CREATIVITY: THE PRODUCTIVE TENSION

by

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This thesis undertakes an analysis of the broad question: what is creativity? Conventional psychological approaches to this topic usually limit the investigation to a smaller aspect of the question and tend to center primarily on one of three points: the nature of the creative process, the personality and behavioral characteristics of the creative person, and the environmental circumstances which facilitate or inhibit the realization of creative potential.

The approach chosen for this thesis includes a general investigation of the material gathered on these three aspects of the phenomenon, but an attempt is made to extend the analysis further in the direction of environmental factors deriving from the social interaction between individuals and the larger society.

The assumption guiding this broad approach is that creativity is best understood in the wider context of the infrastructural and super-structural social components that directly and indirectly affect the development, experiences, expectations, and actions of individuals. Creativity is thus treated not as a quality special or peculiar to certain exceptional individuals but as a socially defined and derived mode of interaction with the larger society. To this extent, "creativity" is defined as achieving a relevant and valued but unanticipated and novel product in contrast to "intelligence" which is defined as producing highly valued but socially directed and anticipated
responses. The tendency of creative individuals to identify themselves either consciously or unconsciously with a nonconforming, "creative" reference group rather than with the conventional values and behaviors of the larger society is examined as is the tendency of societies to resist, control, and label individuals who habitually produce unanticipated "creative" products.

As a result of analysis along these lines, it is suggested that "creativity" primary derives from a "productive tension" that develops from and is maintained by the various psychological and sociological interactions between individuals and the larger society. It is further suggested that these tensions pertain in some degree for all individuals, but that those who become recognized and labelled as "creative" realize the energy of these productive tensions in the performance of actions and the execution of products that are nonconforming but highly relevant to the needs and interests of the larger society.

Finally, it is concluded that understanding the role of productive tensions in creativity demonstrates that only general answers can be given to the question of whether creative individuals can be predicted in advance and whether creative behavior generally can be provoked through specially facilitating circumstances. While certain genetic, psychological, and environmental factors seem to relate generally to the realization of creative potentialities, possession of these predispositions by some individuals is not sufficient grounds for predicting who will be "creative" or what particular products
will emerge. It is argued, then, that social forces and institutions beyond the control of individuals operate to select among all the available productions and actions in a given period of time only a few of those most appropriate and relevant for recognition. Hence, the definition and recognition of individuals for creative productions is only partially the result of individual efforts towards productive mediation of commonly experiences psychological and sociological tensions. Attempts to "cultivate" creative behavior through manipulation of circumstances in individual cases is thus seen to be antithetical to the basic nonconforming nature of "creativity".
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"Creativity" is one of those words, or concepts, which seems plain enough, even simple, till you start fixing your eye on it. Then, like "innocence" or "internationalism" or "love", it begins to swell up like a cloud into something that fills the whole sky of meaning, and darkens it, and comes to signify everything or nothing.

Earle Birney

CHAPTER 1: INTRODUCTION

Earle Birney is right, in the above quotation. "Creativity" has come to signify everything and nothing. It has become an all-purpose word that will mean anything the person using it wants it to mean. Like "motherhood" and "apple pie", it carries with it a connotation of something good, something to be encouraged and cultivated, something that everyone can have. Such a word is useful for the lay public because the aura of its generality transcends all social divisions and wraps everyone in the same snug and undefined common understanding. To the academic, however, such all and nothing concepts are anathema, for they make impossible the business of teasing out cause and effect, categorical distinctions, measurement, and prediction.

Once it was said that the enterprise that occupied the best intellects in Western culture was attempting to determine how many angels could dance on the head of a pin; now perhaps the pervasive academic enterprise could be described as trying to determine how many ways a hair can be split. Such a statement is not intended to be entirely uncharitable, for fortu-
nately hair-splitting does not preoccupy all academics. What it is intended to indicate is that there is a general tendency to try to reduce knowledge into every smaller, ever more isolated, ever more specialized pieces that can be studied in minute detail. Such an enterprise is useful, for it yields information that cannot be gained in any other way; but it should not dominate the entire search for knowledge. Once in a while it is important to try to put all the little pieces back together in order to study the relationships between them and, more important, to see if the reconstruction makes sense as a totality. It is this latter ambition that underlies the analysis contained in the following pages of this thesis.

Justification for a Broad Approach

The fundamental question that guided this project is both simple and difficult: what is creativity? The pursuit of such a broad, general, all-inclusive question may be seen as something like a fast gallop through a big field during the course of which some spots will be missed and some flowers trampled underfoot. Even in narrowly defined studies, however, such casualties occur, and what is unfortunate for one researcher may be fortuitous for another who comes along after identifying the omissions and correcting the errors. Many such vacancies and crushed points will no doubt become apparent in the following pages, but the underlying hope is that the general perimeters of the field will be surveyed and some of the internal
areas that have not been much examined in the literature to date will be more intensively explored.

A terrific amount of research has been done on creativity, but while the topic has been largely the hobby-horse of psychologists, it has not been exclusively theirs. Research in other disciplines has tended not to use the term "creativity" or its synonyms such as "originality" and "productive thinking", but there is much to be learned from related concepts. Thus, the following analysis has attempted to transfer and apply some of the perspectives developed in other areas such as sociology and anthropology. The aim has been, however, to blur the disciplinary boundaries rather than to intensity them. While such a procedure is bound to be arbitrarily subjective, if the totality can be seen to be both internally cohesive and externally "sensible", than such an approach should be justifiable. At the very worst, it cannot fail to explain creativity any more than the usual approaches have failed to do.

And the conventional approaches have failed to explain "creativity" on a broad scale. The empirical research is very contradictory, one study with another, and even within a single study more questions are usually raised than are answered. At the conceptual level, full-blown theories of creativity are virtually non-existent, although there are a few limited explanations dealing with a narrow aspect of the phenomenon such as the creative process or the creative personality. The only large-scale theoretical frameworks to have been devel-
oped are those dealing with intelligence or cognitive abilities generally. These theories tend to be fairly internally consistent, though they do not relate very well to each other and in many cases do not relate at all to the empirical work.

These critical comments are not meant to suggest that all prior work on the topic is useless, however. Indeed, both data and analyses are extremely valuable. What is being suggested is that more heuristic explanations should be developed and that much of the material of prior work can be usefully reconstructed towards this end. Such a goal has guided the selection and presentation of material here, and to that extent, the methodology used might be seen as concentrating on the structure of relationships rather than on identifying and describing various elements within the larger structure. It is hoped that such an approach will at least highlight some areas that have been neglected and point to new possibilities for future work as well as provide the basis for a macro-structural perspective of the phenomenon.

Coming to Terms with Terms

Before embarking on a more involved examination of the topic of creativity, however, it is necessary to establish some preliminary benchmarks -- to come to terms with the terms, as it were.

The establishment of definitions and criteria for distinctions is usually of primary concern in the academic enterprise,
but in regard to creativity, it is one of the most difficult problems of all. There are almost as many definitions of "creativity" as there are writers on the topic. At one extreme are the narrow, operational definitions such as the one J. P. Guilford suggested: "creativity refers to the abilities that are most characteristic of creative people."¹

At the other extreme are the amorphic, generalized definitions such as the one Frank Barron uses: "Creativity may be defined, quite simply, as the ability to bring something new into existence."² In between these two extremes there is a variety of definitions which emphasize various aspects of the phenomenon. George Kneller has summarized this definitional banquet as follows:

Reliable definitions of creativity seem to fall into four categories. Creativity may be considered from the standpoint of the person who creates, that is, in terms of physiology and temperament, including personal attitudes, habits, and values. It may also be explained by way of the mental processes -- motivation, perception, learning, thinking, and communicating -- that the act of creating calls into play. A third definition focuses on environmental and cultural influences. Finally, creativity may be understood in terms of its products, such as theories, inventions, paintings, carvings, and poems.³

In addition to the problem of definition, there is also the problem of where to draw the line in terms of criteria. Is "creativity" to be limited to those rare applications of the term "genius"? Is it to be reserved only for those occasions and products that receive public recognition? Or is it something that every person exhibits, no matter how large or
small is his place in the world? Rollo May has insisted that it should be judged according to a grand scale:

We are not dealing with hobbies, with do-it-yourself movements, holiday painting, or other forms of filling up leisure time, particularly on the part of the indolent classes.  

Frank Barron, on the other hand, would arrange the criteria to include not only impact on the larger society, but also impact on the individual:

A man may think a thought which for him is a new thought, yet it may be the most common thought in the world when all thinkers are taken into account. His act is a creative act, but the "something new" that is produced is something new in the population of thoughts he can claim as his own, not something new for mankind as a whole.  

Kneller expresses this position even more succinctly: "We create when we discover and express an idea, artifact, or form of behavior that is new to us."  

The basic problem in establishing definitions and criteria is thus the question of intent or motivation. May represents those who would limit creativity to acts which intersect the larger world of existence beyond the individual and affect the course of history, while Barron and others would extend the category to include all efforts as they relate to the immediate world of individual experience. The problem thus also involves establishing a frame of reference for judging how novel is "novel" and to whom such products must be "new." Kneller suggests the addition of a relevancy factor to aid the resolution of this question.
an act or an idea is creative not only because it is novel but also because it achieves something that is appropriate to a given situation.\textsuperscript{7}

Finding a suitable definition for creativity thus involves finding an acceptable combination of these elements: novelty, relevance, and criteria for making comparative evaluations. Clearly, no definition will satisfy everyone; those who are most comfortable with narrowly explicit and operational terms will feel frustrated and lost when flexible, amorphous terms are used. And those who like the freedom of loosely contextual definitions will dislike the rigidity and exclusiveness of operational terms. This thesis, however, has adopted the second mode, hence "creativity" is treated as a generic term related to people and processes involved with "bringing something new into existence." Finally, "creativity" will be used to cover the general topic or phenomenon, and in these cases it will be set off by quotation marks to indicate its position as an all-purpose, generic term.

Criteria for discriminating between "creative" and "non-creative" will also be related to the particular context of the discussion. In general, however, the approach used here will regard a product or event as creative in relationship to whether or not it was anticipated and to its appropriateness and relevancy to a given situation, whether it is immediate to an individual or of future importance to the larger society. There will also be, however, of some distinction between those aspects of "creativity" that are generally recognized by the
larger society and rewarded in some form and those that do not achieve widespread recognition. To this extent, Guilford's suggestion will be followed, namely "that all individuals possess to some degree all abilities... Creative acts can therefore be expected, no matter how feeble or how infrequent, of almost all individuals." But the present approach will not include the corollary of Guilford's notion: "those persons who are recognized as creative merely have more of what all of us have." Instead, the perspective followed in this thesis will be that social recognition of and reward for creativity are not explained by quantity or quality of innate characteristics, but rather they are related to the interaction between the forces and institutions of society and the internal dynamics of the individual.

This is not to argue that recognition for being "creative" is largely a matter of luck, although an element of luck may well be involved. Rather, it is to argue that accounting for the make-up of individuals does not explain why some individuals or their products are recognized while others are not. This latter issue is pivotal in the following thesis. While the personal characteristics of individuals are important, it is also necessary to understand that "creativity" is largely socially defined and influenced and that limiting analysis to an examination of individuals as if they were isolated from the larger society is not sufficient.
The Conventional Approach

Such a limited approach to the topic is, however, the convention most frequently followed. Since "creativity" has been favored as a topic of research in psychology more than in other disciplines, it is understandable that the general tendency has been to limit investigation to the level of individual behavior. This narrow focus has been to some extent reinforced by the tradition of "hero-worship" in Western culture. Further, an implicit theme in the development of "science" generally has been the assumption that Nature can be fully known and dominated by Man. Such an assumption has partially motivated research on discovering, shaping, and harnessing individual potential for the purposes of scientific and social progress. This motivation has been expressed in the extreme, for instance, by Calvin Taylor.

Because creative acts affect enormously not only scientific progress, but society in general, those nations who learn best how to identify, develop, and encourage the creative potential of their people may find themselves in very advantageous positions. As few as three or four highly creative minds can make a crucial difference...our nation cannot depend on sheer quantity of manpower, but must strive to find high-quality personnel, especially creative persons, to deal with its vital problems. In fact, an approach utilizing sheer quantity of men and facilities can be unduly expensive, so much so that we would probably find on careful analysis that we cannot afford such wasteful and inefficient approaches.

While much of the research on creativity has been undertaken with more humanistic motivations, the ultimate use for which the work is sought and to which it is intended to be put
is probably the pragmatic realism of political and economic advantages that Taylor expressed. Even so humane an exponent of individual autonomy as Carl Rogers points to the necessity for research on creativity when he ominously warns that,

Unless individuals, groups, and nations can imagine, construct, and devise new ways of relating to these complex social changes, the lights will go out. Unless man can make new and original adaptations to his environment as rapidly as his science can change the environment, our culture will perish. Not only individual maladjustment and group tensions but international annihilation will be the price we pay for a lack of creativity.\textsuperscript{11}

In practice, of course, researchers have limited themselves to more immediate goals and a more manageable scope of investigation. Dellas and Gaier have suggested that,

Most economically, the literature on creativity can be classified into four major orientations: (a) the nature and quality of the product created, (b) the actual expression of creative acts and the continuing process during the "creation", (c) the nature of the individual, and (d) environmental factors and press that tend to initiate and foster creativity.\textsuperscript{12}

As Dellas and Gaier further point out, the most popular aspect has been the study of cognitive characteristics in one of these three smaller subdivisions: theories on the nature of abilities, distinctions between creativity and intelligence, and the styles and modes of cognitive functioning preferred by different individuals. Although mapping cognitive variables received most of the attention at first, it is the study of personological characteristics, say Dellas and Gaier, that has tended to be viewed as most critical latterly in explaining why some individuals are creative and others not. Personological studies have focussed on determining the personality traits,
motivational and value characteristics, and to some extent the influence of environmental factors such as home and school on the development of these characteristics.

Empirical research on "creativity" has been most significantly concerned with the design and use of measuring instruments of one sort or another, but the degree of dispute about reliability and validity of these techniques is almost as widespread as the number of such devices. The most general conclusion that can be drawn about empirical research on creativity is that it has produced a quagmire of results. For instance, creativity measures are found to correlate as well if not better with intelligence measures as they do with other creativity measures. And in studies of personality, profiles of characteristics found in creative people do not explain what differentiates them from "noncreative" people who have similar profiles.

Unfortunately, this empirical quagmire is not much aided by the state of the theoretical perspectives. If the empirical studies have produced a quagmire, then it might be said that a similar slough exists in theory. In general, there have been two theoretical approaches to explaining ability: the "global" concepts more prevalent in Britain and Western Europe, and the "multi-factoral" concepts pursued in North America. Both approaches are internally logical and consistent and have been supported by empirical studies carefully designed and carried out. But since there is not much overlap between them, and since
they are equally supported by their own research, the choice of one over the other is more like an act of faith than an act of judgment. George Shouksmith, however, sees the possibility of a rapprochment between these divergent views, especially those related to concepts of intelligence:

In the past, the isolation and description of the "pure" intellectual elements has been the major concern of researchers. Modern theory suggests that intelligence in all its aspects is a more global concept than we had earlier imagined. Further advances in this area may well occur through studies which emphasize the individual differences in problem-solving, which are produced by social-learning or in the operation of motivational and personality factors.¹³

Theories of creativity are even more fragmented than are the theories of general ability. As pointed out previously, they tend to focus on a particular aspect of creativity, such as the process, the person, the product, or the environment. There has been almost no attempt to develop a theory of creativity that was not based on the assumption that one or another of these specific components was more critically important than the others. There has thus been little attempt to try to coordinate the various perspectives with each other in hopes of developing a broader perspective of what "creativity" is.

An Outline of the Thesis

It is this bold goal of achieving a broader understanding that the present project is directed towards. The hope was that extensive reading across a broad spectrum of disciplines and including a variety of perspectives would provide not
necessarily a theory (such a goal would be much too ambitious at this stage), but rather a more extended analysis of the different parameters that are involved in so complex a phenomenon as "creativity". The basic assumption underlying this investigation is that the nature of creativity is not to be explained merely in terms of elements of ability, personality characteristics, and environmental experiences, but in the relationships that exist between the various elements. In this context, however, some special attention has been turned to environmental factors -- both the immediate experiences of home and school and the more distant social forces and processes that also affect the activities of individuals.

Chapter 2 begins this broad examination with an overview of the large literature on creativity and intelligence, particularly as that concern has been manifested in empirical research. A short critique of these approaches is presented along with a hypothesis that distinctions between "creativity" and "intelligence" are primarily related to "social expectations" rather than to innate or intrinsic differences.

Chapter 3 pursues in more detail specific data on the creative process and creative people. For convenience, Chapter 3 is divided into two parts. Part I is concerned with outlining the process aspects of "creativity" in terms of some of the data on neurophysiology, the sticky interface between concepts of "brain" and "mind", and the exploration of a sequential model of the process as observed by others and as reported
through introspective accounts. Part II reviews the most influential studies on the personological aspects of creativity and summarizes the general picture that emerges from these studies. In particular, a discussion of conformity and non-conformity as related to "intelligence" and "creativity" respectively continues the perspective first suggested in Chapter 2 that social forces and institutions will influence the development of "creative" abilities as well as affect the way in which these abilities are manifested and judged.

Chapter 4 continues this examination of social factors in more detail. Analysis of these aspects points to the importance of resistance to creative products, the attempts by society to control the appearance and effects of creativity, and the reactions of "creative" people to this pressure towards conformity issuing from the larger social values and institutions.

Chapter 5 explores the conventional questions of whether "creativity" can be provoked and predicted. In this exploration, the creative individual is discussed as an example of "marginal man", and the implications of this marginal relationship with the larger society are explored. In particular, a hypothesis is suggested in which creativity may be regarded as a manifestation of various kinds of tension, some psychological and some sociological in origin. These tensions are seen to be "productive" for the individual who utilizes the energy produced by them in socially valued ways. Given this perspective, the goal of predicting and provoking creative behavior towards pre-
designated ends may be neither practical nor desirable since "creativity" is related not just to the micro-structure of specific situations but also to the management of general conditions of tension between the abilities, values, and goals of individuals and the larger social structure.

Chapter 6 continues to examine in greater depth the problems involved in developing a heuristic forecast for the future of "creativity" both in terms of pursuing the topic as an intellectual enquiry and in terms of developing and implementing pragmatic applications of the knowledge obtained through research. It is suggested that as an intellectual endeavor, "creativity" is in great need of (a) moving research from the empirical to the conceptual realm, (b) developing an inter-disciplinary structural conceptualization and methodology in which the focus is shifted from the "figure" to the "field", that is, from isolating relevant factors to integrating these factors into a broad structural matrix, and (c) examining the fundamental epistemological framework that directs enquiry, particularly as that framework affects the motivation, the goals, the techniques, and the effects of research on "creativity." Finally, a new heuristic trajectory is briefly outlined to indicate the direction and results of such a shift to a structural perspective.
Chapter 1: Notes


5 Barron, op. cit., p. 6.

6 Kneller, op. cit., p. 3.

7 Ibid., p. 6.

8 Guilford, op. cit., p. 446.

9 Ibid.


We are prone to use our evidence as Andrew Lang's drunkards used their lamp-posts -- for support rather than illumination.

Liam Hudson

CHAPTER 2: OVERVIEW OF PAST PERSPECTIVES

Although there has been a persistent curiosity throughout history about new things coming into existence, the study of "creativity" as a psychological phenomenon did not start to become popular until 1950. In that year J. P. Guilford in his speech as retiring president of the American Psychological Association urged his colleagues to turn their attention to this new field. Hudson describes what happened after 1950 this way:

"As a topic of research, "creativity" is a bandwagon; one which all of us sufficiently hale and healthy have leapt athletically aboard. It represents a boom in the American psychological industry only paralleled by that of programmed learning."

As measured by publication output, the slowly growing interest in creativity was jolted into an exponential rate of increase by World War Two, the launching of Sputnik by the Russians, and the general onset of the technological era. As Table I shows, the decade of the 1960's was the most prolific period for published articles and Ph.D. dissertations on the topics of creativity, originality, and productive thinking.

The number of popular books and articles published about creativity is virtually uncountable. In fact, if all that has
Table I

Research on the Topics of Creativity, Originality, and Productive Thinking*

<table>
<thead>
<tr>
<th>Years</th>
<th>Psychological Abstracts</th>
<th>Dissertation Abstracts</th>
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<tbody>
<tr>
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<td>12</td>
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<td>1941-50</td>
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<tr>
<td>1966-70</td>
<td>646</td>
<td>150</td>
</tr>
</tbody>
</table>

been written directly or indirectly about creativity is consid-
ered, the task of doing a full review becomes impossible, and to attempt to do so would leave no space for anything else. For these reasons, this thesis will cover the literature very selectively, making no pretense to encompass all the knowledge that is available.

In the Beginning

J. P. Guilford may have sparked the modern surge of interest in creativity, but he was by no means the first to have considered the phenomenon. The early Greek philosophers, for instance, had a great deal to say about the intellect as manifested in various forms. According to Shaffer, these early philosophers were primarily concerned with intellect in theological terms of the soul. Much later on, however, philosophers separated "mind" from "soul", and it is at this point in the history of ideas that psychological perspectives may be said to have begun their growth away from philosophy.

In the realm of modern psychological explanations, one of the first to consider the topic of intellectual talent was Francis Galton. The first edition of his *Hereditary Genius* was published in 1869, and the nature vs. nurture controversy which it began has not yet been laid to rest. Indeed, a frustrated reviewer of the literature up to 1969 was moved to expostulate that "after 100 years of measuring, defining, and redefining, we have not added significantly to Galton's *Hereditary Genius*." This view is probably a little short-
sighted, but the feeling of exasperation is understandable.

For Galton, that level of intellect which he called genius is a complex structure of special personal qualities and abilities that automatically -- and to Galton, indisputably -- separates some men from others.

I am sure that no one who has had the privilege of mixing in the society of the abler men of any great capital, or who is acquainted with the biographies of the heroes of history, can doubt the existence of grand human animals, of nature's pre-eminently noble, of individuals born to be kings of men.6

Galton's theoretical objectives in Hereditary Genius were to prove that qualitative differences exist between individuals and to demonstrate the nature of these differences and their distribution within the population "from one knows not what height, and descending to one can hardly say what depth."7 Unlike many scientists of this century, Galton made no attempt to separate knowledge and norms. Thus his social and practical goals sound grotesque to the modern liberal ear, but confident that he and his family were on the favored side of the Darwinian equation, he did not hesitate to express them frankly. The concluding paragraph of the preface to the 1892 edition of the book is an outstanding example:

In conclusion I wish again to emphasise the fact that the improvement of the natural gifts of nature generations of the human race is largely, though indirectly, under our control. We may not be able to originate, but we can guide. The processes of evolution are in constant and spontaneous activity, some pushing towards the bad, some towards the good. Our part is to watch for opportunities to intervene by checking the former and giving free play to the latter. We must distinguish clearly between our power in this fundamental respect and that which we also possess of ameliorating education
and hygiene. It is earnestly to be hoped that inquiries will be increasingly directed into historical facts, with the view of estimating the possible effects of reasonable political action in the future, in gradually raising the present miserably low standard of the human race to one in which the Utopias in the dreamland of philanthropists may become practical possibilities.⁸

The motivation expressed here by Galton has resonated, usually in lower keys, through all of Western civilization's search for knowledge, a search guided by the hope of being able one day to conquer and control all Nature in the interests of mere man.

Charles Spearman, born like Galton into a "privileged class", set himself the task of building a theory compatible with Galton's findings. He borrowed some of the statistical tools devised by Galton and amended by Karl Pearson -- particularly the correlation coefficient -- and refined them into the technique of factor analysis which he subsequently applied to his own research. The results he obtained from applying this methodology to scores on tests given to a large sample of school children led him to develop a "two-factor theory" of intelligence.

...every individual measurement of ability (or of any other variable that enters into the table) can be divided into two independent parts which possess the following momentous properties. The one part has been called the "general factor" and denoted by the letter g; it is so named because, although varying freely from individual to individual, it remains the same for any one individual in respect of all the correlated abilities. The second part has been called the "specific factor" and denoted by the letter s. It not only varies from individual to individual, but even for one individual from each ability to another.⁹
As Butcher points out, however, there is a minor contradiction in Spearman's term "two-factor theory": "...it might have been called a "one" factor theory"...since it depends on the existence of only one common factor." In any case, Spearman's conception of intelligence as a general, global capacity underlying special abilities is an important theoretical milestone, not only because it has intrinsic value, but also because it laid the foundation for most of the subsequent work done on intelligence in Britain.

Among those who followed in Spearman's footsteps, one of the best known is Sir Cyril Burt. While Burt did not agree with the whole of Spearman's theory, he did accept the concept of general intelligence. To this notion and on the basis of his own research, he added a range of intermediate abilities which he called minor group factors because they appeared to occur with some types of problems (verbal, for instance) and not on others (e.g., spatial). Ultimately he combined these two aspects into a hierarchy of abilities: general, group, specific, and error factors.

The measurement of any individual for any one of a given set of traits may be regarded as a function of four kinds of components: namely, those characteristic of (i) all the traits, (ii) some of the traits, (iii) the particular trait in question whenever it is measured, (iv) the particular trait in question as measured on this particular occasion.11

Other British psychologists such as Eysenck and Vernon have built further on Burt's central notion of a hierarchy of abilities and can thus be said to have maintained the tradition
begun by Galton and Spearman. In contrast, however, is the use made of Spearman's work on the western shores of the Atlantic Ocean. His methodology but not his theory were adopted in North America.

Factor analysis in American hands, however, yielded different results, largely because it was used under the constraints of a different theoretical model or paradigm. L. L. Thurstone was one of the first Americans to use factor analysis for defining and measuring intelligence. His application of the technique yielded not Spearman's "g", but seven (later expanded to eight) distinct abilities which he designated as follows: spatial ability, perceptual speed, numerical ability, verbal meaning, memory, verbal fluency, and inductive reasoning. This dissection of general intelligence into small pieces produced profound repercussions which were not limited to psychological theory. According to Cattell, this development

...was treated as a psychological earthquake by many, and a considerable number of educational psychologists -- especially those who had for various reasons been unhappy with the I. Q. -- began burning their intelligence tests, convinced that with the overthrow of the single, monarchic general intelligence factor, the I. Q. was no longer a useful concept.¹²

Except for Cattell himself whose work followed the British orientation, almost all the work done in the United States since Thurstone's publications has rejected the general intelligence concept in favor of a multifocal view that intelligence is a composite of many different and discrete abilities. The best known of the more recent American factor analysts is J. P.
Guilford.

Guilford and His Model of the Intellect

Not only did Guilford provoke a rush to get on the "creativity" bandwagon, but he also provided a convenient bandwagon already well-defined both theoretically and methodologically. Guilford's use of factor analysis rests on the assumption that each factor of the intellect "is sufficiently distinct to be detected...[and] that the factors themselves can be classified because they resemble one another in certain ways." Graphically, each factor represents the intersection of three planes involved in thinking or problem-solving: the content of the particular problem, the operations used to solve the problem, and the products resulting from the application of an operation to a piece of content. Theoretically, Guilford makes provision for a fourth plane of factors, designated as behavioral and meant to represent something like a "social intelligence", but unfortunately this behavioral plane has not proved amenable to the factor analytic method. Put all together, the three planes of content, operations, and products make a cube consisting of 120 cells of specific intelligence factors.

By 1959, Guilford was able to report that with factor analysis he had identified 47 factors in his model. Of these 47, nearly half were associated with creative thinking. Some of these factors, such as sensitivity to problems, ideational fluency, and spontaneous flexibility, occur
generally in the intellect. But one particular operation — that of **divergent thinking** — is identified closely with creative thinking. Divergent thinking, according to Guilford, is the ability to produce a number of responses to a given stimulus. The opposite of divergent thinking is **convergent thinking** in which one response is produced or accepted as correct. These two terms — divergent thinking and convergent thinking — have since become widely used to distinguish the "creative" from the "non-creative" thinker, even when both thinkers are equally "intelligent."

While many subsequent researchers have ignored or deviated from his cubical model, much use has been made of a series of creativity tests developed by Guilford and his colleagues in the Aptitudes Project at the University of Southern California. Three of the most frequently used tests are the Unusual Uses Test in which the subject is asked to list as many uses as he can think of for common objects like a brick or a barrel, the Consequences Test which requires the subject to list different consequences of a given hypothetical event (e.g., "What would be the results if people no longer wanted or needed sleep?"), and the Plot Titles Test in which the subject composes a variety of clever and interesting titles for short stories he is asked to read.

Although the most recent research on "creativity" has pursued rather different paths than those laid out by Guilford, the importance of his work itself and the impetus of his
example should not be underestimated. According to Butcher, the most important of his contributions are these:

Firstly, Guilford's account of the nature and structure of abilities has the advantage of being systematic and giving the appearance of a scientific classification, unlike much research in the field of abilities which has rightly been criticised as blindly operational and undirected by theory. The three-fold classification of intelligent behavior according to how it operates, what it operates on, and what is produced by the operation, although not the only possible or necessarily the best system undoubtedly forms a logical and useful frame of reference.... In some ways this account of abilities is also more easily related to the general body of psychological knowledge than are most factor analyses.... Finally, Guilford's theory, his analysis of many of the cognitive components in creative production, and the prolific flow of tests from his laboratory have all provided a good stimulus to a new and more varied approach to the study of intellectual functioning.¹⁵

Perhaps the most important influence Guilford's work had on that of subsequent research was in terms of form rather than content. That is, he established a general pattern for research which was narrowly defined and focused and was paradigmatically exclusive rather than inclusive. This general form and particularly the dichotomy between divergent thinking (creativity) and convergent thinking (intelligence) have served as a template for most of the subsequent research, even by those who did not follow the specific methodological or theoretical perspectives developed by Guilford. Thus, while he kept his research focused on certain cognitive aspects, other work on "creativity" branched off into different aspects.

