Analysis of Psychosocial Development

Chapter III
Explanation Scheme

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Chapter III
Explanation Scheme

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INTRODUCTION

In an explanation scheme, the relationships between categories are intended to restrict the permissible fluctuation of values within the categories. The essential features of explanation schemes are the operations performed on the categories, which generate such restrictive relationships. The main purpose of this chapter is to indicate the range of propositions that can be generated within our frame of reference, by the various explanatory operations.

We shall first describe the formal structures of the mode of explanation appropriate to the study of development. This mode differs fundamentally from other modes of scientific explanation, such as deterministic, functional, and stochastic explanations. We shall call it genetic explanation. Theories that use this mode of explanation will be referred to as genetic theories.

Then we shall discuss the differences between endo-, exo-, and epigenetic theories, and the explanatory devices used especially in 🕮 88 epigenetic theories of psychosocial development.

Third, we shall describe an area of agreement between several theories of development of the psychosocial system, or of its sub-systems, or of external systems that are epigenetically relevant for psychosocial development. These theories agree in principle on a description of normal human development in terms of a succession of specific stages.

Next we shall describe a type of external structure that is complementary, within an epigenetic formulation, to the concept of a system undergoing development. This structure, which we call an ejective channel, will then be used to define lexically our concept of an educational institution.

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THE NATURE OF GENETIC EXPLANATION

The genetic type of explanation is the most complex and least developed of the types of explanation used in science. Despite an occasional attempt by

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logicians or philosophers of science to systematize this type of explanation,[3] the only significant development has occurred in mathematical physics.[4]

The need for a genetic type of explanation arises under the following circumstances. In a state-determined system, the knowledge of the regular relationships between the state-variables, and the knowledge of the values of the state-variables at one instant of time, are sufficient for the prediction of the state of the system at any other time, past or 🕮 *90* future. In a graphic representation, the relationships between the variables, plotted also against time as an external coordinate, constitute the permissible lines of behavior of the system. A measurement of the state of the system at one point of time, plotted into the same graph, will fall on one of these lines of behavior. This selects from among the permissible lines of behavior the actual line of behavior of the given system. For any value of time, there is then a corresponding unique state of the system.

Imagine, however, that two lines of behavior intersect and that the measurement of the state of the system at a given time locates it exactly at the intersection. How can we tell which of the two lines represents the behavior of this particular system? If we insist on a deterministic explanation, we will search for a new state-variable (a new dimension) that will separate the two lines of behavior at the point of their intersection. If we find such a new measurable variable, the problem is solved.

If we do not find it, or if it can be shown that more state-variables would be needed for an elimination of all intersections than we can handle computationally, or than it is practicable to measure, the problem 🕮 *91* remains. There is only one alternative solution.[5] If we can extend the period of observation from an instant to a definite interval or two instants of time, we shall observe the system approaching or leaving the intersection. This will select the line of behavior. A system that requires this procedure for prediction is said to exhibit historicity.

Under the circumstances described we no longer can predict for all time. Since we are operating with an incomplete set of state-variables, state-variables not represented may at any time begin to affect significantly the behavior of the system. The relationships between state-variables can be at any time modified by the manifestation of hitherto latent influences. From the available information, we can only make a limited prediction by extrapo-

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3 Cf., for example: HARRIS, D. B. (ED.). (1957). *The Concept of Development: An Issue in the Study of Behavior.* Minneapolis MN: University of Minnesota Press. HEMPEL, C. G. (1942). Function of general laws in history. *The Journal of Philosophy,* Vol. 39, pp. 35-58. NAGEL, E. (1953). The logic of historical analysis. In: FEIGL, H. AND BRODBECK, M. (EDS.). *Readings in the Philosophy of Science.* New York NY: Appleton-Century-Crofts. Pp. 688-700. ZILSEL, E. (1941). Physics and the problem of historico-sociological laws. *Philosophy of Science,* Vol. 8, pp. 567-579.

4 Notably the development of the integro-differential calculus and its applications, for example, to the study of elastic bodies that exhibit hereditary properties. *Cf.:* VOLTERRA, V. (1930). *Theory of Functionals.* London UK: Blackie & Sons. Pp. 142 ff.

5 Adequate stochastic or functional solutions of this problem can be shown to be special cases of one of the two solutions described.

lation, under the assumption that neither the structure of the system nor the set of state-variables will change.

