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ABSTRACT

This is a further clarification of the psychological theory underlying the Information System for Vocational Decisions (ISVD), a prototypic, computer-based, interactive, information guidance system, which is intended to facilitate the realization of purpose. The basic purpose paradigm herein comceptualized consists of a description, largely in terms of information theory, of a phenomenon labeled "ideal behavior." Such behavior maximizes the probability of future outcomes which would be both adaptive and satisfying. Two further requirements are delineated: (1) the more information involved in a decision to act, the more predictable the result of the action; and (2) such information as guides an individual's behavior must have been evolved and integrated into a system of goal and feedback by that individual. The bulk of the report then discusses some ways in which such evolution and integration might be developed, and how a purpose mechanism might operate, given that necessary information had been learned. (TL)

INFORMATION SYSTEM FOR VOCATIONAL DECISIONS

Project Report No. 20

ON THE CONCEPT OF PURPOSE

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Graduate School of Education
Harvard University

April 1969

Editor's Note

On 1 June 1966, the Information System for Vocational Decisions (ISVD) came into being under terms of a grant from the U.S. Office of Education to the President and Fellows, Harvard College. The Graduate School of Education, Harvard University, the New England Education Data Systems, and the Newton (Massacusetts) School Department are partners in carrying out the provisions of the grant.

The purpose of the ISVD grant is to underwrite construction of a prototypic computer-based guidance system in which the comprehension of epigenesis in decision-making development may ensue from repeated interactions with the System. The product of the comprehended epigenesis is purpose in the terms which Field defines in this project report.

The ISVD has from time to time released project reports written by members of its staff. The reports have provided indication of current project thought on technical and theoretical problems.

ON THE CONCEPT OF PURPOSE departs from practice with ISVD Project Reports in that the author, Frank L. Field, is not a member of the staff of the ISVD. However, Field is the one who brought me into understanding of the concept of purpose as we together wrote "Guidance: The Science of Purposeful Action Applied through Education," which was published in the HARVARD EDUCATIONAL REVIEW in 1962. Field and I have continued to learn about purpose together, he more purposefully than I. Field served as consultant to the ISVD during summer 1968. Therefore, it was with pleasure that I seized the opportunity he gave me to release this statement about purpose since we number him in the project in spirit if not in finance. The statement undergirds my work in the ISVD to construct prototypes for a computer-based interactive

information system intended to facilitate realization of purpose The statement therefore further clarifies the psychological theory of the ISVD which I have endeavored to frame throughout conduct of the project.

David V. Tiedeman

31 January 1969

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Frank L. Field

Santa Barbara, California

January 1969

PREFACE

If one looks at the evolution of life upon this planet a number of progressions can be perceived. One of these progressions consists of an ever improving series of navigational systems. One particular aspect of navigational evolution occurred to me during the development of purpose theory, and at the present time this notion appears to provide a context in which the concept, purpose as a navigational system, makes considerable evolutionary sense.

Consider the crude groping navigation of creatures such as amoebae. They blunder along in only slightly better than random fashion, by extending pseudopods--probably with some chemical "rationale" but perhaps not consistently so -fully at the mercy of their environment. Sometimes they find something to eat, but it is equally likely they will encounter something that eats them. Next, take a huge phylogenetic step and consider the relatively advanced capacity for navigation possessed by creatures who have what some would call a "nose brain." Possessing a nose brain, a creature can receive and evaluate information regarding the environment. These creatures have a considerable advantage over the amoeba because they can detect a sort of "getting hot or getting cold" dimension with regard to the presence of food or enemies in the immediate vicinity. Given the information that their local environment contains, say, an edible bit of prey, the nose brain navigator can prepare to pursue; or, given indications that a predator is nearby, preparation can be made to flee. Either way there is a greater degree of early warning involved in the navigation of such creatures as the prosimians, who operate in this manner.

II.

The next step in the progression results in a tremendous advantage over fortuitous groping and also over non-directional early warning systems. Creatures possessing a so-called "eye brain" have a much more direct navigational system. Given the capacity to evaluate whatever information is contained in reflected light rays, creatures with a good sense of sight can determine direction, distance, and even the identity of important variables within their environment not merely their presense or absence. If the information suggests pursuit or the plucking of immobile food these creatures can proceed directly toward their goal without blind groping, and without being mislead by the vagaries of wind and the like. In the same way, if it is danger rather than opportunity that meets the eye, flight can be taken in the best direction. Of course this direct and more precise navigational capacity is dependent upon special conditions to a greater extent than more primitive systems; there must be light, and a reasonable clear and direct line of sight is also necessary. To a certain extent this shortcoming has been overcome by many creatures who have evolved a combination of nose and eye navigation. Nevertheless all of the navigation systems mentioned so far have the common characteristic of passivity. All depend upon the passive reception and evaluation a) of events or entities into which the creature has blundered, b) of particles carried in the air or water that activate the scent mechanisms, or c) of the processing of information born in reflected light rays, (or, d) of following directions contained in a new Party Line!).

The step I perceive next is a shift in kind as well as in method. I perceive a set of navigational procedures which can be described as active

rather than passive; these involve the active "casting forward" of something by the creature, which is then evaluated as it is reflected by the environment. This goes far beyond pseudopod and nose brain. It is more analogous to supplementing the eye brain with a built-in source of light, and perhaps even a complementary x-ray or infra-red system (to broaden the spectrum of rays that can be perceived and evaluated).

One step within this progression from passive to active navigation is represented by the radar-like mechanisms possessed by bats and dolphins. Both supplement their tactile senses, their noses, and their eyes, by actively broadcasting sound waves forward into their environment, and by evaluating the echoes as they return. Independent of touch, scent, daylight, or clear water, then, such creatures steer a course toward prey and away from danger, and they do so under a much wider variety of conditions than is possible for any creature with the more primitive sort of navigation equipment referred to previously. It is for this reason that I consider such <u>active</u> navigation a major step in evolutionary progress. Furthermore, the human version of this progression suggests an evolutionary context for the concept of purpose. Aliens from another galaxy might over-simplify their findings on Earth by categorizing human culture and its accomplishments simply as manifestations of a creature possessing a "symbol brain."

Consider the capacities of the cerebral cortex possessed by human beings. While our lower or more primitive brain centers give us some degree of just those capacities discussed in the first paragraph, the higher brain centers, on the other hand, give us the capacity to process abstract symbols. In one sense this means that we are capable of

"manipulating" our environment entirely within our heads--though of course only by manipulating in the abstract various representations of environmental reality.

One way of comprehending the origins of this odd capacity is to suggest that it provides raw materials for another proactive navigation system. Specifically, the power to manipulate abstract symbols provides the raw materials for a sense of time, for a sense of similarity--based upon s mbol generalization and levels of abstraction--and for a relatively huge storage memory capacity that can accumulate experience far beyond what can be achieved by means of conditioned learnings. In other words, our higher brain centers give us the capacity--directly analogous to bat or dolphin "radar"--to cast something forward and to evaluate reflections from it. What human beings cast forward, however, is a complex set of patterns represented by abstract symbols. And the "forward" in this case is the future--though obviously only as anticipated in the present. In more common terms, we cast our experience forward in time when we imagine what it might be like if one or another event took place, or in one or another alternative situation. After creating these conceptual alternatives we can bring our lower brain centers into play, and literally "try on" each situation; we respond to them as if they were already real. We let our sense of threat or attraction, of comfort or discomfort, of pleasure or displeasure, inform us regarding the suitability of navigating to the left or to the right or straight ahead. If it seems likely that danger lies in one direction and dinner lies in another, we can then emulate the bats and dolphins and move in the more promising direction. In terms of purpose we conceptually establish and then overtly pursue our

goals; in terms of evolution, on the other hand, we navigate through time rather than depend entirely upon the present environment--as even our most sophisticated fellow creatures, the bats and the dolphins are forced to do.

This marked increase in navigational capacity provides me with a context in which it makes evolutionary sense to consider our dual capacity a) to deal with environments which do not as yet exist (or which might never exist without our intervention), as well as b) to respond as our fellow creatures do to events in the real, immediate, and present environment. To do both is (at least potentially) to do considerably better--and doing better seems to be what evolution is all about.

The concept of purpose has another characteristic which I find exciting. Perhaps the best illustration lies in the relatively new science of ecology. Investigators in this area seem less prone to errors of overspecialization than is the case in many other disciplines. They are less puzzled--and therefore less artistically creative in their explanations--when they discover a "bizarre" trait in some animal species' behavior, or in its conformation. Rather than trying to guess what a man would do with some bit of organic apparatus they look to that animal species' normal environment and frequently find that the phenomenon appears bizarre to us only because our environment leads us to contend with quite different problems than those encountered by the species in question.

For some time I have been troubled by the existence of what we call "behavioral sciences"--rather than one behavioral science or life science. More specifically, something gets lost when scientists separate themselves into disciplines dealing solely with the psyche as opposed to dealing solely

with the social environment as opposed to dealing solely with the physical environment, and so on. To a considerable extent the proposed concept of purpose has developed from my personal tendency to view the findings and phenomena specified by one discipline just as if these phenomena were members of a species living within an ecological system. For example other disciplines such as anatomy, biochemistry, and sociology clarify the existence of a complex environment in which, say, the human psyche has to operate. As a result certain characteristics of human mental functioning also begin to lose their superficial bizarreness; invariably, human characteristics of mentation reflect some functional relationship with the characteristics of other systems of which they are a subsystem (say, the digestive) and/or within which they are complementary subsystems (say, the sensory).

The integration of phenomena I have found most useful might be described in the following fashion. Consider that the human cerebral cortex--with all its great power of logic and abstraction--nevertheless lives in the jungle of human instincts. This is really no more than to point out the obvious fact that our cerebral cortexes live within our bodies. At the same time, however, the complex of instincts and automatic mechanisms and biochemical fluctuations built into these bodies by the genetic code and/or by noncognitive learning (such as those upon which the behaviorists concentrate), all of these "wild species" operate within what might be termed the corral established by the capacities of the cerebral cortex or vice versa! As in the case of all other ecological systems, then, there is a cofunctional and covariant relationship.

Whether followers of Ashley Montagu, Gordon Allport, and/or various

religious leaders like it or not, the instinctual jungle exerts its pressures and establishes its limits upon the accomplishments of the cerebral cortex. To be human is to be fully human; it involves feeling all the impulses and emotions that some of sociology and some of psychology and much religion would deny or expunge. But at the same time, and this time risking the displeasure of many behaviorists, many followers of Freud or various neo-Freudians, and an extremely high percentage of those over-advocating such current fads as "creativity", "group dynamics" and the like, this whole wild array of instincts, impulses, and emotional responses is equally affected by the abstract products of the human cortex. To be human is also to be thoughtful, reflective, idealistic, and even reasonable.

This point of view has given me some advantage over those of my colleagues who are "more disciplined." Given a bit of sociological or anthropological information that does not fit what I have come to observe from the standpoint of psychology, I do not feel burdened with the obligation to disprove it. I am therefore free to pursue what seems a far more productive task; namely, attempting to integrate the two apparently conflicting bits of data by puzzling about how they might fit together within some system larger than can be defined completely within the confines of psychology or sociology or anthropology. Given a similar ration of intelligence or imagination, then, I have developed the concept of a navigational system--purpose--that (at least logically) can integrate information from almost every source now existing within the behavioral sciences. Social systems are no more and no less fruitful sources of navigational data than are psychological systems, physical organ systems, genetically conveyed response systems, conditioned response systems, cognitively learned or created

conceptual systems, and so on and so forth. This leads to the third promising characteristic of the theory.

The concept of purpose is often a great deal easier to apply to daily issues of professional educational practice than are more specialized theories. The capacity to integrate diverse sources of information makes purpose theory exceptionally useful for the choice of action. It becomes relatively simple to reconcile those pseudoparadoxes produced by over-specialization or by neglect of well-established data. I have yet to encounter an issue in child-rearing, socialization, education, or therapy that cannot be at least clarified by asking one simple basic question: Is the information produced by one or another traditional behavioral discipline being given undue emphasis in practice? Or are there sets of information specified by other traditional disciplines that have been ruled out or left out? Invariably one or the other turns out to be true, and more usually there is some of both errors. Consequently the approach has proven extremely useful for the critical analysis of existing educational and related practices.

At the same time the concept of purpose has provided the basis for a positive set of recommendations to follow this critical analysis. One clear and simple way of describing this application is to state that any conceptual structure overarching or integrating the subject matter of artificially separated scientific disciplines, all relevant to the whole of human behavior, provides a logical basis for a checklist. In the same way that the present-day flight crew of a huge jetliner must be sure to check far more variables than they could recall even as a team--a fact which has led to the elaborate preflight checklist--so the concept of purposeful

action can call to the professional educator's attention more sources or information relevant to any student's or studentbody's developmental needs than ever could be recalled by that educator without such an integrating structure. Initial interviews, therapeutic goals, curriculum design and so forth, all can be approached by running down the list of essential components to purposeful navigation, and then judging whether or not each essential aspect of human nature has been given due attention--and no more. If the individual student is completely unaware of his or her own internal nature--of his or her likes, dislikes, hates, fears, needs, and so forth--then it may do that student very little good to be exposed to even the clearest set of new information regarding history, philosophy, thermodynamics or biology. The student still will remain unable to choose a personal course that fits his or her own idiosyncratic nature reasonably well. Or, an instance,which is becoming somewhat more common (as the result of certain fads based upon an over-reaction to our present over-intellectualizating of education), a student will profit relatively little from more psychoanalysis, sensitivity training, or unconditional positive regard if his or her previous education has focused entirely upon self, to the complete neglect of other realities in our current cultural environment.

These issues are developed in a concurrent book.* I turn now to the theory itself.

* Tentatively entitled Freedom and Control in the Classroom, in preparation for Thomas Y. Crowell Co., New York.

CHAPTER ONE

THE NATURE OF PURPOSEFUL ACTION

How does one propose a new theoretical structure regarding behavior? What available bases might clarify the proposal or provide a useful context? By 1964 I had become fairly satisfied with the conceptual structure underlying purpose theory; relevant work since then has focused upon its application, and upon the resulting refinements. Such tasks are never finished however, and presentation remained easy to delay.

One of the most consistent needs I felt was for some clear conceptual starting point; the behavioral sciences are primitive but there is no need to start completely from scratch when theorizing about human behavior. Yet the concept of purposeful action to be defined in this book is so general that it could be based upon or derived from quite diverse theories regarding human behavior. I was especially conscious of this while seeking some clear point of departure in my favorite overview of individual behavioral science, George A. Miller's Psychology, The Science of Mental Life (1962). Miller unwittingly triggered the choice of a starting point himself; he reported some recent work in decision-making theory that anticipated my own emerging approach. The following extended excerpt is used to tie my theoretical proposals to existing conceptual research:

> George Katona, a psychologist who looks at economic behavior through a magnifying glass called the University of Michigan Survey Research Center, has pointed out that what people do depends upon their level of aspiration. They decide on a value that would be satisfactory and then accept the first offer that exceeds it. In experimental studies it has been shown that, if they are successful, people tend to raise their aspiration level next time; if they fail, they tend to lower the value they regard as satisfactory. Herbert A. Simon, a behavioral scientist at the Carnegie Institute of Technology and a close student of administrative behavior, has suggested that this strategy of searching for something good enough--even though it may not be the best possible--should be called satisficing. Satisficing does not always extract as large a return as maximizing would, but it is a much easier strategy to follow.

A person who has decided what will be good enough for him can then use this rude decision as a test. Each alternative that presents itself can be tested to see if it matches up to the standard. If it does, he accepts it. If not, he looks further. If a long search turns up nothing good enough, he may revise his level of aspiration.

The alternative choices available will depend partly upon what luck provides, partly upon the personal efforts of the satisficer. If he finds himself in an undesirable situation, he can take action to change or abandon the situation; he is not required to sit quietly until it goes away. This capacity to modify the environment develops progressively up the evolutionary scale, until in man it is so highly developed that the very operation of natural selection can be controlled. Let us consider briefly how the capacity operates.