For instance, in their review of research up to 1967, Parnes and Brunelle note six general areas of interest:
(1) Research regarding differences between highly creative and less creative individuals -- in their cognitive functioning, personality, structures, and biographical data; (2) Studies of factors that inhibit productive thinking; (3) Research comparing individual creativity with that of groups; (4) Analyses of relationships among creativity, intelligence, and achievement; (5) Studies evaluating programs designed to nurture creative behavior; and (6) Studies of environmental variables affecting creativity.¹⁶

Increasingly, then, the consensus has shifted from favoring the exclusively cognitive approach of Guilford to the position that the most critical determinants of whether or not a person will produce creative things are found in the non-cognitive rather than in the cognitive domain. Certainly, the basic talents, knowledge, and skills are necessary before someone can be creative, but whether he actually produces novel products seems to depend in the final analysis on other factors than the purely cognitive.

The Institute of Personality Assessment Research: The Creative Profile

The fundamental assumption that creativity is not solely an intellectual factor but is integrally part of the whole personality has been the guiding principle for the Institute of Personality Assessment Research at the Berkeley Campus of the University of California. Frank Barron and D. W. MacKinnon head this research unit which has set itself the task of mapping as many aspects as possible of creative people. One of the techniques frequently used at IPAR has been "living-in assessment", in which the subjects spend a weekend with the
researchers in an old house decorated and designed to be as homey as possible with such amenities as wine cellar and fireplaces. It is hoped that this environmental ploy will minimize the artificiality of the research situation.

The IPAR researchers have used a number of tests and techniques to study a variety of fields of productivity engaged in by creative people. Some of these different fields have been architecture, literature, mathematics, and science research. Special aspects of creativity such as variables related to sex and character structure have also been studied.

Barron has summarized in several places the findings of all the IPAR research, and he has contributed an impressive amount of work himself to the topic. His precis of the characteristics of creative artists has been substantiated by other studies, and he suggests that creative scientists demonstrate a similar pattern.

Creative people are especially observant, and they value accurate observation (telling themselves the truth) more than other people do. They often express part-truths, but this they do vividly; the part they express is the generally unrecognized; by displacement of accent and apparent disproportion in statements they seek to point to the usually unobserved. They see things as others do, but also as others do not.

They are thus independent in their cognition, and they also value clearer cognition. They will suffer great personal pain to testify correctly. They are motivated to this value and to the exercise of this talent (independent, sharp observation) both for reasons of self-preservation and in the interest of human culture and its future. They are born with greater brain capacity; they have more ability to hold many ideas at once, and to compare more ideas with one another -- hence to make
a richer synthesis.

In addition to unusual endowment in terms of cognitive ability, they are by constitution more vigorous and have available to them an exceptional fund of psychic and physical energy.

Their universe is thus more complex, and in addition they usually lead more complex lives, seeking tension in the interest of the pleasure they obtain upon its discharge.

They have more contact than most people do with the life of the unconscious -- with fantasy, reverie, the world of imagination.

They have exceptionally broad and flexible awareness of themselves. The self is strongest when it can regress (admit primitive fantasies, naive ideas, tabooed impulses into consciousness and behavior), and yet return to a high degree of rationality and self-criticism. The creative person is both more primitive and more cultured, crazier and saner, more destructive and constructive, than the average person.\(^\text{24}\)

At a later date and in a more prosaic and scientific vein, Barron drew this composite portrait of the productive scientist:

If we take in combination the researches of A. Roe, C. W. Taylor, R. H. Knapp, R. B. Cattell, R. D. MacCurdy, D. C. McClelland, B. Eiduson, J. A. Chambers, and H. G. Gough, and list the traits found in one study after another, this unified picture of the productive scientist emerges:

1. High ego strength and emotional stability
2. A strong need for independence and autonomy; self-sufficiency; self-direction
3. A high degree of control of impulse
4. Superior general intelligence
5. A liking for abstract thinking and a drive towards comprehensiveness and elegance in explanation
6. High personal dominance and forcefulness of opinion, but a dislike of personally toned controversy
7. Rejection of conformity pressures in thinking (although not necessarily in social behavior)
8. A somewhat distant or detached attitude in interpersonal relations, though not without sensitivity in insight; a preference for dealing with things or abstractions rather than with people
9. A special interest in the kind of "wagering" which involves pitting oneself against the unknown, so long as one's own efforts can be the deciding factor
10. A liking for order, method, exactness, together with an excited interest in the challenge presented by contradictions, exceptions, and apparent disorder.  

In addition to the characteristics mentioned above, others that have been noted to exist in peculiar relationships to creativity are psychopathology, humor, and variables having to do with birth order and sex. The latter two categories will be dealt with in some detail in later chapters. As for the relationship between psychopathology and creativity, Barron admits to being fascinated by the eccentricities of some noted geniuses.

Images of...figures drifted through my mind: of the apocalyptic rages of Beethoven, the savage indignation of Jonathan Swift, the terrible loneliness of van Gogh, the criminality of Rimbaud, the stoical despair of Emily Bronte, the excruciating physical and spiritual pain endured by Heine. I felt distinctly uneasy: could it be that these creative people had been in need of psychotherapy?  

A superficial interpretation of clinical research done on personality correlates of creativity might have suggested that the answer to Barron's question should be "yes." But after closer analysis of this data, Barron suggests an alternate interpretation:

...one might be led to conclude that creative writers are, as the common man has long suspected them to be, a bit "dotty." And of course it has always been a matter of pride in self-consciously artistic and intellectual circles to be, at the least, eccentric. "Mad as a hatter" is a term of high praise when applied to a person of marked intellectual endowments. But the "divine madness" that the Greeks considered a gift of the gods and an essential ingredient in the poet was not, like psychosis, something subtracted from normality: rather, it was something added. Genuine psychosis is stifling and imprisoning; the divine madness is a liberation from "the consensus."
Thus, while creative people score high on some measures of psychopathology, they also score high on ego-strength. In regard to this unusual and paradoxical pattern, Barron concludes that,

If one is to take these test results seriously, creative individuals appear to be both sicker and healthier psychologically than people in general. Or, to put it another way, they are much more troubled psychologically, but they also have far greater resources with which to deal with their troubles. This jibes rather well with their social behavior, as a matter of fact. They are clearly effective people who handle themselves with pride and distinctiveness, but the face they turn to the world is sometimes one of pain, often of protest, sometimes of distance and withdrawal...

Barron does not attempt to explain how or why this apparent paradox develops. The latter part of the thesis will return to a consideration of this question, but for the moment it will merely be suggested that the "problems" which beset creative individuals are partly self-imposed and partly socially imposed. Further, this nexus of tension between self and society seems to be critical for the occurrence of creative products. This is one way, at any rate, of answering the question of why only some of the people possessing "creative personalities" actually utilize their abilities in the production of creative works.

Getzels and Jackson: Further Attempts to Separate Creativity and Intelligence

The best known single study of creativity and intelligence, and a prototype in design for several subsequent studies, is that done by J. W. Getzels and P. W. Jackson. Theoretically, their study was something of a fishing expedition, for they
state that,

We did not begin (as is our usual preference) with an explicitly stated theoretical framework and a set of formal hypotheses. Instead, we permitted the behavior of the children and our own interests, whatever their conceptual foundation, to lead us from problem to problem and from question to question.³⁰

Their research design essentially revolved upon a desire to demonstrate that the abilities of "creativity" and "intelligence" are not synonymous.

Our argument then is this. Giftedness in children has most frequently been defined as a score on an intelligence test, and typically the study of the so-called gifted child has been equated with the study of the single IQ variable.³¹

Originally, Getzels and Jackson set out to study "giftedness" in thirteen categories which in addition to intelligence, school achievement, and creativity also included such factors as energy level, sense of humor, morality and psychological adjustment. But after some preliminary experimentation, these thirteen categories were reduced to four: intelligence, creativity, morality, and psychological adjustment.

The setting for the study was a private school in the Chicago area. The majority of the students came from middle and upper middle class families, and the mean IQ for the school was 132. That their sample was rather atypical has thus been a recurrent criticism levelled at the Getzels and Jackson study. The composition of the final experimental groups consisted of the following:
1. The High Creativity Group. These were subjects in the top 20 per cent of the creativity measures when compared to students of the same age and sex, but below the top 20 per cent in IQ (N=26: 15 boys, 11 girls).

2. The High Intelligence Group. These were subjects in the top 20 per cent in IQ, when compared with students of the same age and sex, but below the top 20 per cent on the creativity measures (N=28: 17 boys, 11 girls).

Students who were high on both creativity and intelligence measures or low on both were deliberately excluded from the final sample, and this is another aspect of their research design that has received much criticism.

In terms of raw scores on the tests, Getzels and Jackson succeeded in separating two groups of students, although some critics have questioned just what factors they did distinguish, for statistically the intercorrelations among the creativity tests were low and of roughly the same order as the correlations between the IQ tests and the creativity tests. However, the most important findings of their study lay in other directions. One of the more striking was that although there was a 23-point difference between the "creative" and "intelligent" groups on the IQ tests, the mean difference between the two groups on standard achievement tests was only 1.27. Achievement, then, would appear to be a function of more than ability as measured by standard intelligence tests. Nor was motivation a distinguishing variable, for the two experimental groups again did not differ significantly from each other on this measure and did not differ from the total student body either.
Another startling finding of this study was that the teachers of these subjects did not particularly like highly creative students.

The data are quite clear-cut. The high IQ group stands out as being more desirable than the average student, the high creativity group does not. It is apparent that an adolescent's desirability as a student is not a function of his academic achievement. Even though scholastic performance is the same, the high IQ students are preferred over the average students by their teachers, the creativity students are not.³⁴

In addition to assessing intelligence and creativity differences between the students in their sample, Getzels and Jackson also tried to ascertain differences between them in other areas such as value structure, the kinds of fantasy and imaginative productions engaged in, humor, career aspirations, and parental and home environment. They found, for instance, that the high IQ group enjoys a comfortable agreement of opinion between themselves and their teachers on what personal values they should favor, these being the ones seen as leading to adult success. The high creativity group did not enjoy a similar meeting of minds with their teachers in regard to values or future occupational destinations.

As could be expected, the two groups also showed great differences in fantasy and imagination. The highly creative students displayed more stimulus-free themes, unexpected findings, humor, incongruities, and playfulness as well as a certain tendency towards violence. Reproduced below are two examples of responses to a picture stimulus test which was most
often perceived as a man reclining in an airplane seat on his return from a business trip:

The high IQ subject: Mr. Smith is on his way home from a successful business trip. He is very happy and he is thinking about his wonderful family and how glad he will be to see them again. He can picture it, about an hour from now, his plane landing at the airport and Mrs. Smith and their three children all there welcoming him home again.

The high creative subject: This man is flying back from Reno where he has just won a divorce from his wife. He couldn't stand to live with her anymore, he told the judge, because she wore so much cold cream on her face at night that her head would skid across the pillow and hit him in the head. He is now contemplating a new skid-proof face cream.  

Getzels and Jackson also explored in greater depth the differences between the high IQ and the high creative subjects in "character" and "adjustment." A general conclusion reached on this aspect is that,

The high IQ and the high adjusted groups hold in common qualities that are the reverse of those shared by the high creativity and high moral groups. If the moral and creative adolescents are outsiders, the adjusted and the high IQ adolescents are insiders. To be sure, their specific goals may differ, but both are participating in activities that are expected and approved by the social order. Both groups are moving with the tide.

The distinction between the creative "outsiders" and the intelligent "insiders" is critical, but Getzels and Jackson do not pursue it. A re-examination of this aspect will be considered in a later chapter. While both groups may be "moving with the tide," they could be seen as residing on different continents in terms of the forces and groups within the social order to which they respond.
Extensions and Replications of the Getzels and Jackson Study

Of the many studies that took off from the Getzels and Jackson experiment, one of the best known is that done by Michael Wallach and Nathan Kogan and reported in their book *Modes of Thinking in Young Children.* They review critically a great deal of the literature on the creativity-intelligence issue, and their conclusion is that none of these studies demonstrated a creativity factor as separate and distinct from intelligence.

The analysis of this discouraging conclusion, argue Wallach and Kogan, suggests two alternatives: that creativity is not a separate dimension from intelligence, or that the measurement procedures used in past research were ineffective because a too diffuse set of operations was defined for measurement. They settle on the second of these alternatives. The design of their study is predicated on the general tenets of associationist theory, and they use Mednick's definition of creativity: "the forming of associative elements into new combinations which either meet specified requirements or are in some way useful."

The sample used by Wallach and Kogan was drawn from the grade five class of a suburban New England school. They deliberately chose to limit the socioeconomic variable to children from white, Protestant, middle class homes and rationalized their decision on these grounds:
First, because this is the general group that has been the target population in most of the relevant previous research. Second, because the "middle" class is coming to constitute an ever-increasing segment of this country's population, thus making it the most relevant socio-cultural group for which to establish generalizations.³⁹

While such a limitation may be justifiable on the purely technical grounds of reducing the relevant variables and simplifying the statistical analysis, it does open up the question of how much "creativity" is related to class and cultural definition rather than to inherent individual qualities.

Using data from 17 tests administered to the final sample of 151 children, Wallach and Kogan subdivided their sample into four subgroups for each sex: high intelligence and high creativity, low intelligence and low creativity, high intelligence and low creativity, low intelligence and high creativity. Using these subgroups, Wallach and Kogan analyzed the results of behavior ratings made of all the children during two weeks of observation prior to the testing. The striking result of this analysis was that the difference between the sexes was outstanding.

The highly creative and intelligent girls behaved in ways indicative of high levels of "ego-strength," though there were signs of a lack of inhibition in the behavior of those subjects. The girls high in creativity but low in intelligence appeared to be having the most difficulty (of all the female subjects) in coping with the achievement and social demands of the school situation. Their academic motivation was low, and they were the most withdrawn and hesitant pupils in the classroom. For girls with high intelligence and low creativity, in turn, school apparently presents few problems despite evidence of some constriction in intellectual functioning and in interpersonal relationships. Finally, the girls low in both creativity and
intelligence appeared to be compensating for poor academic performance by seeking, with qualified success, for satisfactory personal outlets.

In the case of the boys, only intelligence effects were noted. The less intelligent boys manifested significantly lower levels of concentration and interest in academic work, and were considerably more intra-punitive than their highly intelligent peers. Such intrapunitiveness might be considered a typical outcome of poor academic performance in a middle class elementary school.\textsuperscript{40}

Thus, unlike the girls, the boys in the sample didn't show behavior differences that complemented the creativity-intelligence distinction. Wallach and Kogan only weakly suggest that "differential normative expectations for boys and girls in the achievement and affiliation areas might have contributed to the observed difference."\textsuperscript{41}

Three other areas which Wallach and Kogan investigated were modes of thinking (i.e., categorizing and conceptualizing) on a stimulus-object classification test, thematizing on a projective test, and motivational factors such as defensiveness and anxiety. The results of this part of the study were not entirely conclusive though interestingly suggestive, and again sex differences were found to be outstanding.

Shouksmith in summarizing the Wallach and Kogan study offers this evaluation if it:

...it represents not only the most comprehensive study of creativity and intelligence so far reported, but also has important theoretical and methodological implications. Theoretically, Wallach and Kogan have shifted the emphasis once more. In their conception we are dealing not with separate "faculties" of the mind, not with distinct factors, but simply modes of thinking. Creative and intelligent modes of thinking reflect different cognitive styles, different thematizing modes, and as such may fruitfully be considered together.\textsuperscript{42}
A second researcher to follow up the Getzels and Jackson lead is Liam Hudson. A major criticism he makes of their study, however, is the somewhat ill-defined use of terms:

Getzels and Jackson talk of "High Creatives", and of "creativity" tests, and this seems unwise: in fact, worse than unwise, positively tendentious... do people who are creative in the normal sense of the word (great scientists, writers, painters, and so forth) score unusually well on these tests, or not? If they do not, describing them as "creativity" tests is bound to mislead -- the psychologists not least. In fact, neither Getzels and Jackson nor anyone else, has yet produced evidence that could begin to justify the claim implicit in such nomenclature.43

Hudson chooses instead to talk about "open-ended" tests, and he also prefers Guilford's terms converger and diverger. In addition, he classifies the majority of people as "all-rounders", those who score high or low on both kinds of tests.

As a matter of convenience, I define 30 per cent of my usual schoolboy sample as convergers, 30 per cent as divergers, and leave the remaining 40 per cent in the middle as all-rounders.44

He does not see creative production as being the exclusive property of any one of these groups, however, and in this connection points out

...that original work will come from convergers and divergers alike;... the convergence or divergence of an individual will determine not whether he is original but, if he is original, the field and style in which his originality will manifest itself. The roots of his originality lie... not in his convergence or divergence, but in other aspects of his personality.45

There is no question of the research value of Hudson's work, but it may be that his most admirable contribution is the fact that he practices in his style of writing the creativity
he writes about. With iconoclastic abandon, he throws buckets of cold water right and left at the musty theories, fussy statistics, and inflated or far-fetched interpretations frequently made in the name of "creativity."

The Epistemological Approach of Jean Piaget

The research on intellectual functioning that has come out of the Geneva laboratory of Jean Piaget stands uniquely and distinctly apart from the perspectives discussed so far. Although the impact of Piaget's work has probably not been as widespread in North America as that of Guilford, it has had a profound influence on its smaller target area. Unlike most of the researchers who seem to be primarily concerned with the accumulation of data, Piaget has also attempted to analyze and understand knowledge itself. Thus, he is not content merely to measure intelligence and manipulate methodology without also attempting to come to terms with the epistemology of his interest area. For some, since Freud "he is the greatest figure to emerge in the young science of psychology."46

Having received his initial training as a biologist, Piaget bases his theory firmly on the potentials and limitations of the biological and genetic foundations of both individual and species. But unlike the Galtonian tradition, Piaget does not address himself to the issue of genetic manipulations; nor does he see intellectual development as being amenable to special training or direction. The interpretation generally
made of his theory is that the environment may serve to deprive or delay the child in his progression through the normal stages of development, but it cannot promote more than normal development.

As a result of his studies and experiments with children, Piaget's theory about the development of intelligence posits a sequence of changes and achievements that occurs in the same order in all children in all cultures, though not necessarily at the same chronological ages. Reduced to a basic format, this sequence of development occurs in three succeeding phases, beginning at birth and ending in mid-adolescence around the age of 15.

Central to this paradigm of development are the notions of assimilation, accommodation, and adaptation. The individual interacts with the environment so that he both incorporates elements and structures of it into his perceptual and behavioral patterns (assimilation) as well as modifying his own behaviors in accord with the environment (accommodation). These opposing pressures are mediated through the mechanism of adaptation which is "an equilibrium between assimilation and accommodation." 47 It is the tension between assimilation and accommodation that allows the individual to learn and develop as he works towards accomplishing an adaptation between himself and the environment.

Another important feature underlying Piaget's theory is his conception of how subsequent developments relate to each
other. The accomplishments of one state are not discarded to be replaced by more refined or mature accomplishments, but they are combined. Piaget's assumptions thus include the physical laws of conservation: nothing is ever lost in a system.

In a general way, the fact should be emphasized that the behavior patterns characteristic of the different stages do not succeed each other in a linear way (those of a given stage disappearing at the time when those of the following take form) but in the manner of the layers of a pyramid (upright or upside down), the new behavior patterns simply being added to the old ones to complete, correct or combine with them. Thus the acquisition of intelligence occurs through the restructuring of perceptual, conceptual, and operational achievements at increasingly complex levels.

The behavioral schemata of development are outlined by Piaget in three major stages. The first stage he calls sensorimotor, and as the term suggests, the main activities of this period are concerned with the growth of neural and muscular abilities. Piaget sees this stage as the most critical since it establishes the foundations for future development:

...it is during this time that the child constructs all the cognitive substructures that will serve as a point of departure for his later perceptive and intellectual development, as well as a certain number of elementary affective reactions that will determine his subsequent affectivity.

The skill-behaviors accomplished by the child during the first eighteen to twenty-four months can be divided into six substages. The first four are concerned with the establishment of reflex and reaction patterns of increasing complexity. It is stages five and six which are the most critical in terms of creativity. Stage five concerns the discovery of new means
through active experimentation; the central principle of this stage is that the baby begins to experiment for the sake of experimentation; that is, he learns that experimentation can produce new, interesting, useful, or desirable things. Stage six is achieved when the child masters the invention of new means through mental combinations. At this point the child can not only solve problems, but he can also create them.

...all writers...agree that there exists an essential moment in the development of intelligence: the moment when awareness of relationships is sufficiently advanced to permit a reasoned prevision, that is to say, an invention operating by simple mental combination.

We are constantly confronted by the most delicate problem which any theory of intelligence has to treat: that of the power of invention. Hitherto the different forms of intellectual activity which we have had to describe have not presented particular difficulties of interpretations. Either they consisted in apprenticeships during which the role of experience is evident, or else they consisted in simple application of the familiar to the new. In both cases, thereafter the mechanism of adaptation is easy to explain and the play of assimilations and of primitive accommodations suffices to explain all the combinations. On the other hand, as soon as real invention arises the process of thought baffles analysis and seems to escape determinism.50

As this quotation would suggest, Piaget did not see creativity as an ability distinct or separate from intelligence. In his conception, intelligence "is essentially a system of living and acting operations."51 As a structuralist, Piaget is most concerned with the relationships between the elements in a system, not in just identifying the elements themselves. Behavior must be analyzed in the context of environment acting on innate and acquired qualities of an individual. Intelligence is embodied in interaction.
...viewed as a whole it takes the form of a structur-
ing which impresses certain patterns on the interaction
between the subject or subjects and near or distant
surrounding objects. Its originality resides essentially
in the nature of the patterns that it constructs to
this effect.\textsuperscript{52}

The second major stage of development, which Piaget calls
the pre-operational stage, usually appears around the age of
two years. The chief characteristic of this period is that
the child increasingly develops and refines symbolic thinking
skills.

At about 11 years, the child enters the last stage of
development, the formal operations stage. During this period
his intellectual activity is concerned with the manipulation
of symbolic and abstract propositions, and by the time he is
about 15, he has acquired all the necessary pre-requisite skills
for both solving and generating problems.

The question of how the transition between developmental
levels occurs is explained by Piaget as the interaction between
four factors:

...first of all, maturation, in the sense of Gesell,
since this development is a continuation of the
embryogenesis; second, the role of \textit{experience} of the
effects of the physical environment on the structures
of the intelligence; third, \textit{social transmission} in the
broad sense (linguistic transmission, education, etc.);
and fourth, a factor which is too often neglected but
one which seems to be fundamental and even the principal
factor. I shall call this factor of \textit{equilibration} or
if you prefer it, \textit{self-regulation}.\textsuperscript{53}

The term "equilibration" is used by Piaget in a cybernetics
sense: "in the sense of processes with feedback and feedforward,
of processes which regulate themselves by a progressive compen-
While equilibration functions to keep maturation, experience, and social transmission operating in relationship to each other, it is also important as a means for providing reversibility (or temporary regression) which to Piaget is a structural necessity for any system. In the practical sense, equilibration also serves as a targeting mechanism which permits the individual to proceed developmentally at a pace that allows him to master each stage before proceeding to the next.

The main criticisms directed against Piaget have concerned his inattention to the differences in ability that can be observed between individuals and to pathological disruptions or distortions of the sequence that might occur. Mainstream American psychologists have generally avoided his theory, perhaps because it is not couched in factor analytic methodology. Paradoxically, however, recent Nobel prize-winner Konrad Lorenz is said to have objected to Piaget as "one of those tiresome empiricists." The one point on which most readers of Piaget agree, however, is that his writings are difficult in terms of both "assimilation" and "accommodation." As Butcher puts it, "Even Piaget's most devoted followers rarely claim that he is a very lucid expositer of his own ideas."

Critique

A great deal of new information about individuals and their intellectual properties has been uncovered by such
studies as those discussed in the preceding pages. But this information is voluminous, fragmented into small units of study, statistically shakey, and worst of all, often contradictory.

For the empiricists the most frustrating problems have been the contradictions and statistical inadequacies. One notable example of this is the line of research begun by Getzels and Jackson. Even within their own study, they could not distinguish very satisfactorily between creativity and intelligence in statistical terms. Further, when the achievement scores between the two groups were compared, there was still little difference. Thus, though they added some valuable information to the fund of knowledge on creativity, their main objective of demonstrating that creativity and intelligence are distinct variables was not achieved.

Nor have the replications of the pioneering Getzels and Jackson study shed much light on this foggy scene. As already pointed out, Hudson could not distinguish his sample of English schoolboys along the dimensions established by Getzels and Jackson, and Hasan and Butcher also failed with their sample of Scottish children. Other unsuccessful replications that could be pointed to are those using ordinary public school children in the United States tried by Ripple and May and Edwards and Tyler.

Given the inconclusiveness of the sum total of studies done in an attempt to separate creativity from intelligence,
it seems doubtful that such a distinction is useful much less justified either empirically or theoretically. Why, then, has this distinction been made in the first place, and why has it been maintained so doggedly in the face of so much conflicting evidence? The answers to these questions must necessarily be very complicated and to pursue them to the last letter would be a lengthy digression. But they are important questions none the less -- too important not to examine at least briefly.

In the history of ideas about intellectual functioning, the creativity-intelligence dichotomy is quite recent, appearing only with the psychometric era. Thus, this distinction can be seen to be related at least in part to the general hair-splitting tendency prevalent in recent psychological research that has been made possible by the development of a multitude of measuring instruments and sophisticated computer analysis.

The vested interests of the empiricists in maintaining this dichotomy are relatively unimportant, however, compared to the social and cultural forces shaping not only the empirical approaches but also the general social perspectives. For instance, intelligence is commonly associated with a high level of knowledge generally and educational achievement specifically. Empirical studies of "intelligence" in school contexts have strengthened this association, especially when such studies have used the operational definition "intelligence
is what intelligence tests measure." What intelligence tests seem to measure, however, is school achievement but not necessarily innate ability. To that extent, intelligence tests measure how well the individual conforms in achieving those skills and concepts which have been defined as "correct" or important by the society generally and by school curricula in particular. Intelligence measures are thus indicators of narrow content accumulation, not of broad processes. Within this perspective, intelligence is judged to be high when it is exhibited in responses and behaviors that have been defined as "correct", that are anticipated as socially consistent, and hence that are valued positively by the society. As such, intelligence is a measure of conformity to social norms.

Creativity, on the other hand, is by definition non-conformity. It is said to occur only in connection with something that is unexpected and different from what already exists. But creativity is not bizarre nonconformity, for the creative product must be relevant, rational, and hence of value. To that extent, creativity must be "intelligent" since the products are acceptable though unanticipated.

It can be argued, of course, that behaviors other than "creative" are nonconforming, and that highly conforming behavior is not necessarily an indication of superior "intelligence." Madness is one example of nonconformity that is not "creative", and mentally deficient individuals may be highly conforming in certain respects. The critical
determinants that distinguish the conforming idiot and the nonconforming madman from "intelligent" and "creative" individuals are social value and the range of the behavior pattern. The conforming idiot has only a limited repertoire of behaviors that fulfill social expectations, and those that he does achieve are not usually invested with a great deal of social value. The "creative" individual, however, has an extensive range of behaviors, some of which will conform to social norms and expectations and some of which will be nonconforming. It is important, however, that the nonconforming behaviors or products of that behavior be deemed relevant and hence valuable to the society. A non-relevant nonconformity will be disregarded by the society or may be classified as "insanity." However, a negative social reaction to a nonconforming behavior is not necessarily an indication that that product is not relevant or valuable; a negative reaction may express strong resistance to a novelty that is, in fact, pointedly relevant and hence threatening to the status quo. But this aspect will be dealt with at greater length in a later chapter.

The fundamental problem now becomes clear: how does society contain individuals who are "intelligent" and "sane" but nonconforming? A special category labelled "creativity" is one answer, for such a category can then be institutionalized with a different set of expectations. If creativity and intelligence are judged not in terms of the products themselves but
in terms of the effect on society of those products, then creativity can be said to be simply nonconforming intelligence. The dichotomy is not, then, an intrinsic difference between behavioral elements, but an extrinsically different structural relationship with the larger society.

The conceptual level of the problem has been blurred also by the fact that most of the attention has been focussed on the behavioral products or process rather than on the interaction between individuals and their social context. Theoretically, perhaps Piaget's concept of an integrated structure of operational schemata and personality dispositions is the most fruitful for explaining both intelligence and creativity as a process that enables the individual to understand and deal with the world. How society in turn deals with the individuals and products associated with this process is, as has just been argued, another issue. It is an issue which has been generally neglected in the literature of creativity but which will be highlighted in the pages to follow.
Chapter 2: Notes


7. Ibid., p. 66.

8. Ibid., p. 41.


11. Ibid.


15. Butcher, op. cit., p. 60.


31 Ibid., pp. 6-7.

32 Ibid., p. 20.

33 Ibid., p. 29.

34 Ibid., p. 30.


36 Ibid., p. 158.


40 Ibid., p. 94.

41 Ibid.


43 Liam Hudson, op. cit., p. 51.

44 Ibid., p. 55.

45 Ibid., p. 159.

46 Butcher, op. cit., p. 181.


48 Ibid., p. 329.


52 Ibid., p. 167.


54 Ibid., p. 14.

55 Butcher, op. cit., p. 183.

56 Ibid., p. 182.


59 Meredith Payne Edwards and Leona E. Tyler, "Intelligence, Creativity, and Achievement in a Nonselective Public Junior High School", *Journal of Educational Psychology*, vol. 56 (1965), pp. 96-99.
In the study of brain functions we rely upon a biased, poorly understood, and frequently unpredictable organ to study the properties of another such organ; we have to use a brain to study a brain.

