natural history approaches, both so integral for the work of the physician and the medical scientist (*22*)? How can the clinician be helped to understand the extent to which his scientific approach to patients represents a distinctly "human science," one in which "reliance is on the integrative powers of the observer of a complex nonreplicable event and on the experiments that are provided by history and by animals living in particular ecological settings," as Margaret Mead puts it (*23*)? The history of the rise and fall of scientific dogmas throughout history may give ...e clues. Certainly mere emergence ... new findings and theories rarely suffices to overthrow well-entrenched dogmas. The power of vested interests, social, political, and economic, are formidable deterrents to any effective assault on biomedical dogmatism. The delivery of health care is a major industry, considering that more than 8 percent of our national economic product is devoted to health (*2*). The enormous existing and planned investment in diagnostic and therapeutic technology alone strongly favors approaches to clinical study and care of patients that emphasize the impersonal and the mechanical (*24*). For example, from 1967 to 1972 there was an increase of 33 percent in the number of laboratory tests conducted per hospital admission (*25*). Planning for systems of medical care and their financing is excessively influenced by the availability and promise of technology, the application and effectiveness of which are often used as the criteria by which decisions are made as to what constitutes illness and who qualifies for medical care. The frustration of those who find what they be...e to be their legitimate health needs ...adequately met by too technologically oriented physicians is generally misinterpreted by the biomedical establishment as indicating "unrealistic expectations" on the part of the public rather than being recognized as reflecting a genuine discrepancy between illness as actually experienced by the patient and as it is conceptualized in the biomedical mode (*26*). The professionalization of biomedicine constitutes still another formidable barrier (*8*, *15*). Professionalization has engendered a caste system among health care personnel and a peck order concerning what constitute appropriate areas for medical concern and care, with the most esoteric disorders at the top of the list. Professional dominance "has perpetuated prevailing practices, deflected criticisms, and insulated the profession from alternate views and social relations that would illuminate and improve health care" (*15*, p. 21). Holman argues, not unconvincingly, that "the Medical establishment is not primarily engaged in the disinterested pursuit of knowledge and the translation of that knowledge into medical practice: rather in significant part it is engaged in special interest advocacy, pursuing and preserving social power" (*15*, p. 11).

Under such conditions it is difficult to see how reforms can be brought about. Certainly contributing another critical essay is hardly likely to bring about any major changes in attitude. The problem is hardly new, for the first efforts to introduce a more holistic approach into the undergraduate medical curriculum actually date back to Adolph Meyer's program at Johns Hopkins, which was initiated before 1920 (*27*). At Rochester, a program directed to medical students and to physicians during and after their residency training, and designed to inculcate psychosocial knowledge and skills appropriate for their future work as clinicians or teachers, has been in existence for 30 years (*28*). While difficult to measure outcome objectively, its impact, as indicated by a questionnaire on how students and g...duates view the issues involved in illness and patient care, appears to have been appreciable (*29*). In other schools, especially in the immediate post–World War II period, similar efforts were launched, and while some flourished briefly, most soon faded away under the competition of more glamorous and acceptable biomedical careers. Today, within many medical schools there is again a revival of interest among some faculty, but they are few in number and lack the influence, prestige, power, and access to funding from peer review groups that goes with conformity to the prevailing biomedical structure.

Yet today, interest among students and young physicians is high, and where learning opportunities exist they quickly overwhelm the available meager resources. It would appear that given the opportunity, the younger generation is very ready to accept the importance of learning more about the psychosocial dimensions of illness and health care and the need for such education to be soundly based on scientific principles. Once exposed to such an approach, most recognize how ephemeral and insubstantial are appeals to humanism and compassion when not based on rational principles. They reject as simplistic the notion that in past generations doctors understood their patients better, a myth that has persisted for centuries (*30*). Clearly, the gap to be closed is between teachers ready to teach and students eager to learn. But nothing will change unless or until those who control resources have the wisdom to venture off the beaten path of exclusive reliance on biomedicine as the only approach to health care. The proposed biopsychosocial model provides a blueprint for research, a framework for teaching, and a design for action in the real world of health care. Whether it is useful or not remains to be seen. But the answer will not be forthcoming if conditions are not provided to do so. In a free society, outcome will depend upon those who have the courage to try new paths and the wisdom to provide the necessary support.

Summary

The dominant model of disease today is biomedical, and it leaves no room within its framework for the social, psychological, and behavioral dimensions of illness. A biopsychosocial model is proposed that provides a blueprint for research, a framework for teaching, and a design for action in the real world of health care.

References and Notes

1. A. M. Ludwig, *J. Am. Med. Assoc.* 234, 603 (1975).
2. *RF Illustrated*, 3, 5 (1976).
3. T. S. Szasz, *The Myth of Mental Illness* (Harper & Row, New York, 1961); E. F. Torrey, *The Death of Psychiatry* (Chilton, Radnor, Pa., 1974).
4. R. Rosen, in *The Relevance of General Systems Theory*, E. Laszlo, Ed. (Braziller, New York, 1972), p. 45.
5. H. Fabrega, *Arch. Gen Psychiatry* 32, 1501 (1972).
6. ———, *Science*, 189, 969 (1975).
7. G. L. Engel, *Ann. Intern. Med.* 78, 587 (1973).
8. H. Rasmussen, *Pharos* 38, 53 (1975).
9. S. Kety, *Am. J. Psychiatry* 131, 957 (1974).
10. G. L. Engel, *Perspect. Biol. Med.* 3, 459 (1960).
11. R. Ader, in *Ethology and Development*, S. A. Barnett, Ed. (Heinemann, London, 1973), p. 37; G. L. Engel, *Gastroenterology* 67, 1085 (1974).
12. J. Cassel, *Am. J. Public Health* 54, 1482 (1964).
13. G. L. Engel, *Psychosom. Med.* 23, 18 (1961).
14. R. S. Duff and A. B. Hollingshead, *Sickness and Society* (Harper & Row, New York, 1968).
15. H. R. Holman, *Hosp. Pract.* 11, 11 (1976).
16. K. Menninger, *Ann. Intern. Med.* 29, 318 (1948); J. Romano, *J. Am. Med. Assoc.* 143, 409 (1950); G. L. Engel, *Midcentury Psychiatry*, R. Grin-

ker, Ed. (Thomas, Springfield, Ill., 1953), p. 33; H. G. Wolff, Ed., *An Outline of Man's Knowledge* (Doubleday, New York, 1960), p. 41; G. L. Engel, *Psychological Development in Health and Disease* (Saunders, Philadelphia, 1962).
17. G. L. Engel and L. Salzman, *N. Engl. J. Med.* 288, 44 (1973).
18. R. Dubos, *Mirage of Health* (Harper & Row, New York, 1959); *Reason Awake* (Columbia Univ. Press, New York, 1970); E. Mayr, in *Behavior and Evolution*, A. Roe and G. G. Simpson, Eds. (Yale Univ. Press, New Haven, Conn., 1958), p. 341; *Science* 134, 1501 (1961); *Am. Sci.* 62, 650 (1974); J. T. Bonner, *On Development, The Biology of Form* (Harvard Univ. Press, Cambridge, Mass., 1974); G. G. Simpson, *Science* 139, 81 (1963).
19. R. Dubos, *Man Adapting* (Yale Univ. Press, New Haven, Conn., 1965).
20. L. von Bertalanffy, *Problems of Life* (Wiley, New York, 1952); *General Systems Theory* (Braziller, New York, 1968). See also E. Laszlo, *The Relevance of General Systems Theory* (Braziller, New York, 1972); *The Systems View of the World* (Braziller, New York, 1972); Dubos (19).
21. K. Menninger, *The Vital Balance* (Viking, New York, 1963); A. Sheldon, in *Systems and Medical Care*, A. Sheldon, F. Baker, C. P. McLaughlin, Eds. (MIT Press, Cambridge, Mass., 1970), p. 84; H. Brody, *Perspect. Biol. Med.* 16, 71 (1973).
22. G. L. Engel, in *Physiology, Emotion, and Psychosomatic Illness*, R. Porter and J. Knight, Eds. (Elsevier-Excerpta Medica, Amsterdam, 1972), p. 384.
23. M. Mead, *Science* 191, 903 (1976).
24. G. L. Engel, *J. Am. Med. Assoc.* 226, 861 (1976).
25. J. M. McGinnis, *J. Med. Educ.* 51, 602 (1976).
26. H. Fabrega and P. R. Manning, *Psychosom. Med.* 35, 223 (1973).
27. A. Meyer, *J. Am. Med. Assoc.* 69, 861 (1917).
28. A. H. Schmale, W. A. Greene, F. Reichsman, M. Kenoe, G. L. Engel, *Adv. Psychosom. Med.* 4, 4 (1964); G. L. Engel, *J. Psychosom. Res.* 11, 77 (1967); L. Young, *Ann. Intern. Med.* 83, 723 (1975).
29. G. L. Engel, *J. Nerv. Ment. Dis.* 154, 159 (1972); *Univ. Rochester Med. Rev.* (winter 1971–1972), p. 10.
30. ———, *Pharos* 39, 127 (1976).
31. This article was adapted from material presented as the Loren Stephens Memorial Lecture, University of Southern California Medical Center, 1976; the Griffith McKerracher Memorial Lecture at the University of Saskatchewan, 1976; the Annual Hutchings Society Lecture, State University of New York-Upstate Medical Center, Syracuse, 1976. Also presented during 1975 to 1976 at the University of Maryland School of Medicine, University of California–San Diego School of Medicine, University of California–Los Angeles School of Medicine, Massachusetts Mental Health Center, and the 21st annual meeting of Midwest Professors of Psychiatry, Philadelphia. The author is a career research awardee in the U.S. Public Health Service.

Second Phases in Steel

New analytical methods can identify the types and amounts of complex precipitates in steel.

W. R. Bandi

For many years better analytical methods for the determination of second phases in steel have been needed, because these phases are often more closely related to the heat treatment and mechanical properties of the steel than the elemental composition. I discuss here some of the recent approaches to solving this problem.

Ever since steel was first manufactured, metallurgists have been searching for methods of changing its mechanical properties so that specific grades can be made for particular applications. Often such changes are brought about by the addition of one or more alloying elements to the steel, and at least 35 elements have been added for this purpose. Most of these elements can be present in solid solution in iron, but they often change the mechanical properties of the steel by combining with oxygen, nitrogen, carbon, or sulfur to form precipitates in the steel that are referred to as second-phase compounds. Sometimes the second phase will contain two metals such as nickel and titanium combining to form Ni_3Ti, but most often the second phases are oxides, nitrides, carbides, sulfides, carbonitrides, carbosulfides, and similar compounds. These compounds may be formed in the molten bath, during solidification, during rolling or forming, during heat treatment, and sometimes even during storage at ambient temperature.

Table 1 shows how precipitates can affect some of the mechanical and physical properties of steel. Only a portion of the approximately 200 precipitates found in low-alloy, high-alloy, and specialty steels and some of the important mechanical properties are listed. Often metallurgists can associate precipitates with additional changes in the mechanical, physical, and chemical properties of steel. No attempt has been made in Table 1 to note whether a particular precipitate has a detrimental or beneficial effect on the mechanical properties of steel because in many instances the effect can be either positive or negative depending on the amount, size, and distribution of the precipitate. Precipitate concentration can vary from as much as 10 percent (by weight) (cementite, Fe_3C) to as little as 0.002 percent [boron nitride (BN) and ferrous sulfide (FeS)].

The determination of where a precipitate is located in the iron matrix is of great importance in terms of what effect it can have on the properties of the steel. Even very small quantities of a precipitate located at a grain boundary can induce cracking or corrosion, whereas a larger amount of the same material located randomly throughout the steel will not have the same effect. Small particles of carbide or nitride arranged in rows will form a barrier to slip and dislocation movement in the crystals of the iron matrix and are therefore much more effective in conferring strength than randomly arranged particles.

The particle size of the precipitated phase is also important. As an example, the strength of a steel is changed more by particles of carbide and nitride that are 30 to 400 angstroms in size than by larger particles because these smaller particles are much more effective in preventing grain growth, and fine-grained steels are stronger. Frequently very large particles of carbide or nitride are detrimental to the steel, whereas small particles of the same compound can be beneficial.

The magnitude of the analytical chemical problem can be appreciated when one realizes that more than 50 nitrogen compounds can be present in simple and complex steels. These include simple nitrides such as titanium nitride (TiN) or more complex nitrides such as niobium carbonitride (NbC_xN_y), manganese silicon nitride [$(MnSi)N_2$], and aluminum oxynitride (AlO_xN_y). A like number of carbides and oxides and a smaller number of sulfides and carbosulfides may also be found in steels. There are thus several hundred compounds that can exist in the carbon, alloy, and specialty steels presently being produced in the United States. As a result, the identification and determination of second-phase compounds in steel have been a real challenge in the development of improved steels.

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Domestic Violence: A Diagnosis of High Prevalence

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Overview of Assessment, Incidence and Definitions of Family Violence

Violence in families is being increasingly recognized as highly prevalent and is viewed as a significant variable in the overall health of individual family members. It is also a very frequently-missed diagnosis in the medical assessment of patients both in the emergency room setting and in primary care offices. Family physicians are often the first health care providers consulted about symptoms resulting from family violence. Residents in training need to evaluate the possibility that symptoms are abuse-related both in the emergency room and in office practice. Recent empirical studies have demonstrated that physicians often are not accurately identifying patients who are victims of abuse. It is assumed that the lack of structured, systematic approaches to diagnosis in this area, along with a "conceptual blind spot" about the prevalence of abuse, are responsible for these diagnostic omissions.

Family physicians need exposure to protocols for accurate diagnosis of various types of family violence: (a) elder abuse (b) child abuse: emotional, physical, and sexual; and (d) spouse/partner abuse. Interviewing approaches which assist in identifying violence without immediately alienating family members will be emphasized. The role of family physicians, the role of their psychotherapist colleagues, and the role of state protection services need to be clarified and methods to develop an integrated approach delineated. The goal of assessment is, of course, to have a high degree to sensitivity to situations in which abuse is present. On the other hand, the practitioner must be aware that false allegations of abuse do occur, and accurate assessment will take this into consideration. The special instance of child custody disputes and false allegations of abuse during the divorce process is now recognized as an important dynamic related to the parental alienation syndrome.

It has also become apparent that concern about possible abuse is influenced by sociocultural characteristics of patients. Families from different sociodemographic suburban families, trigger different responses in health care providers. Difficulties encountered by providers with different life experiences and/or ethnic or social background from their patients and the role of these differences in assessing abuse are important to recognize. The following outline details material about the major forms of family violence. Definitions, assessment techniques, and references are included for each area.

Definition and Prevalence of Family Violence

A general definition is: those acts that result or are likely to result in physical injury (Straus, 1980). Additionally, a family is defined as "violent" if at least one violent act occurred within last year (Crelles, Straus, 1985). Acts of minor violence have a potential for causing serious injury, for example: pushing, shoving, slapping, and throwing things. Acts of severe violence have a high likelihood of causing serious injury, such as kicking, biting, punching, hitting with an object, "beating-up," and attacking with knife or gun.

At least 2.2 million Americans are victims of violent medical injury each year. The U.S. ranks first among industrialized nations in violent death. Deaths caused by violent and unintentional misuse of firearms exceed in number the combined total of the next 17 nations (U.S. Dept. of Health and Human Services, 1991). Both suicide and homicide constitute the 4th leading cause of lives lost to people prior to age 65 in the U.S. Suicide is the 3rd leading cause of death among people between the ages of 14-34. Violent death and abusive behavior are an important cause of injury-related death and long-terms disability.

National Objectives for Reducing Violence and Abusive Behavior

A national focus was developed in 1985 by Surgeon General and U.S. Public Health Service to focus on violence as a leading public health problem. The federal government has involvement through U.S. Dept of Health and Human Services, with the goal of reducing various forms of family violence by year 2000. Specific objectives for this public health problem focuses on six key areas: 1) Homicide and assaultive violence, 2) Domestic violence (partner and elder abuse), 3) Child abuse, 4) Sexual assault, 5) Suicide, and 6) Firearm injury. Several needs are to be emphasized in national health policy, including establishing effective services for victims that address the physical and psychosocial consequences of abuse.

Physical Child Abuse

Incidence and Consequences

There has been a steady yearly increase in child abuse with over one million cases reported in the United States per year. In spite of better reporting, no one really knows the true incidence of abuse, since injuries are often explained as "accidents." Physicians (family practice & pediatricians) are often the first persons to come in contact with evidence of child maltreatment. Studies have shown that in emergency rooms: 1)12% of trauma in E.R. visits by children cannot be explained by parents and 2) Reinhurst (1980) documented that 22.5% of infants under 13 mos of age in E.R. had injuries ssuspected to be secondary to abuse.

The mortality & morbidity data (National Study on Child Abuse Reporting) regarding the physical abuse of children is important for physicians to recall: 1) Death rate among physically abused children is 4-5% and 2) Permanent injury occurs in about 30-35% without prompt treatment.

Physical Indicators of Physical Abuse/Neglect

There are distinctive physical signs of abuse in children. The recommendations are to examine children carefully for the following findings:
1) Bruises and welts: a) on face, lips, or mouth; b) in various stages of healing; c) on large areas of the torso, back, buttocks or thighs; and d) unusual patterns, clustered, or reflective of the instrument used to inflict them.

2) Burns: a) cigar or cigarette burns; b) glove or socklike burns or doughnut-shaped burns of the buttocks or genitalia--suggests immersion in hot water
3) Fractures: a) skull, jaw or nasal fractures; b) spiral fractures of the long bones (arm or leg): c) fractures in various stages of healing; d) multiple fractures; or e) any fracture of child under age two
4) Lacerations or abrasions: a) mouth, lip, gums, or eye; or b) external genitalia
5) Human bite marks

Child's Behavior

There are findings that indicate a high likelihood of domestic violence and physical abuse in children. Although some of these behaviors can be associated with children who have not been abused, they should raise the physicians level of concern:

1) Wary of physical contact with adults
2) Apprehensive when other children cry
3) Demonstrates extremes in behavior, including aggressiveness or extreme withdrawal
4) Seems frightened of parents/other caretakers
5) Reports injury by parents/caretakers
6) Rarely attends school or uneven attendance
7) Begins engaging in a pattern of delinquency, including vandalism, prostitution, or drug use.

Characteristics of Abusive Parents

Who are the people who abuse their children? There are many areas of a parent's characteristics, behavior, or circumstances that have been shown to be related to a higher likelihood of physically abusing a child. Practitioners should look for these patterns in assessing families:

1) Less than 10% are psychotic or psychopathic--debunk myth
2) More than 90% are "common folk"
3) Most overwhelmed by role of parenthood - React to crises (large or small) by abuse
4) Most are amenable to treatment
5) Abuse often symptom of other problems: Abusers project problems onto children
6) Misuses alcohol or other drugs
7) May have history of abuse as a child (Only 30% of abused do repeat cycle)
8) Uses harsh discipline, inappropriate to child's age, transgression or condition
9) Explanations of injury: illogical, unconvincing, contradictory, none
10) Seems unconcerned about child
11) Significantly misperceives child - sees child as bad, evil, a monster
12) Attempts to conceal child's injury or protect identity of person responsible
13) Maintains chaotic home life
14) May be family with several long-term chronic illnesses
15) Appears to be under severe stress/anxiety due to finances
16) Blames and belittles child
17) Appears to have a cold, rejecting interpersonal style

Predisposing Factors in Abuser/Network

There are four discrete areas on which the clinician should focus in clinical interviews of family members when physical child abuse is under consideration:

Individual Assessment
1) Abused as child
2) Unmet dependency needs
3) Substance abuser
4) Impaired impulse control
5) Poor self-image
6) Inadequate defenses

Familial
1) Unstable marriage or relationship
2) Spouse abuse in family
3) Isolation from other support networks

Social Assessment
1) Substandard social network/support neighborhood, school, kinship, church activities/resources
2) Problems in housing situation
3) Problems in employment status; time allotments

Cultural Assessment
1) Assess view of discipline;e.g., potty training, corporal punishment
2) Assess views about violence
3) General attitudes toward child-rearing

Sexual Child Abuse

Definition, Incidence and Patterns

Sexual child abuse involves the participation of a child or an adolescent in sexual activities that they do not understand given their developmental stage, to which they cannot give consent or that violate the social taboos or laws of our society. The range of activities includes visual or noninvasive activities such as exhibitionism of an adult or coercing the child to have erotic films made, to fondling by or of the adult, to brutal penetration of bodily orifices.

