

Biological structures of personality in brain & behavioral systems

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ABSTRACT

This article is an introduction to the theory of personality that emphasizes the different evolution of reward and punishment mechanisms in the brain of vertebrates. The three brain/behavioural systems that are believed to underlie personality differences are: (1) the behavioural activation system, which represents sensitivity to reward cues, (2) the behavioural inhibition system, which is responsible for responding to punishment cues,

and (3) the fight/flight system, which is related to unconditioned aversive experiences.

Gray believes that the dimensions of extroversion and neuroticism in Eysenck's theory should have (approximately) a 30-degree rotation, to form the two primary dimensions of anxiety and irritability. He also believes that the hypothesis derived from the theory of introversion-extroversion, according to which conditioning is more in introverts, should give way to a belief that emphasizes the greater sensitivity of introverts to the signs of punishment and the lack of frustrating rewards.

Key Words: Behavioural Brain System, Theory, Behavioural Inhibition System, Anxiety

INTRODUCTION

In the last few decades, the field of personality psychology has witnessed many efforts of theorists who sought to explain individual differences through biologically based variables. Eysenck (1916-1997) proposed one of the most famous theories in this valley. Using the factor analysis method, he identified three basic personality dimensions: introversion-extroversion, neuroticism and psychoticism [1]. These three factors (or factors similar to them) have been confirmed in many studies, for example. In the first dimension, more attention is paid to psychosis, and Eysenck considers individual differences in these dimensions to be caused by differences in the structure and activity of the brain.

But Eysenck's theory has inspired other theorists to provide more accurate explanatory systems in the field of personality differences. In this realm, Gray's theory offers a different interpretation of the facts on which Eysenck's theory is based. In theorizing the two-dimensional space of extroversion and neuroticism, it is described in a more precise way through the dimensions of anxiety and irritability [2].

This article seeks to highlight the importance of personality theory in psychological research and studies. To outline the framework of this theory, firstly, the brain mechanisms of reward and punishment have

been mentioned as the basic concepts of this theoretical framework. Then behavioral brain systems have been introduced as the main foundation of this theory; Systems whose activity in different people is the basis of personality differences, experience of different emotional states and different processing of information. In the following, we have made a brief comparison of this theory with its parallel theories in the field of learning and personality. At the end, we have discussed the two dimensions of anxiety and impulsivity and their relationship with Eysenck's theoretical constructs.

Pleasant motivation and annoying motivation and brain mechanisms of reward and punishment The field of neurophysiological studies of motivation grew significantly with the experiments of James Olds (1965, cited in in America) [3]. In his experiments, electrodes were placed in different areas of the animal's brain and the animal could by pressing a lever, create a slight electric current in his brain or cut off the current that the experimenter sent to his brain through the electrode. The results of these studies showed that the placement of the electrode in special areas causes that The animal exposed its brain to electrical stimulation for hours and enjoyed it, and on the other hand, the placement of the electrode in other areas was associated with the animal's tendency to cut off the electrical current. The logical hypothesis derived from these findings was that in the brain of two There is a different motivational system of reward and

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punishment. It is assumed that the motivational system of reward and its activity is associated with positive emotional states and the activity of the motivational system of punishment is associated with negative emotional states [4].

Now, if we consider the rules of conditioning, we must accept that the stimuli that come before the occurrence of a reward acquire the capacity to activate the reward brain mechanism, and the closer these stimuli are in terms of time to the intrinsic stimulus of the reward, the capacity to acquire it will be stronger. The reward mechanism works through its connections with the motor system (that is, the parts of the brain that send commands to the organs), to maximize these conditional or secondary rewarding stimuli. In this way, in an environment where the sequence of stimuli flows with a certain order, the organism can be directed in the direction of the intrinsic stimulus of the reward. In fact, the reward mechanism can be considered like the tracker of a guided missile that aims at a thermal gradient and moves towards it [5].

