Multidisciplinary Journal With Arbitration Committee

CURRENT SCIENCE

Emotional Motor Cortex Region and Leptin in Nervous System and Diversity Paradigm in Biological, Social and Mental Systems

Prof. Dr. Caglar Sezis

To cite this article: Prof. Dr. Caglar Sezis, Science, Volume 4, No. 8-5, 2022, p. 356 – 379. - 0099-0001-2209-0511.

ISSN: 2667-9515

Barcode: 977266795001

Editors Group:

Concessionaire: Tsisana Kharabadze

Dr. Ugur Ugural

Niyaz Bokvadze

Prof. Sabrina Corbi

Prof. Samantha Lewes

Assoc. Prof. Osman Doruk

""• Current Science Multidisciplinary Academic Journal with Review Panel is a monthly multidisciplinary academic"" (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“CURRENT SCIENCE”) (“CURRENT SCIENCE”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”)

journal with a multi-science peer-review." (“Scientific Studies - Current Science Georgia”) (“Scientific Studies -

Current Science Georgia”)

• The magazine is published monthly.

CURRENT SCIENCE

""The magazine will be at the subscriber's address in the first week of the month."" (“Scientific Studies - Current Science Georgia”) (“CURRENT SCIENCE”) (“CURRENT SCIENCE”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies – Current Science Georgia”)

• The journal continues to be included in all international rankings and registrations. Quality articles and publications accelerate this (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) process. (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”)

""• Response or rejection time for applications varies between 30 and 90 days."" (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“CURRENT SCIENCE”) (“CURRENT SCIENCE”) (“CURRENT SCIENCE”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies - Current Science Georgia”) (“Scientific Studies – Current Science Georgia”) (“Scientific Studies - Current Science Georgia”)

Abstract

In the communication process, there are certain features of the assessment of the psychological state of a partner, his physical identity, the nature of movements of the limbs and body (postures, gestures), facial expressions and vocalization. This assessment is based on a variety of information about the individual. These information processing activities are collectively referred to as "social cognition" or "social perception (intelligence)" depending on the context. Certain mechanisms

have evolved over the course of evolution to create individualized communities within the nervous systems of social animals. These mechanisms are responsible for maintaining social awareness and selectively responding to social inputs. Studies in the fields of physiological and neuropsychological research in the 21st century have identified many socially oriented brain systems. Some are found in the central nervous system and are linked to certain social signals such as: 1) acoustic signal complexes responsible for speech in humans; 2) gestures and positions; and 3) emotional facial expressions. Other processes are located around the nervous system and are linked to the specific function of the autonomic nervous system in maintaining social behavior (Blascovich , 2000). Mimetic muscles are a unique set of facial muscles that developed during the development of mammals. These muscles allow higher animals to communicate their emotions through nonverbal communication. These muscles in the animal's skin are responsible for a wide variety of activities, including the creation of different facial expressions and voice messages, as well as regulating the movements of the animal's whiskers and ears. Charles Darwin believed that facial muscle movements, along with certain ritualized movements of the extremities (or possibly the whole body), could be seen as an alphabet of this emotional language, a form of emotional gesture. The motor cortex area responsible for controlling facial muscles is significantly larger than the area responsible for regulating hand movements. This is because of the importance of mimetic muscles for human behavior. Some academics believe that there are some "basic" emotions that can be directly identified by facial expression and that these emotions can be evaluated as social signals in the non-verbal (emotional) communication channel (Izard, 1980; Ekman, 2010).

Keywords: *Nervous System, Emotional Engine, Cortex Region, Leptin, Biological Social Mental Systems*

1. Introduction

The presence of such stimulating emotional communication signals requires the presence of certain mechanisms in the neurological system that are responsible for their formation and identification.

This research was conducted by AM Chernorizov , AG Asmolov and ED Schechter . Indeed, recent neurophysiological studies of the brains of primates and humans have shown that the temporal cortex and amygdala are used for the identification of facial expressions and emotions. indicates the existence of specific neural pathways (Jankowski , Takahashi , 2014). When the structure is damaged, there is a natural deterioration in social interactions, and it is possible that the neurons in the amygdala responsible for emotional facial expressions are also part of the system that regulates social relationships. As an example, the power hierarchy varies significantly within a hierarchically organized ape community (Pribram , 1975). The findings of psychophysiological research on social perception have been supported by observations in clinical settings.

2. Occipitotemporal Cortex

there is damage to both sides of the occipitotemporal cortex, a person is said to develop the so-called neurological syndrome of facial agnosia, also known as prosopagnosia , characterized by the inability to recognize familiar or unknown faces, in addition to the complete preservation of all other cognitive brain processes. In addition to losing the ability to recognize certain individuals, patients with this syndrome continue to interpret others' emotional expressions correctly, even if they do so impersonally (for example, "someone is crying", "someone is laughing", or "someone is feeling sad"). This is one of the hallmarks of this syndrome . G. Klüver and P. Bucy in 1937 , Klüver-Bucy They described a disease they called the syndrome . This disease is characterized by behavioral problems that occur after bilateral lesions of the temporal anterior lobe in higher mammals . The syndrome, most notably excessive attention and irrational anxiety, hyperorality (the practice of putting objects into one's mouth) and hypersexuality (distortion of emotions or reduced emotional impact, feeling that one's boundaries have been breached, a distorted perception of the emotional significance of signals).

