Behavior Genetics: Twin & Adoption Studies, Overview of Nature v. Nurture

1. Describe how twin and adoption studies help us differentiate hereditary and environmental influences on human traits.
2. Discuss how differences in infant temperament illustrate the effect of heredity on development.
3. Describe how behavior geneticists estimate trait heritability, and discuss the interaction of genetic and environmental influences.

Genes: Our Biological Blueprint

- Chromosomes: threadlike structures made of DNA that contain the genes
- DNA (deoxyribonucleic acid): complex molecule containing the genetic information that makes up the chromosomes. It has two strands forming a "double helix" held together by bonds between pairs of nucleotides
- Genes: biochemical units of heredity that make up the chromosomes
- Genome: the complete instructions for making an organism, consisting of all the genetic material in its chromosomes

Genetics and Behavior

- Nucleus
- Chromosome
- Gene
- Cell
- DNA

Twin Studies

- Identical Twins
  - Monozygotic Twins (sperm fertilizes one egg, it splits)
  - Fraternal Twins (sperm fertilizes two separate eggs, they have their own placentas and amniotic sac.)

Separated Twins

- A number of studies compared identical twins reared separately from birth, or close thereafter, and found numerous similarities.
  - Separated Twins
  - Personality, Intelligence
  - Abilities, Attitudes
  - Interests, Fears
  - Brain Waves, Heart Rate

Although they were reared apart from 4 weeks after their birth, Jim Lewis (left) and Jim Springer (right) exhibited remarkable correspondence in personality. Some of the similarities in their lives—such as the benches built around trees in their yards—seem uncanny.
Heritability

- When someone tells you that height is 80% heritable, does that mean:
  a) 80% of the reason you are the height you are is due to genes
  b) 80% of the variation within the population on the trait of height is due to variation of the genes

- B. Heritability is the proportion of variation among individuals that we can attribute to genes.

A Debate for the Future

- This could be a touchy subject, so do not take any arguments personal!
- With some degree of certainty, parents can pick the sex of their child. Within the next 25-30 years, it is expected that parents will be able to pick the components of their child like a Subway sandwich line, adding and deleting certain physical and mental characteristics.
- Is this a good idea?

DEVELOPMENTAL LIFESPAN PSYCH

Prenatal & Neonatal Development, Infancy & Childhood: Teratogens, Infant Cognition, Biological Maturation

1. Discuss the course of prenatal development and the destructive impact of teratogens.
2. Describe the capacities of the newborn and the use of habituation for assessing infant cognition.
3. Discuss the impact of physical maturation on infants' memory capabilities and motor skills.

DEVELOPMENTAL PSYCH

The Developing Person

"Nature is all that a man brings with him into the world; nurture is every influence that affects him after his birth."

What is Developmental Psychology?

- Developmental Psychology
  - a branch of psychology that studies physical, cognitive and social change throughout the life span (from conception to death)

Prenatal Development and the Newborn

Conception

- starts when a woman’s ovary releases a mature egg (about the size of a . ) and a deposit of 200 million sperm is made during intercourse
- women are born with all the eggs they will ever have
- man doesn’t produce sperm until puberty (sexual maturity)
- about 1000/second 24 hrs a day (330,000 during this class)
- slows down a bit with age
- egg cell is about 85,000 times larger than 1 sperm cell
- the sperm that make it to the egg release a digestive enzyme to help it penetrate the egg
- only 1 lucky sperm will penetrate, because the egg will block out all others
- the egg actually sucks the sperm in once it starts to penetrate

Prenatal Development

fertilized egg is called a zygote
- conception to 2 weeks
- less than 50% of zygotes survive
- once the zygote grows to about 100 cells, the new cells start to differentiate/specialize (about 1 week after conception)
- around 10 days after conception the zygote attaches to the uterine wall
- outer part becomes the placenta
- inner part becomes the embryo
- 2 weeks to 2 months
- during this period organs begin to form, heart begins to beat, liver begins to make red blood cells

Life is sexually transmitted

DEVELOPMENTAL PSYCH

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Life is sexually transmitted
Prenatal Development