In the same way, stimuli that come in a systematic form before punishment, through conditioning, acquire the capacity to activate the brain mechanism of punishment. The closer these stimuli are to the intrinsic stimuli of punishment, the stronger this capacity will be. The structure of the punishment mechanism is such that through its connections with the motor system, it works to minimize its internalizations. It does this by stopping the behavior, and in other words, it is an active avoidance mechanism that commands the motor system to stop. In the language of feedback control systems, the reward mechanism is a positive feedback mechanism and the punishment mechanism is a negative feedback mechanism [6].

As a result, the pleasant motivational system is a reward-seeking system or approach system that responds to positive incentives by activating behavior. This is a motivational, energizing and behavior-directing system. In other words, it is both responsible for activating the behavior for simple reward-behavior situations and is also responsible for active avoidance situations in which the organism must provide an appropriate response to avoid punishment [7]. Of course, it may seem that the latter pattern is associated with some kind of annoying emotional state that has no relation to the pleasant motivational system. But this argument also seems logical that the avoidance response is more controlled through the positive reinforcing properties of safety signs-stimuli that signal the disappearance of the possibility of punishment - and these signs are functionally equivalent to reward signs [8]. In this interpretation, the pleasurable motivational system initiates active avoidance in response to cues that result in bringing the individual to safety.

Therefore, the emotional labels that are used for these two pleasant states are hope for the category of turning to reward and relief for the active avoidance of punishment [9].

Now, if we talk about the disturbing motivational system, we must say that the action of inhibiting the motivated behavior is in the

conditions that there are certain signs or conditional stimuli that show that providing the response will have negative consequences. Extinction occurred in simple reward-learning patterns and passive avoidance in conflict patterns. Avoidance is two important examples of the actions of this system. In the extinction model, failure is an annoying state that occurs after the expected reward does not occur. The signals that predict the absence of the expected reward - i.e. the conditioned stimuli that frustrate the lack of reward - activate the annoying motivational system, and subsequently, the inhibition of the behavior is achieved. Also, in the model of active avoidance, approach behavior (which is inhibited by a kind of reward evoked in response to the signs or conditioned stimuli of punishment that cause fear or anxiety [10], as in the case of different alcoves of the pleasant motivational system. It is also assumed here that failure and fear/anxiety are related to the activation of a single neuro-physiological structure [11].

Emma Gray points out that in the studies she has done on animals, it has been found that animals respond differently to conditioned and unconditioned annoying stimuli. The animal shows increased activity in response to a painful electric shock; It runs, jumps and attacks the right target (for example, another animal). Whereas, in response to a stimulus that corresponds to an electric shock, it is more likely to freeze and stop in one place. We will highlight the existence of a complete distinction between the brain mechanisms modulating these two types of reactions in the following sections.

The distinction between conditioned and unconditioned stimuli also applies to pleasant stimuli. Unconditioned rewards (such as food, water, and sexual mate) in the animal elicit specific terminal responses, each corresponding to the desired unconditioned stimulus (such as chewing, licking, and mating). These final responses can also appear in a conditional format; But in addition, conditional reward stimuli evoke a pattern of behavior (including increased activity, approach, and exploration) that is relatively independent of the specific unconditioned stimuli they are paired with [12]. It is assumed that the punishment mechanism modulates the specific responses to conditioned unpleasant stimuli and the reward mechanism modulates the preparatory responses to conditioned pleasant stimuli [13].

Gray provides a diagram to provide a clearer picture of the functioning of reward and punishment mechanisms and the existing connections between these systems and other centers. Figure 1 [14]. In this way, in addition to the reward and punishment mechanisms and the movement system (which were mentioned), she also considers a decision mechanism in order to make a choice in the situation of conflict between action and active avoidance. Without such a mechanism, conflicting commands would be sent directly to the motor system, possibly producing disastrous consequences. The performance of the decision mechanism is based on mathematical rules [15].