Later, Klüver-Bucy It was determined that emotional changes in the syndrome are related to damage in the amygdala and this type of impairment can show great differences in different animals. Klüver-Bucy Klüver , who first described the condition, named the syndrome . Got it

from Bucy . Once the amygdala is damaged, animals and cats like us become extremely ferocious (undomesticated, ape-like). In this way, the clinical results confirm the psychophysiological evidence of the main function of neurons in the temporal cortex and neurons in the amygdala in perceiving (identifying) faces (ie, perceiving emotional facial expressions). Gnostic facial neurons, also known as "neuron sensors of a person" and "neuron sensors of emotional facial expressions", are components of the neurophysiological system known as the "Who" system. This system integrates information about other people. The "Who" system was developed in the field of phylogeny to fulfill an important task . This task is to enable individuals to interpret various kinds of information (including their psychological state) about other individuals and ultimately to determine their dispositions and intentions. Damage to the brain mechanisms used to identify individuals and facial expressions are fundamental processes of social cognition, and damage to these mechanisms can lead to the destruction of the entire social cohesion system.

3. Brain Mechanisms Used to Identify Individuals and Facial Expressions

Brain mechanisms used to describe individuals and facial expressions can be found in humans and other primates. from the University of Parma (Universita ' degli in Italy) studio di Parma) researchers conducted neurophysiological experiments with macaques in the late 20th century. As a result of these experiments, the researchers discovered what are called mirror neurons (MNs) in the lower part of the frontal cortex (area F5; the human analog is area n. 44). (Gallese et al., 1996). The MNs came into play both when the monkey was performing certain tasks and when the monkey was supervising the researcher as they completed the same actions. These findings confirmed the idea that MNs reflect:

The activity of the monkeys was as if the monkeys' brains had learned (or "read") their external manifestations and physical actions, as well as the brain of the researcher. Using techniques such as functional magnetic resonance imaging (fMRI), positron emission tomography (PET), magnetoencephalography (MEG), and electroencephalography (EEG), several separate research teams have concluded that certain areas of the human cerebral cortex are activated.

Premotor cortex and inferior parietal In addition to the gyrus, MNs cingulate It has been shown that it can also be found in the gyrus , somatosensory cortex, and insula . All of these regions are found in the brain (Blakemore et al., 2005; Liepelt et al., 2009). Because of the discovery of MN, it is now possible to give a direct answer to the question of why in some cases we are able to understand the activities of others so quickly and uncomplicatedly. It is generally accepted that when we see another person's movements, the same neurons in our brain are active when we carry out similar types of activities on our own. Therefore, we can really feel what the other person is doing, and we can also predict the continuation and fulfillment of their activities without the need for complex logical calculations. The discovery of MNs marked the beginning of a new avenue of research in neuroscience and psychophysiology known as "Brain Reading" or "Theory of Mind." The data obtained in its framework relates the brain to the organization of social interaction (learning communication skills, predicting the behavior of the communication partner), emotional empathy processes, and the evolution of communication systems (from poses and gestures - speech) (Baars , Gage , 2010; Riz-zolatti , Sinigaglia , 2008 — English, Oxford Press , 2006 Italian, Rafaello Cortina).

Experimentally gathered information suggests that MN disruption may be a contributing factor to the development of autism in infants (Ramachandran , 2014). Specifically, this hypothesis provides an explanation for certain autistic traits. These traits include a desire to isolate oneself from the outside world and avoid social interactions, difficulties in understanding and imitating other people's actions and emotions, and insensitivity to other people's emotions. The unique activity of the brain in terms of direct social interaction (joint actions, communication) is one of the most important topics for social psychophysiology and cognitive sciences:

Is such a thing happening? If so, what exactly does it work?

TV Chernigovskaya group has developed an innovative multidisciplinary strategy based on a mix of techniques from neurophysiology, psychology and linguistics to try to find an answer to this issue (Chernigovskaya , 2007). Electroencephalograms (EEGs) of two test participants working together to solve cognitive tasks (including visual-spatial orientation) while in the midst of active social participation were analyzed by the researchers (discussion).

4. Realization of Collaborative Social Actions

The idea was that simultaneous activation of certain communication partners in the brain is necessary for cooperative social actions to occur. The authors showed that the following activities were observed among subjects in the process of solving cognitive problems in a situation involving social interaction:

(1) *synchronization of electrical activity in the parietal region of the left hemisphere and*

(2) *general changes. frontal interhemispheric asymmetry EEG characteristic for emotional support of communication* .

the necessary structures for social communication are the prefrontal cortex, temporal lobe and temporoparietal junction has been clarified by these results. This assumption has been extensively discussed in the scientific literature . Note that the maximum temporal matching in the partners' EEGs is achieved during the communication process stage, when the problem-solving (social interaction) process is most effective. This finding is presented in the paper presented by AM Chernorizov , AG Asmolov and ED Schechtering . The authors found that predominant EEG synchronization occurs in the parietal region of the left hemisphere during the process of interaction , including with the partners themselves, through problem solving and the communication medium . They attributed this phenomenon to the formation of the "general focus of attention in the system." By combining data from synchronization of brain activity with data from psychological and linguistic analysis of interactions between partners in the problem-solving process, the authors were able to conceptualize a new psychophysiological phenomenon called cognitive resonance .

5. Melanocortin Receptors

Leptin -regulated melanocortin pathway provides a molecular and neuroanatomical link between peripheral signals and CNS circuits. However, this melanocortin The question of how signals produce downstream effects on appetite, energy expenditure, and neuroendocrine function remains unanswered by this discovery. A number of potential mechanisms emerge. In one model, leptin-regulated arcuate melanocortin nerve terminals transmit to neurons in the paraventricular hypothalamic nucleus (PVN). These neurons are known to respond in vivo to changes in leptin levels as well as changes in nutritional status, as detailed in previous research . Paraventricular nucleus (PVN), median eminence It is possible to think of it as the motor arm of the hypothalamus because it regulates pituitary hormone secretion and autonomic activity through some neuropeptides released by projections . projection tools to autonomous preganglionic neurons . Both of these functions take place in the hypothalamus. One such neuron is the TRH neuron in the PVN , which is responsible for regulating the pituitary- thyroid axis. TRH expression in PVN is controlled in two different ways: first, by melanocortin inputs from the arcuate nucleus acting via MC4Rs on TRH neurons ; second, with leptin acting directly on these cells via leptin receptors (reviewed in Flier et al. 2000). The effects of leptin on additional PVN neurons that alter endocrine status, autonomic function or hunger can be explained by processes similar to those described above.

