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Adaptation as events and as theory[1]

La Adaptación como Evento y como Teoría

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ABSTRACT

Adaptation is a perennial feature of the interactions of every variety of objects including individual chemical elements as well as the most elaborate organismic and human beings. However, this process is not adequately recognized or appreciated. But what is even more deplorable is that adaptations are flagrantly misinterpreted. Adaptive behavior is widely transformed into mysterious powers to explain behavior of organisms such as reflexes, instincts, intelligence and other controllers. At the basis of such misinterpretations stand intuitive psychologies and philosophies. These should be replaced by observational views, with the result that an important type of psychological adjustment be fully credited along with improved postulation concerning the entire science of phychology.

DESCRIPTORS: adaptation, scientific theory, psychological theory, models in psychology, intuition, theoretical development.

RESUMEN

La adaptación es una característica perenne de las interacciones de cualquier variedad de objetos, incluyendo a los elementos químicos así como a los más elaborados seres organísmicos y humanos. Empero, a este proceso no se le ha reconocido o apreciado adecuadamente. Lo que es más deplorable es que las adaptaciones se han malinterpretado de modo contundente. La conducta adaptativa se ha transformado de manera amplia en fuerzas misteriosas tales como reflejos, instintos e inteligencia, entre otros, para explicar la conducta de los organismos. El origen de tales malas interpretaciones lo constituyen las psicologías y filosofías

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intuitivas. Éstas deberían reemplazarse por aproximaciones observacionales a fin de que se le dé todo el crédito que le corresponde a un importante tipo de ajuste psicológico, y se mejoren las postulaciones acerca de toda la ciencia de la psicología.

DESCRIPTORES: adaptación, teoría científica, teoría psicológica, modelos en psicología, intuición, desarrollo teórico.

Continuity of Adaptational Events

Biological and Psychological adaptational interactions on surface levels are universally recognized and referred to. However, there is a scarcity if not a nullity of suggestions that such events are points on a continuum that includes inorganic adaptations as well as organismic ones. This failure to appreciate the continuity of adaptational events is owing to an improper acquaintance with the basic nature of adaptation events, and consequently of an adequate adaptation theory. A most untoward resultant is the introduction into psychology and other sciences of mystic notions concerning adaptational processes. In this article I consider some problems concerning adaptation in various scientific disciplines and suggest a relevant theory of adaptation that applies well to psychological situations. I begin with a brief sampling of adaptations in the inorganic, biological, and psychological domains.

A. Some Examples of Physiochemical Adaptations

It is not a farfetched interpretation that adaptational processes pervade all of nature. An important basis for such an interpretation is chemical valence in its electrochemical form.

Although there are ony about 92 stable chemical elements the number of compounds reaches into the millions. Each of the elements possess unique qualities or properties beginning with their atomic weights and family resemblance. What concerns us most at this point is the combinatory potencies of the different elements. Each element must be in contact and compatible with other elements in order that a molecule or a higher type of compound can be formed. The valency or combining potential of an element is illustrated by the number of atoms of hydrogen which will combine with one atom of that element. For example, the valency of oxygen is 2 since 2 atoms of hydrogen are required to form a molecule of water-H_2O, Nitogen has a valence of 3 as in the case of ammonia-NH_3. Some elements, of course show a greater adaptability than others. Thus nitrogen has 5 valences for combining in 5 different oxides, and carbon adapts in two ways with oxygen, in one with a valence of 2 in carbon monoxide-CO and 4 in carbon dioxide -CO_2.

Chemical reactions in complex organic compounds display vast adaptational processes. A good example is the many instances of compatability or incompatability of compounds with respect to each other. The pharmacist must contend frequently with problems of miscibility.

In all domains of science compatibility like all other properties are functions of specific patterns of ambient conditions. Thus potentiality of interactions whether of things or processes depends upon the conformity with other factors such as spatiotemporal conditions, temperature, pressure, and so on. It is such conditions which constitute adaptations in the fields of gravitation, thermodynamic, and the life times of subatomic particles.

B. Some Examples of Biological Adaptation

Evolution. The potentiality for adaptation is basic to the entire evolutionary process. Only when the inevitable variations of cells or organisms conform to and cohere with their ambient conditions can there be morphological and functional modifications in organismic systems. Furthermore, unless there is an affinity or reciprocal relationship between and environing traits can there be biological survival. When rapid changes occur in either of the two phases of organismic fields, death ensues.