- at each stage of prenatal development, genetic and environmental factors affect the development
- the placenta carries oxygen and nutrients, and screens out many harmful substances
  - teratogens: chemicals and viruses that can reach the embryo or fetus through the placental screen (ex. heroin, HIV)
- mothers who smoke give the fetus nicotine and a decreased oxygen supply
- heavy smoking may cause babies to be underweight and may also cause harm to the brain
  - a Danish study found significantly increased violent crime rates among men whose mothers smoked during pregnancy

Prenatal Development

- fetal alcohol syndrome: marked by a small, misproportioned head and lifelong brain abnormalities
  - Major cause of MR

the Newborn

- Rooting Reflex:
  - tendency to open mouth, and search for nipple when touched on the cheek (see Barron’s for and know other reflexes – ie. Babinski, Moro, Stepping, Sucking)
  - These reflexes eventually disappear due to lack of need

- Preferences:
  - human voices and faces
  - facial-like images
  - smell and sound of mother

- Apgar Scale: Test for checking newborn vital signs/health
  - Appearance, Pulse, Grimace, Activity, and Respiration

- Vision:
  - at one time it was thought newborns could not see
  - they can & prefer to look at objects b/w 8-12 inches from their face (nearsighted)
4-2  143-159
Cognitive Development: Schemas, Assimilation, Piaget's Stages of Development, Theory of Mind, Autism

4. Describe Piaget’s view of how the mind develops, and discuss his stage theory of cognitive development, noting current thinking regarding cognitive stages.

Infancy and Childhood: Physical Development

- Nature vs. Nurture debate continues . . .
- Nurture:
  - US babies walk b/w 11 and 15 months
  - Ugandan babies walk by 10 months
  - US babies spend much time in crib
  - Ugandan babies exp. more intimate and rhythmic contact (always on the move)
- Nature:
  - Identical twins begin walking almost on the same day
  - rapid development of the cerebellum makes us ready to walk around age 1
  - exp. has a very limited effect before that time
  - true also for bladder and bowel movements

Infancy and Childhood: Physical Development

- Maturation
  - biological growth processes that enable orderly changes in behavior
  - relatively uninfluenced by experience
  - lack of complex neural pathways helps explain infantile amnesia
- Motor Development
  - the development of the brain area allows for increased physical coordination
  - most babies roll over before they sit up, crawl before they walk

Infancy and Childhood: Cognitive Development

- Cognition
  - All the mental activities associated with thinking, knowing, remembering, and communicating
- Jean Piaget: Key Researcher on Cognitive Development
Infancy and Childhood: Cognitive Development
- Jean Piaget
- 1920s worked for French gov. developing questions for Binet's intelligence tests
- noticed when children answered incorrectly, they often gave very similar incorrect answers
- led Piaget to believe that a child’s mind develops in stages
- **flashback**
  - schema – a concept or framework that organizes and interprets information
- Piaget believed humans organize info in 2 ways
  1) **assimilation** – process by which new info is placed into existing categories
  2) **accommodation** – a change brought about because of new info

Infancy and Childhood: Cognitive Development
- ex. have schema for a dog
- see a cow for first time, you assimilate the cow into your schema for a dog
- when somebody corrects you, you accommodate that info into a new schema for cow

Piaget’s Stages of Cognitive Development

<table>
<thead>
<tr>
<th>Typical Age Range</th>
<th>Description of Stage</th>
<th>Developmental Phenomena</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth to nearly 2 years</td>
<td>Sensorimotor Stage: Experiencing the world through senses and actions (looking, touching, mouthing)</td>
<td>Object permanence, Stranger anxiety</td>
</tr>
<tr>
<td>About 2 to 6 years</td>
<td>Preoperational Stage: Representing things with words and images but lacking logical reasoning</td>
<td>Pretend play, Egocentrism, Language development</td>
</tr>
<tr>
<td>About 7 to 11 years</td>
<td>Concrete operational Stage: Thinking logically about concrete events, grasping concrete analogies and performing arithmetical operations</td>
<td>Conservation, Mathematical transformations</td>
</tr>
</tbody>
</table>