These arcuate melanocortinergic neurons (AgRP and -MSH) Direct projection onto neurons in the lateral hypothalamus producing the neuropeptides MCH and orexin / hypocretin is part of a second and parallel hypothesis (Elias et al. 1999). Ob / ob of expression MCH, which has been found to be upregulated in the hypothalamide , is what encourages a person to take in more food (Qu et al. 1996). (Shimada et al. 1998) found that deletion of the MCH gene resulted in a weaker phenotype, whereas transgenic overexpression of the gene promoted obesity. In the first two hypotheses, melanocortins are thought to have direct effects on TRH or MCH neurons. Electrophysiological evidence is evident in PVN , which is believed to act as an integrator of various inputs . GABAergic Since it supports melanocortinergic neurons projecting into interneurons , it is possible that other pathways exist (Cowley et al. 1999). It is highly likely that all of these systems will work together. The phenomenon is a special complement to another

phenomenon that is extremely important for social contacts: the phenomenon of emotional resonance, which is associated with the establishment of emotional interaction (harmony) of partners in communication. (“From physiological psychology to psychological physiology ...”) The phenomenon is a special complement to another phenomenon that is extremely important to social relations . The phenomenon is maintaining "personal distance" in communication between members of the personified community, including both psychological and physiological processes .

It is another special complement to its mechanisms. It should come as no surprise that people have to share living space (communication). However, why can it be difficult for us at times, even the presence of our closest and dearest, who are always by our side? Also, why do we dislike intruding into our private worlds? Why does each of us have something called a "drive" that causes us to be only accessible and to a certain degree "open to others"? Why is it necessary for people to "keep a certain distance" from each other?

A comparison between human societies and biological communities in which community life is not combined with an individual's keeping of distance may help us understand the origin of the need to "keep individual distance". (“From physiological psychology to psychological physiology ...”) It is not typical for all species to have a spontaneous drive for individual autonomy combined with the need for cohabitation, also known as cohabitation or communal residence. It is conspicuously absent in insect communities; bees living in the hive physiologically feel comfortable with each other (ie touching). There is no evidence that dogs fear human touch. A flock of minute hands turns into a solid mass. Animals in rat families are always social and always open to close, physical contact with one another. What binds these communities together?

Rats, insects and other rodents do not have personalities. All people are comparable to each other and can identify each other on the basis of basic characteristics shared by all members of the group (i.e., on the basis of the concept of "friend-or foe"). In contrast to such impersonal (anonymous) groupings, the human community is personified, and each member of a community has its own unique "collection of important characteristics" (individuality). The measure of individual distance can be expressed as the distance between people that allows a person to defend himself effectively

if attacked by a partner . According to neurophysiological studies conducted on monkeys, mirror neurons have been shown to be involved in the mechanics of intentional behavior and specifically in specific activity aimed at maintaining individual distance (ll , Svensson and Ziemke , 2011). These experiments were done on monkeys. There is some evidence that humans still exhibit territorial behavior. For example, we experience involuntary distress when we have to wait in line in a busy area, and the person becomes uncomfortable when left alone in a solitary environment. The physical "I" is something that can also be experienced by animals. This "I" includes one's own body, one's own territory, and even close relatives who are sometimes carriers of shared genes. The innate desire to accumulate all this knowledge.

reex that manifests itself not only in physical confinement, but also in reaction to the mental violation of "I" . Shown aggression (anger), genuine aggression (attack), and selective behavioral responses are examples of self-protection (maintaining personal distance) by "keeping distance" (fear). Defensive reactions are not the only way to preserve one's individuality; Another form of expression and "self-protection from slavery" is creative activity. Defensive responses are not the only way to preserve one's individuality (Brodsky , 1987). The following questions, all linked to the concept of maintaining individual distance (personal space), are still subject to further investigation.

1) *does the need to stay away from other individuals first arise in the animal kingdom ?*
2) *Why in some cases (even between close relatives) there is a desire to maintain distance, while in other cases (even with strangers) there is no such desire?*
3) *Are there differences between cultures in efforts to maintain individual distance, and if so, what are the processes underlying these differences?*

Using psychological and physiological theories in the study of cultural differences New avenues for research into the link between the brain and culture, also known as "cultural neuroscience." social relations and neurobiology are neither uncommon nor unrelated to basic science. Experimental studies of the connection between the brain and economics (neuroeconomics), the brain and politics (biopolitics), the brain and art (neuroaesthetics), and more generally the brain and human culture (cultural neuroscience) are gaining momentum in the modern world.