Assume one is dealing with an organism complex enough to maintain an implicit image of the satisfactory states of its world--of itself and its environment. When the state that is perceived to exist does not fall within the bounds of satisfaction, the organism becomes active. If the activity changes the situation in a satisfactory way, it ceases and, presumably, the successful action is remembered for future reference. If the activity does not create a new situation more to the organism's liking, other actions may be initiated. If failures persist, it may be necessary to lower the level of aspiration, to revise the conception of what is desirable in order to bring it more in line with what is attainable. Such revisions, however, are often accompanied by strong emotions.

This description of the adjustment process is quite abstract. It describes the way we cope with our homeostatic drives as well as it describes the way we work toward any other valued objective. The underlying notion is that of a discrete servomechanism, with the one--very important--difference that the threshold for activation can vary as a function of success or failure. In very general terms, therefore, this description preserves the general philosophy of the early, biological accounts of motivation, but does so in terms of guidance and adjustment, rather than in terms of energy.

Leaving aside all the biological problems of energetics and focusing simply on the psychological problems of direction and control, it seems that several independent accounts of motivation--from physiology, from psychoanalysis, from economics--tend to converge. The organism struggles to reduce the mismatch between its own criteria and perceived reality. Of course, concensus is never a guarantee of validity. Even the most rapt admirer of this general picture has to admit that there are many blanks at critical points. *How is*

> *value conferred or withheld as a result of experience? How do we decide what is good enough? How do we compromise between the claims of the present and our hopes for the future? How do we save, plan, and postpone?*
>
> When these questions are faced squarely, the picture begins to look very sketchy indeed--hardly more than an outline of a picture that may someday be drawn. Instinct, drive, reinforcement, pleasure, utility, level of aspiration--these will fit somewhere in the finished product, but exactly where is still an open question.
>
> (italics mine) (pages 264-266)

These are the questions for which the proposed theory of purposeful action provides some potentially testable answers, so the questions provided a starting point for my presentation. In the following sections note the close parallel with briefer excerpts from Miller and others, but note also that there are a number of conjectural advances and integrations. For example, Katona's statement that "the organism struggles to reduce the mismatch between its own criteria and perceived reality" is a neat summary for both his and my theoretical system, but his does not deal with the origins of individual criteria. Katona hints at, and Miller and his colleagues actually describe a system of plan-plus-feedback that guides behavior, but none suggests how such a system evolves or what energy drives it. The proposed theory does contain speculation regarding origins and energy.

These and other proposals--ragarding the nature and function of such human characteristics as motivation, values, and will--constitute later chapters. The first task is to provide a clearer and more detailed description of that unique form of behavior herein termed purposeful. What is purposeful action, and how does it differ from action that is not purposeful?

The Behavioral Referent

The basic purpose paradigm consists of a description, largely in terms of information theory, of a phenomenon labelled "ideal behavior." "Ideal" in this instance refers to behavior that maximizes the probability of future outcomes which would be both adaptive and satisfying. An "adaptive" outcome is one favoring the acting individual's survival while at the same time meeting every absolute requirement of the social and physical environment. Finally, a "satisfying" outcome is one which, within the absolute limits set by the requirements of adaptation, is most pleasant for the individual and at the same time is in reasonable accord with less than absolute environmental pressures. This last point is important for later discussions of educational objectives; it is one thing to help an individual merely to adapt (for example to identify a job in which the individual can make a living legally), and quite another to help the individual identify many adaptive alternatives and then select or perhaps even create one that is satisfying as well.

Any observable action that meets all these requirements for ideal behavior, and is not due to chance or to external force, should reflect certain functional characteristics of the decision-making process by which that particular action was selected from among all other alternatives. Although we live in a universe which is not completely determinate, with the result that none of us ever can know completely in advance the full results of our actions, it is nevertheless an observed fact that some individuals experience better results in choosing behavior than others; also, they do so more frequently than others. One basic premise

of the proposed theoretical approach is that this difference--between relatively consistent individual success or failure in social living--is not always due entirely to chance. Neither is it always due entirely to external influences or controls. Instead, the difference is hypothesized to be directly related to the kind, quality, and comprehensiveness of the information considered by individuals while they are making decisions regarding their behavior.

By definition,* the more information involved in a decision to act the more predictable the result of the action.** This is true even though

* A key word that has recurred throughout the preceding account is "information". It may strike the reader that this term has been used in a peculiar way. Can we say that an array of numbers that is fed to a machine, stripped as it is of all meaning except the digits themselves, is really very "informing"? Furthermore, if we could look through the machine as it operates, we would nowhere see information, in the usual sense, being passed along and worked upon to give a result. We would witness only the flopping on and off of the switches or states of vacuum tubes that serve as relays in an intricate network, or the circuital arrangements for currents in storage devices. We see plenty of manifestations of energy (in small amounts), but nothing that we could call information. Yet the pattern of activation of the relays, we know, is directly related to what we would call decisions or choices. And, since decisions must be based on information, these events therefore function as the handling of information. Logical rules apply to them, and the whole process will result in a calculation that has important bearing upon a practical human problem. Thus, in effect, the machines are continually concerned with the recording, storing, processing, transmission, and use of information. Though energies are involved, they are extremely slight for any one relay operation. It is the patterning of the operations, rather than their energies, that counts.

** No matter how we define it, information, to be of any use in cybernetics, has to be capable of being associated in a one to one way with physical devices where events go on. This fact requires that it be as sharp and definite as these events.

Suppose we are seeking a reward that is hidden under some one of sixteen boxes. We receive a message-segment telling us what box it is under. The possibilities are now reduced from sixteen to one, and the problem is solved. How much information did that message-segment convey? Let us suppose that we receive a series of message-segments reducing the numbers of

all the available information would not necessarily lead to a perfect prediction in every case. For example, in the old carnival shell game there are only three alternative locations for the pea, and a process of trial and error can quickly reduce them to one; a perfect and complete set of information exists even before it is discovered. The game of poker is more complex. Here the number of alternative situations underlying any one visible hand is beyond the power of even the best player fully to comprehend, and decision-making has to be made without complete information; nevertheless all relevant information is available in the cards and their distribution.

The still more indeterminate type of predictions made in the area of thermodynamics seems to provide the best analogy to human decision-making, because in both cases there is no complete set of information available. To the best of our current knowledge, no set of information exists that would permit perfect prediction of any single gas molecule's behavior during an experiment, even though the thermodynamicist is quite able to predict the flow of fluids in terms of statistical trends.* In

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alternative in each instance to halves by delimiting successively smaller groups of boxes, any <u>one</u> of which may conceal the reward. The first segment reduces the number of possible boxes (originally sixteen) by half, to eight. This segment therefore gives one bit of information. The second segment reduces the eight, by half, to four, giving a second bit. The third segment reduces the number from four to two, providing a third bit, and the fourth segment reduces the two to one, yielding a fourth, and final, bit. Four bits of information are therefore contained in the original message which told us the exact box to look under.
(Allport, 1955, pages 481-483)

* This fact can be expressed in still another way. The laws of classical mechanics were applied to single bodies. If the body was large and complex, the location and speed of its center of gravity could give the quantities necessary in the equations. In dealing with macroscopic phenomena it is now recognized that laws like those of the earlier mechanical system apply not to single particles, but to the average of a whole swarm of particles which constitute the aggregate. The combined position and

other words, the thermodynamicist can state only what will most probably happen, and he can state even that much only by generalizing and approximating. This is directly parallel to the prediction of individual human behavior, where again the most perfect prediction possible--even theoretically--involves probable tendencies or "flows" rather than specific acts.

It is in these special and limited terms that the following sections lay the groundwork for a theory of choice; they specify certain information that is relevant to individual choice, and that would increase the probability that the chosen act will be purposeful. But perfect results are not presumed to be even theoretically feasible.

Let me emphasize one point before leaving the topic of the "behavioral referent" of the theory. It is not possible to identify purposeful behavior solely on the basis of external observation, because there is another type of behavior to which it will always appear identical.

Suppose we observe an individual student pursuing some goal; for example, mastery of the Latin language. So long as that student's behavior followed acceptable procedures for language study we might conclude that the behavior we were observing was in fact purposeful. If the student spent some time translating from Latin to English, and time translating from English back into Latin, and if the student engaged periodically in exercises to memorize new vocabulary, and if the student took pains every

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velocity of none of these particles, taken individually, could be observed with certainty, nor could the course of any one of them be predicted. The laws of modern quantum physics are, in other words, statistical laws. Considerations of probability and averages must therefore come in, and we enter the realm of thermodynamics whose laws express the most probable distribution of minute particles.

(Allport, 1955, pages 473-474)

now and then to check his progress, then we might conclude that his behavior was purposeful. However it would not necessarily fit the proposed definition of purposeful behavior in this section.

The factors we have observed regarding the student's behavior thus far do not enable us to differentiate between two basically different causes for the studious activity we have been watching. We cannot know if the student desired mastery of the Latin language for reasons of his own, or, on the other hand, whether the student is blindly, fearfully, perhaps even hopefully, following a set of highly specific directions provided by another party possessing the power to punish or reward. We do not know if the student desires mastery of the Latin language, or only desires grades or other rewards; or, the student might desire only to avoid various types of punishment that might be forthcoming if studious activity were not to take place. Furthermore we have no way of knowing whether or not these rewards or punishments are focused upon the student's learning, or simply focused upon the student's overt activities--which may be "looking at a page" more than "studying".

These considerations suggest that an individual might go through studious-appearing behavior guided by one of two distinct sets of information. Only one of these sets of information has the important quality of having been evolved by the individual, and integrated by the individual into a personally meaningful purpose system. The other set of information, which does not satisfy the criteria established in the proposed definition of purposeful action, is much more akin to the lines and stage directions that guide an actor's behavior in a play. The successful actor seems to be living a part, but the rewards such an actor is seeking normally are

not the make-believe rewards that give meaning to the make-believe character's behavior on stage.

One relevant point proved troublesome in earlier drafts, and perhaps can be clarified here. I have stated that to fit the definition of purpose the information guiding an individual's behavior must have been evolved and integrated into a system of goal and feedback by that individual. This does not mean the individual must have created each and every bit of information involved in the guidance of his behavior; it is the overall system that must be evolved or created individually, not necessarily the specific bits of information of which it is made up. A great part of this necessary information might very well have been taught the individual or borrowed by him from any number of external sources. The student need not have invented vocabulary drill or two-way translation exercises; it is only necessary that the student understand the value of these procedures and follow them.

It is this critical aspect of the definition--that the individual have evolved the purpose system independently--that requires the discussion contained in Chapter Two. Thus Chapter One specifies only what information would be necessary for a purpose system to operate; Chapter Two suggests some of the ways in which at least some aspects of this information--specifically those which cannot be taken directly from outside the organism--might be developed or evolved within the organism. In much the same way the discussion in Chapter Three is designed to suggest how a purpose mechanism might operate, given that the necessary bits of information specified in Chapter One had evolved or had been learned as discussed in Chapter Two. The intent of these partially explanatory

discussions is to avoid some of the problems that have made the products of past personality theorizing difficult to apply in the practical realm. Hopefully, the more attention paid to operation and origination, the more feasible it will be to provide operational definitions susceptible to experimental test and/or professional practice.

The Nature of the Theory

The first aspect of the theory consists of a logically structured description of that information necessary to maximize the probability of "better outcomes more of the time." It describes ideal (social) behavior in a way that permits an informational analysis of the bases upon which any manifest action-in-situation was selected.

This latter process traditionally has been called choice, but will herein be termed selection except in certain special instances. In brief, "selection" refers here to the general case where an action may have been determined (a) largely by the individual, (b) largely by the situation, (c) largely by an on-going process, or even, (d) by a random combination of such factors. "Choice", on the other hand, here refers only to those special instances of selection where the individual clearly displays the conscious effects of a previously established plan upon the selection of actions (no matter how contingent to the situation such actions might also be). Thus the inexperienced poker player's lucky guess, the obedient-but-ignorant soldier's adherence to his part of a mission, the crippled plane's crash into an empty lot in the midst of a housing development, and the child's escape from a burning building by being carried

along in a panicked crowd all can have fine outcomes, and all were somehow selected. But none necessarily involved conscious individual choice--to bluff the man with the shaking hands and very few remaining chips, to bank the plane into a thermal, or to follow the hotel manager who was leading the crowd.

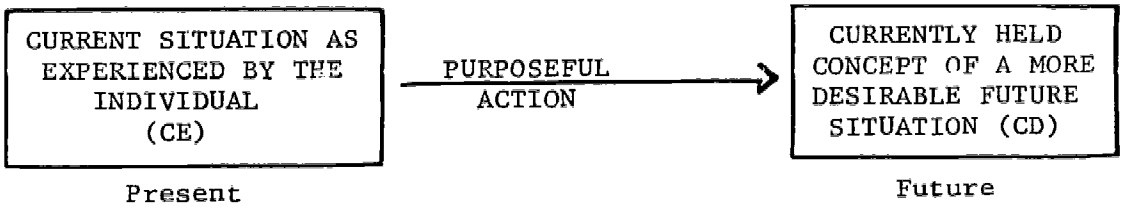
With this distinction in mind, it becomes possible to describe some instances of behavior as being purposeful (having been chosen) as well as ideal (having a satisfactory outcome). Any single action could be termed ideal when the outcome is adaptive and satisfactory, yet such an action may have resulted without intent or volition on the part of the individual. A purposeful action, on the other hand, would reflect the individual's intent by being part of a previously extablished plan. Purposeful behavior would therefore take place over an extended period of time, and would always display the guiding effects of a plan, or program, previously established by the individual. In other words, various criteria established in advance would effect the selection both of contingent one-time actions in situation, and of series of actions and/or situation.

The paradigm diagrammed below expands upon the notion of purposeful action as outlined in a previous statement (Tiedeman and Field, 1962). Attempting to explain the desirability of some goal to guide current action, and at the same time avoid recourse to teleological arguments, we proposed an oversimplified feedback system:

> ...It is quite possible to compare the present state of X with the concept of a future state of X, to note the difference, and to choose, develop, modify, and perform a series of actions designed to reduce this difference. This process is what we mean by the term "purposeful action."
>
> (page 489)

For example, it is well known that we can all recall past events which provided pleasure or pain, and that such events can continue to elicit these feelings in the present when we re-experience them through memory. In similar terms the theory describes a process of goal-formation based upon the equally well known fact that pre-experience (anticipation) also can provide pleasure or pain in the present. Consider, for example, a child on Christmas Eve or an adult waiting in the dentist's office.

