

Personality psychology and the biological domain



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Genetic, physiological, and biological factors that are present when a person develops their childhood, adolescent, and adult personalities (or individual differences) are being explored, discovered, and adopted with the research creating breakthroughs and discovery of links within science and psychology like never before. Studies have been revealing some astonishing influences that the biological domains of genetics, evolution, physiology, heredity, and environmental factors may play in the function role of differences within one's personality and the sex's. e. g. Genes play a role in such things as the propensity to marry or to stay single for example (Johnson, et. al. , 2004, as cited in; Larsen, R. J. & Buss, D. M. , 2010) p. 177. One of the primary goals in genetic research is to determine the percentage of individual differences that can be attributed to genetic differences and the percentage that is due to environmental differences (R. J. Larsen & D. M. Buss, c. 6, 2010). The science is that; though there may be observed differences between people due to genetics, there may also be environmental factors that play a role in modifying a trait (Larsen, 2010).

There are several behavioral methods developed by geneticist to testing apart the contributions of genes and environments as causes of individual differences such as selective breeding of animals and studies of family, twin-studies and adoptions (Larsen, 2010). Further information that defines some of these study methods will be discussed. Even some physical differences between persons are associated with the differences in emotional style. Differences such as these represent the way that people differ from one another and so physiological features represent certain aspects of personality (R. Larsen, 2010).

The percentage of variance is used as a method by behavior geneticist to apply the individual difference variable factor by reference to the fact that the variability of differences between individuals is due to different causes. These variables as they relate to different causes can then be sectioned into percentages (Larsen, 2010). This individual difference variable method can be used to identify differences in personality traits, attitudes, even height-weight differences and their causes.

Heritability is a statistic that refers to the proportion of the observed variance in a group of individuals that can be accounted for by genetic variance (Plomin et. al. , 2001; as cited in; Larsen, 2010). Some researchers view the correlate or indicator of a trait as having a link to one's physiological response or a biological correlate of a particular trait (Larsen, 2010). In contrast, other researchers suggest that the role is much more in a physiological response as a correlate of the traits rather than an underlying substrate that produces or contributes to the personality trait (Larsen, 2010).

Physiological correlates of personality benefit science as the measures often reveal important consequences of personality, e. g. such as the link within Type A persons having a high cardiovascular reactivity that may lead to (the consequences) such as heart disease (Larsen, et. al. , 2010). c. 7, p. 193

There are however, several modern theories of personality to which underlying physiology is more substantial in its function of generating or forming the substrate of specific personality differences (Larsen, 2010).

Each of these theories share certain aspects that specific personality traits are based on these underlying differences. In addition, they assume that if

the physiological substrate is altered the behavior pattern associated with the trait will be altered as well (Larsen, et. al. , 2010). The controversy is in the idea of eugenics, which is the notion that we can design the future of human species by fostering the reproduction of persons with certain traits and by discouraging the reproductions of persons without those traits (Larsen 2010).

These ideas are controversial and suggest that genetic differences between individuals rather than differences in parental socialization or personal experience shape the core of human personality. However, according to Plomin (2002) and as cited in Larsen (2010) pp. 161 genetic components do not render environmental influence obsolete in shaping personality. Biology and personality cross in functions intersecting across the lines of physiological systems such as brain and peripheral nervous systems (Larsen 2010). Due to their subtle contributions in personality differences, these findings are now being studied more closely.

In addition to all of these biological approaches and their emerging theories are what psychologists are now finding to be solid evidence in support of the evolution of physical characteristics presented by Charles Darwin (Larsen, 2010) c. 7, and the parallel function in analysis to the evolution of psychological characteristics using the same theoretical principle. For example, by applying such principles as natural selection to an analysis of physiological traits, whereby natural selection functioned as selection of our ancestors for being a part of things (such as food gathering, etc.) in-group cooperation.