Piaget’s Theory of Cognitive Development - Sensorimotor Stage (0-2)
- characterized by learning to coordinate sensation and perception with motor activity
- infants begin to realize that their physical movements and the results they sense and perceive are related
- before the age of 6 months babies lack object permanence - the awareness that things continue to exist even when not perceived

Piaget’s Theory of Cognitive Development - Preoperational Stage (2-6)
- starts when children start to use words and symbols to represent objects
- during this stage children do not understand the law of conservation – key properties of substances such as weight, volume, and # stay the same even if their shape is changed
- ex. water level of 2 different glasses
- children are egocentric during this stage
- the inability to see another person’s point of view
- ex. little kids often sit directly in front of the TV, they don’t realize you can’t see the same thing they are seeing

Object permanence
- Object Permanence
  - the awareness that things continue to exist even when not perceived

Conservation – Dev in PreOp Stage
- Conservation
  - the principle that properties such as mass, volume, and number remain the same despite changes in the forms of objects

Piaget’s Theory of Cognitive Development - Sensorimotor Stage (0-2)
- Baby Mathematics
  - Shown a numerically impossible outcome, infants stare longer (Wynn, 1992)

Baby Mathematics
1. Objects placed in case.
2. Screen comes up.
3. Object is removed.
4. Possible outcome: Screen drops, revealing one object.
4. Impossible outcome: Screen drops, revealing two objects.

Piaget’s Theory of Cognitive Development - Preoperational Stage (2-6)
- Preoperational Stage Cont’d
- children are also animistic during this stage
- they think objects are alive or have human qualities
- ex. stuffed animals, blankets, etc.
- children are also artificialistic during this stage
- they think natural occurring events are caused by humans
- ex. Mommy make it stop raining so I can go play outside
Piaget's Theory of Cognitive Development - Preoperational Stage (2-6)

- Preoperational Stage Cont'd
  - although they are egocentric, preschoolers do begin forming a theory of mind - ideas about their own and others' mental states about their feelings, perceptions, and thoughts and the behavior these might predict (turn to p. 147)
  - ex. b/w the age of 3 and 5 children begin to realize that others may hold false beliefs
  - ex. If you show a 3 year old a band-aid box full of pencils, he will most likely say that others will say pencils when asked what's in the box
  - 4 and 5 year olds who have a more developed theory of mind, reply that others will think band-aids are in the box (note: Autistic don't exhibit th of mind)

Piaget- Reflections and Criticism

- sequence is about right
- criticized because most researchers see cognitive development as more gradual and continuous than in distinct stages

Piaget's Theory of Cognitive Development - Concrete Operational Stage (7-11)

- begin to show early signs of adult thinking, but only when thinking about objects, not abstract ideas
- able to focus on 2 dimensions of a problem at a time - therefore, understand law of conservation
- learn to see the world form others point of view

Piaget's Theory of Cognitive Development - Formal Operational Stage (12-adult)

- reasoning expands from concrete to abstract
- realize that ideas can be classified mentally just as objects can
- Algebra and geometry can now be understood
- capable of dealing w/ hypothetical situations
- understand there may be more than 1 solution to a problem

Social Development

- stranger anxiety - fear of strangers that infants display beginning at about 8 months
- by this age have schemas for familiar faces - unfamiliar upset child
- major issue in childhood social development is attachment
- an emotional tie with another person
- used to think that infants formed attachments to those who feed them - i.e., babies formed attachments to there mothers because they gave them milk

Social Development - Harlow's Surrogate Mother Experiments

- contact with the comfortable cloth mother, even while feeding from the nourishing wire mother Monkeys preferred
- contact comfort - our need to touch and be touched by something soft and warm - true source of attachment

Social Development

- attachments give us what is known as a secure base
- we know our parent cares for us and looks out for us and this makes it easier to explore our surroundings
- Critical Period
  - an optimal period shortly after birth when an organism’s exposure to certain stimuli or experiences produces proper development
  - imprinting - process by which certain animals form immediate attachments during a critical period early in life
  - ex. ducks will imprint to animals of other species, bouncing balls, etc (exp by Konrad Lorenz, 1937)

