CHAPTER NINE

EVOLUTION AND TEMPERAMENT:
Biological Theories

Chapter Overview

- Evolutionary Approaches
  - Emotions
  - Altruism
  - Sexual Behavior
  - Parental Behavior
  - Aggression and Dominance
  - Culture
  - Language and Thought
- Genetics and Personality
**CHAPTER OVERVIEW**

- **Temperament**
- **Biological Contributors to Personality**
- **The Brain**
- **Emotional Arousal**
- **Cortical Arousal**
- **Biological Factor Theories: Eysenck, Gray, and Others**
  - Eysenck’s “PEN” Biological Model
  - Gray’s Reinforcement Sensitivity Theory
  - Cloninger’s Tridimensional Model
- **Biological Mechanisms in Context**

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**PREVIEW OF BIOLOGICAL THEORIES**

<table>
<thead>
<tr>
<th>Evolutionary Psychology</th>
<th>A recently evolving psychological perspective that applies the evolutionary principles of natural selection to understanding human psychology, including personality</th>
</tr>
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<tbody>
<tr>
<td><strong>Examples:</strong></td>
<td>- Evolutionary explanations of differences between the personalities of men and women</td>
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<tr>
<td></td>
<td>- Evolutionary explanations of aggression</td>
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**Evolutionary Approaches**

A recently evolving psychological perspective that applies the evolutionary principles of natural selection to understanding human psychology, including personality.

**Examples:**
- Evolutionary explanations of differences between the personalities of men and women
- Evolutionary explanations of aggression
Emotions

- Universal facial expressions
- Evolutionary origins of events that trigger emotions
  - Loss of social status
  - Sexual rejection
  - Death of a child

Altruism

- Inclusive fitness
- Kin altruism
- Reciprocal altruism
- Evolved psychological mechanisms

Evolved psychological mechanisms

Specific psychological processes that have evolved because they solved particular adaptive problems

<table>
<thead>
<tr>
<th>Table 9.3</th>
<th>Examples of Evolved Psychological Mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual jealousy</td>
<td>Functions to help ensure that they are the genetic fathers of their mate’s child</td>
</tr>
<tr>
<td>Sexual attraction based on physical appearance</td>
<td>Functions to ensure a healthy mate and one with effects of hormones (estrogen or testosterone) that indicate fertility</td>
</tr>
<tr>
<td>Sexual attraction based on mates ability to provide resources</td>
<td>Functions to assume women that their mates will be able to provide resources needed for the survival of their children</td>
</tr>
<tr>
<td>Sexual attraction based on youth</td>
<td>Functions to optimize the number of remaining years of fertility</td>
</tr>
<tr>
<td>Involution</td>
<td>Functions to enable children to learn culture and to profit from the experience of adults</td>
</tr>
</tbody>
</table>
**Sexual Behavior**

- Sexual attraction
  - Signals of fertility and health
  - Attractiveness and facial symmetry
  - Youth
  - Hormone markers
- Parental investment
  - Greater sexual selectivity by females
- Paternal uncertainty
- Sexual strategies
- Oxytocin

**Parental Behavior**

- Nurturance
- Favoritism toward biological offspring
- Competition among children
- Dependency as a learning opportunity

**Aggression and Dominance**

- Male competition for mates
- Testosterone
**Culture**

- predisposed by evolution
- language
- symbols
- tools and technology
- social organization
- cultural evolution

**Language and Thought**

- consciousness
- theory of mind
- symbolic thought
- framing effect: impact of group size

**Genetics and Personality**

**Heritability:**
- The statistic that shows what proportion of the variability of a trait in a particular population is associated with genetic variability
- High heritability of happiness, coping styles, and likelihood of divorce

**Emergent Traits:**
- Phenotypic traits that are caused by a constellation of many genes, and so may not appear to run in families
Temperament

- The biologically based foundation of personality, including such characteristic patterns of behavior as emotionality, activity, and sociability
- Example includes easy babies and difficult children (anxious)