W. C. Corning

CHAPTER 3: THE MICRO-STRUCTURE OF CREATIVITY

If creativity is defined as nonconforming intelligence, the question arises as to whether non-intellectual aspects of creative individuals are also "nonconforming". That is, in what respects are creative people like or unlike the "average" population? Further, how much are they like each other? Are there detectable patterns of childhood experiences, personality traits, thought processes, or any other factors that are characteristic of creative people as a group? The horizon of inspection can be expanded even more to include cultural or racial factors as they are associated with creativity, and the intertwinnings of historical, social, political, and economic influences are also important. This chapter will focus on the microstructure of creativity, that is, at the level of specific structures, mechanisms, operations, and individuals. The next chapter will follow a more generic perspective in examining the social, cultural and historical factors affecting the creative productivity. The chapter following this macro-structural analysis will explore in greater depth the interface between the generic environment and the specific ambiance.
The micro-structure of creativity is, for the sake of convenience, usually subdivided into four compartments of more manageable size. These compartments are usually labelled in some variation of the following themes of emphasis: Product, Process, Person, Environment. Product has already been dealt with in the "Introduction"; Process, Person, and Environment have also been touched generally in the empirical and theoretical zones, but the rest of this chapter will be concerned with looking more specifically at these last three compartments. The following overview is, however, intended only to highlight a few aspects of this big and complex field.

PART I: PROCESS

Neurology: The Potato-Peeling Machine

If young children are asked to invent a potato-peeling machine they draw a winding tube through which a string of potatoes is seen travelling towards a simple box with the explanatory note, 'In here the potatoes are peeled.' Another tube carries the peeled potatoes away. There is nothing mysterious about the box, it just performs the potato-peeling function. One takes it for granted that that is the function of the box and that somehow the function gets carried out.¹

There is an uncomfortable similarity between de Bono's potato-peeling machine and the creative process: nobody really knows exactly what happens inside "the box". The mystery remains unsolved not for lack of trying, however. Approaches to explanation have generally been made from one of three directions: the "scientific" research on the brain and nervous system, "subjective" third-person observations, and "intro-
Neurological research has been carefully and painstakingly pursued on several fronts. There are the usual divisions according to academic discipline -- the chemists, biologists, physicists, physiologists, etc. each approaching the problems with different techniques and theoretical perspectives. In addition, there is a tradition of isolating some particular aspect of structure and/or function such as perception, memory, learning, etc. and of focusing on that. As the activities of "normal science" fill in the gaps in the various disciplinary paradigms, there is an increasing tendency for cross- or multi-disciplinary research which is beginning to yield even more dramatic results.²

Simplified descriptions of neurological structure and functioning usually draw analogies with machinery. The brain is described as a "super-computer" or a "telephone exchange" with a "storage bank" and "switchboard" that handle information sent over the "wires" of the nerve fibers and in turn "transmit" messages back to other parts of the machine.³ Beyond that level of explanation, however, the machine analogy becomes insufficient.

Some aspects of this complex organ are understood better than other aspects. It is known, for instance, that information arrives in the brain in the form of electrochemical impulses generated when the concentration of sodium ions normally outside the axon (nerve fiber) flow inside and change places with
the potassium ions which are normally concentrated on the inside of the fiber. The change in the permeability of the axon sheath that allows this exchange lasts less than a millisecond, but it is not known precisely what produces this change. Once this electrochemical activation is started, however, it sweeps along the entire circuit of that neuron network in an all-or-nothing impulse or "firing". It is also known that some of the neuron networks operate something like a closed-loop, and these are called reverberating circuits; other networks seem to be more open or linear in their linkages with other circuits.

It has been calculated that within the brain itself, there are something like ten or twelve billion nerve cells, or neurons, each of which has connections, or synapses, with other neurons. The intricacy and complexity of the neurons and their synapses is staggering.

There is evidence that the number of synapses in the mammalian cerebral cortex exceeds the number of neurones by a factor of something like $10^4$, and that one neurone on average has synapses on at least $10^2$ other neurones. Such a complex structure is virtually inconceivable except in mathematical terms, but it is this very complexity which is the basis for creativity. The route to creativity, according to one distinguished neurologist, "lies through the lower levels of sensory experience, imagery, hallucination and memory." Although all aspects of neurological functioning are involved in producing creative or other kinds of behavior, memory and its ramifications are particularly important.

Scientific research on memory began in the mid-nineteenth
century. A critical early step was the postulation of the concept of the engram as a chemical material trace of memory. K. S. Lashley established the foundations of the paradigm based on the engram in a series of studies begun in the 1920's. His original goal was to find the specific location of the engram in accordance with the early behavioristic theories of Pavlov and J. B. Watson, but his research eventually led him to conclude that memory was a diffuse process rather than a physiological storage of something in a discrete brain location. In fact, he generalized even further to conclude that the brain always functions as a totality, never in separate units of behavioral responsibility.

The conclusions is justified, I believe, . . . that all of the cells of the brain are constantly active and are participating, by a sort of algebraic summation, in every activity. There are no special cells reserved for special memories.7

With Lashley's work, there began to be a widening rift between the two main approaches to explaining memory, the biochemical and the physiological. The tradition with which Lashley began -- that the explanation of memory would be found in terms of physiological structures -- has been continued by such well-known scientists as D. O. Hebb and Sir John Eccles.

Reduced to a nutshell, the basic concepts pursued by those of the physiological school are that memory and learning are the result of structural changes occurring at the synapse between neurons. The exact nature of these changes is not agreed upon, however. One possibility is that the synaptic knob (i.e., the
point of contact on an axonal dendrite in association with another neuron) either becomes enlarged or achieves a closer contact with its dendrite. Another explanation is that activation of a synapse increases its efficacy, and the more often that synapse is activated, the more enhanced its efficacy.

Hebb in pursuing both these possibilities used the theory of reverberating circuits. A reverberating circuit is a closed loop network of neurons which forces the nerve impulse to travel around and around the same circuit. Later scientists, however, have diminished the importance of the role played by the reverberating circuits in complex intellectual activity as no longer tenable.

That structural changes do occur with memory has been well demonstrated, though. In studies focusing on development and growth, for instance, the Soviet scientist Ivanitskii found Piaget-like developmental levels of brain maturation in regard to the conditioning of responses through different senses.

Using newborn rabbits as his experimental subjects, the structural changes he found to have occurred with each level of maturation were evidenced by the number of dendrite connections and the amount of ribonucleic acid (RNA) in the cytoplasm and nucleolus in the appropriate parts of the brain.

Research on RNA and its involvement with memory has led to a certain convergence between the physiological and chemical lines of thought. Recent work by Holger Hyden has opened up this new approach. Hyden postulated that RNA stored in a
coded pattern an organism's "personal memories" in a way similar to the manner in which DNA stores an organism's "genetic memories". A dramatic and highly publicized set of experiments performed on the basis of this concept have been those of McConnell and his associates using flatworms called planarians. Experiments on "the cannibalistic transfer of training" (privately dubbed the Mau Mau Hypothesis) involved training planarians to perform a simple task and then rewarding them for their efforts by cutting them into pieces. These pieces were then fed to untrained planarians who, after their meal, were found to learn the same training task much more quickly than their uncannibalistic cohort. Later experimentation yielded similar results when only the RNA was collected and transferred from trained to untrained planarians, thus leading McConnell to favor the notion that a particular and specific engram is contained and passed on in the RNA code rather than merely a general tendency towards a particular response. Although research on planarians is obviously not generalizeable to human structure and behavior on a number of levels, one potent implication of these findings is a little scary.

If "coded" RNA is indeed Nature's "transfer agent," and if we discover what the code is, we may eventually be able to implant some types of knowledge directly into the human brain by injection of suitable "memory molecules." 

In spite of all that has been written by scientists about engrams, relatively little is accepted as "certain". And even
the apparent "certainties" are often couched by cautious scientists in terms of heuristic speculation. It is not the nature of engrams that is most relevant to creativity as the ways in which they act and interact. In abstract or complex intellectual activity, many engrams or wavefronts of nerve impulses interact together, sometimes in a chain reaction as in simple associations, and sometimes in divergent intersections of different networks. Especially important is the evidence suggesting that these patterns or engrams do not remain constant in their composition. As Eccles explains, "because of continued replaying and interaction with intersecting patterns, the 'congealed' engrams will be continuously changing, growing new branches and shedding others." It is probable, furthermore, that individuals vary in the degree and rate of change in these patterns as well as in different levels of elaboration or complexity.

The Mind-Body Interface

Much of the literature on the various facets of cognition unfortunately reflects the troublesome "mind-body split" perpetuated by the mutual isolation of C. P. Snow's "two cultures". While it may not be possible or even desirable to explain mind in terms of body or vice-versa, it is nevertheless important to understand both and to strengthen the interface zones between them. Thus, it is important to understand the structure and operation of the brain and nervous system
during intellectual activity as well as attempt to explain why certain creative products (instead of others equally possible) occur when and as they do. Eccles has made a hesitating step in this direction with his pre-requisites for imagination:

... an adequate number of neurons, having a wealth of synaptic connection between them. ... The synapses of the brain should also have a sensitive tendency to increase their function with usage, so that they may readily form and maintain memory patterns. ... a peculiar potency for unresting activity, weaving the spatio-temporal patterns of engrams in continually novel and interacting forms. ...\textsuperscript{15}

Beyond the structural and functional pre-requisites, it is also necessary to have problems that need solving. Eccles speculates that the "problems" may result from "some failure in the synthesis of the engrams or some conflict in their interrelationship. ...\textsuperscript{16} Having isolated a problem requiring creative insight,

We may surmise that the "subconscious operation of the mind" involves the intense and unimaginably complex interplay of engrams. We have seen that on repeated activation there tends to be a progressive change in their congealed patterns resulting particularly from interaction with other patterns. Thus we can expect that new patterns will arise during the subconscious phase of the effort. Should an emergent pattern combine and transcend the existent patterns, we may expect some resonant-like intensification of activity in the cortex, which will bring this pattern to the conscious attention. There it comes to light as a new idea.\textsuperscript{17}

Although he approaches the chasm between mind and body, Eccles refuses to make the risky leap across it as his use of quotation marks around the phrase "subconscious operation of the mind" shows. Like many natural scientists, he is profoundly
uncomfortable with "soft" terms like mind and subconscious. Most scientists working on problems related to the nervous system manage to avoid such "unscientific" terms or concepts by narrowing their research to such specialized areas of structure or function that they never bump up against them, even accidentally. Others (J. B. Watson being a notable example) cope with the problem by insisting that "mind" does not exist, or they substitute other terms for the uncomfortable ones. Overton, for instance, deals with "the troublesome concept of consciousness" by suggesting that "insight" and "attention" be used in place of "consciousness" and "awareness" and then happily concludes that "Scientifically speaking, psychologists can get along fairly well without mentioning consciousness."19

Avoiding the issue, however, does not bury it, and "the ghost in the machine" continues to haunt scientific investigations, especially those that claim to have access to the secrets of the brain. One scientist who has dared to confront the problem is the biologist Seymour Kety.20 Although he admits that consciousness will probably never be demonstrated by a physiochemical model, it is nevertheless a valid component of behavior. One can, he says, explain the perception of a blue sky on a clear autumn day in terms of wave lengths and impulses and chemical exchange, but that does not explain the sensation of "blueness": 
One does not seem to get closer to its nature by increasing the complexity of its material counterpart — it is qualitatively and dimensionally different. . . . A machine can be built to perform any function that a man can perform in terms of behavior, computation, or discrimination. Shall we ever know, however, what components to add or what complexity of circuitry to introduce in order to make it feel?21

The topic of creativity obviously, then, cannot proceed much further without reference to affective states of behavior. Indeed, much research evidence has indicated how dependent people -- all people, "creative" or not -- are on their conscious and subconscious sensations, images, and emotions. To ignore or deny the importance or existence of mental states is, as Kety warns,

... needlessly to restrict the field of mental sciences and to curtail the opportunities for the discovery of new relationships.... Nature is an elusive quarry, and it is foolhardy to pursue her with one eye closed and one foot hobbled.22

The preceding short and highly selective review of brain structure and operation still has not disclosed the details of the mechanism inside the "potato-peeling machine". In the area of neurology, as in most scholarship, it sometimes seems that as the data and theories grow in number and complexity, the undisputed "facts" diminish proportionately. Indeed, even the most rigorous of scientists will sometimes admit that their models are essentially drawn much as the narrator in Antoine de Saint Exupery's all-ages fairy story The Little Prince drew a picture of a sheep. Three attempts to draw sheep were rejected by the little prince for one reason or another. Finally, in
exasperation the narrator drew a box with a peep-hole in one side and explained:

"This is only his box. The sheep you asked for is inside."

I was very surprised to see a light break over the face of my young judge:
"That is exactly the way I wanted it!"\(^2\)

Whether it is a neurological model or a picture of a sheep, the eye at the peep-hole will perceive what it is predisposed to expect inside.

A Model of the Creative Process

Descriptions of neurons and impulses and engrams, though technically explicit, say little that can be related experientially to the process of living a creation. G. Wallas\(^2\) is usually cited as the first to develop an experiential model for that purpose.

...if we take a single achievement of thought -- the making of a new generalization or invention, or the poetical expression of a new idea -- and ask how it was brought about...we can then roughly dissect out a continuous process, with a beginning and a middle and an end of its own.\(^2\)

Wallas's model outlined four stages in the formation of a new thought: Preparation, Incubation, Illumination, and Verification. Other analyzers of the process\(^2\) have tended to produce very similar models. As Wallas describes them, these four stages are constantly at work, regardless of the topic or problem of mental activity. His observation of unceasing activity fits well with the neurological data outlined previously. According to his scheme, Preparation and Verification,
the first and last stages, are primarily consciously directed behavior; the middle two stages, Incubation and Illumination, are primarily unconscious activity.

Wallas defines Preparation as "the whole process of intellectual education." It is the background training and experiences that provide the person with the raw material and skills necessary for realizing a creative product. In neurological terms, Preparation might also be viewed as the period when particular engram patterns are first established. During Verification, once again the creative person works deliberately and consciously to refine, elaborate, and finish off the fine details of his idea.

But consciously directed thought cannot do the whole job, and it is the middle two stages that take over where Preparation leaves off. During Incubation the individual withdraws from his problem and puts it "in the back of his mind" where it "soaks" as the engram activity freely spreads in new directions. Wallas describes this brain activity as "a series of unconscious and involuntary (or foreconscious and forevoluntary) mental events..." While one problem is incubating, the individual may be actively working on other problems, or he may be resting and relaxing from all intense intellectual activity. Such a withdrawal for incubation is seen by Wallas to be absolutely necessary:
...in the case of the more difficult forms of creative thought, the making, for instance, of a scientific discovery, or the writing of a poem or a play or the formulation of an important political decision, it is desirable not only that there should be an interval free from conscious thought on the particular problem concerned, but also that that interval should be so spent that nothing should interfere with the free working of the unconscious or partially conscious processes of the mind.29

The end of the Incubation period is marked by the Illumination of the idea or answer to the problem. Illumination is characterized by occurring suddenly and strongly and is sometimes described as a "flash of insight" in which the entire solution, idea, or goal is comprehended in its entirety. Following the Illumination, Verification requires the individual to work out the various subordinate elements of the idea and their relationships to each other as well as to the whole.

Underlying the four stages of his model, Wallas also posits two necessary operational mechanisms. The first is that the four stages always occur in the same succession. Second, different problems are worked on at all times, and the phases of these various problems overlap each other.

In the daily stream of thought those four different stages constantly overlap each other when we explore different problems. An economist reading a blue book, a physiologist watching an experiment, or a business man going through his morning's letters, may at the same time be 'incubating' on a problem which he proposed to himself a few days ago, be accumulating knowledge in 'preparation' for a second problem, and be 'verifying' his conclusions on a third problem. Even in exploring the same problem, the mind may be unconsciously incubating on one aspect of it, while it is consciously employed in preparing for or verifying another aspect.30
The Personal Experience

An introspective report on the occurrence of the creative process that clearly exemplifies Wallas's model -- indeed, Wallas refers often to this same account -- has been set out by the mathematician Henri Poincaré in a description of how he developed the Fuchsian functions. Although the full account is long, it is worth reproducing here since it shows so clearly the process as outlined by Wallas.

For fifteen days I strove to prove that there could not be any functions like those I have since called Fuchsian functions. I was then very ignorant; every day I seated myself at my work table, stayed an hour or two, tried a great number of combinations and reached no results. One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, to make a stable combination. By the next morning I had established the existence of a class of Fuchsian functions, those which come from the hypergeometric series; I had only to write the results, which took but a few hours.

Then I wanted to represent these functions by the quotient of two series; this idea was perfectly conscious and deliberate; the analogy with elliptic functions guided me. I asked myself what properties these series must have if they existed, and I succeeded without difficulty in forming the series I have called theta-Fuchsian.

Just at this time I left Caen, where I was then living, to go on a geologic excursion under the auspices of the school of mines. The changes of travel made me forget my mathematical work. Having reached Coutances, we entered an omnibus to go some place or other. At the moment when I put my foot on the step the idea came to me, without anything in my former thoughts seeming to have paved the way for it, that the transformations I had used to define the Fuchsian functions were identical with those of non-Euclidean geometry. I did not verify the idea; I should not have had times as, upon taking my seat in the omnibus, I
went on with a conversation already commenced, but I felt a perfect certainty. On my return to Caen, for conscience' sake I verified the result at my leisure.

Then I turned my attention to the study of some arithmetical questions apparently without much success and without a suspicion of any connection with my preceding researches. Disgusted with my failure, I went to spend a few days at the sea-side, and thought of something else. One morning, walking on the bluff, the idea came to me, with just the same characteristics of brevity, suddenness and immediate certainty, that the arithmetic transformations of indeterminate ternary quadratic forms were identical with those of non-Euclidean geometry.

Returned to Caen, I meditated on this result and deduced the consequences. The example of quadratic forms showed me that they were Fuchsian groups other than those corresponding to the hypergeometric series; I saw that I could apply to them the theory of theta-Fuchsian series and that consequently there existed Fuchsian functions other than those from the hypergeometric series, the ones I knew. Naturally I set myself to form all these functions. I made a systematic attack upon them and carried all the outworks, one after another. There was one however that still held out, whose fall would involve that of the whole place. But all my efforts only served at first the better to show me the difficulty, which indeed was something. All this work was perfectly conscious.

Thereupon I left for Mont-Valerian, where I was to go through my military service; so I was very differently occupied. One day, while going along the street, the solution of the difficulty which had stopped me suddenly appeared to me. I did not try to go deep into it immediately, and only after my service did I again take up the question. I had all the elements and had only to arrange them and put them together. So I wrote out my final memoir at a single stroke and without difficulty.\[31\]

The creative process as described by Wallas and Poincaré seems to approach something like a universal experience, at least in Western culture. Not only have the Einsteins, the Picassos, and the Nietzsches of history reported such events
and feelings, but the everyday housewife, insurance agent, and cattle rancher have also reported them in their own realms of living, not as Ideas of the Ages perhaps, but as personal illuminations nevertheless.

If each of these stages is examined more closely, it is possible to spell out fairly explicitly what happens during the creative process. The necessity for a preparation stage is obvious; as the cliche of the computer world puts it, "Garbage in, garbage out." If there are no skills, knowledge, or aptitude in the area of endeavor, or if these preparations are inadequate, then there is likely to be no creative result. Mastery of all possible specialized knowledge or skills is not necessary, however, for as Thomas Kuhn has pointed out, there is some advantage in being generally knowledgeable but not overly specialized when it comes, for instance, to the creation of new scientific paradigms:

Almost always the men who achieve these fundamental inventions of a new paradigm have been either very young or very new to the field whose paradigm they change.32

Stated in other terms, fully successful socialization into the assumptions, techniques, goals, procedures, and general perspectives of a particular theory, or model can blind the thinking mind to other possibilities -- possibilities which when ripened into certainties appear in retrospect to have been so obvious. Rosamond Harding echoes this observation when she says,
new discoveries and inventions resulting, as they frequently do, from the coalition of ideas gathered from widely different subjects, knowledge outside and beyond the chosen profession is a considerable asset towards the achievement of the new and original.\textsuperscript{33}

The notion of a "coalition of ideas" is used by Arthur Koestler as the basis of his theory of creativity. Koestler sees the preparation stage, for instance, in terms of acquiring "matrices" of abilities, habits, or skills which are ordered according to "codes" of rules and "strategies" of usage. Creative thinking results when the person invokes more than one matrix:

...thinking which remains confined to a single matrix has its obvious limitations. It is the exercise of a more or less flexible skill, which can perform tasks only of a kind already encountered in past experience; it is not capable of original, creative achievement.\textsuperscript{34}

Probably of more importance to creativity than skill or talent, however, is motivation. The particular sources and goals of their drive or motivation are different for different individuals, but the trait has been observed to be very strong in virtually all who have become recognized for their creativity. Barron has pointed out this characteristic with particular regard to creative writers:

Our work with writers has led me to believe that there are many, many persons who have just as much technical potential as the creative writers who came to our attention, yet who do not write. In this, as in other kinds of hard work, one must want to do it...\textsuperscript{35}

This motivation to "create" or "accomplish" is often highlighted in the romantic portrayals of creative genius enduring crippling privations and social odds to produce a Great Work.
Beethoven, for instance, persevered in spite of deafness and John Milton in spite of blindness; Karl Marx, Bela Bartok, and François Villon suffered the worst of poverty and still produced original works; extreme ill-health (to the point of death, in some cases) did not prevent John Keats, Thomas Hobbes, or Chopin from exercising their creative potential either. The catalogue could go on for pages, but this brief list is only an example of some of the data that has coalesced into the realm of traditional myths about innovators and creators. The possibility that it is not mere accident or bad luck that creativity is frequently accompanied by suffering will be explored later, however.

A final aspect of the preparation stage to be considered here is the initial concept of a possible project. Not uncommonly, the germinal conception is described as having come unbidden rather than consiously sought. Samuel Butler once expressed this sense of being caught and compelled by an idea:

I did not want to write Erewhon...I wanted to go on painting and found it an abominable nuisance being dragged willy-nilly into writing it. So with all my books -- the subjects were never of my own choosing; they pressed themselves upon me with more force than I could resist. If I had not liked the subjects I would have kicked and nothing would have got me to do them at all. As I did like the subjects and the books came and said they were to be written, I grumbled a little and wrote them.36

In spite of Butler's assertions to the contrary, most creative people seem always to be looking for ideas and material. How a particular topic for a project is settled on seems to be a fairly individual matter. The selection of an idea or topic
may be something like a carnival scale on which people test their strength by pounding a small platform at the bottom with a heavy hammer and trying to ring the bell at the top. The creative individual may submit every piece of experience, every touch, sight, sound, or feeling to such a "strength test". Those sensations, impressions, or experiences that "ring the bell" are then picked up and used. It is common practice for writers to keep notebooks of anecdotes and ideas that "ring their bells" of inspiration. Henry James, in one of his rambling reminiscences, describes such a bell-ringing occasion:

It was years ago, I remember, on Christmas Eve when I was dining with friends: a lady beside me made in the course of talk one of those allusions that I have always found myself recognising on the spot as "germs." The germ, whenever gathered, has ever been to me the germ of a "story" and most of the stories straining to shape under my hand, have sprung from a single small seed, a seed as minute and wind-blown as that casual hint for "The Spoils of Poynton" dropped unwittingly by my neighbor, a mere floating particle in the stream of talk.37

Once a "bell-ringer" or a "germ" catches the fancy of the creator, the process moves into its second stage -- incubation. In the excerpt from Poincarè quoted previously, the alternation between conscious and unconscious work is pointed out explicitly: four times he consciously strove to work out a problem but did not succeed in each case until he had been diverted by another pursuit. Such diversions appear to be not merely useful for gaining insight, but absolutely necessary. Frequently, the diversion is sought only after the individual
has become frustrated with a blockage in the progress of his work. Koestler, himself a well-known creative writer as well as writer on creativity, describes such blockages this way:

When all hopeful attempts at solving the problem by traditional methods have been exhausted, thought runs around in circles in the blocked matrix like rats in a cage. Next, the matrix of organized, purposeful behaviour itself seems to go to pieces, and random trials make their appearance, accompanied by tantrums and attacks of despair — or by the distracted absent-mindedness of the creative obsession. That absent-mindedness is, of course, in fact single-mindedness; for at this stage — the "period of incubation" — the whole personality, down to the unverbalized and unconscious layers, has become saturated with the problem, so that on some level of the mind it remains active, even while attention is occupied on a quite different field... until either chance or intuition provides a link to a quite different matrix, which bears down vertically, so to speak, on the problem blocked in its old horizontal context, and the two previously separate matrices fuse. 38

Koestler's description of thought running "around in circles... like rats in a cage" might be translated into neurological terms as the occurrence of a reverberating circuit. What is needed in this situation is some way of jogging the reverberating circuit out of its rut so that other neural circuits will be fired by a spreading pattern of engrams which may then provide a new and fruitful juxtaposition of engrams. Koestler calls such a new juxtaposition "bisociation" of matrices. Many creative people have resorted to idiosyncratic techniques or gimmicks to jog loose these reverberating circuits in their search for original "bisociations". Schiller, for instance, kept rotting applies in his desk because he believed that the odor was a useful block-buster; Poincaré on
one occasion drank black coffee to unsnarl his neural circuits; Hart Crane is reported to have used noisy drinking parties as a profitable diversion; Neitzsche reported going on long, energetic walks.39

Since so many of the introspective accounts of the creative process demonstrate this pattern of halting progress forward, it might be argued that a special function of the conscious aspect of incubation is to pose a puzzle, create chaos, and ask the question that is the essence of the vision. When a blockage occurs, then thought goes underground, or on what Koestler calls "the Night Journey":

...the Night Journey is a regression of the participatory tendencies, a crisis in which consciousness becomes unborn -- to become reborn in a higher form of synthesis. It is...the process of reculer pour mieux sauter; the creative impulse, having lost its bearing in trivial entanglements, must effect a retreat to recover its vigour.40

The Night Journey is usually undertaken without the person knowing the itinerary. As a result, when thought finally gets to its destination -- that is, solves the problem -- the illumination appears suddenly and without any apparent connection to the current activity. Such was the case at three points in Poincaré's development of the Fuchsian functions: as he was getting on a bus in Coutances, as he walked along bluffs overlooking the sea, and as he walked along the street in Mont-Valerian. Neitzsche also has carefully pinpointed the time and situation surrounding one of his illuminations, in this instance his vision for Thus Spake Zarathustra:
Its fundamental conception, the idea of Eternal Recurrence, the highest formula of affirmation that can ever be attained, belongs to August, 1881. I made a hasty note of it on a sheet of paper with the postscript: "Six thousand feet beyond man and time."
That day I was walking through the woods beside Lake Silvaplana; I halted not far from Surlei, beside a huge, towering pyramid rock. It was there that the idea came to me.\footnote{11}

Ghiselin summarizes the variations of procedure reported by the individuals represented in his book and concludes that "Production by a process of purely conscious calculation seems never to occur."\footnote{42} On the other hand, unconscious activity cannot do the job entirely alone. The poet Amy Lowell points out the limitations of the unconscious:

The subconscious is, however, a most temperamental ally. Often he will strike work at some critical point and not another word is to be got out of him. Here is where the conscious training of the poet comes in, for he must fill in what the subconscious has left and fill in as much in the key of the rest as possible.\footnote{43}

The filling in that can only be done with conscious effort Lowell calls "puttying up the holes". It is in this situation that the creator must sometimes find himself stretched to the limits of his craft and skill in order that the piece does not appear "mended". "Even in the works of the greatest master we find such moment," observed Tchaikovsky, "when the organic sequence fails and a skillful join has to be made, so that the parts appear as a completely welded whole."\footnote{44}

Some creative people experience spontaneously or seek to cultivate a state of heightened awareness during the periods of consciously directed activity. Poincaré mentions such a state
during his first efforts with the Fuchsian functions when he drank black coffee and felt ideas rise in crowds and interlocking pairs. The intensity of this heightened awareness can be overpowering and exhausting as well as exhilarating.

