EVOLUTION, CULTURE, AND PSYCHOPATHOLOGY* 1

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A. Introduction

The purpose of this paper is to examine some aspects of the relationship between culture and psychopathology in an evolutionary framework. Although genetic considerations form a crucial part of the argument which follows, it deals primarily with cultural considerations, for several reasons. First, the genetic argument has been presented by Huxley et al. (12) and by Erlenmeyer-Kimling and Paradowski (5). Second, methodologically it is impossible to deal adequately with a phenomenon one cannot reliably identify, and identification of psychopathology is entangled in difficulties which are primarily cultural. And third, theoretically psychopathology is manifested in cultural behavior, and seems to have an intimate involvement with the cultural domain.

An evolutionary perspective can help formulate questions crucial for an understanding of psychopathology, even where the data for answering them are not available. The attempt to view psychopathology in such a perspective raises the question of whether psychopathology may not be part of a more encompassing phenomenon which has also had positive adaptive significance. This paper considers one approach to this question, and suggests some kinds of research that seem appropriate.

The reasoning here may be summarized as follows:

1. (a) A genotype which survives with moderately high frequency cannot be exclusively maladaptive. (b) There is sufficient evidence, particularly through twin studies, of a genetic role in mental disorder to make it essential to consider possible genetic models over time (13, 14). (c) The lifetime incidence of schizophrenia seems to be at least 1 per cent in all populations where any figures are available (12, 15). (The lifetime incidence of all forms of psychopathology obviously must be higher.) (d) Psychopathology seems to in-

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solve adaptational disadvantages both to the individuals themselves and to their groups. (e) Its persistence therefore needs to be accounted for, organically or culturally or in terms of some interaction.

2. Like normal behavior, psychopathological behavior varies culturally; therefore, a basic problem in studying psychopathology is its identification without cultural bias. Cross-culturally applicable conceptions need to be abstract, rather than at the level of concrete behavior, which is necessarily more culture-specific (9, 19).

3. The major impairments associated with psychopathology appear in cultural performance. It therefore seems reasonable to consider possible adaptive advantages in cultural terms, while not dismissing physiological hypotheses. Our highly tentative resolution of these problems uses the model of a balanced polymorphism, involving cultural unpredictability occurring as personal reactivity and cultural innovation on one hand, or as personal mental disorder and cultural disruption on the other.

B. GENETIC CONSIDERATIONS

In considering genetic models of psychopathology, or schizophrenia, over a long time span—thousands of generations—the following alternatives are possible. (a) If there is a specific genetic complex or factor it either has a long history or is of recent development. If it has a long history, and has not tended to disappear, then—by definition—it cannot have been exclusively maladaptive. If it has recently become exclusively maladaptive, one would want to ascertain the ecological changes that have made it so. If instead it is a recent genetic development, one would want to know why it has apparently spread to all parts of the world and in fairly large numbers. (b) Alternative to a specific genetic base, there may be an interaction in which certain genetic features in certain environmental contexts, but not others, produce pathology, whereas other genetic features require other specific environments for the production of pathology. If the relevant aspects of the cultural environment change more rapidly than the genetic make-up of a given population, rates of pathology might rise or decline because of a difference in the interaction of these two “components.”

Psychopathology seems adaptationally disadvantageous in at least the following ways: (a) it requires some group expenditure of energy in the handling of the mentally ill; for economically marginal groups, as many of our early ancestors must have been from time to time, such extra energy expenditure might be expected to have been especially harmful; (b) it presumably has
involved occasional serious destructiveness, especially when occurring in persons in positions of power in a group; and (c) if modern evidence—the only evidence available—is relevant for earlier periods, fertility rates have been lower and mortality rates at younger ages have been higher for the mentally ill than for those who presumably are not mentally ill (6, 24). (Different mating practices, however, may tend to emphasize or to eliminate the fertility difference.)