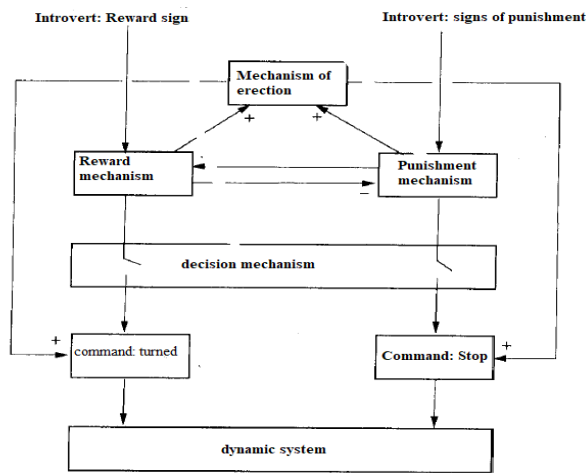


Figure 1) Part of Gray and Smith's model of differentiation and conflict learning (adapted from Gray, 1991)

But what is important here is to pay attention to the fact that the decision mechanism either establishes the connection circuit between the reward mechanism and the behavior command (left side of the figure), or establishes the connection circuit between the punishment mechanism and the command to stop the behavior (right side of the figure), but cannot establish both currents at the same time. In this form, there is also a system called the establishment mechanism. This system receives inputs from the reward and punishment mechanisms and sends outputs to the parts of the command (one for behavior and another for active avoidance). In this way, the increase in activity intensity of each of these commands, which is related to the decision mechanism, depends on the range of inputs that the mechanism receives from reward and punishment mechanisms. The last article indicates that if, for example, the behavior of turning is obtained and the animal is simultaneously faced with threats that have signs of punishment, the turning behavior will flow more strongly [16].

Brain/behavioral systems

Paying attention to different mechanisms of reward and punishment and the issue of individual differences in sensitivity to different stimuli (conditional-unconditional and pleasant-annoying) is the result of studies conducted by Gray, often in the framework of laboratory investigations of animal learning and the effects of psychoactive drugs.

In other words, referring to different biological systems that are based on the separate evolution of reward and punishment mechanisms in the brain of vertebrates, he proposes three different brain/behavioral systems that are the basis of personality differences.

The description of each of these systems requires distinctions that take place at (at least) three levels, the behavioral dimension (input-output analysis of the system). Neurocognitive dimension (activity and nervous structure of the system) and cognitive dimension (system information processing activity). It is appropriate to consider the fourth dimension under the title of active dimension (which represents active experiences along with system activity), but

experimental researches have not had a reliable tool to evaluate the latter dimension.

A) Behavioral inhibition system (BIS)

This system has been discussed more than other parts of this pattern. Figure 2 shows the introversion-extroversion relationships that represent BIS at the behavioral level.

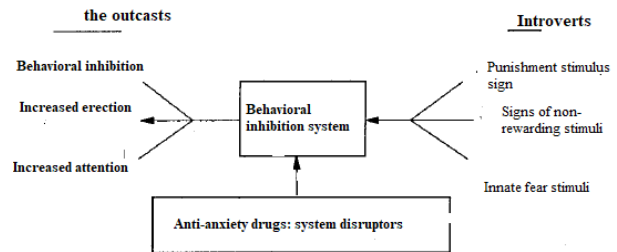


Figure 2) The behavioral inhibition system that is specified through inputs and outputs

Conditional stimuli that are consistent with punishment, conditioned stimuli that are consistent with the removal or termination of rewards, new stimuli, and stimuli that are intrinsically fearful for a type of fear are in the category of important motivating stimuli of this system. [17-20]. It should be noted that although the first two stimuli (conditional stimuli of punishment and lack of reward) are based on the phenomenon of learning, BIS itself does not play a role in learning processes. The formation of conditioned punishment and signs of failure stimuli is based on a specific general process that occurs in other forms of conditioning, and this phenomenon is the responsibility of other brain systems. On the other hand, it should also be taken into account that the way in which the BIS responds to these conditioned stimuli has not been learned either. The organism innately knows how to respond to threat, but it has to learn what is threatening, and in some situations it doesn't even learn that because, as noted, in the case of intrinsically fearful stimuli, the BIS responds almost automatically.