Tchaikovsky expressed his creative experiences in these terms:

| It would be vain to try to put into words the immeasurable sense of bliss which comes over me directly a new idea awakens in me and begins to assume a definite form. I forget everything and behave like a madman. Everything within me starts pulsing and quivering; hardly have I begun to sketch ere one thought follows another....If that condition of mind and soul, which we call inspiration, lasted long without intermission, no artist would survive it. The strings would break and the instrument be shattered into fragments. |

Amy Lowell described the same compulsion to express an idea, but the accompanying emotions in her case seem to have been painful rather than pleasant.

| Suddenly words are there, and there with an imperious insistence which brooks no delay. They must be written down immediately or an acute suffering comes on, a distress almost physical, which is not relieved until the poem is given right of way. |

Just as there is no definitive pattern for emotion or physical states during the creative process, so there is no single form in which the conscious symbols appear to the individual. This variation is partially the result of differences in medium as well as of temperament. Hence, musicians would be more likely to report auditory symbols, painters visual images, and so forth. Sometimes the individual is aware of several types of symbolic activity. Einstein, for instance, reported thinking in terms of abstract visual and musically
felt elements but not in words or other conventional signs.\textsuperscript{47} Mozart apparently hummed to himself as he thought out his music and comprehended the finished piece as a structural whole in visual terms.\textsuperscript{48} Spender's symbols combined music with words devoid of meaning but full of emotion:

Sometimes, when I lie in a state of half-waking half-sleeping, I am conscious of a stream of words which seem to pass through my mind without their having a meaning, but they have a sound, a sound of passion, or a sound recalling poetry that I know. Again, sometimes when I am writing, the music of the words I am trying to shape takes me far beyond the words, I am aware of a rhythm, a dance, a fury, which is as yet empty of words.\textsuperscript{49}

Many creative individuals, like Spender, find their thought processes to be particularly productive during dream-like states. Such twilight states may be productive because they allow for a great deal of flexibility as thoughts, images, sensations, and memories weave new engram patterns. This increased flexibility is accompanied by an awareness which permits a reconstruction of the thought patterns that is sometimes absent from the recall of dreams during sleep. Examples of incubation and illumination through dreams during sleep are not unusual, however. One article\textsuperscript{50} on the phenomenon lists 26 instances in which dreams produced creative material that either solved a particular problem on which the individual had been working or provoked an idea which was later developed into a full work. The most frequently quoted instance of such productive dreaming is that of the chemist Freidrich von Kekule as he dozed before a fire and dreamed of snakes twisting and
writhing until one seized its own tail and formed a circle. When he awoke with this image in his head, he recognized the snake biting its own tail as the molecular formation of the benzene ring, a problem he had been unsuccessfully working on before falling asleep. A more unusual instance is that of the naturalist Louis Agassiz when he once attempted to transfer the image of a fossilized fish from a stone. His early attempts merely produced blurred images and he gave up the project. Several nights later the entire fossilized fish appeared to him in a dream, but in his laboratory the next day he was unable to achieve so clear an image. He repeated the dream the next night with another unsuccessful attempt in his laboratory the following day. The third night he left a piece of paper and a pencil by his bed in hopes that the dream would recur. It did, and in the dark he sketched the image. He was then able to use the sketch to chisel bits from the stone and in so doing he discovered the entire fossilized fish still embedded just as his dream had pictured it. 51

A final aspect of the incubation stage of the creative process is the question of whether or not creativity can be forced into operation. Amy Lowell called the subconscious a "temperamental ally", and this opinion is shared by several authors on the subject. Kubie, 52 for instance, has argued in a neo-Freudian vein that fully unconscious processes produce neurotic distortions, not creative products, because the symbolic material contained in the unconscious has been
"impaired, distorted, or actually lost (i.e., repressed)"

The symbol is to its unconscious root like a delegate who has been sent to the conference table to "negoti-
ate," but with secret orders never to modify his position. He pretends to interchange with those who sit around the table; but his secret orders are un-
alterable and his ultimate position will be precisely what it was at the beginning.

In opposition to the unconscious, Kubie sees the conscious symbolic processes as necessary tools for the communication, examination, and meaningful manipulation of intellectual ele-
ments. Between these two poles lie the preconscious processes which are in the unique position of having access to the material resources of the unconscious as well as to the skills and techniques of the conscious. This view has led Kubie to conclude that,

...the preconscious system is the essential implement of all creative activity....The goal is to seek to free preconscious processes from the distortions and obstruc-
tions interposed by unconscious processes and from the pedestrian limitations of conscious processes. The unconscious can spur it on. The conscious can criticize and correct and evaluate. But creativity is a product of preconscious activity.

A perspective similar to that of Kubie has been operationalized in two techniques born within the techno-economic milieu of this century: "brainstorming", the idea of Alex Osborne, and "synectics", a system devised by William J. J. Gordon. The essence of brainstorming is that ideas for solving a given problem are poured forth by a group of people as quickly as possible without any discussion or evaluations of their worth or possible effectiveness at the time that they are being generated. Such judgment is deferred until later,
after the "storm" is over. What is emphasized in a brainstorming session is quantity of ideas, not quality, in the belief that free association combinations of the unconscious material may yield results spontaneously.

The essence of synectics has been distilled into the motto "making the familiar strange, and making the strange familiar." The synectics practitioners also believe the unconscious to be a storehouse of valuable material not always available to the conscious processes of organization. The barrier between the unconscious and the conscious is described as a "censor" whose job is "to protect the conscious mind from the overt 'interrupting' thoughts from the unconscious..." the censor resides in the preconscious fringe which, as in Kubie's conception, is seen as the arena for true creative activity. The problem in the creative process, according to synectics theory, is how to weaken or bypass the censor. Towards this end, a procedure was developed in which analogies and fantasies are generated in order to solve a set problem.

By utilizing conceptual devices called operational mechanisms the synectics discipline strives to teach an individual how to imitate, whenever he desires, the way he works on his "on" days. Use of these mechanisms forces new ideas and associations up for conscious consideration, and the individual need not wait for them to arise fortuitously.

The operational mechanisms referred to here are analysis, generalization, and analogy (or model-seeking). Synectics sessions are conducted in groups with one person functioning as leader or "interlocuter". The leader's job is to keep the
group operating in accordance with a flow chart that specifies
the type and order of appearance of the operational mechanisms.
As transcripts of synectics sessions demonstrate,\textsuperscript{59} this tech-
nique can be very effective in specialized problem-solving
situations such as those found in the industrial context.
Whether the same success could be gained by an individual
working alone on a broader problem front such as that involved
in artistic creation or in theory development is not so obvious.
Certainly order and discipline of some sort are necessary for
any creative project, but adherence to a flow chart does not
seem as appropriate when the goal is the creation of a complex
set of structural relationships rather than the solution of a
single problematic element within a larger structure.

The third stage in Wallas's model, that of Illumination,
has already been touched on in connection with the incubation
stage. Although they share certain similarities, a distinction
can be made between Illumination and inspiration. Inspiration
is usually associated with the initial "germ" of a creative
project, and it is usually described in terms of a general
feeling of what can be done -- a larger vision rather than a
specific picture. Spender mentions "a dim cloud of an idea"\textsuperscript{60}
in this regard.

Illumination, in contrast, is usually described as very
sudden, very clear, very concise, and as occurring at the end
of the process rather than initiating the beginning. The
classic example usually cited is the story of Archimedes who
suddenly comprehended how he could test the king's crown for the purity of its gold when he noticed the water level in his bath rise as he climbed into it. The "Eureka!" of Archimedes has been analyzed and described by Nietzsche in more evokative prose:

The notion of revelation describes the condition quite simply; by which I mean that something profoundly convulsive and disturbing suddenly becomes visible and audible with indescribably definiteness and exactness. One hears -- one does not seek; one takes -- one does not ask who gives: a thought flashes out like lightning, inevitably without hesitation -- I have never had any choice about it. There is an ecstasy whose terrific tension is sometimes released by a flood of tears, during which one's progress varies from involuntary impetuosity to involuntary slowness. There is the feeling that one is utterly out of hand, with the most distinct consciousness of an infinitude of shuddering thrills that pass though one from head to foot; -- there is a profound happiness in which the most painful and gloomy feelings are not discordant in effect, but are required as necessary colors in this overflow of light....Everything occurs quite without volition, as if in an eruption of freedom, independence, power and divinity.61

Not all creative people experience illumination in this way, as a sudden flash with no precursor or warning. The philosopher Herbert Spencer claimed to mull over and toy with his ideas at length. For him, illumination was well foreshadowed and was a deliberate putting together of pieces in a jigsaw puzzle rather than a sudden flash from nowhere.62 Picasso is reported to have pursued his creative work in an even more vague way, letting the actual production process illuminate itself.
The picture is not thought out and determined beforehand, rather while it is being made it follows the mobility of thought. Finished, it changes further, according to the condition of him who looks at it. When I am working on a picture, I think of a white and apply a white. But I cannot continue to work, think and apply a white; colors, like lineaments, follow the changes of emotion....I want to develop the ability to do a picture in such a way that no one can ever see how it was done. To what end? What I want is that my picture should evoke nothing but emotion.63

In reading the introspective accounts of illumination states, one is reminded of the peak experiences described by Abraham Maslow's self-actualized subjects. Maslow has summarized the main aspect of these peak experiences as follows:

In such a moment, his powers are at their height and he may be startled (afterward) by his unsuspected skill, confidence, creativeness, perceptiveness and virtuosity of performance. It is all so easy that it can be enjoyed and laughed with. Things can be dared that would be impossible at other times.64

Among the many emotions that accompany illumination, particularly vivid is the feeling that the idea is absolutely correct. Such self-certification sometimes proves to be well founded, but not always, as Poincarè points out.

I have spoken of the feeling of absolute certitude accompanying the inspiration; in the cases cited this feeling was no deceiver, nor is it usually. But do not think this is a rule without exception; often this feeling deceives us without being any the less vivid, and we only find it out when we seek to put on foot the demonstration.65

The "demonstration" that may disappointingly disprove the illumination is Wallas's fourth stage, Verification. This phase usually involves more than the "proof" or "disproof" implied by the term verification. In products designed to be
apprehended aesthetically, such as music, theatre, art, etc., verification is perhaps better understood through such terms as representation and translation. Whether the product is a work of art or a scientific theory, however, the central problem of this final stage of the process is conveying the creator's vision to other people. For a variety of reasons, those who experience the creative effort may not grasp the intended vision -- indeed, as Picasso suggested, even a finished picture changes "according to the condition of him who looks at it..." But if the creator and his vision are to intersect at all with the society at large, there must at least be an attempt to communicate the idea in some form that is tangible or replicable as, for instance, in the oral tradition of Homeric poetry.

The points at which breakdown can occur in the communication between creator and public are extremely varied along several dimensions. There may be technical or craft problems in the handling of the material or medium in which the work has been produced; there may be a disjunction in values, perspectives, expectations, etc., between the creator and the general public such that perceptions of objects and events are too different to mesh successfully; and there is always a certain degree of tension generated by the conservatism of social systems to new or novel products which inherently pose possibilities for change. This resistance will be discussed in more detail in a later chapter.
Each medium of representation or verification poses its own unique set of problems. Science is often thought to possess the most "pure" communication techniques and procedures because of the use of a commonly understood meta-language of symbols, rules, categories, and other logical tools. But even mathematical symbols can produce equivocal results in interpretations.

When ordinary languages rather than meta-languages are employed, the greatest problem seems to be imprecision. According to Koestler,

...words are a blessing which can turn into a curse. They crystallize thought; they give articulation and precision to vague images and hazy intuitions. But a crystal is no longer a fluid....The novelist suffers -- among other things -- from the poverty of his vocabulary when he tries to describe what his characters feel (as distinct from what they think or do).... The scientist's trouble is of a different nature. He suffers not from the poverty of his verbal tools but rather from their over-precision, and the hidden snares in them.67

Artistic mediums, such as music, have a number of traps and pitfalls built into the representation and translation stage, too. There are the individual differences in perception referred to by Picasso previously. But there are also the psycho-motor problems of recreating in substantive form a mental vision. The mind can "perceive" in a number of dimensions simultaneously, but substantive representation is usually limited to only a few dimensions. Tchaikovsky expressed his concern over this aspect of the creative process:
I cannot complain of poverty of imagination, or lack of inventive power; but, on the other hand, I have always suffered from my want of skill in the management of form. Only after strenuous labour have I at last succeeded in making the form of my compositions correspond, more or less, with their contents.\textsuperscript{68}

A final aspect that might be included with the last stage of the creative process is the public reaction to the product. There is as great an effect on the creator if his work produces no reaction as if it produces a highly charged one. Public reaction is a source of evaluation that can be used by the creator in his future work. Public reception to an original work can also have important effects on other individuals or groups besides the creator, too. Sometimes the effects turn out to be profound, as, for instance, the invention of the steam engine in the last century. More frequently, however, the ripples of influence are contained by the limitations of time or number of people affected. In any case, public reception should not be under-estimated, although its path is often hard to plot and calculate.

Summary

So far in this chapter, an attempt has been made to explain the process of creativity from two perspectives: from the outside in through scientific research on brain structure and functioning, and from the inside out through the experiential data provided by creators. Lengthy as this chapter is, the material presented is far from exhaustive. The intention was to combine some of the most important information that both
perspectives have to offer. Frequently, proponents of both camps have denied, ignored, or belittled the explanations and insight offered by the other side. Such a practice does little to extend the frontiers of knowledge either horizontally or vertically. Happily, there does seem to be evidence of some tentative multidisciplinary combinations of effort towards understanding behavior in general as well as creative behavior specifically, but disciplinary isolation has not been fully overcome yet.

PART II: PERSON

Most of the research into the personological variables of creativity have been directed by the conscious or unconscious hope of finding a "formula" for distinguishing creative people from the masses. The motivations and aims behind the search for this formula will be left to a later chapter, but it can safely be claimed that these attempts to find common characteristics have not been entirely unsuccessful. However, the patterns, tendencies, and composite portraits of creative people are only suggestive; none provides a critical code that will infallibly predict creative genius before it occurs. Of all the techniques tried so far, the most statistically satisfactory has been the use of biography. Most of the biographical studies have been retrospective analyses of distinguished individuals done after they had achieved eminence, and there is a dearth of prospective or on-going, longitudinal studies of
creative (or any other characteristic, for that matter, individuals in the making. The costs in time and finances are partly to blame for inhibiting the occurrence of such long-range studies. This inhibition is unfortunate since in the case of creativity a longitudinal study of individuals possessing personological characteristics similar to those of creative individuals would be enlightening. There are a few small-scale studies using this methodology, and these will be discussed later in other contexts. Otherwise, there is only one major exception to this general scarcity of large-scale studies of a single sample of subjects.

The Genetic Studies of Genius

The exception to the general rule of limited studies is the Genetic Studies of Genius undertaken at Stanford University by Lewis Terman and his colleagues. As the title suggests, these studies were designed to explore the perspectives developed by such genetic determinists as Galton and Binet. "Genius" in this research was defined operationally in terms of IQ test scores, and work began in 1921 when the sample was drawn from the public school system (grades 2 - 12) in the larger urban centers of California. Baseline data were systematically collected on the sample and included information not only about intelligence, personality, and family variables but also on anthropometric measures such as height, weight, health, and other general developmental aspects. The sample group was then
followed up at various intervals throughout their lives to see what changes had occurred in group and individual patterns. The most recent follow-up was published in 1959, by which time almost a quarter of a million dollars had been spent on the project with 95 per cent of the original group still participating. 70

By 1959, the members of the group had progressed far enough in their careers to allow a good assessment of how well their future promise of childhood had been realized. The verdict given by Terman and Oden in their assessment of this now middle-aged group of "geniuses" was that they had been quite "successful", with success defined in terms of achieving "eminence, professional status, and recognized position in the world of human affairs....It is concerned with vocational accomplishment rather than the attainment of personal happiness." 71 These vocational accomplishments were, they point out, largely confined within the fields of business, law, and science, and they note particularly the "lack of outstanding accomplishments in the fine arts, music, and to a lesser extent, literature." 72 Their explanation for this lack of artistic genius is that the sample group was too small and that "such genius is indeed rare." While group size and rare genius are no doubt important factors, it might also be argued that their basic definitions, assumptions, and methodology skewed the selection of their subjects in the direction of convergent or conforming cognitive styles. As other researchers have taken pains to demonstrate, IQ tests discriminate against the more "creative" intellectual
styles and dispositions. Further, as has already been argued in Chapter 2, the operational bias of intelligence tests tends to equate intelligence with school achievement without examining whether school achievement is related to real ability or is merely the tautological analogue to an operational definition of intelligence. This thesis favors the latter possibility, but the Genetic Studies of Genius do not.

A more explicit example of the bias towards conforming intelligence in the Stanford study is the way in which factors related to socioeconomic class are dealt with. First, it must be remembered that the Stanford studies were based on assumptions of genetic determinism and social Darwinism. As if in support of that set of assumptions, the sample demonstrated a skewed distribution both for nationality and social class origins. Terman points out specifically the marked excess of Jewish and Northern and Western European and the overrepresentation of the upper half of the social class hierarchy. He does not consider the possibility that the IQ tests might contain a culture and class bias, although he concedes that environmental factors should at least be considered. The only environmental factor he considers, however, is the school environment. But once again he neatly overlooks the bias in his basic assumptions. The California public school system, he argues, "prides itself on the equality of educational opportunity provided for its children of every class and station"; therefore, he proudly concludes that the skewed distribution in his sample supports the
genetic determinism hypotheses and confirms the primacy of hereditary factors over environmental factors. That the California public school system might not provide equality of opportunity in education did not occur to him, perhaps because in 1925 practically no one questioned the American equality of education ideal. The complex and subtle nature of the interplay between social and ideological factors that might make an education system provide unequal educational opportunities did not begin to surface and make an impact until the 1950's, although since then an extensive literature has developed pointing out the mis-match between rhetoric and reality in education.

Even within Terman's research there exists one particularly critical contradiction between the data and the theoretical framework. Volume II of the series is an attempt to evaluate the intelligence and certain character traits of eminent historical figures. This part of the study was undertaken by Catharine Cox who selected from a list of 1000 eminent persons drawn up by J. McKeen Cattell the names of 301 people born in the period 1450 - 1850. By intensive reading of bibliographical and historical documents, Cox and her assistants estimated the IQ of each subject and interpreted information related to family ancestry, growth and development to the age of 26, the basis for eminence, and other data that might indicate special qualities associated with genius.

Retrospective assessment of IQ scores is perhaps the weakest link in Cox's research chain. It might be queried, for
instance, how much the "halo effect" influenced assessment; that is, was there a strong, perhaps unconscious, tendency to overestimate IQ because the person had already "proved" his superiority by becoming eminent? Another problem arises from the probability that retrospective assessment through bibliography is not necessarily an assessment of the same characteristics that IQ tests measure. Specifically, IQ tests measure the number of correct answers given by the individual to a carefully selected series of information or task items; the goal is thus to limit measurable behavior to a narrow band in the total behavioral repertoire. Cox, on the other hand, began with the larger context of behavior and attempted to deduce how the individual would have behaved in the more limited situation. It might be claimed, in fact, that Cox's method of assessing a wide band of behavior was a better way of measuring intelligence than is the standard, narrowly specific IQ test which accounts not for general behavior in the context of everyday life, but rather the artificial performance generated in the test situation. In any case, it is not at all certain that had the 301 eminent people been tested on a fifteenth century equivalent of the Stanford-Binet, they would have produced scores similar to those estimated by Cox.

The most critical aspect of Cox's study, however, is not her methodology but the fact that over half of her subjects would not have qualified for Terman's California sample. The 1000 children he chose for study produced IQ scores above 140
on the 1916 edition of the Stanford-Binet. Had this same cut-off point been used by Cox in selecting her eminent group, she would have had to exclude 161 individuals, including such famous figures as Jean de la Fontaine (IQ: 100), Nicholas Copernicus (IQ: 105), Oliver Cromwell (IQ: 110), Rembrandt (IQ: 110), William Harvey (IQ: 120), Johann Sebastian Bach (IQ: 125), John Locke (IQ: 125), Isaac Newton (IQ: 130), and even Charles Darwin (IQ: 135).

These questions and criticisms of the Stanford study are not meant to imply that the quarter million dollars were wasted, however. While the eye at the telescope may have been blind in some areas and hence limited in what it saw, the study still must be regarded as one of the most valuable sources of information on the long-term development of a single sample yet made. It is doubtful whether the study achieved its ultimate goal of demonstrating the primacy of genetic factors over environmental factors, but the information it accumulated in pursuit of that goal has certainly been an important contribution to the fund of knowledge about a segment of society defined in terms of intellectual ability.

**Common Denominators: Those Most Likely to Succeed**

What, then, can be said in general about the nature, development, and disposition of creative individuals? Just as there is no real Average Person, so there is also no Typical Creative Person. Certain patterns, traits, and characteristics
do emerge in the histories of creative people in more than a random manner, but there are always notable exceptions to every hopeful common denominator. Rather than describe the ideal-typical case, it is perhaps more realistic to speak in terms of probabilities. A creative individual is "more likely" to have developed in certain ways under certain conditions than in other ways or conditions, but no pattern has yet been found that fits everyone. The list of "most likely" conditions that follows, it should be remembered, is perhaps only appropriate to Western European and North American cultural heritages; creative people in Oriental or African cultures, for instance, may exhibit similar patterns, or they may emerge under different circumstances with different combinations of characteristics. Unfortunately, this aspect has been too little studied to give even a tentative answer.

The eminently creative individual is first of all more likely to be male than female, to be either the first, last, or only child in a family that is white, middle class, and Protestant. In early childhood this individual is more likely to have been surrounded by an adult-centered and dominated environment and to have been isolated from children who were not members of his family. It is also likely that he received more attention and stimulation from a parent or other adult than is the general case. This early adult attention may have influenced the child to develop early interests in a particular area such as music, science, or philosophy. Such
early influence may have helped the child develop his intellectual skills generally in greater measure at earlier ages; as an adult the creative individual will still be more likely to demonstrate above-average intelligence, though not necessarily in terms of school achievement. As a student the creative individual is more likely to be an indifferent achiever, doing very well in areas that interest him but poorly in areas that do not catch his fancy.

If in the early years the individual was both isolated from his peers and dominated by adults, it is likely that he was more often left to his own devices and hence became accustomed to a greater degree of independence and autonomy. It has been suggested that such early independence fosters greater degrees of fantasy and imaginative play, and these are qualities that often become especially important for later creative work. All of these circumstances may thus promote a certain type of ego-centrism in the child; as an adult this ego-centrism may be described as self-realization or self-actualization. Whatever its source and development, this ego-centrism, independence, and need for autonomy are important to the creative adult and are intimately related to the motivation or drive to produce creative work. In artistic designs or figures the creative adult is more likely to prefer complexity and asymmetry to simplicity and symmetry; emotionally he is more likely to be sensitive, introspective, and accepting of his own irrationalities; cognitively he is also more likely
to be open to perceiving disorder and anomalies; in short, he is more likely to be deeply self-conscious than is his non-creative counterpart. Finally, in many fields of creative endeavour he is more likely to have accomplished what is considered by others to be his greatest work before the age of 30, and although he may be remembered primarily for one or only a few of his accomplishments, his total output is likely to have been much higher than the average, providing he lived, as he is more likely to do, a normal life span.

The foregoing thumbnail sketch is, of course, a mere scratch on the surface of a general portrait of the creative individual. Again, limitations of time and space do not permit a full analysis of these and related factors, but it might be useful to pursue some of them in a little greater depth. The most important point demonstrated by examinations of personological data is that the qualities demonstrated by eminent creative individuals are by themselves less potent in explaining that person's eminence than the relationship between those qualities and the larger social context. There are probably thousands of individuals who are very similar to recognized creative people in every way except that they do not become recognized for their creative accomplishments. In other words, the constellation of personological characteristics is not, in the final analysis, solely determinant of eminence. Emi-

nence may be, as Cox has suggested, a matter of "the most favourable chance combination among many," or it may be that
to achieve the fullest understanding of what makes creative people "great", it is necessary to view the constellation of characteristics within the larger social context.

**Women and Creativity: The Double Whammy**

While it is apparent that distinguished individuals in Western culture are more likely to be male, white, middle class, and Protestant, the actual interplay of social forces involved is complicated and at times paradoxical. It has become commonplace to point out how sex and social class, for instance, can influence career patterns and other aspects of life-experience. One study of the relationship between sex and personality discusses the problems posed by "tacit assumptions" concerning the arbitrarily and socially defined male-female dichotomies. "The concepts of masculinity and feminity," say these authors, "are even more vague than the nineteenth century concepts of intelligence."^89

Vague as they may be, they nevertheless are very powerful tools of social control since they promote the development and behavior of males and females in certain directions, hampering or discouraging behaviors that have been defined as more appropriate to the opposite sex. In western culture, most of the personal qualities and environmental experiences that have been linked to the development of creativity are defined as appropriate for males but not for females. Indeed, the familiar cliche, "It's a man's world" indicates fairly well women's chances of success. The Report of the Royal Commission
on the Status of Women in Canada sums up the lot of women in these strong words:

The three principal influences which have shaped Western society -- Greek philosophy, Roman law, and Judeo-Christian theology -- have each held, almost axiomatically, that woman is inferior and subordinate to man and requires his domination. 90

By implication, then, anyone, male or female, who exhibits feminine behavior or values is assumed not to have the qualities required for achieving eminence. Most women have acceded to this limitation (some more gracefully than others) and have modified their behavior and ambitions in accordance with the norms of acceptable female behavior. But while the halls of fame may be dominated by men, they are not exclusive male clubs. Of the 301 geniuses in Cox's study, for example, eight were women. 91 This figure is usually quite correctly read in the context of the under-representation of women in the ranks of the eminent, but it can also be seen as an indication that even in past times when sex-roles were much more rigidly defined than they are now, it was possible for women to pursue careers that did not coincide with the roles of wife and mother.

Explanations of why women do not proportionately achieve recognition for creative work have been lacking until recently when a flood of literature has hit the market dealing with various aspects of the so-called "woman question." A great deal of argument and counter-argument has been advanced defining the economic and social status of women and the psychological, sociological, and cultural factors underlying
that status. To attempt to recapitulate all the various arguments is not appropriate here; instead, the following abbreviated explanation is offered as one possibility.

Stated most simply and perhaps contentiously, women are victims of what might be described as a cultural "double whammy." Essentially, those characteristics that are seen as appropriate to women and which the society actively socializes are the opposite characteristics of those admired and rewarded for being "creative" or "successful" in the world at large. To be "feminine" is thus to be excluded automatically from consideration as "creative", except in the procreative sense. But paradoxically, when the personality profiles of creative men are examined, it has been found that they demonstrate a number of characteristics which are culturally defined as "feminine" rather than "masculine". Thus, men may be rewarded for displaying certain "feminine" characteristics which are not similarly rewarded when displayed by women. On the other hand, women who buck the socialization pressures towards feminine values and behaviors have better chances of success in the occupational world, but at the risk of being perceived as "unfeminine". This, then, is the double whammy: early conformity to feminine norms is rewarded at first but then becomes devalued later and may be used to deny future opportunities; conversely, early nonconformity may lead to greater occupational status rewards.

The ways in which sex-role images and behavior are incul-
cated in children are pervasive and often very subtle. The Royal Commission on the Status of Women in Canada, for instance, examined textbooks used in elementary schools and concluded:

...sex role imagery in a representative selection of elementary school textbooks indicates that a woman's creative and intellectual potential is either underplayed or ignored in the education of children from their earliest years.... The sex-roles described in these textbooks provide few challenging models for young girls...⁹³

This subtle pressure is particularly obvious in the area of occupations and vocational decisions. One example given by the Royal Commission of how sex-role models are typically portrayed was a brochure published by the Sun Life Assurance Company of Canada. Entitled What's in Your Future? A Guide to Choosing a Career, the front cover depicted "a physician, an engineer, a laboratory technician -- all men -- and a typist, the only woman."⁹⁴

On the other hand, the school system also discriminates against certain aspects of masculine values and norms, some of which are also related to creativity. According to the sociologist Patricia Sexton, schools are essentially feminine institutions. Though run by men at the administrative top, the "female school" is staffed by women at the teaching bottom and is characterized by an atmosphere that is typically "polite, prissy and puritanical...there is little place...for some of the high-ranking values of boy-culture -- courage, loyalty, independence..."⁹⁵ Sexton also agrees with the Royal Commission that in regard to achievement, girls are still favored over
boys.

Taken on an average, girls do much better in school than boys -- either because they mature faster physically or because the schools make it easier for them to succeed, or both. By almost any measurement used, they do much better; they get better grades, more honours and awards, and much better citizenship ratings.\(^96\)

However, it has also been pointed out that although girls get better marks on the average, there is a stigma against the girl who displays great intellectual accomplishments.\(^97\) According to this argument, intellectual achievement is equated with lack of femininity, and the woman who wishes to fulfill her personal needs for achievement as well as be seen as "feminine" is caught in a double bind. The result may be what Horner has called "the motive to avoid success...When fear of success conflicts with a desire to be successful, the result is an inhibition of achievement motive."\(^98\)

In regard to the reverse side of the double whammy, women who do not conform whole-heartedly with traditional feminine norms but who do display such characteristics as aggressiveness, autonomy, adventuresomeness, and intellectual acuity (all associated with masculine norms) are more likely to succeed in establishing careers outside the home and in accomplishing work judged to be "creative." This aspect has been explored by Ravenna Helson in a longitudinal study of women college students selected by their teachers on the basis of their potential for creative achievement. Helson's research indicates that there is a "creative personality" that is not specific to
either sex but is shared by creative members of both sexes.99 This creative personality, she says, includes such traits as need for autonomy, interest in ideas, lack of defensiveness, high levels of aspiration, and strong motivation to engage in creative activity. The creative women in her study also showed in childhood

...strong symbolic interests, a well-developed sense of individuality, and a high aspiration level... these characteristics put them at an advantage during periods when ego-building was socially rewarded [late childhood] and at a disadvantage during periods when sex-role learning was socially rewarded [adolescence].100

Whether the double whammy actually operates as outlined above, it does seem clear that women who conform to traditional norms for femininity are not often singled out for social reward or recognition while those who conform to some of the norms associated with masculinity may become recognized, perhaps at some risk to their feminine identification. In spite of the costs, many women do set out to achieve in a "man's world," and some are successful. Certain areas of achievement are apparently more open to ambitious women than are other areas. Of the eight women listed in Cox's study, for instance, seven were writers of one sort or another. A comprehensive survey of eminent women both past and present would probably confirm this high percentage of writers. It may be that the nature of writing is inherently less jeopardizing to femininity norms since it can be accomplished individually and with a fair degree of anonymity. Further, it doesn't require special equipment or skills other than basic literacy and an intelli-
gent, observant, and reflective mind. In previous historical periods when women were even more constrained to tend the home fires than they are today, writing was not only a stimulating diversion and means of interacting with the world but also could be accomplished at home. As one analyst has pointed out, "The hand could wield the pen while the foot rocked the cradle." But while the annals of history record women who have achieved minor recognition in fields dominated by men, major figures such as Madame Curie are unfortunately few and far between.

