Nature and Nurture

Lecture 33

Views of Mental Development

Ontogenetic

Phylogenetic

Cultural

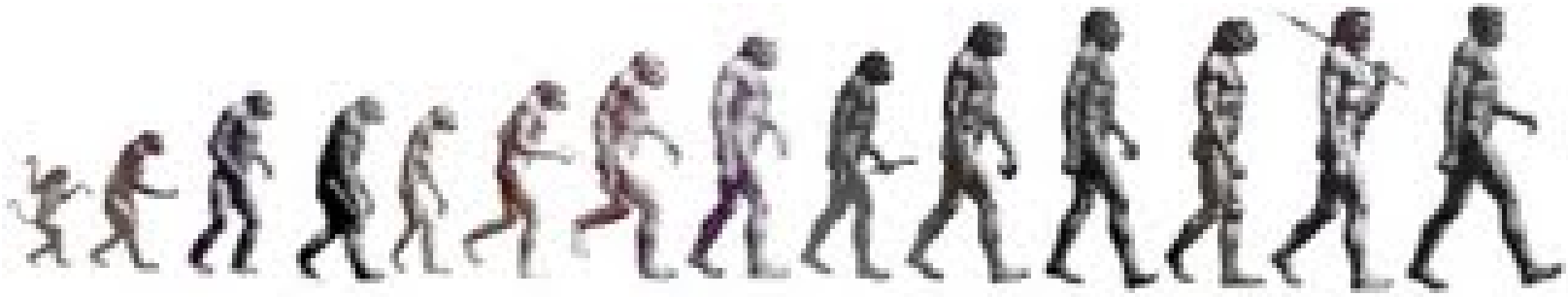
Ontogenetic View of Development

- Individual Species Members
- Development Across the Life Span
  - Infancy
  - Childhood
  - Adolescence
  - Adulthood
  - Old Age
- Developmental Psychology
  - Cognitive Development
  - Social/Personality Development

Titian, “The Three Ages of Man” (1509)
National Gallery of Scotland

Phylogenetic View of Development

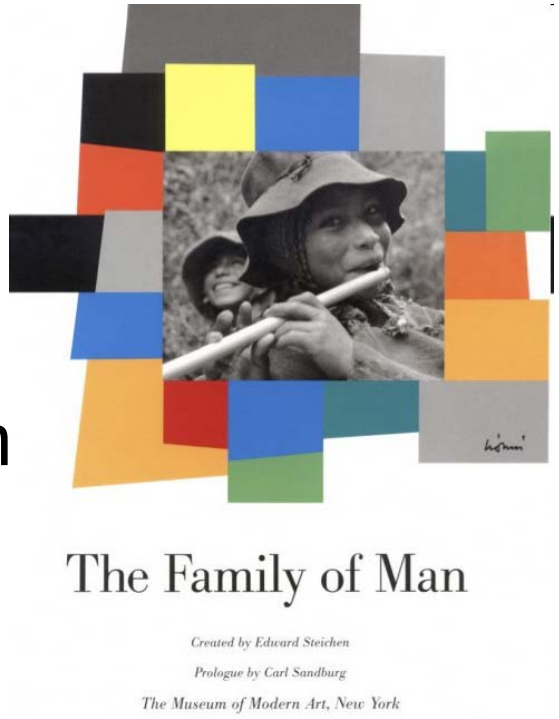
- Evolution of Mind and Behavior
- Comparative Psychology
- Evolutionary Psychology
  - Sociobiology
  - Environment of Early Adaptation
    - African Savanna, Pleistocene Epoch



R. Zattlinger in F.C. Howell, *Early Man* (1970)

Cultural View of Development

- "Primitive" vs. "Advanced"
  - Stone, Bronze, Iron Ages
    - Anthropological Psychology
- History
  - Ancient, Medieval, Early Modern
  - Modern, Post-Modern
- Forms of Development
  - Literacy
  - Economic
  - Political