Once the concept of some desired future situation is established such a concept can affect the processes by which <u>current</u> actions are chosen, and in such a way as to increase the chances of the desired outcome. Purpose refers in part to a "program" which, in the machine data-processing sense, guides the process of choosing actions, specifically that series of actions taken in order to guide an individual's "currently experienced situation" toward a "currently held concept of a desired future situation." A diagrammatic representation follows:



Movement from (CE) toward (CD) is controlled by "feedback":

> For any machine subject to a varied external environment to act effectively it is necessary that information concerning the results of its own action be furnished it as a part of the information on which it must continue to act...This control of a machine on the basis of its <u>actual</u> performance rather than its expected performance is known as <u>feedback</u>, and involves sensory members which are activated

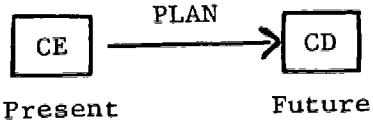
> by motor members and perform the function of tell-tales or monitors--that is, of elements which indicate a performance.
>
> (Wiener, 1954, page 24)

For such a feedback mechanism to work there first must be an "expected performance" to which actual performance can be compared. Actually an established plan or program is nothing more than a series of expected performances, a set of predictions regarding the most feasible way to achieve a specified goal. And feedback is a process by which progress toward this goal is assessed and then used as a criterion for the selection of subsequent actions. A clear, concurrent statement of this was made by Tompkins:

> Our final argument for the postulation of a centrally controlled feedback reporting mechanism rests upon the fact that the human being, as we conceive him, has purposes which he achieves through the feedback principle. His purpose is a centrally emitted blueprint which we shall call Image.... In the Image the individual is projecting a possibility which he hopes to realize or duplicate and that must precede and govern his behavior if he is to achieve it. But how can a human being do what he intends?
>
> (Tompkins and Messick, 1963, pages 36-37)

To accomplish (or at least to pursue) intent the individual processes information until alternative courses of action are clear, and then selects among these courses. Consider the following over-simplified representations of an individual's mental activity at various stages of purposeful behavior:

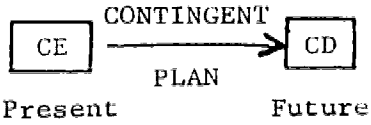
1) Purpose:



> "I am aware of my current situation. I can imagine a different situation in the future, and I prefer the latter situation. If I perform certain actions it appears that there is a greater chance to change my

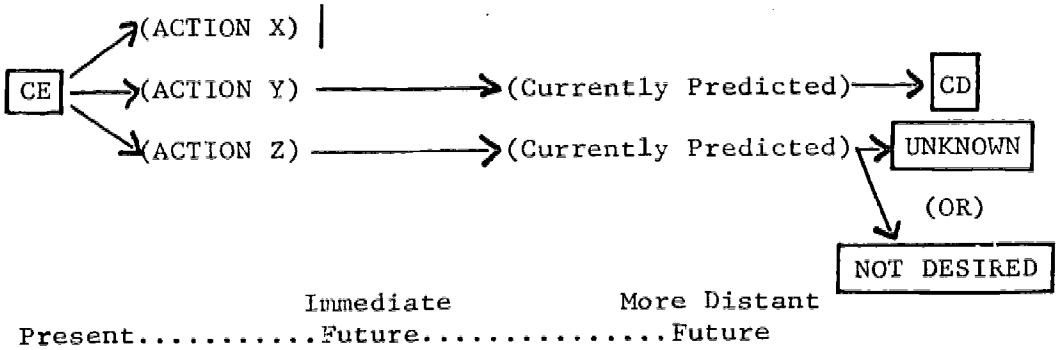
situation from the way it is now to the way I want it to be. Therefore I shall perform precisely those actions."

2) Contingent Purpose:



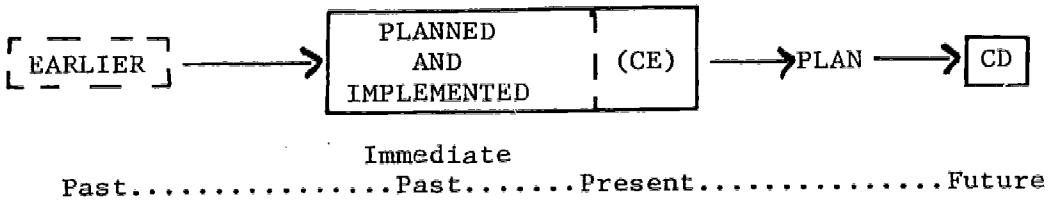
"Ditto, barring unforeseen changes in me, my desires, the situation, and/or whatever activity appears to be most successful in pursuing my goal."

3) Feedback Based Upon Predicted Action-Outcomes:



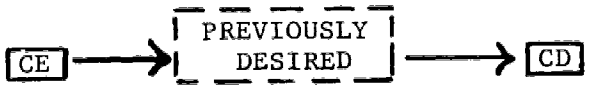
"It appears possible for me to perform actions Y and Z here and now; action X appears impossible; action Z appears likely to have unknown or undesired results; action Y appears most likely to result in progress toward my goal; therefore I shall perform action Y."

4) Feedback on Completed Actions:



"My planned actions appear to have had the results I predicted and desired: I shall hold to the plan for the present because I am on course."

5) Feedback Regarding Goals:*



Present.....Future

"Now that I know what my goal is really like, I find that I have another goal."

(OR)

"I must change my goal because I am unable or unwilling to perform the actions that now appear necessary to achieve it."

An individual's behavior will be purposeful if all the above stages of decision-making are carried out, and, obviously, if all considerations suggested by the paradigm are based upon comprehensive and accurate data.

Application of the Paradigm for the Categorization of Information

In terms of information theory, the foregoing paradigm categorizes the ideal general contents of a selecting mechanism. The paradigm makes it possible to ask the question, "What kinds of information are necessary in order for the individual to choose those actions-in-situation which will maximize the odds in favor of an ideal outcome?" The following section develops a scheme for categorizing such individually relevant information by describing each aspect of the paradigm, and by proposing ways in which these aspects are related.

The paradigm specifies four basic sets of information:

1) The current situation and course of events as experienced

*This concept has previously been discussed by Wiener as "policy feedback." (Wiener, 1954)

by the individual;

2) The currently held concept of (a) future situation(s) and (b) the individual desires;

3) The concept of planned or expected situations and events lying between (1) and (2); and

4) The raw materials for feedback, specifically, information regarding any current differences between (1) and (3).

The important point is that the amount and the accuracy of information contained in each of these categories will affect the selection of individual action-in-situation, and hence will affect the chances of individual adaptive success. To maximize these chances, the following general criteria must be met:

1) the CURRENTLY EXPERIENCED must be comprehensive and accurate with regard to the states and properties of things, and of self;

2) the CURRENTLY EXPERIENCED must also include a sense of process, an awareness of the course of events, of change, sequence, and time flow;

3) patterns inherent in (1) and (2) must be integrated and extended to form predictions of alternative future outcomes that are possible;

4) one or more of these alternatives must be used to form some CURRENTLY DESIRED concept of self-acting-in-a-future-situation that is or will be both possible and pleasant;

5) on the basis of this GOAL, a PLAN must be evolved in order to specify an expected course of events most likely to lead to achievement of the goal;

6) this prediction, of events or situations having the greatest likelihood of leading to the desired goal, provides the basis for a feedback system to operate; a feedback system can serve to affect future events by guiding the individual's choice of current action; actions are chosen continually to reduce the difference between observed events and the previously established expected course of events;

7) to assure (6) requires that all previous aspects of the paradigm exist to some minimal degree, and in addition, that the individual be aware that choice of actions in the present can affect the relative likelihood of various future alternatives; such awareness is here termed a "sense of agency" and will be elaborated in a later section.

So far, so good; given all such data an individual could choose just those actions most likely to achieve the desired outcome. But "given" covers a multitude of sins; where does such data come from, and how does abstract metaphysical data cause concrete physical doing?

Before turning to a discussion of additional factors that might transform this static paradigm into theory representing a dynamic process, one further categorization seems useful. As it stands, the paradigm denotes sets of information--CURRENTLY EXPERIENCED, CURRENTLY DESIRED (GOAL), PLAN, and FEEDBACK DATA--with little reference to the different sources of such information. Later application of purpose theory to educational issues will be facilitated by adding a brief consideration of sources at this point.

Consider the task of a student trying to choose among three career alternatives; for example, physician, auto mechanic, and narcotics pusher. Just what data must be considered in order to assure reasonably effective decision-making? In other words, what would he need to know in order to identify what, for him, would constitute ideal social behavior?

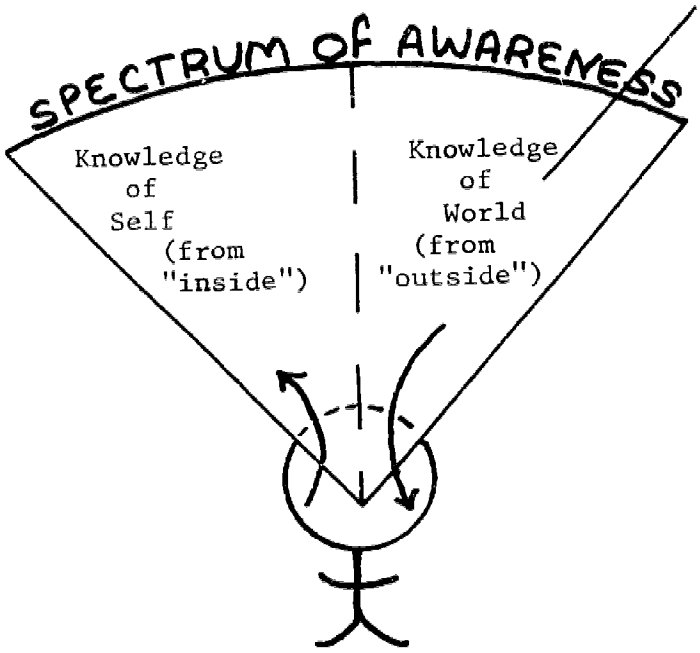
Part of the necessary information will exist outside this student; it can be described as falling within the accrued total of human knowledge to date, and more specifically, as knowledge concerning the way of life associated with each of the three occupations in contemporary society. Also relevant, and also generally available apart from the particular

student in question, is information about the steps a young person must take in order to prepare for such activities, and about the sort of individual likely to be capable of the required preparation and performance. Obviously there is a great deal of such data about man and society which, if known to the student, would improve his decision. Hypothetically at least, information of this type is generally available within the environment and therefore can be acquired from others. It is necessary to distinguish between such outside information and a second type.

Equally relevant to the student's career decision-making is information that literally resides inside that student. (It may or may not exist within the awareness of the individual, but that is not important at this point.) Suffice it to say that an individual makes a better decision when, in addition to relevant information generally available from the outside world, his own inner makeup and condition is also considered. How he is likely to feel about and react to the way of life associated with each career alternative is just as important to the decision-maker as is the nature of the career alternatives themselves. For example, a strong desire to serve others (but also to be highly respected by them and by others), or the characteristic of deriving strong pleasure from making powerful things work (in this instance irrespective of the social image), or pleasure in the capacity to exploit others (but without needing to possess much in the way of disciplined techniques, or without having to meet any regularly scheduled commitments)--knowledge of one's idiosyncratic pattern of positive and negative needs and wants such as these is critical to personal decision-making. Again, granting that it is impossible to know oneself completely, it is still

reasonable to state "the more self-awareness the better" when making a personal decision.

The student's CURRENT EXPERIENCE can be represented by a sort of spectrum, then, as illustrated by the following diagram:



Effective decision-making requires possession and consideration of data from both these information realms; self-knowledge and general knowledge are equally essential.* The changing nature of the student himself

* Two recent philosophical positions stress the importance of concepts similar to "inside" information. Phenix (1964) uses the term "synoetics" to denote individual knowledge of self-in-situation. Such knowledge comprises one of the six "realms of meaning" he proposes in order to categorize human knowledge more adequately. Polanyi (1964) offers a still more compatible position, in that he places such "personal knowledge" above so-called objective fact in its importance to human endeavor. I find the latter more appealing when trying to justify educational reforms aimed at increasing self-knowledge. Ultimately, however, I would hope for a more balanced educational curriculum of "inside" and "outside" information. It is important to recognize the impact of one's feelings, regarding abstract concepts as well as actual experiences, upon one's behavior. However, the proposed theory does not rule out or de-emphasize cognitive any more than affective behavioral determinants, because both are obviously at work when purposeful activity takes place.

is just as vital to his decision as is the changing nature of the alternative careers resulting from social progress.

CHAPTER TWO

THE EVOLUTION OF INDIVIDUAL PURPOSE-SYSTEMS

Though useful for categorizing information affecting individual behavior, the paradigm is not yet a theory regarding behavior itself. One gap, to be dealt with in this chapter, involves the processes by which an individual might come to possess or to be aware of all the various kinds of information relevant to purpose. Some of this information can be learned under traditional instructional conditions, but other equally relevant aspects cannot. The next task is to suggest how an individual human being can become aware of "inside" information (as defined in the previous chapter) and also of information that is not available "ready made" from his environment or from others.

Cybernetic models have not provided much of a lead in this case; machines are the products of human purpose and cannot evolve purposes of their own. Machines can be programmed to pursue man's goals, but they cannot be programmed to select among alternatives completely on their own, independent of man's goals. Man is still a necessary part of the process. Consequently the problem of origins can be stated as follows: By what processes, requiring what capacities, is the information necessary to the choice of purposeful actions evolved and/or learned by individual men?

A large part of the answer can be taken directly from theories of learning. The individual takes in data regarding the outside world through sensory-perceptual-cognitive mechanisms that are already sufficiently well understood, at least for insertion into the proposed theory. Our children learn from our teachings and from their own more independent experiences with their environment.

However another part of the proposed answer has been only implied in existing literature. How do our children learn what we, their teachers and parents, do not or cannot know--what they cannot observe in their environment? How do they become aware, for example, of the unique aspects of their own internal nature, or of things none of us has yet conceived? (Where does man get the information that only he can provide the machine, that he cannot program the machine to develop for itself?) Somehow man gets more service from his information input than current non-human systems are prepared to derive.

Simple Prediction

Consider the notion of informational amplification in the following ingenious statement by Tompkins:

> The world changes over time and so, therefore, does the information it transmits...By means of memory and the conceptual organization of memories, what is now being duplicated in the immediate present by the sensory system can be ordered in varying ways with what that same sensory system duplicated a moment ago, a week ago, or for the entire past history of that individual. It is not our intention to put the subjective into opposition to the objective nature of perceptual information. Our interest is rather in the amplification of information which becomes possible through the use of a matching feedback mechanism which can be sensitive to more than one source of information. Perceptual skill is based on such a mechanism, which can select from the flow of sensory messages those redundancies that have occurred before, as well as higher order trends across time which, in a real sense, cannot be represented at any one moment of sensory transmission....
>
> (Tompkins and Messick, 1963, pages 34-35)

People have the capacity to perceive the existence of patterns within various courses of events, they have the capacity to recall these

patterns from memory, and they have the capacity to match 1) old stored up patterns with 2) patterns newly perceived in the current course of events. The result is a capacity to predict what might happen in the future--what will happen, if the current event turns out like the similar event observed previously and recalled. If history repeats itself one can predict the future by examining the past, in other words. Clearly this is a limited prediction capacity because history does not always reflect such consistency. Nevertheless, even such imperfect predictions improve man's navigational system and hence his adaptation.

Miller provides a closely related description of this same phenomenon and emphasizes the processes of generalization and recognition that are involved:

> Certainly the measurement of sensations no longer occupies the central position in psychology it once did. But it still provides essential information about important psychological concepts. It is, for example, absolutely fundamental to our understanding of the crucially important psychological concept of similarity. Similarity is the basis of our ability to recognize objects and group them in classes--chairs, books, ships, shoes, and sealing wax--each member of a class being related to, and therefore a symbol of, the others. This skill enables man to profit from experience, to recognize a new situation as similar to an old one. It would not be possible to give any coherent account of how people behave without somehow including the fact that they tend to generalize on the basis of similarity.
>
> (Miller, 1962, page 90)

Here the term "generalization" is used to describe the reducing, simplifying, "boiling down" process that reduces complex events--perceived or recalled--to symbol-patterns that can be manipulated more effectively. An analogy is the arithmetician's reduction of complex fractions to a more manageable format prior to performing the actual calculation.

Still another approach to the explanation of simple prediction has been taken by Tompkins and Messick:

> There is, on the one hand, an over-abundance of stored information which would overwhelm consciousness if it were the direct recipient of all such stored past experience, and, at the same time, there is insufficient information across time and across separately stored items. Sequential phenomena, trends, and the variety of higher order organizations of his past experience which the individual must achieve require a centrally controlled feedback mechanism, one which can match the stored information but is not so closely coupled that its matching is limited to the passive reporting of either one isolated memory trace at a time or to the Babel which would occur if all of the stored information were suddenly to become conscious. The inner eye, whether the recipient of information from the outside or from the inside, is postulated to be active and to employ feedback circuitry. Relating the past to the present is possible because these two skills are based on a shared mechanism which can turn equally well outward to the senses and inward to memory and thought.
>
> (Tompkins and Messick, 1963, pages 36-37)

Clearly, these largely cybernetic hypotheses are reasonable with regard to the human capacity to predict. One aspect of my proposed model, of purpose as a conceptual navigation system that "extends experience forward in time," is therefore solidly based upon computerized "simulation" research. However this aspect implies only an <u>adaptive</u> navigational system, one by which the individual only avoids obstacles and dead ends. "If I continue walking in the present direction I shall fall into the cold, wet river" is about as far as one can get with such procedures. The world would not be changed much by such human adaptation--yet humans obviously do change their world as well as adapt to it. Building a log bridge involves change, and if one has never experienced a bridge before one does more than predict from past experience when saying, "If I put that log across, I can keep going and stay warm

and dry." It is still necessary to describe a navigational system creative enough to account for such higher level human behavior, and such a system requires an additional ingredient beyond those of generalization and the recognition of similarity.