The type of system described exhibits properties of change that we characterized as idiothetic and idiologic. A nomographic description and a deterministic prediction of the behavior of the system can be given only while the system is in a given stage of its development. We need additional information in order to predict the duration of the stage, or 📖 *92* the conditions for its termination, or the characteristics of the transition, or the characteristics of the new stage. This information we can obtain only by a study of a population of such systems.

We can try to establish the relative frequencies with which different kinds of changes in structure or in significant state-variables occur. From the knowledge of these we can begin to construct a stochastic system of explanation and prediction, based on the transitional probabilities of alternative kinds of development.

Or we can study in minute detail the histories of systems that underwent similar kinds of development, in an attempt to discover unique relationships between variables, or unique sets of variables,[6] that can be used for explaining and predicting these different kinds of development. This second procedure is a combination of what is usually called the historical and the comparative method.

The two approaches are well known in psychiatry as respectively actuarial and clinical methods of prediction. Both assume inadequate information for deterministic prediction, and each depend for its 📖 *93* effectiveness on the use of an adequate taxonomy of stages and of types of development. The lack of understanding of the nature of genetic explanation, and of the conditions under which it is required, is possibly responsible for attempts to predict outcomes of development nomographically by discriminant function models, where only idiographic models based on Markovian[7] transitions could be adequate.

We can summarize the features of genetic explanation as follows. Genetic explanation is necessary in situations where the full set of state-variables is either unknown, or too large for computation or measurement. Any selection of state-variables is inadequate for unique time-invariant prediction, but some can be used for unique prediction within a limited interval of time. Such an interval constitutes a stage in the development of a system. Genetic explanations proceed seriatim, from stage to stage, each stage being characterized by different sets of variables and/or different propositions. Explanations and predictions of specific development (succession of stages) presuppose an adequate taxonomy of 📖 *94* stages and types of development,

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6 Especially variables that maintain extremum values during the transitions; this would make possible a functional explanation of the transitions.

7 For a definition of Markov Chains and for examples of actuarial prediction in the behavioral sciences based on Markovian models, *cf.:* KEMENY, J. G., SNELL, J. L., AND THOMPSON, G. L. (1957). *Introduction to Finite Mathematics.* Englewood Cliffs NJ: Prentice Hall. Ch. IV, sections 5, 7, & 13. Ch .V, sections 7 & 8. Ch. VII, sections 3-6.

and data obtained from a study of a relevant population of systems. A statistical analysis of the population can provide stochastic explanation of the transitional probabilities of different types of development between any two stages, and will yield actuarial predictions. Alternately, comparative case studies of different types of development can provide historical or functional explanations of metastable development in terms of unique propositions and categories, and can yield a clinical prediction of the type of development.

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THE NATURE OF EPIGENETIC EXPLANATION

Endo- and exogenetic explanations are essentially simple. A completely endogenetic explanation of development is possible only for a fully isolated system. The only system that we conceive of as fully isolated, temporally as well as spatially, is the universe. In a relativistic and expanding universe, we can conceive of parts interdependent in the past, but now fully isolated. But these are inaccessible to observation. Any observable system can be only analytically and virtually isolated, by a definition of the system in terms of those state-variables that are not, under given circumstances, substantially influenced by external variables. Development of such systems can in principle be fully endogenetic, *i.e.,* the predictive system is the same as the system predicted.

The predictive system in an exogenetic explanation of development contains only external variables. The external variables are treated as independent variables, while internal variables are treated as dependent variables. The isolation that is necessary in this case resembles a one-way mirror: the internal variables must remain accessible to influence, while the external variables must be isolated from any influence by the internal variables.

Epigenetic explanations are necessary if there is interaction *96* between the external and the internal variables. An epigenetic explanation formulates a predictive system that contains a mixed set of interdependent internal and external variables.

In the literature the term epigenetic is used whenever both internal and external variables are necessary for explanation. Such a criterion seems at first insufficient, since it is the structure of the relationship between the internal and external variables in the predictive system, that distinguishes between exo- and epigenetic explanations. However, we can encompass the standard usage by interpreting our definition of interdependence between internal and external variables to include the case when they are not interdependent directly, but both dependent on a second order external variable.