If there is a limited and relatively small number of genetic conditions involved in psychopathology, or in a specific diagnostic grouping, the arguments regarding compensating adaptive advantages are warranted; if there is an unlimited or large number of possible mutations associated with any given form of psychopathology, no compensating advantages are necessary to account for its persistence. In addition, if the apparent disadvantages are not real, the argument is not warranted. It is assumed here—seemingly in accord with prevailing opinion—that the genetic bases of psychopathology are limited in number, and that psychopathology does in general somewhat reduce survival and fertility.

The problem an evolutionary model raises here is not specific to psychopathology. One always needs to account for the persistence of phenomena which have certain clear individual and group disadvantages, whether one accounts for them biochemically or behaviorally. This is obviously also true for diabetes, semantic ambiguity, and broken legs; but it may be useful or trivial (as perhaps in the case of the breakability of bones) to view the phenomenon in a framework designed to clarify its adaptive significance. Psychopathology has certain special characteristics, particularly in terms of the complexity of its dependence on culture, which seem to us to warrant such consideration.

The particular resolution suggested here to the paradox of continuing high rates of genetic transmission of an evidently maladaptive characteristic uses the model of a balanced polymorphism—an underlying entity or process which under different conditions has opposite adaptive significance, developing in ways which are advantageous to individual and cultural survival under some conditions and disadvantageous under others. In the purely physical realm for human beings, the best known example of balanced polymorphisms is the sickle cell complex. When malaria is present in the environment, the gene for sickle cell is advantageous to the population, because individuals who are heterozygous are more resistant to the disease than those who are homozygous for the normal hemoglobin. When no malaria is present, sickling is disadvantageous because of the fatal anemia of those homozygous for the sickling gene.
While we would not suggest so neat a picture for psychopathology, one might be able to arrive at something as neat for some particular types of psychopathology (1, 17).

In a recent article, "Schizophrenia as a genetic morphism," Huxley, Mayr, Osmond, and Hoffer (12) suggest, as possible compensatory advantages, high resistance manifested by schizophrenics to "surgical and wound shock . . . to visceral perforation . . . to arthritis . . . and probably to many infections." They refer to possible increased resistance to smallpox and bubonic plague. They also suggest, though without evidence, a possible reproductive advantage in those who are carriers of the relevant gene but do not manifest the disorder. Relevant to this, Erlenmeyer-Kimling and Paradowski (5) report preliminary findings on fertility rates for two samples of siblings of schizophrenics. In one sample, fertility rates are the same as in the general population; in the second sample, they are much higher. It is not possible yet to evaluate the significance of these data.

C. CULTURAL UNPREDICTABILITY

Without discounting possible physiological advantages, the cultural characteristics of mental disorder also suggest exploration of possible cultural advantages. Cultural unpredictability was mentioned earlier as a conception associated with psychopathology, but not restricted to psychopathology, and which may be broad enough yet potentially precise enough to be useful for this purpose. As will be elaborated below, cultural unpredictability may confer adaptive advantage or disadvantage to individual and group, depending upon its conditions of occurrence.

We should state here briefly what we mean by "culture." Culture refers to a more or less integrated system of codification of behavior in a social group; a system involving the categorization of phenomena and principles for combining categories of phenomena into classes. The infinitely varied environment in which any animal species functions must be ordered by some sort of programming of what to attend to and how to attend to it: i.e., the screening out of irrelevant input and screening in of relevant input. For human beings, socially based learned classification of events and objects constitutes a large component of this programming, and this is what we are calling culture.

Given the fact that the learning is itself social, a high degree of articulation in codification and in the enactment of the code in behavior may be expected for members of the same social group.

Whatever the cause, the disturbance in mental illness involves the cultural realm. The encoded behavioral repertoire of the mentally ill individual, and
his utilization of these codes, do not correspond well to the codes of those he interacts with, as reflected in the fact that his behavior doesn't fit with theirs. This produces a situation in which it becomes difficult for others to anticipate, predict, or interact with the deviant person; or, in other words, they can not "understand" him. Although prediction of behavior is not always successful in normal individuals, since there is always an element of uncertainty in any prediction, one can usually predict with a greater or lesser margin of error the classes of events that may occur next. As a very simple example, if I have just said "Hello" to someone, I cannot say whether he will say "Hello" or "How are you" or "Nice day" or smile or nod or, less probably turn his head away and pointedly ignore me; I can say that he will initially make one of a number of greeting responses, rather than run away, cry, or recite the multiplication table, none of which are, for us, greeting responses (although at least one of them is a greeting response elsewhere).