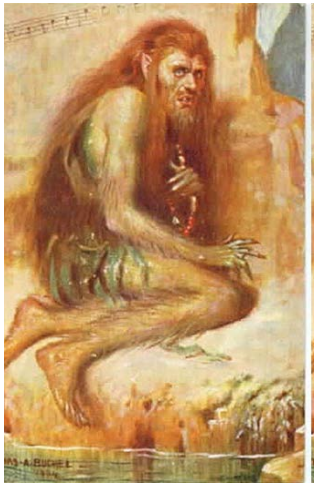


Cultural Psychology

Diversity of Mind

Nature and Nurture in Development

Galton (1874), inspired by Shakespeare's *The Tempest*



Charles A. Buchel

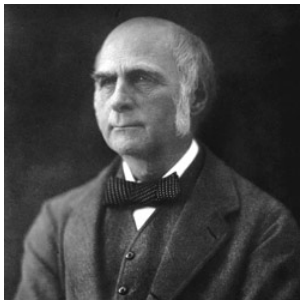
Prospero on Caliban:

"A devil, a born devil, on whose nature
Nurture can never stick."

"…a convenient jingle of words, for it separates under two distinct heads the innumerable elements of which personality is composed…"

Defining the Terms

Galton (1874)



- "Nature is all that a man brings with himself into the world…"
  - Genetic, Hormonal Endowment
  - Constitution, Temperament

Nativism

- "…Nurture is every influence that affects him after his birth."
  - Physical and Social Environment
  - Social Learning, Socialization
  - Experiential History

Empiricism

Traditional Perspectives on Nature and Nurture

- Opposition
  - Nature ***vs.*** Nurture
- Independence
  - Nature ***and*** Nurture
- Interdependence
  - Nature ***Interacts with*** Nurture

Developmental Corollary to the Doctrine of Interactionism

Just as the Person

is a Part of His or Her Own Environment,

So the Child

is an Agent of His or Her Own Development.

The Human Genome

Money & Erhardt (1972)