From a legal perspective, one must have documented physical evidence, identification of abuse by the victim, or acknowledgement by the child abuser, in order to have a legal case against a perpetrator. For purposes of referring the child or family to protective services or for counseling, the physician need only have a suspicion that sexual abuse has occurred.

The courts seem to be more protective of children in terms of separation of the victim from perpetrator in the case of sexual abuse, as compared to physical abuse. Goldberg, Wall, and Commerford (1990) describe a case of suspected, unconfirmed sexual abuse in which the father also presented a physical danger to his family (while displaying a gun, he threatened to kill all of them); the daughter was returned to his care, as the father passed polygraph test regarding the abuse.

It is debatable whether the incidence of sexual abuse is rising, or if there is an increased emphasis placed on the problem by health officials. A report compared recent statistics in the 1970's and 1980's to those reported by Kinsey's work in 1953 and concluded that the most methodologically sound projects yielded results of no significant increase in child sexual abuse. The stable

incidence reported is that 10-12% of girls younger than 14 experience sexual abuse by a perpetrator at least 5 years older than the girl. Other researchers have estimated that incidence to be closer to 25% for girls and 10% for boys.

Familial incest is more common than stranger molestation. Some researchers have reported that sexual abuse appears to be more prevalent than physical abuse or battery. The median age of the child is 11 years of age. Ten girls are molested for every one boy; while 97% of the abusers of both genders are males. Seventy-five percent of the offenders were known to the child or family; 27% lived in the home (father, stepfather, mother's partner, brother); another 11 related by blood or marriage; less than 25% were total strangers. The offenders ranged in age from 17 to 68 years, with a median of 31 years; more than 30% were under 24, 60% were under 34 and 10% were over 50. Fathers comprised 27 percent of one sample, evenly divided between natural and stepfathers. In more than 40% of cases, abuse continued from weeks to years. Force or the threat of force was used in 60% of the cases. In 25%, the lure was more subtle, based on the child's natural loyalty and affection. In 15%, money or gifts were offered.

Sexual Abuse is Color-Blind and Income-Blind

Debunking a popular myth that ethnicity and socioeconomic status are strong influences on sexual abuse, most studies have documented that "race and social class do not appear to be related to childhood sexual abuse" (Felman et al, 1991, p 32).

Presentations of Abuse:

There are often no clear symptoms; Children are often coerced into secrecy, so symptoms not clear. There are several general, nonspecific symptoms often associated with sexual abuse: sleep problems, phobia, enuresis, encopresis. Psychological symptoms: which are actually consequences of abuse, include: lowered self-esteem, mistrust of adults, guilt, depression, suicidal ideation, delinquency, acting out, and running away. More specific signs and symptoms: rectal or genitalia pain, bleeding or infection, STDs, and developmentally precocious sexual behavior.

Assessment and Interviewing Children

Physicians are urged to consult the guidelines for interviewing published by the American Academy of Child and Adolescent Psychiatry.

Two sets of statements and questions are important to include on a pediatric examination with a child on a periodic basis. These do not even mention sex and yet will prompt questions or statements from children who have been sexually abused.

"I am a doctor and am an expert about bodies. Do you have any questions about your body or kid's bodies? and how they work?

"Adults have bodies that are different from kids. Do you have any questions about adult's bodies? and how they work?

The interviewing style should include: a) Using nonleading questions; b) Maintaining a calm, unemotional, but empathic demeanor; c) Encouraging child with nonverbal behavior, openness and rapt attention; d) Encouraging child with paraverbal signs: "uh huh," "go on," "okay," "yes"; and e) Encouraging child with verbal statements: "Tell me more about that." "What happened after that?"

Drawings, dolls, and other interviewing aids can be helpful, especially with very young children. However, the provider should check rules in each state, as some jurisdictions consider these to be "leading the witness," and may ruin a case against a perpetrator in court.

Parents and other caretakers should be interviewed separately. False allegations of abuse have become an issue, especially during divorce, custody and visitation hearings. It is important to take all allegations of abuse seriously, but to realize that in custody considerations, up to 25% of allegations may be false.

Physical Examination

The physician should try to avoid further emotional trauma while examining the child. It is best to perform the exam in the presence of a supportive adult not suspected in the abuse.The exam should focus on trauma in areas involved in sexual acts: mouth, breasts, genitals, perineal area, buttocks an anus. Physical Findings Suggestive of Child Abuse (American Academy of Pediatrics, 1991) include:

(1) chafing, abrasions, or bruising of the inner thighs and genitalia
(2) scaring, tears, or distortion of the hymen
(3) a decreased amount of or absent hymenal tissue
(4) scarring of the fossa navicularis
(5) injury to or scarring of the posterior fourchette
(6) scarring or tears of tne labia minora, and
(7) hymenal enlargement (see Cantwell, 1987)
(8) bruises around anus
(9) scars and anal tears, especially those that extend into surrounding perianal skin
(10) anal dilation and visual sphincter laxity

The differential of genital trauma or findings includes accidental injury, physical abuse, infectious processes, and congenital malformations. The physician should obtain a detailed history and consult with colleagues if the etiology is unclear. A regional child protection team or other experts can be consulted in case of confusing or contradictory findings. Do not do cultures for STDs routinely, only if history or physical findings suggest the possibility of direct contact. If history of sexual abuse with ejaculation within 72 hours, use standardized rape kit and adapt for child.

The physician should include detailed records, drawings and or photographs. Written reports to county agencies and law enforcement are an excellent idea; the more explicit the opinion, the less likely that the physician will need to testify for potential protective custody hearings. In criminal proceedings, the physician will have to testify.

Families undergoing evaluation of sexual abuse need mental health services. All children who have been sexually abused need supportive counseling. More extensive treatment depends on extent of the abuse (how violent, how long it occurred, and the closeness of the relationship of the child to the abuser). Parents and other family members, such as siblings, also require counseling; the extent of this depends on whether the situation involves an intrafamilial abuser or if the children were victims.

Spouse and Partner Abuse

Incidence and Patterns of Abuse

The incidence of spouse or partner abuse is astonishingly high to most primary care physicians. Some surveys have estimated that at least one act of violence occurs from husband to wife in 50 percent of marriages (Straus, Gelles, & Steinmetz, 1980). Other studies gauge the incidence of abuse as closer to a 40 percent lifetime incidence and a 25 percent frequency of abuse within the last year (Hamberger, Saunders & Hovey,1992). Although the highly publicized 1993 case of Lorena Bobbitt and John Wayne Bobbit noted the possibility of physical violence occurring from a wife toward her male partner, only 12% of spousal abuse is reciprocal, occurring in both directions between partners. As Burge (1989) has noted, there are two main ingredients that lead to the abuse of women. The first involves the inability of abusive men to deal constructively with anger; the second, the prevailing attitudes in the larger society that condone violence toward women.

The onset of marital abuse occurs normally within the first year of marriage. Straus and colleagues have reported that 49 percent of battered women saw their husband acting violently with others or were themselves assaulted by him before marriage. By the end of the first year of marriage, an average of 72 percent of women who had seen some evidence of premarital violence, had been abused. The majority of these battered women experience multiple assaults each year, with about 40 percent of them experiencing assaults on a weekly basis (Okun, 1986). A high level of regular abuse appears to be related to a number of identifiable factors.

Age--The largest number of assaults on wives occurs where the spouses are under the age of 30 and the wives are younger than their husbands. One possible reason for the shift of abuse towards the younger generation is the changing values among many of the younger women concerning divorce and sex roles (Okun, 1986). In a survey of men and women regarding the presence of family violence, Gin et al (1991) reported an incidence of 44 percent for current violence among respondents under 25 years of age, and an 11 percent incidence for those above 25. Okun (1986) further notes that the age discrepancy between husband and wife is an important one; apparently, the wife being older than her male spouse results in a lower abuse rate. Whereas, when the man is older than his spouse (the average being 3.4 years), the abuse rate is higher than in marriages without this age discrepancy.

Ethnicity.--Ethnicity is a significant variable in spouse abuse, as groups differ in attitudes and behaviors (Coley and Beckett, 1988). According to Straus (1986) the abuse rate among members of minority groups is over triple that of abuse within Caucasian marriages. In addition, Straus believes that the higher abuse rate in African-American marriages compared to Caucasian marriages has to do with the frustrations encountered by being black in a predominantly white American society. It has also been reported that the rate of abuse is even higher in other minority groups, such as Orientals, Mexicans, or Europeans (Lewis, 1987). However, the rate of self-reported abuse was not significantly different in Gin et al's (1991) sample of Spanish-speaking and non-Anglo participants than in English-speaking, Anglo subjects. The results may have been affected by the fact that a number of Spanish-speaking women were excluded from the study because of illiteracy. The authors theorize that illiteracy may be associated with a higher rate of domestic violence and a lower rate may have been found by excluding these women.

Socioeconomic Status.--The lower the income and occupational status of the couple, the higher the rate of partner abuse; the rate of violence in a marriage is double for blue collar workers in contrast to white collar workers (Okun, 1986) Other studies show that the most abusive relationships have a mean income well below the national average (Coleman, Weinman, & Hsi, 1980). Straus reported that families at or below the poverty level have a 500 percent increase in

the rate of violence compared to the upper classes (Lewis, 1987). In the Gin et al (1991) study, which included both indigent and affluent subjects, poverty was a significant predictor of domestic violence, as determined by logistic regression analysis.

The numerous studies cited have catalogued additional indicators that are associated with higher rates of domestic violence, as indicated in the table below.

Indicators of Domestic Violence
Female gender**
Young age: Less than 25-30**
Low Socioeconomic Status**
Minority Group Member
Unmarried status**
Recently separated or divorced
Woman younger than male partner
Victims or partners abuse alcohol and/or street drugs
Pregnancy
** most significant variables from the Gin et al (1991) study

Abused Partners in the Medical Care System

Recent reports have suggested that a high percentage of emergency room visits by women are for injuries sustained through domestic violence, but that they are not frequently assessed as assault incidents (Morrison, 1988; Raymond, 1989). Another study documented that approximately 30 percent of women visiting internal medical outpatient practices had been victims of partner abuse at some time in their lives, and that 44 percent of young adult patients and 11 percent of older patients were victims of current abuse (Gin, Rucker, Frayne, Gygan, & Hubbell, 1991). If physicians include partner abuse in their differential diagnosis of injuries (including unexplained abdominal pain), they will detect it. Pregnancy appears to be related to a high level of abuse; approximately 30 percent of pregnant women suffer physical abuse during the gestation of their child (Okun, 1986).

Hamberger, Saunders and Hovey (1992) document the rarity of physician inquiry into the problem of physical abuse. In their study of approximately 400 women seeking medical care from a family practice clinic, 22.7 percent had been physically abused by their partners within the last year, with a lifetime rate of physical abuse of 38.8 percent. Yet, only six women in the group had been asked about abuse by their health care providers. Although only about 2% of women report that their physicians asked about partner abuse at their most recent visit, patients who have had an extended office visit in the past had higher inquiry rates, ranging about 8 or 9 percent. Interesting, given the difference in possible medical consequences, more family physicians were shown to have inquired about relationship problems than about verbal or physical abuse (Hamberger et al, 1992)

In a Canadian study, Ferris and Tudiver reported that about half of family physician respondents believed that they should counsel patients who were abuse victims, as well as referring patients

for other appropriate services. Yet, only 13 to 19 percent of the physicians had a standard method for diagnosing wife abuse, even though half of them thought that a standard method for diagnosing and treating wife abuse would be helpful.

Understanding Why Women Do Not Leave Abusive Relationships

Economic.--There are three main reasons why women enter, tolerate, and stay in abusive relationships; these reasons are financial, financial, and financial. Economic considerations play the most important role; women experience extreme job and pay inequality, and many virtually are not able to support themselves and their children without a man in the household (Straus & Hotaling, 1980). Aguirre (1985) reported that 84 percent of women in a shelter whose spouse was their sole source of income planned on returning to him, while 82 percent of the wives whose husbands did not provide their only means of income planned to separate.

Family and Social Considerations.--Another major reason that women stay in abusive relationships relates to the preservation of family life and stability for children. In addition, the women experience little societal support for leaving. Society has placed a double bind on battered wives, they are often blamed for not seeking help, but "when they do, they are advised to go home and stop the inappropriate behavior, which causes their men to hurt them" (Okun, 1986). There is also a strong belief among battered women that the husband will be able to change and will cease being abusive (Holtsworth-Munroe, 1988), and that the situation will improve. Additionally, Ferraro and Johnson (1983) point out that women may be prompted to leave when they relinquish hope that the situation will get better. This diminution of hope is associated with a decrease in the partner's remorse and expressed love and an increase in the level of violence. Also, if the women experience a change in resources, such as a safe place to stay, they may be finally prompted to leave.

Personal.--It is important for the physician to understand that there are several reasons prompting women to remain in abusive relationships. One factor has to do with the personal sphere: Many women have low self-esteem and a lack of confidence related to their battering by spouses. Most abused women see themselves as relatively powerless and as trapped within their relationships. Since most battered women feel dependent on others (Okun, 1986), their personal initiative and personal assertiveness may not be sufficient to leave the relationship at the point that they are first evaluated. It is essential to emphasize that women do not stay because they have masochistic tendencies, as documented by Kuhl (1984). They may legitimately have ambivalent feelings about the abuser, experiencing feelings of love, as well as fear and disdain.

Emotional Disability.--The best explanation of why women stay in abusive relationships is because they suffer a form of Post-Traumatic Stress Disorder (PTSD), as described by Janoff-Bulman and Frieze (1983). As noted below, some of the symptoms characterizing abused women include re-experiencing the trauma in nightmares and flashbacks, a numbing of responsiveness to the external world, and a myriad of anxiety-related symptoms. From another perspective, they exhibit symptoms similar to those of kidnap victims or hostages (Hilberman (1980), including a distortion of reality and a pathological transference that often develops between kidnappers and victims. Symonds (1975) uses the analogy of the "Stockholm Syndrome," in which victims describe positive feelings toward their captors and negative feelings toward the rescuers. Women who are repeatedly abused experience threats against their life, damage to their property, and emotional degradation. The male abuser may then follow episodes of abuse with a "honeymoon" period in which he makes amends, promises to reform, and to love and cherish. It is perfectly understandable that the battered woman, like the political hostage, becomes dependent on her tormentor and may, in an ironic distortion of reality, view the assailant as her protector.

Determination of Possible Abuse

First, have a high index of suspicion, being ever cognizant of the incidence. It is important to recognize that many of assaults are severe. Hamberger et al (1992) report that during the past year, (a) 7.5 percent of women had been hit or an attempt was made to hit them with an object, (b) 3 percent received multiple blows, (c) more than 5 percent were choked, and (d) 3 percent were threatened or victimized with a knife or gun. The one year injury rate for all women due to domestic assault was 13.3 %, while the at-risk women had rate of 14.8%. During their lifetimes, 38.8 percent of the sample had been physically abused by an intimate partner. In terms of specific threats or actions, 19% were hit or almost hit by an object, 12% to 13 % were beaten and/or choked, and 10% were threatened with a knife or gun. The lifetime injury rate was 24.7%.

Physician Preparation for Handling Abused Patients

Physicians should have a high index of suspicion regarding partner abuse among all women patients, particularly those under 30 years of age or those who are pregnant. Asking some screening questions to all women is an appropriate area of inquiry for all women. The physician should follow inquiries about the patient's level of satisfaction with relationships, with statements and questions about abuse. "I am aware that women in this society are often victims of verbal or physical abuse by men. Have any events occurred that you consider to be abusive?" Additional questions are described below. Completing a comprehensive physical examination and carefully attending to headaches, earaches, and abdominal pain is crucial in any emergency room presentation by a woman.

It is important for physicians and other health care professionals to have completed some planning before an injured woman presents in the clinic or hospital. For instance, the health care provider needs to know resources available in the area, such as women and children's shelters and counseling facilities. It is also important to know legal requirements for obtaining restraining orders; if a woman is not able to obtain one on the first documented abuse incident, caution her about returning to her home. Florida has recently enacted a "stalking" law, and women are able to receive restraining orders if she has good reason to believe that someone may endanger her.

Questions to use on history:

Braham, Furniss, Holtz & Stevens (1986) list of questions for uncovering suspected abuse in women. They suggest that it is crucial to ask direct questions in a nonthreatening, empathetic manner. Examples of statements and questions from their list include:

I noticed you have a number of bruises. Could you tell me how they happened? Did someone hit you?

You seem frightened of your partner. Has he ever hurt you?

Many patients tell me they have been hurt by someone close to them. Could this be happening to you?

You mention your spouse loses his temper with the children. Does he ever lose his temper with you? Does he become abusive when he loses his temper?

Have there been times during your relationship when you have had physical fights?

Do your verbal fights ever include physical contact?

Your partner seems very concerned and anxious. Was he responsible for your injuries?

Other statements or questions validate the "normalcy" of abuse or its prevalence, so that the patient is not made to feel inferior or "different" if it is occurring in her family. Another option for assessment would be to use a written scale to assess the possibility of domestic violence, such as Kuhl's (1984) Domestic Violence Assessment Form. Additionally, if a physician has a patient complete a questionnaire that taps family functioning in several areas, such as the Family Apgar, it is then easy to query about anger and violence.

"So, you state, Mrs. Smith, that you do not feel that your family supports your efforts outside the home. Does your husband/partner not encourage you to spend time with others?"

"Tell me a little about what happens in your family when people are angry. For instance, are you a 'loud anger' or a 'quiet anger' family? "

" Do people lose their temper often or infrequently? Does the anger ever escalate to the point that one person might throw something or hit someone else?"

If the physician sees the children in a family, they are the perfect family members to ask about anger, especially if the physician claims that they have had experience with really noisy, "loud anger" families. Children often do not see the harm in describing the events to an empathetic, concerned physician; whereas, adults may be embarrassed or worried about the consequences of such a disclosure.

The "Stockholm Syndrome" consists of behavioral changes exhibited by kidnap victims and hostages. It is often characterized by a pathological transference that develops between abuser and victim; due to terror, development of a regressed dependence and gratitude. A woman may develop negative attitudes toward potential helpers and the distorted notion that her persecutor is her protector.

Characteristics of Abused Women

There is not a psychological prototype of an abused woman. According to Follingstad, et al (1980) "the population of battered women is a heterogeneous one that will react and cope in a vast range of ways with their experiences" (p. 387). Additionally, there is no empirical proof that abused women contribute to their own abuse by being aggressive, efficient, masculine, sexually frigid, controlling or castrating, nor by having a masochistic personality (Kuhl, 1984). On the other hand, Kuhl reports that these women do exhibit characteristics that appear to be a result of abuse: cautiousness, shyness, emotional blunting or low emotional expressivity, difficulty in coping with stress or trauma, and avoidance of confrontations.

Symonds (1979) review of research on victims of violent crime is relevant to the stages that abused women may experience. A three stage reaction pattern is described as: (1) initial phase of shock, disbelief and denial; (2) a second phase of acknowledging the reality wherein a state of terror sets in and the victim feels dependent, and (3) a period of depression with intermittent inner-directed rage and outbursts of anger. In all of these phases, the woman's emotional responses may profoundly influence her problem- solving ability and judgment. The long-term psychological effects of constant victimization include: a profound betrayal of trust; chronic tension; low ego strength and an impaired level of self-esteem; difficulty coping with aggression; feelings of guilt, shame, and inferiority, especially if verbal and emotional abuse are present along with the

physical; and a gradual replacement of love with loneliness and pessimism.

A table is included that contains a compilation of symptoms that researchers report as commonly occurring in physical abuse. They are categorized into different diagnostic groups, including physical, psychosocial, and cognitive.