Adaptation, then, appears to be the underlying condition for the origin, development, and succession of organisms. Darwin and his scientific followers have adopted the formula of natural selection, and have exhibited a succession of theories as to the intimate details of the process, ranging from the mere description of surface observations to the intricacies of genetic and statistical operations.

This combinative feature of biological things and events undoubtedly arises from and simulates prior events in physiochemical situations. Biological adaptation is a complicated derivation from subatomic, atomic, and molecular interactions of elements with their individual properties and unique valences.

Reproduction as species adaptation. Among the most informing instances of biological adaptation are the events of reproduction. The essentiality of biological species consists of the potentiality for adaptation to the cellular organization of another organisms. Mating behavior between disparate species is doomed to sterility when the organisms involved are not genetically adaptable with respect to each other.

Immunology. Proper adaptation to the environing things and events is the basic requirement of biological welfare. The same statement may be made with respect to that portion of environing things that become metabolized as food or ingested fluids. On the other hand organisms suffer maladjustment when they are invaded by toxic substances as in the case of pathogenic bacteria and viruses. Immunology is the process of building up defences against maladapting substances.

Immunization consists of applying vaccinic preparations derived from the toxin of an infection. This vaccine stimulates the production by invaded organisms of antibodies which neutralize and nullify the toxic effects of the invading organisms or viruses. Antibodies are described as protein molecules

present in the blood serum which attaches firmly to the antigen and thus destroys it.

Regeneration. An outstanding type of organismic adaptation is found in regeneration processes. The self repair of tissues and organisms in plants and animals marks the greatest efficiency of survivalship in the organisms-environment system. Probably the best known examples of regeneration are those of the planarians which regrow vast missing parts. An interesting phase of regeneration is the phenomenon of autotomy, the self-amputation or organisms like crayfish and starfish which can break off and discard injured or restrained limbs. Regeneration of complicated organisms is limited or almost nonexistent though some amphibia still show this condition. Among organisms in the upper scale of evolution only a reflection of regeneration remains in the from of wound healing.

Commensalism. The records of zoological science are replete with numerous types of adaptation based on organisms living together in some way. Some types of plants and animals are so integrated in their life processes as to constitute close instances of commensalism. A noted case is that of the Yucca moth and Yucca plant, neither of which could live without the other. There are many examples of such intimate relationships within the biological realm.

Social living among bees, ants, and other animals exemplify adaptations by close association. Instances of group adaptation are available at all species levels as illustrated by herds, schools, flocks, gaggles, up to and including human gangs, clubs, fellowships, social and trade societies and many other groups.

Zoological literature provides numerous examples of symbiotic and parasitic associations of which the parasitic are of benefit to one and detrimental to the other while symbiotic commensalism may be neutral for one or beneficial for both.

C. Some Examples of Psychological Adaptation

Sensory Increase and Decline. Every student of psychology is familiar with the positive and negative adaptive interactions with stimulus objects and conditions. An excellent example of positive adaptation is the increase in visual sensitivity to objects after a stay in the dark. Negative adaptation is the general decrease in an organism's discriminative activity under prolonged exposure to lightmediated objects. Similar decline in behavioral efficiency occurs in other modes of interbehavior with objects such as sounds, odors, tastes, pressures, and pains. It is plausible to regard negative adaptation as discriminative fatigue behavior.

Intellectual Fatigue. Declines in intellectual behavior are as common as sensory or perceiving fatigue. Too long a concentration upon reading, thinking, or problem solving results in a definite loss of efficiency. In all cases such declines are associated with biological or physiological factors. In the case of intellectual behavior there is an additional condittion which may be called

boredom. This condition is effectively modified by a change in the behaviorial field, with the restoration of vigorous and dependable performances.

Conditioned Behavior. The interbehavioral shifting of an organism whereby it reacts to an additional object the way it originally did to another one is well regarded as a special form of adaptation. Technically the process consists of a transfer of stimulus functions from certain objects to others as in the case of Pavlov's dogs changing from original salivation in the presence of meat to that of a buzzer. Of the many conditions which operate in such shifts of behavior the reward or reinforcement type has been greatly popularized.