The behaviors that are stimulated by these stimuli include: behavioral inhibition (disruption of the current behavior, increasing the level of establishment so that the next behaviors that can be the continuation of the disturbed action) are performed with greater strength and/or speed. Increasing attention in such a way that more information is received, especially about new components of the environment [21]. It should be noted that BIS represents a single system, it cannot be expected that there are a number of separate connections between each of the inputs and outputs, and in fact each input triggers all the outputs. Also, the studies that have followed up the effect of drugs and the creation of lesions in the brain of animals have come to the conclusion that with these interventions, all the outputs of this system can be disturbed, without leaving any traces in other systems. Among the interventions that specifically stop BIS input-output communication, the use of anti-anxiety drugs is of particular importance. Benzodiazepines, barbiturates and alcohol are three important categories of drugs that reduce anxiety [22]. In fact, investigating the effects of these drugs played an important role in the formation of the concept of BIS. In other words, the selective effects of anti-anxiety drugs on BIS activity have played an important role in

accepting the assumption that the activity of this system is mixed with anxiety. Based on this, we can theoretically establish a special state of mind that exists with BIS activity, considered as anxiety. If we want to provide an operational definition of anxiety according to the inputs and outputs of this system, we must say that it is a state in which a person reacts to a threat (stimuli that are compatible with punishment or lack of reward) or ambiguity (unknown and new situations) with The reaction of stopping, staring, listening and preparing for action is responding [23].

Neurologically, the set of structures responsible for BIS actions are located in the parietal system of the hippocampus. The three main structural parts of this system are: hippocampal formations of the parietal area (which consists of the medial parietal area and the lateral parietal area) and Pap's circuit.

At the cognitive level, the key concept of BIS is summarized in node comparison, that is, a system that predicts moment by moment the possible next event and compares this prediction with the actual event. In fact, this system: 1) considers the information that represents the current state of the perceptual world; 2) to this information, adds other information related to the person's current movement plan; 3) it uses stored memory information that represents past regularities in communicating between stimulus events; 4) Likewise, it benefits from information stored in memory that represents past patterns of association between responses and subsequent stimulus events; 5) based on these sources of information, it predicts the expected next state in the perceptual world; 6) compares this prediction with the actual state of the perceptual world; 7) decides whether there is agreement or disagreement between this forecast and the actual state; 8) If there is an agreement between these two situations, steps one to seven will flow again; But 9) if there is a discrepancy between the prediction and the actual state, it stops the current movement program and generates the BIS outputs (mentioned earlier in Figure 2) to get more information and solve the problem that caused it. solve the disruption in this program [24]. It should be noted that the application of this model for the concept of anxiety is focused on step number 9 and its subsequent consequences [25].

B) fight/flight system (FFS)

Specific input-output relationships that represent the fight/evasion system are reflected in Figure 3. While the BIS responds to conditioned aversive stimuli, the FFS response to aversive stimuli is unconditioned, and while BIS responses are manifested by stopping, staring, listening, and preparing to act, FFS responses appear in the form of unconditioned defensive aggression or avoidance behavior.

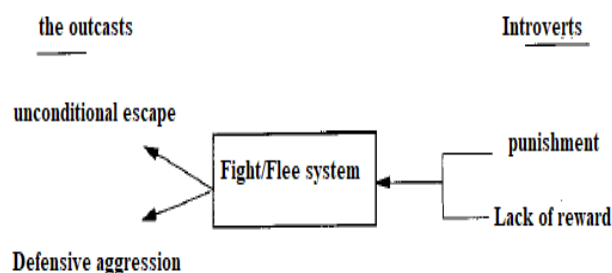


Figure 3) Display of war escape system through input-output system

Before we examine the distinct conditions for the emergence of war and flight, we must distinguish between two types of war behavior. Various studies conducted on animal species have identified defensive attack (which is carried out by a threatened animal against an animal of its own kind or an attacker) and aggressive attack (which is carried out by an attacking animal against other animals) [26].

It should be noted that attack or defensive aggression is an output that appears against annoying stimuli. On the other hand, as mentioned, these unconditioned annoying stimuli sometimes lead to escape behavior and sometimes fight behavior. This issue may cause doubt in the acceptance of FFS as a single system. Despite this, laboratory studies have shown that the appearance of fight or flight behavior does not depend on the difference in punishment, but on other stimuli that are present at the time of punishment.