Extrapolation

A more powerful process of informational amplification can be termed "extrapolation"--i.e., the continuation of symbol patterns beyond previously experienced patterns. The following statement regarding man's capacity to manipulate symbols sets the stage for a conjectural definition of extrapolation (and perhaps even of creativity):

> Thus far the evolution of the higher levels of thought has been considered only as a potential for better, more efficient adaptation. It has been mentioned that this evolution is characterized by the ability to anticipate events in the distant future from complicated memories. *Thus the manipulation of symbols in thinking is potentially more efficient than trial and error (motor activity)*, but retains a basic relationship to motor activity.
>
> (Tulane Department of Psychiatry and Neurology, 1954, page 17)
> (italics mine)

What this suggests is not merely conceptual trial and error, using symbols to try out strategies prior to overt trial and error activity--although that in itself is an important step in explaining complex adaptive behavior. By stressing the process of symbolic manipulation that goes on within conceptual trial and error, the Tulane group provides the raw materials for a process that goes beyond the review of past experience when dealing with present problems.

When previously experienced or immediately perceived patterns

can be symbolized abstractly--freed from time, space, and their immediate environmental context--it becomes feasible to predict the future in a more complex fashion that is possible simply by recalling the outcome of similar events in the past. Rather than predicting what single course of events is probably going to happen, and being only forewarned, the human can literally conjure up alternative continuations or outcomes for any ongoing course of events. It is feasible to predict contingently what might be if...if X happens, if Y is done, etc. Perhaps this capacity accounts for the observed fact that human purposes and achievements continue to advance beyond those of the past. By manipulating symbols we can conceive of events, objects, situations, etc. that have never existed and that would never occur without our intervention; then we can plan actions to make it more likely that one or the other event, object, or situation will come to exist in the future.

One objection raised by readers of early drafts was to the effect that chance and/or memory could explain all such "creative" behavior, that the primitive man recalled a natural log bridge he had once encountered and simply reproduced it in a new setting, or accidentally caused a log to fall into a bridge position. But with less simple examples--the internal combustion engine, the reflecting telescope, the atom bomb--this objection becomes less valid. Thought, the manipulation of abstract symbols into completely new patterns, obviously preceded and (at least partly) guided the complex series of actions by which such unique products were first fabricated.

So much for the generation of alternative predictions regarding the future, one subset of information essential to the navigational system

labelled "purpose". It remains to speculate regarding the origins of a second subset of necessary information, information that clarifies what is desirable and what is undesirable to the individual.

Value Formation

Recall the open theoretical issues so clearly specified by Miller:

> ...focusing simply on the psychological problems of direction and control, it seems that several independent accounts of motivation--from physiology, from psychoanalysis, from economics--tend to converge. The organism struggles to reduce the mismatch between its own criteria and perceived reality. (page 266)

For any organism to "struggle" it must act. And rarely is there just one single action possible for an organism, expecially one equipped with the information-generating capacity just described. Some sort of choice among alternatives must be made prior to any action. And by definition, information must be present whenever a decision is made. From this cybernetic point of view it is hardly surprising that theories of physiological, psychodynamic, and economic decision-making and indeed of decision-making in any context begin to appear similar; they can all be described as special cases of general information theory. And as stated previously this theory has logical implications for the study of behavior; the open questions posed by Miller can be restated and speculatively answered.

First, Miller asks: "How is value conferred or withheld as the result of experience?" (page 266) In other words, given (or evolved) information that specified the existence or potential existence of two or more alternative objects, situations, etc. in his future, how does

the individual come to believe that any specific one of these alternatives would be most satisfying to him? Clearly all the information necessary to this decision cannot reside in objects, situations, etc. external to the individual, because different individuals will often choose different alternatives from the same set, and yet each individual will display satisfaction with his choice.

There must be some additional type of information involved when such choices are made, a type presently labelled by the loose term "value". Miller's answer is partial; it contains only part of the ingredients logically necessary for the independent or original development, by an individual, of what we term "values". He defines values as personal judgments passed on from generation to generation. He also specifies the complexity of overlapping value systems in a complex society, and notes that there will be occasions when values from different systems will have different implications for a particular event or object. The familiar conflict between moral and economic values is an example of such an instance. What he does not provide is a logical explanation regarding how these values come to exist in the first place.

I believe the missing ingredients involve two distinctions. The first of these is the distinction between those two sources of information defined (in Chapter One) as "inside" and "outside". When this distinction is made it becomes clear that decision-making criteria are at least partially formed on the basis of inside information, information that is internal and completely idiosyncratic to the particular individual involved. The second distinction was made by Mason*; he speaks

* Russell E. Mason, Internal Perception and Body Functioning, International Universities Press, Inc., New York, 1961.

of our capacity to be aware of various pleasant or unpleasant internal states. In other words there is information available to us in communicable cognitive-symbolic patterns, but there is also information in our own emotional-physical reactions or states.

Miller's statement implies that all values are learned from others, and that they are communicated from one person to another solely as abstract facts or data. Yet it is obvious that mankind does not hold any one common set of values, that whatever values are held by different groups are continually changing, and that all such values must have originated somewhere. Consequently the evolution of values as well as of goals eventually must be explained; not all human valuing can be ascribed to what an individual learns from his world or from his elders any more than all human creativity can be explained solely by chance. A potential explanation follows.

First, it must be made clear that the phrase "most valuable to them" denotes something quite apart from the term "most valued by me." If, for example, suitably cooked snails are involved as one alternative on an otherwise typically American menu, I know with great certainty that the likely decision, by, say, a long-expatriate Frenchman would not satisfy me. I would know because of different physical reactions to the (thankfully) abstract concept of eating snails; the Frenchman might well salivate in good Pavlovian style, but I tend to react with nausea. In other words the Frenchman and I have different physical reactions to the very same abstract concept: a human consuming cooked snails. Neither physical reaction is a property of the general abstract concept, snail-eating by human beings; yet in our respective memories this concept does

have one or the other property. Such idiosyncratically assigned properties, recalled in conjunction with neutral abstract concepts common (or available) to all individuals are, then, the referent denoted by the general term "value".

This does not mean all values must be evolved from direct individual experience with the particular thing one is to evaluate. Actually I have never eaten a snail; others' reactions to the concept, in combination with my own experience with the creatures as aquariast and gardner, have given the concept of human snail-eating a property which tends to have an unpleasant physical effect upon me. Yet this abstractly evolved value acts just as effectively upon my behavior as do other directly evolved values. What I actually ate at one time or another, and hated (for example, smoked oysters, octopus, and seaweed), I now choose to eat no more and no less frequently than other untried foods that revolt me in advance of actual trial, even as abstract concepts (chocolate covered ants and french-fried caterpillars). In essence, some of my values I acquired from direct physcial experiences with actual objects and others evolved partially be means of conceptual activity; nevertheless all values affect my behavior in the same way. Those with a physical origin are no more or less influential than those built partly from abstract data. (As an exercise, consider the abstract concepts of suicide and sexual intercourse.)

This does not mean there is no useful distinction betwee cognitive and emotional sources of information, however. Recalled from memory, the concept of snail-eating might very well lead to a completely unemotional decision by either the Frenchman or me, his with no salivation

and mine with no nausea. Once established in memory in conjunction with the concept of snail-eating, these once-physical reactions can be transformed into the purely cognitive modifiers "...and I did/did not like it." There must have been such a physical reaction at one time, to something very similar if not identical, because no value is solely abstract in its origins. But upon examination it appears that three quite different processes can lead to a value.

First, direct physical reaction to the texture and taste of snails can provide a tag ("I don't like it") for the concept of snail-eating. Second, direct experience with the texture and taste of something that seems similar to snails (perhaps eels) can affect the concept of snail-eating, indirectly providing the same value-tag, "I don't like it." Third, an important or powerful authority can communicate to another value tag already linked with a concept. ("There is a process, snail-eating, and it is bad.") However, in this case it is the learner's relationship with this authority that provides the emotional basis for such tags; it is not "snail-eating: ugh!" that affects choice, but rather "going-against-authority: ouch!" This point becomes important later, and is simply introduced at this point.

In response to Miller's first challenge to theorists, then, it is proposed that individual values are acquired by transforming physical--i.e., emotional--reactions to an experience or concept into cognitive "tags" or labels or modifiers that are subsequently stored with the concept itself. Hence the familiar class of statement, "I just can't tell you how (funny/frightening/beautiful) it seemed at the time!" All we can do is report that it was an experience to which we responded emotionally at

the time, with laughter, or lots of adrenalin, or some other feeling. Although we might re-experience these feelings it is not likely that our listeners will.

A Second Look at Purpose, Including Its Origins

At this point it becomes possible to restate the various categories of information necessary to purpose, this time in terms of evolutionary processes including informational amplification and informational creation to complement the more thoroughly understood process of learning:

1) A comprehensive and accurate CURRENT EXPERIENCE would include valid information regarding
   - A) current states and properties of one self
     - i) in terms of positive and negative needs in the life or death sense (food, temperature-level, water, safety)
     - ii) in terms of pleasure and pain
       - a) of a basic sort, affecting physical welfare above the minimal survival level (companionship, physical comfort, stimulation)
       - b) of a preference-aversion nature as governed by individual tastes
   - B) Current states and properties of the situation or environment
     - i) in terms of absolute limits (gravity, weather)
     - ii) in terms of limits that could be altered by extensive instrumental behavior
       - a) by an individual

b) by individuals in collaboration

C) Regarding the facts of process (change) and time sequence

i) within self

ii) within the environment

2) The information contained in such an ideally comprehensive and accurate CURRENT EXPERIENCE can be used to predict alternative future events, situations, and personal or environmental states-properties. Such use involves extrapolation; the continuation--through abstract thought--of conceptual patterns beyond those already in existence. Thus

A) states-properties of the participants in current events (including self) can be assessed and categorized as

i) unchangeable

ii) possible changeable but by factors not subject to one's control

iii) subject to change if some feasible action were performed to make the change occur

B) patterns underlying the current course of events are also assessed and categorized as

i) constant, inevitable, unchangeable

ii) possibly changeable, but by factors not known or subject to one's control

iii) subject to change if some feasible action is performed

3) One or more of such anticipated future situations can be assessed as

A) possible in the environment

B) meeting the probable future requirements of the environment

C) both adaptive and desirable for the individual in terms of his current nature

D) adaptive and desirable for the individual in terms of his predicted future nature

This process of extrapolation produces a CURRENTLY DESIRED goal, a current concept of self in a desired future state or process.

4) Once a goal exists <u>in addition</u> to information regarding the present, it is possible to evolve a PLAN. A PLAN consists of a series of predicted events that appear, on the basis of current information, most likely to result in achievement of the goal. Such events must be

A) inevitable, and/or

B) probable though beyond control, and/or

C) subject to control by the individual's actions

5) Such an "expected course of events" provides the basis upon which a FEEDBACK mechanism can operate.

A) It provides information for evaluating the current situation, by comparing it to the planned course of events previously predicted to result in progress toward the desired goal.

B) It guides the choice of actions to bring the actual situation closer to the expected/planned situation.

Essentially this represents the general process an individual goes through when <u>generating</u> as well as pursuing purpose. Using data from both inside and outside sources, one conceptually extends various abstract patterns "forward in time," pre-experiences the resulting alternative situations, finds that one future situation literally "feels better,"

and plans how to bring it about by making a series of shorter-range predictions--a plan. An extension of an earlier diagram can illustrate this more graphically.

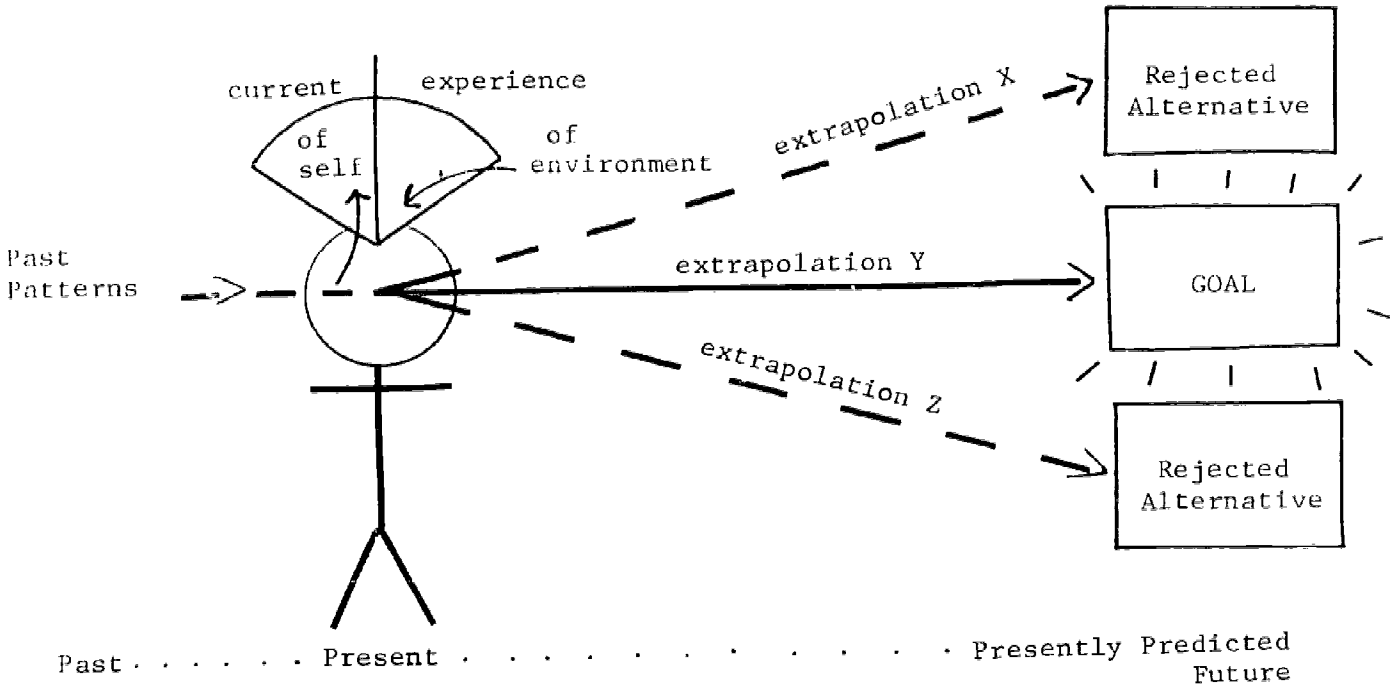


FIGURE 1

This diagram can be expanded in its turn, in order to clarify one important source of inside information.

