Genetic Influences
Lecture 22

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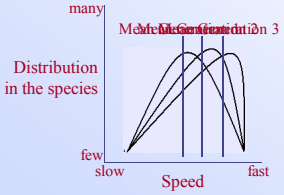
III. GENETIC INFLUENCES
A. Darwin and Natural Selection

- To Darwin (1872, The Origin of Species), all present living things descended from prior forms.
  - **Natural selection**: The explanatory principle.
    - Some organisms produce offspring that are able to survive and reproduce while other organisms of the same species do not.
  - **Survival of the fittest**: The mechanism by which natural selection works.
    - Organisms best suited to exploit environmental resources and defend against predators will reproduce and bequeath their genetic heritage to their offspring.

III. GENETIC INFLUENCES
A. Darwin and Natural Selection

- Consider the evolution of the speed of a given species in a given environment
- Assume that:
  - speed is normally distributed in the species.
  - survival is more likely the faster you are.



III. GENETIC INFLUENCES
A. Darwin and Natural Selection

- "Survival of the fittest" does not mean **personal survival.**
  - An organism who survives without reproducing is an **evolutionary failure**.
- More importantly than personal survival of individual organisms is the survival of the **gene pool**: The sum total of the genes of all future parents of the species.
  - Critical in evolution is
    - Who gets to reproduce?
    - What characteristics are passed down?

III. GENETIC INFLUENCES
A. Darwin and Natural Selection

- Thus, factors influencing reproductive success are central to evolutionary theory
  - Many factors that contribute to reproductive success may not contribute to personal survival.
  - For example, consider a Peacock with its magnificent tail feathers. Such tail features are important in mating behavior, but may decrease probability of escaping predators.
  - From an evolutionary perspective, the reproductive benefits outweigh the personal costs.

III. GENETIC INFLUENCES
B. Analyses of Inherited Characteristics

- Inherited characteristics that increase the probability of reproductive success can not only be bodily structures and features, but also behavior.
  - Squirrels burying nuts and beavers constructing damns are species-specific genetic-based behavior.
- The study of inherited **social behavior** is studied in **ethology**.
  - Ethology: The branch of biology that studies animal behavior under natural conditions.
  - Recently, the evolutionary basis of social behavior has been studied by sociobiologists. Ants.

III. GENETIC INFLUENCES
B. Analyses of Inherited Characteristics

- ***How do we determine whether or not a human characteristic is inherited*?**
- **Similarity Argument**: All members of a species are similar in that characteristic.
- Argument is based on evolutionary theory:
  - Species will pass on adaptive characteristics to offspring.
  - Evolved human species-specific characteristics?
    - Language
    - Pretend Play

III. GENETIC INFLUENCES
B. Analyses of Inherited Characteristics

- **Difference Argument**: A characteristic is inherited if unrelated people are different in that characteristic, but related people are similar.
- **Behavioral Genetics:** The field of study devoted to uncovering the contributions of nature and nurture to the diversity in human characteristics.
  - Behavior Geneticists compute **Heritability Estimates** which measure the extent to which individual differences in complex traits (e.g., intelligence and personality) are due to genetic factors.

III. GENETIC INFLUENCES
B. Analyses of Inherited Characteristics

- Heritability estimates are obtained from **kinship studies**, which compare characteristics of family members.
  - The most well known kinship studies compare siblings on IQ.

Relationship	Genetic Similarity	Predicted r for IQ	Actual r for IQ
Unrelated siblings	0%	.0	.15
Related Siblings	50%	.5	.47
Fraternal Twins	50%	.5	.60
Identical Twins	100%	1.0	.86

III. GENETIC INFLUENCES
B. Analyses of Inherited Characteristics

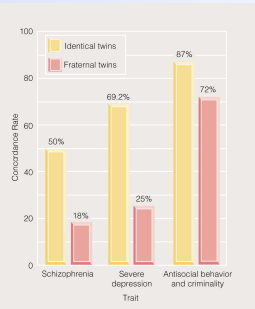
- Kinship studies of IQ are controversial.

Relationship	Genetic Similarity	Actual r for IQ	Environmental Similarity
Unrelated siblings	0%	.15	low
Related Siblings	50%	.47	medium
Fraternal Twins	50%	.60	medium high
Identical Twins	100%	.86	high

- Adoption studies examine concordance rates…
  - between twins when reared together & apart.
  - between adopted kids are their biological and adopted parents.

III. GENETIC INFLUENCES
B. Analyses of Inherited Characteristics

- Other characteristics show signs of being inherited



- Limits of research:
  - They can overestimate the influence of heredity while underestimating the impact of the environment.
  - It is difficult to generalize the twin pair study results to the general population.
  - They do not address the process of development.