6. The Crossroads of Psychology, Neuroscience, Cultural Anthropology, and Genetics

These new types of research are gaining momentum at the intersection of psychology, neuroscience, cultural anthropology, and genetics (Falikman , Cole , 2014; Zhou, Cacioppo, 2010; Kitayama , Uskul , 2011; LeClair , Janusonis , Kim, 2014). Studies on the relationship between brain plasticity and the acquisition of various cultural experiences and the physiological drivers of cognitive processes in various cultures are conducted in light of these new lines of work. These studies are currently ongoing (Millar et al., 2013; Kelkar , Hough , Fang , 2013). Ideas about the existence of brain structures, the substratum of internalized social functions in the process of evolution and ontogenesis , are naturally combined with the ideas of social neuroscience and social psychophysiology. This is because evolution and ontogenesis both serve to internalize ideas. Investigation of the mechanisms of "social categorization" associated with certain behavioral behaviors, referring to the brain and processes of social classification, the perception of the social environment as categories of group membership and position in the social structure. expectations is considered the mainstream neurocognitive and psychophysiological study of cultural phenomena. (“From physiological psychology to psychological physiology ...”) [cultural phenomena] are studied to better understand how people behave in certain situations (Contreras , Banaji , Mitchell, 2011). Findings of modern social psychophysiology provide evidence that the brain specializes in connection with processes of social categorization that have made an important contribution to the development of Homo sapiens (Kinzler , Spelke , 2007). 14 AM Chernorizov , AG Asmolov , EDSchechter There is evidence (EEG, fMRI, PET) of a statistically significant difference in human brain responses in the perception of different social groups: themselves and an "alien" social group (Rilling et al., 2008; Volz , Kessler) , von Gramon , 2009; Vrticka et al., 2009; Van Bavel , Packer , Cunningham, 2008), (Freeman et al., 2010).

7. Perception of Various Social Categories

In this and many other studies, the perception of various social categories was found to involve the same areas of the brain; this made it possible to formulate the hypothesis of a basic universal mechanism that ensures the representation of the social world in the brain (Shkurko , 2012). Cross-cultural differences in social cognition mechanisms have also been demonstrated in studies investigating cultural differences in perceiving social knowledge (Ng et al., 2010; Harada, Chiao , 2010). "Important discoveries were made in the field of perception of other people among representatives of collectivist cultures and individualistic cultures." (“From physiological psychology to psychological physiology ...”) In particular, in collectivist cultures (traditionally Eastern cultures), the perception of close relatives or friends has been found to activate areas of the brain associated with our own perception of "self". Finding can be interpreted as a result of the inclusion of “dear and close people” (friends and relatives) in the self-concept . There is no such effect in individual cultures (traditionally Western cultures).

specific activity of the brain confirms the need for further development of psychophysiological methods for use in cross-cultural and cross-cultural studies . (“From physiological psychology to psychological physiology ...”) Psychophysiological approaches to the study of social categorization processes in the field of international relations: racial perception, stereotypes and prejudices In social neuroscience, when dealing with social categorization processes, maximum attention is paid to the study of racial perception, stereotypes and prejudice. - dices (Ito , Bartholow , 2009; Dickter , Bartholow , 2007; Knutson , et al., 2007). (“From physiological psychology to psychological physiology ...”) Most research in this area is conducted in the United States because of its practical importance in that country. Thus, initial pioneering research has revealed the role of the amygdala in the perception of people of another race, which is often associated with a response to emotionally significant stimuli (Hart et al., 2000; Phelps et al., 2000).). Research by Cunningham and colleagues (Cunningham et al., 2004) has demonstrated the importance of neuroscience research for understanding the cognitive processes involved in perceiving one's self and individuals of other races: rapid (30 ms) activation of the amygdala in response to the unconscious state. There was no representation of people of other races when the stimulus

exposure time exceeded the threshold of conscious perception (0.5 s), which may be interpreted as a result of suppression of automatic stereotyped response by controlled processes.

From passive perception to imitation and meaningful judgments, the different response of the human brain to exposure of an individual's racial and/or ethnic group representatives during the performance of different experimental tasks (Golby et From physiological psychology) to psychological physiology… 15al ., 2001; Richeson et al., 2003; Lieberman et al., 2005; Adams et al., 2009; Bruneau , Saxe , 2010; Xu et al., 2009; Cheon et al., 2011 ; Losin et al., 2012) indicate that racial (ethnic) categorization is deeply rooted in the architecture of social cognition, possibly confirming the hypothesis of racial categorization as an epiphenomenon of evolutionarily established mechanisms for coalition recognition (Kurzban , Cosmides , 2001). However, research on the neurophysiological basis of social cognition is already gaining momentum; There seem to be serious methodological problems.

According to classical neurophysiology and modern neuroscience, narrow brain specialization is not validated even for basic physiological (e.g. breathing) and psychological (attention, memory, emotions, speech, perception) processes. Given socially charged categories, such specialization is reliably captured if only faces (temporal cortex and adjacent amygdala) are detected/identified. The task of finding brain correlates (patterns of brain activity) for invaluable categories of stimuli such as "marital status", "political affiliation" or "social hierarchy" arises from the perspective of experience. In this sense, what is the main difference between the proposed research projects and an older project by F. Gall investigating the localization of personality traits (in the brain) such as "independence", "amor patriae "? The proposed meta-analysis method in this area (analysis of data obtained in the framework of socially oriented neurophysiological research by different authors) has accumulated little statistically significant material in this area, with differences “noisy for specific experiments” (Van Overwalle , 2009). Meta-analysis in modern neuroscience and psychophysiology refers, as a rule, to studies carried out using fMRI and PET. First, the analysis of tomograms is a type of statistical analysis that has limitations regarding the accuracy and reliability of the data regarding the localization of brain activity patterns. Second, fMRI and PET cannot identify the type of physiological processes (excitation/inhibition) occurring at active sites

and do not allow the detection of functional areas with low energy requirements. This implies a possible situation: all active regions (pixels/ voxels of tomograms) are brain-obstructed areas that impair the analysis of social categories, and in reality the areas associated with these analyzes consume less energy, so the methods consume less energy. cannot detect them (due to space-time thresholds). fMRI and PET make serious claims about physiological, technical, and (mainly) methodological issues that will be extremely fruitful in planning research (including meta-analysis) in social neuroscience (for review, see Logothesis). , 2008; Figley , Stroman, 2011).