In the purpose paradigm diagrammed below the figure in the present has been moved to the "center of the stage." This leaves room on the left for a representation of those developmental processes that have taken place--or that have not completely taken place--such as to bring the individual to the present condition (the closest theoretical position relative to the point of view this diagram will attempt to clarify is that of Erik Erikson's hierarchy of developmental needs and tasks.* In the most basic sense, I am attempting to bring this concept

*Erik H. Erikson, "Identity and the Life Cycle," Psychological Issues, 1, 1, 1959, Monograph 1.

of Erikson's, in somewhat modified form, into the purpose paradigm.) Consider one condition not uncommon to graduate students, especially in the applied behavioral sciences:

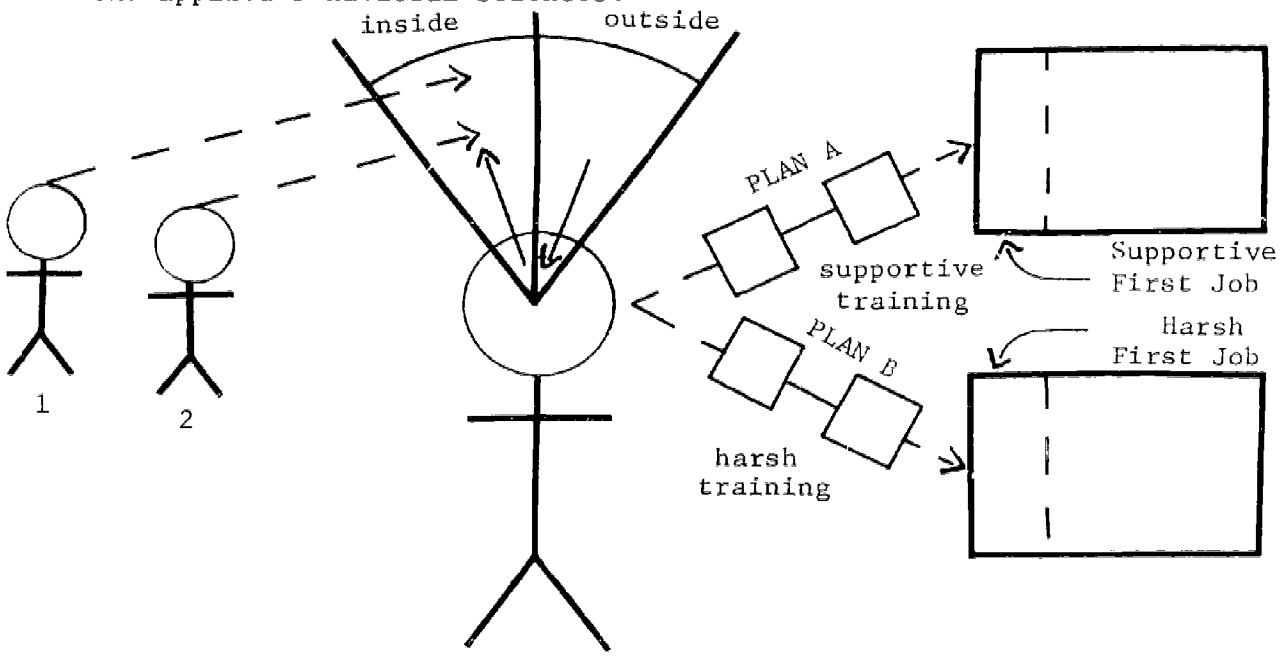


FIGURE 2

Let us suppose that at each of the two earlier developmental stages indicated to the left of the present figure, one important developmental task has not been completed:

1) during infancy the person received too little comfort, nurturance, animal warmth, or call it what you will;

2) during the somewhat longer period before, during, and after puberty the individual lived in a subculture and/or family situation in which masculinity and femininity--as behavioral characteristics--did not correlate exactly with masculinity as represented by a male parent, or femininity as represented by a female parent.

To oversimplify, unsatisfied infantile needs (from Past 1) bring the individual into the present with a very undifferentiated hunger for people. This need, hunger, or "emotional malnutrition" involves the need for affection, care and nurturance, companionship, animal warmth, feelings of security, and perhaps others. Unrecognized and/or undifferentiated, these malnutritions--these leftover needs from the unsatisfying infantile period--predispose the individual to have exceptionally strong needs for people.

This already "people-hungry" individual, remember, also went through a period (Past 2) during which there was not a clear and readily available set of lessons, identification figures, or whatever one might call them, out of which to forge a sexual identity in the full male or female sense of the term. Quite to the contrary, this individual might well equate assertive, achieving, seeking types of behavior with the female role, while at the same time seeing the male role as somewhat passive, nurturant, unagressive, and so forth. Whichever type of body the individual occupies, a male body or a female body, by this time it is likely that needs and hungers left over from childhood are by now further complicated by an habitual approach to people, occupations, and/or relationships that is almost perfectly inappropriate for whichever sexed body is in fact "occupied."*

The relevance of purpose theory to educational practice can be introduced briefly at this point, although only to clarify theory for the time being. (A concurrent book contains more detailed applications.)

* A more recent book by Robert J. Stoller (Sex and Gender, Science House, 1968) develops this point of view with exceptional clarity. Though focusing upon sexual development--both physical and in terms of temperament, or style, or role--it provides a useful model of developmental processes in general.

Consider the informational needs of such a person, and the sources of this information during more normal development.

The role of guidance or therapy in such a case would be to teach the individual some of what made up, determined, or distorted that inside information (leftover needs, and habitual interpersonal style) currently affecting that individual's decision-making. In other words, with a carefully contrived educational exposure to his or her own "normal" (i.e., instinctual) needs, and to the concept of readiness for various developmental stages, plus the concept of leftover unsatisfied needs or malnutritions, the individual might then consciously put all of these needs into the purpose system being built for future career navigation. For example, the upper plan (A in Figure 2) might be preferable because it involves considerable exposure to affection and support during, say graduate training, plus considerable exposure to more appropriate role models than the feminine father and/or masculine mother provided. It might also make clear the concept of readiness, and combine it with the concept of opportunism in such a way that the individual could avoid panic regarding diverse pseudo-sexual impulses--and so on and so forth. In more traditional career terms, the individual might form a career plan containing a nurturant, supportive first job to account for any leftover needs to be cared for and guided. Later in the career, however, flexibility might be critical, to permit outlets and applications for whatever basic tendencies are by that time firmly built in, for relatively masculine or relatively feminine activity. A psychologist, for example, might wish to move around among the (mildly assertive) teaching, (less assertive) practicing, (extremely assertive) researching roles, and so forth.

Unexpected and unplanned for, on the other hand, such leftover needs could be not only frightening ("I'm basically abnormal"), but could lead to erroneous conclusions of career diffusion, uncertain goals, and general worthlessness. With educational efforts focused upon purpose, on the other hand, the individual could see such evolving needs for what they were, literally as the gradual undoing of "leftover malnutritions" that leave a healthier, more balanced, and more directly expressible set of needs to plan for next.

The Concept of Agency

One final bit of information, dealing with the individual's power to affect the course of events and herein labelled "a sense of agency," completes the paradigm. There are two more very potent modifiers ("tags") that can be attached to the general concept denoting any adaptive or goal-directed activity. They take the form

a) "I <u>can</u> affect outcomes; the concept of myself without X goal is less comfortable than the concept of myself performing the clearly necessary instrumental actions, 1, 2,.....n"

b) "I <u>can't</u> affect outcomes; the concept of myself attempting clearly necessary instrumental actions 1, 2, 3,.....n is less comfortable than the concept of myself without X goal."

Note that there is no implication the individual must know the outcome of the action in advance of its occurrence. To the contrary, it is the previously stored positive or negative property of a general concept--self performing certain types of action or perhaps any instrumental actions--that determines the choice.

> Medicine, the "queen of applied sciences," furnishes us even better examples of the erroneousness of the view that purposiveness and causality preclude each other. No "life purpose," no "whole-making factor," and no sense of imperative obligation can help the unfortunate patient with acute appendicitis, but even the youngest hospital surgeon can help him if he has rightly diagnosed the cause of the trouble. The appreciation of the fact that life processes are directed at aims or goals, and the realization of the other fact that they are, at the same time, determined by causality, not only do not preclude each other but they only make sense in combination. If man did not strive toward goals, his questions as to causes would have no sense; if he has no insight into cause and effect, he is powerless to guide effects toward determined goals, however rightly he may have understood the meaning of these goals.
>
> (Lorenz, 1966, pages 222-223)

If the individual has learned that agency is generally possible, then adaptive behavior is more likely than in cases where agency has become a property of others rather than self.

Summary of Individual Purpose

The characteristics of data necessary to purposeful behavior can now be described in more simple terms:

CURRENTLY EXPERIENCED:

He must know what he needs (and needs to avoid).

He must know what he likes (and dislikes).

He must know what the immediate situation absolutely requires (and prevents).

he must know what the immediate situation tends to permit (and [illegible]).

He must be aware of events;

that they take place,

that they are organized to varying degrees,

that common patterns of organization underlay many past events, and

that these patterns provide bases for better-than-chance predictions of future events and situations that might "just happen," and/or that might happen if he affects the course-of-events in certain ways.

CURRENTLY DESIRED:

He must predict his needs, his likes, the requirements and pressures of the environment, and use these to select (or invent) a favorable alternative situation as his goal.

PLAN:

He must have developed the concept of a series of future events

that will occur, and/or

that will probably occur, and/or

that he can bring about,

and these must be likely to result in achievement of his established goal.

FEEDBACK:

He must continually assess what is actually taking place.

He must compare this observed pattern with the planned or expected pattern.

He must choose actions to reduce the difference, or

He must revise the plan and/or the goal.

The Problems of Multiple Purpose and Priority

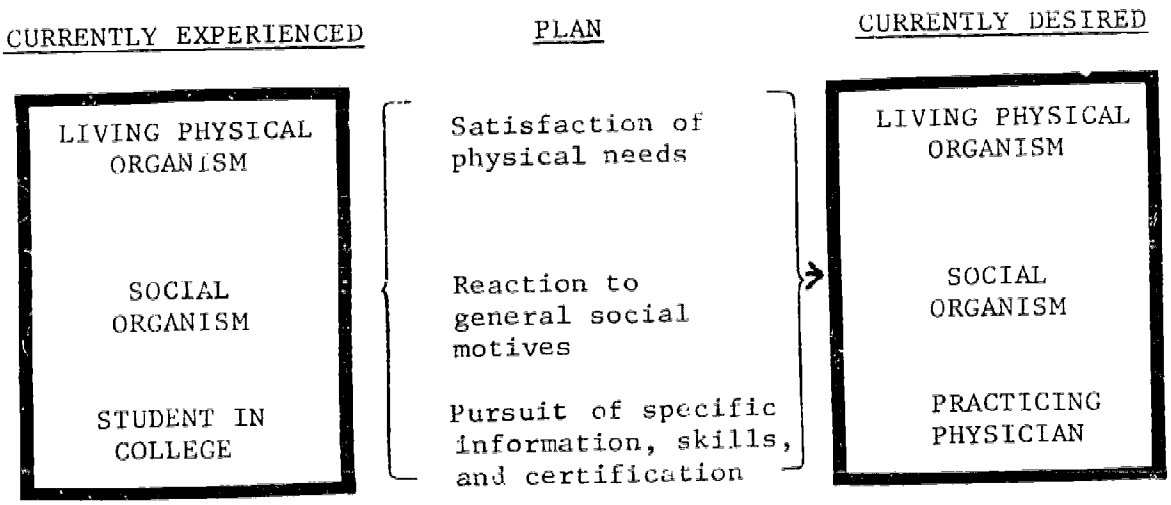
Only a caricature of the human condition is denoted by the theory up to this point. We have all heard of the "single-minded" individual, the "man with a purpose in life." In describing only such unipurposed

persons the theory fails to suggest any way by which the individual might keep himself amused as well as fed, warm, and safe. One might well prefer to give up the benefits of purpose and so deviate from one's course for an occasional movie.

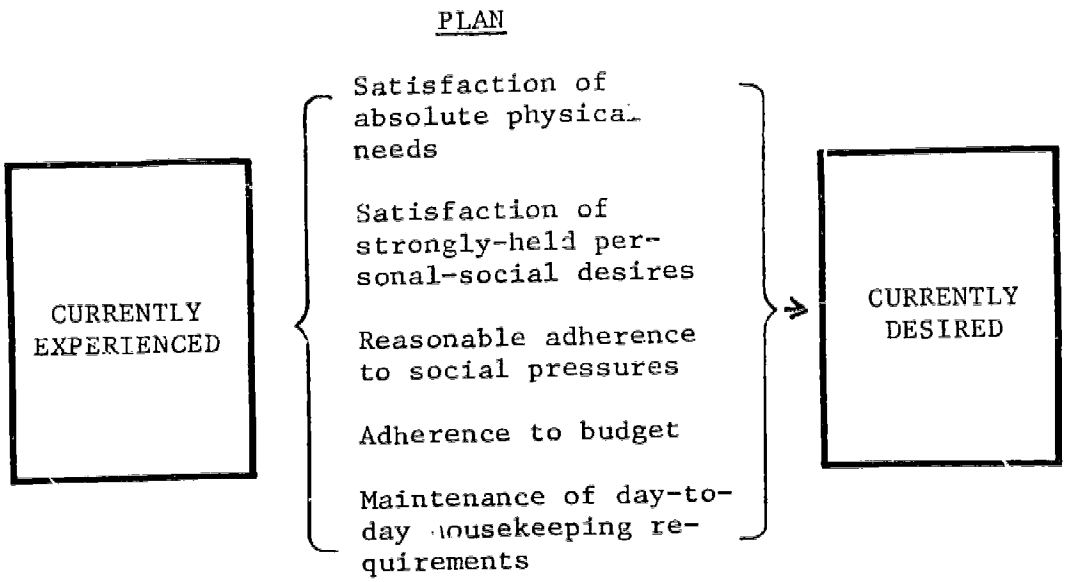
Consider the general case of the male college student who was trying to choose a goal in Chapter One, and by now has planned to become a physician. To describe his current experience simply as "non-physician," his goal as solely "self practicing medicine," and his plan simply as "three more years of premed four years of medical school, and then an internship" is to provide a very limited picture of young Mr. Kildare. Such a description misses the fact that he has and will continue to experience cyclical physical pressures to eat, breathe, excrete, sleep, and so on. These must be obeyed or he will die. In addition the young man will experience still other cyclical and/or irregular pressures that may be less immediately critical to his survival, but which will nevertheless affect his behavior whether planned or unplanned. Personal cleanliness and decoration, social interaction, heterosexual relationships, family and peer companionship--such factors are really just as critical to his behavior in our culture as his absolute biological drives would be in a more primitive human group.

These factors require the general theory of purposeful action to include such complicating experiences and desires, with the result that the referent of the term "plan" logically takes on far greater complexity. It is no longer a simple series of predicted events leading step-by-step to some singular goal. To the contingencies resulting from unforeseen external events must be added contingencies resulting from <u>internally</u>

determined fluctuations in attention, energy, need and the like. The following diagram is still oversimplified, but broader in scope than before:



If the most perfectly ideal and purposeful plan were to be examined in terms of a detailed cross section at any given period, the problem of priority would be clearly apparent.



Young Mr. Kildare could, quite purposefully, begin a particular Saturday morning by eating, or catching up on his sleep, or studying any one of several subjects, or arranging a date, or working at a part-time job, or cleaning up his room, or picking up his shirts at the laundry, and so on ad infinitum. Clearly there must be some way of judging which of these sub-purposes is most in need of instrumental ac-action (or which one currently offers the greatest opportunity for substantial and immediate gain). Metabolic needs such as food and drink ordinarily take care of themselves by means of undeniable physical manifestations that force necessary action. But the other sort of physical manifestations that (hypothetically) lend power to more socially-based motives typically are not undeniable. A comfortable and rational decision by our young student, based upon a complex consideration of existing budgetary problems, a new scholarship opportunity, study fatigue from the previous night, and hunger might easily be undone by the perceived characteristics of a new waitress at the diner.

In addition to implying a new definition for the term "rationalization" this example raises some critical issues regarding the theory of purposeful action. How do the priorities arise that guide an individual's decisions in such situations? The theory so far can account only for the evolution and operation of criteria regarding single classes of experience, desire, and instrumental action.

> Repeatedly, day after day, we face conflicts and make decisions that force us to search for rules, for strategies, for a structure that will reduce the complexity and ease our burden of decision. Little wonder, therefore, that we prefer a single, simple ordering. We may even come to feel that there is a kind of inconsistency in multiple orderings, that all values ought to be measurable with a single yardstick.
>
> (Miller, 1962, page 274)

No full resolution of this issue is anticipated for the present. However, it is conjectured that the concept of agency will play an important role in the resolution. Even though it is logically possible to use a need-priority system such as Maslow's (1962), which places the absolute biological drives above the socially affected biological drives, which in turn ordinarily outrank the learned social motives, all such general systems that I know of have one serious fault. None ascribes any concurrent determining power to the contingencies of the external situation faced by a particular individual at a particular time, and therefore all end up being just as one-sided as drive theories that are based solely upon triggered animal behavior--though in the opposite direction.

