

Teacher notes 3-C: Genetics, Evolutionary Psychology and Behavior

- We as humans have identical mechanisms—hunger pains, senses, language development, fearing strangers by 8 months, prefer people who have similar interests to us
- How are we different?
 - Our genes (**nature**) and our environment (**nurture**) define us
- 1. What are genes, and how do behavior geneticists explain our individual differences?
 - **Behavior geneticists** study our differences and weigh the effect and interplay of heredity and our **environment** (every non-genetic influence, from pre-natal nutrition to the people and things around us)
 - **Genes:**
 - **46 chromosomes** (threadlike structures made of DNA (deoxyribonucleic acid) molecules that contain the genes)
 - **23** are from mom (egg)
 - **23** are from dad (sperm)
 - **Genes** (small segments of the giant DNA molecules)—30,000 in your body
 - Active (expressed/provides the building blocks for physical development)
 - Inactive
 - ****Most of our traits are influenced by our genes (height, intelligence, happiness, aggressiveness)**
 - Human **genome** researchers have discovered the common sequence within human DNA (shared genetic profile)
 - We share about 96% of the chimpanzee DNA sequence too!
 - But have different behaviors (Chimpanzees are more aggressive & male dominated)

****Stop to show that many traits and behaviors are inherited:**

- Have students draw a horizontal ----- line on a sheet of paper. When the tip of their ring finger is placed on the line, does the tip of the forefinger also reach the line? (Research indicates that short forefingers are determined by a recessive trait in females, whereas in males, it is dominant.)
- When interlocking your fingers, do you place your left or right thumb on top? (Particular characteristics are genetically controlled. Practice or experience has no effect)

Twin & Adoption Studies

Identical v. Fraternal twins:

- **Identical twins** (who develop from a single fertilized egg that splits in two, are *genetically* identical)
 - Referred to as **monozygotic twins** (come from one zygote that split during pregnancy)
 - **100% of the same genes**, but not always that same *number of genes* (which may explain why one twin may be more at risk for certain illnesses)
 - Some (1/3) share a separate placenta during prenatal development and one twin's may provide better nourishment which may contribute to identical twin differences
 - Some twins can have different phenotypes:
 - Mirror images of each other (one is left-handed, one is right-handed, one has a mole on the left side of their face while the other has one on their right)
 - Others may have different personalities and interests, showing that heritability of a trait doesn't mean it will occur even in two people who share the same genes
- **Fraternal twins** develop from separate fertilized eggs (share a fetal environment, but are no more genetically similar than ordinary brothers and sisters)
 - Referred to as **dizygotic twins** (come from two different eggs that produced during the same menstrual cycle that were fertilized at the same time)
- ****Typically identical twins are much more similar than fraternal twins**

Separated Twins

Jim Lewis & Jim Springer—born from the same woman, adopted by two different families after being born. Reconnected after 38 years. Psychologists performed personality, intelligence, heart waves and brain waves testing. They were virtually as alike as the same person being tested twice.

- After 80 pairs of identical twins raised apart were studied, the researchers continued to find similarities with tastes, physical attributes, personality, abilities, attitudes, interests and even fears.
- Compared to fraternal twins, identical separated twins are more alike genetically.
- **Often times relative strangers can share many things in common→ if we were to do a scavenger hunt of similarities like birthdays, shoe sizes, clothing sizes, favorite food, favorite movie, height, weight, etc... many would have more similarities than differences (if people grow up in similar environments, they will value and have similar stages of development)

Biological v. Adoptive Relatives

- Genetic relatives (biological parents and siblings)
- Environmental relatives (adoptive parents and siblings)
- Adoptees (those who are adopted) are more similar to their biological parents than to their caregiving adoptive parents
 - The environment shared by a family's children has virtually no significant impact on their personalities
 - But, parents do influence their children's attitudes, values, manners, faith and politics (parenting matters!)
 - 7/8 adopted children feel strongly attached to one or both adoptive parents; tend to grow up to be more self-giving and altruistic
 - Children do benefit from adoption overall