The core of epigenetic explanation of development consists of the identification of a structure in which this second order external variable is time. This structure involves the idea of a system that is undergoing endogenetic development. During this development it is autonomous from exogenetic in-

fluences. In a certain phase of its endogenetic development it becomes susceptible to exogenetic influences, or it enters into an epigenetic development in the narrow sense of the term (mutual influence of the internal and external system). At 🕮 97 such times, the effect of the external system may determine (or co-determine) the development of the internal system.

This structure is often described in terms such as 'maturational readiness' of the system, with reference to the beginning of the period of susceptibility; 'crucial time' with reference to the whole period; and 'imprinting' and 'locking' to indicate that the effect can become irreversible, since the period of susceptibility terminates when the external variables had affected the system, or after a given time, whether the external influence has 'taken' or not.

Terms such as 'maturational readiness' and 'maturation of functions' imply the possibility of appropriate development, while terms such as 'typical danger situations' imply the possibility of deviant development. Sometimes more neutral terms, such as 'critical choice situations,' periods of 'bifurcation' or 'decisive encounter' are used. Some epigenetic theories describe the influence of the environment as an overpowering intervention, while other theories describe the external system as participating in the decision, or as simply selecting among the alternatives that are already latent endogenetically. However, these distinctions are in most instances evaluative and do not need to concern us here.

The structure of the epigenetic formulation, as presented so far, implies the existence of stages of development, as we have 🕮 98 defined them earlier. Metastable development, or succession of stages, is codetermined by external variables. In this formulation, we can conceive of the successions of stages as a branching tree of alternatives, where the choice at intersections is determined or codetermined by external variables. The structure is time-symmetric, *i.e.,* we can use it to explain divergent as well as convergent evolution in a population of developing systems.

Some theories try to reduce the number of alternatives by characterizing certain stages in the development of particular systems by a binary set of alternatives, the choice between which is then epigenetically determined. This is what Parsons[8] means by 'bifurcation,' and Erikson[9] by 'critical alternatives'. This reduces the complexity of the tree of alternatives, and by specifying the nature of the alternatives, permits hypotheses about the nature of internal and external variables that could determine the choice.

Another way in which we can reduce the number of alternatives is more intrinsic to the nature of epigenetic explanation than the somewhat arbitrary assumption of only two alternatives. We can use the idea of *coordination in time* between the development of the internal 🕮 99 system and its exposure to, coming in contact with, or reaching out for contact with external systems.

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8 PARSONS, T. (1955). The organization of personality as a system of action. In: PARSONS, T. AND BALES, R. F. *Family, Socialization and Interaction Process.* Glencoe IL: The Free Press. Ch. III.

9 ERIKSON, E. H. (1950). *Childhood and Society.* New York NY: Norton.

This idea receives a further elaboration in the idea of such parallel development in time of two systems as brings them into an encounter that determines epigenetically the further development of one or both systems. In the most extreme formulation, the same systems are brought into periodic encounter with each other, and this periodicity characterizes the rhythm of the stages of development.

This last formulation combines the two epigenetic principles of explanation, *i.e.,* interdependence of systems and synchronization of development.

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TYPICAL STAGES OF DEVELOPMENT

The joint application of the two epigenetic explanatory principles (interdependence of systems and coordination in time) selects from the tree of alternatives a single succession of stages as the typical sequence of development. The mutually external systems are undergoing parallel development in relative autonomy from each other. At the same time they become internally unstable and also encounter each other. Their temporary interdependence characterizes a transition that is externally stable. This transition terminates when the modified systems reach internal stability.

During the period of transition the behavior of any one system considered alone exhibits the characteristics of unstable development. But considered jointly the two systems are stable. This development we call *ultrastable.*[10] The sequence of development (from the old stage of stability and relative autonomy of the two systems, through interdependence and internal instability but joint ultrastability of the systems, to a new stage of internal stability and relative autonomy) is metastable.

The behavior of either internal system is explainable at each stage, and at the phase of transition, only in terms of different cate- *101* gories and/or propositions. We can thus date an individual system by the stage-characteristic structure it exhibits. If for some reason the development of the two systems is not properly synchronized or the epigenetic influence does not 'take,' or produces effects that disturb the mechanism of further synchronization, the individual systems become arrested at the preceding stage of development; or they may from then on follow an abnormal course of development, either in mutual epigenesis, or by becoming susceptible to influence by other external systems. It is possible that the abnormal epigenesis will produce development that either reverses or compensates for the abnormal result of an earlier transition. Theories of epigenetic development differ in this respect. According to some this is permissible, while according to others, not. Finally, some theories permit the occurrence of regression to a previous stage of development.