Even if the criterion of (positive or negative) situational opportunity is added to any such general priority system, the concept of opportunity still must be defined in terms of the particular individual's awareness. It is not enough to add the phrase "when conditions permit," instead, the qualifier "when the individual believes it is possible" appears more logical in terms of information theory. Consequently the individual's beliefs concerning his own powers of agency seem likely to be powerful criteria in more complex decision-making, complementing the criteria implied by general hierarchical value systems. Mr. Kildare's reaction to the waitress's characteristics might differ grossly from the reaction of his shy, sexually inhibited roommate.

It is one thing sagely to propose that a hierarchy of needs exists and operates; the proposal is undoubtedly correct because it fits what we observe in all organismic behavior. But it is quite another thing to explain how such a behavioral control might operate. No full explanation

is claimed in this area, but I believe conceptual raw materials exist that permit considerable progress. Allport cites the following:

> The fit of the cybernetic model in the fields of motivation and emotion is not so well established as it is in some of the above applications. Wiener has regarded emotions as communications that are not directed to any particular place in the mechanism. They are messages labelled "to whom it may concern"; and it is hypothesized that hormones circulating in the blood-stream are their carriers. The enhancing or inhibition of behavioral processes is provided by an "affective tone totalizer," operating with feed-backs, in connection with local processes and their affective tone mechanisms. The organismic bases of such mechanisms is, however, a matter of conjecture.
>
> (Allport, 1955, page 496)

Conscious awareness provides a delay for triggered behavioral responses, and frees adaptive behavior from the need for direct and immediate external or internal cues; in other words one can act prior to actual need and/or decide to act for the future without regard to an immediate need. This capacity can serve to increase the odds in favor of successful adaptation by making it possible to take advantage of the most beneficial opportunity rather than always reacting to the most immediate. In the same way, then, it is suggested that hormonal "shotgun messages" can be employed to increase the odds in favor of adaptation by "priming" the organism.

In response to an established plan, an internal need, or an anticipated opportunity, the cerebral cortex might have the effect of triggering a hormonal state of readiness--of creating a body-wide state of receptivity--regarding a particular potential opportunity. Then, rather than depending upon the perception of, say, immediate danger, one could look ahead, anticipate the danger in a potentially dangerous situation, and take steps to enter that situation forearmed with adrenalin, shield,

and weapon. In this way, Wiener's notion of generalized or "shotgun messages" provides a potential explanation for the functioning of any need hierarchy.

Any basic, physical, life-or-death determining drive could over-ride a social motive simply by having a more direct link with hormone or enzyme production. Hunger over-rides the need for achievement at the point of starvation. Yet a civilized human being who had been conditioned to an unusually powerful need for social acceptance or service might, quite logically, produce more of the chemicals we call "fear" when his group status or when the group itself is threatened, than when he himself is physically threatened. Hence the failing student's suicide or the soldier's self-sacrifice to save his buddies.

Once learning is connected to feeling, as in the observation that information can elicit physical change, it is logical to suggest that an organism can learn to value a group's purpose more than its own individual survival. And we already know such events take place, and for some reason other than coincidence.

Furthermore, such things as diet pills, anxiety reducing pills, and the like often have a concurrent and positive effect upon higher-order motivated behavior such as learning, concentration, etc. Could it not be said that they do so by counteracting existing, drive-based "to whom it may concern" messages? Do such pills not alter the individual's hierarchy of values? If so, then the functioning of values can be explained in terms of overall biochemical states of readiness, created by the way an individual once tagged experiences falling into various categories--social purpose vs. own homeostatic needs, for example.

It could be, then, that the processes we refer to as conditioning are, simply, ways of assuring exactly what tag an individual will place upon the concept of a particular type of experience. Thus to reward or punish following any event is to affect the overall biochemical state of the individual, and at the exact time when the concept of that event is being stored in memory. As a result, it is logical that subsequent cerebration regarding that event can have a duplicate-though-reversed physical link with the full system, a link such as to reproduce that biochemical state originally elicited by the experience of punishment or reward. And if that state is one of readiness, identical to a more directly produced "shotgun message," the tag has become a functional criterion for selecting behavior; it is a value. By thinking of danger or threat, one's bodily state often does change toward "fight or flight" readiness; this readiness can easily lead to a fight or flight response that is not directly in line with the most obvious and immediate environmental cues. One can be conditioned, then, to react first to perceived threats, despite all other cues and opportunities.

CHAPTER THREE

THE DYNAMICS OF PURPOSEFUL ACTION

The phenomenon of purposeful human behavior would not be explained even if every bit of speculation advanced in the previous two chapters were verified empirically. So far the theory describes the nature and evolution of a navigating mechanism, but there is no specific indication regarding what vehicle it guides. No satisfactory link has been established between the brain's mentation and the most basic activity of that living system within and upon which it operates. Thus

> ...it remains true that problem solving models in effect avoid the issue by assuming energy availability and by working only with activities which can be dealt with solely in terms of the functioning of the cognitive apparatus. Psychoanalytic models, on the other hand, although they may assume some more or less neutral energies at the disposal of the ego, are obliged, at least in Rapaport's (1959, page 96) judgment, to face the fact that "the problem of the energy supply of these apparatuses (when they are not triggered by drives) has so far not been satisfactorily solved."
>
> (Reitman, in Tompkins and Messick, 1963, page 78)

What I am proposing in this chapter is that the theory of purposeful action can provide a hypothetical link between the higher levels of brain function on the one hand and on the other hand the (relatively) well-understood lower levels of organismic behavior. At least two firmly established explanations of complex animal behavior can, by extrapolation, be expanded to provide speculative but nevertheless logical explanations for all levels of human behavior.

Purpose as Instinct

Ardrey's concept of the "open instinct" is the first such basis, and the one requiring least development. He describes this particular

type of behavioral guidance system as a progression from "...the closed program of the tree pipit, in which nothing is learned, through the moderately open program...in which there exists a design and a general disposition to learn...by experience...." to the open instinct, that requires extensive learning:

> When we discuss behavior patterns, such as the territorial, we deal with these open programs of instinct. The disposition to possess a territory is innate. The command to defend it is likewise innate. But its position and borders will be learned. And if one shares it with a mate or group, one learns likewise whom to tolerate, whom to expel.
>
> (Ardrey, 1966, pages 24-25)

Had Ardrey written of purpose rather than of territoriality, he might have stated, "The disposition to strive is innate in some organisms, but the nature of what such purposeful organisms strive for has to be learned." Behavior designed to achieve conceptualized goals is an inborn human behavioral pattern in other words, but the goal itself (a tree to keep off the rain, an ice-block cave to hold heat, or a split-level house in a good neighborhood) must be filled in by the individual's experiences after birth.

Just as any other organism, both primitive and civilized men strive first for survival. For primitive groups such as the Australian Bushman this is a full-time job. A Bushman literally has no time for anything beyond the basic business of living. Middle class white anglo-saxon protestants in the United States, on the other hand, usually have little concern for basic physical survival. Consequently they learn to strive for things not considered essential by Bushmen--although such things as status have come to be felt as quite essential "nourishment" by many Americans.

Until they encountered advanced Western culture the Eskimo's purpose was much like that of the Bushman. Now, however, Eskimos have come to possess some of our tools, have become more efficient, and in addition have learned from us to be aware of easier ways to live. Now they too tend to strive for more advanced goals, rather than be content simply to remain alive. Nevertheless the differences in behavior in all three cases are the result of learning after birth. All three are instances of filling in, with learned information, the identical instinct to strive toward some conceptualized goal.

> The open instinct, a combination in varying portion of genetic design and relevant experience, is the common sort of all higher animal forms...in human behavior those patterns common to the animate world have been permitted the widest latitude of adaptation to circumstance. *We retain genetic resolve while obtaining the diversity of experience.* But what the sophisticated man in our time tends to ignore is that, no matter how open the instinct, no matter how much learning is incorporated into the completed pattern, the total influence on individual behavior will proceed with very nearly the form of a closed program directing an insect in the heart of an oak. It remains an instinct.
>
> (italics mine) (Ardrey, 1966, page 26)

In Ardrey's terms the purpose paradigm of Chapter One specifies what information needs to be filled in, and the processes advanced in Chapter Two suggest how such necessary information is accumulated. Furthermore the task set for this chapter, of linking the patterning of purposeful behavior with the basic force--life--that drives all behavior, is accomplished quite simply by considering purpose as just one more instinct. The only addition to established thought is the insertion of information creation, by extrapolation and the like, into the process of "filling in"

an open instinct.* Ardrey implies that such filling in is accomplished solely by learning from the external environment, but I suspect he would not object to the idea that creativity also can contribute.

Purpose as a Source of Energy

The second approach to the construction of new theory, again using the raw materials of existing theories, involves some combining and modifying as well as extrapolation. Beneath differences in terminology, the systems or cybernetic theorists and the drive theorists both have produced strikingly similar conceptual structures to describe the observable patterning of most organismic behavior. Also, they have responded similarly to the task of explaining the origin of these patterns; cyberneticists point out that it is external human programmers who provide the purpose that a servomechanism is to pursue, and drive theorists state that it is the external environment that cues, releases, or triggers an organism's patterned behavioral responses. Neither machine nor creature is granted the capacity to set up tasks for itself; both are theorized simply to react to surrounding conditions.

Allport has provided a clear and brief description of the process by using the systems language:

> Open systems are those through which there is a continuous flow of component materials. There is a continuous

*It is my hunch that the two "orders of reality" suggested by Levi-Strauss (Tristes Tropiques, Atheneum, 1967) represent another way of describing these same partly inborn, partly learned aspects of purposeful behavior. Open instincts and the "unconscious code shaping all human intellectual achievement" sound highly similar, especially as both are inescapable. Very likely Levi-Strauss would approve Ardrey's conclusion that the beginnings of human purpose can be observed in the structured behavior of certain higher animals, too.

input from the environment and a continuous output of products of the system's action. The system is of such a nature that after any disturbance of the input, or step by step in association with it, its constant and time independent character may be restored and maintained, and a restabilization of its output may occur. But it is never in true equilibrium; it maintains what is called a steady state. The state is "steady" as to component-types and proportionate quantities; but it is far from static or motionless. It is in a condition of ceaseless activity and change of the specific materials involved. A simple example of an open system with a steady state is afforded by a container holding a quantity of water into which water is being pumped, but which also has an outlet from which the water flows at the same rate. The walls of the container and the molecules of water are the system's elements, and by their interaction a steady state of water level is maintained although the particular molecules of water are continually changing.

In organismic systems the constancy is maintained by complicated chemical reactions and by certain physio-chemical principles. The homeostatic processes of the body, maintaining, in the face of environmental changes, a constancy of hydrogen-ion concentrations, blood volume, sugar content, temperature, and so on, are examples of steady states in an open system. The system, as it were, "defends its own existence," so that whenever any disturbance occurs something happens in it to make the new state differ as little as possible from the previous standard (principle of Le Chaterlier). Chemical equilibria in closed systems, as we have seen, are based on reversible reactions; but the steady states of open systems are, in many of the component reactions entering into them, irreversible. The reactions go in one direction only.

A steady state is maintained in the organism by the fact that degradative processes in the cells are being continually compensated for by synthetic or anabolic processes. This work, of course, requires energy; and so we find that an organism requires nourishment merely to exist, that is, to maintain itself in a steady state, quite apart from the energy that goes into effective work upon the environment.

(Allport, 1955, page 471)

This describes the process of living very generally, and in an obviously oversimplified fashion. Indeed the amoeba and paramecium do no less

than the human being in these most basic terms. Yet the human organism and many other species obviously display the operation of far more complex mechanisms directing their physical self-regulation.

One way of describing these more complex adaptations grew from the early concept of "tropistic behaviors" (Loeb, 1918) which is now variously referred to as "released", "triggered", and "externally stimulated." Here it appears that quite complex patterns of stalking, evading, courting, nest-building and other instinctually guided behavioral "rituals" are set into motion by certain specific cues from the organism's environment.

> ...an animal does not react to all the changes in the environment which its sense organs can receive, but only to a small part of them. This is the basic property of instinctive behaviour, the importance of which cannot be stressed too much.... Lack (1943) discovered that a territory-holding male [robin] would threaten a mere bundle of red feathers much more readily than a complete mounted young robin which showed all the characteristics of a robin except the red breast. Again, the red breast is the effective simulus.... The reactions of many birds to flying birds of prey are often released by quite harmless birds. The domestic cock gives its alarm call, not only when a sparrow hawk is passing, but also as a reaction to the sudden appearance of a pigeon or a crow. The special type of movement, the sudden appearance, is sufficient to elicit the alarm, although the shape of a pigeon is quite different from that of any bird of prey.
>
> (Tinbergen, in McClelland, 1955, pages 113-116)

Clearly, it is common for instinctual behavior to be released by external cues. In addition, drive theorists have shown that <u>internal</u> bodily conditions have the same effect. Puberty or the periodic mating cycle would be examples of this internal contribution to readiness, to increased susceptibility to the triggering effect of certain cues from the environment. (Very likely this is related to the concept of readiness for <u>learning</u> recently developed in conjunction with research regarding

teaching young children to read.) However external, internal and even compound cues fail to account for all human or even all animal behavior.

Creative purposeful activity, for example, fits neither the "sensed internal need" model not the "externally released instinct" model. Similarly, gluttony and other forms of insatiability seem to refute the conclusion that direct homeostatic drives are the sole basis for human action.

> There is more to life than keeping one's blood chemistry in equilibrium. Homeostatic drives play only the most general role in human conduct. They do not even account for all the motivated behavior observed in animals; manipulation, exploration, playfulness are motivated activities unrelated to homeostasis. Like the force of gravity, homeostatic drives are always around to trip us up if we become careless or unlucky. They goad us to action because they are part of being alive. But they are not the central focus for most of us most of the time. The larger and more baffling problem is to understand what guides human action, what organizes it and assigns priorities.
>
> (Miller, 1962, page 259)

But perhaps this is not a necessary problem. Writings by drive theorists, ranging from Loeb's early statements (1918) to more recent work by Tinbergen and others, suggest that the borderline between inside and outside the organism lies, quite literally, at the organism's skin. I believe this is a case where common sense has blocked the development of promising theory.

Suppose that instead of being at the point defined by the animal's hide, this borderline were placed fully within the organism, between the more primitive operations of the nervous system on the one hand, and on the other hand the mentation processes of the higher level brain structures.* The three types of triggered or cued drive described above

*As this book reached the stage of production, I encountered this same

would continue to operate as before. Internal conditions such as hunger would be perceived as cues, external events such as danger or opportunity would be perceived in the same way, and longer term organismic change such as maturation, mating cycles, and the like would affect readiness--even if they did not directly trigger patterned behavior. But in addition, I am suggesting that the purely cognitive processes of the cerebral cortex can have exactly the same effect upon lower brain centers as more concrete cues from inside or outside the organism. An idea or concept communicated by another individual, or read, or conjured up from the individual's own imagination could have the same power to release patterned behavior as could any of the more primitive internal or external cues. In a sense, then, it is suggested that by means of abstract thought man can create his own "external cues," totally from within himself.

I made my first attack upon this problem in a earlier statement, which suggested a modified application of the concept of "dissonance" proposed by Festinger:

> The arrangements for living in various societies place persons in a sequence of substantially different events from birth to death. To some degree these events are structured; we become involved in various processes--i.e., systems functioning over a period of time--whereas individuals we affect and are affected by other individuals (and by other processes). Unless we are entirely oblivious to the structure of any such ongoing process, we tend to evolve concepts regarding alternative ways in which the process might develop by some future time. And whether or not we fully realize it, we have varied emotional responses toward each of these conceptualized future alternatives. Thus we prefer some potential outcomes over others, and vice versa. And, still more basic, we also have an emotional response to the dif-

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argument--in far more highly developed form--presented in Arthur Koestler's The Ghost in the Machine (New York: Macmillan, 1967). Readers are urged to explore this monumental integration of human behavioral science.

ference between the current state of the process and possible future states that we prefer.

This latter argument can be considered a partial corollary of Festinger's (1957) theory of cognitive dissonance. He suggests that humans who experience a difference between their real situation and a preferred situation (a) feel discomfort, and (b) tend to reduce this discomfort by altering their desire in order to make it congruent with their experience. We concur with (a), but instead of merely observing (b) in others, we would prefer (c) to encourage others to alter their real state in order to make it more congruent with their desired state.