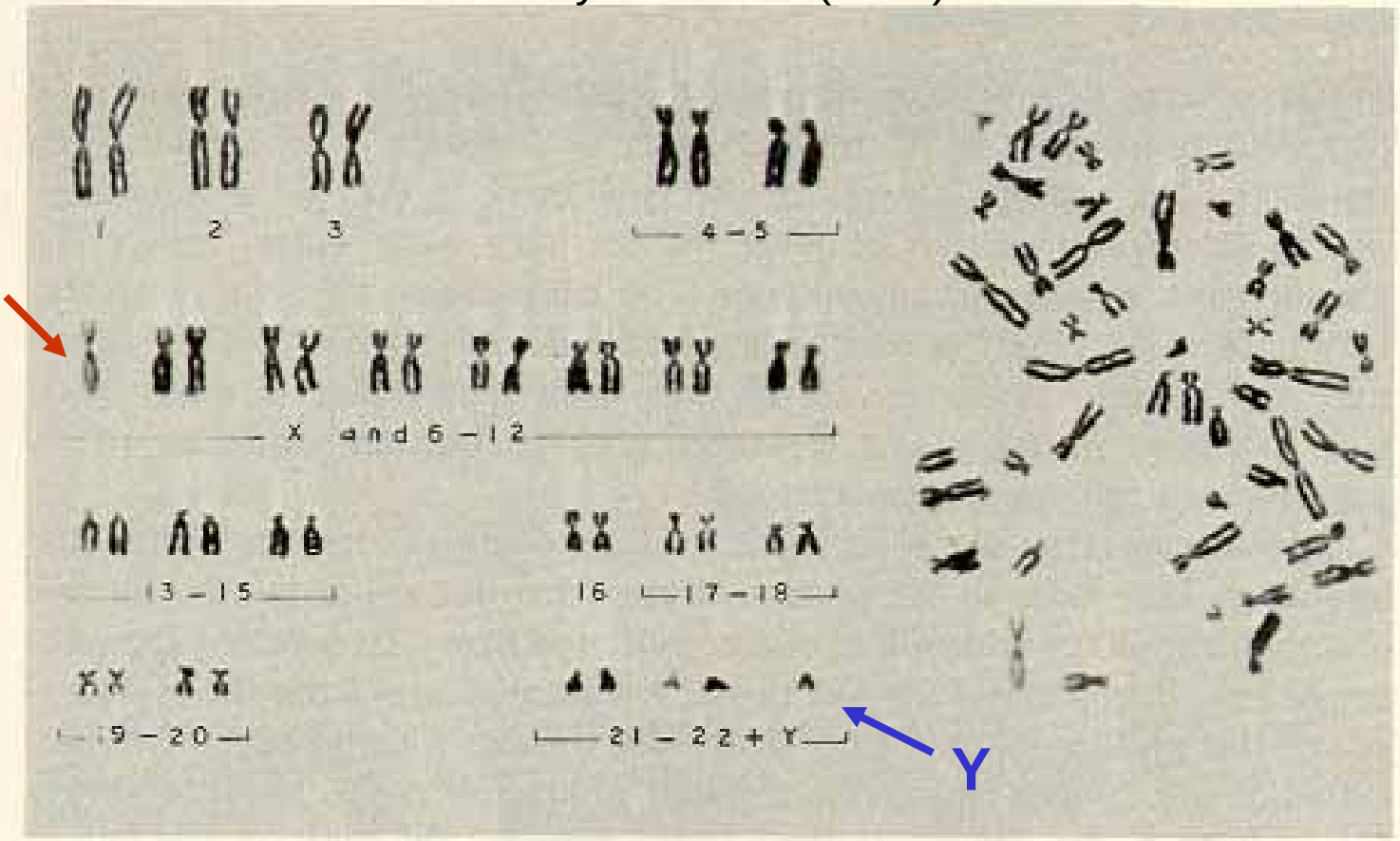
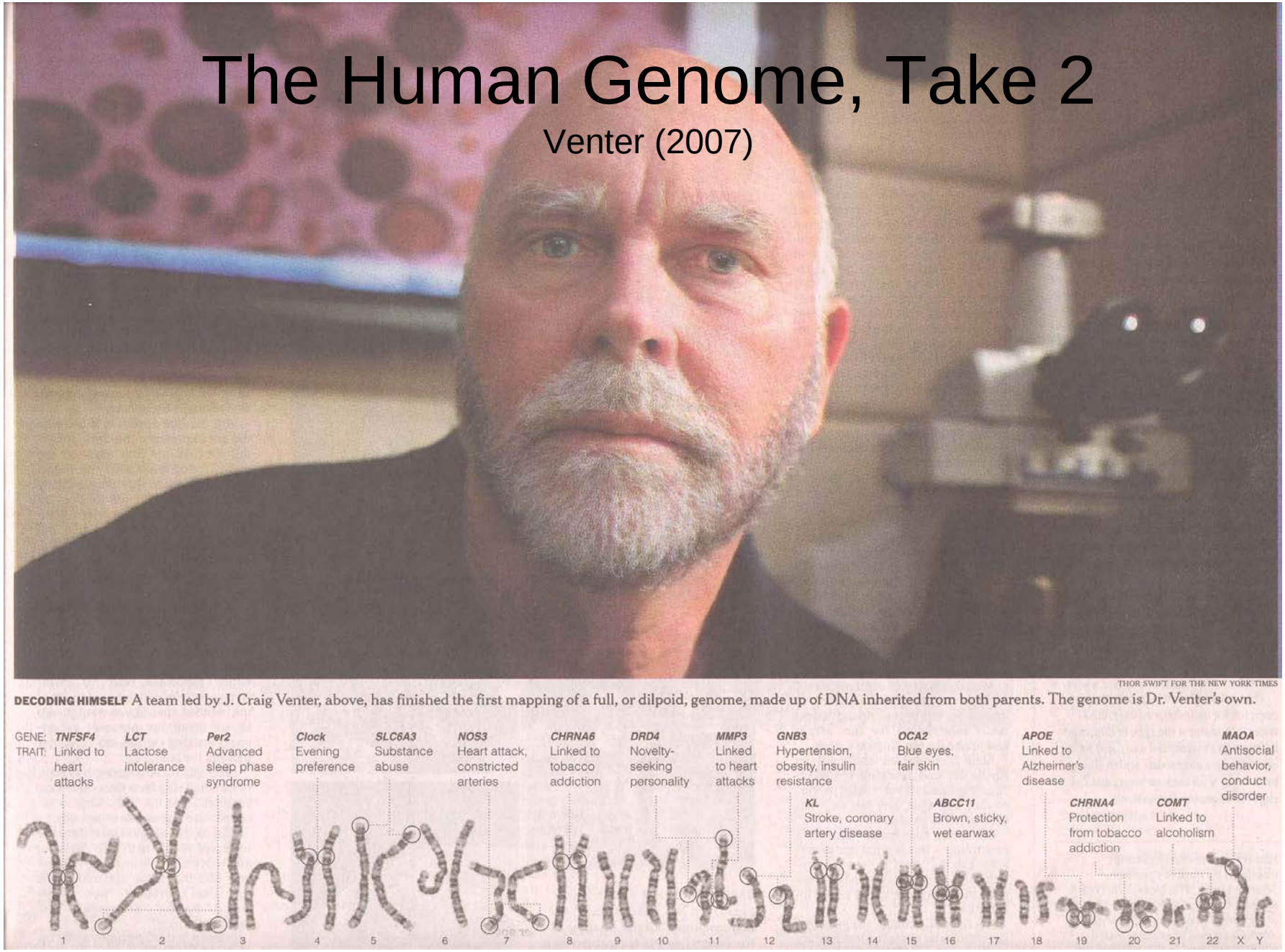


