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## CHAPTER ONE – THE BIOLOGICAL LEVEL OF ANALYSIS

### Paper 1 – core topic

Our cognitions, emotions and behaviors are products of our nervous and endocrine systems.

#### **Biological issues of interest to psychologists include:**

- Different areas of the brain carry out different functions.
- Synapses (gaps) exist between nerve cells. Different neurotransmitters carry different neural transmissions (messages) from one synapse to another, according to our psychological functioning.
- The role of hormones in our psychological functioning.

The biological level of analysis thus emphasizes that cognitions, emotions and behaviors are products of our nervous and endocrine systems.

New brain imaging technologies (for example, CAT (computerized axial tomography), PET (positron emission tomography), and fMRI (functional magnetic resonance imaging), have made it possible to study living brains in action as various tasks are performed. This makes it possible, for example, to correlate specific areas of brain damage with specific changes in a person's personality or cognitive abilities. The key word is correlate. We know relatively little of the actual changes that take place within the brain. We do not have the capacity to view a piece of brain tissue and read the knowledge contained therein.

Advances in psychopharmacology (the study of medicine that addresses the balance of chemicals in the brain) have led to the development of new medications for conditions such as depression, and eating disorders. These are considered in the option: 'Abnormal Psychology'.

The biological perspective incorporates the theory of the evolutionary process. It takes into account the survival of the fittest. Indeed, those who adapt to environmental changes and challenges are those who get the best opportunities to mate and pass their adaptive genes to the next generation. The rest tend to die out.

Behavioral genetics considers that behavior patterns can be inherited. It applies biological analysis to understand and explain differences in individual people's conduct.

#### **METHODS USED IN THE BIOLOGICAL LEVEL OF ANALYSIS INCLUDE:**

1. Laboratory experiments (exemplified by Baumgartner 2008 below, on the role of oxytocin on economic decision making). This involves a test sample and a control sample to determine the acceptance or rejection of a hypothesis. The conditions are the same except that the IV (independent variable) is different in the test sample. The control sample may use a placebo: where the control participants are deceived in being told that they are in the experimental condition, where in fact they are not (e.g. given tonic water and told that it contains vodka, and then tested for driving reactions after that drink). The main criticism of the placebo or any type of blind condition is ethical: deception at various levels is involved. The ethical issues may be reduced by debriefing the participants at the end of the study.
2. Correlation studies, exemplified by Perry 1997 below, on the effect of deprivation on neuro-plasticity). Based on brain scans, he found a positive correlation between the size of the brain and child neglect. The ethical issues are reduced by the child neglect having been in the past.

3. Case studies: exemplified by the brain damage cases of HM, and Clive Wearing, below. These do not involve any clinical interference, but rely solely on findings that were made after the brain damage took place. The ethical issues are like the correlation studies, above. In addition, the uniqueness of the details of the cases would need greater safeguards to the participants' anonymity.

### **BIOLOGICAL LEVEL OF ANALYSIS: STRENGTHS.**

- High credibility – scientifically-based subject matter and its experimental methodology.
- Effective practical applications – e.g. the use of medication in treating mental conditions.
- Contributes to an understanding a wide range of phenomena – e.g. why people fall in love.
- Nature based – strong arguments favoring the nature side of the nature/nurture debate.

### **BIOLOGICAL LEVEL OF ANALYSIS: WEAKNESSES.**

- Reductionist – could overlook interactions with environmental factors that also affect people's behavior.
- Determinist – can lead to e.g. explaining criminal behavior in terms of individual physiology, and genes: "It wasn't me, it was my nervous system".
- Nature based – lacks sufficient recognition of the nurture side of the nature/nurture debate.

## **A. Physiology and behavior**

**Explain one study related to localization of function in the brain (for example, Kim and Hirsch).**

**The case of railway worker Phineas Gage (1848) showed that brain functions are localized:** an explosion sent a pole right through his brain. He lost some, but not all his mental capacities – demonstrating that different parts of the brain have different functions. The parts of the brain having specific functions are becoming clearer with modern methods of brain scanning, exemplified by:

**Kim and Hirsch (1997)** used fMRI (functional magnetic resonance imaging) to see **how the brain processes language in bilingual people**. One group had learned a second language as children. The other had learned a second language later in life. Both groups had to think about what they had done the day before – first in one language, and then in the other.

Kim and Hirsch investigated the Broca's area - in the left frontal lobe of the brain, which manages speech production, and the Wernicke's area - in the rear of the brain, which processes the meaning of language. Both groups of people used the same part of the Wernicke's area no matter what language they were speaking. But their use of the Broca's area differed. Those who learned a second language as children used the same region in the Broca's area for speaking both languages. But those who learned a second language later in life made use of a distinct additional region in Broca's area for their second language, close to the one activated for their native tongue.

This suggests that language is being hard-wired during early childhood development. Once that wiring is complete, the management of a new language must be handled by a different part of the brain.