In brief, then, we believe that the experience of cognitive dissonance leads to an emotional response; discontent (or agony!). We do not know if there is a basic human drive or a frequently learned human motive to seek self-actualization, but we are comfortable with our premise that people tend to avoid pain and to desire pleasure. And we are assuming that one source of considerable pain/discomfort lies in the awareness of wide difference between current experience and current desire. This discomfort can be reduced (often pleasurably) by a form of adaptive behavior we call purposeful action. Others have called it: "goal-directed," "tropistic", "programmed".

(Tiedeman and Field, 1964, pages 423-424)

I have since speculated upon the great similarity of this statement to the following, which was derived from physiological experimentation undertaken with schizophrenics at Tulane:

The manner in which the cerebral cortex is related to lower centers has not been extensively investigated. If our "levels" scheme is correct however, the peripheral chemical changes associated with stress must be the result of the interpretation by the individual of a given stimulus in the context of past experience or cultural factors, and, therefore must be influenced at the level of the cerebral cortex. *This would suggest that there are different pathways from the cerebral cortex which influence the humoral adaptive mechanism.*

(Tulane Department of Psychiatry and Neurology, 1954, page 25)
(italics mine)

What this means is that there are measurable changes in localized brain chemistry that take place when a human becomes aware of certain abstract patterns. Purely metaphysical information can cause measurable physical change, in other words. Consequently, there is no reason why the existence of cognitive dissonance--the desire for something not yet achieved--cannot trigger behavior in exactly the same physical manner as do internal homeostatic needs and external environmental stimuli.

This is a very important link. By assuming that humans prefer comfort to pain and discomfort, and by recognizing the recently established fact that abstract information as well as direct physical experience can elicit painful physical responses, it is possible to breathe life into the paradigm of purposeful decision-making. Thus the once-emotional type of information specified in the previous chapter, and labelled "tag", is not only necessary to identify adaptive course of action; it is also logically sufficient to cause action. This is the case because cognitive awareness of dissonance--or non-similarity--between (a) one's current experience and (b) a concept of possible future experience, often quite literally hurts. (Consider the example of a child on Christmas Eve.) And when organisms feel pain they tend to act. So to be aware of the types and amounts of information necessary to identify valid instrumental action, and to have "tagged" it according to previous emotional reactions, is to possess information logically sufficient to cause action.

This is a complex proposal that warrants more elaborate development. The pattern I am beginning to perceive underlying existing drive-theory is a progression, from purely reactive to largely proactive behavior. In these terms, purpose theory is simply a continuation of that progression.

At the first stage are those automatic adaptive processes in which the immediate physical-chemical environment is a major determinant of the organism's behavior. In simple one-celled animals all life processes would be of this nature; the amoeba's ingestion of accidentally encountered nourishment is one example. Among higher level creatures there are similar automatic processes, but like man's mechanisms for bodily temperature control such mechanisms represent only a small part of what takes place in the business of living.

A second stage might be defined in terms of processes that are not completely automatic, although they do tend to run their full, patterned course once they are released or triggered. Various closed instincts guiding elaborate hunting and feeding behavior, for example, are activated partly by external opportunity (the sight of prey) and partly by internal readiness (hunger); the same is true of complex reproductive rituals, evasion patterns, aggressive behavior, and other processes an amoeba cannot perform. These might be labelled uncontrollable rituals, since they are neither completely automatic not fully subject to termination if the organism experiences poor results. Humans, for example, cannot exercise much control over, say, their "startle response."

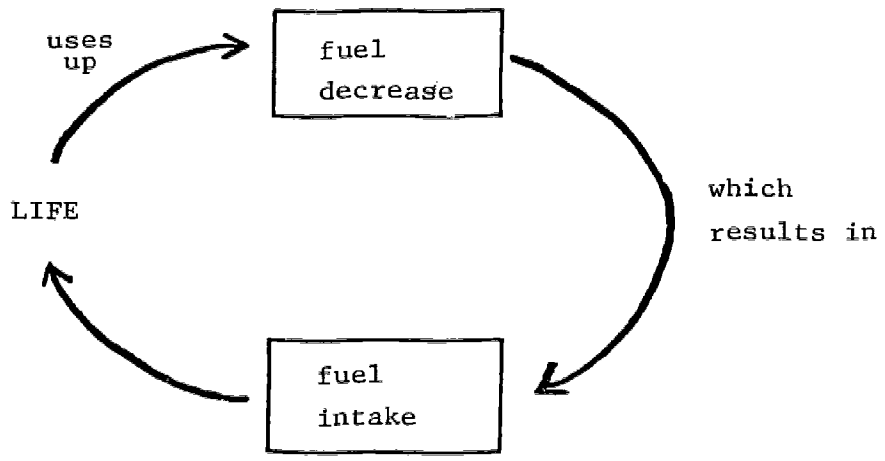
Stage three could be described in terms of alternative reactive patterns that are subject to simple either-or selection by the organism. Perhaps the best example is the fight-or-flight alternative. An animal can react to danger by fighting, but if the battle goes badly, can switch to the flight reaction rather than doggedly dying in the service of an unbreakable combat ritual.

A sort of contingent-reaction process loosely defines a fourth stage,

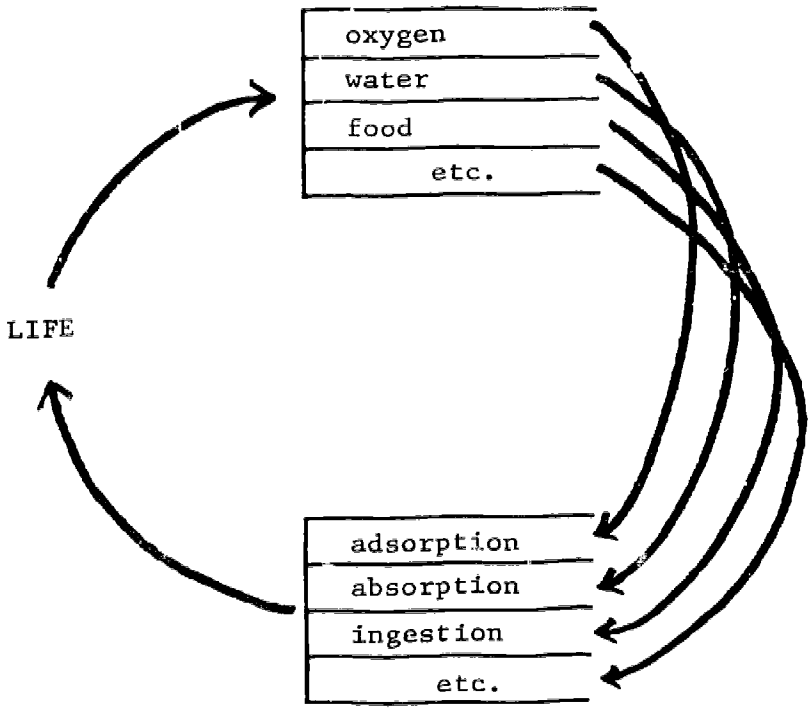
in which reactive patterns apparently can be combined into more flexible sequences. The bear or cougar pursued by hounds has at his disposal various escape, rest, trail-disguising, and even ambush or counterattack patterns that may be displayed in diverse sequences. Often these sequences are not elicited directly by the hounds' activity, but rather partly by the danger, partly by the immediate surroundings, and partly by the animal's past experience.

Finally, there is the creative adaptation of man, in which various predicted alternatives are pre-experienced, one alternative is chosen, plans are made, and then these are pursued in frequently original "for the first time" fashion. Rather than simply reacting <u>to</u> the internal or external environment, man can <u>pro</u>-act upon the environment by first providing himself with a conceptualized plan to which he can then react just as a lower animal would. The only difference, though an important one, is that man literally can <u>create</u> the "environment" to which he "reacts".

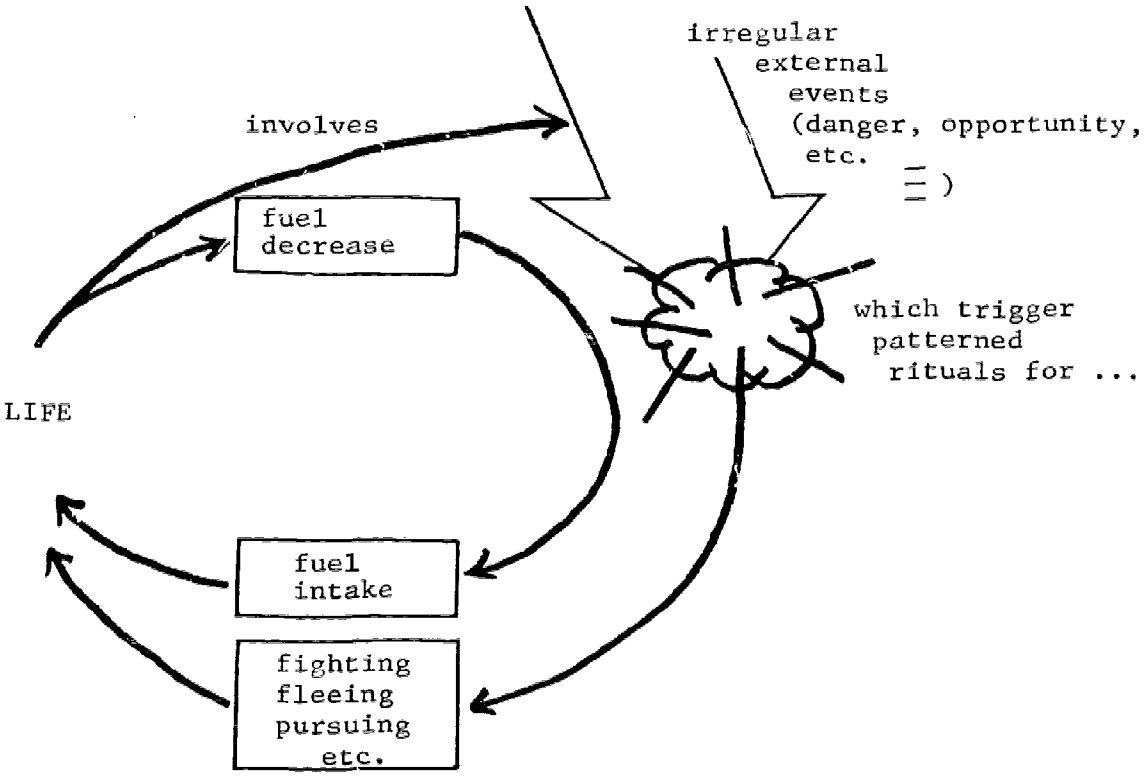
Consider this progression in terms of feedback loops, which format makes it possible to simplify the pattern and reduce the number of stages. The most primitive sort of homeostatic process can be represented as follows:



Actually the above figure is a gross oversimplification; there are several different automatic processes involved in meeting the various homeostatic requirements. The figure below suggests some of these parallel subprocesses:



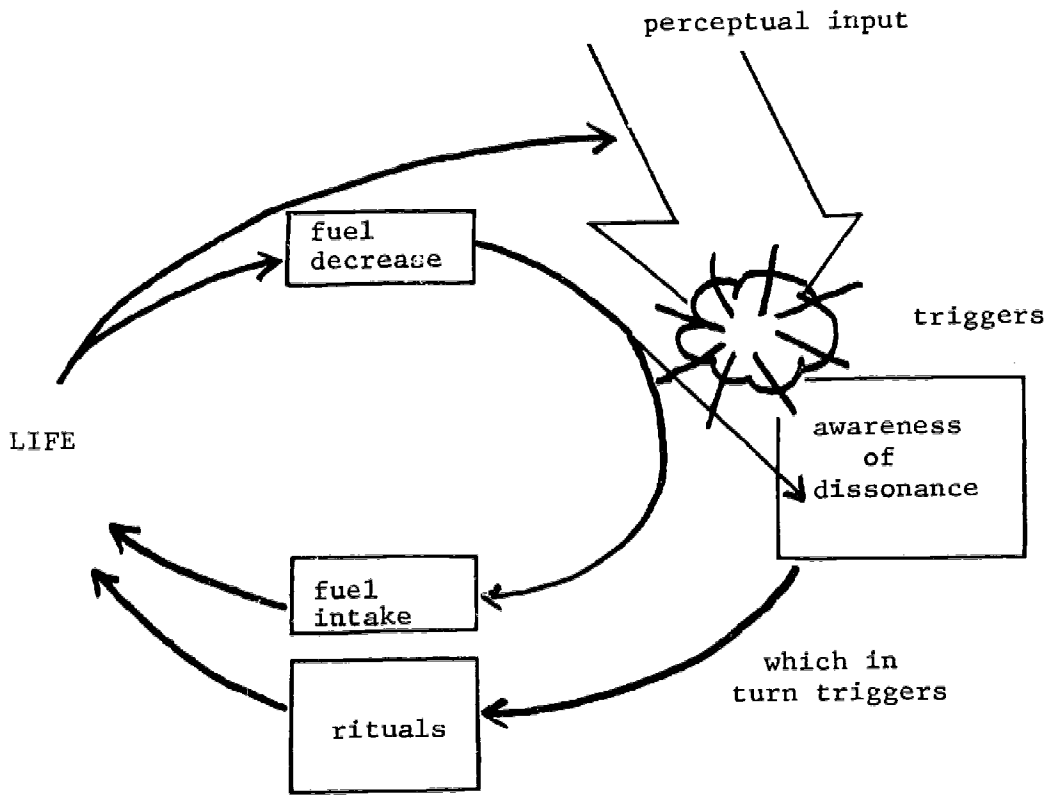
In the intermediate stage, all the processes are not so direct and automatic as osmosis, various chemical reactions, surface tension alterations and the like. Rather there are additional processes triggered by environmental conditions, but once triggered these higher order processes are carried on by internal mechanisms. Below, these are suggested by the outer loop, containing such released "rituals" as evasion patterns, courting, nest-building procedures, and such, while the original inner feedback loop represents the more basic, automatic processes denoted by the first stage.



Stage Three (below) reflects a critical shift. In earlier stages all processes were triggered, released, or otherwise directly caused by immediate conditions, involving physiological need and/or environmental opportunity. However, at this next level a new function--conscious awareness--introduces the potential for delay, for a break in the formerly unbroken chain of events. The same basic need-opportunity-action sequence exists, but here action can be preceded by an intermediate process during which the triggering impulse is taken into conscious awareness and "screened" with regard to its adaptive value. Thus the perceived opportunity to eat might be subjected to the tests, "Is there time? Is it safe?" or the like rather than the automatic, unconscious "if there is hunger there will be eating whenever there is food." Consequently

action appropriate to the original need-opportunity condition can be delayed, or even remain undone.