Casual Interbehavioral Development. Among the best examples of psychological adaptation must be numbered the casuality of development of all types of interbehavior. Careful observers must conclude that the great majority of the innumerable action and adjustment traits are developed without tutelage or contrivance. Excellent examples are observable in the native language of children or the learning of a second language of adults. In the case of children, speaking behavior is mostly the self insinuation into family, playmate, and general interpersonal relations with various individuals. The primary condition is to be in simultaneous contact with interesting and imposing events plus the copresence of persons. What is the case in linguistic situations is duplicated in the many adjustments to objects during the development of skills and manipulations of many varieties.

Second or more language learning of adults is equally a matter of adjustment as is illustrated by the increased effectiveness of learning while living where the new language is spoken. Casual foreign language learning exceeds the effects of teachers and their methods. The employment of native speakers as informants serves to support this fact.

Although it is not usually noticed, learning in all situations consists of casual developments so that learning overshadows teaching while the gains consist of specific adaptations.

Habituation. The building up and constant performance of habits is an especially prominent type of psychological adaptability. Because habits consist of tight and relatively long-lasting integration of stimulation and responses, organisms seem ensconced among compatible things and situations. Often the consequences of such habituation are not entirely beneficial to the organism. Nevertheless it persists in developing detrimental interbehaviors. Although from the standpoint of consequences many habitual adaptations are maladaptations they still serve as examples of adaptation.

Trait Convergence. An important type of complex adaptation is available in situations when persons live long together. Such is the case when husbands and wives grow closer and closer in their psychological trait equipment. Such couples share beliefs, thinking, tastes, habits, and social conduct. It is such results of behavioral convergence that are basic to groupings in communities, regions, cities, and states.

Imprinting. Ethologists and psychologists have recently popularized the observations that various animals are prone to adapt themselves to the movement of objects by trailing those objects. This primitive form of adaptation is simulated in many ways in complex human behavior of an individual and group type. Examples are the changeable styles and fashions in dress, cultism, rites, voluntary associations, and so on.

Analysis of Adaptational Events

Now that we have sampled a number of adaptational events and glanced at their range it is desirable to analyze and summarize the primary factors in adaptive adjustments. Since adaptation events are so common and so readily available we may always expect to find the following interrelated characteristics.

1. Contiguity or togetherness
2. Coincidence of adaptational processes with surrounding conditions
3. Compatibility of Interacting Factors
4. Mutuality of Interactions
5. Consequences or Interbehavioral Products.

1. *Contiguity of Things and Events.* Adaptations invariably involve the togetherness of things, a synthesis of elements and factors in a specific event unit. The contiguity may be direct as when one factor impinges upon another, but it may also be mediated by some similar or dissimilar medium. In general biological and psychological adaptations are more distantly related than inorganic adaptations. In inorganic events the contiguity concerns chemical reagents or electromagnetic emissions or absorbtions, in biology organisms and environments, in psychology interbehavior of organisms and stimulus objects and functions.

2. *Coincidence of Adaptational Processes and Ambient Conditions.* As in all events adaptational events display a correspondence of a central interaction of factors plus an equally important if descriptively peripheral set of happenings. Inorganic examples are the mass and distance factors in gravitational attraction. This coincidence occurs in all adaptations whether inorganic, organic or human.

It is copresent conditions that invariably accompany the evolution of all things and events. While in the organic and cosmic domains there are such obvious variables as time, space, temperature, and pressure, on organismic levels there are in addition innumerable distinctive biological and psychological circumstances.

3. *Compatibility of Factors.* Whether or not an interaction takes place between contiguous things depends, of course, upon their traits or properties. As the above examples indicate adaptations in all types of events though dif-

ferent bespeak prior evolutional adaptations that facilitate the later adjustments. Since evolutionary processes vary in complexity biological and psychological interbehavioral fields seldom are lacking in intimate adjustmental qualities.

4. *Mutuality of Interactions.* Since the obvious basis of interactions consists of the interrelations and interactions to two or more entities or conditions it is unnecessary to elaborate on this feature. However, the factor of mutuality should always stand out while investigating or describing adaptational events.