Several experiments by Ezrin and his colleagues (1967) show that if an electric shock is given to the animal's foot in a situation where there is no suitable object in the animal's environment to attack, unconditioned avoidance appears, but if there is a suitable object in the environment, The most likely answer is to attack that object. Even if it has nothing to do with the delivery of the hit. Of course, the most appropriate subject to attack is another animal, but attacks can be made against anything else.

There are many factors that influence the likelihood of aggressive behavior in response to punishment, but overall, one can draw the general conclusion that the emergence of fight or flight is largely dependent on the stimuli present in the environment at the time of punishment. Therefore, instead of thinking about two response systems to two different types of punishment, it is better to consider a single mechanism of war-fighting that receives information about all non-contingent threats.

And then, based on the overall context of the stimuli in which the punishment has taken place, he issues the command of war and flight.

As mentioned, anti-anxiety drugs reduce BIS responses to its relevant inputs, but this group of drugs does not reduce responses to unconditioned disturbing stimuli. In contrast, analgesics, such as morphine, reduce the response to these stimuli, but do not affect the response to conditioned aversive stimuli.

Similarly, BIS and FFS have different neurological bases. Researches based on nerve stimulation and creating lesions in the brain have identified specific structures for this system in the brain. One of these structures is the amygdala and the other is the medial hypothalamus. Almonds have an inhibitory effect on the middle hypothalamus, and this part of the hypothalamus also exerts an inhibitory effect on the final output of the midbrain. The latter area receives light fibers that transmit painful stimulus information. Both this part between the brain and the amygdala have many nociceptors, and therefore, probably the analgesic effects of endogenous and exogenous narcotics are modulated through these areas [27].

C) Behavioral Activation System (BAS)

The specific input-output communication system that represents the behavioral activation system is shown in Figure 4. This figure represents a simple positive feedback system that is activated through stimuli that are compatible with reward or lack of punishment and acts in such a way that spatio-temporal proximity to these stimuli increases. By adding the assumption that pleasant conditional stimuli of this type, in proportion to their spatial-temporal proximity with non-conditional pleasant stimuli (goals), cause BAS activation, we are faced with a system that is generally capable of guiding the organism to goals (such as water and food) which are necessary for survival (Deutsch, 1964). In other words, the purpose of the BAS is to initiate and direct approach-based exploratory behavior that brings the organism closer to reinforcers.

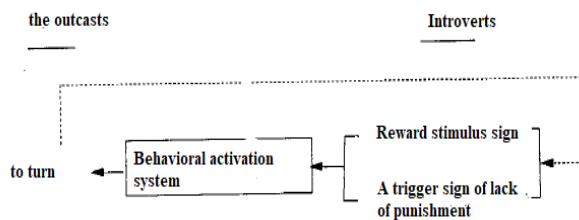


Figure 4) Representation of the behavioral activation system through the input-output system

At the neurological level, the rapid advances of recent decades have played a significant role in the formation of possible neuropsychological patterns of BAS. The key neurological components of the BAS are: basal ganglia (anterior and posterior striatum and anterior and posterior pallidum), dopaminergic fibers that ascend from the mesencephalon (substantia nigra and A10 nucleus) and innervate the basal ganglia, thalamic cells that are closely related to the basal ganglia. Follows by examining this system in human subjects, associated BAS activity with the reactivity of the autonomic nervous system. Although few studies have examined the relationship between BAS and emotional states in humans, it can be expected that this system is the infrastructure of states such as pleasant expectation (hope) and happiness [28].

RESEARCH METHODOLOGY

Personality and conditioning

The concept of conditioning has played an important role in the theories of personality development, abnormal behavior and socialization. Therefore, studies related to individual differences in conditioning ability can help identify some factors that make people prone to some aspects of psychopathology and antisocial behavior. Loya and Martin, in reviewing the background of personality and conditioning researches, point out that this research field expanded, especially during the 1950s and 1960s, has been significant. Many of these studies have focused on the theoretical contrast between Eysenck's introversion theory and Spence's anxiety theory.