Common Symptoms of Partner Abuse

Physical Findings:

physical injuries of all kind
especially injuries to the head
(headaches, earaches)
except in pregnancy, blows to the abdomen resulting in injury
psychosomatic complaints
vague pain reports
exaggerated startle reflex

Psychosocial Symptoms:

emotional blunting
sleep disturbance
anxiety
depression
terror
nightmares, flashbacks, intrusive thoughts
inability to handle anger
intense feelings of vulnerability
helplessness-hopelessness syndrome
lowered self-esteem
withdrawal from the external world
isolation from peers
shyness
reduced coping skills
avoidance of confrontation

Cognitive Symptoms:

a numbing of responsiveness to the external world
avoidance of any stimuli associated with the trauma
diminished decision-making and problem-solving
distortion of reality - the "Stockholm Syndrome"
denial and rationalization of injuries or partner responsibility

It is crucial for physicians to remember that severe depression and an increased risk of suicidality are also often present. Stark et al (1979) reported that there is a 25 percent suicide attempt rate after chronic abuse, whereas only 6 percent of these women had any attempts before the initial assault. Most battered women who attempt suicide do so with prescription overdoses, according to Gayfor (1975); 42 percent of her sample had attempted suicide. Furthermore, 71 percent of Gayfor's study group had received hypnotics, tranquilizers, or antidepressants. Stark et al (1979) found that victims of abuse are more likely to leave emergency rooms with some sort of prescription than other patients, including tranquilizers or pain medications. The medications were given whether or not they acknowledged the abuse. Hilberman and Munson (1977-78) found that most abused women had been treated periodically or consistently with sedative-hypnotics, tranquilizers and/or antidepressants.Self-destructive acts by the abused victims encourage health care providers to view the women as pathological; physicians then focus on the battered partner as the problem rather than the abusive partner who may be absent from the professional's clinic or hospital.

Coping strategies

Major coping strategies of abused women include substance abuse, denial, and a constant stance of learned helplessness. The findings delineated above about the prevalence of psychotropic drug prescriptions given to abused women are illuminating considering the risk of prescription drug abuse in battered women. In addition, abused women are at risk for abusing alcohol and illegal drugs, as are their partners.

Denial is pervasive and injurious to the woman and her responsiveness to help from the medical profession. She may: (a) deny the injury (It really did not hurt very much."), (b) rationalize the motives of the partner ("His job is very stressful."), (c) deny victimization ("It was really my fault for spending too much money."), and (d) deny alternative options ("I really can't leave, the children would be devastated.") Another form of denial has to do with belief that it is her job to stay and help the abuser; here the woman usually appeals to traditional or religious values. She may also believe that violence is normal, justified and controllable; these beliefs are more common in women who grew up in abusive homes.

The victim may also have a cognitive defense style of learned helplessness, as originally described by Seligman (1975) to explain depression. When a person has experienced trauma she cannot control, her motivation to respond in the face of later trauma is diminished. In spouse abuse, a learned helplessness stance is developed partially due to the attacks being unprovoked, without cues, and of a degree not corresponding to the external events (Martin, 1976). In addition, when women do act to help themselves, their efforts may not be rewarded in the external world. For instance, physicians do not ask about possible abuse and the legal system does not respond by issuing assault charges when women request them (only 3% of women were successful in this endeavor). Then, the women may be punished when their attempts to protect themselves threaten the husband and she may be subjected to additional abuse (Follingstad, 1980)

Another negative coping mechanism important to mention involves the displacement of anger; some battered women abuse their children physically. Inquiry into this dynamic is crucial, as the physician is often able to convince a woman that treatment is imperative if her children are at risk, either due to her bouts of anger or the abuse of her partner.

Initial Interventions and Counseling Approach

After the physician has determined that the patient is a victim of abuse: (a) they should attempt to

assess the level of current danger; (b) develop an atmosphere of empathy and understanding and counsel her about her experiences; (c) validate her fears and negative emotions; (d) discuss immediate and long-range alternatives to living with violence; and (e) develop an appropriate intervention plan with the patient. "The battered woman should not be blamed for staying with the abusive partner, rather she must be understood as a victim/survivor. Yet, after the understanding must come the interventions to help her understand and confront the ties that bind" (Follingstad, et al, 1984, p 387).

The physician must help the patient to develop realistic expectations about leaving an abusive relationship. It is especially important for the physician to account for the factors that prompt women to stay and realize that expecting the patient to move immediately to a shelter and extricate herself from a dangerous situation is often not realistic. She should be sensitively counseled about the reasons that she has chosen not to leave before now, have the reasons validated as understandable and urged to develop a plan that will eventually be successful. In the meanwhile, she should be given emergency numbers (police, domestic crisis lines, women and children's shelters) and brought back for regular visits. In addition to leaving the relationship, intensive individual and conjoint counseling can be utilized in selected couples to overcome the cycle of violence in which they both live. These feelings deserve empathy on the part of the health care provider and skilled counseling to allow the woman to develop priorities that are more self-protective.

Various protocols have been proposed to deal with the presentation of abused women in the medical system (McLeer & Anwar, 1987). The plan that the physician develops depends partially on the level of risk to the patient's health/life that the situation encompasses. It is an interesting cultural phenomenon that we have legislation in place that allows the provider to involuntarily hospitalize someone who is suicidal or homicidal; yet the standard of care in emergency rooms is to send abused women home to an environment where their life is endangered. It is this standard of care which must be changed to better prevent recurrence of the violence. For a situation deemed to present a high level risk, the physician should arrange for a shelter representative to meet the patient at the office or emergency room. Ask the patient to at least talk to the representative, even if she appears intent on going home. If there has been a clear assault on an adult only, ask woman for permission to call police or inform her of your plan to do so

Immediate intervention is required if children have also been abused. Physical abuse of children occurs in at least 40% of homes in which the man batters his partner. In the case of physical child abuse, the physician must notify the child protection team or another HRS agency of abuse. Inform the woman that this is mandatory and have her take steps to protect herself and the children during the investigation.

If your assessment indicates that the patient or others are at a moderate to low level risk: (a) provide her with the number of the local women and children's shelter; (b) provide her with the number and address of family counseling services and encourage participation by the woman and her partner; (c) Clarify her "point of contact" within the legal system, both police or sheriff's office and an attorney who could help her with a restraining order; (d) tell the patient that you are not only concerned for her safety, but that of the children; women may be motivated to seek help "for the sake of the children;" (e) provide her with a referral to vocational counseling or job information if she is unemployed or underemployed; and (f) have the patient return within two weeks for a re-check to re-assess the level of danger and her coping strategies.

Description of Effective Therapy Approaches: Informing Patients About What to Expect

Both individual and conjoint therapy are employed to treat couples with a history of domestic violence. For the conjoint therapy, co-therapy with opposite gender therapists is seen as the most effective therapeutic modality. "This technique diffuses anger, increases clarification, and helps reduce tensions or resentments that build into violence later." (Harris, 1986) During the initial stages of therapy, the couple should be separated and living apart, as this de-escalates the conflict and increases the motivation for the batterer to work on the relationship. Often, group treatment of male abusers is an essential part of treatment, as well as concurrent treatment for alcohol or drug abuse, when indicated. Individual and group treatment of abused women focuses on self-esteem, on the cultural determinants of violence, on appropriate assertiveness, and on direct treatment of depression and PTSD symptoms.

Counseling with couples involved in domestic violence has several key ingredients: (1) emphasizing the role of anger control, (2) teaching constructive problem-solving skills, (3) using behaviorally-oriented communication skills, (4) clarifying assumptions each party makes about the other's behaviors, (5) educating clients about the cycle of violence and asking for acceptance of appropriate responsibility around the violence from each partner, (6) educating clients in the use of time-outs and other anger-defusing techniques, (7) encouraging independence from the destructive parts of the relationship, and (8) teaching appropriate assertiveness skills.

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References

Aguirre, B.E. (1985). Why do they return?: Abused wives in shelters. Social Work, 30, 350-354.

Braham, R., Furniss, K., Holtz, H., Stevens, M.E. (1986) Hospital protocol on domestic violence. Morristown, N.J.: Jersey Battered Women's Services, Inc., 1986.

Burge, S. K. (1989). Violence against women as a health care issue. Family Medicine, 22, 368-73.

Davis, L.V. (1991). Violence and families. Social Work, 36(5), 371-373.

Ferraro, K. J. & Johnson, J. M. (1983). How women experience battering: The process of victimization. Social Problems, 30, 325-339.

Ferris, L. E. & Tudiver, F. (1992). Family physicians' approach to wife abuse: A study of Ontario, Canada, practices. Family Medicine, 24, 276-282.

Follingstad, D. R. (1980). A reconceptualization of issues in the treatment of abused women: A case study. Psychotherapy: Theory, Research and Practice, 17, 294-303.

Follingstad, D. R., Neckerman, A. P., & Vormbrock, J. (1988). Reactions to victimization and coping strategies of battered women: The ties that bind. Clinical Psychology Review, 8, 337-390.

Gelles, R. (1977). No place to go: The social dynamics of marital violence. In M. Ray (Ed.), Battered Women: A Psychological Study. New York: Van Nostrand Reinhold Co.

Gin, N. E., Rucker, L., Frayne, S., Gygan, R., Hubbell, F. A. (1991) Prevalence of domestic violence among patients in three ambulatory care internal medicine clinics. Journal of General Internal Medicine, 65, 317-322.

Hamberger, L.K., Saunders, D. G., & Hovey, M. (1992). Prevalence of domestic violence in community practice and rate of physician inquiry. Family Medicine, 24, 283-287.

Harris, J. (1986) Counseling violent couples using Walker's model. Psychotherapy, 23(4), 613-621.

Hauser, W. J. (1982). Differences in Relative Resources, Familial Power and Spouse Abuse. Palo Alto: R & E Research Associates, Inc.

Holtaworth-Munroe, A. (1988). Causal attributions in marital violence: Theoretical and methodological issues. Clinical Psychology Review, 8, 331-344.

Janoff-Bulman, R. & Frieze, I. H. (1983). A theoretical perspective for understanding reactions to victimization. Journal of Social Issues, 39, 1-17.

Kuhl, A. F. (1984). Personality traits of abused women: Masochism myth refuted. Victimology, 9, 450-463.

McLer, S. V., Anwar, R. A. H. (1987). The role of the emergency physician in the prevention of domestic violence. Annals of Emergency Medicine, 16, 1155-1161.

National Committee Against Domestic Violence. (1987). Domestic Violence Statistical Survey. Washington, D.C.:

Seligman, M. E. P. (1975). Helplessness: On depression, development and death. San Francisco, CA: Freeman.

Sigler, R. T. (1989). Domestic Violence in Context. Lexington, MA: Lexington Books.

Snyder, D. K. & Fruchtman, L. A. (1981). Differential patterns of wife abuse: A data-based typology. Journal of Consulting and Clinical Psychology, 49, 878-885.

Straus, M. (1980). Victims and aggressors in marital violence. American Behavioral Scientific, 23, 681-704.

Straus, M.A., & Gelles, R. J. (1990). Physical Violence in American Families: Risk Factors and Adaptations to Violence in 8,145 Families. New Brunswick: Transaction Publishers.

Symonds, A. (1979) Violence against women: The myth of masochism. American Journal of Psychotherapy, 33, 161-173.

Symonds, M. (1975). Victims of violence: Psychological effects and after-effects. American Journal of Psychoanalysis, 35, 19-26.

United States Department of Health and Human Services. National objectives for reducing violent and abusive behavior. Response. Issue 78, 14(1), 21-23.

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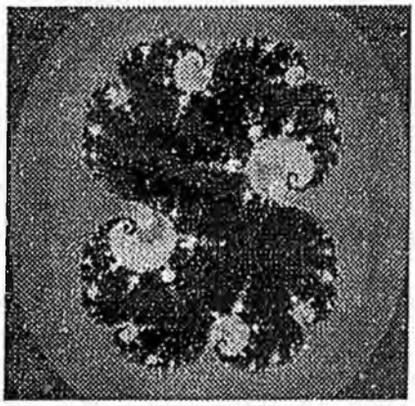
Creative Chaos



"Chaos is not merely a mindless jiggling, it's a subtle form of order."

What does chaos theory have to do with creativity? Everything. A simple understanding of chaos will forever change your idea of what creativity is all about. In truth there is no chaos, just different levels of order, interlaced and folding in upon itself.

The essential concepts behind chaos theory are that:

- **Perspective is the key to perceiving order.**
- **There is order in apparent randomness.**
- **It only takes a very small change to render a system chaotic, or conversely bring order to chaos. This event has been dubbed the "strange attractor".**
- **The strange attractor is self-reflective and redundant.**
- **Nature is composed of mirroring echoes of non-linear events.**

Perspective

The discernment between chaos and order is merely a point of view. "Maps are imaginative pictures which allow thought to bring into focus aspects of reality that might otherwise be lost in details. With a good map we can appreciate some features of a reality we could otherwise miss, and we can explore this reality in a way that would be actually impossible without the map." So say John Briggs and F. David Peat in their excellent book *Turbulent Mirror*.

If you are inside of something, say an atom, you only see electrons whirling chaotically around you. If you moved outside the atom you would see those electrons moving with a pattern around the atom. If you rise further above you see that atoms are actually the building blocks of larger structures called molecules. And so it goes, on up the scale, ad infinitum. The ever familiar 'forest from the trees' syndrome. It's all a matter of perspective. True creativity is allowing yourself to gain the loftiest perspective you can in relation to the object of your quandary or inquiry.

Order in Randomness

Creativity in its most meaningful sense renders order out of chaos. True creativity engenders new coherent form from existing patterns or ideas. The creative mind is not subdued by the apparent

coherent form from existing patterns or ideas. The creative mind is not subdued by the apparent anarchy of random chaos.

Chaos theory has discovered that when a system begins to veer out of balance, it is pulled in the new direction by a 'strange attractor.' According to John Briggs, "An attractor is a region of phase space which exerts a "magnetic" appeal for a system, seemingly pulling the system towards it."

The strange attractor is the force that pulls any system in an entirely new direction. When you focus on a solution to a puzzle, your focus is what pulls all the relevant information together to find the solution. In effect, concentrated focus is the strange attractor we use to manipulate the world in a way that is creative and purposeful.

Minimal Change

For a system to move out of a state of coherency, or order, it only takes a very small, self-replicating event to pull it into apparent chaos. Mathematicians found that it was a very small fractional interjection, multiplied upon itself, that sends a system into a new non-linear, seemingly chaotic direction. Chaos theory has also discovered that all things are interconnected. As the Taoist has always known, a butterfly in Asia exercising its wings can create a cyclone on the other side of the planet. Now we know why.

Fractals

These fractional changes in direction result in fractals. "Randomness, is interleaved with order, simplicity enfolds complexity, complexity harbors simplicity and order and chaos can be repeated at smaller and smaller scales, a phenomenon known as fractal." Fractals were so named because they are the very small change in events that folding in upon themselves can create whole new systems. Fractals are nested self-replicating events. A Chinese box of nested boxes is analogous to a fractal.

Redundant Echoes

Creativity takes all that has come before, ventures a bit further into the unknown, brings back the unknown and marries it to what is known. Sounds a bit like evolution doesn't it? It is the self-referential nature of chaos that moves it towards eventual order. Sacred geometry has shown us that nature is ever resplendent with self-replicating forms. The golden mean and the fibonacci series are evidence of this ever-repeating pattern. The fibonacci series continues to add unto itself as it increases. 1, 2, 3, 5, 8, 13.... Each number adds to the number before it as the progression continues. This is how nature adds back unto itself as it unfolds its myriad of forms. The asymmetry that is created from this process results in the golden mean, or the ratio of 1 : 1.6.

In summary, natural order is maintained by an mirroring feedback loop. We learn, and then add this learning to everything else we know. A creative mind seeks to appreciate the order within all things, and to create new form or systems from that existence order. A creative mind understands that chaos is relative to a point of view.

Possibly the best news coming out of chaos theory is that everyone does has an effect on the whole. Every contribution you make in a creative vein does have an effect on all that exists. There are no

small or meaningless creative acts.

Contemplation is the process by which creativity is generated. Thus, the true act of creativity is an act of self-reflection. Order is created from the mirroring of consciousness back onto itself. Venturing into the unknown, or venturing slightly off the beaten path, is the creative urge. Adding the new territory to the existing map is what allows the new effort and energy to take form.

Anyone interested in increasing their creative talents would be wise to read the *Turbulent Mirror* to gain a fuller understanding of this theory. Another book worth reading is *Order Out Of Chaos* by Ilya Prigogine and Isabelle Stengers. And, there is the book *Chaos* by James Gleick. Once you understand the profound implications that science is now revealing, your creative horizons will be infinitely broader. Once you understand how important you and what you do are in the whole scheme of things, you will fully appreciate the precious gift of creativity you hold.

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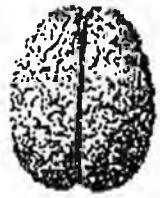
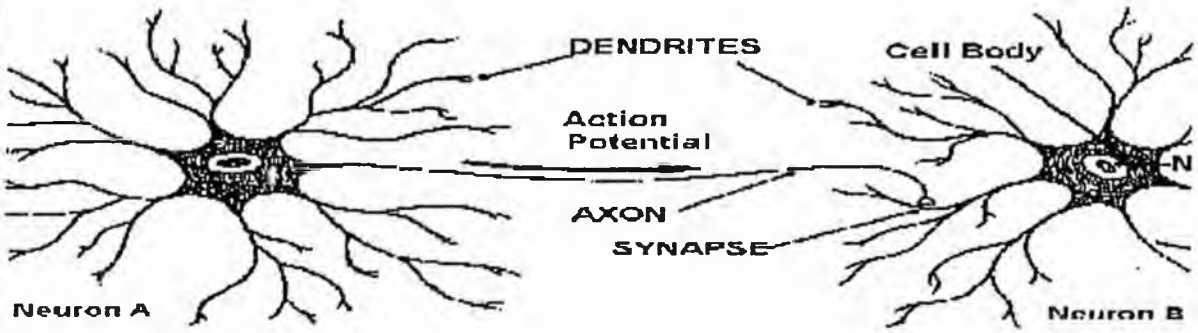
The Quantum Mechanical Brain and Creativity



We create our reality moment to moment. Noted physicists and mathematicians, as well as psychiatrists and neurophysiologists, are now supporting this opinion. Quantum mechanics supports the theory that personal creativity plays an essential role in our perception of the what we call reality.

MECHANICS OF NEURONAL FIRING

When a perception of any kind takes place an electrical impulse is sent from the senses to appropriate neurons in the brain. This impulse is carried along the axon out to the dendrites. Between each of the billions of dendrite connections within our brains there are little gaps. These gaps, called synapses, are microscopic in size. Communication takes place between these synapses through the use of neuro-transmitters.



Quantum physics has determined that wave patterns are the essential building blocks of the brain's electro-chemical neuro-transmitters. It is at the synapse that quantum wave patterns are transformed into neuro-transmitters. Through this neuronal synaptic firing the translated wave frequenies are made coherent. These coherent frequencies are then transferred from dendrite to dendrite to the appropriate areas of the brain.

Psychologist William Greenough conducted studies on rats in isolation as well as in stimulating environments. Upon examining their brains he discovered that the rats in the stimulated environment had more dendrite extensions, thus were richer in synaptic connections. It could be concluded, therefore, that a stimulated brain is able to process more information because it is richer in synaptic connectivity.

WE CANNOT PERCEIVE WHAT WE CANNOT CONCEIVE

We can only perceive, or literally see, what we can conceive of. We must have neuronal firing in our brains, whether it be in the imaginal state or actual perceptual state, for us to register an object as a reality.

Joseph Chilton Pearce's book "The Crack in the Cosmic Egg" purports and shows many examples that we can only perceive what we can conceive of. When Magellan's fleet sailed around the tip of South America he stopped at a placed called Tierra del Fuego. Coming ashore he met some local natives who had come out to see the strange visitors. The ship's historian documented that when Magellan came ashore the natives asked him how he had arrived. Magellan pointed out to his full-masted sailing ships at anchor off the coast. None of the natives could see the ships. Because they had never seen ships before they had no reference point for them in their brains, and could literally not see them with their eyes. Therefore, it is to our advantage to expose our brains to varied stimulus so that the proper neuronal connections are forged. In this way we expand and enrich our ability to experience more of our environment in a meaningful way.