D. Definition and Identification of Psychopathology

Psychopathology can accordingly be defined in terms of reduced cultural predictability. This conception is related to that of Ralph Linton (16), who discussed reduced responsiveness to social sanction, and even more closely related to the more recent definition by Anthony Wallace (21) in terms of what he calls "desemantication" (loss in the significant dimensions of a meaning system). Cultural predictability, however, can be measured by tools already available, and seems for that reason to be a preferable definition. Furthermore, while psychopathology involves a reduction in cultural predictability, there are also other conditions which are viewed as nonpathological and even culturally valuable in which a reduction in cultural predictability occurs (e.g., "genius"); and there may be some advantage in dealing with the more inclusive conception. Cultural unpredictability does not define psychopathology, but a broader domain. Within that domain, psychopathology is characterized by a process of cumulative noncongruence—continuously or during certain periods—rather than episodic noncongruence resolved by alteration of the individual's mode of behavior, or its incorporation through alteration of the modes of others.

The concept of cultural unpredictability thus has possible general methodological value, as well as possible relevance to a balanced polymorphism for psychopathology. This will be discussed with research suggestions in one particular area.

One basic methodological value is in the definition of the phenomenon. Exploration of psychopathology, by all the many disciplines dealing with it, has been hampered by the lack of a good basis for its identification. This must rest
on appropriate definition. An appropriate formal characterization or definition of psychopathology must be cross-culturally applicable (across both space and time) and must have an ascertainable relationship to observable behavior.

Work in the descriptive characteristics of psychopathological behavior and its distribution in different populations reveals that the kinds of behavior that have been treated as symptomatic of illness have varied a great deal across cultures and across time. Even over a relatively short period of time, between the last century and this one, the change has been so great that last-century "classical" symptom patterns are rarely found in today's hospitals. In practice, mental illness is primarily defined by the disturbances it creates in its immediate surround; only secondarily may associated characteristics which are not themselves necessarily disturbing be abstracted as cues or symptoms (8). Neither the primary disturbances nor the secondary cues need be the same in very different cultural contexts. It is clear, and by now widely recognized, that culturally relative standards must be used in studying psychopathology. The terminology itself—e.g., "abnormal"—implies relative standards; and relative standards are essential to avoid diagnosing as mentally ill mere disparity from certain Euro-American traditions—for example, visions. However, if individuals or behaviors are considered ill solely on the basis of being so defined by their own culture group, comparability is lost. The phenomenon is then defined in such a way that questions about relative incidence, for example, can mean only "how much illness does society X 'think' it has?" Investigations of the extent of unrecognized illness become by definition meaningless. The question also arises of what to do with the individual or the kind of behavior which is judged sick by some but well by others of the same cultural group. A usable standard of judgment must consider behavior relative to its cultural context; but the standard itself must be invariant. It must therefore be formulated at a level of abstraction above that of concrete behavior. Cultural predictability would seem to be such a conception.

In terms of applicability over the whole time span of human development, it would perhaps be more appropriate to state this criterion negatively: a definition should not lead to implausible conclusions about earlier human organization, human organisms, and psychopathology. Present knowledge is not adequate, even to look for paleological evidence on psychopathology. The value of such a perspective is simply that it helps to set the problem in larger terms. Any model to be applied to contemporary conditions must be capable of handling plausibly what is known about older populations, both culturally and organically. What might have been the effects on a group of six or 10
or 30 individuals, with limited tools and no direct control over food supplies, of an adult psychopathological member? Would the group's social organization change, would the group die out, would the individual die young and without progeny? Do other primates show signs of psychopathology in natural conditions, and how would one identify it? Hebb (11) thinks that spontaneous disorders do occur in chimpanzees living in colonies, such as the Yerkes Primate Station provides, and has reported two such cases. Very tentatively, primatologists report a marked increase in nervous and aggressive behavior as population density increases, and in caged or laboratory as against natural conditions. If such suggestions hold up under more extensive primate studies, it will be important to determine the relevance of these patterns of behavior to human psychopathological behavior and its evolution.