Figure 2.3. A spread of human chromosomes from the nucleus of a single cell, and their classified arrangement or karyotype. The presence of the X and Y chromosomes signifies the male genotype.

The Human Genome, Take 2

Venter (2007)



THOR SWIFT FOR THE NEW YORK TIMES

DECODING HIMSELF A team led by J. Craig Venter, above, has finished the first mapping of a full, or dilpoid, genome, made up of DNA inherited from both parents. The genome is Dr. Venter's own.

Genes and Environments

- Genotype
  - Biological Potential
    - Different Genotype, Same Phenotype
- Phenotype
  - Actualized Potential
    - Same Genotype, Different Phenotype
- Types of Environment
  - Prenatal
  - Perinatal
  - Postnatal

Behavior Genetics: Twin Studies

- Monozygotic (MZ) Twins
  - Identical
  - 1 Fertilized Egg
  - 100% of Genes in Common
- Dizygotic (DZ) Twins
  - Fraternal
  - 2 Fertilized Eggs
  - 50% of Genes in Common
- If a Trait is Inherited
  - Similarity: MZ > DZ

Diane Arbus, *Identical Twins* (1967)

Jenna and Barbara Bush

Measuring Similarity in Personality

- Personality Questionnaires
  - Assess Individual Differences in Traits
- Similarity Measured by Correlation
  - Strength, Direction of Relationship
    - Concordance Rate
      - % Sharing a Trait
- If a Trait is Wholly Inherited
  - MZ twins, *r* = 1.00 (Concordance = 100%)
  - DZ twins, *r* = 0.50 (Concordance = 50%)
  - Unrelated Individuals, *r* = 0.00 (Concordance = 0%)

Example Correlation:
60-Point Scale of Extraversion

Twin Pair	Twin A	Twin B
1	20	18
2	24	25
3	27	26
4	33	35
5	39	40
6	44	42
7	48	45
8	52	50
9	53	55
10	58	57

***r* = .99**

Twin Study: The "Big Five" Personality Traits

Loehlin (1992)

Trait	*MZ*	*DZ*
Neuroticism	.48	.28
Extraversion	.48	.24
Agreeableness	.46	.28
Conscientiousness	.45	.28
Openness	.51	.28

Implications of Twin Studies

- MZ Twins More Alike Than DZ Twins
  - *Prima Facie* Evidence for Genetic Contribution
- But MZ Twins Also Share Environment
  - Arguably More Alike than For DZ Twins
    - Same Sex, Physical Resemblance

How Do We Tease Apart
Genetic and Environmental Contributions
to Personality?