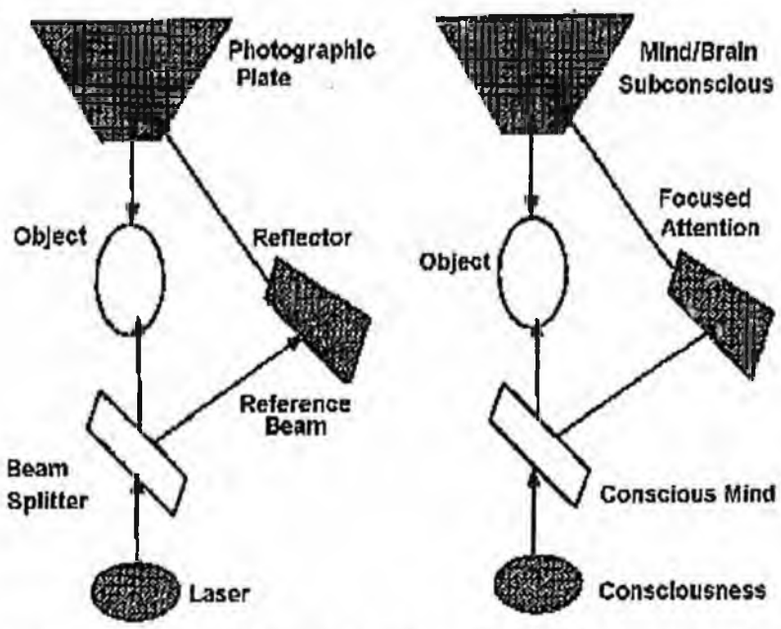
CODED WAVE INFORMATION

The brain translates consciousness, as coded wave patterns, into the coherent state we call mind. How does the brain form reality from these wave/particles, or interference pattern codes? Deepak Chopra in "Quantum Healing" gives us an example of the difference between interference patterns and a cohesive image. He says, "A good image for this would be a pianist playing a Chopin etude. Where is the music? You can find it at many levels - in the vibrating strings, the trip of the hammers, the fingers striking the keys, the black marks on the paper, or the nerve impulses produced in the player's brain. But all of these are just codes; the reality of music is the shimmering, beautiful, invisible form that haunts our memories without ever being present in the physical world."

This is similar to a computer that translates electric impulses of on and off signals. These impulses are translated into bits, the bits into bytes and the bytes into the patterns of language that produce a program. A stimulated brain is richer in synaptic potential, thus able to process more code. It is more like having a 32 bit Pentium as opposed to an 8 bit 286. Not only is the quantity of information processing greater, but with the capability of more sophisticated programming, or wave form transformation, the quality is also greater.

HOLOGRAPHIC MODEL OF CONSCIOUSNESS

Neurophysiologist, Karl Pribram has done extensive work to prove that the brain acts holographically to produce our experience of reality. Again, the brain is a transducer of interference wave patterns. It turns these wave frequencies into electrical and chemical patterns. A hologram is produced when a laser beam is split, bounced off of an object, and then reflected from a mirror onto a photographic plate. Another laser beam directed at the holographic plate produces a three dimensional hologram.



HOLOGRAM ON LEFT - CONSCIOUS MIND ON RIGHT

Our brain also converts and mirrors the interference patterns of the quantum world into three dimensional constructs. John Briggs and F. David Peat in "The Looking Glass Universe" explain that, "If the world is composed of frequencies and the brain is a frequency analyzer (itself made out of frequencies of matter), how does the three dimensional solid world we know come into being? The answer is as before: We have to learn it. We learn to respond mainly to certain frequencies and not to the constant transformations of frequencies. A few selected holograms become stabilized and apparently separate from one another into "things." The holograms, formed as memory, reinforce the impression of these separate things, and so the explicate space-time world we know evolves out of the implicate universe of waves and frequencies."

CONSCIOUSNESS AS A SUPERCONDUCTOR

A superconductor acts as a totally coherent medium which offers no resistance to whatever passes through it. A correlation between this superconductive state and consciousness itself is in "The Philosopher's Stone, Chaos, Synchronicity and the Hidden Order of the World" by F. David Peat. He explains, "One of the pioneering ideas about the brain is that it is a coherent quantum system, an idea that goes straight back to Herbert Froehlich. Consciousness, they argue, is all one piece; it is coherent and cannot be reduced to any classical mechanistic model. Just as the electrons in a superconductor engage in a global dance in which each individual movement is guided by the whole, so, too, individual activities of nerve cells may be coordinated into a much wider dance of thought."

CONCLUSION

The brain transforms the quantum wave patterns of consciousness into electro-chemical neuro-transmitters. This information is further translated in different parts of the brain holographically into what we call reality. The more you challenge your brain, the more connections you are going to form in the sea of neurons, axons and dendrites that translate waves of thought into a meaningful understanding of our world. Neurologists call this "use dependent plasticity." If you haven't forged a neural pathway that allows for a solution to an apparently

impossible problem, you can't intuit or recognize the answer, even when consciousness inspires you to see it. You can only see what you have allowed yourself to experience.

Use your brain, both sides of it. Map and mine those unexplored areas. Stretch it beyond it's familiar limits. Doing the daily puzzles presented here will challenge your notions of rational and non-rational thought. In attempting to solve the puzzles you are forging new neural pathways and enriching the number of synaptic clefts. You are overlaying habitual thinking processes with new potentials. You also entrain the brain as you search for solutions to certain kinds of lateral and analogical puzzles.

This is the stuff that genius is made of. Creative genius has an open mind and has pondered what other people don't dare to think about. In this way they are utilizing that 90% of the brain that science tells us now lies dormant. Ask yourself questions that don't have obvious answers. Allow yourself to contemplate those puzzling situations you would otherwise ignore. Everyone has creative potential as yet unrealized. Discover yours and be richer for it.

Related Reading Material

The Quantum Self by Danah Zohar
The Philosopher's Stone by F. David Peat
The Emperor's New Mind by Roger Penrose
The Holographic Universe by Michael Talbot
Quantum Healing by Deepak Chopra
Brain States by Tom Kenyon
The Three Pound Universe by Judith Hooper and Dick Teresi
The Amazing Brain by Robert Ornstein and Richard F. Thompson
Looking Glass Universe by John P. Briggs and F. David Peat

For a glance at the sample of puzzles that will be sent out each week see Samples.
More Research: Brain Plasticity, Build a Better Brain

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Building a Better Brain

Life magazine, July 1994 page 62.
By Daniel Golden and Alexander Tsiaras

Editor's Note: This is an excerpt from an article in Life magazine pointing to the research being done on ways to stimulate and increase brain power into old age. This is the article that was the original impetus for creating this web site. - Webmaster J. L. Read

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Evidence is accumulating that the brain works a lot like a muscle -- the harder you use it, the more it grows. Although scientists had long believed the brain's circuitry was hard-wired by adolescence and inflexible in adulthood, its newly discovered ability to change and adapt is apparently with us well into old age. Best of all, this research has opened up an exciting world of possibilities for treating strokes and head injuries -- and warding off Alzheimer's disease.

The party last year was as rowdy as it gets in a convent. Celebrating her 100th birthday, Sister Regina Mergens discarded her habit in favor of a daring red gown, downed two glasses of champagne and proclaimed her intention to live to 102. She didn't quite make it. Now, at vespers on a March afternoon in Mankato, MN, dozens of nuns file past the open casket where Mergens, 101 lies, rosary beads in her hands.

Concealed from view is an incision in the back of Mergen's head through which her brain has been removed. Mergens and nearly 700 elderly sisters in her order are the largest group of brain donors in the world. By examining these nuns, as well as thousands of stroke victims, amputees and people with brain injuries, researchers are living up to the promise of a presidential proclamation that the 1990s be the Decade of the Brain. Scientists are beginning to understand that the brain has a remarkable capacity to change and grow, even into old age, and that individuals have some control over how healthy and alert their brains remain as the years go by. The Sisters of Mankato, for example, lead an intellectually challenging life, and recent research suggests that stimulating the mind with mental exercise may cause brain cells, called neurons, to branch wildly. The branching causes millions of additional connections, or synapses, between brain cells. Think of it, says Arnold Scheibel, director of UCLA's Brain Research Institute, as a computer with a bigger memory board: "You can do more things more quickly."

The capacity of the brain to change offers a new hope for preventing and treating brain diseases. It helps explain why some people can:

- **Delay the onset of Alzheimer's disease symptoms for years. Studies show that the more**

Delay the onset of Alzheimer's disease symptoms for years. Studies show that the more educated a person is, the less likely he or she is to show symptoms of the disease. The reason: Intellectual activity develops brain tissue that compensates for tissue damaged by the disease.

- Make a better recovery from strokes. Research indicates that even when areas of the brain are permanently damaged by stroke, new message routes can be created to get around the roadblock or to resume the function of that area.

New knowledge about the brain may emerge from the obscure convent in Minnesota, a place where Ponce de Leon might have been tempted to test the waters. Mankato is the site of the northwest headquarters of the School Sisters of Notre Dame, where a long life is normal. In part because the nuns of this order don't drink much, smoke or die in childbirth, they live to an average age of 85, and many live far beyond that. Of the 150 retired nuns residing in this real-life Cocoon, 25 are older than 90.

But longevity is only part of the nuns' story. They also do not seem to suffer from dementia, Alzheimer's and other debilitating brain diseases as early or as severely as the general population. David Snowdon of the Sander's Brown Center on Aging at the University of Kentucky, the professor of preventative medicine who has been studying the nuns for several years, had found that those who earn college degrees, who teach, who constantly challenge their minds, live longer than less-educated nuns who clean rooms or work in the kitchen. He suspects the difference lies in how they use their heads.

Within the human brain each neuron contains at one end threadlike appendages called axons, which send signals to other nearby neurons. At the other end of the neuron are similar threadlike appendages called dendrites, which receive messages from nearby cells. Axons and dendrites tend to shrink with age, but experiments with rats have shown that intellectual exertion can spur neurons to branch like the roots of a growing tree, creating networks of new connections. Once a skill becomes automatic, the extra connections may fade, but the brain is so plastic that they can be tapped again if needed. Like the power grid of an electric company, the branching and connections provide surplus capacity in a brownout. Snowdon and some neuroscientists believe that people with such surplus who find their normal neural pathways blocked by the tangles that characterize Alzheimer's disease can reroute messages. To be sure, every brain is limited by genetic endowment, and flexibility does decrease with age. But new thinking in brain science suggests that whether someone hits that wall at age 65 or at age 102 may be partly up the the individual.

Professor Snowdon says the nuns of Mankato demonstrate this. He expects to prove that the better-educated sisters have significantly more cortex and more synaptic branching of neurons than their less-educated counterparts, which would allow the former to cope better with Alzheimer's disease, dementia and stroke. Brain exercising is a way of life at the nunnery, where the sisters live by the principle that an idle mind is the devil's plaything. They write spiritual meditations in their journals and letters to their congressmen about the blockade in Haiti, and do puzzles of all sorts....One 99 year-old, Sister Mary Esther Boor, takes advantage of slow minutes while working as the complex's receptionist to solve brainteasers -- some with words in Spanish.

What can the average person do to strengthen his or her mind? The important thing is to be actively involved in areas unfamiliar to you, says Steel, head of UCLA's Brain Research Institute. "Anything that's intellectually challenging can probably serve as a kind of stimulus for dendritic growth, which means it adds to the computational reserve in your brain."

So pick something that's diverting and, more important, unfamiliar. A computer programmer might try sculpture, a ballerina might try marine navigation. Here are some other stimulating suggestions from brain researchers:

"Do puzzles, I can't stand crosswords," says neuroscientist Antonio Damasio of the University of Iowa, "but they're a good idea." Psychologist Sherry Willis of Pennsylvania State University says, "People who do jigsaw puzzles show greater spatial ability, which you use when you look at a map."

And remember, researchers agree that it's never too late. Says Scheibel: "All of life should be a learning experience, not just for the trivial reasons but because by continuing the learning process, we are challenging our brain and therefore building brain circuitry. Literally. This is the way the brain operates."

This article also discusses the enigma of phantom limbs and how the brain continues to register impulses due to synaptic connectivity long after the limb itself is gone. If you are interested you can probably pick up a copy of this article at any library. The pictures are excellent and this is information that everyone should be aware of.

More Research: Brain Plasticity

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INCUBATED IN TERROR:

Neurodevelopmental Factors in the 'Cycle of Violence'

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"Children are not resilient, children are malleable."

RESILIENT

1. Marked by the ability to recover readily, as from misfortune.
2. Capable of *returning to an original shape or position*, as after having been compressed.

MALLEABLE

1. *Capable of being shaped or formed*, as by hammering or pressure: a malleable metal.
2. Easily controlled or influenced; tractable.
3. Able to adjust to changing circumstances; adaptable.

Approximately 250,000 years ago, a few thousand *Homo sapiens* (our first genetically-equivalent ancestors) migrated out of Africa, beginning the long transgenerational process of inhabiting and, ultimately, dominating of the rest of the natural world (Leakey, 1994). This fragile process was aided by a great deal of luck and the remarkable potential of the human brain to allow non-genetic, transgenerational transmission of information (sociocultural evolution). For thousands of generations, life was characterized by danger -- omnipresent threat and pervasive intra- and interspecies violence. Humankind and our current sociocultural practices evolved in -- and, therefore, reflect -- a brutal, violent and unpredictable world. The evolution of complex cultures and 'civilization' have not protected millions from

the brutality which characterized the 'ascent' of humankind. While 'civilization' has decreased our vulnerability to non-human predators, it has done little to decrease intraspecies violence (Keegan, 1993). Indeed, modern history is characterized by increasingly efficient, systematic and institutionalized violence (e.g., the Inquisition, slavery, the Holocaust, the Trail of Tears). Men were, and men remain, the major predators of vulnerable humans (typically women and children). The profound impact of domestic violence, community violence, physical and sexual abuse and other forms of predatory or impulsive assault can not be overestimated. Violence impacts the victims, the witnesses -- and, ultimately, us all. Understanding and modifying our violent nature will determine, in large part, the degree to which we will successfully 'adapt' to the challenges of the future -- the degree to which future generations of human beings can actually experience humanity.

In order to understand the origins and impact of interpersonal violence, it is essential to appreciate how violence alters the developing child. The child and the adult reflect the world they are raised in. And, sadly, in today's world, millions of children are raised in unstable and violent settings. Literally, incubated in terror.

In the United States alone, at least 5 million children are victims of and/or witnesses to physical abuse, domestic violence or community violence -- all while they are bathed in the powerful images of television which over-represent violent acts and over-value the viability of violence as a solution to conflict (Perry, 1994a; Prothrow-Stith, 1991; Dodge et al., 1991; Osofsky, 1995). What is the impact of these pervasive experiences with violence on the developing child ? How does violence change the child ? What is the impact of being repeatedly assaulted by a parent -- how is that different from being targeted in a drive-by shooting or watching a loved one being assaulted or watching a 'pretend', but graphic, murder on television ? How do these childhood experiences contribute to the much-discussed but little-understood 'cycle of violence' ?

This chapter will examine these questions in context of neurodevelopment -- how these experiences influence brain development and subsequent emotional, behavioral, cognitive and social functioning of children. The amazing capacity of the human brain to develop in a 'use-dependent' fashion -- growing, organizing and functioning in response to developmental experience -- means that the major modifier of all human behavior is experience. Experience, not genetics, results in the critical neurobiological factors associated with violence. A common error in examining the 'neurobiology' of violence is to presume a neurobiological trait, a biochemical marker (e.g., whole blood serotonin, or CSF 5-HIAA), which may be altered in 'violent' populations suggests a genetic difference. Nothing could be further from the truth.

There is no more specific 'biological' determinant than a relationship. Human beings evolved as social animals and the majority of biology of the brain is dedicated to mediating the complex interactions required to keep small, naked, weak, individual humans alive by being part of a larger biological whole -- the family, the clan. Indeed, it is the primary caretaking relationships of infancy and childhood which determine the core neurobiological organization of the human individual, thereby allowing this incredible social specialization. Early life experience determines core neurobiology. The experiences which will be the focus of this chapter include those which predispose to violent behavior and those which result from exposure to violent behavior. The two are inextricably intertwined.

VIOLENCE and the DEVELOPING BRAIN

Violence is heterogeneous -- in etiology, quality, quantity and impact on its victims. Physical violence can be the result of impulsive, reactive behavior or predatory, remorseless aggression. Physical violence can be related to intoxication from alcohol or from psychosis or from other neuropsychiatric conditions (e.g., dementia, traumatic head injury). Physical violence may be the result of a personal (Oklahoma City

bombing) or a cultural (political terrorism) belief system. Physical violence can be sexualized (rape) or directed at a specific victim (domestic violence) or at a specific group (e.g., African-Americans, homosexuals, Jews). Violence may be physical or emotional. Indeed, some of the most destructive violence does not break bones, it breaks minds (Vachss, 1994). Emotional violence does not result in the death of the body, it results in death of the soul.

The major setting for violence in America is the home (Straus, 1974). Intrafamilial abuse, neglect and domestic battery account for the majority of physical and emotional violence suffered by children in this country (see Koop et al., 1992; Horowitz et al., 1995; Carnegie Council on Adolescent Development, 1995). Despite this, a majority of our entertainment, media and public policy efforts focus on community or predatory violence. Understanding the roots of community and predatory violence is impossible unless the effects of intrafamilial violence, abuse and neglect on the development of the child are examined. Indeed, the adolescents and adults responsible for community and predatory violence likely developed the emotional, behavioral, cognitive and physiological characteristics which mediate these violent behaviors as a result of intrafamilial violence during childhood (O'Keefe, 1995; Myers et al., 1995; Mones, 1991; Hickey, 1991; Loeber et al., 1993; Lewis et al., 1989).

What are the pathways from terrorized infant to terrorizing adolescent ? How can someone develop the capacity to stalk, torture, murder and mutilate another human being and feel no remorse -- even feel pleasure ? How can a 14 year old kill someone over a jacket ? How can someone load a truck with explosives and blow up a building full of anonymous and innocent people ? How can someone beat senseless the woman they 'love' and, if she leaves, taking the children, track them down and kill them all ? Why are men so much more violent than women ? What happens to people to make them act like "animals" ?

All violent behavior impacts the children in its wake, but there is heterogeneity of impact. Important factors in the differential impact on the developing child include the type of violence, the pattern of violence, the presence (or absence) of supportive adult caretakers and other support systems, and, of key importance, the age of the child (for review see Pynoos, 1990; Schwarz and Perry, 1994). Under all circumstances, however, the organ which allows the child victim to adapt to any violent trauma is the brain -- just as the brain is the organ that is the origin for the violent behaviors of the victimizer. How is it that the very neurobiological adaptations which allow the child to survive violence may, as the child grows older, result in an increased tendency to be violent ? It is not the finger pulling the trigger that kills; it is not the penis that rapes -- it is the brain. In order to understand violence we need to understand the organization and functioning of its birthplace -- the brain.

Brain Organization and Function

The human brain is an amazing organ which acts to sense, process, perceive, store and act on information from outside and inside the body all solely to promote survival. In order to carry out these functions, the human brain has evolved a highly functional hierarchical organization -- from the lower, more simple portions to the more complex higher cortical regions (Figure 1). Various functions are mediated by various brain areas -- with more simple, regulatory functions (e.g., regulation of respiration, heartrate, blood pressure, body temperature) mediated by the 'lower' parts of the brain (brainstem and midbrain) and the most complex functions (e.g., language and abstract thinking) by its most complex cortical structures. The hierarchy of increasingly complex functions is mediated by the hierarchy of increasingly complex brain areas (Figure 1).

The structural organization and functional capabilities of the mature brain develop throughout life, with the vast majority of the critical structural organization taking place in childhood. Brain development is

characterized by 1) sequential development and 'sensitivity' -- from the brainstem to the cortex -- and 2) 'use-dependent' organization of these various brain areas (see below). As the brain develops in this sequential and hierarchical fashion, as the more complex limbic, sub-cortical and cortical areas organize, they begin to modulate, moderate and 'control' the more primitive and 'reactive' lower portions of the brain (Figure 2). These various brain areas develop, organize and become fully functional at different stages during childhood (Singer, 1995). At birth, for example, the brainstem areas responsible for regulating cardiovascular and respiratory function must be intact while the cortical areas responsible for abstract cognition have years before they are required to be fully-functional. A frustrated three year old (with a relatively unorganized cortex) will have a difficult time modulating the reactive, brainstem-mediated state of arousal -- he will scream, kick, bite, throw and hit. However, the older child when frustrated may feel like kicking, biting and spitting, but has 'built in' the capacity to modulate and inhibit those urges. All theoretical frameworks in developmental psychology describe this sequential development of ego-functions and super-ego which are, simply, cortically-mediated, inhibitory capabilities which modulate the more primitive, less mature, reactive impulses of the human brain. Loss of cortical function through any variety of pathological process (e.g., stroke, dementia) results in 'regression' -- simply, a loss of cortical modulation of arousal, impulsivity, motor hyperactivity, and aggressivity -- all mediated by lower portions of the central nervous system (brainstem, midbrain). Conversely, any deprivation of optimal developmental experiences (which leads to underdevelopment of cortical, sub-cortical and limbic areas) will necessarily result in persistence of primitive, immature behavioral reactivity. And, thereby, predispose to violent behavior (see Figures 5 and 7).