A final criterion is that a definition have a simple relationship to observable behavior. Any selection of behavioral units that can be observed can be treated experimentally and mathematically in terms of predictability. The concept can be defined and worked with quite precisely and translated with clarity into operational terms.

The definition suggested involves cultural predictability. However, culture is generally conceived to be a specifically human phenomenon. Thus, the definition must be altered, or the concept of psychopathology must be limited to human beings, or the concept of culture must be modified so as to include infra-human organisms. The alternative of restricting psychopathology to human beings is not an acceptable one, since it makes a judgment by definition which should rather be made empirically, and it also cuts off needlessly an exceedingly useful source of evidence from animal observation and experimentation. While it seems that the concept of culture as an exclusively human phenomenon would in fact benefit from modification (22), it is more to the point here to take from the concept those aspects which are crucial for the immediate purpose, and not for the time being argue the larger question. What is relevant is the systematic codification of behavior. Behavioral units are combined into categories with differing degrees of sequential acceptability. A class or category does in fact exist when a number of discernible units do function as mutual substitutes in some contexts. For real groups of organisms—societies—with histories of interaction, interdependencies among the component organisms will have developed with regard to the structure of those behavioral categories and their appropriate sequences. The kind of predictability of in-

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2 American Association for the Advancement of Science, Primate Symposium, Montreal, Canada, December, 1964; and P. Jay, personal communication, New York City, 1964.
terest here might be referred to as systematized category predictability, rather than cultural predictability. (It is incidentally irrelevant whether all the organisms in interaction belong to the same species. The categories in use need not be the same; they only need to operate in the same system. Thus it is not inconceivable, for example, to create or to recognize departures from predictability for laboratory chimpanzees who interact only with humans—or for the humans who interact with these chimpanzees.)

E. Possible Adaptive Advantages

Three possible kinds of adaptive advantage of states or symptoms often associated with psychopathology will be briefly considered. Two obvious forms of cultural utilization of such states will be mentioned before suggesting a more interesting but less clear possibility. The two obvious forms both involve social control. First, it might be noted that recent epidemiological studies find only a fraction of the population (e.g., about 1/5 in the Midtown Study) to be free of symptoms associated with psychopathology (20). This does not mean that the rest of the population is sick; nor should it even be taken to mean that the symptom-free are necessarily in better mental health than the rest of the population. It does, however, mean that many of the characteristics which occur in the mentally ill, and which are involved in our identification of them, occur in most people. Human susceptibility (though not necessarily exclusively human) to such partially learned psychic discomforts as worry, anxiety, guilt, shame, etc., with their related insomnia, depression and sometimes planning and action, is part of the basis on which humans are trained and maintained in socially expected patterns. Thus, even though we regard anxiety, guilt, shame, etc., as significant in psychopathology, they are also harnessed to socially "useful" purposes. Second, the folk category "crazy" (a more appropriate term in this context than its medical substitutes) is probably essential as a cultural waste-basket category. In addition to more or less specific pathological patterns, it contains all those things that are not to be done or thought but are not ruled out by more specific dicta. In our own culture, it has in recent years included such examples as three white Freedom Riders in the South, hospitalized rather than jailed since they must have been crazy; a navy officer who, at court martial, was judged insane because he unswervingly applied every detail of the regulations he was supposed to enforce, thereby creating chaos; and—perhaps—the subsequently hospitalized navigator on the weather plane of the Hiroshima atom bomb mission, who denied being a war hero and publicly acclaimed himself guilty of mass murder. It is not at all unlikely that the latter two examples were in some sense mea-
tally disturbed. But what is interesting about these cases is that the disturbances created by their behavior simply do not fit well into areas better defined by the community, such as crime or even immorality. They have no special category, since they do not fundamentally involve specified breaches of rules, and that is what they seem to have in common.