Inhibited and Uninhibited Temperament in Kagan’s Model

- Amygdala
- Genotype: the inherited genetic profile of an individual
- Phenotype: the developed characteristics that can be observed in an individual, based on both genetic and environmental influences
Biological Contributors to Personality

- The Brain
- Emotional Arousal
- Cortical Arousal

The Brain

- Modules with specialized functions
- Social judgments
- Emotions
- Neurotransmitters

Emotional Arousal

- Emotional intelligence
- Antisocial personality disorder (lower emotional arousal)
- Left cerebral hemisphere: approach and anger
- Right cerebral hemisphere: avoidance
CORTICAL AROUSAL

- Pavlov's research on dogs
- Strong nervous system: greater conditioning to strong stimuli
- Weak nervous system: inhibition to strong stimuli
- Sensation seeking

Pavlov's Model of the Nervous System and Implications for Personality

Biological Factor Theories: Eysenck, Gray, and Others

- Eysenck’s “PEN” Biological Model
- Gray’s Reinforcement Sensitivity Theory
- Cloninger’s Tridimensional Model
Eysenck's "PEN" Biological Model

THREE FACTORS:

- Extraversion
- Neuroticism
- Psychoticism

Extraversion

- Sociable
- Lively
- Active
- Assertive
- Sensation seeking
- Carefree
- Dominant
- Surgent
- Venturesome

Neuroticism

- Anxious
- Depressed
- Guilt feelings
- Low self-esteem
- Tense
- Irrational
- Shy
- Moody
- Emotional
Psychoticism

- Aggressive
- Cold
- Egocentric
- Impersonal
- Impulsive
- Antisocial
- Unempathic
- Creative
- Tough-minded

Eysenck’s Extraversion and Neuroticism Factors and the Ancient Greek Temperaments

<table>
<thead>
<tr>
<th>Greek Temperament</th>
<th>Description</th>
<th>Eysenck Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choleric</td>
<td>Irritable</td>
<td>High Neuroticism</td>
</tr>
<tr>
<td>Melancholic</td>
<td>Depressed</td>
<td>High Neuroticism</td>
</tr>
<tr>
<td>Sanguine</td>
<td>Nervousness</td>
<td>Low Extraversion</td>
</tr>
<tr>
<td>Phlegmatic</td>
<td>Hypochromic</td>
<td>Low Extraversion</td>
</tr>
</tbody>
</table>

Situations where Eysenck’s extraversion and neuroticism factors are relevant:

<table>
<thead>
<tr>
<th>Situations</th>
<th>Relevant Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stressful situation</td>
<td>Low Extraversion, High Neuroticism</td>
</tr>
<tr>
<td>Low external cues</td>
<td>Low Extraversion, Low Neuroticism</td>
</tr>
</tbody>
</table>

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Gray’s Reinforcement Sensitivity Theory

- **Behavioral Activation System (BAS)**
  - Reward
  - Approach

- **Behavioral Inhibition System (BIS)**
  - Fear, aversive stimuli
  - Inhibited behavior

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Gray’s Model of the Biological Basis of Personality

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<th>Table 9.5 Gray’s Model of the Biological Basis of Personality</th>
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<tr>
<td><strong>Neurotransmitter</strong></td>
</tr>
<tr>
<td>Sensitivity to reward</td>
</tr>
<tr>
<td>Dopamine</td>
</tr>
</tbody>
</table>

Note: The fight-flight system is low highly correlated to Gray’s model than the BAS and the BIS

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Cloninger’s Tridimensional Model

- **Novelty Seeking**
  - Dopamine (low levels)
  - “I do things spontaneously.”

- **Harm Avoidance**
  - Serotonin (high levels)
  - “I get tense and worried in unfamiliar situations.”

- **Reward Dependence**
  - Norepinephrine (low levels)
  - “Others think I am too independent.” (Disagree)
  - “I often push myself to exhaustion.”
BIOLOGICAL MECHANISMS IN CONTEXT

- Biology may not represent the appropriate level of explanation for understanding various phenomena.
- Experience can change biology (e.g., maternal deprivation causes abnormal dopamine systems).
- The effect of biology depends on the environment (e.g., shyness in China vs. U.S.).

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