Essential to understanding the neurobiology of violence is this: The brain's impulse-mediating capacity is related to the ratio between the excitatory activity of the lower, more-primitive portions of the brain and the modulating activity of higher, sub-cortical and cortical areas (Figure 3). Any factors which increase the activity or reactivity of the brainstem (e.g., chronic traumatic stress) or decrease the moderating capacity of the limbic or cortical areas (e.g., neglect, EtOH) will increase an individual's aggressivity, impulsivity and capacity to display violence (Halperin et al., 1995) see below). A key neurodevelopmental factor which plays a major role in determining this moderating capacity is the brain's amazing capacity to organize and change in a 'use-dependent' fashion.

In the developing brain, undifferentiated neural systems are critically dependent upon sets of environmental and micro-environmental cues (e.g., neurotransmitters, cellular adhesion molecules, neurohormones, amino acids, ions) in order for them to appropriately organize from their undifferentiated, immature forms (see Perry, 1994a; Perry et al., 1994b; Lauder, 1988). Lack (or disruption) of these critical cues can result in abnormal neuronal division, migration, differentiation, synaptogenesis -- all of which contribute to malorganization and diminished functional capabilities related to that portion of the brain (Perry, 1988; Perry, 1994a; Perry, 1995a). These molecular cues, in turn, are dependent upon the experiences of the developing child. The quantity, pattern of activity and nature of these neurochemical and neurotrophic factors depend upon the presence and the nature of the child's total sensory experience (e.g., Kandel, 1989; Goelet et al., 1986; Thoenen, 1995).

Different areas of the CNS are in the process of organization at different times. During these critical periods of primary neural system organization, the brain requires and is most sensitive to organizing experiences (and the neurotrophic cues related to these experiences). Disruptions of experience-dependent neurochemical signals during these periods may lead to major abnormalities or deficits in neurodevelopment -- some of which may not be reversible (see below). Disruption of critical cues can result from 1) lack of sensory experience during critical periods or 2) atypical or abnormal patterns of necessary cues due to extremes of experience. Due to the sequential development of the brain, disruptions of normal developmental processes early in life (e.g., during the perinatal period) which alter development of the brainstem or midbrain will necessarily alter the development of limbic and cortical

areas because critical signals these area depend on for normal organization originate in these lower brain areas (see Figure 4). The clear implication of this immutable neurophysiological chain of development is that, again, early life experiences have disproportionate importance in organizing the mature brain. Experiences which could be tolerated by a 12 year old child can literally destroy an infant (e.g., being untouched for two weeks). Both lack of critical nurturing experience and excess exposure to traumatic violence will alter the developing CNS, predisposing to a more impulsive, reactive and violent individual.

Emotional Neglect

A fifteen year old boy sees some fancy sneakers he wants. Another child is wearing them -- so he pulls out a gun and demands them. The younger child, at gunpoint, takes off his shoes and surrenders them. The fifteen year old puts the gun to the child's head, smiles and pulls the trigger. When he arrested, the officers are chilled by his apparent lack of remorse. Asked later whether, if he could turn back the clock, would he do anything differently, he thinks and replies, "I would have cleaned my shoes." 'His' bloody shoes led to his arrest. He exhibits regret for being caught, an intellectual, cognitive response. But remorse -- an affect -- is absent. He feels no connection to the pain of his victim. Neglected and humiliated by his primary caretakers when he was young, this fifteen year old murderer is, literally, emotionally retarded. The part of his brain which would have allowed him to feel connected to other human beings -- empathy -- simply did not develop. He has affective blindness. Just as the retarded child lacks the capacity to understand abstract cognitive concepts, this young murderer lacks the capacity to be connected to other human beings in a healthy way. Experience, or rather lack of critical experiences, resulted in this affective blindness -- this emotional retardation.

Very narrow windows - critical periods - exist during which specific sensory experience is required for optimal organization and development of any brain area (e.g., Singer, 1995; Thoenen, 1995). Absent such experience and development, dysfunction is inevitable (e.g., Carlson et al., 1989). When critical periods have been examined in great detail in non-human animals for the primary sensory modalities, similar use-dependent differentiation in development of the brain occurs for the rest of the central nervous system (Diamond et al., 1964; Altman et al., 1964; Cragg, 1967; Cragg, 1969; Cummins et al., 1979). Abnormal micro-environmental cues and atypical patterns of neural activity during critical and sensitive periods can result in malorganization and compromised function in other brain-mediated functions such as empathy, attachment and affect regulation (e.g., Green et al., 1981). Some of the most powerful clinical examples of this are related to lack of 'attachment' experiences early in life. The child who has been emotionally neglected or abandoned early in life will exhibit attachment problems which are persistently resistant to any 'replacement' experiences including therapy (Carlson et al., 1989; Ebinger, 1974). Examples of this include feral children, Spitz's orphans (Spitz et al., 1946), the Romanian orphans (Chisholm et al., 1995) and, sadly, the remorseless, violent child (Ressler et al., 1988; Myers et al., 1995; Mones, 1991; Hickey, 1991; Greenberg et al., 1993).

Lack of appropriate affective experience early in life and the resulting malorganization of attachment capabilities plays a major role in the current epidemic of senseless violence in the United States today(Lewis et al., 1989). So often, these acts are inhuman -- throwing a six year old boy out of a window because he refused to steal candy for you -- planning, stalking, kidnapping and torturing someone who 'disrespected' you -- hunting any homeless man to set on fire. *Senseless* --- or are they senseless acts ? The ability to feel remorse, to be empathetic, to be sympathetic -- are all experience-based capabilities. If a child feels no emotional attachment to any human being, then one cannot expect any more remorse from him after killing a human than one would expect from someone who ran over a squirrel. These behaviors are not senseless, they are not beyond our understanding. They arise from children reflecting the world in which they have been raised (Taylor et al., 1992; Perry, Pollard, Blakley, Baker, & Vigilante, in press).

It is important to emphasize that the majority of individuals who are emotionally neglected in childhood do not grow into violent individuals. These victims carry their scars in other ways, usually in a profound emptiness, or in emotionally destructive relationships, moving through life disconnected from others and robbed of some of their humanity. The effects of emotional neglect in childhood predispose to violence by decreasing the strength of the sub-cortical and cortical impulse-modulating capacity and by decreasing the value of other humans due to an incapacity to empathize or sympathize with them. This decreased value of humans means that there is a much lower threshold for the unattached person to act in an antisocial fashion to gratify their impulses.

Cognitive Neglect

There are other deprivations of experience which play a major role in impulsive and reactive violence. These are experiences which, in effect, 'feed' and grow the human cortex (Singer, 1995; Thoenen, 1995; Brown, 1994). As the cortex plays a major role in inhibiting, modulating and regulating the functioning of the lower parts of the central nervous system, any experiences which increase this cortical capacity would be expected to decrease violent behavior (Moffitt et al., 1988; MacEwen, 1994). The human cortex grows in size, develops complexity, makes synaptic connections and modifies as a function of the quality and quantity of sensory experience (Chisholm et al., 1995; Singer, 1995; Courchesne et al., 1994). Lack of type and quantity of sensory-motor and cognitive experiences leads to underdevelopment of the cortex (see Figure 5). The cortical and sub-cortical areas are smaller in individuals who have suffered global environmental neglect. In our preliminary studies, we have demonstrated 'cortical atrophy' (as read independently by neuroradiologists) in 7 of 12 severely neglected children (Pollard and Perry, submitted). These children (average age 8) did not develop cortical and subcortical structures which subsequently atrophied. These areas, which develop in a use-dependent fashion, were under-used, resulting in profound underdevelopment of these areas. There are multiple examples of the negative impact of environmental deprivation on the developing brain in animal studies. Rats raised in environmentally enriched setting have a 30% higher synaptic density in cortex than rats raised in an environmentally deprived setting (Bennett et al., 1964; Altman et al., 1964). Animals raised in the wild have from 15 to 30% larger brain mass than their offspring who are domestically reared (Darwin, 1868; Rehkamper et al., 1988; Rohrs, 1955).

A striking example of the role of cognitive development (development of a literate population) on violence comes from historical accounts of violence. In the year 1340 in Amsterdam, the murder rate was in excess of 150 murders per 100,000 people. Two hundred years later the murder rate was below 5 per 100,000 people. Clearly this is not a 'genetic' phenomenon. The genetics of the population of Amsterdam likely did not change much in two hundred years. This marked decrease in the incidence of murderous violence likely is due to the development of a higher percentage of individuals in that society having better developed cortices -- more capable of abstract cognition, and, thus, more capable of modulation of aggressive and violent impulses. The sociocultural phenomenon underlying the development of healthier and more capable cortices was, without question, literacy. The introduction of the printing press allowed the percentage of literate (i.e., cortically-enriched, cognitively-capable individuals) to dramatically increase. Over a few generations, the impact of a number of bright, abstract individuals transformed their society.

The introduction of television has had a similar revolutionary impact on the organization and functional capacity of the human brain (remember, the organization and functional capacity of the brain reflects the pattern and nature of sensory input during development). The implications of this major sociocultural and environmental phenomenon on development have yet to be fully realized. Ominous clues abound, however (Donnerstein et al., 1995). American children raised on Sesame Street and MTV are impatient with even moderately slow presentations of any stimuli, written, spoken, or visual (Carnegie Council on

Adolescent Development, 1995). The brain of a human infant born in 20,000 B.C. had the same potential as an infant born in 1995. Despite the fact that 22,000 years ago there was essentially little language, no science, no understanding of 'computers', if this pre-historic infant was raised today, she would be playing Nintendo, watching MTV, reading, writing and 'thinking' in as abstract a fashion as any child born today. The brains of our children are organized differently from ours. The increase in youth violence is related to the world we have provided for our children to grow up in (Wright et al., 1992; Taylor et al., 1992; Richters, 1993; Osofsky, 1995) -- a world markedly different from the one in which our brains developed.

Traumatic Violence: The Persisting State of Fear

Children exposed to chronic violence are more likely to be violent (e.g., Loeber et al., 1993; Lewis et al., 1989; Koop et al., 1992; Hickey, 1991; Halperin et al., 1995). This is related to many factors, including modeling and learning that violent aggression is acceptable, even a preferable and honorable, solution to problems. Analysis of much of the violent behavior by children and adolescents today reveals a troubling degree of impulsive, reactive violence. This violence is often interpreted by the perpetrators as defensive. "If I didn't shoot him, he would have shot me." "I could tell that he was going to jump me -- he looked me in the eyes." "Listen, man, I just did him before he did me. So. " These verbalizations reflect the persistence of a state of fear, literally, a persisting 'fight or flight' state which these adolescents are unable to get out of. The persistence of this originally adaptive internal state is due to growing up in a persistently threatening environment (Perry, 1994; Perry, 1996).

If during development, this stress response apparatus is required to be persistently active, a commesurate stress response apparatus in the central nervous system will develop in response to constant threat. These stress-response neural systems (and all functions they mediate) will be overactive and hypersensitive. It is highly adaptive for a child growing up in a violent, chaotic environment to be hypersensitive to external stimuli, to be hypervigilant, and to be in a persistent stress-response state (see Figure 6). In most cases, however, these "survival tactics" ill-serve the child when the environment changes.

Clinically, this is very easily observed in children who are exposed to chronic neurodevelopmental trauma (Perry, 1994a; Perry, 1995a). These children are frequently diagnosed as having attention deficit disorder (ADD-H) with hyperactivity (Haddad et al., 1992). This is somewhat misleading, however. It is not that they have a core abnormality of their capacity to attend to a given task, it is that they are hypervigilant. These children have behavioral impulsivity and cognitive distortions (Pynoos et al., 1985; Pynoos, 1990), all of which result from a use-dependent organization of the brain (Perry, Pollard, Blakley, Baker, & Vigilante, in press). During development, these children spent so much time in a low-level state of fear (mediated by brainstem and midbrain areas) that they were focusing consistently on non-verbal cues. In our clinical population, children raised in chronically traumatic environments a prominent V-P split on IQ testing (n = 108; WISC Verbal = 8.2; WISC Performance = 10.4, Perry, in preparation). This is consistent with the clinical observations of teachers that these children are really smart but can't learn easily. Often these children are labeled as learning disabled. These difficulties with cognitive organization contribute to a more primitive, less mature style of problem-solving -- with violence often being employed as a "tool". All of these symptoms are the result of a use-dependent organization of the brain stem nuclei involved in the stress response apparatus (Perry, 1988; Perry et al., 1994b).

These children are also characterized by persisting physiological hyperarousal and hyperactivity (Perry, 1995a; Perry, et al., in press). They are observed to have increased muscle tone, frequently a low grade increase in temperature, an increased startle response, profound sleep disturbances, affect regulation problems and generalized (or specific) anxiety (Kaufman, 1991; Ornitz et al., 1989; Perry, 1994a). In addition, our studies indicate that a significant portion of these children have abnormalities in cardiovascular regulation (Perry, 1994a; Perry et al., 1995b). Using continuous heartrate monitoring

during clinical interviews, male, pre-adolescent children exposed to violence exhibited a mild tachycardia during non-intrusive interview and a marked tachycardia during interviews about specific exposure to trauma (n = 83; resting heartrate = 104; interview heartrate = 122). In comparison, females exposed to traumatic events tended to have normal or mild tachycardia which, during interviews about the traumatic event decreased (n =24; resting heartrate = 98; interview heartrate = 82). This gender difference was associated by differences in emotional and behavioral symptoms, with males exhibiting more 'externalizing' and females more 'internalizing' symptoms (Perry, et al., 1995b; Perry, et al., in press;).

In our work with another population of boys exposed to severe prolonged domestic violence (n = 65) at a residential treatment center, a subset of the hyperaroused, reactive boys (n = 65 total; predatory subset = 12) developed predatory aggressive behaviors. In early adolescence, this subset of boys actually had a normalization of the tacycardia noted when they were younger. Indeed, they began exhibiting decreases in heartrate when asked to discuss specific violent events they had been involved in. Some of these youth described a soothing, calming feeling when they began 'stalking' a potential victim. The detached, calm, dissociated (and re-inforcing) feeling these boys felt is reminicent of the feelings described by borderline adolesent girls who cut themselves and may be related to an endogenous opioid release similar to that seen in various dissociative states (Perry, in preparation). These preliminary observations are consistent with recent reports of the physiological differences between a cohort of 15 year old antisocial youth followed to age 29. In the group which by age 29 had become criminal, resting heartrates were much lower than controls and the comparison antisocial cohort (Raine et al., 1995).

The implications of this for the violent youth are profound. First, any child exposed to chronic intrafamilial violence will develop a persisting fear-response. Because there are marked gender differences in this response (Perry et al., 1995b; Perry, Pollard, Blakley, Baker, & Vigilante, in press), with females more likely to dissociate and males more likely to display a classic "fight or flight" response, more males will develop the aggressive, impulsive, reactive and hyperactive symptom presentation. Males will more likely be violent (George et al., 1979). This can be explained, in part, by the persistence of this "fight or flight" state -- and by the profound cognitive distortions that accompany this neurodevelopmental state. A young man with these characteristics, then, will very easily misinterpret a behavior as threatening and will, being more reactive, respond in a more impulsive and violent fashion. Literally, using the original (childhood) adaptive "fight or flight" response in a new context but, now, later in life, in a maladaptive fashion.

Finally, this reactivity of response is profoundly exaggerated by the influence of alcohol or other drugs (Shupe, 1954; Lindqvist, 1986; Cordilla, 1985). Unfortunately, the emotional emptiness resulting from neglect can only be filled by the temporary pleasure that an exogenous euphoriant (e.g., heroin, cocaine) can provide. Similarly, a young man may find the only escape from the distress and pain caused by the anxiety of a persisting fear response is with alcohol. It is often the intoxicating agents that allow expression of the neurodevelopmentally-determined pre-disposition for violence (Figure 8).

Ideology of Aggression

There are multiple pathways to engaging in violent behavior (Wolfgang et al., 1967). Some are defensive, some are predatory, some are impulsive. All of these pathways, however, are facilitated by the individual practitioner's belief system (MacEwen, 1994; Burton et al., 1994). The majority of neglected children never become violent. The majority of traumatized children never become violent (e.g., Belmore et al., 1994). Even the majority of traumatized and neglected children do not become remorselessly violent. Belief systems, in the final analysis, are the major contributors to violence. Racism, sexism, misogyny, children as property, idealization of violent "heroes", cultural tolerance of child maltreatment, tribalism, jingoism, nationalism -- all unleash, facilitate, encourage, and nurture violent individuals. Without these

facilitating belief systems and modeling, neglected and abused children would carry their pain forward in less violent ways -- as silent, scarred, adult members of the vast army one commentator has termed the "Children of the Secret" (Vachss, 1991).

Extreme violence of the most heinous sort (organized, systematic and remorseless) is conducted by individuals, groups of individuals, and by governments with the blessing of various belief systems (for God and Country). Indeed, the current "Violence Prevention" initiatives are really not interested in preventing all violence. These programs are focused on random, unpredictable physical violence against 'us'. The pervasive community violence of the inner cities was of little concern to the public policy makers in government until it metastasized to other parts of our society. Widespread ignorance of the intimate relationships between cultural belief systems, childrearing practices and the development of violent behaviors will doom any attempts to truly understand, and prevent, violence (Dodge et al., 1991; Richters, 1993).

Malignant Combination of Experiences

The most dangerous among us have come to be this way because of a malignant combination of experiences -- lack of critical early life nurturing (Radke-Yarrow et al., 1995), chaotic and cognitively impoverished environments (Carlson et al., 1989), pervasive physical threat (O'Keefe, 1995), persisting fear (Schwab-Stone et al., 1995) and, finally, watching the strongest, most violent in the home get what he wants, and seeing the same aggressive violent use of power idealized on television (Miedzian, 1991) and at the movies (Figure 9). These violent offenders have been incubated in terror, waiting to be old enough to get "one of those guns", waiting to be the one who controls, the one who takes, the one who hits, the one who can "make the fear, not take the fear." Nowhere is this predatory food chain more evident than in juvenile justice settings where, too often, the youth is either victim or predator -- with no third option. Due to clear socio-cultural devolution in some segments of our communities, there are more and more undersocialized, traumatized children (Horowitz et al., 1995; Carnegie Council on Adolescent Development, 1995). These children get little cognitive stimulation -- the public schools are falling apart; their lives are devoid of emotional contact -- mom is a child herself and pregnant again; no predictability, structure or nurturing can be found out of the home -- the community has dissolved.

Clinical Implications

There are a variety of important clinical considerations when examining the interplay between developmental trauma and brain development. One of the most obvious is the developmental stage at which it occurs. What may be partially 'absorbable' at age 15 may be devastating at age 5. The younger someone is, the fewer defensive capabilities they have. As we get older, reasoning and cognitive capabilities facilitate adaptation.

The intensity and frequency of the trauma determines how, in a use-dependent fashion, the brain will internalize the traumatic event. The proximity to (and reality of) threat, the degree to which body integrity and life-threatening experiences take place, and the presence of protective factors all play some role in this. The presence of a strong supportive family network or a strong stable adult figure is critically important. Children exposed to violence benefit from the presence of a stable adult even outside the home (for review see Pynoos, 1990; Schwarz and Perry, 1994).

Predictability of threat is important in determining the impact of a trauma. Stress is much more tolerable when it is relatively predictable. Indeed, there are a number of behavioal features of traumatized children which initially appear to be very maladaptive but are in fact very highly adaptive. This is seen with behaviors which solicit or a promote either physical or sexually abuse. A child who has been a victim of

unpredictable sexual or physical abuse learns (consciously or unconsciously) that if this abuse is going to happen, it is far preferable to control when it happens. As a result, children who have been violently physically assaulted will frequently engage in provocative, aggressive behavior in an attempt to elicit a predictable response from their 'environment'. This behavior is often misinterpreted, and the school or foster placement will punish them severely (often following a restraint situation), thereby re-inforcing the child's view of the world -- adults are aggressive and solve problems using force. Our ineffective child protective, mental health and juvenile justice systems teach this lesson to children again and again -- until they are big enough, smart enough or violent enough to turn the tables.

Intervention strategies with the emotionally-empty violent youth must be different from those designed for purely impulsive, reactively violent youth. Heterogeneity of violence dictates heterogeneity of intervention. Effective implementation of intervention and prevention strategies, therefore, requires effective assessment of the emotional, behavioral, cognitive, social and physiological functioning of the individual child (Vachss et al., 1979). A 'boot camp' model may be very effective for some, and dreadfully ineffective for others. Therapeutic intervention based upon interpersonal relationships may be critical for rehabilitation of some, while they are a waste of resources for others.