As predicted by Levy and Martin, in the 1980s and 1990s, the renewed interest in the concept of personality and conditioning flourished significantly. Again, this attention is focused on Eysenck's theory and its two changed models, that is, theory and Newman's

theory, each of which has tried to describe and explain the structure of personality by using the theory of learning.

a) Eysenck's theory and conditioning in introverts and extroverts

In the theoretical framework of Eysenck's personality curve, the relationship between personality and learning has been widely investigated. Eysenck tried to explain introversion and extroversion first in the form of facilitating and inhibiting processes, and then in the form of differences in the ability to establish cortex using the assumptions of Hall's learning system [29]. He has also tried to bring up the relationship of this personality dimension with neuroticism and a set of mental disorders (which Eysenck calls misogyny) and a second set of social crimes (painful psychosis).

In fact, many questions come up with this theory, such as what are the psychological or physiological variables that lead to the high readiness of people with high levels of neuroticism towards moodiness and emotional pain? With which psychological or physiological variables differentiate psychopathic people in the dimension of introversion-extraversion, and what makes introverted psychopaths prone to mischief and extroverted psychopaths prone to psychopathy?

The first connecting link in Eysenck's explanatory chain is the description of narcissism as over-socialization disorders and psychopathy as under-socialization disorders. In an introverted psychotic person, the establishment of conscience (which Eysenck considers as a set of classic conditioned fear reactions) is so intense that in adulthood, the person is affected by a set of conditioned fear manifestations (in the form of panic, obsession, incontinence, anxiety states, Reactive depressions become incapacitating. On the contrary, an extroverted neurotic person has a lack of sense of responsibility towards society due to failure in socialization and shows types of antisocial behavior (juvenile delinquency, sexual deviance, and breaking the law).

The role of neuroticism in this process is to increase the overall intensity of emotional reactions, Eysenck considers neuroticism equivalent to the intensity of excitability. The combination of intense emotions and conscience became more social; It is the introverted disturbed person who sends him to the hospital, and in the same way, it is the combination of intense emotions and shaky conscience that drives the extroverted disturbed person to confront the law.

Psychologically, Eysenck assumes that when there is a possibility of emotional activation, neurotic people will have higher levels of general tension, and physiologically, Eysenck considers the level of neuroticism as a direct action of the reactivity of the autonomic nervous system. Eysenck also proposes a dual-psychological and physiological explanation for introversion: compared to extroverts, introverts form conditioned reflexes that form conscience more easily, because introverts have a higher ability to be conditioned. The higher ability of conditioning in introverts, in turn, has been attributed to their relatively low tendency to inhibition processes, or to a relatively higher level of general standing, or both.

On the other hand, Eysenck considers the relationship between the level of establishment and the ability to condition to be non-linear; In

other words, increasing erection facilitates conditioning until it reaches an optimal level of erection. Based on these hypotheses, Eysenck predicted that introverts would be conditioned much more easily than extroverts in mild to moderate situations. When Eysenck made this assumption, he believed that this principle only applied in classical conditioning. However, since then, this prediction has been extended to instrumental conditioning. According to Eysenck, the moderating mechanism of the relationship between introversion and conditioning is that because the level of arousal in introverts is high, the received sensory stimulation is enhanced. does, these people receive weak non-conditioned stimuli in a stronger and therefore more reinforcing form and become conditioned more easily.

In sum, it seems that Eysenck considers many of the behavioral differences between introverts and extroverts to be directly and indirectly the result of differences in conditioning ability. Although many subsequent studies have not confirmed the relationship between introversion and conditioning, Eysenck considered the non-observance of some parameters in research strategies as the cause of contradictory findings.

b) Sensitivity to reward or punishment cues instead of conditioning

Gray believes that if we accept the phenomenon of different socialization in introverts and extroverts and if we also accept the opinion that the process of socialization includes the formation of a set of conditioned fear reactions, then we must accept that Eysenck answered the question correctly. proposed that "why do introverts form stronger conditioned fear reactions than extroverts?" But we cannot accept Eysenck's answer that "because introverts are conditioned more easily than extroverts". A competing hypothesis is that introverts are more prone to fear than extroverts.