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[10] Cf.: ASHBY, W. R. *An Introduction to Cybernetics.*

It is outside the scope of this section to review the various theories of relevance to psychosocial development.[11] We only wish to note, that since Abraham first developed the idea of a stage-specific character structure, and Freud formulated the psycho-sexual stages of early development, most writers on this topic essentially 🕮 *103* agree on such an epigenetic formulation of development, and on the division of a normal life history into a succession of stages. Erikson, who distinguishes between eight stages from infancy to maturity, has formulated the most elaborate theory of this kind that refers to psychosocial development. Perhaps a last stage, of senility, could be added to his classification.

Freud, Abraham, and other writers of the Freudian school formulated stages of development in terms of encounters between the physiological and the psychological systems. Gesell and his collaborators have studied development mainly from the point of view of physiological stages. Piaget has described stage-specific intellectual and moral processes. White has discussed possible stages in the development of competence in work and in interpersonal relations.

Of the major theorists concerned with psychosocial development, only Mead, Sullivan, Erikson and Parsons have attempted to formulate systematically the relationship between psychosocial development and external variables of the social system. The anthropological comparative literature is in general a-theoretical, or devoted to the testing of theories of psychosexual development. The most notable exception in this respect is Ruth Benedict's 🕮 *104* formulation of continuities and discontinuities in cultural conditioning.[12] However, it is relevant to note, that all these writers have stressed

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[11] The relevant works of the authors discussed in this section are:
ABRAHAM, K. (1921). Contributions to the theory of anal character. In: ABRAHAM, K. *Selected Papers on Psychoanalysis.* London UK: Hogarth. 1927.
ERIKSON, E. H. (1950). *Childhood and Society.* New York NY: Norton.
ERIKSON, E. H. (1959). Identity and the life cycle. *Psychological Issues,* Vol. I, No. 1, New York NY: International Universities Press.
FREUD, S. (1905). Three essays on the theory of sexuality. *Standard Edition* of 1953. Vol. 7. London UK: Hogarth. Pp. 123-245.
FREUD, S. (1953). *New Introductory Lectures on Psychoanalysis.* New York NY: Norton.
GESELL, A. AND THOMPSON, HELEN. (1938). *The Psychology of Early Growth.* New York NY: Macmillan.
GESELL, A. AND ILG, FRANCES L. (1946). *The Child from Five to Ten.* New York NY: Harper.
GESELL, A. AND AMATRUDA, CATHERINE G. (1956). *Developmental Diagnosis.* New York NY: Hoeber.
MEAD, G. H. (1934). *Mind, Self and Society.* Chicago IL: The University of Chicago Press.
PARSONS, T. (1942). Age and sex in the social structure of the United States. Ch. X in: PARSONS, T. *Essays in Sociological Theory Pure and Applied.* Glencoe IL: The Free Press. 1949 edition.
PARSONS, T. (1955). Ch. II, Family structure and the socialization of the child. And Ch. III, The organization of personality as a system of action. In: PARSONS, T. AND BALES, R. F. (EDS.). *Family, Socialization and Interaction Process.* Glencoe IL: The Free Press.
PIAGET, J. (1932). *The Moral Judgment of the Child.* New York NY: Harcourt, Brace.
PIAGET, J. (1960). *The Psychology of Intelligence.* Paterson NJ: Littlefield, Adams.
SULLIVAN, H. S. (1953). *The Interpersonal Theory of Psychiatry.* New York NY: Norton.
WHITE, R. W. (1952). *Lives in Progress.* New York NY: Holt-Dryden.
WHITE, R. W. (1960). Competence and the psychosexual stages of development. In: JONES, M. R. (ED.). *Nebraska Symposium on Motivation.* Lincoln NE: The University of Nebraska Press. Pp. 97-141.
For a general survey of the psychoanalytic theory of stages of development, *cf.:*
FENICHEL, O. (1945). *The Psychoanalytic Theory of Neuroses.* New York NY: Norton. Chs. 4 & 5.