State-dependent storage and state-dependent recall are critical issues to consider when focusing on the violent youth (Ungerleider, 1995; Maunsell, 1995). These powerful principles of neurophysiological functioning relate back to the way in which the brain internalizes new information -- in a use dependent fashion. The only parts of the brain which can change are those parts which are on -- those that are being used. So that when asleep, storage of information -- or recall of previously stored information from parts of the brain that are active only during waking hours is impossible. This state-dependence is very important in the clinical approach to the traumatized child. When a child is in a state of hyperarousal -- a persisting fear-state -- this child will not easily be taught complex cognitive information, i.e., if the cortex is not active, it will not store information. The child will be focusing on non-verbal cues -- body movements, facial expressions, tone of voice -- searching for threat- storing that information, not the words which accompany this. Only when significantly 'calmed' will these children benefit from 'words.' What we can expect children to have access to during these states of arousal is their 'catalogue' of previous experiences -- their non-verbal memories, many of which are characterized by unpredictability, threat, pain, assault. They will (re)act accordingly. It is the task of therapeutic interventions to begin to provide a set of consistent alternative memories based upon trial after trial of neutral or positive interaction. Unfortunately, our interventions frequently mistarget the needs of a given child.

Interventions which are based simply upon a cognitive, problem-solving approach to conflict resolution can not be easily generalized to a perceived-threat situation. When a child or adolescent sits quietly in a room with peers and can think through a situation, non-violent resolution comes more easily. This same child, however, when threatened will be in a different internal state. The fearful child's cognition and behavior is being mediated by more primitive parts of the brain -- she will be more reactive, reflexive and will have a very difficult time pulling cognitive solutions from her cortex. Experience-based conflict resolution models offer advantages over simple cognitive, classroom based programs. Imagine a soldier trying to effectively learn how to act in combat by sitting in class. The soldier could learn, on a cognitive level, what to do. In combat, however, finding and applying this 'book-learning' will be virtually impossible. And any mistakes could be fatal.

Public Policy Implications

Ultimate solution to the problems of violence -- whether from the remorseless predator or the reactive, impulsive youth -- is primary prevention. Our society is creating violent children and youth at a rate far faster than we could ever treat, rehabilitate or even lock away (Groves et al., 1993; Garbarino, 1993;

Sturrock et al., 1983; Richters, 1993). No single intervention strategy will solve these heterogeneous problems. No set of intervention strategies will solve these transgenerational problems. In order to solve the problems of violence, *we need to transform our culture.*

We need to change our childrearing practices, we need to change the malignant and destructive view that children are the property of their biological parents. Human beings evolved not as individuals, but as communities. Despite Western conceptualizations, the smallest functional biological unit of humankind is not the individual -- it is the clan. No individual, no single parent-child dyad, no nuclear family could survive alone. We survived and evolved as clans -- interdependent -- socially, emotionally and biologically. Children belong to the community, they are entrusted to parents. American society, and its communities, have have failed parents and children alike. We have not provided parents with the information and resources to optimize their children's potential and, when parents fail, we act too late and with impotence to protect and care for maltreated children (Kendall et al., 1995; Urquiza et al., 1994; Klee et al., 1987; McIntyre et al., 1986; Carnegie Council on Adolescent Development, 1995).

The true potential of the human brain is rarely, if ever, realized. The major expressor of that potential is experience. The most critical and formative experiences are those provided to the developing child in the incubator of the family and, optimally, by a vital, invested community. Past and present, our society dramatically undervalues its young, despite the claims that 'we love children'.

It is in the nature of humankind to be violent, but it may not be the nature of humankind. Without major transformation of our culture, without putting action behind our 'love' of children, we may never learn the truth.

Acknowledgments

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REFERENCES

- Altman, J.. & Das, G. D. (1964). Autoradiographic examination of the effects of enriched environmer t on the rate of glial multipication in the adult rat brain. Nature, 204, 1161-1165.
- Belmore, M. F., & Quinsey, V. L. (1994). Correlates of psychopathy in a noninstitutional sample. Journal of Interpersonal Violence, 9(3), 339-349.
- Bennett, E. L., Diamond, M. L., Krech, D., & Rosenzweig, M. R. (1964). Chemical and anatomical plasticity of the brain. Science, 146, 610-619.
- Brown, J. W. (1994). Morphogenesis and mental process. Development and Psychopathology, 6, 551-563.
- Burton, J., Foy, D., Bwanausi, C., & Johnson, J. (1994). The relationship between the traumatic exposure, family dysfunction and post-traumatic stress symptoms in male juvenile offenders. Journal of Traumatic Stress, 7, 83-93.
- Carlson, V., Cicchetti, D., Barnett, D., & Braunwald, K. (1989). Disorganized/disoriented attachment relationships in maltreated infants. Developmental Psychology, 25, 525-531.
- Carnegie Council on Adolescent Development. Great Transitions: Preparing Adolescents for a New Century. (1995). Anonymous. New York: Carnegie Corporation of New York.
- Chisholm, K., Carter, M. C., Ames, E. W., & Morison, S. J. (1995). Attachment security and

indiscriminately friendly behavior in children adopted from Romanian orphanages. Development and Psychopathology, 7, 283-294.

- Cordilla, A. (1985). Alcohol and property crime: exploring the causal nexus. J Stud Alcohol, 46(2), 161-171.
- Courchesne, E., Chisum, H., & Townsend, J. (1994). Neural activity-dependent brain changes in development: Implications for psychopathology. Development and Psychopathology, 6(4), 697-722.
- Cragg, B. G. (1967). The density of synapses and neurons in the motor and visual areas of the cerebral cortex. Journal of Anatomy (London), 101, 639-654.
- Cragg, B. G. (1969). The effects of vision and dark- rearing on the size and density of synapses in the lateral geniculate nucleus measured by electron microscopy. Brain Research, 13, 53-67.
- Cummins, R. A., & Livesey, P. (1979). Enrichment-isolation, cortex length, and the rank order effect. Brain Research, 178, 88-98.
- Darwin, C. (1868). The variations of animals and plants under domestication. London:
- Diamond, M. C., Krech, D., & Rosenzweig, M. R. (1964). The effects of an enriched environment on the histology of the rat cerebral cortex. Comparative Neurology, 123, 111-119.
- Dodge, K. A., Bates, J. E., & Pettit, G. S. (1991). Mechanisms in the cycle of violence. Science, 250, 1678-1683.
- Donnerstein, E., Slaby, R., & Eron, L. (1995). The mass media and youth aggression. In L. Eron, J. Gentry, & P. Schlegel (Eds.), Reason to Hope: A psychosocial perspective on violence and youth. Washington, D.C. American Psychological Association.
- Ebinger, P. (1974). A cytoachitectonic volumetric comparison of brains in wild and domestic sheep. Z Anat Entwicklungsgesch, 144, 267-302.
- Garbarino, J. (1993). Children's response to community violence: what do we know? Infant Mental Health Journal, 14, 103-115.
- George, C., & Main, M. (1979). Social interactions of young abused children: approach, avoidance and aggression. Child Development, 50, 306-318.
- Goelet, P., & Kandel, E. R. (1986). Tracking the flow of learned information from membrane receptors to genome. Trends in Neuroscience, 9, 492-499.
- Green, A. H., Voeller, K., Gaines, R. W., & et.al. (1981). Neurological impairment in maltreated children. Child Abuse and Neglect, 5, 129-134.
- Greenberg, M. T., Speltz, M. L., & DeKlyen, M. (1993). The role of attachment in the early development of disruptive behavior problems. Development and Psychopathology, 5, 191-213.
- Groves, B., Zuckerman, B., Marans, S., & Cohen, D. (1993). Silent victims: children who witness violence. Journal of American Medical Association, 269, 262-264.
- Haddad, P., & Garralda, M. (1992). Hyperkinetic syndrome and disruptive early experiences. British Journal of Psychiatry, 161, 700-703.
- Halperin, J. M., Newcorn, J. H., Matier, K., Bedi, G., Hall, S., & Sharma, V. (1995). Impulsivity and the initiation of fights in children with disruptive behavioral disorders. J Child Psychol Psychiat, 36(7), 1199-1211.
- Hickey, E. (1991). Serial Murderers and Their Victims. Belmont, CA: Wadsworth Publishing.
- Horowitz, K., Weine, S., & Jekel, J. (1995). PTSD symptoms in urban adolescent girls: compounded community trauma. Journal of the American Academy of Child and Adolescent Psychiatry, 34(10), 1353-1361.
- Kandel, E. R. (1989). Genes, nerve cells and remembrance of things past. Journal of Neuropsychiatry and Clinical Neurosciences, 1, 103-125.
- Kaufman, J. (1991). Depressive disorders in maltreated children. Journal of the American Academy of Child and Adolescent Psychiatry, 30 (2), 257-265.
- Keegan, J. (1993). A History of Warfare. New York: Alfred A. Knopf.
- Kendall, J., Dale, G., & Plakitsis, S. (1995). The mental health needs of children entering the child

welfare system: a guide for case workers. The APSAC Advisor, 8(3), 10-13.
- Klee, L., & Halfon, N. (1987). Mental health care for foster children in California. Child Abuse and Neglect, 11, 63-74.
- Koop, C. E., & Lundberg, G. (1992). Violence in America: a public health emergency. Journal of the American Medical Association, 22, 3075-3076.
- Lauder, J. M. (1988). Neurotransmitters as morphogens. Progress in Brain Research, 73, 365-388.
- Leakey, R. (1994). The Origins of Humankind. New York: Basic Books.
- Lewis, D. O., Mallouh, C., & Webb, V. (1989). Child abuse, delinquency, and violent criminality. In D. Chiccetti & V. Carlson (Eds.), Child Maltreatment: Theory and research on the causes and consequences of child abuse and neglect. Cambridge: Cambridge University Press.
- Lindqvist, P. (1986). Criminal homicide in northern Sweden 1970-1981: alcohol intoxication, alcohol abuse and mental disease. Int J Law Psychiatry, 8, 19-37.
- Loeber, R., Wung, P., Keenan, K., Giroux, B., Stouthamer-Loeber, M., Van Kammen, W. B., & Maughan, B. (1993). Developmental pathways in disruptive child behavior. Development and Psychopathology, 5, 103-133.
- MacEwen, K. E. (1994). Refining the intergenerational transmission hypothesis. Journal of Interpersonal Violence, 9(3), 350-365.
- Maunsell, J. H. R. (1995). The brain's visual world: representation of visual targets in cerebral cortex. Science, 270, 764-769.
- McIntyre, A., & Kessler, T. (1986). Psychological disorders among foster children. Journal of Child and Clinical Psychology, 15, 297-303.
- Miedzian, M. (1991). Boys Will Be Boys. New York: Doubleday.
- Moffitt, T. E., & Silva, P. A. (1988). IQ and delinquency: a direct test of the differential detection hypothesis. Journal of Abnormal Psychology, 97, 227-240.
- Mones, P. (1991). When a Child Kills: Abused children who kill their parents. New York: Pocket Books.
- Myers, W. C., Scott, K., Burgess, A. W., & Burgess, A. G. (1995). Psychopathology, biopsychosocial factors, crime characteristics and classification of 25 homicidal youths. Journal of the American Academy of Child and Adolescent Psychiatry, 34(11), 1483-1489.
- O'Keefe, M. (1995). Predictors of child abuse in maritally violent families. Journal of Interpersonal Violence, 10(1), 3-25.
- Ornitz, E. M., & Pynoos, R. S. (1989). Startle modulation in children with post-traumatic stress disorder. American Journal of Psychiatry, 147, 866-870.
- Osofsky, J. (1995). The effects of exposure to violence on young children. American Psychologist, in press
- Perry, B. D. (1988). Placental and blood element neurotransmitter receptor regulation in humans: potential models for studying neurochemical mechanisms underlying behavioral teratology. Progress in Brain Research, 73, 189-206.
- Perry, B. D. (1994a). Neurobiological sequelae of childhood trauma: post-traumatic stress disorders in children. In M. Murberg (Ed.), Catecholamines in Post-traumatic Stress Disorder: Emerging Concepts. (pp. 253-276). Washington, D.C. American Psychiatric Press.
- Perry, B. D., & Pate, J. E. (1994b). Neurodevelopment and the psychobiological roots of post-traumatic stress disorders. In L. F. Koziol & C. E. Stout (Eds.), The Neuropsychology of Mental Illness: A Practical Guide.
- Perry, B. D., Pollard, R. A., Baker, W. L., Sturges, C., Vigilante, D., & Blakley, T. L. (1995). Continuous heartrate monitoring in maltreated children [Abstract]. Annual Meeting of the American Academy of Child and Adolescent Psychiatry, New Research,
- Perry, B. D. (1996). Maltreated Children: Experience, Brain Development and the Next Generation. New York and London: W.W. Norton.
- Perry, B. D., Pollard, R. A., Blakley, T. L., Baker, W. L., & Vigilante, D. (in press). Childhood

trauma, the neurobiology of adaptation and use-dependent development of the brain: How states become traits. Infant Mental Health Journal.

- Prothrow-Stith, D. (1991). Deadly Consequences. New York: Harper Collins.
- Pynoos, R., & Eth, S. (1985). Developmental perspectives on psychic trauma in childhood. In R. C. Rigley (Ed.), Trauma and its Wake. New York: Brunner/Mazel.
- Pynoos, R. S. (1990). Post-traumatic stress disorder in children and adolescents. In B. Garfinkel, G. Carlson, & E. Weller (Eds.), Psychiatric Disorders in Children and Adolescents. (pp. 48-63). Philadelphia: W.B.Saunders.
- Radke-Yarrow, M., McCann, K., DeMulder, E., Belmont, B., Martinez, P., & Richardson, D. T. (1995). Attachment in the context of high-risk conditions. Development and Psychopathology, 7, 247-265.
- Raine, A., Venables, P. H., & Williams, M. (1995). High autonomic arousal and electrodermal orienting at age 15 years as protective factors against criminal behavior at age 29 years. American Journal of Psychiatry, 152(11), 1595-1600.
- Rehkamper, G., Haase, E., & Frahm, H. D. (1988). Allometric comparison of brain weight and brain structure volumes in different breeds of the domestic pigeon, columbia livia f. d. Brain Behav Evol, 31, 141-149.
- Ressler, R., Burgess, A., & Douglas, J. (1988). Sexual Homicide. Lexington, MA: Lexington Books.
- Richters, J. E. (1993). Community violence and children's development: toward a research agenda for the 1990's. Psychiatry, 56, 3-6.
- Rohrs, M. (1955). Vergleichende untersuchungen an wild- und hauskatzen. Zool Anz, 155, 53-69.
- Schwab-Stone, M. E., Ayers, T. S., Kasprow, W., Voyce, C., Barone, C., Shriver, T., & Weissberg, R. P. (1995). No safe haven: a study of violence exposure in an urban community. Journal of the American Academy of Child and Adolescent Psychiatry, 34(10), 1343-1352.
- Schwarz, E. D., & Perry, B. D. (1994). The post-traumatic response in children and
- adolescents. Psychiatric Clinics of North America, in press
- Shupe, L. M. (1954). Alcohol and crime. Journal of Criminal Law, Criminology and Police Science, 44, 661-664.
- Singer, W. (1995). Development and plasticity of cortical processing architectures. Science, 270, 758-764
- Spitz, R. A., & Wolf, K. M. (1946). Anaclitic depression: an inquiry into the genesis of psychiatric conditions in early childhood. II. Psychoanalytic Study of the Child, (2), 313-342.
- Straus, M. (1974). Cultural and organizational influences on violence between family members. In R. Prince & D. Barried (Eds.), Configurations: Biological and Cultural Factors in Sexuality and Family Life. Washington,D.C. Health.
- Sturrock, R. R., Smart, J. L., & Tricklebank, M. D. (1983). A quantitative neurohistological study of the long term effects in the rat brain of stimulation in infancy. Journal of Anatomy (London), 136, 129-144.
- Taylor, L., Zuckerman, B., Harik, V., & Groves, B. (1992). Exposure to violence among inner city parents and young children. American Journal of Diseases of Children, 146, 487
- Thoenen, H. (1995). Neurotrophins and neuronal plasticity. Science, 270, 593-598.
- Ungerleider, L. G. (1995). Functional brain imaging studies for cortical mechanisms for memory. Science, 270, 769-775.
- Urquiza, A., Wirtz, S., Peterson, M., & Singer, V. (1994). Screening and evaluating abused and neglected children entering protective custody. Child Welfare League of America, 73, 155-171.
- Vachss, A. (1994). Emotional abuse: A plea for the wounded. Parade August 28, 1994
- Vachss, A. H., & Bakal, Y. (1979). The Life-Style Violent Juvenile: The Secure Treatment Approach. Lexington, MA: Lexington Books, D.C. Heath and Company.
- Vachss, A. H. (1991) Sacrifice. New York: Alfred A. Knopf, p. 56.

- Wolfgang, M. E., & Ferracuti, F. (1967). The Subculture of Violence. London: Tavistock.
- Wright, J., Sheley, J., & Smith, M. D. (1992). Kids, guns and killing fields. Society, 30, 84-89.

FIGURES

FIGURE 1. Hierarchy of Brain Function. The human brain is organized from the most simple (e.g., fewest cells: brainstem) to most complex (e.g., most cells and most synapses: frontal cortex). The various functions of the brain, from most simple and reflexive (e.g., regulation of body temperature) to most complex (e.g., abstract thought) are mediated in parallel with these various areas. These areas organize during development and change in the mature brain in a 'use-dependent' fashion. The more a certain neural system is activated, the more it will 'build in' this neural state -- creating an internal representation of the experience corresponding to this neural activation. This use-dependent capacity to make internal representations of the external or internal world is the basis for learning and memory.

FIGURE 2: Cortical Modulation: The capacity to moderate frustration, impulsivity, aggression and violent behavior is age-related. With a set of sufficient motor, sensory, emotional, cognitive and social experiences during infancy and childhood, the mature brain develops - in a use-dependent fashion -- a mature, humane capacity to tolerate frustration, contain impulsivity and channel aggressive urges.

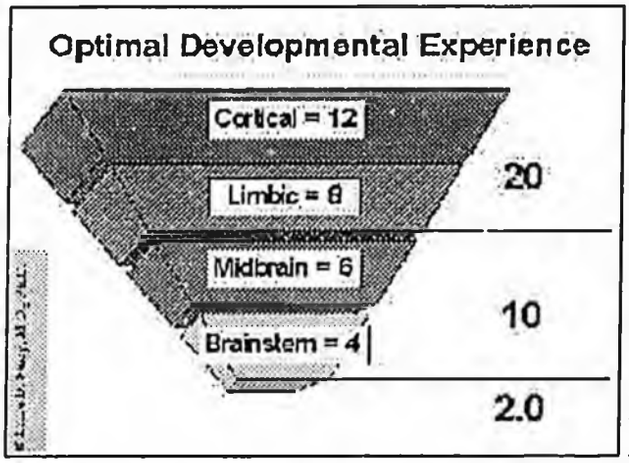

FIGURE 3. Ratio of Modulation: Optimal Development. A healthy Cortical Modulation ratio (Cortical and Limbic/Midbrain and Brainstem) develops when the child experiences a variety of optimal emotional, behavioral, cognitive and social experiences at key times during their development. This ratio indicates the relative 'power' of the maturing and mature brain to modulate the more primitive, reactive, reflexive output of the brainstem and midbrain. During infancy and childhood, sequential development of the brain necessitates that the lower, more primitive portions of the brain develop first and, over time, the output of these areas is shaped, modulated, modified in more mature fashion as the higher brain areas develop. Any disruption of development which either 'overdevelops' the midbrain and brainstem or 'under-develops' the limbic and cortical areas will result in an imbalance in the Cortical Modulation ratio, predisposing to aggressive and violent behavior.

FIGURE 4. Sequential Development of the Brain. The simple and unavoidable result of this sequential neurodevelopment is that the organizing, 'sensitive' brain of an infant or young children is more malleable to experience than a mature brain. While experience may alter and change the functioning of an adult, experience literally provides the organizing framework for an infant and child. The brain is most plastic (receptive to environmental input) in early childhood, therefore, the child is more vulnerable to variance of experience during this time.