Of course, many studies have confirmed the easier conditioning of introverts; But Gray believes that these results were obtained in annoying conditional situations, and for a more accurate test of the two hypotheses, pleasant reinforcements should also be used.

An obvious point where these two theories make different predictions is about conditioning. Both theories predict that introverts are more capable of conditioning in response to punishment cues compared to extroverts. Eysenck's theory also proposes the superiority of introverts' ability to be conditioned in response to reward signs, in contrast to the theory, by emphasizing the greater sensitivity of extroverts to reward signs, he claims that in response to reward signs, extroverts' ability to be conditioned is more It is an introvert.

In Gary's theory, the degree of introversion-extroversion is determined through sensitivity in the BIS and BAS system, which in turn determines the appropriate reinforcement conditions for the formation of behavior. Extraverts are characterized by a relatively sensitive BAS and a relatively insensitive BIS; As a result, rewards dominate in shaping their behavior. On the other hand, in introverted people, the balance of BAS and BIS is reversed and their behavior is basically controlled through punishment. While extroverts tend to learn proactive behaviors best, introverts are better at learning inhibitory behaviors.

Theorizing predicts testability in different domains, including psychopathology and somatic; But this theory, since it was mentioned in this section, brings up the field of hypotheses that have deep themes for education. One of these cases is the balance between positive and negative reinforcement in shaping behavior and acquiring information in students and paying attention to their status in the introversion-extroversion continuum. In the same way, Wakefield and McCord showed in a classroom situation that extraverted students made more progress compared to introverts when they often received positive verbal reinforcement from teachers in mathematics education, while introverts in The conditions that received more negative verbal reinforcement from teachers showed greater improvement compared to the extraverts.

However, some believe that because the theory is based on brain and behavioral studies of lower animals,

As in mice, it can be hypothesized that the core of behavioral responses modulated through brain/behavioral systems is based on primitive (phenomenologically) primitive learning systems.

c) Newman's theory; Formation of answer sets

Newman hypothesized that: 1) extraverted people have an exaggerated focus on rewards, that is, when they are exposed to rewards, they probably form a set of dominant responses that are difficult to disrupt; 2) The increase in standing is the inevitable consequence of punishment, failure or facing new situations; 3) establishment increases the intensity of whatever response is ultimately chosen; and 4) unlike introverts, whose reaction to punishment includes disruption of behavior and stimulus processing, extroverts' reaction to punishment is more stable, their response to reward and strengthening the main behavior in the direction of the goal in other words, in In the latter case, it can be said that this possibility of contradictory response in extroverted people prevents the appropriate processing of punishment signs and their dominant response set is preserved. This implies that extroverts experience less distress when faced with corporate events.

Newman and his colleagues provide evidence that indicates the low level of active avoidance in extroverted people, and this point is compatible with their hypothesis based on which extroverted people have an exaggerated focus on rewards [30]. However, they do not provide an explanation as to why extroverts have such an exaggerated focus on rewards.

Although there is considerable overlap between Newman's and Gray's theories, there are also important differences between these two theories. First, Newman emphasizes the role of the dominant response set as the fundamental factor that moderates inhibition in extroverts. Second, Newman believes that the insensitivity of extroverted people to punishment is a simple consequence of the continuation of deviant behavior in them. Gray does not explain introversion-extroversion through the balance of sensitivity to punishment and reward, but considers them as a result of sensitivity to the signs of punishment and reward. This distinction is very important, because in the framework of the theory, reward signs include both signs of approach behavior (reward for responding) and active avoidance signs of avoiding punishment by providing a

response. In the same way, punishment cues include both active avoidance cues (punishment for response) and exclusion or extinction cues (not providing reward for response [31]).