5. *Consequences.* Spatiotemporal relatedness or contiguity usually results in some specific form of interaction. In some cases interactions result only in a symmetrical or asymmetrical patterning, while in others consist of mild or massive changes and the transformation of one or all of the interacting entities. In the physiochemical domain the great variety of explosions illustrate the violent and destructive types of consequences.

Probably the most intimate and subtle changes are observed in the biological and psychological situations. At any rate we discover more opportunities to get close to the particularities of adaptational adjustments. Organismic situations provide many examples of attractive and repulsive interactions with ambient organisms leading to beneficial or harmulf results to one or another and frequently to both.

Adaptations Precultural and Cultural

From all that has been presented above it is clear that adaptational processes include all varieties of cultural as well precultural situations. However, we may refer again to the implication that cultural events involve no extranatural factors beyond their observable interrelationships and consequences. Accordingly, none of the conventional philosophical categories such as mechanical, materialistic, idealistic, phenomenological, spiritistic applies to the interbehaviors described or inferred. What must be respected here is the occurrence of events without admixture with descriptive or explanatory constructions. The entirety of adaptational events constitute a plenum independently of the individuals who interact with it.

What is particulary precluded is the injection of subjetive, or mentalistic epiphenomena as interpretations or explanations of the adaptations observed. As we have already seen, sufficient tratment of adaptations is provided by taking account of the protagonists in interbehavioral situations plus the conditions under which they interact.

Cultural adaptations though occurring on the simpler infrahuman level progresses to the complex relationships of persons in many interacting situations. There are adaptations to other persons on linguistic, sexual, family, school, community, basis as well as adaptations to social institutions, intellectual, religious, philosophical, and church traditions. In addition there are the all embracing economic and political circumstances, with taxes, legal pre-

scriptions, political parties, elections, and various city, state, and national organizations. All of these lead to problems of moderate or turbulent adjustments and maladjustments.

Psychological Adaptation and Maladaptation

At this point it is time to detach psychological adjustments from the general continuity of adaptations and glance at the particular range of such special forms of interbehavioral associations. The focus here is upon organisms and their concomitant objects and conditions. At one pole of the psychological continuum stand the stable positive relations, while at the other are grouped the negative, unstable field events.

Positive adaptations mark the successful and secure coordinate existence of a person with inorganic or organic stimulus objects. Such adaptations are correlated with favorable environing organisms and conditions. Persons live together in harmony of a more or less adequacy. The fields in wich individuals adapt themselves persist for a longer or shorter time.

Negative adaptations mark a range in which individuals fail to adapt themselves to the conditions and events among which they live and thus become mildly or seriously inefficient and retarded. In extreme cases individuals attract to themselves the appelation of abnormality or pathology. Abnormal individuals are lacking in knowledge, skills, and social behavior that preclude their living comfortably, happy, and without detriment to others, in their social environments.

Maladaptational relatedness in psychology is excellently illustrated by creative processes in delusory behavior. While an individual may be well adjusted in every day practical affairs he may at the same time be retarded in misperforming acts of creative imagination. Extreme examples are those persons who do not or can not differentiate between properly adaptive imaginative behavior and the confusion between what they themselves create and the things and events they actually encounter. Thus they imagine that they are something or someone entriley different from the persons they actually are. Such maladjusted individuals may imagine that they are Napoleon, Jesus Christ, or paranoically wealthy or powerful.

An interesting feature of maladapted abnormal behavior may be mentioned, namely that no matter how detrimental delusional behavior is such behavior is nevertheless continuous with the individual's most adaptative behavior since even the most extreme imaginative behavior is rooted in some manner in concrete interactions with actual things. Scientific psychology makes entirely clear that the wildest phantasmagorias are inevitably anchored in previous contacts of the individual with things and events either directly or through the medium of language or speech. Evidence from religious circles indicates that deities are simply more powerful and more knowledgeable than the men or women actually met with in usual living. In civilizations where males are masters

the gods are large powerful men, and when in some cultures the importance and appreciation of women are recognized goddeses too are created. In the linguistic world, as technological preoccupations produce automatic contraptions the name horseless carriages is developed.

The conclusion is inescapable that both normal and abnormal adaptations are phases of naturalistic interbehavior and do not require any supernatural interpretation. Even the greatest creative achievements of the most advanced scientists or artists attain their peaks as adaptations to former or current interbehavior.