8. Evolutionary Background of Social Behavior

Social behavior has an evolutionary background and a real genetic basis; it is also created by selection and is rooted in the instinctive behavior of animals. The study of the biological basis of social behavior engages representatives of such sciences as ethology, animal psychology, psychogenetics , evolutionary biology, evolutionary psychology, ethnography, and sociobiology . (“From physiological psychology to psychological physiology ...”) 16 AM Chernorizov , AG Asmolov , ED Schechter Over the past 10 years, there has been rapid development in new interdisciplinary research areas at the intersection of neuroscience and social sciences (social psychology and behavioral economics), social neuroscience and social psychophysiology. . Within the framework of social neuroscience and social psychophysiology, brain structures related to the conduct of social behavior and interpersonal communication have been studied. Approaches and methods used in social psychophysiology and neuroscience enable researchers to come closer to understanding the evolutionary biological origins of fundamental phenomena underlying social behavior, such as social perception, social cognition, social categorization, and cross-cultural differences . (“From physiological psychology to psychological physiology ...”) "Historical and evolutionary synthesis: a paradigm of diversity in biological, social and mental systems ." Purpose of this program

(1) *diversity , specialization, and symbiosis are universal phenomena that characterize many aspects of life; ("From physiological psychology to psychological physiology ...")*

(2) *analyze the role of mental diversity in the development of biological , social and mental systems; and*

(3) *to analyze the causes of unpredictability in the consequences of evolutionary leaps in biological and social systems, and to objectively prove the pre-adaptation laws (i.e., provide answers to future challenges in unexpected situations).*

The authors acknowledge partial support of the MV Lomonosov Moscow State University Development Program. Physiology is a biological science, and Skinner (1974, p. 214) and John B. Watson (1919, pp. 19-21) have said that psychology is not a biological science. The argument in this article is that behavior analysis is a branch of psychology, not a branch of physiology and this is why behavior analysts can safely ignore physiological processes. It's not that behavior analysts should ignore or ignore physiological processes, it's that behavior analysts don't need to consider physiological processes. Also, the argument refers to behavior analysis.

Just as behavior analysts cannot ignore behavior, researchers in the latter fields cannot ignore physiological processes. Also, the argument is not that behavior analysis is unrelated to physiological research; In fact, several recent reviews have shown that many neurophysiological studies are concerned with the effects of behavior on neural function. Association for Behavioral Analysis, Washington, DC, May 1995. Author correspondence at West Virginia University, PO, Department of Psychology. Box 6040, Morgantown , West Virginia 26506-6040 (Email: hreese@ wvnvm.wvnet .edu). the effect of neural functioning on behavior rather than its effects on behavior (Maunsell , 1995; Singer , 1995; Ungerleider , 1995). Finally, the argument is not that psychological processes are independent of physiological processes, since this would require the existence of disembodied behavior similar to a nonsubstantial mind, and a behavior-body parallelism similar to the mind-body parallelism. Rather, the argument is that empirical analyzes of behavior do not suffer if behavior analysts ignore physiological processes. However, although behavioral analysts can safely ignore physiological processes, it would probably be a serious

mistake to ignore all the consequences or products of physiological processes. The products of physiological processes include behavioral phenomena such as instinctive drift (Breland and Breland , 1961), observer drift (Sulzer-Azaroff and Mayer, 1991, p. 84), hunger, and behavior itself . Instinctive, unlearned or unconditioned, also all other types of behavior, also called "species-specific behavior" (Catania , 1992, pp . 97, 396) and "behavior potential" (Kuo , 1976, p. 125) . Products also include some developmental milestones— phenomenons that indicate changes in developmental stages —and certain life events that occur throughout life and have significant consequences (Reese & 61 62 Hayne W. Reese Smyer , 1983).

Relevant developmental milestones include birth, puberty, and menopause, which mark the onset of infancy, adolescence, and advanced age, respectively. Relevant life events include teething, the emergence of mature secondary sex characteristics, and facial wrinkling in old age.

Some of these products function as discriminative stimuli, while others function as identifying events, identifying factors, establishing operations, or as developmental starting points (see Bijou & Baer , 1978, pp. 26-28 for definition of related terms). ; Kantor , 1970, p. 106; Michael, 1982; Rosales Ruiz & Baer , in print). For example, secondary gender traits and visible signs of aging can serve as discriminative stimuli for approach and non-approach social behavior types, respectively, and developmental milestones and teething can be influenced by environmental events, setting factors, etc. fits the definition.

Physiology deals with the sources of such products; Behavioral analysis can, and sometimes does, deal with the effects of certain products, and the effects of products can be understood without understanding the sources of the products. (“Psychological Theories of Childhood Autism | SpringerLink”) The opposing view—the view that such effects cannot be understood without understanding their source—is a form of reductionism that will be discussed in the next section.