Darwin suggests that these ancestors were more likely to survive as opposed to those who did not wish to cooperate within the group resulting in the likelihood of diminished survival and their becoming an ancestor at all. This desire to be a part of a group is now seen as what may be an evolved present day evolutionary perspective to personality psychology (Larsen, et. al. , 2010). Biological Genetics The Human Genome The human genome “ refers to the complete set of genes that an organism possesses” (Larsen, Randy J. & Buss, D. M. 2010). These genomes contain 20, 000 to 30, 000 genes located in 23 sets of chromosome.

Each person inherits one set of chromosomes from their mother and one from their father. Within each gene is a sequence of DNA molecules that were once thought to be “ genetic junk” that are now however, seen as important sequences within those DNA molecules to show how each human being is uniquely different (Gibbs, 2003; Plomin, 2002; as cited in: Larsen, 2010) p. 160. Breakthroughs such as those in the process of DNA sequences and just how it relates to genes and their function both in physical and psychological evolution involving such character traits making up the human genome, are unveiling just how complex human nature really is.

Additionally, methods of study on a molecular level in genetics have led to findings that have associated particular genes with certain identifiable, personality-related traits. Although human nature as it functions within the biological realm of one’s personality trait and where it resides within the 100 trillion copies of the human genome have given science a overall globe to human life, its individual road map of functions within those genes and the DNA molecule, remain to be found, with 100 percent specificity.

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Heritability, as written by Larsen & Buss (2010) by formal definition is: The proportion of phenotypic variance (or observable differences), that is attributable to genotype variance or the individual differences in the total collection of genes possessed by each person, p. 163. There are several theories that research has born of its reasoning in these areas that link to the causation of human nature, emotion, and personality relationships. The exact links to those factors are still being found as scientific breakthroughs continue to emerge. Environment

Environmental influences shared and other genotype environmental interactions- or differential response of individuals with different genotypes to the same environments; are major behavioral shared genetic study area of research that suggest either passive, reactive or active genotype environment correlations ; that is the differential exposure of different genotypes to different environments (Larsen, 2010) p. 173. There are many findings of moderate heritability on different personality characteristics such as those measurements in shared and non -shared environments.

Some show a percentage of both measurements contributable to certain characteristics. This conclusion must be considered with the assumption there may be a degree of error to the measurement. Thus some of the differences in personality maybe contributable to neither genetics nor environment but are simply errors of measurement (Larsen 2010). Studies Twin births occur only once in every 83 births. A phenomenon that cannot possibly reveal all there is to know about the human connection.

The twins that are born that stem from a split-fertilized egg are known as MZ twins or monozygotic twins; (Identical). Those that are born stemming from completely separate fertilized eggs (or just shared the womb) are known as what is called the DZ twins or dizygotic twins; (fraternal), Larsen (2010).

Activity level and heritability are studies of behavioral genetic design dimensions in extraversion and neuroticism that are used most commonly to define the heritability of these two dimensions in twin studies done by, Henderson (1982); as cited by Larsen (2010).

These twin studies estimate heritability by gauging whether identical twins (who share 100 percent of their genes) are more similar to each other than are fraternal twins (who share only 50 percent of their genes); Larsen, 2010. Studies have shown that identical twins are more alike in dominance, height, and fingertip ridge- counts than fraternal twins; (Henderson, 1982; cited in: Larsen, 2010) c. 6. These findings suggest that heritability plays a casual role in these individual differences.

Equal environmental assumptions, used in the twin method study, assumes that the environments experienced by both identical and fraternal twins are the same in degree of similarity (Larsen, 2010) p. 169. Adoption Studies are revered as being the strongest of all the studies available as a method for correlating between individual gene differences (Larsen, 2010). Of specific interest is in adopted children and their adoptive parents, because they do not share genes.

The strongest indicator that the correlation of traits would be due to environmental influence is if there is a zero correlation between the adopted

child and the genetic parents with whom they have had no contact. Then this is a good indicator of lack of heritability (Larsen 2010). Conversely, if the parents of an adopted- away child who have positive correlation with whom they've had no contact, then this is strong evidence of heritability (Larsen, 2010) p. 179.