This suggests a key to the higher-level, partly cerebral drive mechanism postulated here. Given the phenomenon we call consciousness or conscious awareness, the primitive feedback loop can be expanded once more. Homeostatic drive-based behavior can be <u>freed of time and place</u> as well as of specific and direct physical triggers and cutoffs for each physical need. This provides additional degrees of freedom for alternative activities, regardless of the particular need that exists at any one instant. At the same time the functional integrity of the feedback loop is maintained. Below is a representation of this third feedback loop operating in addition to the two lower level loops:

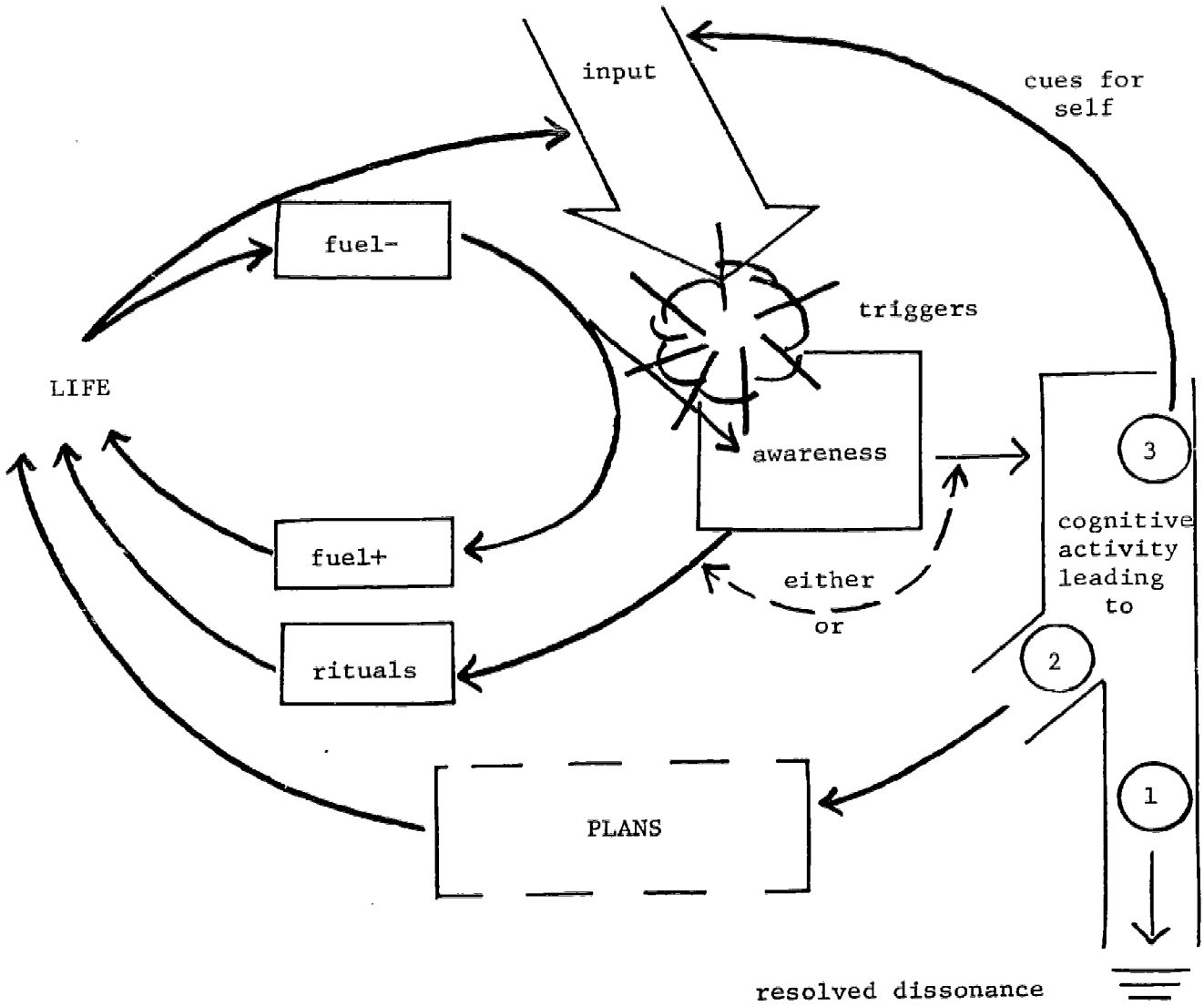


It is at this evolutionary level that purpose becomes feasible. All the capacities necessary to learn, produce, and evaluate the information necessary to guide behavior purposefully have come to exist, once consciousness and symbol manipulation appear. Furthermore the energy or force necessary to drive an organism to action is satisfactorily explained by the lower order life processes denoted by stages one and two.

The basic proposal here is quite simple when it is reduced to these terms. Once the link between awareness and action has been established, both social motivation and long-term individual goal-seeking (purpose) can be explained by the same physical mechanisms that explain basic physiological drives. Festinger's work establishes part of the link by strengthening a common sense observation: it feels lousy to lack something we want, or to be saddled with some condition we hate. Dissonance is just another source of pain, regardless of its physical or mental source.

An additional type of feedback, based upon the conscious awareness of the existence, increase, decrease, or absence of dissonance is therefore logically sufficient to define a general drive toward <u>conceptual homeostasis</u>, which drive provides the necessary logical link between mentation and overt behavior.

Below is an expansion of the previous diagram in which various alternative cognitive activities are represented--including that key aspect of purpose, creation by the organism of cues for itself:



The homeostatic feedback loop remains as before, as does that loop representing triggered response patterns or rituals. Also as before, both processes can affect the organism's awareness--specifically the awareness that dissonance exists, that some action is necessary. However awareness does not necessarily have to cause an immediate physical response. First, as Festinger (1957) points out, it can lead to a type of cognitive activity that reduces dissonance without overt instrumental activity. This (1) might be termed a "dissonance ground" and denotes

mental processes such as rationalization. Second, dissonance can lead to the formulation of complex sequences of activities--a plan (2). Third, cognitive activity can itself be the source of cues or goals upon the organism, (3) literally by conjuring up the dissonance-producing notion of something desirable--a goal.

From Individual to Group Purpose

A second critical aspect of human purpose can be explained at this point. Given the capacity to manipulate abstract symbols, it is logical to predict that a species eventually will develop the capacity to communicate. At this point, then, not only can the individual conjure up cues for himself, he can also provide cues for others. Consequently purpose can be shared by a group. This is a tremendous potential advantage to the species, because the strength of group members can be massed (say to put a very large log across a wide stream); and various special skills can be utilized for the total group's interest (say the creative concept of making a bridge in the first place, or the possession of a tool to fell or trim the necessary tree). It is precisely this capacity, to integrate individual contributions in order to pursue individually impossible goals, that provides the evolutionary "rationale" for a communication mechanism, just as the capacity conceptually to "navigate through time" is a logical evolutionary advance over the sense of smell, sight, and hearing.

At the same time, however, a serious problem for our species is introduced by the capacity to conceive of and to communicate purpose. It becomes possible for us to create conditions of long-term individual

discomfort, as well as gradually and collaboratively to create wonderfully complex products. For this reason I have speculated upon a second course of satisfaction necessary for purposeful species, a satisfaction that is not dependent upon or derived from the pleasure of physiological need satisfaction, or upon tension-reduction.

A Hypothetical Pleasure Mechanism

One of the most intriguing hypotheses derived from the theory of purpose is that a higher-order pleasure mechanism exists, one operating over and above the more primitive tension-reduction mechanisms that provide pleasure from direct physical need satisfaction--eating, resting, mating, etc. The more advanced mechanism can be activated by information regarding abstractions as well as information regarding solely physical phenomena. Thus it is proposed that favorable feedback information--the awareness that one is "on course and making progress"--could serve to stimulate the brain's pleasure center just as readily as can the full-belly signal.

The reason for this proposal is that without such a mechanism to provide an immediate reward for delaying one's direct gratification, some advantages of our species' capacity for purposeful behavior cannot be assured. The potential evolutionary benefits of capacities such as symbol manipulation, the sense of time, extrapolation, and the like could just as easily become evolutionary disasters. Human beings can form wonderfully elaborate plans, they can communicate these plans to other humans in order to benefit from combined group strength and the specialized skills

of group members, and, most powerfully of all, humans can pass on the resulting huge, compound group task to their descendents if one life is insufficient time to complete it. But the capacity to do this is also the capacity to set a goal so highly complex that generations of individuals could spend their lives in purposeful pursuit, all without the remotest chance of experiencing any pleasure by achieving the original goal. And at the same time that such tasks are imposed upon succeeding generations, it must be recalled, the human being experiences great discomfort from the degree of long-term "conceptual imbalance" or cognitive dissonance that can result. Furthermore the prolonged emotional state of painful tension is physically harmful, as the "executive monkey"* and other experiments have firmly established. Without a drive mechanism other than tension reduction, then, the capacity to create and pursue purpose represents a very mixed blessing.

However it is possible to conceive of an additional positive mechanism that could compensate. Part of the raw material for such an hypothesis lies in the Olds-Milner experiments at McGill, reported in 1954. It was found that rats' brains contained a general pleasure center, one which provided non-specific but apparently very strong pleasure when stimulated electrically through a tiny electrode. There is, at least in rats, a brain function that provides pleasure completely independently from tension-reduction or the satisfaction of physical needs. All the rat needs is electrical stimulation in the right spot. Perhaps humans possess such a center, too, and it can be stimulated by favorable feedback as well as by goal achievement.

*J.V. Brady, "Ulcers in 'Executive' Monkeys," Scientific American, 1958.

Another part of the raw material for hypothesizing a positive drive mechanism lies in the play behavior of various higher animal species. Dolphins amuse themselves literally by setting up problems for themselves--difficult tasks to be performed, or events to await and act upon--that on the surface might appear to be needless frustrations. Yet such task-creation, followed by joyful pursuit and a quick release of the prize so the game can be repeated, is far too common among the higher mammals to be anything other than pleasurable. There seems to be joy derived from the perception of progress in the pursuit of a plan or goal--even when that goal has nothing whatsoever to do with the satisfaction of homeostatic requirements.

This sort of mechanism would make long-term and compound group purpose a tolerable as well as instrumentally effective human capacity. If man possesses such a "pleasure-in-perceived-progress" mechanism, that mechanism could produce a positive--and therefore far healthier--emotional state rather than pure tension during the prolonged periods of frustration necessarily produced by elaborate human purpose. Olds' and Milner's rats' "pleasure centers" produced satisfaction outweighing the discomforts of hunger, fatigue, and the like. While it is not reasonable to suggest these rats were "purposefully pursuing the higher-level goal of thalmic stimulation," it is logically sound to suggest that such pleasure centers in the brains of higher animals can be stimulated just as strongly by the animals' perception of progress-in-pursuit as by feeling a full belly.

If this proves to be the case after empirical research, it will have considerable evolutionary significance. A direct drive to obtain the pleasure of progress is a <u>positive</u> complement to the more clearly

established negative drive to reduce discomfort or tension. And the species that comes to possess such a balanced drive system would certainly have an advantage. In the case of individual members of the species, long-term goal pursuit--if not too frustrating--can serve to increase the individual's adaptive power by facilitating the accumulation of instrumental activities. It is one thing for a chimp to reach with a stick or to drink with the aid of a leaf; the reward is the drink. It is quite another thing to derive pleasure directly from building tools and keeping them handy for later use, as we do. Individual humans realistically can set much higher-level goals than the lower animals. Delay, and the derived pain of long-term dissonance, apparently can be partly offset by pleasure derived from perceived progress, even while progress remains short of the ultimate goal.

In evolutionary terms, there is a definite increase in a species' power to survive when individual member organisms can share in a larger scale purposeful activity. A group goal quite literally can be larger in size, scope, etc., as well as being cumulative over periods of time; indeed these periods of delay and dissonance can be greater than one individual's lifetime. An integrated specialization of function permits tremendous amplification of human competence, just as integrated effort amplifies individual human strength. Joint effort, then, is partly a result of our susceptibility to diverse types of information. Too, it would be adaptive if we possessed the capacity to experience pleasure from progress; there could be direct and immediate satisfaction for members of a group engaged in mutual purposeful activity. Members would not have to maintain such a systemmic imbalance as unrelieved, long-term

delay of gratification. Hence the group could comfortably pursue extremely complex and distance goals--up to a point.

However, in order for such a mechanism to operate there is at least one condition that logically would have to exist. The individuals involved in the task would have to comprehend the goal and the plan well enough to be aware of progress when it was being made. If they could not perceive changes, or could not recognize those changes constituting progress, there would be no basis for pleasure until the goal was finally achieved--and this might take longer than the individual could tolerate, or even live.

The point is that the existence of such a pleasure mechanism is necessary but not sufficient to an adaptive general purpose mechanism. Also necessary are certain conditions of purpose itself, conditions that are not readily satisfied by extremely complex social purposes; the latter can accumulate and compound to the point where many participating members of the society cannot derive or expect any direct or immediate reward for their efforts. And when such individual efforts are required, as in compulsory education, the evolutionary advantages of purpose can be lost.

Compound or Group Purpose, Human Nature, and Education

At this point it is possible to introduce several questions that become relevant when dealing with educational or re-educational applications of purpose theory.* With the concept of large, complex, highly

*My own efforts in this area are contained in a concurrent book, tentatively entitled Freedom and Control in the Classroom. (New York: Thomas Y. Crowell, 1969)

specialized modern group purpose in mind, consider the importance of the following questions to the design of educational procedures:

1) In what size group--family, tribe, village, etc.--did the instinctual machinery we currently call human nature evolve?

2) Whatever the answer--whatever size group purpose our nature evolved with--how much more could individual capacity for group purpose be "stretched" by more effective socialization, education or training--without over-stretching human nature?

3) At the present time, how far have our existing social systems grown <u>beyond</u> this maximum tolerance point, the point beyond which human nature cannot operate effectively because the purpose system is too incomprehensible?

4) Given the socio-political system that we have currently, is it more feasible to operate upon this <u>social</u> system, to make it smaller and more appropriate to human nature, or, on the other hand, is it more feasible to modify <u>educational</u> systems in such a way that future generations will themselves either change or learn to cope with the size of their social systems? In other words, given that we have a problem, which is the more feasible approach? Should we try to change social systems, or to change the procedures by which we prepare individuals for participation in social systems?

Any full development of these questions is beyond the scope of this book. However, at this point I would venture to guess that an examination of small <u>but not quite primitive village societies</u> in various parts of the world today might provide the best indication of what size group

purpose best fits human nature. I agree with Desmond Morris in that an examination of very primitive tribal groups might well be misleading; Morris makes the point* that groups and tribes that have remained completely primitive might well be doing so as the result of some failure to evolve various necessary capacities--capacities that we had to evolve in order to advance into our present trouble.

Second, I would venture to guess that considerable stretching of this natural human-nature-size group purpose would be possible by means of more effective socialization/education procedures.

Third, despite the belief expressed in the immediately preceding paragraph, I believe that many of our current group purposes have gone ridiculously far beyond the point where human nature can operate healthily within them. Thus it seems possible to describe two kinds of purpose, one "primitive" and the other more "advanced"--although probably they are only "different". One can specify some of the so-called primitive tribes' rituals as examples of what might be termed a "fixed purpose," directly analogous to what Ardrey might describe as a closed instinct. The other side of the coin from the ritual would be the more familiar concept of a flexible purpose analogous to Ardrey's concept of the open instinct. One of the factors that seems to make a difference is whether or not the particular culture rests upon a belief in magic. If so, the magic can be considered the opposite or the inverse of the concept of agency. Levi-Strauss (1967, pages 288-289) might provide an example of how a ritual might first come to exist. It appears that magic provides a "middle-man function" that bridges the

*Desmond Morris, The Naked Ape (McGraw Hill, 1967), Introduction.

gap between patterned behavior that has always proven productive (but for reasons unknown to the actor), and consciously purposeful pursuit of some desired outcome. Another example is in Levi-Strauss' report of the type of body painting used by one of the tribes. Designs are in many ways unforeseen products of patterned behavior rather than pre-conceived basic structures to be elaborated in detail.

All such habitual procedures tend to block further development of group purpose, because there is no reason to develop the concept of a plan or the concept of feedback. Goals might be desired, but their pursuit through planned behavior is really unimaginable because it overlaps with the function of magic. In terms of social development it would then appear that extensive belief in magic could only maintain social behavior in the form of rituals or closed purposes that inevitably block new learning. In this way social rituals become analogous to Freud's definition of a neurosis, as an "erroneous self-fulfilling prophecy."

The point of greatest relevance here is that ritual can "freeze in" the growth increments of group purpose as well as fix purpose at a small, primitive level. The result of such a ritualized proliferation pattern would be just that out-of-control growth in social complexity that we experience at the present time.*

Fourth, I think all hopes for radical political reform are false. I think the only feasible point at which to attack our current problem is the educational system itself. The best I believe we can do, in other words, is to begin preparing future citizens to avoid irresponsible use

*One perfect analogy is a statement attributed to Samuel Gompers, the early labor leader. Asked just how much he wanted, his answer was, "More."

of intellect to go beyond their human nature. However at this point I want to introduce another belief regarding educational reform.

I have stated that I see the education as that process most susceptible to significant change. What I want to emphasize briefly at this point is that although education should be the focus of these basic reform efforts, I do not believe such efforts can be made from within the educational establishment, or by educators. In line with the thinking of Galbraith (The New Industrial State) and with Miller ("Some Psychological Perspectives on the Year 2000," in the Summer 1967 issue of Daedalus), I believe that education is unlikely to change itself.

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