9. Explanation of Psychological and Behavioral Phenomena in Terms of Physiological Processes

Behavioral phenomena should be explained in terms of physiological processes is contained, or at least strongly implied, in the view that psychology and behavior analysis are branches of physiology. This belief is also seen in other views, but in any case implies an acceptance of reductionism. The value of this type of reductionism is discussed in this section, following a brief discussion of the meaning of explanation in behavior analysis. The Meaning of Explanation in Behavior Analysis In behavior analysis, explanation is the same as description (for example, Bijou , 1979; Day , 1969, 1976/1992; Delprato , 1986; Wood , 1978) or rather, it means to explain a phenomenon . a functional analysis of the phenomenon (Day , 1969, 1976/1992; Skinner, 1950). Another requirement is that the concepts in an explanation must be at the same level as and in the same domain as the phenomenon to be explained (eg , Morris, Higgins , & Bickel , 1982a; Skinner, 1938, pp. 441, 1969, pp. 237-238). This condition is true if Skinner's (1950) explanation "applies to events occurring elsewhere, at another level of observation, defined in different terms, and measured in different dimensions, if any" (p. 193) and that of C. Ferster and Skinner . (1957) commented that their theoretical analysis of reinforcement schedules is "non-theoretical in the sense of speculating about corresponding events in another discourse universe " (p. 2). Skinner (1950) gave physiological explanations of behavior as an example. Two aspects of this requirement are its enforceability and its force or basis. Its applicability depends on determining the level and scope of concepts and observations. It is often very difficult to determine that the concepts are on the same level (Nesselroade & McArdle , in press), but Morris et al. (1982a) pointed out that observations of behavior are clearly not on the same level as intervening variables (as defined by MacCorquodale & Meehl , 1948), and therefore behavior explanations involving intervening variables are unlikely to be useful. Identifying whether concepts refer to different areas such as behavioral and mental areas or behavioral and physiological areas should be easier than determining levels; in any case, the requirement implies that explanations of behavior that involve "mental constructs" (Skinner, 1974, p. 18) or physiological processes (Skinner, 1950) are unlikely to be useful. The strength of the requirement depends on the usefulness of the explanations that are consistent with it. The condition is not a categorical principle or assumption underlying behavior analysis; It is a pragmatic rule adopted because it works, that is, advances the purpose of behavior analysis . The purpose of behavior analysis is to explain behavior (Skinner, 1974, p. 9;

said understand and explain, but these terms seem to be synonymous), and the criteria for demonstrating that an explanation is adequate is successful prediction and control (Skinner, 1974 , chapter 1). In other words, truth, as defined in behavior analysis, is indicated by successful work, not agreement (e.g. Day , 1976, 1977, 1983; Hayes, Hayes, and Reese , 1988; Lamal , 1983; Mapel , 1977; Skinner, 1945). , 1974, p. 16, 31, 235; Zuriff , 1980). Therefore, the condition may be violated if its violation is beneficial, that is, it improves prediction and control of behavior. One violation that might work is to refer to physiological processes in descriptions; this constitutes a kind of reductionism, as it refers to processes in a field different from observations. The current value of such a reduction, and even more, will be discussed in the next section. Reduction to Physiology and Beyond This section describes various aspects of reductionism. Opinions are not behavior analysis because, as stated in the explanation section, behavior analysts typically refuse to reduce it to a different explanatory field. However, the opinions illustrate the problems behavior analysts may face if they accept reductionism. reduction to physiology. Teyler (1975), a psychobiologist , defined a reductionist as "a person who tries to explain a phenomenon by reducing it to its constituent parts" (p. 139). Bugelski , a former stimulus-response learning theorist, fits Teyler's reductionist definition and believed that the parts are physiological. His view was that unless the physiological processes underlying stimulus-response relationships were identified, psychology was "inadequate, incomplete, and was a technology or art rather than science" (Bugelski , 1973, p. 53). He believed that if the underlying physiological processes were defined at least hypothetically, psychological laws could allow for the prediction and control of behavior, but he believed that understanding behavior requires knowing basic physiological processes. Consistent with the first point, Bugelski (1982) tried to explain learning. and the display phenomenon on the basis of "neural action currents", but that it is not necessary to specify the specific neural units involved to make the description useful.

10. Conclusion

Beyond the realm of physiology, reduction. The kind of reduction that Teyler (1975) demanded was more severe than the kind requested by Bugelski (1973). Teyler wanted not only the reduction

of a behavioral whole to physiological processes, but also the reduction of physiological processes to chemical processes and chemical processes to submolecular structures. Behavioral aggregates would be reduced to physiological processes, chemical processes, and submolecular structures (p. 1-2). Moreover, it was stated by Jacques Loeb (1912/1964) that psychological phenomena are theoretically reducible to chemical and physical processes (pp. 61-63). However, if one is ready to become accustomed to reductionism, both his and Teyler 's perspectives seem to end too soon. If this is the degree of complexity that cannot be further reduced, why would a reductionist stay at any level beyond quantum physics? Even if the explanation were theoretically feasible, it is likely that such a reduction did not actually occur.

References

Blundell JE. "Physical activity and appetite control: can we close the energy gap?" ("Can physical activity improve the health of the overweight without ...") Nutr Bull 2011;36:356–66. doi:10.1111/j.1467-3010.2011.01911.x CrossRefGoogle Scholar

Blundell JE, Gibbons C, Caudwell P, Finlayson G, Hopkins M. Appetite control and energy balance: impact of exercise. Ob Rev. 2015;16 Suppl 1:67–76.