Components of Environmental Variance in Personality

Shared Environment

Between-Family Variance

What Siblings Have in Common

- Family
- Race, Ethnicity, Culture
- Neighborhood
- School
- Church

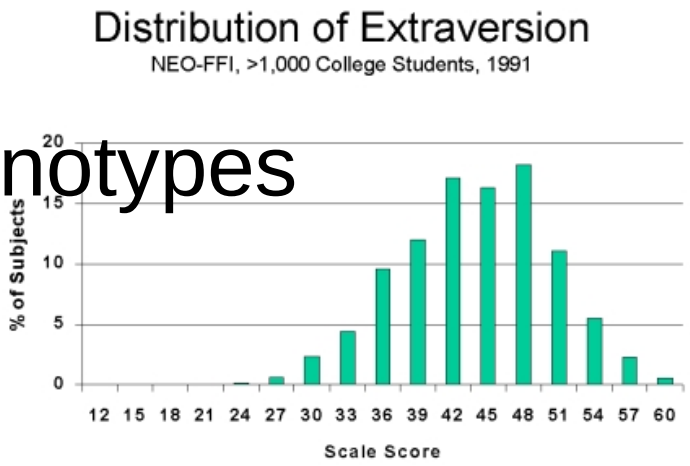
Nonshared Environment

Within-Family Variance

Siblings' Unique Experiences

- Birth Order
- Gender
- Sibling Interaction
- Parental Interaction
- Extrafamilial Networks
- Nonsystematic Factors

Components of Population Variance



- Total Variance in Phenotypes
  - The "Bell Curve"
- Genetic Variance
  - Individual Differences in Genotypes
- Environmental Variance
  - Individual Differences in Environments
  - Shared vs. Non-Shared