FIGURE 5. Developmental Neglect: Emotional or Experiential Deprivation. The ability of the brain

to develop a healthy Cortical Modulation ratio (Cortical and Limbic/Midbrain and Brainstem) is impaired when key experiences are minimal or absent. This results in poor modulation of impulsivity, persisting 'primitive' or immature emotional and behavioral functioning and, in combination with other developmental experiences, a predisposition to violence. The ability of the maturing brain then, to modify impulsive and reactive responses in the face of stress or frustration is decreased in individuals deprived of specific developmental experiences.

FIGURE 6. The Persisting Fear Response: Developmental Trauma. A child raised in an environment characterized by persisting trauma (e.g., domestic violence, physical abuse, community violence) will develop an excessively active and reactive stress-response apparatus. The majority of the stress response systems reside in the brainstem and midbrain (e.g., locus coeruleus). Overdevelopment of these areas, even in the presence of optimal emotional or cognitive experience will result in an altered Cortical Modulation ratio and, a predisposition to act in an aggressive, impulsive, behaviorally reactive fashion.

FIGURE 7. Neglect and Trauma: The Malignant Combination. Developmental neglect or traumatic stress during childhood can profoundly alter development. Unfortunately, emotional and cognitive neglect usually occur in combination with traumatic stress. The combination of a lack of critical emotional experiences and persisting traumatic stress leads to a dramatic alteration in the brain's modulation and regulation capacity. This is characterized by an overdevelopment of brainstem and midbrain neurophysiology and functions (e.g., anxiety, impulsivity, poor affect regulation, motor hyperactivity) and an underdevelopment of limbic and cortical neurophysiology and functions (e.g., empathy, problem solving skills). This experience-based imbalance predisposes to a host of neuropsychiatric problems --. and, violent behavior.

FIGURE 8. Alcohol Decreases the Cortical Modulation Ratio. Upper Panel. Alcohol has a well-documented relationship to violent behavior. Under optimal circumstances, drinking can decrease judgment, impair capacity to modulate impulsivity and predispose to aggressive and violent behaviors. Alcohol does this, in part, because of mass action effects of the non-specific actions on neurons, decreasing functional capacity in all cells. Because the cortex has the most cells, however, it is relatively more sensitive to the non-specific effects of alcohol, resulting in the general phenomenon of 'getting' drunk from the top down. The sequence of loss of function under the influence of alcohol match the hierarchical sequence as illustrated in Fig. 1. The temporary decrease of Cortical Modulation ratio under the influence of alcohol leads to many violent actions.

Lower Panel: The capacity of alcohol to impair functioning and decrease Cortical Modulation ratio is even more dramatic in the poorly organized brain. The combination of alcohol (or other drugs) and a neglected, abused adolescent often leads to deadly and chilling violence.

FIGURE 9. Malignant Combination of Experience: Neurodevelopmental experiences of trauma or neglect alter a variety of brain areas and functions important in predisposing to violence. Depending upon the time in development, the nature (trauma, neglect or both) and extent of the abuse and the presence of attentuating factors, the developing brain will be impacted differentially. These experiences may occur in utero or in the perinatal period, impacting the brainstem and resulting in symptoms of anxiety. Experiences in the perinatal and first few years of life can impact the midbrain resulting in impulsive and aggressive symptoms. Trauma and neglect during infancy and childhood can impact the sub-cortical and limbic areas, resulting in dysthymic, depressed or unattached individuals. Finally, experiences throughout

childhood can impact the development of cognitive capabilities resulting in processing and problem-solving styles which predispose to violent solutions. Ultimately, however, being anxious or impulsive or depressed or unattached or cognitively-impaired do not compel violence by individuals. It is a malignant combination of one or more of these vulnerabilities in concert with a facilitating or encouraging belief system that leads to violent behaviors.

CIVITAS
INITIATIVE

The achievements and failures of any human living group-- family, clan, community-- reflect the transgenerational childrearing practices of its members. In the ways we care for our children, we create our society. We create the healers and the destroyers. Our children are reflections of the world in which we raise them. We reap what we sow.

In the United States, despite two centuries of extraordinary human achievement, our future is increasingly threatened by persisting ignorance about - and maltreatment of - children. Our policies and practices do not reflect an enduring understanding of the critical role that childrearing plays in the health and welfare of our world. This urgent issue underlies a myriad of personal, social, and economic problems threatening our future. We are in the midst of an invisible public health crisis - like a cancer growing, silently, in the heart of society.

Mission

CIVITAS Initiative catalyzes the development and distribution of practical, enduring solutions that promote the optimal development of children.

Research and programs which can address these problems already exist. Yet this information is inefficiently synthesized and transformed into practical knowledge, and rarely distributed for widespread impact. Innovative programs and policies are often isolated, under-funded, and - in a resource scarce world - competitive instead of cooperative. And the cancer spreads.

Discovery collects and distills research, programs and innovations in all aspects of child development, with a specific focus on maltreatment. Through information exchange and partnerships with individuals, agencies and institutions conducting effective work, CIVITAS Initiative continuously explores, evaluates and synthesizes working concepts from all disciplines affecting children.

Strategy
To do so, CIVITAS Initiative operates three integrated divisions - Discovery, Translation, and Communication.

Translation then incorporates these concepts and program elements into the CIVITAS Living Laboratories -- multi-institutional, public/private partnerships which integrate the innovations from many sites into comprehensive programs focused within a single community. In the Laboratories, ongoing research, training and clinical service delivery take place, with the goal of creating practical applications that can be exported and adapted to meet the specific needs and interests of other communities.

Communication uses media, technology and influential communicators to further infuse into the American consciousness those working concepts which support the optimal development of children. CIVITAS Initiative will create and manage the Cybrary™ of Child Development and Maltreatment, a comprehensive multimedia archive of translated, multi-disciplinary information on child development. Worldwide access to, and continuous promotion of, this knowledge can shift societal attitudes and behaviors regarding children and effect systemic changes which create the opportunities all children need to maximize their potential.

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Aggression and Violence:
The Neurobiology of Experience

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IN: The DevelopMentor

(AACAP)
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Each year in the United States alone, over 5 million children are directly exposed to violence. The most common form of destructive aggression takes place in the home in the form of physical abuse or domestic violence. The impact of these various forms of violence on children and adolescents is complex, but one result appears clear: the number of aggressive and violent youth is increasing dramatically. Young murderers (under age 18) in the United States tripled from 1984 to 1994. Currently 28,000 children and adolescents are known murderers. The number of violent crimes committed by youth is expected to double by the year 2010.

Are violent children conceived or created ? Is there a neurobiological reason that a child is violent ? What makes a child violent? Genes that make testosterone? Maternal neglect? Physical abuse? Modeling from a father hitting a mother? Impaired problem solving skills? Peer/gang pressures? Violence on television? Violent lyrics in music? Access to guns? In attempting to understand what makes a child violent, it is important to remember three points: 1) not all violence is the same, 2) the brain mediates all human behavior and 3) the biological properties of the brain are the result of genotype and developmental experiences.

Violence is heterogeneous. Physical violence can be impulsive, reactive or defensive; or it can be predatory, remorseless aggression. Violent behaviors can be related to intoxication from alcohol or psychosis or other neuropsychiatric conditions (e.g., dementia, traumatic head injury). Violent acts may be the result of personal (Oklahoma City bombing) or a cultural (political terrorism) belief systems. Violence can be sexualized (rape) or directed at a specific victim (domestic violence) or at a specific group (e.g., African-Americans, homosexuals, Jews).

Aggression is not violence. An aggressive person may not be violent. Aggression is a behavior characterized by verbal or physical attack, yet it may be appropriate and self-protective or destructive and violent. The complex set of behaviors recognized as aggression has been studied in man and animals for many years. Thousands of studies have examined various aspects of the neurobiology of aggression -- and the summed result is a better understanding of, simply, the neurobiology of aggressive behaviors within specific contexts, (typically animal populations in experimental conditions). Unfortunately, these insights have resulted in few advances in clinical practice or public policy related to domestic or community violence. Why ? Because the complexity of violence means that there is a complexity of neurobiology. The neurobiology of aggression, studied in the lab, leads to little insight into the neurobiology of racism or misogyny -- or anti-Semitism. Ironically, many violent behaviors are the result of a defensive response to perceived aggression. The neurobiology of fear, therefore, holds as many important clues to prevention and treatment interventions related to violence as the neurobiology of aggression. The neurobiology of hate -- or ideology -- remain unstudied -yet as surely as there are neurobiological mediators of aggression, there are neurobiological mediators of ideology.

The human brain mediates all human behavior -- all aggression -- all violence -- all fear -- all ideology -- indeed, all human emotional, behavioral, cognitive and social functioning. This three pound mass of 100 billion neurons and 1000 billion glial cells is infinitely complex. Yet certain principles of brain organization and function can lead to insights regarding neurological factors involved in violence and aggression.

The brain has a hierarchical organization, from the lower, more simple areas to the more complex higher cortical areas. Simple, regulatory functions (e.g., regulation of respiration, heartrate, blood pressure, body temperature) are mediated by the 'lower' parts of the brain (brainstem and midbrain) and the most complex functions (e.g., language and abstract thinking) by cortical structures.

The brain's impulse-mediating capacity is related to the ratio between the excitatory activity of the lower, more-primitive portions of the brain and the modulating activity of higher, sub-cortical and cortical areas (Cortical Modulation Ratio). Any factors which increase the activity or reactivity of the brainstem (e.g., chronic traumatic stress, testosterone, dysregulated serotonin or norepinephrine systems) or decrease the moderating capacity of the limbic or cortical areas (e.g., neglect, EtOH) will increase an individual's aggressivity, impulsivity and capacity to display violence.

As the brain develops and the sub-cortical and cortical areas organize, they begin to modulate and 'control' the more primitive and 'reactive' lower portions of the brain. With a set of sufficient motor, sensory, emotional, cognitive and social experiences during infancy and childhood, the mature brain develops - in a use-dependent fashion -- a mature, humane capacity to tolerate frustration. A frustrated three year old will have a difficult time modulating the reactive, brainstem-mediated state of arousal -- he will scream, kick, bite, throw and hit. However, the older child when frustrated may feel like kicking, biting and spitting, but has the capacity to modulate those urges. Loss of cortical function through any variety of pathological process (e.g., stroke, dementia, head injury, alcohol intoxication) results in **regression' --** simply, a loss of cortical modulation of arousal, impulsivity, motor hyperactivity, and aggressivity -- all mediated by lower portions of the central nervous system (brainstem, midbrain). Deprivation of key developmental experiences (which leads to underdevelopment of cortical, sub-cortical and limbic areas) will necessarily result in persistence of primitive, immature behavioral reactivity. And, thereby, predispose to violent behavior.

The most dangerous children are created by a malignant combination of experiences. Developmental neglect and traumatic stress during childhood create violent, remorseless children. This is characterized by sensitized brainstem systems (e.g., serotonergic, noradrenergic and dopaminergic systems).

Dysregulated brainstem functions (e.g., anxiety, impulsivity, poor affect regulation, motor hyperactivity) are then poorly modulated by poorly organized limbic and cortical neurophysiology and functions (e.g., empathy, problem solving skills) which are the result of chaotic, undersocialized development. This experience-based imbalance predisposes to a host of neuropsychiatric problems -- and, violent behavior.

As we search for solutions to the plagues of violence in our society, it will be imperative that we avoid the False God of Simple Solutions. The neurobiology of complex, heterogeneous behaviors is complex and heterogeneous. In the end, paying attention to the neurobiological impact of developmental experiences -- traumatic or nurturing -- will yield great insight for prevention and therapeutic interventions.

Comments or Problems

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Helping Families Support Healthy Brain Development

It is now clear that what a child experiences in the first few years of life largely determines how his brain will develop and how he will interact with the world throughout his life. Parents play the most important role in providing the nurturing and stimulation that children require, but they need information and support to develop good parenting skills. In the past, extended family members were often close by, offering advice and acting as role models for inexperienced parents. Young families today often live far away from grandparents and other family and rely more on community resources for information and support in parenting. There is much that communities can do to help families promote their children's healthy brain development.

Educate parents about the importance of early experiences for their children's development. Often parents don't know about the many little things they can do to foster their child's healthy cognitive and emotional development, like talking to the child beginning in infancy, reading to him from a very early age, and helping him play simple games. Parents, especially new or young parents, may also need help learning to recognize their child's cues that he is hungry for stimulation or has had enough.

.... *While good early experiences help the brain*

In some cases, written materials or a few sessions of parenting education classes may be all that a parent needs to learn how to provide his or her child with appropriate stimulation. However, parenting styles and beliefs that have evolved over generations, like rarely talking to babies, can be difficult for parents to change. Many parents benefit from community-based programs in which a parent group leader or a home visitor acts as a role model and friend, supporting parents in their relationship with their children. Programs that work with parents over several years can be very successful in helping them become effective "first teachers" of their children. (11)

Prevent abuse and neglect. Children who are abused or severely neglected are at extremely high risk of developing emotional, behavioral, social, and intellectual disabilities. By the time a child is identified as having been neglected or abused, these problems have already begun to develop. Greater attention must be given to preventing maltreatment before it starts. High-quality home visiting programs which start working with families as soon as the child is born have proven to be effective in preventing abuse and neglect. (12) The key to these programs' success is that they help parents manage the

Provide accessible, quality mental health services for parents. Research has shown that parents suffering from untreated depression often fail to respond sensitively to their children's cries and bids for attention, and that they are unlikely to provide the child with the kind of cognitive stimulation that promotes healthy brain development. (13) Other mental illnesses like schizophrenia can also dramatically affect a parent's ability to interact appropriately with his or her child. Proper mental health treatment for these parents can make a real difference in their ability to raise a competent, happy child.

Ensure adequate nutrition prenatally and in the first years after birth. Numerous studies have shown the devastating effects on intelligence and brain development of a lack of basic nutrients at the prenatal stage and in infancy and early childhood. Programs such as the Special Supplemental Program for Women, Infants, and Children (WIC) can be

experiences help the brain to develop well, poor early experiences can literally cause a genetically normal child to become mentally retarded or a temperamentally easy-going child to develop serious emotional difficulties.

they help parents manage the stresses of raising children before unhealthy patterns develop and things get out of control.

effective in ensuring that babies receive the kinds of foods they need to thrive. (14) Educational and outreach campaigns to alert women to the importance of nutrition in the first trimester of pregnancy would also be helpful in preventing problems that can arise in this critical period when brain cells begin to form.

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The Importance of Quality in Infant-Toddler Child Care

Increasing numbers of American infants and toddlers spend several hours each day in various child care arrangements because their parents work or attend school. It is critical that the care these children receive promotes their healthy growth and development. Too often, however, child care providers are poorly trained and do not provide children with appropriate stimulation. Research has shown that in the majority of infant care arrangements in the U.S., children are not talked to and played with enough, and they do not have the opportunity to form the kind of comfortable, secure relationships with a caregiver that will promote their healthy emotional development. (15)

Parents should be given information about how to choose quality care for their children. In addition, special attention must be given to the development and enforcement of child care licensing standards that promote high-quality care: adequate pre-service and in-service training for caregivers; low child-to-teacher ratios, and small group sizes. Finally, child care reimbursement rates for families moving from welfare to work must be high enough to fund well-trained teachers who can deliver developmentally appropriate care and education.

Conclusion

Like most children, Michael Stevens has a family that will provide the stimulation and nurturing that he needs to grow and develop to his potential. Unfortunately, rising rates of child abuse and neglect across the country and persistently high rates of school failure in some communities indicate that far too many children do not receive what they need during their first few years for healthy brain growth and development. Our increasingly technically and socially complex society cannot afford to continue to allow large numbers of children to miss out on the positive experiences they need in infancy and early childhood; the costs, in terms of lost intellectual potential and increased rates of emotional and behavioral problems, are too high. The new developments in brain research show us what children need; our challenge is to ensure that every child receives it.

Recommended Reading

Kotulak, Ronald. (1996). *Inside the brain*. Kansas City: Andrews and McMeel.

Harris, Irving B. (1996). *Children in jeopardy: Can we break the cycle of poverty?* New Haven, CT: Yale University Press.

Ramey, C. and S. Ramey. (1992). *At-risk does not mean doomed.* Occasional Paper #4. Washington, DC: National Health/Education Consortium.

Goleman, Daniel. (1995). *Emotional*

Notes

1. Huttenlocher, P. R. (1994). Synaptogenesis, synapse elimination, and neural plasticity in human cerebral cortex. In C. A. Nelson, Ed., *Threats to optimal development: Integrating biological, psychological, and social risk factors.* The Minnesota symposia in child psychology, Vol. 27, pp. 35-54.
2. Turner, A. M. and W. T. Greenough., (1985). Differential rearing effects on rat visual cortex synapses: I. Synapse and neural density and synapses per neuron. *Brain Research, 329*, 195-203.
3. Greenough, W. T. (1987). Experience and brain development. *Child Development, 58*, 539-559.
4. Ibid.
5. Campbell, F. and C. Ramey. (1994). Effects of early intervention on intellectual and academic achievement: A follow-up study of children from low-income families. *Child Development, 65*, 684-698.
6. Huttenlocher, J. *et al.* (1991). Early vocabulary growth: Relation to language input and gender. *Developmental Psychology, 27*, 236-248.
7. Lieberman, A. F. and C. H. Zeanah. (1995). Disorders of attachment in infancy. *Infant Psychiatry, 4*: 571-587.
8. Werner, E. E. and R. S. Smith. (1982). *Vulnerable but not invincible: A longitudinal study of resilient children and youth.* New York: Adams, Bannister, Cox.

Goleman, Daniel. (1995). *Emotional intelligence: Why it can matter more than IQ*. New York: Bantam Books.

Zero to Three: The National Center for Clinical Infant Programs. (1992). *Heart start: The emotional foundations of school readiness.* Arlington, VA: Author.

Carnegie Task Force on Meeting the Needs of Young Children. (1994). *Starting points: Meeting the needs of our youngest children.* New York: Carnegie Corporation.

9. Perry, B. D. *et al.* (1995). Childhood trauma, the neurobiology of adaptation, and "use-dependent" development of the brain: How "states" become "traits." *Infant Mental Health Journal, 16*: 271-291.
10. Perry, B. D. (1993). Neurodevelopment and the neurophysiology of trauma II: Clinical work along the alarm-fear-terror continuum. *The Advisor, 6*: 1, ff.
11. Olds, D. L. *et al.* (1993). Effect of prenatal and infancy nurse home visitation on government spending. *Medical Care, 31*: 155-174.
12. MacMillan, H. L. *et al.* (1994). Primary prevention of child physical abuse and neglect: A critical review. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 35*, 835-856.
13. Field, T. M. (1995). Psychologically depressed parents. In M. H. Bornstein, Ed. *Handbook of parenting, Vol. 14: Applied and practical parenting*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
14. Yip, R. *et al.* (1987). Declining prevalence of anemia among low-income children in the United States. *Journal of the American Medical Association, 258*, 1619-1623.
15. Whitebook, M; D. Phillips; and C. Howes. (1989). *Who Cares? Child care teachers and the quality of child care in America: National Child Care Staffing Study.* Oakland, CA: Child Care Employee Project.

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Brain research manifests importance of first years

By TIM SIMMONS and RUTH SHEEHAN , Staff Writers

An empty vessel to be filled. A lump of clay to be molded. This is how adults often regard a young child entering school.

But stunning discoveries about the human brain are shattering these assumptions.

Kindergarten is not the starting point of a child's brain development, scientists say. By kindergarten, the process is half over.

A child's potential is determined in the early years --from the first moments of life to countless hours spent in day care. These are the years when we create the promise of a child's future. This is when we set the mold.

The discoveries are so profound that many researchers say we will surely look back on the 1990s as the "Decade of the Brain."

Taking aim at the future: Claire Weintraub gazes curiously at a toy at the Frank Porter Graham Child Development Center in Chapel Hill. The center is a national leader in research in early childhood care.

STAFF PHOTO BY SCOTT SHARPE

In the past few years, for example, scientists have found that an adult's potential vocabulary is determined largely by the words filtered through the brain before age 3. The neurological foundations for math and logic are set before age 4. Emotional stability is greatly affected by how the brain develops in the first two years of life.

And the outcome is not predetermined, scientists say. How a child is nurtured plays a huge role in how the brain chooses to wire itself for life.

"There is no doubt that experience molds the young brain," says Dr. Harry Chugani, a pediatric neurologist at Children's Hospital of Michigan and a national leader in the field. "The early years determine how we turn out."

What matters most during this crucial period?Just about everything, it appears. For a young child's brain to thrive, the child needs to be loved, held, talked to, read to and allowed to explore. A child who lives in a world of daily stress and hostility will pay for it later. So will a toddler who is parked in front of a television for hours and hours every day.