The drawback to these studies lies with the problem of selective placement or the children being unrepresentative of the population as a whole (Larsen, 2010). However, they solve the equal environmental assumption issues found in twin studies (Larsen, 2010) p. 169. Attitudes Social psychologists use the term attitude to refer to people's evaluation of virtually any aspect of their social world (Olsen & Maio, 2003; as cited in; Baron, Branscombe, &, Byrne, 2008) c. 5, p. 148.

Responding to stimulus in either favorable or unfavorable reactions either explicitly- or conscious and reportable, in an immediate evaluative basis that produces different brain waves from a response in a non-evaluative basis or implicitly- uncontrollable or not consciously accessible to us (Crites & Cacioppo, 1996; as cited in: Baron, et. al. , 2008) c. 5, p. 146. Stable attitudes are thought to be part of personality because they show individual differences; they tend to remain stable over time, and sometimes are paired with actual behavior (Larsen, 2010).

Part of the behavior manifestations that are linked to personality dispositions are regarded in a social aspect as somewhat deviant behaviors such as, they do not conform to some social norms, such as drinking and smoking. These behaviors are never- the- less found to be differences in individuals, and

although consumers sometimes quit and abstainers sometimes start, they tend to be stable over time, as do sensation seeking (Zuckerman & Kuhlman, 2000; cited in: Larsen, et. al. , 2010) extraversion, and neuroticism (Eysenck, 1981; cited in: Larsen 2010 c. 6, p. 174).

The studies and methods used in major findings of behavioral genetics and in the biology domain of personality psychology have been the springboard for several theories with empirical evidence to back them up. Although in the United States, the behavioral genetic research did not always fair well according to the environmentalist view. Findings that some personality traits were heritable moderately or otherwise seemed to violate the behaviorism and environmentalism of prior teachings, as well as threatening to undermine those practices such as parenting styles and certain behavior modification techniques (Larsen 2010).

Even concerns over the testing and findings over the study of intelligence were feared vulnerable to change as it has often been considered a personality variable (Larsen, 2010). This fear to a certain degree shared by some concerning the science, politics, knowledge and values within our society are valid concerns that must be addressed but the mainstream findings adopted in behavior genetic research is not relenting of its place in the study of personality. Physiological Approaches to Personality

In 170 AD the ancient Roman physician, Galen built from the works of Hippocrates who was an earlier Greek physician, taught that the amount of four fluids : phlegm, blood, yellow and black bile, present in the body determined personality. Such attributes as: passive, calm and thoughtful

(phlegmatic), to happy, lively, and outgoing (sanguine) and also aggressive, unstable and excitable (choleric), to unhappy, pessimistic and somber (melancholic), according to Stelmack & Stalkas, (1991) such as those in Galen's work were noteworthy because it was one of the theories to first take a physiological approach to personality.

Such approaches are based on the premise that psychological characteristics such as friendliness and thoughtfulness are due to an underlying physiological system (Larsen, 2010). These systems include the brain, nerves, and cardiac (heart, arteries, and veins) and the musculoskeletal system like muscles and bones; these make movements and behavior possible (Larsen, 2010).

Physiology is important in that the differences contribute to indicators of differences in psychological functioning and often the theories bare simplicity and state a physiological difference result in a given personality difference or behavior pattern (Larsen, c. 7, 2010). Measures of distinct physiological systems such as brain waves, heart rate and how people differ from one another in their reactions to different and more or less of, nervous system stimulation, are the initial focus to a physiologically-oriented, personality psychologist (Larsen, 2010).

The way that personality psychologists talk about physiology are made in ways that researchers can build a theoretical bridge between personality dimension of interest and physiological variables in order to use physiological concepts to explain personality: i. e. Specific statements, about which traits, that are connected to which psychological reactions, under

which conditions, (or in response) to which stimuli (Levenson, 1983; as cited in: Larsen, 2010) c. 7 . p. 193. Measurements of Physiology There are four areas of interest in measuring the physiological response in personality psychology.