[12] BENEDICT, RUTH. (1938). Continuities and discontinuities in cultural conditioning. *Psychiatry,* Vol. I, pp. 161-167.

much more the structural development of the psychosocial system of the individual, than the structural characteristics of its sociological complement.

The problem that confronts us when we attempt to formulate the sociological complement to the psychosocial system of the individual in terms suitable for epigenetic explanation, is certainly not due to a lack of stage-specific sociological information.

There exist adequate theoretical formulations of characteristic social behavior of individuals at the different stages of development. Among the best are Piaget's description of the group behavior of small children in terms of 'collective monologue' and 'emotional contagion' and Parsons' analysis of the American 'youth culture'. Also available are excellent structural analyses of stage-specific social milieus, and their epigenetic relevance to psychosocial development, beginning with Freud's classical analysis of the nuclear family in terms of the development and suppression of sexual jealousy between parents and children, and of sibling rivalry.

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The mechanism of influence of the social system on the psychosocial system of the individual is also sufficiently well articulated theoretically. Mead's idea of the transformation of the biological system into a psychosocial system by the development of symbolic communication (language) and the 'taking the role of the other' is essentially an epigenetic formulation of the emergence of what we called the Domain of Role Orientations of the psychosocial system. In Mead's formulation, a complementary independent development of both the biological and the sociological system is a prerequisite for the development of this domain. Parsons' and Shils' statement of the internalization of role expectations is another adequate explanatory device.

Besides the complementarity of role expectations that is required by Parsons' formulation for a stable social process, both Parsons and Erikson also treat complementarity of need-dispositions as a prerequisite for a normal outcome of an epigenetic encounter between the psychosocial system and the representatives of the social system.

The coordination in time between the social system and the psychosocial system of the individual is dramatically demonstrated through the intervention of the social system in the transitions between stages of development.

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These *rites of passage,* however, are not the determinants of the transition. Their function is to stabilize transitions, and to classify and legitimate outcomes of transitions as appropriate, variant, or deviant. They also serve notice both to the individual and to the social system that not only is new stable process expected of the individual in the new stage, but also that new behavior on his part is now to be expected.

The distinction (between a statement to the individual of what is expected of him by the community, and a statement to the community of what is to be expected from the individual) becomes especially clear, when a transition is branded as one into deviant status, or in rituals associated with death.

These usually include a ritual test of whether the individual is really dead, his death is officially certified and announced, his new behavior is demonstrated by public display, and he is ostensibly buried or burned to impress on everybody concerned that the transition is irreversible.

For an adequate epigenetic explanation of psychosocial development we need more than stage-specific sociological information. We need a 🕮 *107* theoretical formulation of a social mechanism, which, like the rites of passage, is synchronized with the psychosocial stages of development. Unlike the rites of passage, this mechanism must be synchronized with the periods of stable process in the psychosocial system, *i.e.,* with the stages themselves.

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EJECTIVE CHANNELS: AN EXPLANATORY CONSTRUCT

We seem to encounter a difficulty when we attempt to formulate the epigenetic relationship between an individual and society in the same form as is used for psycho-biological epigenesis. Individuals and social organizations do not seem to undergo parallel and synchronized development characterized by stages of the same duration.

It seems possible to overcome this difficulty by focusing attention on two distinctions. The first distinction is between systems that are analytically distinguishable, and systems that are physically distinguishable. The difference between the biological system and the psychological system is purely analytic. Although they involve different sets of variables, both share the same physical referent, *i.e.,* an individual organism. On the other hand, the psychosocial system, as we use the term, refers to an individual organism, while the social system refers to an aggregate of organisms.

The second distinction concerns the point of reference we choose for the description of stages of development of social organizations. We can probably distinguish different stages in the history of a family that are unrelated to the developmental stages of the children. But a one-child family is clearly a different organization before the child is 🕮 *109* conceived, while the mother is pregnant, when the child cries and has to be fed, when it has to be watched so that it won't hurt itself or break up things, when it begins to say things in public that embarrass the parents, when it goes to school, when it begins to date, and when it leaves home or gets married. If there are several children, the changes in the organization of the family become more complex and obscured, but they are there nevertheless.

An educational institution is clearly synchronized in developmental sequences with those of the individual students, at least in principle. Yet it undergoes separate developmental stages of its own. Furthermore, it participates cyclically in the same developmental stage of its students, and simultaneously in several phases of it. Even an individual teacher participates in several stages of development of his students, while undergoing a separate development of his own.