Social Development

- secure vs. insecure attachments
- secure - play comfortably, happily explore their environment in their mothers presence - get distressed when mother leaves them - run to her when she returns
- insecure - less likely to explore environments, very clingy - when mother leaves they cry loudly and remain upset or seem indifferent to their mother’s going and returning

Social Development - Mary Ainsworth - Researched secure v. insecure attachments

- studied mother infant pairs in their homes first 6 months of their lives
- then observed them as 1 year olds in a “strange situation” without their mothers
- found sensitive and responsive mothers had babies with secure attachments
- insensitive and unresponsive mothers had babies with insecure attachments
- Infants’ anxiety about being separated from parents usually peaks around 13 months, then declines
- secure attachments make more socially competent children

Social Development

- imprinting - process by which certain animals form immediate attachments during a critical period early in life
- ex. ducks will imprint to animals of other species, bouncing balls, etc (exp by Konrad Lorenz, 1937)
Social Development

- Ainsworth's 3 Attachment Styles:
  1. Secure: play and explore with mother present, upset when she leaves, quickly calmed by her return
  2. Anxious-ambivalent: anxious when mom near, extreme protest when she leaves but aren't really comforted when she returns
  3. Avoidant Attachment: seek little contact with mom & not distressed when she leaves

>> evidence suggests that insecure (either 2 or 3 above) occur more often with fussy, fretful, and irritable infants
>> van den Boom Study controls for temperament:

Social Development

- Erik Erikson says securely attached children approach life with a 
  basic trust - a sense that the world is predictable and reliable
  Self concept - a sense of one's identity and personal worth
  - develops by age 12
  - view of themselves affect their actions
  - positive concepts lead to confidence, independence, optimism, assertiveness, and sociability
  - 6 mo benchmark: kid is excited about image in mirror but doesn't really know it's him/herself
  - 15-18 mo benchmark: kid wipes red mark off face, therefore does recog self (some animals do this, ie chimps, elk)

Social Development

- Groups of infants left by their mothers in a unfamiliar room (from Kagan, 1976):
  - Sandra Scarr: high quality daycare doesn't hinder development

Social Development: Child-Rearing Practices (3)

- Authoritarian
  - parents impose rules and expect obedience
  - "Don’t interrupt." “Why? Because I said so.”
- Permissive
  - submit to children’s desires, make few demands, use little punishment
- Authoritative
  - both demanding and responsive – set, enforce, and explain rules so child understands the reasoning behind them – encourage open discussions
  - Which is best?
  - Authoritative proves to be best style to get children with high self-esteem, self-reliance, and social competence

Social Development: Child-Rearing Practices

- Parenting style (e.g., authoritative)
- Child's traits (e.g., self-reliant, socially competent)
- Harmonious marriage, common genes, or other third factor

Adolescence

- Adolescence: the transition period from childhood to adulthood
- Puberty: the period of sexual maturation
- extending from puberty to independence
- when a person becomes capable of reproduction

Adolescence

- Primary Sex Characteristics
  - body structures that make sexual reproduction possible
  - ovaries - female
  - testes - male
  - external genitalia
- Secondary Sex Characteristics
  - nonreproductive sexual characteristics
  - female-breast and hips
  - male - voice quality and body hair
  - Menarche (men-NAIR-key) (Spermarche)
  - first menstrual period

DEVELOPMENTAL/LIFESPAN PSYCH

9-3 441-445


8. Define adolescence and identify the major physical changes that occur during this period of life
9. Describe adolescents' growing reasoning power, and discuss specific ways in which moral behavior is affected by moral reasoning, emotional intuitions, and social influences.
10. Discuss the search for identity and the development of intimate social relationships during the adolescent years.

DEVELOPMENTAL/LIFESPAN PSYCH

9-4 445-455

Adolescence:

- Primary Sex Characteristics
  - body structures that make sexual reproduction possible
  - ovaries - female
  - testes - male
  - external genitalia
- Secondary Sex Characteristics
  - nonreproductive sexual characteristics
  - female-breast and hips
  - male - voice quality and body hair
  - Menarche (men-NAIR-key) (Spermarche)
  - first menstrual period
Adolescence

In the 1890’s the average interval between a woman’s menarche and marriage was about 7 years; now it is over 12 years.