30

$$T = G + E$$

$$T = G + E_S + E_{NS}$$

Calculating Components of Population Variance

$T = G + E$

$G = 2 * (MZ - DZ)$

$E = E_S + E_{NS}$

$E_{NS} = 1 - MZ$

$E_S = 1 - G - E_{NS}$

T = Total Variance

G = Genetic Variance

E = Environmental Variance

E_{NS} = Variance due to the *Nonshared* Environment

E_S = Variance due to the *Shared* Environment

Genetic and Environmental Contributions to Variance

MZ = 1.00 **DZ = 0.50**

$T = G + E$

$E = E_S + E_{NS}$

$G = 2 * (MZ - DZ)$

$G = 2 * (1.00 - 0.50)$

$G = 2 * (0.50)$

$G = 1.00$

$E_{NS} = 1 - MZ$

$E_{NS} = 1 - 1.00$

$E_{NS} = 0.00$

$E_S = 1 - G - E_{NS}$

$E_S = 1 - 1.00 - 0.00$

$E_S = 0.00$

Genetic and Environmental Contributions to Variance

MZ = 0.50 **DZ = 0.40**

$T = G + E$

$E = E_S + E_{NS}$

$G = 2 * (MZ - DZ)$

$G = 2 * (0.50 - 0.40)$

$G = 2 * (0.10)$

$G = 0.20$

$E_{NS} = 1 - MZ$

$E_{NS} = 1 - 0.50$

$E_{NS} = 0.50$

$E_S = 1 - G - E_{NS}$

$E_S = 1 - 0.20 - 0.50$

$E_S = 0.30$

Genetic and Environmental Contributions to Variance

MZ = 0.80 **DZ = 0.70**

$T = G + E$

$E = E_S + E_{NS}$

$G = 2 * (MZ - DZ)$

$G = 2 * (0.80 - 0.70)$

$G = 2 * (0.10)$

$G = 0.20$

$E_{NS} = 1 - MZ$

$E_{NS} = 1 - 0.80$

$E_{NS} = 0.20$

$E_S = 1 - G - E_{NS}$

$E_S = 1 - 0.20 - 0.20$

$E_S = 0.60$

Genetic and Environmental Contributions to Variance

MZ = 0.50 **DZ = 0.25**

$T = G + E$

$E = E_S + E_{NS}$

$G = 2 * (MZ - DZ)$

$G = 2 * (0.50 - 0.25)$

$G = 2 * (0.25)$

$G = 0.50$

$E_{NS} = 1 - MZ$

$E_{NS} = 1 - 0.50$

$E_{NS} = 0.50$

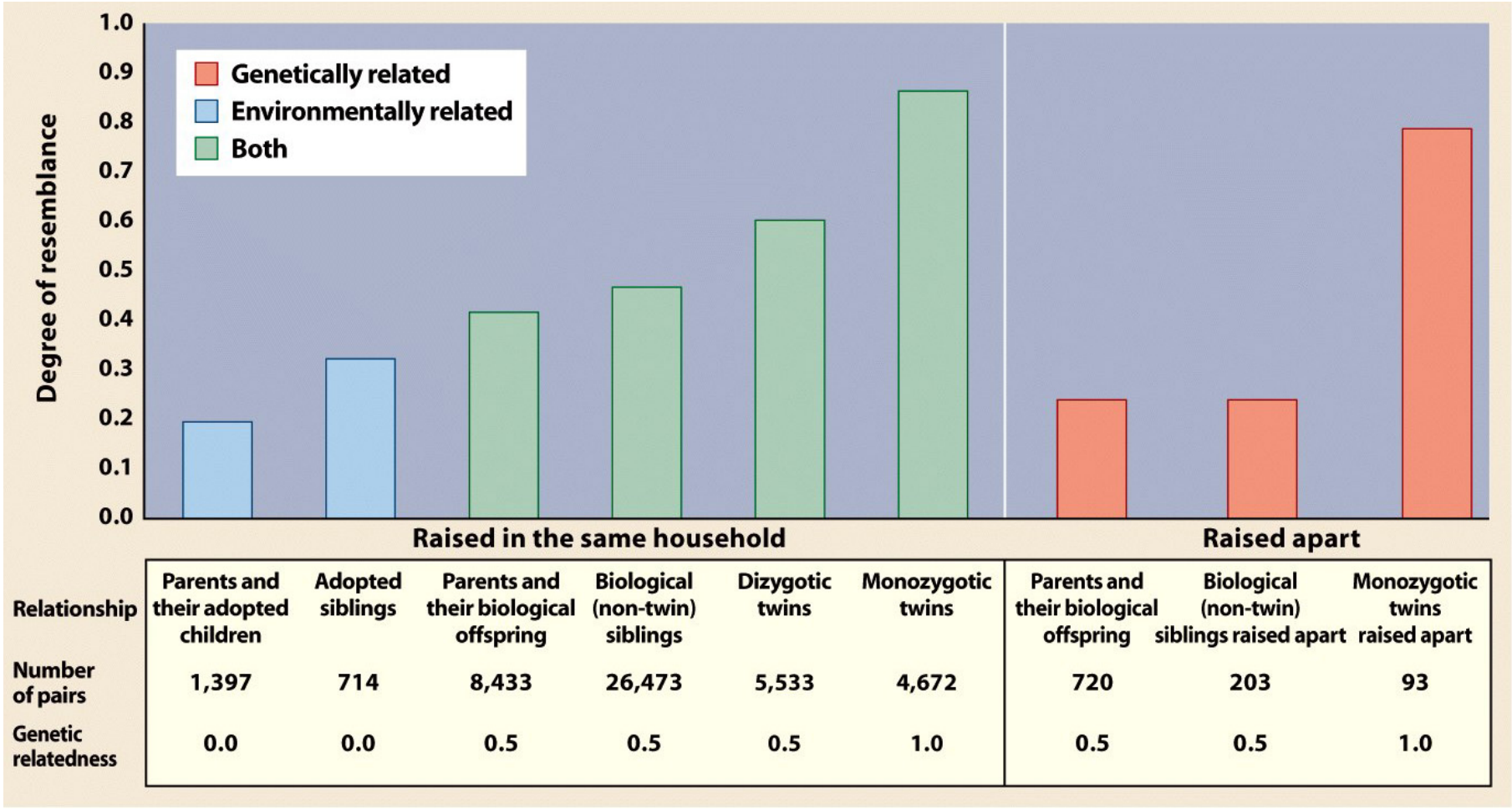
$E_S = 1 - G - E_{NS}$

$E_S = 1 - 0.50 - 0.50$

$E_S = 0.00$

Family Studies of IQ

Summary from Gleitman 7e



Relationship	Parents and their adopted children	Adopted siblings	Parents and their biological offspring	Biological (non-twin) siblings	Dizygotic twins	Monozygotic twins	Parents and their biological offspring	Biological (non-twin) siblings raised apart	Monozygotic twins raised apart
Number of pairs	1,397	714	8,433	26,473	5,533	4,672	720	203	93
Genetic relatedness	0.0	0.0	0.5	0.5	0.5	1.0	0.5	0.5	1.0