There also exist types of social systems whose entire organization is related to a stage in an individual's development. Let us return again to the rites of transition. Some of these organizations emerge only periodically, when the transition in the life of an individual or a generation calls for their participation. Others are organized on a permanent basis, while a succession of individuals becomes their momentary members.

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In connection with death, we can identify a structure that is related not to a transition, as the funeral ceremonies are, but to a developmental stage of an individual's life. This is the institution of mourning and the social organization that emerges on such an occasion. This organization carries the individual through the stage of mourning, until (in traditional societies) in a new rite of passage he sheds his mourning cloth and becomes again a normal member of the society.

The basic characteristics of a form of social organization that is epigenetically complementary to a stage of an individual's development can be characterized as follows. The individual becomes a temporary member of such an organization. While the organization as a whole may be undergoing unrelated development of its own, salient aspects of its organization are synchronized with the developmental stage of the individual. Usually such an organization specializes only in one stage of the individual's development. Thus it may undergo repeatedly the same stage of development, as new individuals become its temporary members.

The structure we have identified is descriptive of many other *111* phenomena. Some occur spontaneously in nature, but more are an outgrowth of human behavior. Most processes of production are describable in such terms. Since a good deal is known about these processes, it seemed desirable to formulate the construct in such a way that it could generate propositions applicable across the whole range of phenomena that appear isomorphic from this point of view.

The term 'ejective channel' was chosen to emphasize the central mechanism implied.

It assumes that an item enters at a time into a specific, and usually in certain respects protective, environment. After a lapse of time (an incubation period) the item changes in certain, usually very similar ways. When it reaches a certain degree of development, it must, in order to continue its development, leave the specific environment.

The changes that occur during the period of its stay can usually be conceived of as due to the interaction between the material and the specific environment. Sometimes, however, the only contribution of the environment is to erect a wall of null-functions, or constancies, which protect the material from exogenous variations that would interfere with its endogenous development.

The ensuing normalcy of development is due to the standardization of the entering material and the environing 'channels.' Naturally, the *112* more

determining power the channel has, the greater the variety of materials that will result in similar products. The more determining energy and information that is packed into the entering material, the more alike it will be as a product, despite variation in the environing channels. The puzzles of uni- and multilinear evolution, and equifinality, are readily approachable from this point of view.

The ejective character of the channel derives from three main considerations.

1. Subjecting a material to an influence over an increasing (linear) time span seldom produces a linear increase in the values of the changing attribute. Often the increase is asymptotic, or it suddenly goes into a decline. The point of diminishing returns is reached at a specific time.
2. Change beyond a certain quantity is not regarded as appropriate. After a certain time, the protective and determining capacity of the channel may become exhausted. Or it may become ineffective due to growth or other changes in the material. A certain change in the material can become toxic or destructive to the channel.
3. The 'total appropriate development' is accomplished in a series of different stages, and one channel may be equipped only with energy and information favorable to one stage. Among the results of staying in the channel, beyond the accomplishment of the particular 🕮 *113* developmental phase, may be an inappropriate binding of the material to the stage. Irreversible changes (or changes that will require special, improbable conditions for their reversal) occur that prevent a further development, or a further 'normal' and/or 'appropriate' development of the material.

Hence to pass through a 'normal' developmental course, the material must have built-in responses, that are activated as a part of the developmental stage, and that motivate the material to leave the channel when the stage is completed. Or the channel must catapult its product out.

The construct of the ejective channel could be elaborated further. Only those aspects were presented here that were necessary to relate it to the other concepts of our frame of reference. Within this frame of reference, the school would be defined lexically as an ejective channel. Since it is a social system, it would also have other relevant properties, such as self-maintenance. One characteristic of ejective channels is that they often are, or attempt to become, dominant complements of the individual and thus insulate him from other influences. This aspect of ejective channels can be studied within the construct 'total institutions,' as developed by Goffman.[13]

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EVALUATION OF INFLUENCE ON DEVELOPMENT

In an evaluative research that is to have general significance, the criteria of evaluation given to the scientist need often be reformulated. The construct

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[13] GOFFMAN, E. (1957). "Characteristics of total institutions." In: *Proceedings of the Symposium on Preventive and Social Psychiatry*. Washington DC: Walter Reed Army Institute of Research.