Body Changes at Puberty

Adolescence – Cognitive Development

• Metacognition (thinking about thinking) begins to come into play during adolescence
• also begin thinking about what others are thinking about them
• as cognition abilities mature, teens start to think about ideology and might begin to criticize society, their parents, or even themselves
• during teenage years we reach Piaget’s formal-operational stage—now we are capable of abstract logic
• we can detect inconsistencies in others and spot hypocrisy
• this is when heated debates w/ parents and friends occur over difference in ideals

Stage Theories

• Piaget, Kohlberg, Erikson, Kubler-Ross

Adolescence – Moral Development (Kohlberg)

Kohlberg’s Theory of Moral Development

• studied moral reasoning
• posed moral dilemmas to children, adolescents and adults, and analyzed their answers for evidence of stages in moral thinking
• Kohlberg wasn’t really interested in the answers to the dilemma, but in respondents reasoning behind the answers

Kohlberg’s Moral Ladder

Adolescence – Moral Development (Kohlberg)

Preconventional
Stage 1 – avoid punishment,
Stage 2 – gain reward—what’s in it for me?

Conventional –
Stage 3 good boy/girl orientation—maintain rules to fulfill social roles (golden rule)
Stage 4 – social contract orientation—society must transcend individual needs—uphold law & rules to maintain a functioning society.

Postconventional –
Stage 5 indv are sep entities from society. Working out personal code of ethics, acceptance of rules is less rigid. Laws are regarded as social contracts vs dictums & those that don’t promote gen social welfare should be changed to meet greater good. Democracy is based on this reasoning.
Stage 6 Laws are valid only insofar as they are grounded in justice, and a commitment to justice might carry an obligation to disobey unjust laws. Kohlberg insisted that this stage existed although he had difficulty finding people who lived in it.

Adolescence – Moral Development (Kohlberg)

Criticism of Kohlberg

• many say that post-conventional level only appeals to European and American societies that prize individualism
• i.e., put own goals ahead of group goals
• also that women’s reasoning seems to be based more on caring relationships than less abstract impersonal principles (Carol Gilligan)—therefore women are seen as in conventional stage whereas men are in postconventional
Adolescence – Moral Development

- Is Moral Reasoning all Cognitive? (OR)
- Are there times when biology overrides cognition? Can it be explained from a Biological Perspective?

Erikson’s Stages of Psychosocial Development

<table>
<thead>
<tr>
<th>Approximate Age</th>
<th>Stage</th>
<th>Description of Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infancy (1st year)</td>
<td>Trust vs. mistrust</td>
<td>If needs are dependably met, infants develop a sense of basic trust.</td>
</tr>
<tr>
<td>Toddler (2nd year)</td>
<td>Autonomy vs. shame and doubt</td>
<td>Toddlers learn to exercise will and do things for themselves, or they doubt their abilities.</td>
</tr>
<tr>
<td>Preschooler (3-5 years)</td>
<td>Initiative vs. guilt</td>
<td>Preschoolers learn to initiate tasks and carry out plans, or they feel guilty about efforts to be independent.</td>
</tr>
<tr>
<td>Elementary (6 years-puberty)</td>
<td>Competence vs. inferiority</td>
<td>Children learn the pleasure of applying themselves to tasks, or they feel inferior.</td>
</tr>
</tbody>
</table>

Adolescence: Social Development

- Identity – issue of adolescence stage (identity v role confusion) one’s sense of self
  - teens play different roles depending on who they are with
  - when these roles overlap it becomes very uncomfortable for them
  - ex. friends and parents
  - Erikson said some teens forge identity very early like their parents- same beliefs and values
  - OR
  - opposite their parents- opposite beliefs and values
  - however, some never really figure out who they want to be

Adolescence: Social Development – Carol Gilligan’s Gender Differences

- men are more likely to guess or make up answers than to admit “they don’t know”
- called the male answer syndrome
- women emphasize caring
- men emphasize freedom and self-reliance
- explains why men typically place less importance on religion
- by age 50 most of these gender differences disappear