Boss O., Hagen T. Lowell BB Uncoupling proteins 2 and 3. Diabetes. 2000; 49: 143-156

Bouchard C. Tremblay A. Despres JP Nadeau A. Lupien PJ Theriault G. Dussault J. Moorjani S. Pinault S. Fournier G. The response to long-term overfeeding in identical twins. N. Engl. J.Med. 1990; 322: 1477-1482

Bray GA Tartaglia LA Medicinal strategies in the treatment of obesity. nature. 2000; 404: 672-677

Brodskij , I. (1987). Nobelevskaya rech [Nobel Speech]. Bruneau, EG, & Saxe, R. (2010). Attitudes towards the outgroup are predicted by activity in the precuneus in Arabs and Israelis. NeuroImage , 52, 1704–1711. doi: 10.1016/j.neuroimage.2010.05.057

Brown MS Goldstein JL Sterol regulatory element binding proteins (SREBPs). ("Regulation of Sterol Regulatory Element-Binding Transcription Factor 1a ...") Nutr . Rev. 1998; 56: S54-S75

Brown MS Ye J. Rawson RB Goldstein JL Regulated intramembrane proteolysis. Cell. 2000; 100: 391-398

Bruning JC Gautam D. Burks DJ Gillette J. Schubert M. Orban PC Klein R. Krone W. Muller-Wieland D. Kahn CR Role of brain insulin receptor in control of body weight and reproduction. science. 2000; 289: 2122-2125

Bultman SJ Michaud EJ Woychik RPMolecular characterization of the mouse agouti locus. Cell. 1992; 71: 1195-1204

Burks DJ de Mora JF Schubert M. Withers DJ Myers MG Towery HH Altamuro SL Flint CL White MF IRS-2 pathways integrate female reproduction and energy homeostasis. nature. 2000; 407: 377-382

Butler AA Kesterson RA Khong K. Cullen MJ Pelleymounter MA Dekoning J. Baetscher M. Cone RD A unique metabolic syndrome causes obesity in the melanocortin-3-receptor-deficient mouse. endocrinology. 2000; 141: 3518-3521

Cassard-Doulcier AM Gelly C. Fox N. Schrementi J. Raimbault S. Klaus S. Forest C. Bouillard F. Ricquier D. Tissue-specific and beta-adrenergic regulation of the mitochondrial uncoupling protein gene. Mole. endocrinol. 1993; 7: 497-506

Cheon , BK, Im , DM, Harada, T., Kim, JS, Mathur, VA, Scimeca , JM, Parrish, TB, Park, HW, & Chiao, JY (2011). Cultural insights on neural basis of intergroup empathy. NeuroImage , 57, 642–650. doi: 10.1016/j.neuroimage.2011.04.031

Chernigovskaya , T. V. (2007). Brain, concepts, and language: price for anthropo-genesis. Neuroscience and Behavioral Physiology, 37(3), 293-302. doi: 10.1007/s11055-007-0014-7

Contreras, JM, Banaji, MR, & Mitchell, JP (2011). Dissociable neural correlates of stereo-types and other forms of semantic knowledge. SCAN, 7(7), 764–770. doi: 10.1093/scan/nsr053

Cornwell, BR, Johnson, L., Berardi, L., & Grillon , C. (2006). "Anticipation of public speaking in virtual reality reveals a relationship and startle reactivity." (“From physiological psychology to psychological physiology ...”) Biological Psychiatry, 59, 664–666. doi: 10.1016/j.biopsych.2005.09.015

Costantini , M., & Haggard, P. (2007). □e rubber hand illusion: Sensitivity and reference frame for body ownership. Consciousness and Cognition, 16(2), 229–240. doi: 10.1016/j.concog.2007.01.001

Cunningham, WA, Johnson, MK, Raye, CL, Gatenby , JC, Gore, JC, & Banaji, MR (2004). Separable neural components in the processing of Black and White faces. Psychological Science, 15, 806–813. doi: 10.1111/j.0956-7976.2004.00760.x

Dawkins, R. (2014). Samoan grandioznoe shou na ground . Dokazatel'stva evolutsii greatest show on Earth. Evidence for evolution]. Moscow : ACT: CORPUS.Dickter , Ch. L., & Bartholow , BD (2007). Racial ingroup and outgroup attention biases revealed by event-related brain potentials. SCAN, 2, 189–198. doi: 10.1093/scan/nsm012

Diaz EO, Prentice AM, Goldberg GR, Murgatroyd PR, Coward WA. Metabolic response to experimental overfeeding in lean and overweight healthy volunteers. (“Effect of Exercise and Training on Fat Oxidation During Overfeeding ...”) AmJ Clin Nutr . 1992; 56:641–55.CrossrefMedlineGoogle Scholar

Dontsov , A., & Perelygina , E. (2013). Tense situations and the signi□cance of stability for psychological security. Psychology in Russia: State of the Art, 6(2), 20–31. doi: 10.11621/pir.2013.0109Ehrsson, HH (2007). experimental induction of out-of-body experiences. Science, 317, 1048. doi: 10.1126/science.1142175

Ehrsson , H.H. (2009). How many arms make a pair? Perceptual illusion of having an additional limb. Perception, 38(2), 310–312. doi: 10.1068/p6304Ekman, P. (2010). psychology emotsij [Psychology of emotions].

Ekelund U, Åman J, Yngve A, Renman C, Westerterp K, Sjöström M. Physical activity but not energy expenditure is reduced in obese adolescents: a case–control study. AmJ Clin Nutr . 2002;76:935–41.

"Hand GA, Shook RP, Paluch AE, et al. The energy balance study: the design and baseline results for a longitudinal study of energy balance." (“4 Science-Based Strategies for Losing Stubborn Fat for Good”) Res Q Exerc Sport 2013;84:275–86. doi:10.1080/02701367.2013.816224 CrossRefPubMedGoogle Scholar

"Heyman MB, Young VR, Fuss P, Tsay R, Joseph L, Roberts SB. Underfeeding and body weight regulation in normal-weight young men." (“Energy Balance and Obesity - PMC - PubMed Central (PMC)”) AmJ Physiol. 1992; 263:R250–R257.MedlineGoogle Scholar

Jankowski, KF, & Takahashi, H. (2014). Cognitive neuroscience of social emotions and implications for psychopathology: Examining embarrassment, guilt, envy, and schadenfreude. Psychiatry and Clinical Neurosciences, 68(5), 319-336. doi: lO.llll /pcn.12182