Social Class and Education: The Pre-Conditions for Success

The relationships between social class, education, and creative achievement are similar in many ways to those involving sex-role norms. To use Turner's terms, the competition for achievement mobility is to a certain extent a "contest" equally open to individuals from all social groups, but those who have the right "sponsorship" (i.e., white, male, middle class, and Protestant) are several steps ahead in that competition. Success is not assured for the sponsored contestants, but bookmakers would "favor" them in the odds. Discrimination on the basis of race has been particularly well documented. It is a highly complex issue, of course, but the consensus on its occurrence is generally unanimous. Thus, nothing more will be said about it here except to reinforce the point that in Western societies individuals of Caucasian ancestry are more favored in the pursuit of occupational mobility and status.
A classic explication on the relationships between social stratification, religion and occupational success is Max Weber's *The Protestant Ethnic and The Spirit of Capitalism*\(^1\)\(^{03}\). Weber's explanation of the fruitful economic resonance that developed between the ascetic Protestant values and the middle class in Europe following the Reformation has been generally accepted by scholars. Weber's analysis was empirically confirmed in North America by the genetic studies of genius which demonstrated a strong statistical favoring of middle class and Protestant backgrounds. Cox's study of eminent figures also supported this relationship: over two-thirds of her 301 geniuses had fathers whose occupations could be classed as white-collar or middle class, and over 40 per cent of this middle class group were lawyers, clergymen, and merchants. Only 20 per cent of Cox's sample had fathers who were skilled or unskilled tradesmen or non-land-owning rural workers.

While Terman and Cox would have liked to demonstrate the hegemony of genetic determinants over environmental variables, their results did not justify an unqualified conclusion. According to Cox, "individual chances for eminence are usually dependent upon favorable hereditary background and are increased by favorable opportunity..."\(^1\)\(^{04}\) One of the "favorable opportunities" she most emphasized was education.

The average opportunity of our young geniuses for superior education and for elevating and inspiring social contacts was unusually high.\(^1\)\(^{05}\)

In Europe during the period 1450 - 1850, education was virtually
monopolized as an elite privilege. Hence, it does not seem surprising that the upper half of the social hierarchy should have been overrepresented in her sample. North American educational structure, on the other hand, was designed to reduce the favoring of any one group over another. Thomas Jefferson articulated this ideal succinctly:

> We hope to avail the State of those talents which nature has sown as liberally among the poor as the rich, but which will perish without use, if not sought for and cultivated.\(^{106}\)

Unfortunately, on the basis of Terman's skewed sample, it must be concluded that Jefferson's hopes have not been realized.

This conclusion is also supported by other research data. In spite of the "equality of opportunity through equality of provision" rhetoric, the North American school system has remained steadfast as a bastion of middle class values and behavioral norms, to the detriment not only of the working class, but also to the middle class itself, especially in the occupational sphere.\(^{107}\)

The most dramatic evidence of bias in schools against children who are not white and/or middle class has been provided in a study by Rosenthal and Jacobson.\(^{108}\) Their methodology consisted simply of administering a standardized IQ test to all the children in an elementary school, randomly selecting an experimental group whose names were informally conveyed to the teachers as "potential spurters" (those who would make unusual intellectual gains in the following year), and re-testing the children the following year. The results indicated
strongly that the power of suggestion worked remarkably well in shaping the teachers' expectations which in turn produced real gains in academic performance among the randomly selected experimental group.

In digging deeper into the mechanisms behind this powerful effect of teacher expectations, Rosenthal and Jacobson also discovered that the teachers' perceptions of and attitudes towards the students were affected:

The children from whom intellectual growth was expected were described as having a better chance of being more successful in later life and as being happier, more curious and more interesting than other children.\( ^{103} \)

This positive perception of students did not, however, extend across the board generally to all the experimental group subjects. Lying behind the expectations for intellectual gains seemed to be a prior set of pre-conceptions and expectations, for Rosenthal and Jacobson found that teachers gave the most unfavorable ratings to the children in low-ability classrooms who had gained the most intellectually.

Even when the slow-track children were in the experimental group, where greater intellectual gains were expected of them, they were not rated as favorably with respect to their control-group peers as were the children of the high track and the medium track. Evidently it is likely to be difficult for a slow-track child, even if his I. Q. is rising, to be seen by his teacher as well adjusted and as a potentially successful student.\( ^{110} \)

Getzels and Jackson in their study also found this selective favoring in regard to their high IQ and high creative students:
Even though the scholastic performance is the same, the high IQ students are preferred over the average students, the creativity students are not. This is a finding of considerable import, for it suggests that teachers distinguish among high achievers, favoring one group of achievers over the population of students but not another group. They favor high achievers who are high IQ's, but not high achievers who are high creatives.121

Getzels and Jackson offer two possible reasons for this difference in teachers' reactions: the "halo effect" of the IQ score, and the degree of conformity to the teachers' personal values and behaviors demonstrated by a student. In either case, it seems clear that "sponsorship" in the schools, whatever the criterion, favors and facilitates the progress of some over others.

Creativity and the Protestant Ethic

The middle class values and norms that predominate in Western culture have been described by Weber as the Protestant Ethic. He noted the predominance in his own day of Protestant business leaders and highly skilled or technically trained workers and personnel over Catholics. More recent research in North America tends to reinforce this observation. Of the 64 "eminent scientists" sampled by Roe, for instance, none was raised as a Catholic.112 She avoids trying to explain why being raised a Catholic should disfavor a person towards becoming an eminent scientist, but she vaguely suggests that authoritarian methods of rote-learning and lock-step progress in mass education hinder the development of independent thinking. Private schools, she claims, are worse than public schools
in these respects, and she cites the private church school as the least likely to produce future scientists. Another study of scientific creativity confirms Roe's statistics on the absence of Catholics and goes further to draw a definite link between strong Protestant ethic values and the socialization of future scientists.\textsuperscript{113}

In defining the Protestant ethic, Weber contrasts the "ascetic worldliness" of the Protestant with the "other worldliness" of Catholics:

"The Catholic is quieter, having less of the acquisitive impulse; he prefers a life of the greatest possible security, even with a smaller income, to a life of risk and excitement, even though it may bring the chance of gaining honour and riches. The proverb says jokingly, 'either eat well or sleep well'. In the present case the Protestant prefers to eat well, the Catholic to sleep undisturbed."\textsuperscript{114}

Like Roe, he also notes differences between Catholic and Protestant schools, and he points out the smaller proportion of Catholics in post-secondary institutions generally, especially those oriented towards technical and industrial occupations. A Catholic is more likely to prefer, he says, the humanistic Gymnasium over the technical school.

The differences in educational preference are perhaps reflective of a higher level set of differences concerning the control of individual conduct. The Catholic Church, Weber says, has been traditionally more lenient in accepting or forgiving deviations in personal character: this lenience does not extend, however, to intellectual deviations. He describes the "rule of the Catholic Church [as] punishing the heretic,
but indulgent to the sinner.\textsuperscript{115} One of the outcomes of the Reformation was, he says, to tighten the control over the behavior of individuals.

...the Reformation meant not the elimination of the Church's control over everyday life, but rather the substitution of a new form of control for the previous one. It meant the repudiation of a control which was very lax, at that time scarcely perceptible in practice, and hardly more than formal, in favour of a regulation of the whole of conduct which, penetrating to all departments of private and public life, was infinitely burdensome and earnestly enforced.\textsuperscript{116}

"The Rule of Calvinism", as he termed it, was thus in its earliest forms "the most absolutely unbearable form of ecclesiastical control of the individual which could possibly exist."\textsuperscript{117} This concern with personal conduct resulted in such values as hard work, deferred gratification, and material success. On the other hand, the rule of Calvinism was not so concerned with maintaining purely intellectual correctness. As long as one behaved correctly, intellectual conduct was of less concern. But, as Weber and others have pointed out, the emphasis on material success brought with it a great many more tensions, and it may be that such tensions contribute to intellectual and creative achievements. This possibility will be pursued in further detail in Chapter 5.

Character Structure: The Importance of Being Inner-Directed

To focus on religion as a source of differences may, however, be to look at a side issue. Although related to religious dogma and structure, essential character differences might be perceived more usefully in terms described by David
Riesman et al. in *The Lonely Crowd*. Their analysis of the relation between social character and society maintains that,

...the link between character and society...is to be found in the way in which society ensures some degree of conformity from the individuals who make it up. In each society, such a mode of ensuring conformity is built into the child, and then either encouraged or frustrated in later adult experience.

In his analysis of social character, Riesman defines three types, each peculiar to and predominant in a different historical period. The three character types are tradition-directed, inner-directed, and other-directed. In the tradition-directed character, relations between individuals at both the personal and societal levels are dictated by very formal power relations, "relations which have endured for centuries and are modified but slightly, if at all, by successive generations." He cites the Middle Ages as the period when this character type was most prevalent. During the Renaissance and powerfully reinforced by the Reformation, a second character type began to emerge. Riesman argues that the changing nature of the social and economic structure of the whole society required its members to conform through an internalized behavioral code "that is implanted early in life by the elders and directed toward generalized but nonetheless inescapably destined goals." This internalized code is essentially Weber's Protestant Ethic, and Riesman sees it as "a psychological gyroscope."

This instrument, once it is set by the parents and other authorities, keeps the inner-directed person... "on course" even when tradition, as responded to by his character, no longer dictates his moves. The inner-directed person becomes capable of maintaining
a delicate balance between the demands upon him of his life goal and the buffetings of his external environment.122

As the rapid material accumulation of the transitional, post-Reformation society reached its peak, other people rather than the material environment became the most problematic. In response to this change, the other-directed character structure began to be most effective in ensuring conformity. The "gyroscope" of the inner-directed individual was replaced by "radar" which functioned to pick up and attend to messages or signals sent by other people or environmental circumstances. If the gyroscope operated to keep the individual "on course", the new radar offered guidance for changing course. But it is the signals that are most important, not the course.

The goals towards which the other-directed person strives shift with that guidance; it is only in the process of striving itself and the process of paying close attention to the signals from others that remain unaltered throughout life.123

The picture of the creative personality that can be drawn from research studies specifically and biographies generally in large measure fits the description of the inner-directed person as Riesman defines him. Such character structures probably occur in all cultures and historical periods. Riesman suggests that they do. When the inner-directed individual occurs in a society that is predominantly tradition-directed, he may be something of a deviant. In a tradition-directed, culture, such a deviant is controlled by being institutionalized into a role that allows him to "make a socially acceptable contribution, while at the same time...provide the indivi-
An acceptable niche might be that of shaman or sorcerer. The nonconformist in the later two types of cultural character, says Riesman, will not be institutionalized and integrated into the heart of the social structure, but instead he will be marginalized on the edges and perhaps labelled "innovator" or "rebel." The marginalized nonconformist is still useful to the society -- perhaps even necessary if there is a great need for change -- but to operate on the periphery of the society rather than at the heart is to operate under a very different set of circumstances and to acquire a very different set of power relations. More will be said on this topic in a later context, however.

In summarizing the critical character traits for achieving eminence, Cox names "persistence of motive and effort, confidence in their abilities, and great strength or force of character." In Roe's survey of eminent scientists, "the need and ability to develop personal independence to a high degree" is cited as "the most important single factor in the making of a scientist." Chambers reinforces Roe's observations with more detail:

...the creative scientist emerges as a strongly motivated, dominant person who is not overly concerned with other person's views or with obtaining approval for the work he is doing. He is not the type of person who waits for someone to tell him what to do, but rather thinks things through and then takes action on his own with little regard to convention or current "fashion". He then is prepared to face the consequences of making unpopular decisions or of pursuing unconventional paths...

The motivation and strength to pursue unconventional paths
may derive in measure from a kind of ego-centrism observed by Barron in a study of writers:

In brief, such individuals are involved constantly in the creation of their private universes of meaning; they are cosmologists all....Without wishing to be overly dramatic in this matter, I believe it is literally true that the creative individual is willing to stake his life on the meaning of his work.

All of these studies (and others not mentioned) emphasize the existence in creative people of some type of personal gyroscope such as that Riesman described for the inner-directed individual. It would be a mistake to claim that the inner-directed man of the rising capitalist bourgeoisie is identical to the creative individual, but it seems clear that they share many characteristics in common. Their individual values and goals may be very different, but the structure and mechanism, the energy and strength, the independence and commitment are very similar in both.

Birth Order and Adult Attention

It seems probable that, like Riesman's inner-directed individual, the creative person acquires the basic mechanisms of the gyroscope early in life. Biographical evidence would strongly suggest that the establishment of this gyroscope is related to the amount of adult attention bestowed upon the child in his early years. One situation that may focus a greater degree of attention on the child is that of being first-born. Indeed, being first-born is a very consistent pattern found among "geniuses."
A breakdown of the birth-order data on Terman's 1000 "geniuses" is a representative example of this pattern. Although many statistical qualifications are necessary for a precise interpretation of the data in Table II, some general tendencies can be observed. The most favorable conditions for producing children with an IQ score of 140 or above would seem to be the first or second child in a family of three or four children. Further, small families are more favorable to the production of high IQ children than are larger families, but in larger families a sex bias seems to operate such that boys at the beginning of a large family are more favored than boys at the end, but for girls, to be at the end of a large family is the second most favorable position of all.

One qualification necessary for interpreting Terman's statistics is that the small families may not have been complete when these data were taken, and the larger families may have been so spread out that the older children were not available for comparison purposes. Thus, the favorability of birth order conditions as suggested in Table II can only be tentatively suggested.

Cox did not include statistics about the birth order of her 301 geniuses, but a subgroup of 20 of the highest IQ individuals on her list was selected by McCurdy for more intensive study.¹³⁰ The raw data on birth order of these individuals generally conform to the tendencies found in Terman's sample. Specifically, 8 were first-born, 3 were
Table II

Analyses of the Birth Order of 574 Subjects in Terman's Genetic Studies of Genius*

<table>
<thead>
<tr>
<th>Position in Family</th>
<th>Boys</th>
<th>N</th>
<th>Girls</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-born or only child</td>
<td>48.2</td>
<td>305</td>
<td>46.8</td>
<td>269</td>
</tr>
<tr>
<td>Last born</td>
<td>28.5</td>
<td>305</td>
<td>26.4</td>
<td>269</td>
</tr>
<tr>
<td>Born into families of 1-4</td>
<td>84.6</td>
<td>305</td>
<td>82.9</td>
<td>269</td>
</tr>
<tr>
<td>Born into families of 1-2</td>
<td>44.0</td>
<td>305</td>
<td>40.5</td>
<td>269</td>
</tr>
<tr>
<td>1st or 2nd in families of 3-4</td>
<td>67.0</td>
<td>124</td>
<td>63.2</td>
<td>114</td>
</tr>
<tr>
<td>1st, 2nd, 3rd in families of 5+</td>
<td>59.5</td>
<td>47</td>
<td>45.7</td>
<td>46</td>
</tr>
<tr>
<td>Last two in families of 5+</td>
<td>36.2</td>
<td>47</td>
<td>47.8</td>
<td>46</td>
</tr>
<tr>
<td>First 3 or last 2 in families of 5+</td>
<td>95.7</td>
<td>47</td>
<td>93.5</td>
<td>46</td>
</tr>
</tbody>
</table>

first-born sons, 2 were only children, 2 were the only surviving sons, and 4 were last children. Out of the total 20, that leaves only one who did not fall into any of these categories. Table III details these data.

Roe's eminent scientists also follow this pattern: of the 64 she studied, 39 were first-born, 5 were eldest sons, and 2 were effectively the eldest due to the death of the first-born. These 46 subjects make up 72 per cent of her sample, and she notes that the remaining individuals were separated by a "considerable gap" from their next oldest brother.¹³¹

No one would argue that the first-born children in a family get a better selection of genes than subsequent children. A more reasonable explanation is that first-born, especially first sons, receive more parental attention. Only children obviously receive all the parental attention, and the youngest in a large family may also receive more attention than their middle siblings. McCurdy stresses the significance of this parental attention and notes also the isolation from non-family peers in the development of the 20 geniuses he studied:

Favorable parental attention may take the two forms of displays of affection and intellectual stimulation.... Remarkable indeed are the educational programs followed by Mill, Goethe, Pascal, Bentham, Niebuhr, Adams, Wieland, Tasso, and Pitt, under the encouragement, guidance, and powerful insistence of their fathers. Yet it is not the educational program itself which requires our notice so much as it is the intimate and constant association with adults which it entails. Not only were these boys often in the company of adults, as genuine companions; they were to a significant extent cut off from the society of other children.¹³²
### Table III

<table>
<thead>
<tr>
<th>Name</th>
<th>Birth Order</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. S. Mill</td>
<td>First-born: 1 in 9</td>
<td></td>
</tr>
<tr>
<td>Grotius</td>
<td>First-born: 1 in 5</td>
<td></td>
</tr>
<tr>
<td>Goethe</td>
<td>First-born: 1 in 6</td>
<td></td>
</tr>
<tr>
<td>Macaulay</td>
<td>First-born: 1 in 9</td>
<td></td>
</tr>
<tr>
<td>Bentham</td>
<td>First-born: 1 in 2</td>
<td></td>
</tr>
<tr>
<td>Leopardi</td>
<td>First-born: 1 in 5</td>
<td></td>
</tr>
<tr>
<td>Wieland</td>
<td>First-born: 1 in ?</td>
<td></td>
</tr>
<tr>
<td>Melanchthon</td>
<td>First-born: 1 in 5</td>
<td></td>
</tr>
<tr>
<td>Coleridge</td>
<td>Last-born: 10 in 10</td>
<td></td>
</tr>
<tr>
<td>Chatterton</td>
<td>Last-born: 3 in 3</td>
<td></td>
</tr>
<tr>
<td>Voltaire</td>
<td>Last-born: 5 in 5</td>
<td></td>
</tr>
<tr>
<td>Tasso</td>
<td>Last-born: 3 in 3</td>
<td></td>
</tr>
<tr>
<td>Leibniz</td>
<td>Only child</td>
<td></td>
</tr>
<tr>
<td>Pope</td>
<td>Only child</td>
<td></td>
</tr>
<tr>
<td>Pascal</td>
<td>First son: 2 in 3</td>
<td></td>
</tr>
<tr>
<td>Niebuhr</td>
<td>First son: 2 in 2</td>
<td></td>
</tr>
<tr>
<td>J. Q. Adams</td>
<td>First son: 2 in 5</td>
<td></td>
</tr>
<tr>
<td>Mirabeau</td>
<td>First surviving son: 9(?) in 11</td>
<td></td>
</tr>
<tr>
<td>Tasso</td>
<td>Only surviving son: 3 in 3</td>
<td></td>
</tr>
<tr>
<td>Pitt</td>
<td>Second son: 2 in 2</td>
<td></td>
</tr>
</tbody>
</table>

Roe does not argue the point as strongly as McCurdy, but she concurs with her observation that as children, the 64 scientists tended to be left to their own resources "more than is usual." In her composite portrait of the creative scientist, she indicates that one of the reasons for this early isolation was a greater incidence of illness in childhood. Helson's study of creative college women also indicated a higher than average incidence of chronic or severe illness in childhood: almost two-thirds of the creative women reported a sickly childhood as compared to fewer than one-third of the comparison subjects. Again, it seems likely that more parental attention may be focused on a child with delicate health than on one with robust health.

The Creative Gyroscope

Whatever the reasons for and sources of the early independence and adult attention, these circumstances appear to be important in establishing the pattern that emerges in almost all studies of creative adults, namely their self-sufficiency and need for autonomy. If these traits are critical in the full character structure of the creative individual, Riesman's metaphor seems remarkably appropriate. The inner-directed or creative person is not oblivious to the pushes and pulls and signals of the environment, but he is, like Thoreau's drummer, marching to a tune that only he can hear. It is not the signals that are important, then, but the goals and expectations of the individual; the signals will thus have extrinsic
relevance in relationship to these goals, not intrinsic relevance.

The operation of the gyroscope can also be described by the concepts of reference groups and frames of reference. By definition, reference groups are

...those groups or social categories which are especially significant to an individual in helping to define his beliefs, attitudes, and values. The individual need not be a member of his reference group; it may be a group or category which he aspires to join and, therefore, identifies with.\textsuperscript{134}

The main functions of reference groups are to set normative standards as guides for behavior and to serve as points of comparison for judging one's own situation. The operation of reference group influences has become well established sociologically.\textsuperscript{135} While a complex society contains many different reference groups providing a wide range of choice for every individual, membership in particular groups is not entirely a free choice situation, as Merton points out:

...identification with groups and with individuals occupying designated statuses does not occur at random but tends to be patterned by the enviroring structure of established social relationships and by prevailing cultural definitions.\textsuperscript{136}

Moreover, an individual may be as much influenced by reference groups of which he is not a member as by those in which he does have membership. Thus, for instance, the owner of a factory will be influenced in the management of his business by the values and behavioral norms of the labor union to which his employees belong even though he is not himself a member of that reference group and, indeed, identifies him-
self with a group diametrically opposite, namely that of management.

Merton has also addressed himself to the relationship between reference group theory and nonconformity. Nonconformity, he says, is more appropriately explained as "conformity to norms of an out-group." In support of this perspective he quotes an early social theorist, Charles H. Cooley:

"[Nonconformity] may be regarded as a remoter conformity. The rebellion is only partial and apparent; and the one who seems to be out of step with the procession is really keeping time to another music. If a boy refuses the occupation his parents and friends think best for him, and persists in working at something strange and fantastic, like art or science, it is sure to be the case that his most vivid life is not with those about him at all, but with the masters he has known through books, or perhaps seen and heard for a few moments."

The extent to which creative people consciously identify themselves as members of a group specifically labelled "creative" is not really known. It may sometimes be more a case of negative identification, that is, knowing which social groups he doesn't fit into and doesn't want to join. In all probability, however, some awareness of belonging to a "creative" reference group exists. Such, at any rate, would seem to be the point of this remark by the poet Robert Graves: "geniuses silently recognize one another by the way they come into a room and sit down."

Although some individuals seem able to set and maintain their independent life-course, they still live in society and hence are bound to come up against group pressure to conform.
A classic experiment by Solomon Asch demonstrated how effective group pressure can be in eliciting conforming behavior, even from people who believe that the group behavior is wrong. Asch's subjects were required to judge which of three comparison lines equalled in length a reference line. The subjects were tested in groups of varying size, but in all trials only one of the subjects was naive, the rest being confederate with the experimenter in giving a uniformly wrong judgment. The naive subjects thus had to choose between conforming to the group consensus or telling it like they saw it. In spite of this heavy pressure to conform, however, about a quarter of the subjects stood alone in maintaining their own judgment. Regardless of whether they remained independent or yielded, the subjects were consistent in their behavior. Such consistency thus seemed related to basic personality structure, and Asch permitted himself a few tentative generalizations in this direction:

The most significant fact about the independents was not the absence of responsiveness to the majority but a capacity to recover from doubt and to re-establish their equilibrium. Among the extremely yielding persons we found a group who quickly reached the conclusion: "I am wrong, they are right." Others yielded in order "not to spoil your results."...More disquieting were the reactions of subjects who construed their difference from the majority as a sign of some general deficiency in themselves, which at all costs they must hide. On this basis they desperately tried to merge with the majority, not realizing the longer-range consequences to themselves.

Crutchfield replicated Asch's experiment in order to gather data on the personality correlates of yielding or remaining
independent in group pressure situations. His results confirmed Asch's postulations:

As contrasted with the high conformist, the independent man shows more intellectual effectiveness, ego strength, leadership ability and maturity of social relations, together with a conspicuous absence of inferiority feelings, rigid and excessive self-control, and authoritarian feelings.\(^{142}\)

In continuing this line of investigation on the differences between conformers and nonconformers, Barron isolated one particularly interesting factor: Independents seem to prefer complexity to simplicity. He later extended the category of "independents" to include creative people since the latter also exhibited the same preference. At the psychometric level, liking complexity can be demonstrated through the selection of complex rather than simple line drawings on the Barron-Welsh Art Scale. But Barron has extended the range of inference to many areas of human behavior from interpersonal relations to politics and economics to originality. In general, says Barron,

A liking for the complex figures is related negatively to rigidity, constriction, social conformity, subservience to authority, politico-economic conservatism, and ethnocentrism; it is related positively, however, to originality, verbal fluency, expression as opposed to repression of impulse, and to cathexis of intellectual activity.\(^{143}\)

What the Asch, Crutchfield, and Barron studies have most in common is their demonstration that there is a group of individuals who consistently behave differently from the ascribed norms. Such nonconformers might thus be characterized as possessing strong internal frames of reference rather than strong
external frames of reference. Tyler has characterized this distinction in the following way:

Whereas the typical person focuses on adjusting to his environment, the creative individual tries to adjust the environment to him, to improve it in ways that he feels are urgently needed.\footnote{144}

To return to the Riesman metaphor, it might also be said of creative people that they operate by means of a gyroscope in today's electronic society. As such, the innovator is "unadjusted" or "deviant." However, Riesman is careful to point out that there is a difference between nonconforming behavior and nonconforming character structure.

A person who has the appropriate character for his time and place is "adjusted" even when he makes mistakes and does things which deviate sharply from what is expected of him....Conversely, just as nonconformity in behavior does not necessarily mean nonconformity in character structure, so utter conformity in behavior may be purchased at so high a price as to lead to a character neurosis and anomie: the anomic person tends to sabotage either himself or his society, probably both.\footnote{145}

Between the extremes of the "adjusted" and the "anomic" Riesman posits a third possibility which he calls "autonomous." Like the inner-directed individual, the autonomous operates on a personal gyroscope; and like the anomic person, the autonomous deviates from the adjusted patterns. The crucial difference, according to Riesman, is that the autonomous individual chooses deliberately to control the direction, range, and timing of his deviations. It may be, then, that the creative individual, like the autonomous, has internalized as his normative system a frame of reference reflecting the essence of this advice given by Polonius to his son Laertes in \textit{Hamlet}:
This above all; to thine own self be true,
And it must follow, as the night the day,
Thou canst not then be false to any man.¹⁴⁸

As has already been pointed out, creative people are not oblivious to the signals of the environment but rather are very selective in their responses. The evidence, in fact, strongly suggests that they are keenly aware of the behavior society wants, expects, and is happiest to reward. But in choosing to be true to themselves, such individuals are willing to go counter to social expectations. Getzels and Jackson have indicated that this awareness can be present even in children. The subjects in their study were asked to rank the qualities that make for adult success in society and that teachers prefer as well as to indicate their own ranking of these qualities in reference to their self-ideals.

The high creatives and the high IQ's agree on what qualities make for adult success in our society and on what qualities teachers prefer in their students. However...there is considerable disagreement on what qualities they prefer for themselves....For the high IQ students, the relationship between the qualities they value for themselves and those they believe lead to "success" as adults is quite close....For the high creativity students the relationship between the qualities they value and those they believe lead to "success" as adults is virtually nil....In effect the high IQ is saying, "I know what makes for success and what teachers like, and I want those qualities too"; the high creative is saying, "I know as well as the high IQ what makes for conventional success and what teachers like, but these are not necessarily the qualities I want for myself."¹⁴⁹

To be able to proceed quite deliberately on a course that is fully understood to be divergent with relation to the general society thus obviously requires a great deal of self-
confidence and strength. Everyday observation as well as historical and psychological scholarship will testify that a certain number of individuals possessing these qualities are present in every society. At intense levels of operation, such self-confidence becomes total ego-centrism and generates many points of friction between the individual and other people and thus may destroy the potentiality for productive interaction with the society. At less intensely self-absorbed levels of functioning, the energy and drive of the creative individual propel him to persevere in his accomplishments despite the resistance he may meet from the society. Those achieving individuals whom Maslow defined as self-actualized displayed this kind of productive confidence and self-sufficiency.

It was found that they had less need of other people and therefore, depending on them less, could be less afraid of them and less hostile against them. Perhaps more important, however, was their lack of fear of their own insides, of their own impulses, emotions, thoughts. They were more self-accepting than the average.¹⁴⁸

Barron has suggested that creative people may be more non-conforming partly because they feel secure in their ability to take care of themselves even when they refuse to bend with the wind of society. With this kind of security, the creative individual can then permit his mental and emotional processes to explore worlds that are taboo or threatening to the "adjusted" individual.

