

Chapter 2: Genetics and Environment

- I. Issues raised by Better Baby Institute Video
 - A. Nature/Nurture
 1. What is the institute's view? Nurture!!!
 2. Is there a critical period before 5 years?
 - a) Imprinting Ducks experiment
 - b) Language is the main
 - B. Can early environment stimulation increase brain growth?
 1. More exercised, the more it grows
 - C. What is a good environment?
 1. Good parenting? - Picking up cues and knowing how to react with them
 - D. Impact of the Media?
 1. People writing about psych without degrees
- II. What is meant by Nature/Nurture?
 - A. It is the distinction between:
 1. Genotype - actual coded info contained in the genes and DNA
 2. Phenotype - what actually emerges or gets expressed
 - B. Interaction between nature (genes) and environment (nurture)
 1. Genes can turn on and off based on environment and happen at any time during development
- III. Genes
 - A. Cell - basic structural unit of a living thing
 - B. Nucleus - houses the chromosomes and genes
 - C. Chromosome - structures made of DNA
 - D. Gene - part of DNA containing the code for a particular protein; determines our biological development
 - E. DNA - spiraling complex molecule containing genes
- IV. What Causes Genetic Variability?
 - A. Meiosis causes genetic variability and has 2^{23} possible pairings of chromosomes
 - B. Meiosis in a Male
 1. 46 chromosomes, 23 pairs
 2. Splits then duplicates itself to an X
 3. Both X separates into 4 sperm with 23 chromosomes in each (2 sperms from 1 X)
 - C. Meiosis in a Female
 1. 46 chromosomes, 23 pairs
 2. Splits then duplicates itself to an X
 3. One X disintegrates and the other fertilizes with the sperm
 4. Second Division - X separates into 2 individual chromosomes; one disintegrates and other is the ovum with gamete (sperm) in it
 - D. Genetic Variability and Cross-Overs
 1. Each chromosome pair align before segregation into separate germ cells
 2. The chromosomes cross
 3. Chromosomes break at the point of crossing, exchange genetic material, and segregate into separate germ cells
 - E. Genetic Variability

1. Mutations
 2. Chromosomal Abnormalities
 3. Every Human except identical twins, is generally unique
 4. Why is it important to have genetic diversity?
 - a)
 5. Transcription "errors"
 - a) Deletions
 - b) Repetitions
 - (1) Autism is related to age of father because of sperm reproduction
- F. Phenotype Variability (Expression of Genes)
1. Mendelian Principles
 - a) Dominant (tall pea pods) and Recessive genes (short pea pods)
- G. Why Mendelian Principles are too Simple
1. Incomplete Dominance (Pink flowers)
 2. Co Dominance (blood types)
 3. Polygenic Traits
 - a) Many genes contribute to single phenotype trait
 - b) Video: Eyes and skin color are controlled by multiple genes from melanin
 - (1) 3 different genes control skin, 2-3 genes control eye color
- H. Expression of Genotypes: The Epigenetic View
1. The expression of phenotypes actively depends on the continuous interaction of genotype and the environment
 2. Penetrance - the probability that a genotype will be expressed can vary from 0 to 100% and depend on the environment
 - a) We have fatal genes that never get expressed because our environmental conditions aren't ideal
- I. Epigenetic View
1. Reaction Ranges: genotypes can have different ranges of phenotypic expression - the notion that the human beings's genetic makeup establishes a range of possible developmental outcomes, within which environmental forces largely determine how the person actually develops
 - a) Ex of Narrow Reaction Range:
 - (1) Gene for eye color says a persons eye color will be 450nm
 - b) Ex of Wide Reaction Range:
 - (1) Gene for eye color says a persons eye color will be between 450 and 550nm
 - (2) What determines the exact color?
 2. Canalization: the genetic tendency to normalize development for specie survival
 - a) E.g there are genetic limits on how much variability can be caused by environmental differences so species can survive
 3. Many believe these limits are narrower during the first 3 years
 - a) E.g language or motor development
 4. Implications for early stimulation
- J. What is the Environment?
1. The Family (dynamic)
 - a) Parenting behaviors and styles

- b) Social Economic Status
- c) Micro-environments: individual interactions