Temperament

- **Temperament** = A person's characteristic emotional reactivity and intensity
 - Heredity predisposes temperament differences
 - Identical twins have more similar personalities (including temperament) than do fraternal twins
 - Ex-physiological tests reveal that anxious, inhibited infants have high and variable heart rates and a reactive nervous system, and that they become more physiologically aroused when facing new or strange situations.
 - Biologically rooted temperament helps form our enduring personalities

2. What is heritability and how does it relate to individuals and groups?

Heritability

- **Herit** (similar to inherit—possess something that someone else has given you. We inherit our traits and qualities from our parents)
- **Ability** (capable)—If a trait is genetically passed on from one generation to the next, then it is capable of showing up in the children of people who possess that quality.
 - **A heritable** trait is one that is capable of being passed down from parent to child
 - **Heritability** refers to the extent to which *differences among people* are attributable to genes (ex=height)
 - Just because a trait is heritable does not mean it will affect an individual or that it will be a defining trait of a group. Heritability only demonstrates the extent to which a trait is explainable by genetics, but not the extent to which the trait will affect behavior in an individual or group outside of environmental influences (ex-raised in a wealthy home vs. a poor home)

Nature and Nurture

- Genes (nature) and our environment (nurture) work together like two hands clapping. Genes not only code for particular proteins, they also respond to environments.
 - Genes are *self-regulating*—genes react to different temperatures (cold in cold weather, hot in hot weather)
 - Human differences result from BOTH genetic and environmental influences

Gene-Environment Interaction

- Genes and environment interact (occurs when the effect of one factor (environment) depends on another factor (heredity/genetics))
- Genetically influenced traits also evoke significant responses in others
 - EX: A student's impulsivity and aggression may evoke an angry response from a teacher who otherwise reacts warmly to the student's model classmates; parents may treat one child harsher than another (the child's nature—genes and the parents nurture interact)
- Our genes affect how people react to and influence us (nature via nurture)

3. How do evolutionary psychologists use natural selection to explain behavior tendencies?
 - Evolutionary psychologists study the evolution of behavior and the mind using principles of **natural selection**.
 - Natural selection = those that lead to increased reproduction and survival will most likely be passed on to succeeding generations.
 - For example: Dmitry Belyaev & Lyudmila Trut (Russian psychologists) able to transform 45,000 wild foxes into friendly foxes in 40 years
 - When certain traits are selected—by conferring a reproductive advantage to an individual or species, those traits, over time, will prevail
 - Our genes give us a great capacity to learn and therefore *adapt* to life in varied environments.
 - Genes + experience = wires the brain
 - ****Evolutionary psychology = how genetics and environment interact, leading to changes in genetics to fit the environment. It is also about how traits that lead to survival are more likely to be passed down.**
 - Our emotions, drives and reasoning have a “common logic across cultures”—we have a shared human genome (95% of genetic variation exists within the population)
 - **Ask—why do you eat what you eat?** Can the evolutionary perspective explain your eating habits (overeaters/dieters in your family; latino food vs. Asian food—genetic/environment)
 - A number of human traits have been identified as a result of pressures afforded by natural selection.
 - Why do infants fear strangers when they become mobile?
 - Why do people fear spiders and snakes and not electricity and guns?
 - How are men and women alike? How and why do men’s and women’s sexuality differ?

An Evolutionary Explanation of Human Sexuality

4. How might an evolutionary psychologist explain gender differences in sexuality and mating preferences?
 - **Men** are more prone to think about sex, initiate sex, sacrifice more to gain sex, desires more frequent sex
 - Men have a lower threshold for perceiving warm responses as a sexual come-on (more friendly=more sexier)
 - Women approach sex more relational; men approach sex more recreational
 - Women send their genes into the future by pairing wisely, men by pairing widely
 - **Attractiveness**
 - Men judge women as more attractive if they have a youthful appearance, healthy skin, youthful shape
 - Older men prefer younger women (Hugh Hefner-Playboy bunnies)
 - Women prefer stick-around dads
 - Mature, dominant, bold, affluent for long-term mating and investment in their children

****Nature selects behaviors that increase the likelihood of sending one’s genes into the future.**

Critiquing the Evolutionary Perspective

5. What are the key criticisms of evolutionary psychology?