...the creative individual not only respects the irrational in himself, but courts it as the most promising source of novelty. He rejects the demands of society that he should shun in himself the primitive, the uncultured, the naive, the magical, the non-
sensical; that he must be a "civilized" member of the community. Creative individuals reject this demand because they perceive a shortsightedness in the claim of society that all its members should adapt themselves to a norm for a given time and place.\textsuperscript{149}

Finally, creative people probably find much of their desire and courage to be different from the fact that the creative process is personally satisfying and rewarding. Stripped of the technical jargon and theoretical and statistical esoteria, they simply like being creative. While the struggling to fulfill an inspiration and the pressures of society to conform may present difficult obstacles for the creative process, the striving itself and, if it comes, the final achievement are apparently worth the risks and costs. A passionate outburst in Emily Carr's diary reflects this feeling:

Oh the glory of growth, silent, mighty, persistent, inevitable: To awaken, to open up like a flower to the light of a fuller consciousness: I want to see and feel and expand...\textsuperscript{150}

Her words echo Barron's previously cited remark: "They are cosmologists all....the creative individual is willing to stake his life on the meaning of his work." But it should be added that it is the work, after all, which gives meaning to the life.
PART I


4 Francis O. Schmitt, "Molecular Correlates of Brain Function", in Corning and Balban, op. cit.


6 Eccles, op. cit., p. 3.


9 Eccles, op. cit., p. 9.

10 Schmitt, op. cit., p. 29.


13 Ibid., pp. 66-67.

14 Eccles, op. cit., p. 9.

15 Ibid., p. 12.

16 Ibid.

17 Ibid.

18 McConnell, op. cit., p. 51.


Ibid., p. 285.

Ibid., p. 287.


Ibid., p. 91.


Wallas, *op. cit.*, p. 92.

Ibid., p. 94.

Ibid., p. 95.

Ibid., p. 92.


37 Henry James, "Preface to the Spoils of Poynton", in Ghiselin, op. cit., p. 147.

38 Koestler, op. cit., p. 119.


40 Koestler, op. cit., p. 360.

41 Friedrich Nietzsche, "Composition of Thus Spake Zarathustra", in Ghiselin, op. cit., p. 201.

42 Ghiselin, op. cit., p. 15.


44 Peter Illich Tchaikovsky, "Letters", in Vernon, op. cit., p. 58.


46 Lowell, op. cit., p. 111.

47 Albert Einstein, "Letter to Jacques Hadamard", in Ghiselin, op. cit., p. 43.


51 Kripner and Hughes, Ibid.


53 Ibid., p. 139.

54 Ibid., p. 140.

55 Ibid., p. 137, 143.


57 Ibid., p. 2.

58 Ibid., p. 4.

60Spender, op. cit., p. 118.


63Christian Zervos, "Conversation with Picasso", in Ghiselin, op. cit., p. 57.


65Poincare, op. cit., p. 38.

66Zervos, op. cit., p. 57.


68Tchaikovsky, op. cit., p. 59.

PART II


71Ibid., p. 151.

72Ibid., p. 150.


77 McCurdy, op. cit.; Roe, op. cit., Hollingworth, op. cit.

78 McCurdy, op. cit.; Cox, op. cit.


80 Cox, op. cit.; McCurdy, op. cit.

81 McCurdy, op. cit.; Getzels and Jackson, op. cit.


84 Barron, op. cit.


88 Cox, op. cit., p. 216.


Cox, op. cit.


Royal Commission on the Status of Women, op. cit., p. 175.

Ibid., p. 183.


Ibid., p. 277.


Ibid.


Ibid., pp. 250, 230.


Cox, op. cit., p. 216.

Ibid.


Ibid., p. 110.

Ibid., p. 111.


Roe, op. cit.

J. A. Chambers, "Relating Personality and Biographical Factors to Scientific Creativity", *Psychological Monographs*, vol. 78, no. 7 (1964), whole no. 584.


Ibid., p. 36.

Ibid.

Ibid., p. 37.


Ibid., p. 20.


Ibid., p. 30.

Ibid., p. 32.

Ibid., p. 37.

Ibid., p. 27.

Ibid.

Cox, op. cit., p. 218.

Roe, in Vernon, op. cit., p. 49.


McCurdby, op. cit.

Roe, in Vernon, op. cit., p. 49.
132 McCurdy, op. cit., p. 531.


136 Ibid., p. 302.

137 Ibid., p. 358.

138 Ibid.


141 Ibid., p. 33.


143 Barron, Creativity and Personal Freedom, op. cit., p. 175.


145 Riesman, et al., op. cit., p. 279.


147 Getzels and Jackson, op. cit., pp. 34, 35, 36.


150 Emily Carr, Hundreds and Thousands, Toronto: Clarke, Irwin and Company, 1966, p. 47.
"Sometimes I ain't so sho who's got ere a right to say when a man is crazy and when he ain't. Sometimes I think it ain't none of us pure crazy and ain't none of us pure sane until the balance of us talks him that-a-way. It's like it ain't so much what a fellow does, but it's the way the majority of folks is looking at him when he does it."

William Faulkner,
As I Lay Dying.

CHAPTER 4: THE SOCIAL CONTEXT

The tradition of hero-worship and the cult of personalities has always been very strong in Western culture. For the general population, one of the outcomes of such hero-worship is the provision of models for divergent behavior as points of reference against which other people can evaluate their own efforts. But hero-worship also tends to distract attention from the real product or achievement to the personal characteristics of the hero. This diversion of focus then tends to mystify the nature of the creative process itself. Thus, the creative "hero" is depicted as being extremely different from the "ordinary" person, and this exceptional "personality" is often construed as the sole source of work which is believed to be somehow intrinsically different from that produced by "intelligent" people.

Thus, instead of being viewed as a normal, rational, regularly occurring process, creativity and innovation have been swallowed by a mystique that paints both process and pro-
ducts as peculiar or atypical and the individuals who work this way as exceptional. The general belief that "such genius is indeed rare" is perhaps epitomized in the writings of the father of eugenics, Sir Francis Galton. What intelligent and educated person could doubt, he wondered, "the existence of grand human animals, of natures pre-eminently noble, of individuals born to be kings of men."²

Such emphasis on the personalities rather than the events themselves or the social and cultural structure in which they are embedded is seen as a typical phenomenon by the anthropologist A. L. Kroeber. This tendency is due in part and certainly exacerbated by the fact that

Most of the readily accessible data of history are attached to personalities....Whether or not there was a Homer, we invent one. Little as we know of the life and personality of Shakespeare, we use his name to typify a flowering of culture. There is more written about him, probably, than about Elizabethan literature.³

In his own analysis of the relationship between personalities and events, Kroeber reverses this traditional priority and treats historic figures as agents or vehicles of cultural achievements. Within this perspective, the achievements are portrayed as being both broader and deeper in their significance than the human beings associated with them. Kroeber criticizes Galton's genetic determinism view in particular. If Galton were right, then the configuration of social change and growth should show an evenly spaced continuum of individuals displaying the "genius" that Galton glorified. But when he came to
plot the pattern of the great cultural achievements of several "civilizations", Kroeber found not an evenly spaced string, but instead little clusterings of famous names. He thus primarily refutes Galton's view on statistical grounds, concluding that,

Genetics leaves only an infinitesimal possibility for the racial stock occupying England to have given birth to no geniuses at all between 1450 and 1550 and a whole series of geniuses in literature, music, science, philosophy, and politics between 1550 and 1650. Similarly with the Germany of 1550 - 1650 and 1700 - 1800, respectively; and innumerable other instances in history.

While Galton explained such clusterings as the development of a superior racial stock in certain periods, it seemed clear to Kroeber that "genius" was largely a sociocultural construct related more immediately to environmental factors than to individual psychological or biological determinants. Assuming that the basic distribution of genetically determined potential remained more or less constant over time in any given population, then the clusterings of genius were strong evidence

...that cultural situations or influences must at times allow and at other times inhibit the realization of genius....it would seem that a large proportion, probably a majority, of eminently superior individuals never get into the reckoning of history. There are long stretches in which first prizes are not awarded, or at least are not recognized by posterity.

Thus, it is not men who shape history, but history which selects among the achievements of many potentially eminent individuals living in a given period. Further, Kroeber argues, the long, dry stretches in which "first prizes are not awarded" indicate not lack of superior individuals but an "absence of
cultural superiority [which] tends strongly to prevent inherently superior personalities from being recognized, historically."

The strongest evidence Kroeber presents in support of his theory, however, is the occurrence of multiple discoveries. Although he first discussed this phenomenon in 1917, it received greater attention after Ogburn and Thomas published in 1922 a list of 148 cases of multiple discovery in science. These instances of "inventions...made two or more times by different inventors, each working without knowledge of the other's research" are too numerous to be mere accidents or coincidence, wrote Ogburn and Thomas. In support of Kroeber's general perspective, they thus conclude that scientific inventions are more dependent on the material culture than on the superior ability of rare individuals. To this extent, inventions are then inevitable.

...the elements of the material culture at any one time have a good deal to do with determining the nature of the particular inventions that are made. For instance, a few discoveries regarding electricity made possible a great many inventions in which these fundamental discoveries were used or applied. ...The fact that so many electrical inventions followed so quickly after certain researches in electricity had been made, suggests the inevitability of these inventions. And also the fact that most of the major electrical inventions were made by two or more inventors leads one to think that electrical development was more dependent on cultural preparation than on genius.10

It should be noted, however, that Kroeber's original goal was not realized in his research; that is, he could not distil from his investigations any specific laws regarding
cycles, repetitions, or patterns of cultural achievements. The best he could do in this regard was to document the spasmodic clusterings of those cultural manifestations judged to be qualitatively high. Given the general tendency towards hero-worship in Western history, it is thus not surprising that Kroeber's relativistic "superorganic" perspective was shared by few of his scholarly colleagues. Indeed, as Marvin Harris has pointed out in his monumental review, The Rise of Anthropological Theory,

...the unconscious patterns which set the limits for the "in" look in social science and which governed the intellectual behavior of the profession's Christian Diors and Balenciagas cast Kroeber in the role of a potential if not actual wild-eyed radical. It definitely strained "bourgeois" anthropology to the limits of its patterns to insist history could be studied without becoming involved in individual biographies.\[11\]

It should be possible, however, to use Kroeber's data without necessarily embracing the full sweep of his theories. Since the study of innovation, change, and creativity has tended to become increasingly embedded in psychological determinism, a re-examination of other perspectives might be a healthy antidote against the persistent retreat into the glorification of individualism. In any case, the irregular clusterings of "genius" throughout history have not been satisfactorily explained by other theories, and it may be that Kroeber's analysis of the relationship between social forces and individuals has more merit than was first thought.
Resistance to Innovation and Change

Basic to the study of creativity is the concept of change. A peculiar characteristic of this concept is that its essence is conflict. On the one hand, changes that occurred in the past are understood to have been necessary pre-requisites for contemporary conditions. But on the other hand, stability and maintenance of established order are also considered to be essential for the persistence of society. Out of this conflict has thus come a strong tendency to resist or prohibit the occurrence of the innovations that lead to changes in the status quo. The philosopher-cum-industrial consultant Donald Schon has reflected as follows on this fundamental contradiction:

We conceive of our institutions -- nations, religions, business organizations, industries -- as enduring. Change of values is seen as deviance, undependability, flightiness. Values are presumed to be firm and constant....Yet institutions, laws, actions, occupations, professions and even our concept of character can be seen, after the fact, to have changed; it is only that we are somehow protected from these changes while they are occurring.12

Resistance to change and innovation is manifested in several forms and at several levels. At the highest level is the interaction between individuals and the general cultural environment. As discussed in the preceding section, Kroeber conceived of this interaction as an irregular alternation between inactive dry spells in which social conditions inhibited the realization of individual potentialities for superior cultural achievements and shorter periods of fortuitous resonance between the interests and abilities of a few indivi-
duals and the ambient culture.

A middle-range level of this resistance is the tendency to mystify the way in which change occurs. As Schon points out,

To the extent that we admit historical change, we see it according to the model of progress -- steady change occurring within a stable framework of values. ¹³

Thomas Kuhn, a physicist-cum-philosopher historian, concurs with this view in his analysis, The Structure of Scientific Revolutions. ¹⁴ Explanations of scientific change or progress have been particularly susceptible to mystification, writes Kuhn. The most blatant aspect of this mystification is the usual portrayal of scientific discoveries as having occurred in a neat, linear progression in which there were apparently no mistakes or unsolved problems along the way. Kuhn particularly blames science textbooks for perpetuating this myth.

From the beginning of the scientific enterprise, a textbook presentation implies, scientists have striven for the particular objectives that are embodied in today's paradigms. One by one, in a process often compared to the addition of bricks to a building, scientists have added another fact, concept, law, or theory to the body of information supplied in the contemporary science text. ¹⁵

In the field of practical or industrial inventions, says Schon, this same myth also obtains.

From the outside and after the fact, invention can be seen as the work of many interrelated contributors in which the later contributions build on past results. From the inside and before the fact -- that is, for the man who is confronted with an unsolved problem of technology or with a technical situation full of some dim promise of novelty -- it is by no means obvious how the past contains the
solution to his problem or the invention which could draw novelty out of his situation, even though in most cases he is aware of earlier work and knows that it is in some way relevant.16

Thus, he says, invention is not the coldly logical process it is often cracked up to be; rather, it "is more like exploring an unfamiliar coastline in a fog."17 But, it should be pointed out, it isn't only "others" who perpetuate the myth of how science is done or how inventions are discovered; the scientists and inventors themselves help. In their own reports of their work, innovators often mystify the actual process through a practice known as "retrospective falsification." All the blind alleys, mistakes in technique, wrong conclusions, and other deviations from the model norm of the "scientific method" are left out, and all that is included are the bits of the process that turned out to be right. Bernard Barber explains the occurrence of retrospective falsification this way:

There is... a strict convention in science that discoveries should be presented in their finished and rationalized form, with their logical structure and supporting evidence standing forth as clear and bare as possible. All else is considered distracting from the main purpose of science, which is the demonstration of the theoretical validity of a discovery. It leaves out all the errors and all the fertile imagination of the scientific discoverer.... It also leaves out the influences on each new discovery of what has gone before in science and what exists in the surrounding society.18

This practice fortifies the general tendency to resist change. The rationale for it might be that if the process that led to an innovation which caused a change can be shown to be logical and orderly, then the change is legitimized as
both "good" and "inevitable."

Resistance to change at the most immediate level is largely a matter of how individuals deal with anomaly. Scientific discovery, says Kihn, "commences with the awareness of anomaly, i.e., with the recognition that nature has somehow violated the paradigm-induced expectations that govern normal science."

Awareness of anomaly is not always easily achieved, as he further points out, because the theoretical and methodological expectations of a paradigm predispose the scientist to seeing congruities and to overlooking incongruities.

Initially, only the anticipated and usual are experienced even under circumstances where anomaly is later to be observed. Further acquaintance, however, does result in awareness of something gone wrong or does relate the effect to something that has gone wrong before.

The psychological act of perceiving anomaly has been empirically explained by Bruner and Postman in terms of expectancies. On the basis of an experiment using decks of playing cards that had been "doctored" by reversing the normal color and suit relationships (i.e., black three of hearts, red six of spades, etc.), Bruner and Postman developed two axioms to explain why a person will stall for as long as possible the recognition of an incongruity. Their basic axiom states that "perceiving is a process which results from the stimulation of a prepared or eingestellt organism." The second axiom explains the directive mechanism involved as the propensity for organizing the perceptual field "in such a way as to maximize percepts relevant to current needs and expecta-
tions and to minimize percepts inimical to such needs and expectations. In other words, we see what we want or expect to see whenever possible and ignore that which doesn't match these expectations.

Although Bruner and Postman did not pursue the question, other studies have suggested the kind of relationship that may exist between personality and environmental variables related to individual differences in the perception of incongruities. The Asch and Crutchfield experiments described in Chapter 3 could be cited as relevant to this question. Of particular importance in the Asch study, for instance, was the existence of a small number of subjects who appeared to deny even to themselves that there was a discrepancy between the group consensus and their own perceptions. This reaction was noted and defined by Bruner and Postman as a dominance reaction or perceptual denial. The findings in Crutchfield's study would suggest that those who react to incongruities with strong dominance reactions would also be those most likely to conform in accord with the group pressure. The personality patterns of these conformers includes such traits as rigid and excessive self control, authoritarian attitudes, low ego strength, and feelings of suspicion and distrust with strangers.

Resistance to change or the awareness of anomaly is not wholly a matter of psychological and perceptual expectations and predispositions, however. As Kuhn has pointed out, the kinds of questions that can be asked — that is, the anomalies
that are most likely to be perceived and pursued -- are in large measure determined by the particular paradigm in which the scientist pursues his work. Further, not only does the paradigm establish the questions that can be asked, but it also determines what data will be observed and how they will be explained. It is in this context that Einstein is said to have argued with Heisenberg, "Whether you can observe a thing or not depends on the theory which you use. It is the theory which decides what can be observed."24

The pursuit of data that will fit or confirm the prevailing paradigm is what Kuhn has called "normal science." While the ultimate goal of normal science is the maintenance of a theoretical status quo, the very pursuit of that goal eventually destroys the paradigm that directs the work. More precisely, normal science is concerned with the elaboration of detail in the prevailing paradigm, but the elaboration of detail is inevitably accompanied by the uncovering of anomalies. Some of these anomalies are trivial or merely counter-instances, but others are true and critical anomalies within the confines of the particular paradigm and cannot be explained by it. When these critical anomalies increase in number and are pursued far enough and in enough detail, the final outcome is a scientific revolution in which the old paradigm is replaced by a new one. This process has been summarized by Kuhn as follows:

Contrary to a prevalent impression, most new discoveries and theories in the sciences are not merely additions to the existing stockpile of scientific knowledge. To assimilate them the scientist must usually rearrange
the intellectual and manipulative equipment he has previously relied upon, discarding some elements of his prior belief and practice while finding new significances in and new relationships between many others. Because the old must be revalued and reordered when assimilating the new, discovery and invention in the sciences are usually intrinsically revolutionary.25

A tension can thus be seen to exist at the structural level between the assimilation of data into a prevailing paradigm and the replacement of that paradigm by a new one. Kuhn further suggests that a similar "essential tension" exists at a more immediate level, too. The normal research scientist is not a "revolutionary", but merely a "solver of puzzles", a tradition-bound "convergent thinker."

Yet -- and this is the point -- the ultimate effect of this tradition-bound work has invariably been to change the tradition. Again and again the continuing attempt to elucidate a currently received tradition has at last produced one of those shifts in fundamental theory, in problem field and in scientific standards to which I have previously referred as scientific revolutions. At least for the scientific community as a whole, work within well-defined and deeply ingrained tradition seems more productive of tradition-shattering novelties than work in which no similarly convergent standards are involved.26

This discrepancy between what the individual researcher does and what his work may actually accomplish might be seen as a productive cultural tension, but a discussion of this concept will be left to the final chapter. What is most relevant at this point is that such tension may provide some of the resistance to individual potentiality observed by Kroeber. Sometimes the interests and products of the individual resonate with the larger interests and requirements of the society. More
often, they do not; or alternatively, the forces of inhibition and resistance to novelty or change are higher. The question arises, then, as to how this tension between individuals and social structures is mediated.

The Social Control of Creative Potential

The mediating forces between individuals and social structures are, of course, legion, and several academic disciplines are devoted to quantifying and qualifying them. It might be said by way of gross generalization, however, that the central mediating mechanism is control, a force which appears to work in both directions. If the basic inertia of social structures is stability and persistence, then the basic inertia of individuals can be seen to be towards movement and change. By working against each other, the social structures keep individual actions towards change from producing complete disorder, and the constant push towards change provided by individuals prevents the social structures from stagnating in their own bureaucracies. In the context of the present thesis, creativity constitutes one of the avenues through which this social control operates in its dual directions. For the most part the literature on this topic deals with only one of these directions: from the individual to the larger society. This focus is part of the hero-worship tradition in which the creative genius is depicted as Saint George slaying some kind of dragon. Less well investigated has been the way in which societies control the creative actions of the individual citizens. It is this
latter question which will be emphasized in the remaining segment of this chapter.

It is essential for the persistence of a society that the majority of its members are capable and competent in the execution of whatever tasks are required for survival. At the most fundamental level, these tasks are concerned with provision of food, protection from danger, and the production of future members. With increasingly complex technology, these basic requirements are elaborated into an immense variety of forms, but the basic need for a high proportion of capable and competent individuals continues. In Western society and particularly North America, this basic principle plus the hero-worship tendency have promoted the concept of "intelligence" as a valuable "commodity". A huge business -- most of it concerned in one way or another with the production of future members -- has grown up around this commodity. Aspects of this proliferation such as the psychometric movement have already been dealt with in previous chapters and won't be repeated here. The point that will be re-emphasized, however, is that "intelligence" has been rewarded as particularly valuable and desirable.

Also glorified and institutionalized although in a somewhat different manner has been the concept of "creativity." When considered together, "creativity" and "intelligence" have been commonly put into an Abel-and-Cain kind of relationship to each other. It has already been argued in Chapter 2 that such a dichotomy is artificial and is done largely for the bene-
fit of social edification rather than because the results of empirical investigations pointed in that direction. And it has been argued in Chapter 3 that the cognitive processes of "mind" and "brain" are similar for both "creativity" and "intelligence." Thus, those differences that can most realistically be posited between the two seem to be related not to intrinsic factors but to extrinsic ones. In other words, what seems most critical is not what an individual produces, but the effect on others of that production.

Intelligent productions, it has been suggested, fulfill expectations and achieve the anticipated. In that sense, intelligence can be equated with conforming behavior since it follows the rules and fulfills the logic of prior predictions. According to Kuhn, this is the aim of a scientist engaged in normal research: "Bringing a normal research problem to a conclusion is achieving the anticipated in a new way..." Another example of this kind of creative intelligence in the service of the anticipated has been described in the corporate context by Schon. He argues that the most convergent thinking approaches are often found in industrial research and design, and by way of example he quotes a government official's description of the U. S. Weapons System Approach:

"To ensure that no time, money, or effort will be wasted on blind alleys, almost all of the planning is done in terms of the end products that are supposed to emerge from the program -- the weapon systems. Before any major product is begun, the planners painstakingly figure out what performance characteristics the weapon system is supposed to have and the technical innovations it will contain. The development program is
spelled out stage by stage... After the program is under way, progress is monitored at every step.28

In aesthetic productions, as distinct from scientific ones, it is more difficult to establish objective criteria for distinguishing between "creative" and merely "intelligent" efforts. But in art as in science, it would seem that the potential for dramatic innovation within a particular paradigm is greatest when the paradigm is still young and relatively undeveloped. As a paradigm or "school" becomes more and more detailed with exploration, the possibilities for achieving the anticipated in a novel way are diminished. "The fundamental fact," Kroeber suggests,

is that while twentieth-century Occidentals can still write in the manner of Goethe and compose in the manner of Beethoven, they evidently cannot do so with the same quality, else presumably some of them would be doing it. That is, the pattern possibilities are obviously exhausted.28

With apologies to both Kuhn and Kroeber, it might be said that continuing attempts to write like Goethe and compose like Beethoven are not "creative" so much as they are the pursuit of "normal art." They may be regarded as clever, but they are not novel since the form is already familiar to society.

If "intelligence" is achieving the anticipated, then "creativity" is producing the unanticipated. It is Picasso drawing a cubical woman, or Einstein conceiving of a system in which mass and energy are equated. While dramatic deviations are eventually accepted, integrated into the historical folk-lore of the culture, and regarded as inevitable, on first
presentation to the society such startling innovations may arouse reactions of shock, disbelief, and perhaps rejection. Public reaction may be so strong that the creator is forced to choose between his life and his work. Keplar retracting his laws of motion on pain of death because they were perceived as heretical in one famous example; Socrates drinking hemlock rather than retract is another.

**Techniques of Control**

The intensity of public reaction varies, of course, with each instance, but this inherent resistance to novelty seems to operate through various techniques that promote the control of creative individuals. The mildest means of indicating to an individual that he is nonconforming and his work is unacceptable is to ignore him. While it is very frustrating to be ignored or not taken seriously, this form of coercion produces the least direct pressure on the person to conform, thus leaving him with a relatively unfettered freedom to pursue his work as he wishes. In the long run, however, such a technique can be very effective. If going unrecognized for a long time causes the person to doubt or give up his work in favor of more conforming and socially rewarded pursuits, then the desired result has been achieved without incurring the problems involved in a head-on clash between a determined nonconformer and the rest of society.

If a clash does occur, it may begin in a low key and then
progress to increasing levels of intensity as the creative individual persists in his nonconformity. A low-key form of pressure might be the open disapproval and discouragement of family and friends. A more strident pressure might be ostracism or rejection from the professional or reference group whose approving recognition is most desired by the creative individual. The painter Emily Carr suffered this experience when she first began exhibiting her work: "My pictures were hung either on the ceiling or on the floor and were jeered at, insulted; members of the 'Fine Arts' joked at my work, laughing with reporters."

The most violent form of social control occurs when the individual is actually retained or incarcerated legally in a hospital, prison, or other institution. Mahatma Gandhi languishing in prison for espousing so outrageous a political technique as non-violence is an example that can be given in this context.

The amount of open and hostile confrontation that occurs between the non-conformer and the society will depend in some measure on the particular characteristics of the individual and the degree of perceived threat to the status quo. Clearly, the preference is for obtaining conformity with the least upset. Thus, attempts to control creative nonconformers by getting them back into line with conventional values and behaviors can take less unpleasant forms. One such sugar-coated manipulation is co-optation. When an individual is co-opted, he agrees to
use his abilities towards those ends established by the co-opting group which then dictates the choice of problems, the techniques for pursuing them, and the kinds of products that are acceptable. A writer employed to churn out scripts for television soap-operas, a political activist hired by a governmental agency, and a scientist doing R and D for an industrial corporation are examples of this kind of co-optation. Although the individual is still free to pursue his "real interests" in his spare time, the pervasive efforts at re-socialization that occur in any social group may, in fact, slowly undermine his original goals and motivations. Eventually he may come to share fully the values, expectations, and sense of responsibility of the co-opting group. Co-optation is thus particularly useful for the society since it utilizes for its own advantage the abilities of the creative individual while at the same time defusing any potential threat to the status quo.

If all these attempts to control creativity fail and the individual succeeds in pursuing and achieving his goals on his own terms without selling his soul to any devil, an interesting reversal occurs. After having directly or indirectly rejected the individual and his work, the society then lionizes him. Lionizing an individual accomplishes several ends. First, it maintains and reinforces the tradition of hero-worship. Second, hero-worship permits mystification since it defines the creator as an acceptable exception to the norm. The effect of this shift in social definition is that he is removed from
a category with a negative label ("nonconformer" or "deviant") to one with an acceptable label ("creative" or "genius").

According to the sociologist Howard S. Becker, the social labels attached to people not only define the behaviors that are expected from them but also tend to promote the occurrence of those particular behaviors. Although Becker has discussed labelling theory in reference to concepts of sociologically defined "deviance", the general notion of how labelling may influence behavior can be usefully employed with creative individuals as a particular sub-group of his "outsiders." The essence of labelling theory is to focus attention on the way labelling places the actor in circumstances which make it harder for him to continue the normal routines of everyday life and thus provoke him to "abnormal" actions.

The cult of personality thus places particular emphasis on the unconventional or unexpected aspects of behavior, a focus which tends both to segregate the "outsider" from the rest of society and to encourage or promote the occurrence of those behaviors most closely associated with the label. In the case of creative people, then, the dynamic is first to try to repress nonconformity, and failing that, to institutionalize it.

...being caught and branded as deviant [or creative] has important consequences for one's further social participation and self-image. The most important consequence is a drastic change in the individual's public identity. Committing the improper act and being caught at it places him in a new status. He has been revealed as a different kind of person from the kind he was supposed to be. He is labelled...and treated accordingly.
Thus, having finally "arrived" in the eyes of society, an individual may suddenly find himself honored and surrounded by various supportive props such as personal, financial, and perhaps institutional assistance. These personal props may include not only a variety of people who look after the mundane routines of day-to-day existence but also an ego-boosting array of fans, friends, and sycophants. Put all together, fame, staff, and self-perception build barriers between the individual and the society and thus promote the continuation of the "creative" behaviors.

It is also possible, however, for the label to divert an individual from his original work. In such cases, he becomes primarily concerned with maintaining the reputation which then outstrips the creative work and eventually collapses for lack of reinforcement.

It should be emphasized, though, that the traditional concepts concerning deviance are not fully applicable to the study of creativity. The "rules" that creative people break are generally not legally or even morally defined. That is, the creative individual does not commit acts qualitatively commensurate with petty thieving or prostitution in terms of "wrongness." The nonconformity of a creative individual -- while it may provoke varying degrees of shock and rejection -- does not usually strike as sharply at the heart of fundamental values as the sociologically described "deviant." Unlike the moral-breaking "outsiders" Becker describes, the creative out-
sider is rewarded once he achieves recognition. Ironically, the degree of reward may appear to be almost directly related to the degree of nonconformity and hence to the degree of social resistance and efforts at control. Thus, the more nonconforming a person is, the more his products will be resisted; but having achieved recognition for his socially valued though nonconforming product, the more nonconforming it is, the more rewarded he will be.

The basic problem for the society, then, is how to recognize officially the "deviant" who produces a socially valued product without encouraging other members of the society to adopt nonconforming behavior. One way of achieving this solution, it has been argued here, is to assign the positive label of "genius" or "creative" to individuals who without such a label would be considered eccentric or even dangerous. Such a label can work because it separates the personality from the product, designating the latter as "progress" and the former as "exceptional" in perceiving the way to such progress, and because it isolates the individual from the rest of society while mystifying the nature of the creative process.

Individual Resistance to Control

On the reverse side of this coin, the basic problem for creative individuals is how to find a way of surviving psychically and economically without compromising their values or work goals. Just as the society may pressure creative nonconformers to conform in several ways, so the individual may react to those
efforts at control in several ways. He may first of all acquiesce, give up his nonconforming work and/or life-style, and begin to behave and work in conventional ways. A popularized stereotype of this reaction is the aspiring artist or poet who finally joins his father's business firm, marries, buys a house in the suburbs and stocks it with three kids and a dog, and then pursues his painting or poetry only on weekends. Such "Sunday painters" may possess no less talent or potential creativity than the professional artists, but their self-concept and hence their values and goals are directed towards intersecting society in conventional ways.