Parents, of course, have the most to say about a child's experiences. But the flood of women entering the work force in the last 25 years --the biggest change in family life since the Industrial Revolution, some historians say -- has made day care an integral partner in the child-rearing process. Thousands of parents see their children for only a few hours a day during the workweek.

Day care is now the rule for most families, not the exception. In North Carolina, just over one-third of all children under 6 are cared for by a stay-at-home parent, according to the latest Census figures. That means the rest --more than 335,000 preschoolers --spend the majority of their waking hours outside their parents' reach.

Good start: Little Sterling Margrave gets some personal attention from Christy Farmer at the Frank Porter Graham Child Development Center in Chapel Hill, where he is in day care. How a child is nurtured plays a huge role in how the brain chooses to wire itself for life, scientists say.

STAFF PHOTO BY SCOTT SHARPE

Understandably, parents use safety as the most important yardstick of quality care. But early childhood experts have long argued that settling for safety ignores the more important issue of developing a child's potential. Today, neuroscience is providing striking confirmation.

Day care is more than a service that holds daily schedules intact. It is a place where children build their brains.

Invisible changes

Building pathways

From the moment a baby is born, each and every experience builds the neural connections that guide development. The young brain grows phenomenally in the first years of life, opening windows of opportunity for learning that occurs only once in a lifetime...

In many ways, the brain research of the past decade has raised two questions for every answer. As one mystery is solved, another unfolds. Meanwhile, our knowledge is growing by huge leaps.

Until the 1960s, most researchers thought of the brain as some sort of impenetrable box with its wiring largely determined at birth. Those interested in the inner workings of the soggy gray matter had only the lifeless brains of laboratory animals and human cadavers to provide clues.

But with the 1970s came scanning equipment, and soon after, improvements with each new generation of machines. By the 1980s, scanners were giving scientists a chance to see distinct areas of the brain in action. The result was an explosion in research and knowledge, culminating in the 1990s with one breakthrough announcement after another from the thousands of researchers now working in the field.

From only a handful of pathways at birth to trillions of connections by age 3, scientists now say, brain growth in the early years of life is unparalleled.

At no other stage does the brain master so many activities with such ease. At no other time does experience etch so deeply into our biological makeup.

Without a second thought, most parents simply enjoy the neurological miracle that produces vision, motor skills and a little nonstop chatterbox --all by the age of 5.

But equally profound changes take place within those five years that are practically invisible. They happen during what scientists call critical periods, or windows of opportunity.

It is during these periods that long, thin fibers grow inside the brain,

creating pathways that carry electrical impulses from cell to cell. The resulting network, which grows daily in the young brain, forms the neurological foundation upon which a child builds a lifetime of skills.

The connections needed for some skills form quickly. Vision, for example, develops in a matter of months. But it takes almost four years before the brain is done building the neurological foundations that allow a child to pick up a pin or to skip down the sidewalk.

Once the critical periods pass, however, they are gone forever. Improving a child's potential after these windows of opportunity close is far more difficult --and in some cases impossible.

The genetic blueprint that determines our potential comes with a major condition:To fully reach that potential, start early.

[TOP]

Wired for learning

One of the few places in the nation where brain research and day care can be discussed comfortably in the same conversation is the Frank Porter Graham Child Development Center in Chapel Hill.

Founded 30 years ago and named in memory of the former University of North Carolina president and U.S. senator, it is among an elite group of research centers scattered across the United States. To those in the field, the center's work is well known on subjects as diverse as the spread of germs in day care and the long-term effects of quality care on a child's academic achievements.

Essential ingredient: Volunteer Ann Goode reads to her daughter Cara, right, and classmates at the Community School for People Under Six in Chapel Hill. If a young child's brain is to thrive, experts say, she needs to be loved, held, talked to, read to and allowed to explore.

STAFF PHOTO BY SCOTT SHARPE

Last year, the Frank Porter Graham center was given a role to play in helping set national policy when it was awarded a $14 million grant to coordinate research efforts throughout the country on early childhood care.

But all of that is lost on the roughly 65 children who attend the center's day-care program. To the toddlers in Harriet Reddick's class, research is the different noises one can make by banging a plastic shovel and then a plastic bucket against one of the playground toys.

Brooke, a little blond girl with all the curiosity you would expect in a child of 16 months, holds a green plastic bucket at arm's length. "Bu-bu-bu,"she repeats

over and over.

"That's right, Brooke. It's a bucket,"Reddick replies

Brooke responds by shoving the bucket in front of anyone who will praise her for her discovery.

Although most of her communication is limited to two- and three-word phrases, Brooke is clearly about to cross the threshold of practical speech.

But this isn't something that has happened in the past few months. Her brain --like the brains of young children throughout the world --has been getting ready for this task since birth.

A child's brain, logically enough, has no idea at birth what language the child will be required to speak. So it comes equipped with the ability to learn any language, says April Benasich, director of infancy studies at Rutgers University.

At the same time the brain is forging thousands of new connections a day, it is also keying in on the repeated sounds of speech it hears, the tone of a person's voice and subtle verbal cues that go unnoticed by adults.

Happy to simply make noise at first, babies soon learn to specialize based on the sounds they have heard, according to research by scientists such as Patricia Kuhl at the University of Washington.

By the age of 1 year, a child is clearly developing a native tongue. She is learning to focus on the sounds of the language that surround her while ignoring sounds she is capable of producing but never hears. By age 5, the neurological connections needed to speak additional languages without an accent will be pruned away or put to other use.

Contrary to conventional wisdom, the young brain is more than capable of learning several different languages during this window of opportunity --with little effort or confusion.

"Neurologically speaking, there is nothing that prevents a child from learning two or three languages at the same time. The brain appears perfectly capable of that,"says Chugani, the neurologist at Children's Hospital of Michigan.

Scientists have long known that hearing disorders or chronic ear infections can impair a young child's speech or stunt his vocabulary. Now they are beginning to understand why.

If a child cannot properly hear and process sound during the critical period for speech, it is far more difficult for the brain to form the proper pathways and connections, Benasich explains.

'It's pretty outrageous what happens in those first years. They go from the blob stage to being this little, very interactive member of the family.'

Anne Goode

Chapel Hill, mother of Cara, 2 1/2

[TOP]

Complex connections

At a little table near the back of their classroom at the Frank Porter Graham center, a small group of children gather around teacher Phyllis Royster.

While the 3-year-olds begin cutting pictures from magazines, other children gather around Laura Coble to play with blocks and toys. With a little prodding by Coble, the children soon are singing nursery rhymes and

counting games.

A neurological scan of these children would show sections of their brains literally glowing with electrical activity. This is the beginning of the period that defines a child's greatest learning potential --roughly from the ages of 2 to 10.

'The most important thing you can do is be proactive. Parents often know, they just don't know why.'

Dr. April Benasich

director of Infancy Studies at Rutgers University

Amazingly, what started in these children's brains as a few scattered connections and pathways has now developed into a tangle of interconnections of almost adult volume.

But compared with an adult, each child is putting far more effort into maintaining the connections he has generated.

At Children's Hospital in Michigan, Chugani is considered a pioneer in the use of a technique that allows researchers to watch the human brain in action.

The technique, known as Positron Emission Tomography or PET, scans for activity in a child's brain based on glucose consumption. The brightly colored pictures it produces make it possible to see what part of the brain is most actively engaged during given activities.

What the scans show in general is that the brain does not reach into one specific area to retrieve a single piece of information or a command. Instead, it relies on a complex network of connections that respond in concert to messages received by the brain.

This is what allows the children gathered around the table with Royster to cut out pictures, answer questions and giggle over something delightful all at the same time.

But the scans that Chugani works with show something else about the brains of children. The growth at this age is explosive, a fact that allows them to absorb and organize new information at a rate much faster than adults. Until the age of 10, children's brains show almost twice the activity of an adult brain.

Once considered static, the brain is revealing itself to be an amazingly adaptive organ. The trillions of connections that make up a child's brain are staggering for their complexity alone. But it is the speed with which these connections work simultaneously that makes the most powerful computers seem primitive in comparison.

Once a child reaches puberty, the brain activity that distinguishes the early years begins to ebb. By about age 16, the body's effort to maintain neurological connections hits a plateau, and it remains at that level throughout much of adult life.

The idea of critical periods for brain development was only a theory until a series of breakthrough experiments in the 1960s and early 1970s.

It was during that time that two researchers, David Hubel and Torsten Wiesel, performed experiments on how the brains of cats are wired for sight.

The research, for which Hubel and Wiesel won a Nobel Prize in 1981, showed that sewing one eye shut on an otherwise healthy newborn kitten prevented the cat from ever seeing when the eye was reopened. Even closing the eye for a few days caused permanent damage to the cat's sight.

'The brain knows what it wants, and if you give it a chance, it's

By denying stimuli to the kitten's eye during the brain's critical period for sight, the researchers prevented the formation of connections between the eye and the brain's visual cortex. Trying to develop the connections after the critical window passed proved fruitless.

going to make the most of the opportunities you present it.'

Dr. Larry Katz

Duke University neurobiologist

critical window passed proved fruitless.

"It forever changed the way we thought about brain development," says Carla Shatz, immediate past president of the Society for Neuroscience and a neurobiologist at the University of California at Berkeley.

[TOP]

Nature and nurture

The day-care program at Frank Porter Graham in Chapel Hill is almost utopian in its approach.

While most day-care centers in North Carolina struggle to meet minimum standards on tight budgets, the mission of the Graham center is to seek the best care possible for its children.

Teachers at the center earn between $24,000 and $37,000 a year, about two to three times the average for child-care providers in North Carolina. All have college degrees and most have a master's. The 12 infants who are enrolled at the center each year remain together until they leave at age 5.

In return for letting their children participate in the studies, parents receive model day care.

"This isn't what most parents are going to find when they start shopping for day care,"center director Debby Cryer says. "In fact, it's not the real world."

Indeed, on many days adults outnumber babies in the infant room as Cryer takes visitors from one crib to another.

The first rule in the infant room is obvious: No child who is awake goes unattended.

It's not that the teachers in the infant room don't like to hear children cry. As any young parent can confirm, no amount of attention can eliminate that.

Instead, the adults play with the children constantly because that is how children learn

"The brain is an association machine," says Dr. Larry Katz, a neurobiologist at Duke University who was a postdoctoral fellow with Wiesel in the 1980s.

"The brain constantly looks to link things together -- by sight, smell, sound and space.Then it calls on those associations to make sense of the world."

Although the brain connections formed before birth are critical, they

mostly allow for biological survival. Connections that are necessary to control breathing and heart rate, for example, have already been formed at birth.

But in the following months and years, nature and nurture tumble over one another until they become intertwined and inseparable.

Nature provides an organ that craves experience and association. Nurture guides the process, ultimately deciding which pathways in the brain will be used and which will be ignored.

All children learn. They can't help it. What they learn depends on what they are exposed to.

Timely lesson: Daniel Helfrich, 2, gets encouragement from his mother, Carol, during a Kindermusik class at the Raleigh Conservatory of Music. Researchers have found that the "window of opportunity" for learning musical skills opens early.

STAFF PHOTO BY SCOTT SHARPE

[TOP]

Emotional evolution

Even emotions appear to have a critical period of development, although the concept is still a murky one among researchers.

Feelings, personalities, emotions --in many respects the essence of what we are --have long been regarded as family traits passed fr .1 parent to child. A large body of work, for example, documents genetic li .s for emotional disorders.

But questions have lingered for decades about whether genetics alone dictates the emotions that define us. In some of the most famous social experiments of the 1950s, baby monkeys were separated from their mothers at birth and raised without parents. As they matured, they tended to respond to stress by hugging themselves while rocking back and forth. They also stared blankly for abnormally long periods.

Tragically, researchers see many of the same behaviors in children who were discovered in Romanian orphanages in the late 1980s. Now in elementary school, the children had been deprived of any nurturing for the first year of life or longer.

Those who have since been adopted seem to be adjusting to their new family settings, but they often have trouble developing socially. Psychologists report that some of the children react to stress by hugging and rocking themselves much as the monkeys did.

Others have a difficult time forming normal relationships with adults. Even though they are loved and well cared for, some will walk away with almost any stranger who is kind to them.

The idea that a critical window for emotional development contributes to these problems is bolstered by PETscans that show increased activity in the brain's frontal cortex between the ages of 6 months and 2 years, according to

Chugani. In older children and adults, that is the area of the brain that dominates emotions and complex thoughts.

But answers to how these circuits form --and why -- is still as mysterious to researchers as emotions themselves.

What isn't mysterious to Cryer, the director at the Frank Porter Graham day-care program, is what day-care operators should do with the findings.

Shortly after she took over as director last year, she stopped changing children's teachers at the end of the first year --a common practice in day care. Instead, she allowed the teachers to change rooms with their children as they grew older.

"Why rip them apart at the height of their social and emotional attachment?"Cryer says. "What are our priorities?"

At the end of a long morning, 5-month-old Nija coos in the arms of her teacher, Christy Farmer. At this time next year, the two of them will be working together in the toddler class. The emotional bond --as well as any underlying neurological connections --will remain intact.

[TOP]

A question of care

WhenChugani, the neurologist from Michigan, is invited to speak about brain development, he is sometimes joined by Craig Ramey. A psychologist at the University of Alabama, Ramey was a senior researcher at Frank Porter Graham for two decades.

Putting experts from early childhood and neuroscience at the same table is something that wouldn't have happened five years ago. Neither would have thought the other's field had much to offer.

But there is a growing awareness that something is seriously wrong with the way we raise our young children. Separately, neuroscientists and early childhood experts have reached the same conclusion:Ayoung mind denied opportunities is a young child denied potential.

Early childhood experts had suspected this for years, long before their own formal studies were completed.

Parents who rely on intuition sense it as soon as they are forced to search for quality care.

And neuroscientists --while reluctant to publicly pass judgment on day care -- tip their hand when it comes to making decisions about their own children.

Duke's Katz, for example, hired a nanny for his first child "because I can't really see anything good coming out a situation where one adult watches five children."

Chugani assumes that his young son will follow in his 12-year-old sister's footsteps and play several instruments, learn a foreign language or maybe do both. "Why shouldn't I expect it?"the father says.

Even politicians have pegged the issue as one they can't ignore. First lady Hillary Rodham Clinton will host a national conference on children and the family this spring. In North Carolina, Gov. Jim Hunt's early childhood

program, Smart Start, is built entirely upon the belief that people will respond to the needs of the state's youngest residents.

But it isn't likely that brain researchers will ever be able to tell parents what they really want to know:how to build the perfect brain. Many in the field are not even comfortable with the dawning recognition that they could dramatically change tomorrow's public policies or the way parents raise their children.

"Some of the assumptions people make about the human brain are logical, based on what we know so far, but we are not early childhood experts,"says Shatz, the past president of the Society for Neuroscience. "This is research."

Still, it is the type of research that drew about 75 of the nation's top educators and neuroscientists to a meeting in Colorado last summer to talk about common areas of interest and the possibility of joint projects.

Had the current discoveries of neuroscience preceded the day-care revolution by 10 years --instead of happening the other way around --Ramey, the Alabama psychologist, says he has no doubt that attitudes about day care would be different and that the public would demand a better system.

"But it's too late for that now," says Ramey, who has watched his own ideas about day care change between the births of his oldest child --who is now 30 --and his youngest, who is 4. "Our system of day care is bootstrapped upon the belief that day-care providers are baby sitters. First we will need to change that belief."

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April 3, 1998

The Honorable Con Bunde
Chairman, House Hess Committee
State Capitol, Room 104
Juneau, AK 99801-1182

Re: HB 369 and HB 375

Dear Representative Bunde,

I am writing in support of Governor Tony Knowles' Smart Start Initiative, and its pending legislation, House Bill 369 and companion measure Senate Bill 266 and House Bill 375 and its companion measure 272.

I feel that we, as Alaskan's can not afford to ignore the evidence of continued child abuse and neglect in our state. The Smart Start Initiative is based on the theory that early-childhood intervention programs result in a significant government savings.

Anything that you can do to further these important pieces of legislation would be greatly appreciated.

Sincerely,

Don Argetsinger
President

KLUKWAN, INC.
P.O. BOX 32077 • JUNEAU, ALASKA 99803-2077 • (907) 789-7361

April 3, 1998

The Honorable Tony Knowles
Governor
P.O. Box 11001
Juneau, AK 9981-0001

Re: HB 369 and HB 375
SB 266 and SB 272

Dear Governor Knowles,

I am writing in support of your Smart Start Initiative, and its pending legislation, House Bill 369 and companion measure Senate Bill 266 and House Bill 375 and its companion measure 272.

I feel that we, as Alaskan's can not afford to ignore the evidence of continued child abuse and neglect in our state. The Smart Start Initiative is based on the theory that early-childhood intervention programs result in a significant government savings.

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Sincerely,

Don Argetsinger
President

KLUKWAN, INC.
P.O. BOX 32077 • JUNEAU, ALASKA 99803-2077 • (907) 789-7361

April 6, 1998

The Honorable Joe Green
House of Representatives
State Capitol, Room 118
Juneau, AK 99801-1182

Re: HB 369 and HB 375
SB 266 and SB 272

Dear Representative Green,

I am writing in support of your Smart Start Initiative, and its pending legislation, House Bill 369 and companion measure Senate Bill 266 and House Bill 375 and its companion measure 272.

I feel that we, as Alaskan's can not afford to ignore the evidence of continued child abuse and neglect in our state. The Smart Start Initiative is based on the theory that early-childhood intervention programs result in a significant government savings.

Anything that you can do to further these important pieces of legislation would be greatly appreciated.

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STATE OF ALASKA

TONY KNOWLES, GOVERNOR

DEPT. OF HEALTH AND SOCIAL SERVICES

OFFICE OF THE COMMISSIONER

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FAX: (907) 465-3068

February 4, 1998

Honorable Con Bunde, Chairman
House Health, Education and
Social Services Committee
State Capitol Room 104
Juneau, AK 99801-1182

Dear Representative Bunde,

The Department of Health and Social Services respectfully requests a hearing in the House Health. Education and Social Services Committee on House Bill 375 "An Act relating to ch. .lren in need of aid matters.....; and providing for an effective date."

This bill was introduced by the Rules Committee at the request of the Governor. Fiscal notes were submitted at the time of introduction.

Attached is a two page summary of changes to the criminal and civil statutes included in the bill.

Based on previous conversations with yourself and Representative Joe Green, Chairman of the House Judiciary Committee, we understand there may be interest in receiving an overview of the legislation in the House Health, Education and Social Services Committee and House Judiciary Committee sitting in joint session. If a joint hearing is not desirable at this time, we request a hearing in the House Health, Education and Social Services Committee, the first committee of referral. Your favorable consideration of this request will be most appreciated.

Sincerely,

Elmer A. Lindstrom
Special Assistant to the Commissioner

Attachment
cc: Representative Joe Green, Chairman, House Judiciary Committee
Russ Webb, Deputy Commissioner
Pat Pourchot, Office of the Governor

STATE OF ALASKA

TONY KNOWLES, GOVERNOR

DEPARTMENT OF EDUCATION

OFFICE OF THE COMMISSIONER

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(907) 465-2800
FAX (907) 465-4156

January 26, 1998

The Honorable Con Bunde
Chairman of the House Health,
Education and Social Services Committee
Alaska State Legislature
State Capitol
Juneau, AK 99801-1182

Dear Representative Bunde:

Today HB 351, the Governor's academic performance/accrediation/and foundation formula bill, was referred to your committee. I would like to request that you hold a hearing for that bill at your earliest convenience.

HB 351 includes a statewide comprehensive testing system, an expansion of report card requirements, a state accreditation system, and the proposal to hold schools accountable for student learning. It also includes our foundation formula rewrite. As we know that your committee will be holding hearings on the foundation formula this Tuesday, Thursday, and next Thursday, we hope that you will take action on this bill as soon as possible.

Last session your committee initiated and was successful passing the high school qualifying exam legislation. As the Department prepares to implement that law, we also look to you for support in establishing a statewide comprehensive testing system. It is our responsibility to make sure Alaskan students are well prepared for that qualifying exam when it is put in place.

Your support for K-12 education in Alaska is always appreciated. I look forward to testifying in your committee on behalf of this important piece of legislation.

Sincerely,

Shirley J. Holloway, Ph.D.
Commissioner

Cc: Pat Pourchot, Legislative Director
Office of the Governor