Biological measures in the electro dermal activity (skin conductance of electricity) and the cardiovascular measures, activity in the brain and even the amount of hormones produced in the blood (Larsen, 2010). The sympathetic nervous system, which is a branch of the automatic nervous system that prepares the body for the “ fight or flight” response, is responsible for the skins responses in electro dermal activity and skin conductance of electricity through functions in the sweat glands and is a direct measure of the activity within the sympathetic nervous system (Larsen, 2010).

These electro dermal responses can be elicited by all kinds of stimuli and those personality types that are chronically active in these responses without any kind of triggering stimuli appear to rate high in anxiety and neuroticism (Cruz & Larsen, 1995; 2010). A larger increase in a response called cardiac reactivity is found when a person’s measured heart rate and blood pressure are much larger than other people during the person’s having to do a stressful task or under cognitive effort, and not surprisingly, the body’s heart rate and blood pressure increase for everyone (Larsen 2010).

However though people differ in their B P M (or beats per minute), heart rate responses and blood pressure, the phenomena of a larger increase is linked to a Type A personality trait characterized by impatience, competitiveness,

and hostility. The hostility characteristic of a Type A personality is associated with a higher risk of heart disease and heart attacks (Larsen, 2010).

Evidence also suggests that chronic cardiac reactivity contributes to coronary artery disease (Larsen, 2010, c. 7) pp. 194-195.

There have been cases in the research of personality psychology and physiology that have perplexed physicians and other medical professionals alike. The explanations that accompany brain trauma and changes in personality associated with those injuries continue to astound researchers to this day. Dr. Antonio Damasio a neurologist at the University of Iowa in 1994 wrote a book about a patient whom he treated that had experienced a brain tumor and the resulting surgery to remove the tumor had altered only a selective part of the patients personality.

The link to the mind and body connection was in the patients change in personality not his memory, reasoning or knowledge (Larsen. 2010). So not only is the connection of these two a physically necessary pairing but it should be that the recognition of one's physical makeup and mental intellect be combined as a real and prominent part of the human nature and individual personality traits. Another measuring of brain activity is by non-invasive electrodes which are sensors placed on the scalp that can measure the small amounts of electricity that the brain spontaneously produces.

EEG or evoked potential techniques are used to measure the participants brain responsiveness to stimuli which can assist in identifying active parts of the brain that are triggered in a evaluation of differences in personality and whether different regions on the brain show different activity for different

people. MRI or magnetic resonance imaging is also beneficial in this type of research for highlighting the brain regions activated by different stimuli.

Biochemical analyses of blood and saliva are other measures used in personality research when biochemists extract indicators from these sources to identify how competently one's immune system is functioning indicating its function goes up and down with stress and emotions, which may relate to personality (Larsen 2010). Hormones such as testosterone can be extracted from such samples, and has been linked to uninhibited, aggressive, and risk taking behaviors (Dabbs & Dabbs, 2000; as cited in Larsen 2010) c. 7, p. 197.

Additionally that can be measured is a non-adrenaline hormone such as Cortisol which researchers have linked to high levels in the body systems of shy children (Kagen & Snidman, 1991; as cited in: Larsen 2010) c. 7, p. 198.

Theories These are biological theories that are not related to physiological traits. Circadian Rhythms of Morningness –Eveningness where Horne and Ostberg in 1976 and 1977 found that the time of day and peak body temperatures reached are related to the individual's long or short circadian rhythms of wake and sleep biological rhythms.

These relations to whether you are a morning or evening person at your best is related to these 28- 50 hour day cycles of wake and sleep (Larsen, 2010).

Brain Asymmetry and Dominant Hemisphere The brain's constant production of electrical activity in the front left and right sides of the brain is rhythmic and exhibits waves either fast or slow (alpha waves) depending on the neurological activation. (Larsen, 2010) One finding consistent in several

studies regarding the left and right dominant activation of the brain is that of the patterns of emotional influence.

