Psych 305A: Lecture 14

Biological Approach: Genetics

1

Behavioral Genetics Methodological Issues

- Twin Studies
  - Equal Environments Assumption
    - Is amount of shared environment really the same for DZ vs. MZ twins?
- Adoption Studies
  - Representativeness
  - Selective placement

2

More General Limitation

• Assumption that genes and environment are independent

• In fact, certain genotypes and environments may be associated with each other (genotype-environment correlation)

Passive, Active, Reactive

genetic dispositions → Selection of certain environments (P)
→ Manipulation of the environment (A)
→ Reactions from others (R)

3

Findings of Behavioral Genetic Research

- Twin studies have revealed 3 important influences on personality:

- **Genetic influences:** Genes individuals inherit from their parents
- **Shared Environment:** Environmental effects shared by family members (parenting style, family environment, schools, neighborhood, material resources)
- **Non-shared Environment:** Environmental effects unique to the individual -- NOT shared by family members (illnesses, friends, teachers, being treated differently by your parents)

4

INTRODUCTION

Genetic and Environmental Effects

- Genetic effects
  - What parents pass on to their children
  - 100% shared in MZ twins, 50% in DZ twins
- Environmental effects
  - Shared: Family and environmental influences that affect MZ/DZ twins similarly
  - Non-shared: Family and environmental influences that affect MZ/DZ twins differently

5

Heritability of Personality

	Genetic	*Shared*	*Non-shared*
Extraversion:	.49	.02	.49
Agreeableness:	.35	.11	.54
Conscientiousness:	.48	.07	.45
Neuroticism:	.41	.07	.52
Openness to Experience:	.45	.06	.49

**Genetics and non-shared environment important
**Shared environment has little influence on personality

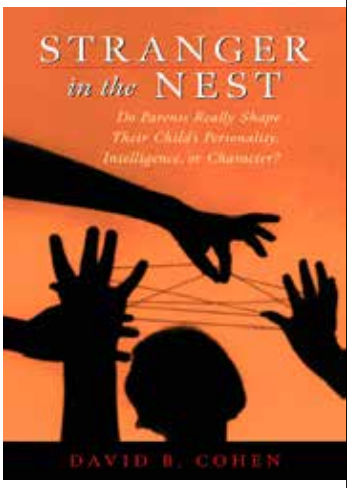
6

CONCLUSION FROM TABLE:

• Most personality traits have some genetic component

• Non-shared environmental experiences have a very strong impact on personality

• Shared environmental experiences have little impact on personality
  •Do parents matter??



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Where do non-shared environmental effects come from?

New Zealand Twin Study

8

INTRODUCTION

Genetic and Environmental Effects Study

- Measured self-esteem: two teachers reported (age 5 & 7)
- Measured parent-child relationship
  - Mother's expressed emotion (child at age 5)
  - Mothers spoke about each twin for 5 minutes
  - Negative emotion expressed towards child coded from tapes

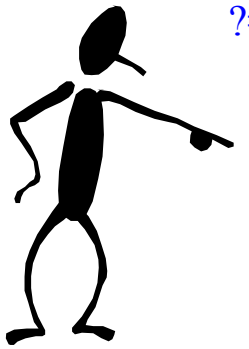
9

Negative Expressed Emotion

"She always does it, I've never met such a clumsy child. We think 'oh here we go again, she's done it again.' It drives me mad! Why doesn't she look where she's going? I'm constantly having to look after her, she's constantly breaking things. Sometimes I think she's stupid. She never learns."

10

Does unique parenting (non-shared environmental effect) influence self-esteem?



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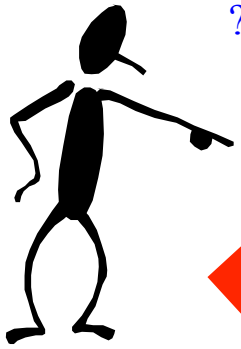
Self-Esteem
(age 5 & 7)

Parent-Child
Relationship

11

Parenting and Self-Esteem



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Self-Esteem
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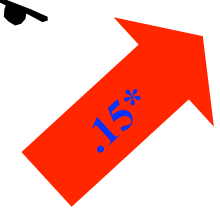

.65*

Parent-Child
Relationship

Variance due to
Genetics

12

Parenting and Self-Esteem

- Do parents matter?
  - Yes
  - The unique relationship between the mother and each child predicts the unique self-esteem of each child
    - Non-shared environmental effect
  - This effect cannot be explained by genetic or shared environment influences

13

Conclusions from Behavioral Genetic Research

- All personality traits are at least partially heritable
- The effect of being raised in the same family is smaller than the effect of genes
- Much of the variance in personality is not due to genes or shared family experiences
  - Personality differences are strongly influenced by unshared or idiosyncratic experiences, or unique parent-child relationship

14

Shared Family Environment

- Does influence other aspects of a person
  - Attitudes
  - Religious beliefs
  - Political orientations
  - Health behaviors
    - Strong correlation between adopted siblings on smoking and drinking tendencies

15

Which traits are most heritable?

- Which traits have strongest genetic component?

16

Twins Separated at Birth

Very Heritable	MZ Twins Raised Apart
Neuroticism	.70
Imagination	.74
Aggression	.67
Moderately Heritable	
Traditionalism	.59
Sense of Alienation	.59
Social Potency	.57
Sense of well-being	.49
Risk Taking	.45
Somewhat Heritable	
Achievement Orientation	.38
Social closeness	.15

17

How Can We Explain Heritability of Personality?

- How can self-esteem, personality, IQ, sexual orientation, political & religious orientation, even divorce, be heritable??
- Genes → Neurotransmitters, hormones, physiological arousal→ Thoughts and Feelings → Personality → Divorce
- Current genetics research on personality
  - Molecular genetics (genetic markers of traits)
  - Neurotransmitters (dopamine) and hormones (testosterone)
  - Neuro-anatomy

18

Broader Issue: Genetic Determinism vs. Free Will

Do we have any conscious control over our actions, thoughts, and personality?

	Concordance Rates of Felony Convictions
Identical twins	42%
Fraternal twins	13%

19

What if we could choose our genes?

If scientists can find the genes associated with certain "good" and "bad" traits, could we manufacture "perfect" humans? Should we?

20

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21

Physiological Approach

- How do we get from genes to personality?

22

Physiological Approach

- How do we get from genes to personality?

23

TEMPERAMENT

Biologically based traits present at birth

Excitability
Sociability
Activity level

INFANT TEMPERAMENT → **ADULT PERSONALITY**

some adult traits are strongly related to temperament and others are not –i.e. some are mostly biological and others are mostly environmental

↑

OBJECTIVE AND SUBJECTIVE ENVIRONMENT

24

Which personality traits have the strongest biological basis?

Extraversion and neuroticism

Adult traits related to temperament -->
Sociability + activity level (extraversion) and
Excitability (neuroticism)

25

Eysenck's Theory of Personality

- Extraversion and introversion represent different levels of physiological arousal
- Extraverts: Below optimal level (under-aroused)
  - Seek out social interactions for stimulation
- Introverts: Above optimal level (over-aroused)
  - Avoid excessive stimulation (e.g., social interaction)
  - But, this does not mean that introverts are *shy*
    - What is the difference?

26

INTRODUCTION

Next Class

- Friday: Wrap up physiological approach; begin evolutionary approach
- Read Larsen & Buss, Chapter 7

27