Genetic and Environmental Contributions to Variance in IQ

MZ = 0.86 **DZ = 0.60**

$T = G + E$

$E = E_S + E_{NS}$

$G = 2 * (MZ - DZ)$

$G = 2 * (0.86 - 0.60)$

$G = 2 * (0.26)$

$G = 0.52$

$E_{NS} = 1 - MZ$

$E_{NS} = 1 - 0.86$

$E_{NS} = 0.14$

$E_S = 1 - G - E_{NS}$

$E_S = 1 - 0.52 - 0.14$

$E_S = 0.34$

Genetic and Environmental Contributions to Variance in Education

MZ = 0.86 **DZ = 0.66**

$T = G + E$

$E = E_S + E_{NS}$

$G = 2 * (MZ - DZ)$

$G = 2 * (0.86 - 0.66)$

$G = 2 * (0.20)$

$G = 0.40$

$E_{NS} = 1 - MZ$

$E_{NS} = 1 - 0.86$

$E_{NS} = 0.14$

$E_S = 1 - G - E_{NS}$

$E_S = 1 - 0.40 - 0.14$

$E_S = 0.46$

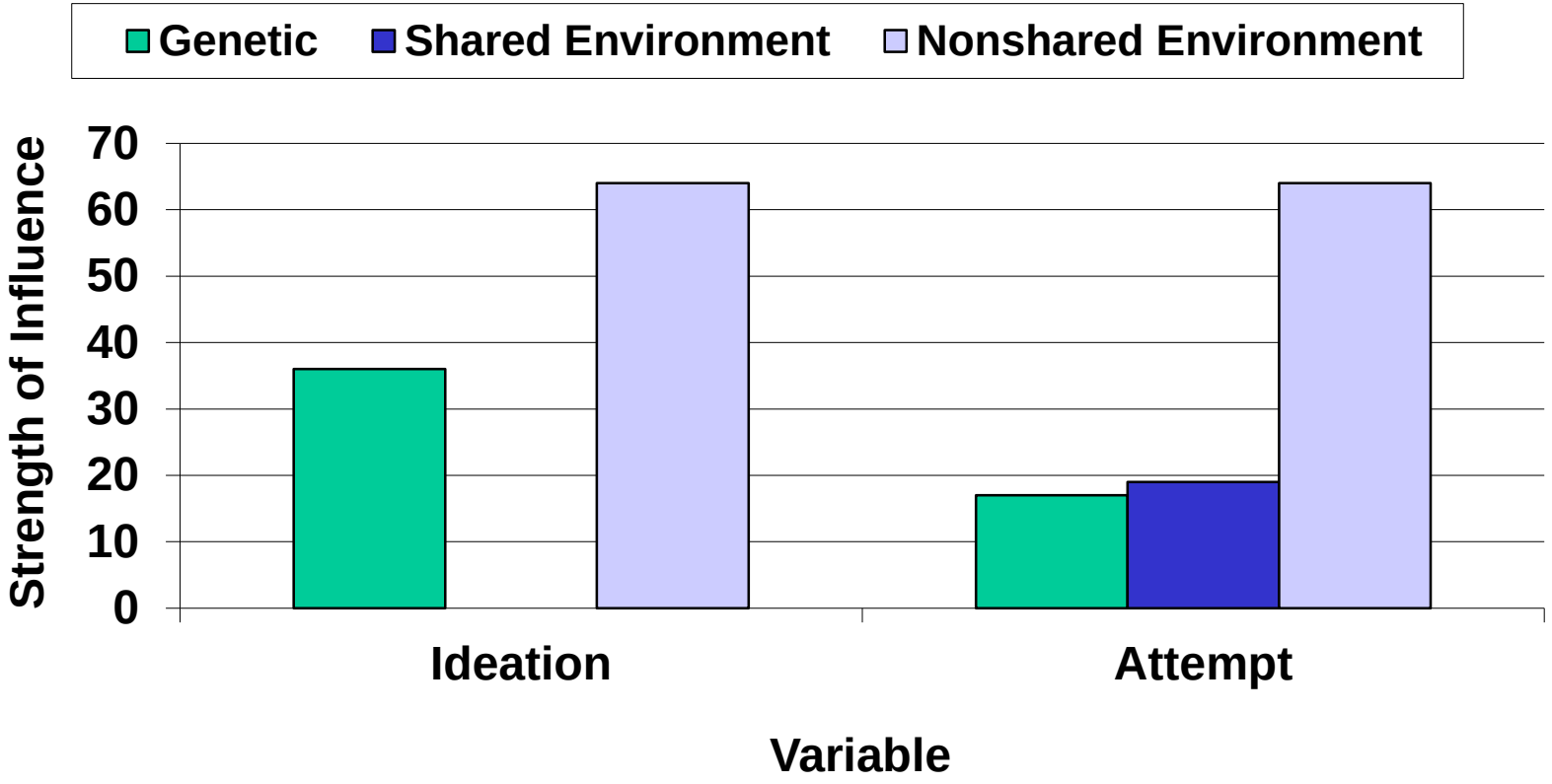
Components of Variance in Adolescent and Young Adult Behavior