Another reaction to resistance to creative work is to "go underground." This reaction can take one of two forms. The individual may become anomic and adopt illegitimate means to the socially designated end of achieving success. Merton has described this reaction as being "a symptom of dissociation between culturally defined aspirations and socially structured means." In the North American context, this dissociation may reveal itself when the route to a highly valued occupational goal is blocked by such social barriers as those related to race, class, sex, religion, etc. Thus, the man who cannot achieve recognition and economic success as an artist may become instead a forger. If he succeeds in this pursuit and becomes rich, he has, in Merton's conception of anomie, retained a socially sanctioned goal by substituting illegitimate means for the usual and institutionalized route to professional art.
Riesman uses the term "anomie" in a somewhat different sense. To him, the anomic person is out of step with the predominant characterological structure of the time. That is, if he is "inner-directed" when the rest of his society is "tradition-directed", he is "maladjusted" and hence anomic. Riesman thus sees anomie as a personal failure on the part of the individual rather than as a general failure on the part of society to provide adequate means to all people for attaining the culturally defined goals.\(^{34}\)

Another way for the nonconformer to "go underground" is to retreat into an "outsider" sub-culture in which both the conventional social goals and the institutionalized means to those goals are rejected. The "hippie" sub-culture of the past decade, the "beatniks" of the decade before that, and the "bohemians" of an even earlier era might all be cited as examples of this form of retreat from both the goals and means of the larger society. While the "hippy" poet may continue to write in his "communes", his goal is a privatized one -- personal edification -- rather than a desire for interacting with the larger society. While some creative individuals may limit their personal interactions with society, they nevertheless accomplish such interactions through the process of presenting their work to the society for evaluation and hopefully an economic reward.

A final way that the individual may react to attempts at controlling his nonconformity is to persevere stubbornly.
Eventually he may be rewarded if a resonance develops between his work and the culture. Unfortunately, the reward of social recognition may not come until after the person is dead. In such cases, he may be even more lionized posthumously than might have been the case if the recognition had come during his lifetime. Again, the hero-worship tradition works to magnify certain characteristics out of proportion to the total structure of relationships between person, product, and culture. More often, probably, no strong resonance develops, and the person never achieves any wide-spread public recognition for his work. This is not to say that such an individual necessarily fails to live a personally satisfying life. If he craved great public glory, failing to receive it (during his life-time, anyway) would probably promote great frustration and disappointment. But, on the other hand, it is also likely that some creative people are relatively satisfied with earning the recognition and approval of a small public. These people would be defined by the psychologist Abraham Maslow as self-actualized even though they did not achieve eminence. In fact, he points out, most of his self-actualized subjects did not display the "special talent creativeness" of the recognized "genius." Instead, they approached all the ordinary affairs of life with a spontaneity and expressiveness that permitted them to achieve the expected in a new way. Essentially, then, such individuals are "intelligent" conformers rather than "creative" nonconformers.

The discussion thus returns to the point at which it began,
that the fundamental difference between creativity and intelligence is not an intrinsic difference in the cognitive process or even necessarily any substantial difference between personality configurations. Rather, the difference between creativity and intelligence is best understood in terms of the social context surrounding it. When the product conforms to prior cultural expectations either in regard to exact specifications or to a commonly understood logic between basic assumptions and appropriate outcomes, it can be said to be "intelligent." The "creative" product, on the other hand, is also "intelligent" in that it is rational and logical, but it is nonconforming in relation to the standards and expectations of the society. The cult of personality movement which has tended to depict "genius" as possessing rare qualities not in the genetic or environmental repertoire of "ordinary" people must thus be seen as on the wrong track.

A further recognition must be extended to the part that labelling may play in promoting both the perceptions of the "genius" by society and, if he is still alive when fame reaches him, the effect on his future work of being lionized. Thus, today's "genius" was probably yesterday's "kook", and his deviation from the "ordinary man" is largely confined to his perseverance in pursuing his work despite the attempts to resist and control it on the part of the larger society.
Chapter 4: Notes


4. Ibid., pp. 10-11.


6. Ibid., p. 16.


9. Ibid., p. 83.

10. Ibid., pp. 87-88.


13. Ibid.


15. Ibid., p. 140.


17. Ibid., p. 18.


20. Ibid., p. 64.

Ibid., p. 207.

Ibid.


Ibid., p. 350.

Kuhn, *The Structure of Scientific Revolutions*, op. cit., p. 36.

Schon, op. cit., p. 7.


Ibid., pp. 31-32.


The whole world belongs to me implicitly when I have given it all up, and am wedded to nothing in particular; but for the same reason no part of it properly belongs to me as a possession, but only in idea. Materially I might be the most insignificant of worms; spiritually I should be the spectator of all times and all existence.

George Santayana,
My Host the World

CHAPTER 5: THE PRODUCTIVE TENSION

The aim of scholarship is usually said to be the acquisition of knowledge, and in a technological society the ultimate use of knowledge is control through prediction. That is, the better understood past and present circumstances are, the more accurate are predictions of the future course of events likely to be. The concern with prediction in the research on creativity has been primarily directed at two questions: who will be most creative, and under what conditions is creativity most successfully provoked? In a general sense, this concern with provocation and prediction is an extension of the control mechanism discussed in the last chapter. If change is perceived as threatening, then the tendency is for social groups to inhibit or resist it as much as possible, or failing that, to control it towards socially designated ends.

The efficient use of resources, including human resources, might thus be said to motivate the basic concern with provocation and prediction of creativity. Chapter 2 of this thesis
suggested a number of avenues of empirical research this motivation has taken social scientists. Some of the pertinent data gathered about the creative process and creative people was presented in Chapter 3, and Chapter 4 explored some aspects of the relationship between people defined as creative and the social structure that arranges that definition. This final chapter will concentrate on pursuing the conventional questions related to prediction and provocation.

Can creativity be predicted? The answer to this question must be an ambiguous "yes and no." However analysis of the second question -- under what conditions can creativity be provoked? -- will help to explain the first question. Before proceeding with the first question, then, it will be more fruitful to investigate the second.

Some General Considerations

One environment in which "creativity" has been loudly proclaimed as a guiding principle behind changes in structure and technique is education. Although much lip service is usually paid at the theoretical level to "knowledge for the sake of knowledge", encouraging "creative expression", and to "developing the whole child", at the realistic level remnants of utilitarianism maintain an educational structure in which children are separated according to ability and "streamed" towards specific destinations in the labor market. John Porter has pointed out this contradiction:
Canadian education is sometimes criticized for presenting so little for the mind, but it would be wrong to think that in this respect Canada has fallen from some pinnacle. There never has been, in any society, knowledge for its own sake on a democratic scale. At the most, that kind of education was confined to the leisure classes of earlier historical periods, or it was a monopoly of priestly castes, such as the Brahmins of India. Although modern mass education up to now has been little more than a transmission of know-how of varying complexity it could be a stage in the development of a system in which there is more for the mind and less for the market.\(^1\)

Unfortunately, however, it seems that most attempts to promote more for the mind and less for the market somehow end up the other way around. Thus, for instance, one passenger on the bandwagon of creativity has reported his development of "A Program for Productive Thinking."\(^2\) His article begins by noting that programmed learning materials restrict creativity, and then it goes on to describe a self-instructional programme for "productive thinking" in which the child is supposed to arrive at a single, "correct" solution to each problem.

More basic and hence more critical than such teaching manipulations, however, is the manner in which the boundaries of knowledge are established in the educational system. This difficult issue has been studied recently by Basil Bernstein.\(^3\) If, as he says, "educational knowledge is a major regulator of the structure of experience," then it is important to understand "how a society selects, classifies, distributes, transmits and evaluates the educational knowledge it considers to be public..."\(^4\) In his examination of the classification and
framing of knowledge, he argues that the ideology of a society as reflected in the distribution of power among its members and the principles of social control over them will determine the educational knowledge code that shapes curriculum, pedagogy, and evaluation in the school system. The shape of the educational system, then, obviously helps determine the present experiences and future social destinations of the young people in a society. Thus, it is no wonder that the schools have become particularly concerned with determining and operationalizing conditions that will provoke creativity.

The popular literature is full of advice on "How You Can Help Your Child Be Creative" and "How You Can Raise a More Creative Child." The professional literature, too, is full of articles containing nearly identical advice written in more inflated language. In both contexts, the underlying assumption is that creativity, like a garden, must be cultivated. Given soil conditions neither too acid nor too alkali, fertilizers applied in the right proportions, optimum combinations of sunshine, water, and weeding, creativity will come up as surely as radishes or peas. Such assumptions are more romantic than realistic, however, for if careful analysis is made of the environments producing recognized creative people, the general finding is that adverse conditions are more likely to yield "geniuses" than are the most self-consciously facilitating conditions.
A review of the research on environmental conditions thus indicates contradictory conclusions on this issue. Some studies have indicated that eminent individuals were more likely to have come from home environments characterized by instability, chronic illness, and psychic stress while other studies failed to find such indications of early childhood tensions. This confusion may result in part from having the focus of the research so narrowly fixed on specific instances that the general pattern is overlooked. That is, instead of directing research towards postulations about broken homes, illness, oppressive child-rearing practices, and so forth, it might be more fruitful to begin with a generalization about the existence in the experiences of the creative individual of a general sense of tension which could derive from a number of sources. In some cases, the sources of tension might arise from the early, family experiences of the person, and in other cases, the most critical sources of tension might lie outside the family in areas of intersection between the individual and society.

A broader focus of this sort could thus move research to a more structural plane which would permit not only the investigation of particular sources of tension, but more important, an analysis of the relationships and patterns between these specific tensions and the total functioning of the individual. As a first step towards this research possibility, such a structurally oriented hypothesis will be explored in these
A Definition of Tension

The term "tension" is usually accompanied with negative connotations; at worst, tension is believed to be a powerfully destructive force, and at best, it is usually portrayed as inhibiting. For instance, Dentler and Mackler found in a study of originality that when high states of anxiety were induced in their subjects, originality was inhibited. Their explanation of this relationship runs along these lines:

Anxiety, as an affecter, acts as a depressant, in that a person who is highly anxious usually cannot deal with a situation in an appropriate, goal-directed manner. Confusion, rather than purposiveness, is the result of a high anxiety state. The person loses his bearing, and therefore his attempt to be original will be affected. The more confused, the greater the degree of incapacitation, and hence, less originality will be evinced.

The Dentler and Mackler study, however, raises more questions than it answers. Although they began with the good intention of showing how social situations can affect originality, they define originality only in operational terms and anxiety not at all. Further, they were unable to account for the sex differences apparent in their results, most particularly, that their women subjects were "more original" than the men under either high or low anxiety conditions. Finally, they feebly attempt to justify their muddy inconclusiveness by blaming the primitive state of current psychometric measurements yet simultaneously forecasting this technique as the future salvation.
When the measurement specialist provides an instrument which discriminates powerfully between James Joyce and "Joe Glotz" before either begins his adult career, we will be interested. In the meanwhile, reconstruction of the life history of each seems a more profitable approach.  

Another study with even less potential for insight confirmed the usual finding of higher anxiety levels in females than in males, but it found no relationship between anxiety and self-ratings of creativity and no relationship between anxiety and scores on creativity tests. As with the Dentler and Mackler study, this one suffered from lack of an adequate definition of anxiety and also, it would appear, from an artificial testing situation.  

That high levels of tension can be both physically destructive and psychically inhibiting has been demonstrated to be true in some situations, but that is not the whole story. Tension also has its positive, productive side. The basis of motivation is almost always tension, since the desire for something arises when that thing is lacking. In this context, tension can be said to exist when there is a sense of discrepancy between what is and what could be. A metaphorical comparison could perhaps be made in which tension is thought of as a wire spring; the spring is at rest when what is and what could be coincide, but when what is becomes separated from what could be, the spring is stretched or in tension and is thus in a state of readiness for action. Tension in the pursuit of human affairs might thus be described as "the spring into action." Interestingly enough, the word "spring"
in this phrase could be linguistically defined as either a noun or a verb: it is a noun when it describes a state of being, and it is a verb when it denotes an action. The concept of tension might also be thought of as serving in a similar dual capacity: as a state of being, and as an action towards change. When the change occurs, the tension can be said to have been productive.

Tension can be lessened or resolved in several ways. One way is to perform some action that helps bring what is and what could be closer together. Another is to undergo a shift in the perception either of what is or of what could be so that they are not so separated. An example of this resolution might be to change one's occupational goal from a more difficult and remote possibility to a more accessible and immediate one. More extreme forms of relieving the tension are to give up on what could be or to become so preoccupied with what is that perception of what could be is blocked out; this type of reaction might also indicate the presence of severe mental or emotional problems.

The Productive Tension in Creativity

"It is a mistake for a sculptor or a painter to speak or write very often about his job," Henry Moore has complained. "It releases tension needed for his work."11 This comment by one well recognized for his creative work suggests that it is the first method of relieving tension — performing some
action designed to realize what could be -- that is at the basis of creativity. It takes time and energy to write about sculpting, Moore implies, and when the sculptor is writing about sculpting, then he isn't doing it. Such a diversion of potentially productive tension is obviously undesirable to the creative person who would rather channel his time and energy into the work itself.

On the other hand, as Wallas's conception of an Incubation stage in the creative process would suggest, it also appears that temporary diversion from the work, while allowing the brain to go on its Night Journey, helps reinforce the tension necessary for doing it. This particular tension may not be productive for Henry Moore, but it is probable that his life does contain other sources of tension that are productive. It is likely, too, that every individual uses tension productively in some way or another, for tension is not the sole property of the "creative" over the "ordinary" part of the population. Further, it might be postulated that the person who experiences no tensions would seem to experience no needs, and hence never does much of anything at all. The precise goals may not always be definable or obtainable, but if there is no sense of need and hence no tension, then there is also no reason for doing anything. Some amount of tension is thus of great value, then, for the business of living and certainly for the accomplishment of creative work.

Individuals vary, of course, in the kinds of tension and
the levels that are optimum for their productivity. The kinds and levels of tension are, in turn, dependent on the source of the tension. In general, there are two sources; the first might be called psychological, and the second sociological. A brief examination of these two sources might thus be useful as the next step in answering the questions about provocation and prediction.

**Psychological Sources of Tension**

It would be foolish to pretend that psychological and sociological spheres of existence can really be separated from each other. They are, of course, subtly intertwined in a variety of complex ways, but the distinction, though admittedly artificial, can be useful for the purposes of intellectual analysis. Psychological tensions might be seen as issuing from three sources: intra-familial, inter-social, and intra-psychic. Intra-familial tensions are those that arise from the particular circumstances of the person's family, the relationship of the various members with each other, and the activities and events that form the earliest experiences of his or her life. These are the sources of tension noted by Roe,\(^{12}\) for instance, in her study of eminent scientists. These men showed greater than normal tendencies towards chronic or severe illness in childhood and the early loss of a parent. Nelson\(^{13}\) in her study of creative college women also noted a decided tendency towards chronic or severe illness in early childhood. As had already been discussed in Chapter 3, the most likely significance of
early illness or a broken home is that such situations cause a certain amount of social isolation, especially from non-family peers, and such isolation probably tends to reinforce self-sufficiency and independence.

The relationship between the parents themselves and between parents and children is also an obvious source of many tensions. McCurdy's study discussed earlier of twenty eminent historical figures indicated again the exceptionally strong tendency for creative individuals to have received a high amount of adult attention generally and parental attention particularly. Another example that might be pointed to in this context of parent child relationships is the description by Lois Hughson of the life-long tension generated by George Santayana's traumatic early relationship with his mother who was widowed, remarried, and then lived apart from George for several years.

Nor do intra-familial tensions necessarily decrease as the individual reaches adulthood. Becker notes, for instance, that the young man who aspires to be a professional dance musician often encounters considerable resistance to this goal from his parents:

The musician's parents ordinarily do not aid the development of his career....The reason is clear: regardless of the social class from which he comes, it is usually obvious to the prospective musician's family that he is entering a profession which encourages breaking with the conventional behavior patterns of his family's social milieu.

And, Becker continued, if the dance musician marries, he faces another set of intra-familial sources of tension.
As a husband he is expected by his wife, typically a nonmusician, to be a companion and provider. But musicians feel that the imperatives of their work must take precedence over those of their families, and they act accordingly. Marriage is likely to turn into a continuing struggle over this issue; the outcome of the struggle determines whether the man's musical career will be cut short or will continue.

Inter-social sources of tension are those that occur in the course of social experiences and relationships outside the family. Such situations may arise in school, in the development and interaction (or lack of it) of a circle of friends, in the work relationships of the adult, and in general all those spheres in which the individual encounters other individuals and institutions outside the family. The Nobel-Prize winner James Watson has indicated that a productive source of tension of this type may have been utilized by his co-discoverer of the DNA structure, Francis Crick. In Crick's case, the tension derived from the resistance to himself and his work mounted by Sir Lawrence Bragg, the director of the Cavendish Laboratory in which Watson and Crick did their research. There was, says Watson, a considerable personality clash between ebullient, loud-voiced, nonconforming Crick who was a graduate student in the laboratory and polite, well-mannered, contained Sir Lawrence Bragg. The upshot of this clash was that Bragg, being anxious for Crick to get out of the Cavendish, forbade him to work on the DNA structure until he finished his dissertation. Crick reacted with rebellion to this prohibition and continued to work secretly on DNA; it seems likely then that this tension helped stimulate and moti-
vate his research.¹⁸

Intra-psychic tensions include the fears, phobias, superstitions, values, and habit patterns that are developed and elaborated through experiences with other people and events. This source of tension has been particularly well covered in the literature on creativity, for it is in this area of functioning that the "peculiarities" of creative people are most apparent. Schiller filling his desk with rotten apples, Goethe walking long and energetically, Malcolm Lowry, Ernest Hemingway, and Hart Crane getting roaring drunk prior to writing, Samuel Johnson stepping over cracks and thresholds always with his left foot first, and the agonizing melancholia of Jonathan Swift are a few well known examples of intra-psychic tensions. In other individuals, similar fears and habits might dominate functioning to such an extent that the tension is released not in productive work but rather in self-destruction. That is, instead of channeling the tension through creative work, it is recycled back on itself in a vicious circle. Frank Barron has speculated that this is the difference between the effective, original person and another with similar traits but whose relationship with the outside world is pathological.

...in the highly creative individual the basis for these phenomena [such as hallucinations, visions, superstitions, etc.] is precisely the opposite of their basis in mentally ill individuals. In paranoia, for instance, the fundamental ego-failure is the chronic inability to distinguish between subject and object, between inner and outer sources of experience...In the creative person, this distinction may...have been won out of childhood circumstances that are ordinarily pathogenic,
but once attained it is then maintained with unusual confidence. 19

Thus, as Barron has noted elsewhere, while creative people may be "much more trouble psychologically" than ordinary people, at the same time "they also have far greater resources with which to deal with their troubles." 20

For many creative people, the intra-psychic tensions are providential in another way, too. The richness and variety of the inner life may also provide some of the material for their work. Examples of insight into problems through dreaming have already been discussed in Chapter 3. In addition, it would seem that creative people commonly use their memories, fantasies, and sensual and physical experiences as the basis for their work. The novelist Henry Miller, for example, has said that he doesn't consider himself a writer but merely "a man telling the story of his life." 21 And the Irish poet William Butler Yeats describes his view of the personal effect of art on experience and vice-versa this way:

[No] painting could move us at all, if our thoughts did not rush out to the edges of the flesh, and it is so with all good art, whether the Victory of Samothrace which reminds the soles of our feet of swiftness, or the Odyssey that would send us out under the salt wind, or the young horsemen on the Parthenon, that seem happier than our boyhood ever was, and in our boyhood's way. Art bids us touch and taste and hear and see the world, and shrinks from what Blake calls mathematic form, from every abstract thing, from all that is of the brain only, from all that is not a fountain jetting from the entire hopes, memories, and sensations of the body. 22

(emphasis added)
Sociological Sources of Tension

Since nobody lives out a life in total isolation from other people or social institutions, psychological tensions must be seen as related ultimately to sociological tensions. These sociological sources may be generally divided into two categories: those that are infra-structural, and those that are super-structural. The infra-structural sources of tension are those social events and arrangements that impinge directly on each individual and influence the way he defines himself since they manifest definitions and actions towards him by the society generally. Particular examples of these social definitions are class, sex, ethnicity, race, occupational status, etc. As already pointed out in Chapter 3, "sponsorship" by virtue of a certain class, sex, ethnicity, or race can help the potentially creative individual realize the social label of "creative." But whether success is aided by sponsorship or is achieved with difficulty in the "contest", once labelled as creative the person makes a shift in terms of social status. Although his relationship to the larger society is somewhat changed, this change is not itself as great as the change in valuation placed on this relationship. Thus, in many respects, the creative individual is still kept at arm's length (through the various forms of control discussed in Chapter 4) from the central workings of the social structure, but the judgment of his position on the margins is reversed from the low valuation placed on being "deviant" to the high valuation placed on
"genius."

The sociologist Everett Stonequist in an analysis first published in 1937 coined a phrase that might be useful in this discussion of creativity. The "marginal man" that Stonequist first defined was a person...

...poised in psychological uncertainty between two (or more) social worlds; reflecting in his soul the discords and harmonies, repulsions and attractions of these worlds, one of which is often "dominant" over the other, within which membership is implicitly if not explicitly based upon birth or ancestry (race or nationality), and where exclusion removes the individual from a system of group relations.

While Stonequist was mainly concerned with individuals whose birth origins reflected a minority position in terms of race, religion, or nationality, much of his analysis of marginality can be seen to apply also to the creative individual. There are, says Stonequist, three stages in the life-cycle of the marginal person. In the first stage, there is no awareness of conflict; the second stage concerns the first conscious experiences of conflict; and the third stage centers around attempts to adjust to the conflict. Both the second and third stages involve a great deal of mental activity as the marginal person seeks to understand his conflict and to figure out a personally effective mode of dealing with it. Frequently, he says, much of the mental activity revolves around attempts to conform, but the individual may also seek new ways of relating to the society beyond the traditional and conventional patterns. Thus, he points out,
...the stimulus of the marginal position develops varying degrees of mental conformity or originality according to the opportunities for expression and collective movements which exist in any given situation.25

Stonequist outlines three types of adjustment an individual may make to marginality. One adjustment is total conformity to the dominant culture such that the individual is assimilated into it. Complete assimilation is not always possible -- clearly not possible in cases of obvious racial difference -- or the individual may never feel that he is a fully accepted member of the dominant culture, no matter how much he conforms to the dominant values and behaviors.

A second type of adjustment is for the marginal person to assume the role of "intermediary" and attempt to interpret the two groups to each other and thus to forge some links towards integration.

...the intermediary role of the marginal man involves a cultural relationship. This may take a creative form. His insight into the two cultures peculiarly qualifies him for this; and to the degree that it is successful he contributes to his own inner adjustment.26

Kuhn's normal scientist might be seen as fitting into the intermediary role. In one sense the researcher pursuing normal science represents the dominant social value towards persistence and preservation of order and stability (particularly in relation to paradigms of knowledge), but in another sense he is also a member of a minority group whose actions ultimately produce change through scientific revolutions. So, too, might the conventionally defined "intelligent" person be seen as an
intermediary. If he achieves the anticipated in a new way, he is applauded for his intelligence, but the stress is on achieving the anticipated, not on finding a new way of doing it.

The type of adjustment that most closely ties in with creativity is what Stonequist called the "nationalist" role. The nationalist, he says, identifies fully with the minority or oppressed group and may become a leader in the fight against the dominant group.

As an agitator, the nationalist acts as a ferment, constantly keeping old issues alive and pointing out new ones. He prevents accommodation on any particular level from becoming too fixed and crystallized. By losing himself in a cause larger than himself the marginal nationalist overrides, if he does not solve, his own personal conflicts.\(^{27}\)

Whichever form of adjustment the marginal person takes, there is always a certain degree of tension in merely being marginal, and this tension may thus promote actions toward change, some of which may be subsequently lionized.

A certain degree of personal maladjustment is inherent in the marginal situation, but it varies in terms of individuals and situations. At a minimum it consists of an inner strain and malaise, a feeling of isolation or of not quite belonging. Perhaps it is the socially sensitive but introverted person who has idealistically identified himself with a culture or scheme of life which subsequently proves unrealizable, who finds it hardest to contract his spiritual life into a narrower framework. He cannot rid himself of his earlier sentiments and aspirations; and even when he adopts the role of intermediary, or becomes a flaming nationalist, the mental tension persists as an underlying motive colouring his moods and driving his thoughts. Such personalities, when superior in intelligence and will, may become outstanding leaders.\(^{28}\)

The marginal man concept can also be usefully related to
the reference group influences discussed in Chapter 3. If being on the margins of society contains an inherent tension, then that tension can be strongly reinforced if the individual not only identifies himself with a reference group of "creative" marginals but is also recognized and labelled by the larger society as being a member of that group. Although this resonance between self and social definition may not decrease the inherent tension of marginality, it changes the social sign from a minus to a plus. Thus, having once been recognized and legitimized as marginal and nonconforming, the individual may find the social resistance to his work and his own self to have decreased. While the tension between the individual and the society may still be there, the effect on the person's work may be to facilitate the conditions for productivity and to inhibit the interventions, diversions, and disruptions that decrease productivity. In this way, the tensions relevant and optimal for productivity are intensified, and the nonproductive tensions are minimized; this situation of positive environmental tensions is clearly the ideal towards which every creative person yearns.

There is much evidence that the society in some sense also shares this view of optimally facilitating conditions for creative productivity. The rationale and techniques employed in synectics and brainstorming sessions are clearly designed to facilitate productive tensions and minimize nonproductive ones. So, also, is the multitude of schemes, programmes, devices, and
criteria designed to encourage creativity in children at school or at home aimed at structuring a positive and facilitating environment.

There is evidence, too, that the society may in some way also recognize the value of keeping some persons on the margins of the social structure. This, at any rate, is the general drift of the functionalist view of deviants or marginals. Dentler and Erikson in a study of deviance in small group situations developed three propositions to support this view. Their first proposition states that,

groups tend to induce, sustain, and permit deviant behavior...A group...tends to institutionalize and absorb this behavior into its structure rather than eliminating it. As group structure emerges and role specialization takes place, one or more role categories will be differentiated to accommodate individuals whose behavior is occasionally or regularly expected to be deviant.

This institutionalization of deviant behavior, described by Becker as "labelling", is seen by Dentler and Erikson to induce deviance for the purpose of establishing the last acceptable bounds of behavior.

...groups induce deviant behavior in the same sense that they induce other group qualities like leadership, fellowship, and so on....In giving definition to the end points in the range of behavior which is brought to a group by its membership, the group establishes its boundaries and gives dimensions to its structure. In this process, the designation of low-ranking deviants emerges as surely as the designation of high-ranking task leaders.

This boundary patrolling function of deviance is thus seen by Dentler and Erikson as an important mechanism for maintaining group equilibrium. In their argument supporting
this second proposition, they also point out that deviants within a group are necessary if rewards for conformity are to have any meaning.

The rewards of conformity... are seen as "rewarding" in comparison to other possible outcomes, and obviously the presence of a deviant in the group would provide the continual contrast without which the reward structure would have little meaning.\(^{32}\)

Finally, in the third proposition, Dentler and Erikson argue that,

Groups will resist any trend toward alienation of a member whose behavior is deviant. From the point of view of the group majority, deviants will be retained in the group up to a point where the deviant expression becomes critically dangerous to group solidarity.\(^{33}\)

Although these propositions were developed from research using small groups, Dentler and Erikson suggest that "the same general processes may well characterize larger social systems."\(^{34}\) If this is the case, then what appears at first glance to be a basic ambivalence to creativity and innovation on the part of the larger society can be explained in other terms as the provocation of a productive tension between the creative non-conformer and the conventional social structure. This is the conclusion drawn by the present author, at any rate. While ambivalence and resistance to change certainly occur, it also appears that these and similar social forces serve as tensions, the attempted resolution of which prompts original and innovative actions and products. It is in the long-range interests of the society, then, to maintain an optimal level of such productive tensions by maintaining a small group of "creative
deviants."

This brings the discussion to consideration of the second source of sociological tensions: those that are super-structural. At this level, the focus is not on institutions and relationships within a society, but the larger forces of cultural change and momentum. Kroeber refers to this as the "super-organic", a concept that was the central support of his analysis of culture. His emphasis on the superorganic was of such proportions that he denied that individuals had any value in the course of history. His argument for the inevitability of invention (a trend continued by Ogburn and Thomas, as previously noted, and more recently by Robert Merton) as evidenced by multiple discoveries perhaps goes to an unacceptable extreme. A refutation of this extreme has been offered, for instance, by Bernard Barber:

Common notions to the contrary notwithstanding, even Newton and Einstein were dependent on their scientific antecedents, yet this does not explain Newton and Einstein. The rate of scientific advance also depends on the number of creative imaginative individuals in a society. Elements in the cultural heritage do not spontaneously combine themselves into novel products. The cultural heritage only makes invention possible, not inevitable.

What the argument between these two positions boils down to is a difference in perspectives on the nature of knowledge and history. The traditional and most widely held view is what William Leiss has called the "domination of nature" credo which he explores in his book of the same title. This credo is a teleological one, for it assumes that there is a
fixed Truth and that the history of ideas has been a steady, orderly, progressive accumulation of knowledge whose ultimate achievement will be the final scientific revelation of this Truth. It is only when Nature has been fully explained that it can be absolutely dominated by man.