The right- side hemisphere correlation to the more vulnerability in negative emotions such as, distress, anxiety, and sadness and the opposite being true of a left side dominant hemisphere correlation in the brain being more susceptible to emotions that are positive or affective- reactive to positive emotional stimuli (Davidson, 1993, 2003; as cited in Larsen, 2010) c. 7, p. 221. Neurotransmitters in Personality Neurotransmitters are chemicals in the brain that are being studied as possible sources of specific personality differences.

These chemicals are in the nerve cells and are responsible for the transmission of nerve impulses from one cell to another. These impulses must jump the gap that separate the cells called the synapse where it transmits the electrical signal one nerve to the next. One neurotransmitter thought to be associated with pleasure is Dopamine. A second important one is serotonin, which plays a role in depression, and other mood disorders such as anxiety and in animal studies Depue (1996) found that low serotonin was associated irritable behavior (Larsen 2010).

The third neurotransmitter and one that is thought to activate the sympathetic nervous systems “ fight or flight,” is norepinephrine. Genes regulating our neurotransmitter systems are a new primary focus of study for researchers (Larsen 2010). Theories To explain why introverts and extroverts are so different from each other is the theory put forth by H. J. Eysenck in 1967. He proposed that introverts are characterized by higher levels of

activity in the brains ARAS or ascending reticular activating system than extraverts are. ARAS is a structure in the brain stem that is thought to control overall cortical arousal.

Resting arousal level of the cortex lets in too much stimulation for introverts. They need to seek low stimulating settings such as quiet to keep their already heightened level of arousal in check. Extraverts need to seek out extraverted behaviors to increase their levels of arousal (Claridge, Donald, & Birchall, 1981 as cited in: Larsen 2010). Incorporated into his theory was the optimal level of arousal notion by Hebb's theory in 1955. Arousability in arousal response not baseline arousability is the revised theory in Eysenck and Eysenck 1985 (Larsen 2010).

Jeffery Gray proposed what is called reinforcement sensitivity theory and was mostly done based on the BAS or behavioral activation systems in the biological systems of the brain, in 1972 and 1990 (Larsen 2010). His research was conducted measuring the brain function in animals and cues of reward responsive incentives. Approach behavior and approach motivation where also introduces by Gray in 1975 as was behavior inhibition system or BIS which is responsive o cues of punishment frustration and uncertainty this is useful in bringing about avoidance behavior.

The BIS is also responsible for the dimension of anxiety according to Gray and the BAS is responsible for the dimension of impulsivity or inability to inhibit responses (Larsen, 2010) c. 7 p. 203. Building on this theory were psychologists like Charles Carver and colleagues in 1994 and Zelenski and Larsen in 1999 who found a scale to measure BIS and Bas in individual

differences where humans possess separate systems for responding to incentives and threats (Larsen 2010).

Zuckerman and Haber in 1965 introduced the sensation seeking scale, which is closely correlated to Eysenck's theory of extraversion (Larsen 2010). In Zuckerman's most recent work in 1991 and 2006, he focused primarily on the role played by neurotransmitters in bringing about differences in sensation seeking and certain enzymes known as MAO or Monoamine Oxidase, which breaks down the neurotransmitter after it, passes the synapse.

His theory explains drug use, wild parties, and illicit sex as to little in the biochemical breakdown at the synapse (Larsen, 2010). The most comprehensive of personality theories is Cloninger's tridimensional personality model, where traits are tied to the three neurotransmitters (Cloninger, 1986, 1987; Cloninger, Svrakic, & Przybeck, 1993; as cited in Larsen 2010).

Low dopamine is associated with novelty seeking, abnormalities in serotonin metabolism with harm avoidance such as 5-HIAA in cerebrospinal fluids risk association with severe depression; and reward dependence with persistent behavior and low levels of norepinephrine (Larsen 2010) c. 7, p. 214.

Cloninger's theory has been used in psychiatry to explain various types of addictions (Larsen 2010). In the future there are likely to reveal a complicated multiple interaction of genetic contributions that possibly require some environmental trigger for the expression of any biologically based personality trait.