The more interesting (and more speculative, though researchable) possible utility of psychopathology to culture is suggested by our conception of the nature of psychopathology, and by the fact that cultural organization involves ever-changing degrees of repetitive and creative performance. An unusually high degree of repetitiveness of performance, even of quite ordinary bits of behavior, is culturally unpredictable, just as is the creation of new bits or new sequences; a highly repetitive performance is, in fact, a new sequence. Extremes of stereotypy and idiosyncracy may be disadvantageous under any cultural conditions; but it may be that such tendencies, in modified form, are highly useful under certain kinds of cultural conditions. There is still no agreement, for example, after years of discussion, as to whether many shamans —using, for example, trances for diagnosis and for a variety of culturally important predictions— are to be considered psychopathological (16). There is no question, however, that they are significant members of their cultures, often occupying creative positions. Thirty years ago, Ruth Benedict (3) suggested the one-track-minded American businessman as another example of culturally channeled pathology. Both the outstanding shaman and the outstanding businessman (of an earlier generation, at any rate) are relatively creative of behavior patterns which they then use repeatedly and which are to some degree imitated by others. In these cases, the patterns have slightly altered the overall cultural codes, rather than simply disrupted them. It may be worth considering whether "creative" deviation and "pathological" deviation rest on the same genetic base. The crucial difference may lie in the characteristics of the individuals (such as the genetic environment), the cultural conditions, or an interplay between them.

F. Relevant Research Approaches

In discussing relevant research, it is necessary first to distinguish cultural from individual predictability; and second, to elaborate briefly on the concept of predictability as it is treated in information theory.

The kind of predictability relevant here is that which develops out of culturally coded social categories. For a complex of reasons—neurological, social, etc.—the process of acquiring and using these coded categories has considerable variation, resulting in a number of individuals whose code-content
manner of code-use is noticeably different from others of the same wide social group. Depending on the general social conditions of the group at that me, and the individual’s position within it, as well as on the nature and degree of the difference between his code and the codes of others, this difference may become the basis of "creative style" or of intolerable deviance. The psychotic individual may, if well known to the observer, be equally or even more predictable in idiosyncratic terms than the nonpsychotic; but his behavior is not well predicted on the basis of socially operative codification. We will not attempt to summarize all the types of such behavior here, but they include such features as failure to perform a culturally appropriate role, violence against culturally inappropriate objects, etc. (It should be noted here that here is also cultural codification of psychopathological behavior and there are some well formed behavior patterns essentially reserved to the mentally ill. It seems likely that such patterns are taught and learned, that they involve the patient and those around him in a tacit agreement as to role change—temporary or permanent—and that they must occur later than the initial disruptions to culturally coded interactions.)

Information theory helps to provide some useful research tools (2). Predictability can be measured in terms of variation within some entity—let us say an individual’s performance of some task—or in terms of that entity’s deviation from some outside criterion—let us say some other individuals’ expectations (predictions) about that performance. Such measures may also differ in terms of the magnitude of the component units selected. As an example, predictability in a passage from a book may be high for letter sequences but low for word sequences. It may in addition be different measured in terms of internal predictability and measured in terms of someone’s guesses (predictions of letter sequences, word sequences, etc.).

A crude classification can then be made along a double axis: internal—external (social), and low-order—high-order (or "micro-units" and "macro-units"). Related distinctions have implicitly been utilized in some analyses of psychopathology. For example, the individual with low predictability on all grounds is a disorganized psychotic; with high idiosyncratic predictability (internal redundancy) but low social predictability on macro-units, the individual is probably paranoid; whereas with the same combination on micro-units, he is probably a compulsive neurotic. We would suggest that the "genius" might be described as having low predictability on all micro-units and social measures, possibly with high predictability on idiosyncratic macro-unit measures.