There have been through history various voices protesting this view of the relationship between man, nature, and knowledge. Kuhn, for instance, has suggested that in science,

We may...have to relinquish the notion, explicit or implicit, that changes of paradigm carry scientists and those who learn from them closer and closer to the truth...The developmental process described in this essay has been a process of evolution from primitive beginnings -- a process whose successive stages are characterized by an increasingly detailed and refined understanding of nature. But nothing that has been or will be said makes it a process of evolution toward anything.⁴⁰

A similar view is shared by the philosopher John Herman Randall, Jr. when he writes,

History is thus a continual readaptation of old materials, in the light of changing needs and problems....For history is a construction made by men, not by God or by metaphysical forces. Whatever pattern or patterns we may find there illustrated, are not the causes of the facts that have brought them into being, they are the resultants. They are not principles of explanation: it is they that need to be explained....Intellectually, while there has been a genuine continuity of materials in our civilization, there has been no orderly progress, no simple fixed line of development through time. There has been rather a series of successive lootings.⁴¹

These successive lootings, he argues, occur in response to changes in the needs, experiences, and general structure of society. Such changes arise in times of great conflict, hence, he implies, innovation is likely to be greatest during such
periods of social tension. While this tension between persistence and change at the cultural or super-structural level can be said to occur, it thus isn't necessary to resort to Kroeber's metaphysical "superorganic" concept.

While the super-structure of a society is bigger and somewhat removed from the direct interaction between individuals, groups, and institutions, it is not totally isolated or self-determining. As Randall points out, cultural change at the super-structural level can only come out of conflicts within the infra-structure. When such conflicts arise, the resultant tension provokes individuals to pursue work related to those problems; the increased activity thus produces a variety of novel or innovative products out of which one or a few become selected and singled out to be applied to the needs of society.

But, warns, Barber, there is a hidden trap in this line of argument. Although the existing structure of knowledge acts selectively with respect to the novel products available at a given time, this structure "is not wholly autonomous; it is influenced...by other parts of society: by values, and by religions, economic and political factors." Thus, he says, ...

...we need to take warning against catchword descriptions of the social influences of scientific discovery. Formulas will not serve us here, formulas like "invention must fit the times," or "the times must be ripe for an invention," or "social needs produces invention." Such statements are indeterminate; they beg the very questions we want answered. For instance, we know that "social need" does not always produce an invention, for many "social needs" have existed and still exist without calling forth adjusive inventions.
While a deeper exploration and analysis of these questions would be very interesting and instructive, in the present context it is only necessary to note that however it is seen to work, this tension between persistence and change at the super-structural level is potentially productive at both the infra-structural and individual levels. Furthermore, if the view supported by Kuhn, Randall, and others like them is accepted, it can be concluded that tension at the super-structural level is inherent and may be ultimately responsible for generating and maintaining tensions at all the levels below it.

Provocation and Prediction

To turn back at last to the questions that initiated this chapter, it is now easier to see why the ambiguous "yes and no" answer is appropriate to the issue of provocation and prediction. "Yes," it can be predicted that creativity will occur as the result of various tensions and in some corners of society, but "no," so far no foolproof techniques have been found for predicting which child will be Joe Glotz and which will be James Joyce. Nor can the specific creative products be forecast in advance, except perhaps in such tightly controlled situations as industrial R and D. Barber suggests a moderate optimism as the best middle road on this issue:

Obviously we are not yet capable of long-range forecasts about important discoveries which are going to affect the whole society. But something else important is left to us. We can still adopt the more modest goal of using what knowledge we have to make a continual series of short-range forecasts....This is...a recommendation that cautious optimism about
the possibilities of useful prediction of the social consequences of discovery and invention will, at this stage of our knowledge, serve us best.44

In regard to the best conditions for the provocation of creativity, it has been argued that generally speaking, innovation arises under periods of tension. This tension exists at a number of levels and is experienced by individuals in a variety of forms and with differential intensity. It would be difficult, then, to outline hard and fast rules for "best" and "worst" types or levels of tension since each individual is unique in the precise structural relationship between genetic endowment and environmental experiences that he brings to the creative process. The fairly intense sense of despair felt by Santayana seemed to be a productive tension for him, but similar levels and sources of tension have probably prohibited the realization of creative potential in other individuals. There seems to be no way of knowing how many potentially creative people have suffered this fate, for those who don't win prizes are not often recorded in the history books. The cult of personalities isn't interested in the "also rans", only in the winners.

The efficient use of human resources may have motivated and guided the goal of dominating nature through provocation and prediction, but "creativity" may prove to be more inherently elusive than other "quarries." The more it is confined, contained, and deliberately provoked, the less novel will its products prove to be since they will have been so carefully pro-
grammed and anticipated in advance. Such products may be highly "intelligent" and hence fortuitous for the society, but they can hardly be described as really "original." Nevertheless, since originality grows out of tension, the hope remains that these carefully controlled facilitating conditions will rub some individuals the wrong way and provoke tensions anyway -- perhaps arising from rebellion -- that will produce truly original and unanticipated responses.

So far, little has been said conclusively about distinguishing "creative" from "intelligent" people. The general implication of all the discussion up to this point has been that there is no "real" difference. Yet, common observation (with or without reinforcement from empirical studies) of a variety of individuals strongly suggests that some are different from others in ways that are understood to related to generic notions of "creativity" and "intelligence." Such intuitive designations are probably as effective in separating individuals into these vague categories as are the techniques and theories employed by social scientists. The most critical intrinsic difference, if one must be isolated, is the self-conception people have of themselves. Those who might describe themselves as "basically like other people" probably identify with the conventional society and accept as their own the dominant values, expectations, and behaviors; they will thus use their abilities towards maintaining personal conformity with the larger society. On the other side, those who might describe themselves as "different
from other people" probably identify either consciously or unconsciously with a nonconforming minority in the society; these individuals are then more likely to exhibit the "inner-directedness" that permits them to withstand and even sustain the creatively productive tensions produced by their nonconformity.

A final word should be extended to this discussion of productive tensions, however. Finding a productive level of tension that is neither "too hard" nor "too soft" is a difficult proposition for each person as well as for the social groups and institutions that wish to provoke creativity. In some cases the desire to eliminate the blocks to creativity are so overrun with enthusiasm that attempts are made to remove all tensions entirely. The result, unfortunately, has produced happy but uncreative individuals, and not infrequently, individuals frustrated by boredom and inactivity. On the basis of the psychic and environmental ups and downs she observed among her sample of eminent scientists, Roe tentatively concluded that,

...it would seem that a completely placid life, although not necessarily a hinderance to development, is also not necessarily an advantage...there is a strong tendency in our culture to reduce difficulties, to take the attitude that we do not want our children to go through what we had to go through, to try to protect them from many normal vicissitudes.45

Liam Hudson46 in his study of convergent and divergent thinking styles in English schoolchildren appears to share Roe's perspective when he argues that in the context of education,
My own suspicion is that progressive schools do make most children happier than authoritarian ones; but they withdraw from children the cutting edge that insecurity, competition, and resentment supply. If we adjust children to themselves and each other, we may remove from them the springs of their intellectual and artistic productivity. Happy children simply may not be prepared to make the effort which excellence demands.47

Hudson hastened to add, however, that he is not advocating a return to the old-style of authoritarian education. Such a step would be indeed backwards. Rather, he suggests, more leisurely educational practices

...may be inept, without "driving our creativity." Indeed, they may provide precisely the background of mild conformity and incompetence which reinforces the potentially original child's conviction of his own worth. They provide the ideal background against which to rebel.48

Thus, the concept of productive tension should not be used to justify a return to oppressive or authoritarian practises in childrearing or education. Instead, understanding the positive and productive aspects that can accrue with tension may hopefully permit a judicious selection and guidance of experiences that are generally facilitating without being self-consciously programmed. Such a selection and guidance is rather tricky, for too much concentration of attention on providing optimum conditions for provoking creative productivity may in itself serve as the greatest inhibition of all to its achievement. Yet, in spite of all the possible pitfalls lying in the path of realizing creative potential, some people will manage to steer a reasonable course among them anyway. In the
final analysis, the course one steers towards creative productivity is probably a matter of setting one's sights on a distant point and persisting in the journey towards that vision. In closing, then, it might be appropriate to recall Barron's description of the creative individual as a cosmologist with his sights set on the universe in a dedicated

...quest for ultimate meanings. Or perhaps it is not so much that they are dedicated as that they understand themselves to be elected and have accepted the office. What is enjoined upon them then is to listen to the voice within and to speak out....In these essentials...I believe creative writers are no different from creative individuals in all walks of life, including those whose business it is to be silent.⁴⁹
Chapter 5: Notes


4Ibid., p.


8Ibid., p. 3.

9Ibid., p. 7.


17 Ibid., pp. 116-117.


21 Henry Miller, Reflections on Writing", in Ghiselin, op. cit., p. 178.


24 Ibid., p. 8.

25 Ibid., p. 156.

26 Ibid., p. 178.

27 Ibid., p. 174.

28 Ibid., p. 201.


31 Ibid., pp. 99-100.

32 Ibid., p. 101.
33 Ibid., p. 102.
34 Ibid., p. 98.
42 Barber, op. cit., p. 264.
43 Ibid., p. 265.
44 Ibid., p. 291.
48 Ibid.
49 Barron, Creativity and Personal Freedom, op. cit., p. 249.
...the rational view of invention and innovation is more nearly correct for more nearly marginal inventions. The less significant the invention, the more the process tends to be orderly and predictable. The more radical the invention, the less rationality and predictability.

Donald A. Schon

CHAPTER 6: THE HEURISTIC ROUND-UP

In order to make explicit the crux of the analysis outlined in the preceding pages, a final round-up may be provided by considering the question: what is heuristically useful in the perspective of "creativity" developed here? The answer is necessarily complex, for it requires a radical shift in the perception of the phenomenon.

The Need for Structural Analysis

The first problem in attempting a heuristic round-up is that of form. A prime thrust in the analysis has been that "creativity" is most appropriately understood in its totality as a structural social relationship between individuals and their environment and not as a simple or even a multiplicative mixture of discrete factors. Such a thrust implies that the traditional modes of pursuing heuristically fruitful research prospects are not entirely appropriate. Although further conventional research may be quite illustrative, the logic pursued in this thesis would suggest that it is not the empirical realm as much as the conceptual that is in need of
attention. While there are always inviting possibilities for narrowly focused studies, it seems to this writer that more research along the lines of what has already been done is not needed. New directions may be forthcoming, but probably not before a large-scale overhaul and re-vamping of the theoretical aspects of the paradigm are undertaken.

The conceptual reorientation suggested in this thesis is to shift the focus from the individual factors involved in "creativity" to the structure, direction, and strength of the vectors between the various factors. Thus, while it is important to locate and understand the environmental conditions (such as birth order, social class, parental attention, etc.), the recurring patterns of personality characteristics (such as high ego strength, self-sufficiency, ambition/motivation, perseverance, etc.), and the influence of social institutions and forces (such as reference group identification and social labelling), it is the way in which these factors line up with each other that needs attention now, not further delineation of the factors in isolation.

While empirical investigations appropriate to a structural perspective are not impossible, they would obviously be very different from the conventional forms and perhaps more difficult since fewer of them have been done in the past and hence the technique itself is in need of study. The basic requisite for a structural methodology is a shift in perception both empirically and conceptually from attending to the
"figure" to attending to the "field." In practice, this means two changes: first, instead of limiting the focus to a few factors isolated from the larger background of total behavior, the focus should be widened to permit a broad view of the full behavioral matrix. Such a change would be staunchly contested by conventional practitioners, for it is inherently more "messy" and difficult to deal with many variables in relationship to each other than to isolate a few and ignore the interactions. While structural methodology might in fact be "messier", it might also produce more realistic and hence more accurate results which would ultimately lead to better predictions. Second, the conventional and convenient assumption of individual autonomy must be abandoned in favor of the more methodologically cumbersome but again more realistic recognition that the environment at all levels and in many forms shapes the experiences of every member of a society. Restricting the focus, isolating arbitrarily selected factors, and proceeding on the basis of operational assumptions and definitions may yield research results that are crisp, clear, and concise, but such results are of little use unless they can be coordinated and interpreted within an analytic framework.

A further methodological consideration that affects the direction of heuristic possibilities is the ethical question of motivation and goal: why do we want to study "creativity", and what do we want to do with the knowledge? Is the motiva-
tion an academic one -- to extend the frontiers of "pure" knowledge -- or is it a practical one -- to continue the drive towards the domination of nature by finding useful applications? The implication derived from this thesis is that the question is rhetorical and that the second of these alternatives has already been established in the "scientific tradition." The motivation, then, is practical; what of the goal? Will new knowledge about "creativity" be used in a liberal humanism to promote creative expression generally in the population, or will the directive be towards the pragmatic goal of distinguishing and developing an "elite" corps of those most potentially likely to produce acceptable creative products? Again, the question is largely rhetorical. As has already been argued at the beginning of the previous chapter, the efficient development and use of human resources has been, in fact, the prime goal of past research on "creativity."

Thus, Porter's humanistic hopes for "developing a system in which there is more for the mind and less for the market" seems less likely to be realized than Taylor's business-like rationale:

...our nation cannot depend on sheer quantity of manpower, but must strive to find high-quality personnel, especially creative persons, to deal with its vital problems. In fact, an approach utilizing sheer quantity of men and facilities can be unduly expensive...we cannot afford such wasteful and inefficient approaches.

The heuristic import of research carried out in accord with a structural perspective may be difficult but possible in
practical sense; whether it is acceptable is another issue. The implications turned up may be not only unexpected but also unpleasant if, for example, analysis of the structural forces related to the provocation and prediction of "creativity" point to the possibility or advisability of fundamental social changes. Such deep-rooted socio-structural changes would axiomatically threaten the status quo, both in the "real world" and in the "conceptual world."

Although little research using a more structural methodology has been attempted, it is not entirely lacking. Such approaches are more common in both sociology and anthropology, and even "creativity" in some of its aspects has been studied by these disciplines. What is largely lacking is an attempt to integrate the various findings into a holistic conceptualization that would encompass "creativity" at all levels of analysis: the individual, the systemic, and the epistemological. The following necessarily brief re-capitulation will outline a possible direction for building this kind of analytic framework.

The Social Construction of Creative Individualism

At the individual level the conventional conceptualizations of "creativity" have emphasized the possession of certain cognitive and affective traits, processes, and patterns of responses. The work of such men as Terman, Guilford, Cattell, Barron, Getzels and Jackson, Wallach and Kogan, and others has pointed out a variety of differences between "convergent"
and "divergent", "intelligent" and "creative" individuals. But if the focus is shifted from the figural elements involved in these distinctions to the field arrangement of them, the conceptual and practical implications change dramatically. Consider, for example, the following conceptual trajectory.

Hudson has suggested that both "convergers" and "divergers" will produce original work and that the essential difference is not in the cognitive processes themselves (or the concomitant personality characteristics) but in the choice of subject matter or field and in the style of the pursuit and presentation. As far as this writer knows, no research has directly pursued this point, but if it were to be verified, the implications are tremendous. It would reinforce, for instance, the concept of ability as a global behavioral process rather than as a multi-factoral cognitive property. More important, however, it might shift the emphasis from differentiating individuals on the basis of whether they fit the "convergent" or "divergent" model to examining the situations and styles of behavior that promote productivity within the general parameters of each pattern.

This suggestion by Hudson could be usefully extended by considering it in connection with the sociological concepts of reference group identification, marginality, and deviance. Taken together, these three concepts would suggest that "divergers" not only recognize and maintain themselves as such but also are so identified and maintained by the society.
Merton, for instance, has described in some detail how individuals look to significant reference groups in defining their beliefs, attitudes, and values. And as Stonequist and Becker have indicated, so also does the society tend to elicit certain behaviors by imposing definitions and categorizations with consequent behavioral expectations on the individual members. When a strong resonance between self and social definition develops such that an individual perceives himself to be and is similarly labelled and treated by the society as nonconforming either in a "creative" or "deviant" sense, the resultant effect will be to reinforce both the label and the behavior.

Inherent in this resonance is an interesting paradox. Although the pervasive social pressure is towards ensuring conformity to the conventional values and behaviors, Dentler and Erikson have indicated that parallel to the conformity pressure there exists a contradictory pressure towards maintaining some individuals in a marginal or deviant position with respect to the others in any given group. These marginals or deviants are essential for defining the outer limits of acceptable behavior as well as for providing fresh and stimulating inputs.

As additional reinforcement to these perspectives, Barron has suggested that creative people respond primarily to their internally defined universes of meaning instead of to the conventionally socialized cosmology and that they actively
reject the demand of society that they "must be a 'civilized' member of the community." If creative people are so motivated both personally and socially towards nonconformity, it seems probable that such behavior is habitual at the individual level and inherent in the social system. The most obvious heuristic implication of this is that attempts to "engineer" creative personalities may produce nonconformity in great abundance, but the likelihood seems dim of being able to direct it at will into anticipated and socially acceptable "creativity" rather than into "deviance."

Maintaining a Systemic Tension

This same heuristic implication seems to hold, too, at the systemic level. The developers and proponents of techniques such as brainstorming and synectics have indicated highly successful instances in which careful and deliberate provocation of "creativity" has produced remarkable results. Schon has also documented how well industry has productively institutionalized various organizational structures and techniques that facilitate "creativity" on demand. Hence, there is no denying that under certain conditions, "creativity" can sometimes be engineered. However, there is a notable qualification to this success story. As Schon has further pointed out in regard to innovation carried on in the industrial context, those inventions and processes that were most "revolutionary" in their technological effect came from the periphery of the system and not from the center. That is,
they came from individuals working by themselves or from companies that were newly established, often small, and usually science-based; they did not come from the large, well established companies in the traditional lines of business.\textsuperscript{11}

Schon points to the Manhatten Project during World War Two as establishing the model for R and D so eagerly institutionalized by industry. To the dismay of many, however, this model did not prove to be a sure-bet thing by any means.

\ldots the great message of the Manhatten Project was that if you take a clearly defined objective, with a great doctor at the head of the enterprise and a lot of sophisticated equipment, and if you funnel essentially unlimited money toward one objective, you can do anything. Industry took the lesson to heart after the war and the notion of the central research department came into being. In the late Fifties, we discovered that \ldots it sometimes occurred that if you had a clearly defined objective and a great doctor and lots of sophisticated equipment, and if you funneled lots of money into it, what you produced was scientific papers -- which was not precisely what had been expected.\textsuperscript{12}

It is Schon's final observation that poses the greatest problem for developing systemic conditions to provoke and predict creativity: even under tightly controlled conditions, you may not get what you expected. And conversely, it would appear that those revolutionary innovations that eventually invade the established systems are neither expected nor wanted but are forced upon them by persistent inventors or entrepreneurs who have productively maximized some gap or contradiction in the system.

At the root of most innovations significant enough to precipitate a change of state, there are individuals who display irrational commitment, extra-
ordinary energy, a combativeness which enables them to battle established interests over long periods of time, and a remarkable skill at guerilla warfare.\textsuperscript{13}

Once again, then, the key point seems to be that "creative" nonconformers will not be pressured into conformity when they have departed in a direction of their own choosing, and though a group or system may attempt to engineer specific outcomes, they may not necessarily get what they wanted.

Supposing, though, it were possible to control all the variables and bring probability into close proximity with certainty in regard to the provocation of "creativity." B.F. Skinner outlined such an ideal-typical situation in his novel \textit{Walden Two}. Innovation is programmed into the daily affairs of the inhabitants of this imaginary community, but what becomes apparent is that these innovations are all anticipated as responses to immediate and specifically defined needs within the community. In other words, the "creativity" that Skinner envisages would be particularistic problem-solving designed to maintain the status quo. But "creativity" as it has been envisaged in these pages shows a persistent tendency not to be so well mannered -- it insists on shattering the old traditions and imposing the threat of change, if not change itself. The dynamic of "creativity" as outlined here, then, is not to maintain the systemic status quo but to destroy it and replace it with something new. Indeed, it is this very tension between persistence and change that constitutes the essence of "creativity", and any system which is so thoroughly controlled
as to eliminate potential or real threats of basic change would stagnate and in the end either destroy itself completely or be saved by some nonconforming but "creative" change.

The Influence of Epistemological Shifts

Finally, there is the epistemological level of analysis. The persistent thread in these pages has been that the critical difference between "intelligence" and "creativity" lies not so much in the products or behaviors themselves but in the social response to these behaviors. This social response is directed in turn by whether the product or behavior was "anticipated" and whether it is perceived as threatening. If it is "anticipated" it fits logically into the existing paradigm or system. The function of a paradigm, in fact, is precisely to establish the boundaries of acceptable knowledge and to determine the operational logic by outlining the assumptions, techniques, evaluative criteria, and relationships between data. A response described here as "anticipated" may not have been exactly predicted, but it is consistent and coherent with the established order and is "anticipated" in the sense that the paradigm was already predisposed towards incorporating it. In contrast to the anticipated responses such as those Kuhn describes as "normal science", the "creative" response is unanticipated and hence revolutionary since it does not fit the existing logic but is embedded in a different epistemological framework which, though different, contains its own internally consistent and coherent logic.
If judgments of "creativity" are linked directly to the conceptual boundaries of knowledge, changing those boundaries will affect the judgments made about "creative" and "intelligent" products. Bernstein has suggested that such an epistemological shift is currently underway. As he sees the situation, the movement that is occurring is one away from what he calls "collection codes" of knowledge and towards "integrated codes." A collection code is one in which knowledge is treated as if it were private property; this means that in acquiring that knowledge, individuals narrow the range of their studies to one subject and eventually to a specialty within that subject. The "deep structure" of this approach to knowledge is one in which knowledge contents are carefully separated from each other by strong boundaries which emphasize differences from rather than communalities between subject contents. In contrast, the integrated codes center around the structuring of knowledge rather than on factual content; in this sense, integrated codes emphasize ways of knowing rather than attaining states of knowledge.

But blurring the boundaries between knowledge at the surface level changes the locus for establishing and maintaining social order, says Bernstein, and this presents a crucial problem. In collection codes order is established hierarchally and externally to individual behavior. Individual action is judged in terms of conformity to these external norms, and hence social order is proscribed above and beyond the individual
level. The problem for integrated codes is how to maintain this social order when the extrinsic organization of knowledge and power is replaced by an intrinsic organization which is centered on process rather than on product and which does not then provide the strong boundaries necessary to impose conformity from without. In essence, then, social order under integrated codes comes from within rather than being imposed from without and is dependent on individual consensus and cooperation. To this extent, socialization becomes even more penetrating and pervasive since individual deviation is more threatening when social order is so dependent on intrinsic cooperation and not extrinsic proscription.

The paradox here, Bernstein implies, is that of not being able to have your cake and eat it, too. Organic social solidarity can be maintained either under conditions where knowledge is absolutely bounded and power is imposed from without but individual action is relatively free, or under conditions where knowledge is unbounded and thus is dependent upon explicit agreement and conformity by individuals who then have less freedom for personal deviation. If ideology is not explicitly shared and acted out when integrated codes are in effect, says Bernstein, "then order is highly problematic at the level of social organization and at the level of the person." Freeing the boundaries of knowledge may thus serve to fetter the boundaries of individual behavior and may then confine and inhibit creative nonconformity even more. On the basis of his
analysis, he then concludes that

...the movement away from collection to integrated
codes symbolizes that there is a crisis in society's
basic classifications and frames, and therefore a
crisis in its structures of power and principles
of control. The movement from this point of view
represents an attempt to de-classify and so alter
power structures and principles of control and in
so doing, to unfreeze the structuring of knowledge
and to change the boundaries of consciousness.16

Conclusions and Research Possibilities

When all these points are taken together, four conclusions
seem to come out. First "creativity" in its role as "noncon-
formity" can only be judged in relation to the prevailing
epistemology and concomitant social conditions. Research on
this aspect might thus investigate the prevailing epistemology
and social conditions as they relate particularly to the
occurrence of and reaction to nonconformity. Of interest, too,
might be the study of how this epistemological tension between
persistence and change is transmitted and utilized. Any
research, however, should be predicated on the development of
a broader conceptual framework in which ways of knowing as well
as states of knowledge are examined.

A second conclusion seems to be that like the poor, the
nonconforming are always with us. Every documentation of
social structure wherever, whenever, and however constituted
indicates that nonconformers can appear in any social grouping.
Whether these nonconformers and their products are viewed as
"deviant" or "creative" will depend on the basic ideology and
social structure of the group. It might thus be useful to
investigate the ways in which various social systems deal with nonconforming behavior. Already much research has been devoted to documenting the ways in which individuals deal with the society, and it is now necessary to look more carefully at the ways in which social structure establishes the limits and orders the experiences of nonconforming individuals.

A third conclusion that seems merited is that since non-conforming behaviors are socially defined and hence related directly to particular social structures and conditions, changing these structures and conditions might change not only the definitions and hence behavior forms but also the group of individuals who will most be provoked into nonconformity. Thus, those who would be conformers under certain conditions might be nonconformers under different conditions. Of particular interest here might be a study of "creativity" as related to self and reference group identification.

Finally, if Bernstein is right and there is at present a shift occurring from collection to integrated codes with a parallel crisis in power structures, then long-range prediction is very difficult both for distinguishing the James Joyces from the Joe Glotzes and for paradigm organization generally. With such an epistemological shift, the whole phenomenon of "creativity" is cast adrift from its former conceptual and empirical moorings. Although all intellectual topics will be dislocated by such a shift, "creativity" perhaps experiences a "triple whammy." First, such periods of transition, according
to historical and anthropological evidence, produce apparent surges of "creative" activity either through lowering the various forms of resistance to innovative behavior and products and thus increasing their rate of occurrence, or through heightening their visibility to the larger society. Second, an epistemological shift will have effects not only on the objectively perceived occurrence of "creativity", but also on the intellectual efforts to explain these changes. Theoretical and empirical study of "creativity" as a phenomenon will also change in accord with the different frames and classifications of knowledge. The final bit of "whammy" becomes apparent when it is realized that the productive tension (or dialectic) between persistence and change is the organizing common denominator that is involved in every activity at every level of our life-system. Although it seems paradoxical, it can be argued that persistence is made possible because of the tendency towards change, and the tendency towards change derives from an inherent, systemic, productive tension which has here been called "creativity."

A Heuristic Forecast

A heuristic empirical forecast that might be made on the basis of these conclusions is that while there are some interesting possibilities for research suggested by the perspective of "creativity" pursued in this thesis, such short-range studies may have dubious long-range value. Specifically, three points are implied in this statement.
First, the psychology of creativity as an isolated disciplinary endeavor seems to have reached a dead-end. Further empirical research on individuals would simply be more of what has already been done, a case of flogging a dead horse, as it were. The tragic flaw in the psychology of creativity is that it has proceeded too long on the thin ice of what C. Wright Mills has called "abstracted empiricism." That is, it lacks substantial support in the form of an underlying theoretical paradigm. The data that have been collected about particular dimensions of individual behavior remain fragmented, and what theorizing has been done has been too tightly girdled by unrealistic assumptions about the autonomy of the individual in relation to the larger social structure. What is desperately needed at this juncture before any further research will have longer-range meaning is more attention to the theoretical aspects of paradigm construction and less emphasis on the mechanical aspects which have now far outstripped their antiquated and inadequate theoretical counterparts.

Second, the kind of immediate empirical research on "creativity" that might help extend the frontiers of knowledge in the short-range would be further study of the interface between the individual and the social context. As has been pointed out repeatedly, the large sociological and anthropological literature on the structure and functioning of social systems has not been much related to the large psychological literature on the structure and functioning of individuals.
Clearly, the different disciplinary emphases have much to contribute to each other generally, and such interface analysis is particularly relevant to the topic of "creativity."

Third, Bernstein's prediction of an epistemological shift is increasingly reinforced (though in other terms) by other observations. In the narrow technological sphere, the developing science of computers and systems theory already demonstrates this emphasis on ways of knowing. At a broader level of analysis, Schon has documented at some length that the present trajectory of western civilization is a movement "beyond the stable state." The stable state, he says, is essentially a fundamental and pervasive belief in constancy. This sense of constancy is imparted through the strongly framed boundaries of the collection codes which have socialized all of us. But, says Schon, society is losing faith in the stable state as it increasingly comprehends the rapidity of change occurring in almost all aspects of existence. Rationality and order must depend on another paradigm than that based on belief in the stable state. "Our need," he suggests, "is to develop institutional structures, ways of knowing, and an ethic, for the process of change itself." 18 His proposal (and prediction) is that institutions and individuals develop "learning systems" which can adapt easily to change because, in emphasizing ways of knowing, they are "capable of bringing about their own continuing transformations." 19

If Bernstein and Schon are right, the whole business of
prediction as it is currently understood and implemented is thrown for a scut. As Schon has pointed out on another occasion, "what can we do [or say] about things we can not anticipate?" It seems clear that intellectual activity on all fronts is changing in the direction suggested by Bernstein and Schon, and hence both theory and research on "creativity" seem destined to progress on new ground. This writer hopes the progress will be in the direction outlined in these pages, and the possibility that it will proceed that way seems good. But the probability of that happening is another matter. It also seems clear that attempting to predict particular "creative" products or changes that may be forthcoming would be somewhat presumptious if not outright fool-hardy. For as Schon has summed it up, "in the process of predicting invention, you are really inventing [and] prediction becomes a paradoxical effort and virtually impossible."
Chapter 6: Notes


13 Schon, Beyond the Stable State, op. cit., p. 56.


15 Ibid., p. 89.

16 Ibid., pp. 89-90.

18 Schon, *Beyond the Stable State*, *op. cit.*, p. 11.


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