Anxiety and irritability

By making a change in the personality dimensions of extroversion and neuroticism, Eysenck introduces two new dimensions of anxiety and impulsivity. According to Gary, the dimensions of extroversion and neuroticism should have a rotation of approximately 30 degrees to create two new dimensions. Gray believes that the factors of anxiety and precociousness are more fundamental and extroversion and neuroticism are derived from these fundamental factors (5) in the continuum of the new dimension of anxiety, on one side are the annoyed neurotic introverts (+E-N), which represents anxiety is high and BIS is strong, and on the other hand, there are extraverts with emotional stability (-E/N), which indicates low anxiety and weak BIS. According to Gary's model, neurotic introverts and other anxious people have a distinct tendency to disrupt the current behavior and direct attention in response to signs of punishment, lack of reward and new situations.

The personality dimension of impulsiveness is orthogonal to the dimension of anxiety. In the continuum of precociousness, on one side are nervous extraverts (+E+/N), which represents the intensity of precociousness and on the other hand, there are introverts with emotional stability (-E-N), which indicates the weakness of precociousness.

Although in Gary's theory, the anxious personality is at a high level in terms of neuroticism and introversion, the component of neuroticism is more important in this combination. Similarly, in the case of a precocious person whose level of neuroticism and extroversion is high, extroversion is considered a more important component. The response of BAS to its appropriate stimuli (mentioned earlier) is the basis of the dimension of impulsivity.

If we want to provide a clearer explanation about impulsivity, it is a tendency to extremes of behavior and doing things that potentially lead to problems. Behaviors can be considered premature, which would have been prevented if proper and correct judgment had been made about them.

As mentioned, Gray relates the trait of impulsivity to the dimension of reward sensitivity, that is, it represents a strong BAS. Then, Gray et al. point out that both strong BAS activity and weak BIS activity can be related to behavioral extremes.

Regarding the anxiety dimension, we can consider an active BIS, this situation causes both severe anxiety and behavioral inhibition and risk avoidance. Based on BIS functioning, it is expected that such individuals show shyness, social isolation, sensitivity to punishment and failure, and easily lose their courage and fail to develop active ways to deal with situations. It seems that if we assume all the factors to be the same, these people will experience more anxiety when faced with stressful situations compared to others.

One of the things that attracts attention in conceptualization is the issue of consequences and changes caused by anxiety. In the

theoretical and research scope of the concept of anxiety, some authors consider anxiety to disrupt the capacity to pay attention and process environmental stimuli, while in theory, one of the changes that appears with anxiety is increasing attention to environmental stimuli.

RESULTS

The results of these studies showed that the placement of the electrode in special areas causes that the animal exposed its brain to electrical stimulation for hours and enjoyed it, and on the other hand, the placement of the electrode in other areas was associated with the animal's tendency to cut off the electrical current. The logical hypothesis derived from these findings was that in the brain of two there is a different motivational system of reward and punishment. It is assumed that the motivational system of reward and its activity is associated with positive emotional states and the activity of the motivational system of punishment is associated with negative emotional states.

CONCLUSION

Carey's theory has a special place in the field of psychology as one of the efforts that focuses on the underlying biological structures of personality. The increasing expansion of interdisciplinary research in the field of biological and psychological sciences doubles the necessity of dealing with theories of this type. Paying attention to the concepts of this theory not only highlights new explanations in personality psychology, but also draws new perspectives in other fields, including psychological and physical pathology.

Of course, from a psychologist's point of view, it is not important to say that a set of brain structures modulate the activity of a behavioral system instead of other structures. In fact, psychologists have made valuable efforts, and without any reference to the neurological basis of behavior, they have taken steps towards testing predictions related to psychological theories. However, it is important for the psychologist to address the neurocognitive aspects. First, because in building a concept such as brain/behavioral systems, using the findings of neuroscience alongside psychology increases the possibility of obtaining more specific foundations for the subsequent purely psychological theorizing. Second, understanding the neural basis of a behavioral system raises certain psychological questions and hypotheses, which are otherwise unlikely to be proposed.

Finally, the neurological level of analysis inevitably returns to the current issues of psychology; Because the main country of Parviz Azad Fallah, the prosecutor's office, is the brain of information processing, and the responsibility of describing how this processing is done, outside of neurological terms, is the responsibility of cognitive psychology. Therefore, against the specific neurocognitive structures that were introduced, not only can the question be raised as to how these structures produce behavioral outputs, but also what cognitive operations (with information processing) flow in these structures.

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