'ejective channel' suggests several indices that can be used for the evaluation of the influence of epigenetic complements on the development of a system.

The extent to which the total relevant behavior of the channel is related to the behavior of the material we can call *rationality.* The distinction implied here is similar to that between control by the reality principle and control by the pleasure principle. If the channel is to be an effective regulator, it must itself be controlled by disturbances in the condition it is to regulate, rather than by its own disturbances. More precisely, a regulator is controlled by two sets of conditions: internal criteria for the desirable state of the material, and the external state of the material. An anticipated or actual discrepancy between the two activates a mechanism that produces a counter-disturbance designed to prevent, inhibit, or compensate for the disturbance.

Our earlier discussion has emphasized *interdependence* and *synchronization* of two mutually external systems as the central explanatory devices in an epigenetic formulation. These two principles are also 🕮 *115* the central features in the analysis and design of regulators. The importance of the timing of intervention is widely recognized in the study of social control, and is among the first principles of the psychotherapeutic as well as other operational doctrines. If we now conceive of the ejective channel as a special type of regulator, we avail ourselves of a whole body of theory concerned primarily with problems of timing of interventions.

Regulators operate essentially in two ways. Errors controlled regulators respond to disturbances in the material and create counter-disturbances that act on the material.

The second type is the advance-warning regulator. An advance warning may be necessary because of a lag in the response of the regulator. In this case the regulator still works on the material. But more often, an advance warning regulator works on the condition that is potentially disturbing to the material. It creates a counter-disturbance that annihilates the disturbance before it reaches the material. As a special case of a counter-disturbance an insulating wall between the disturbance and the material is sometimes erected.

We can estimate the *dominance* of either type of regulator in terms of two indices: its *power* to counteract specific kinds of disturbances, and the *range* of disturbances it can counteract. The term *total* is used frequently as a value of range, rather than of power. 🕮 *116* What we called an internal criterion in no way implies the presence of goals or purposes in the regulator. A regulator is activated if the state of the material causes a change of the value of one of its variables. This variable exceeds a critical value, and the regulator experiences a transition from stable process to elastic process. The regulator, in other words, is strained by the behavior of the material, and experiences stress, *i.e.,* behaves in such a way as to return within its critical values. What makes it a regulator is, paradoxically enough, that it can only do so by controlling the external disturbance. Once we take the structure of the regulator for given, its regulative behavior appears completely controlled

by the external disturbances. It becomes inefficient as a regulator when it is controlled by its endogenous disturbances, or when it develops defense mechanisms that can internally control exogenous disturbances.

Once this characteristic of regulators is understood from the descriptive point of view, there is no danger in discussing their performance from a normative point of view. We then call those conditions in the external system that do not stress the regulator its goals, and those conditions that do, we call deviant behavior in the material.

Before we turn to the discussion of goals of an ejective channel, another formal analogy may be helpful. We can think of the regulative behavior of the ejective channel as a process of production. Both advance 🕮 *117* warning and error control processes are operating. The advance warning system excludes some material as disturbing; it is not admitted into the channel. The material that is admitted becomes disturbing unless it changes at a given rate and in a given way.[14] If it does not, the channel attempts to regulate it. If it deviates too much, and strains the channel near its elastic limits, the channel attempts to reject it. (This premature ejection in self-defense is not uncommon, in an abortion, or an expulsion of a child from a family or an educational institution.) When the change in the material reaches a certain value, other mechanisms in the channel are activated, and the material is ejected, having passed quality control. Sometime the material is ejected in a particular direction, *i.e.,* is marketed.

The regulation involved in quality control and ejection may itself be of the advance warning type, *i.e.,* the potential product is evaluated for ejection in terms of its marketability, or in terms of its probable performance once it is put to use. The performance of an ejective channel, from this point of view can be evaluated in terms of the correlation of its product specifications (proximal goals) with the desirable modes of functioning of the product in its probable future environment (distal goals).