Performance on a variety of speech tasks seems to be one highly relevant
kind of empirical material to utilize here, since it involves cultural performance, and is in a domain that has permitted much more exact analysis than most other kinds of cultural performance. Here one finds indications that although the degree of redundancy, at the word level, internal to the verbal message of a mentally ill person (idiosyncratic predictability) tends to be higher than is the case for normal individuals (10), the predictability of parts of the message as gauged by normal individuals who are presented with an incomplete version of it (social predictability) is lower than is the case for the verbal protocols of normal individuals (18).

For the questions raised here about the relation between psychopathological and nonpsychopathological behavior, intracultural tests would be appropriate. Individuals judged psychopathological with a high degree of consensus among those of the same culture or cultural subgroup, as compared with those judged normal and with those judged creative (or a comparable concept) by the same kind of consensus, may be quantitatively evaluated with respect to intra-individual and group predictability in their use of existing cultural categories. Language use, as mentioned earlier, is an area of behavior which is methodologically convenient, and which has also been considered by many to be crucially involved in psychopathology (7). In addition, individuals with known biological relation to persons judged ill would be similarly evaluated.

The problem of evaluating nonhuman species is obviously more complex, because of the initial difficulty of abstracting from observed behavior the classes actually in use. However, the potentiality for experimental manipulation of such behavior is obviously much greater.

Paleological inferences can perhaps be made on the basis of primate behavior, and possibly on the basis of archaeological evidence, particularly artifactual, if that were to be evaluated in relevant terms (4). More direct paleological evidence would seem to be contingent on the finding of organic symptoms which could have been preserved in early human and hominid fossils.

In addition, an understanding of mental disorder would be facilitated by clearer information on associated physiological responses, some of which may be independent of cultural differences. If differential responses could be established for sets of psychopathological individuals, it would become possible to recognize vulnerability to mental disorders regardless of culture and regardless of the actual development of the illness. Such differential responses have been tentatively suggested in a variety of laboratories in such disparate responses as evoked potentials to stimulation of the ulnar nerve, reaction time studies in which the expectancy of a given stimulus was varied, two-pulse threshold, auditory localization of sound, and a variety of other techniques (23).
The question could then be raised more directly as to whether such detected vulnerability would be found to be specific to mental disorders (or some specific type of mental disorder) or whether it may instead be a vulnerability (if we would still want to use that term) to some underlying process which is apt to emerge as mental disorder under some conditions, but as a fundamentally quite different state under other conditions. In other words, does the vulnerability have the potential for only negative or neutral alternatives, or is it balanced by some culturally positive alternatives?

G. SUMMARY

In summary, we have tried to suggest that it may be useful for an understanding of psychopathology, as for many other phenomena, to view it in terms of long-term adaptive processes. Such an orientation does not yet provide a theory of psychopathology: we have not the detailed information on the basis of which to choose among a variety of potentially plausible interpretations. We may, however, be able to obtain some of the necessary information fairly readily, by formulating a few of the more testable propositions relevant to human organic-cultural evolution.

We are also suggesting that cultural unpredictability of behavior may appropriately characterize both psychopathology and creativity or "genius." The mathematics of information theory can be applied to individuals' modes of using socially created behavior classes. If those judged psychopathological show formal similarity with those judged creative, when compared to the "normal" populations, we should explore further the question of whether this reflects some partially common process or is a mere metaphoric accident.

There are two kinds of information measures that have been used, one a measure based exclusively on the performance of a given subject, the other based on the responses of others to that subject's performance. Purely speculatively, we are suggesting here that the information measure based on others' guesses would show higher uncertainty or unpredictability for both the "genius" and the mentally ill than for the "normal" population; whereas low-order measures internal to the performance (intraindividual) would show lowest uncertainty for the mentally ill and highest uncertainty for the "genius."

Moreover, the same basic approach should be applicable both to artifactual remains of earlier cultures and to other species, of which the other primates would be of greatest immediate interest. Earlier primates, including our own early ancestors, could not be directly studied without much better organic data than we now have; in fact, it is not highly probable that we will obtain
organic clues which can be investigated in early fossils. Systematic study of contemporary human populations, directed in part to integration with archaeological and primate studies, should, however, provide the basis for good inferences about the evolution of psychopathology and its adaptive significance in the course of human organic-cultural evolution.

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