Harden et al. (2007)

Trait	*G*	E_S	E_{NS}
Age of Sexual Debut	.31	.10	**.59**

Genetic and Environmental Influences on Suicide

Fu et al. (2002)



Twin Study:
The “Big Five” Personality Traits

Loehlin (1992)

Trait	*MZ*	*DZ*
Extraversion	.48	.24
Neuroticism	.48	.28
Agreeableness	.46	.28
Conscientiousness	.45	.28
Openness	.51	.28

Genetic and Environmental Components of Extraversion

MZ = 0.48 **DZ = 0.24**

$T = G + E$

$E = E_S + E_{NS}$

$G = 2 * (MZ - DZ)$

$G = 2 * (0.48 - 0.24)$

$G = 2 * (0.24)$

$G = 0.48$

$E_{NS} = 1 - MZ$

$E_{NS} = 1 - 0.48$

$E_{NS} = 0.52$

$E_S = 1 - G - E_{NS}$

$E_S = 1 - 0.48 - 0.52$

$E_S = 0.00$

Components of Variance in the "Big Five" Personality Traits

Loehlin (1992)

Trait	*G*	E_S	E_{NS}
Neuroticism	.40	.08	**.52**
Extraversion	.49	.02	**.51**
Agreeableness	.35	.11	**.54**
Conscientiousness	.38	.07	**.55**
Openness	.45	.06	**.49**

Genetic and Environmental Contributions to Political Attitudes

Alford et al. (2005)

- Virginia 30K Twin Study
  - c. 29,080 subjects and 1st-degree relatives
    - 2,648 MZ Twins; 1,748 DZ twins
- Wilson-Patterson Attitude Inventory
  - Endorse Socio-Political Issues
    - School Prayer, Property Tax, Busing, Abortion
    - Agree, Disagree, Uncertain
  - 25 “Liberal”, 25 “Conservative”
  - 28 items were expressly political

Twin Study: Political Attitudes

Alford et al. (2005)

Attitude	*MZ*	*DZ*
Lib-Conserv 1	.65	.43
Lib-Conserv 2	.47	.31
“Opinionation”	.39	.20
Party Affiliation	.55	.48

Components of Variance in Political Attitudes

Alford et al. (2005)

Attitude	*G*	E_S	E_{NS}
Lib-Conserv 1	.43	.22	**.35**
Lib-Conserv 2	.32	.16	**.53**
“Opinionation”	.36	.02	**.61**
Party Affiliation	.14	.41	**.45**

Summary: Components of Variance in Traits, Attitudes, Behaviors

- Significant Genetic Component
  - Even in Attitudes!
- Nonshared Environment Dominates the Shared Environment
- Nonshared Environment Matches the Genetic Component

Group Socialization

Harris (1995, 1998, 2006)

- Socialization is Context-Specific
  - Within vs. Outside Home
    - Different Extrafamilial Contexts
- "Code Switching" in Bilinguals, Biculturals
  - Minority Children "Acting White"
- Peer Groups, Peer Cultures
  - The Case of Food Preferences

"It's broccoli, dear."
"I say it's spinach, and I say the hell with it."

Academic Motivation

Kindermann (1993)

- Cliques in 4th and 5th grade
  - "Brains" vs. "Slackers"
- Instability in Clique Membership
- Children's Attitudes Changed ***After*** They Changed Cliques
  - IQ Remained Constant
  - Parental Influence Remained Constant

Behavior-Genetic Analysis of Adolescent Behavior

Rowe (1992)

- Parents Who Smoke Tend to Have Children Who Smoke-- **G**, not $\mathbf{E_S}$
- Adolescents Who Smoke Tend to Have Peers Who Smoke -- $\mathbf{E_{NS}}$

Drinking

Delinquency

Sex, Pregnancy