Jebb SA, Prentice AM, Goldberg GR, Murgatroyd PR, Black AE, Coward WA. Changes in macronutrient balance during over- and underfeeding assessed by 12-d continuous whole-body calorimetry. AmJ Clin Nutr . 1996; 64:259–266.CrossrefMedlineGoogle Scholar

Kurzban, R., Tooby , J., & Cosmides, L. (2001). Can race be erased? Coalitional computation and social categorization. PNAS, 98,15387-15392. doi: 10.1073/pnas.251541498

LeClair, J., Janusonis , S., & Kim, HS (2014). Gene-culture interactions: A multi-gene approach. Culture and Brain, 2(2), 122-140. doi: 10.1007/s40167-014-0022-8

Leibenluft , E., Gobbini , MI, Harrison, T., & Haxby JV (2004). Mothers' neural activation in response to pictures of their children and other children. ("Father's brain is sensitive to childcare experiences - PubMed Central (PMC)") Biological Psychiatry, 56,225-232. doi: 10.1016/j.biopsych.2004.05.017

Lieberman, MD (2007). Social cognitive neuroscience: A review of core processes. Annual Review of Psychology, 58, 259-289. ("Lieberman, M. D. (2007). Social Cognitive Neuroscience A Review of Core ...") doi: 10.1146/annurev.psych.58.110405.085654

Lieberman, MD, Hariri, A., Jarcho , JM, Eisenberger, NI, & Bookheimer , SY (2005). An fMRI investigation of race-related amygdala activity in African American and Caucasian American individuals. Nature Neuroscience, 8,720-722. doi: 10.1038/nnl465

Liepelt , R., Ullsperger , M., Obst , K., Spengler, S., von Cramon , D. Y, & Brass, M. (2009). Contextual movement constraints of others modulate motor preparation in the observer. ("Datensatz - Max Planck Society") Neuropsychologia , 47(1), 268-275. doi: 10.1016/j.neuropsychologia.2008.07.008

Lobacheva , EM, Galatenko , Yu. N., Gabidullina , R. E, Galatenko , VV, Livshitz , ED, Lukashenko, TP, Vetrov , DP, Lebedev, AE, Podol'skii , VE, Lebedev, VV, Isaychev , SA, Chernorizov , AM, & Zinchenko , yu. P. (2013). "Automated real-time classification of functional states based on physiological parameters." ("Automated real-time classification of functional states: the ...") Procedia — Social and Behavioral Sciences, 86, 373-378. doi: 10.1016/j.sbspro.2013.08.582

Logothetis , NK (2008). What we can do and what we cannot do with MRI. Nature, 453, 869878. doi: 10.1038/nature06976

Lorenz, K. (1998). Oborotnaya storona zerkala [Behind the mirror, a search for a natural history of human knowledge]. Moscow: Respublika.

Losin , EAR, Iacobony , M., Martin, A., Cross, KA, & Dapreto , M. (2012). Race modulates neural activity during imitation. Neuroimage, 59, 3594-3603. doi: 10.1016/ j.neuroimage . 2011.10,074

Lowell BB, Role of the beta(3)-adrenergic receptor and/or a putative beta(4)-adrenergic receptor on the expression of uncoupling proteins and peroxisome proliferator-activated receptor-gamma coactivtor-1.

Martin, A., Wiggs, CL, & Weisberg, J. (1997). Modulation of human medial temporal lobe activity by form, meaning and experience. Hippocampus, 7(6), 587-593. doi: 10.1002/(SICI)1098-1063(1997)7:6< 587: AID - HIPOl >3.0.CO;2-C

Menshikova , G., Kovalev , A., Klimova , O., Chernorizov , A., & Leonov, S. (2014). ("The application of virtual reality technology to testing resistance to ...") "Testing the vestibular function development in junior figure skaters using the eye tracking technique." ("Evaluating the Vestibular Function Development in Junior Figure ... - CORE") Procedia Social and behavioral sciences, 146, 252-258. doi: 10.1016/j.sbspro.2014.08.123

Mezzich , JE, Zinchenko , YP, Krasnov, V. N. Pervichko , EI, & Kulygina , MA (2013). Person-centered approaches in medicine: clinical tasks, psychological paradigms, and postnondassic perspective. Psychology in Russia: State of the Art, 6, 95-109. doi: 10.11621/ pir.2013.0109

Millar, PR, Serbun , SJ, Vadalia , A., & Gutchess , AH (2013). Cross-cultural differences in memory specificity. Culture and Brain, 1(2-4), 138-157.doi: 10.1007/s40167-013-0011-3

Mitchell, GP, Macrae, CN, & Banaji MR (2006). Dissociable medial prefrontal contributions to judgments of similar and dissimilar others. Neuron, 50, 655-663. doi: 10.1016/j. neuron.2006.03.040

Muhlberger, A., & Pauli, P. (2011). virtual realitat in der psychotherapy [Virtual reality in psychotherapy]. PiD Psychotherapy im Dialog 12(2), 143-147. doi: 10.1055/s-0031-11276816

Myers CA, Johnson WD, Earnest CP, Rood JC, Tudor-Locke C, Johannsen NM, et al. Examination of mechanisms (E-MECHANIC) of exercise-induced weight compensation: study protocol for a randomized controlled trial. Trials. 2014;15:212.

Stubbs RJ, Hughes DA, Johnstone AM, Horgan GW, King N, Blundell JE. "A decrease in physical activity affects appetite, energy, and nutrient balance in lean men feeding ad libitum." ("The influence of physical activity on appetite control: an experimental ...") AmJ Clin Nutr . 2004; 79:62–69.CrossrefMedlineGoogle Scholar