Misinterpretations of Psychological Adaptability

While psychological adaptations stand forth as definite and available objects of investigation it is remarkable how enormously such adaptations are constantly misinterpreted. Instead of accepting obvious events as they occur they are transformed into such transcendental principles and powers as instincts, intelligence, innate determiners, and similar verbal inventions.

Impressive examples of the misinterpretation of adaptational behavior are available in speech situations. It is well known that the children of missionaires and others who work in foreing lands must interpret the new language for their parents. But instead of considering the actual conditions involved resort is made to an instinct in children to learn languages. Again when children at an early age utter what grammarians call complex sentences they are said to inherit the power to do so, even though the influence of the events spoken of are clearly to hand for guidance.

What is the case in the language situation is likwise the case in every other circumstance. Even if instincts, intelligence, and other mystic powers are not expressly invoked, the comparitively simple process of adaptation is either ignored or overlooked. Psychologists, anthropologists, or sociologists do not mention in their writings that most of culturalization is, or is based upon definite adaptations to customs, manners, language, tastes, and preferences, of the family or other group in which individuals are born and live. It is by social adaptation that children become wearers of clothes, eaters of certain kinds of food, relatives of certain persons, engagers in particular types of work for a livelyhood or entertainment. Furthermore, it is a matter of adaptation that influences membership in one type of group or socioeconomic class. Another way to state the same view is that habituation is basic to the kind of personality one develops and the type of action and living one becomes accustomed to.

Misinterpretations of adaptability like other intellectual crimes against events may be explained on two grounds. First, there is the heritage of traditional assumptions which are supported by the continuous use of certain words. Secondly, there is the failure properly to respect the interbehavioral events which after all constitute the basis and the occasion for psychological investi-

gation, description, and interpretation. Proper attention to adaptational events is a fine preparation for obviating principles and powers that have no other existence beyond their verbal expressions.

Adaptation in Scientific Theory

Problems involved in adaptation events encourage the consideration of problems in the general logic of science. We may here contrast two methods of constructing theories or models for the interpretation of things and events whether amenable to investigation and analysis or just known to exist in their spatiotemporal coordinates. One method is to formulate theories, laws, or models with a minimum appeal to events. We may call this the intuitive method. The components of intuitive products may be derived from traditional beliefs about events, the evidence of a small sample or from the attractiveness of curves and equations. An excellent example is the preoccupation of workers with abstract responses and stimuli without regard to the actual things and conditions dealt with. Such is the case when the psychology of language is limited to words and their combinations.

The second method of theory construction which we may name the observational procedure derives all interpretational products from the observation, analysis, and measurment of the components or total fields of interacting things. To evaluate the validity of the products so obtained it is necessary to appreciate fully the psychology and philosophy involved in the different methods.

Practitioners of the intuitive method assume that while science is concerned with persons engaged in the discovery of the nature and operation of particular things and events there is room for imposing arbitrary abstractions on both the events studied and the work of investigation. Scientist are presumed to be endowed with intuitive powers to explore a mythical and mysterious world beyond actual psychological interbehavior.

Scientists attempt to justify trascendental excursions by pointing to the work of mathematicians who construct intuitive models and then find that they fit events. While nothing can diminish the grandeur of mathematical models or their utility and their partial applicability, the explanation of how they work depends upon naturalistic and not transcendental principles.

Intutive explanations assume ghostly internal mentality with creative faculties more or less independent of events and their observation. Whatever correspondence with events they display is inscrutable mystery. Greatly contrasting is the psychological basis of the observational logic of science. It demands a thorough analysis of all the components of scientific models and finds a valid basis for each constant and variable. All the components of valid mathematical models have their sources in prior adaptations to things and events. Genuine scientific intuitions as against the vacuities of unrestrained imagination and purely verbal expressions arise from lengthy histories of inter-

action with events. That is why in physics, for example, valid models require the work of a Maxwell or an Einstein.

Similarly, intuitive and observational logics of science arise out of very different philosophies. Intuitive logic is based on the futile premise of a verbally created "universe", while observational logic is founded exclusively on the postulate that scientific and all other activities of individuals constitute interactions with a plenum of specific events as stimulus objects. It is only, therefore, observational logic and all it implies that can be useful in the treatment of adaptational events among all others.