Adolescence: Social Development

- Intimacy – (struggle in young adulthood – intimacy v. despair stage) ability to form a close, loving relationships
  - must have a clear identity before you are ready for this
  - Carol Gilligan believed this applied more to males than females because males are more individualistic and females are more relationship oriented
  - little boys play in large groups- focus is on activity not intimate discussion
  - little girls play in smaller groups, often with just one other
  - initiate social relationships
  - In adulthood, women use conversation to explore relationships, men to solve problems

Erikson’s Stages of Psychosocial Development

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<th>Stage</th>
<th>Key Question</th>
</tr>
</thead>
<tbody>
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<td>Trust vs. mistrust</td>
<td>Is my world predictable and supportive?</td>
</tr>
<tr>
<td>Toddler (2nd year)</td>
<td>Autonomy vs. shame and doubt</td>
<td>Can I do things myself or must I always rely on others?</td>
</tr>
<tr>
<td>Preschooler (3-5 years)</td>
<td>Initiative vs. guilt</td>
<td>Am I good or am I bad?</td>
</tr>
<tr>
<td>Elementary (6 years-puberty)</td>
<td>Competence vs. inferiority</td>
<td>Am I competent or worthless?</td>
</tr>
</tbody>
</table>


11. Identify the major physical changes that occur in middle and older adulthood.
12. Describe the impact of aging on adult memory and intelligence.
13. Explain why the path of adult development need not be tightly linked to one’s chronological age.
14. Discuss the importance of family and work commitments in adult development.
15. Describe people’s life satisfaction across the life span and their reactions to death or the prospect of dying.
16. Summarize current views regarding continuity versus discontinuity and stability versus change in lifelong development.

Developmental/Lifespan Psych

11. 455-473
**Adulthood: Physical Development**

- **Menopause**
  - the time of natural cessation of menstruation
  - also refers to the biological changes a woman experiences as her ability to reproduce declines
- **Alzheimer’s Disease**
  - a progressive and irreversible brain disorder
  - characterized by a gradual deterioration of memory, reasoning, language, and finally, physical functioning
  - Due to lack of Ach (Acetylcholine): deterioration of terminal branches of Ach releasing neurons in the [hippocampus](#)

---

**Adulthood: Physical Development**

- **The Aging Senses**

  ![Graph: Proportion of normal 20/20 vision when identifying letters on an eye chart](image)

  ![Graph: Percent correct when identifying smells](image)

  ![Graph: Percent correct when identifying spoken words](image)

- **Slowing reactions contribute to increased accident risks among those 75 and older.**

---

**Adulthood: Cognitive Development**

- **Recalling new names introduced once, twice, or three times is easier for younger adults than for older ones** (Crock & West, 1990).

  ![Graph: Percent of names recalled](image)

- **In a study by Schonfield & Robertson (1966), the ability to recall new information declined during early and middle adulthood, but the ability to recognize new information did not.**

  ![Graph: Number of words remembered](image)

- **Cross-Sectional Study**
  - a study in which people of different ages are compared with one another

- **Longitudinal Study**
  - a study in which the same people are restudied and retested over a long period
**Adulthood: Cognitive Development**

- Verbal intelligence scores hold steady with age, while nonverbal intelligence scores decline (adapted from Kaufman & others, 1989).

<table>
<thead>
<tr>
<th>Age group</th>
<th>Nonverbal scores</th>
<th>Verbal scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>90</td>
<td>100</td>
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<tr>
<td>35</td>
<td>85</td>
<td>95</td>
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<td>55</td>
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<tr>
<td>105</td>
<td>60</td>
<td>65</td>
</tr>
</tbody>
</table>

- Crystallized Intelligence
  - one’s accumulated knowledge and verbal skills
  - tends to increase with age

- Fluid Intelligence
  - one’s ability to reason speedily and abstractly
  - tends to decrease during late adulthood

**Adulthood: Social Changes**

- Social Clock
  - the culturally preferred timing of social events
  - marriage
  - parenthood
  - retirement

**Social Development: Child-Rearing Practices (3)**

- Discuss the impact of body contact, familiarity, and responsive parenting on infant social attachments.
- Describe the benefits of a secure attachment and the impact of parental neglect and separation as well as day care on childhood development.
- Describe the early development of a self-concept and discuss possible effects of different parenting styles on children.