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TYPES OF EDUCATION IN A NORMATIVE PERSPECTIVE

Since our frame of reference encompasses the possible influence of formal education on psychosocial development, we shall outline an approach to the classification of educational institutions from a normative point of view, in terms of the kind of appropriate development they attempt to regulate. The classification of educational goals about to be presented grew out of empirical observation, discussions with educators, and a perusal of the literature. The empirical referents of these concepts, however interesting they might otherwise be, are not within the subject matter of this chapter. Here we

[14] This formulation makes theoretically permissible a completely endogenous development of the material with no direct intervention, but only insulation from potentially disturbing exogenous influences.

simply wish to define the normative concepts lexically, by relating them to some of the descriptive categories developed earlier.

Although official statements of educational goals are usually not descriptive of the actual regulatory behavior of a particular institution, differences in both educational goals and educational effects clearly exist, and the two quite possibly may be correlated.

We can distinguish at least four types of educational institutions on the basis of the assumptions they make about the nature of psychosocial development. Whether or not these assumptions are correct in general is not a meaningful question. It is possible to think for each of 📖 *119* them of instances, when they appear valid, and of other instances, when they appear to be counter-factual.

Custodial education is based on the assumption that appropriate development would not occur endogenetically. This kind of education attempts to maximize the dominance of the channel, in terms of its power and/or range.

Liberal education assumes the likelihood of inherent appropriateness of endogenetic development. It merely attempts, as an ideal type, to provide maximum choice and stimulation, restricted only by the maturational readiness of the individual. In a radically liberal approach, the physical plant, the library, the laboratories and equipment, and the faculty are simply facilities to which the student has a right of access.

Correctional education makes more complex assumptions. The basic assumption is that a development that has occurred is reversible. A custodial or a liberal approach may then be applied as corrective.

Educational approaches based on an epigenetic conception of development have been formulated sporadically. Usually they stress the mutuality of benefit by educator and student, and try to control ecological and status factors as to maximize contact and *equalitarian* relations between student and teacher.

Educational institutions can be further classified in terms of 📖 *120* the evolution in a population that they are intended to bring about. If a goal is to bring about a convergence in a population of initially different individuals, we describe the particular ejective channel as an *assimilating* institution.[15] If, one the other hand, the goal is to bring about a divergent evolution in a population, we speak of a *differentiating* institution.

The latter classification is conceptually unrelated to the first one. Liberal education can be assimilating, by selecting a homogeneous or a heterogeneous population, and exposing it to a similar kind of experience. Custodial education can be differentiating, by differentially arresting or fostering variant kinds of development in sub-populations.

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[15] An excellent analysis of an educational institution in terms consistent with our approach is: DORNBUSH, S. M. (1955). "The military academy as an assimilating institution." *Social Forces,* Vol. 33, pp. 316-321.

Educational institutions often specialize in attempting to develop one particular aspect of the psychosocial system. Sometimes the aspect to be developed coincides with one or several of the classes of state-variables, which we used for the definition of the system. 📖 *121* Some educational institutions, especially those that complement the later stages of normal development, clearly specialize in one of the three classes of the secondary system.

- Specializing in 'fixation' is *dogmatic* education, which has as its objective the development of a specific set of discriminations, tastes, preferences, norms, needs, and aversions. The display or observance of these becomes not only a basis for prestige within a sub-group, but makes the individual dependent on a sub-group for norms and reinforcements.
- Connected with 'functional differentiation' is *professional* education. Its aim is not only to induce the internalization of a particular role or roles. It also teaches appropriate responses to a set of complementary roles in a way designed to maximize the functional significance of the role being internalized.
- Specializing in the development of 'manipulation' is *technical* education, which aims particularly at the learning of skills necessary to master some aspect of the physical, social or cultural environment.

Education with respect to the three classes of the primary system, 'adaptation,' 'generalization,' and 'integration,' is usually fused in the same ejective channels, and occurs early in life. It becomes specialized only in correctional institutions, or as a concomitant to specialized training with reference to one of the secondary system 📖 *122* classes.

However, it is possible that for the early stages of psychosocial development different individuals or groups assume the role of ejective channels specializing in one of the classes of the primary system.

Indeed, several theories of development would characterize a stage by the development of one aspect of the system. If this is the case, a classification of ejective channels in terms of their specialization in the development of a particular class of variables could provide the basis for a tree of channels, corresponding to the tree of stages in development. The various types of ejective channels could either be normal for a stage, or corrective of deviations.

Such a classification would make possible, together with other concepts developed in this chapter, a developmental analysis of the epigenetic relationship between the psychosocial system and a complementary social system.