Other domains of personality research

- Evolutionary perspectives and individual differences
- Behavior Genetics of Personality
- Personality and Intelligence
- Longitudinal studies of personality consistency
  - Block et al.
  - Caspi et al.
- Cognitive Affective Personality Systems
- Affective Dynamics

Personality, Individual Differences and Evolutionary Psychology

- Evolutionary Psychological Theory
  - Barkow, Cosmides, and Tooby (1992) The Adapted Mind
  - Species typical behavior
    - Adaptations that are important for survival and reproduction will be selected for over time
    - Why are there individual differences
      - Nettle (2005, 2006)

5 broad classes of competition

- Between species
- Within species
  - Intrasexual competition for survival and reproduction
  - Intersexual competition
  - Parent offspring competition
  - Sibling competition

Competition-1: Between species

Competition and co-evolution: the “Red Queen hypothesis” Van Valen, 1973

need to run fast just to stay in place

Is co-evolution the genesis of sexual reproduction?

Why do we sexually reproduce -- wastes 50% of our genes

Random reassortment protects from parasites?

Are individual differences merely a defense against parasitic load?

Competition-2: Within species

- Intra-sexual competition for survival and reproduction
  - Niche selection
  - Multiple strategies lead to locally optimal solutions
  - Nettle (2005, 2006) discusses costs and benefits that lead to balanced selection
    - Extraversion leads to higher reproduction but at cost of increased mortality risk

Competition 3: within species

- Inter-sexual competition
  - Resource investment model (e.g., Buss)
    - Materity certainty and high resource cost
    - Paternity uncertainty and low resource cost
  - But reproductive success is not number of children, but number of surviving descendants

Competition-4: Within species

- Parent - offspring competition for resources
  - Offspring share 50% of parent's genes.
  - Reproductive value of offspring to parent varies as situational stress and probability of offspring reproduction
  - Parent - step child conflict - Cinderella
    - Daly, M. & Wilson M. 1996. Homicidal Tendencies. *Demos*, Dec. 8, 1996, p. 39-45.

Competition -5: within species

- Sibling competition (see F. Sulloway's Born to Rebel for a discussion of the implication of birth order effects)
  - Differential reproductive fitness (as a child) as a function of birth order leads to
  - Multiple strategies varying by birth order
    - First borns -- higher conscientiousness
    - Later borns higher openness
  - (but see also Harris for an analysis of the effects of peer groups)
    - Peer groups as collection of unexplained variance?

Behavior Genetics and inheritance of individual differences

- Until recently, little emphasis upon genetic mechanisms per se, but rather on proportions of variance explained through genetic relationship
- Not much (until recently) recognition of distinction between structural versus regulatory genes

Behavior genetics

- Experimental studies
  - Rats and selective breeding
    - Maze bright versus maze dull
    - Reactive versus non-reactive
  - Drosophila and selective breeding
    - Positive and negative geotaxis
    - Positive and negative phototaxis
    - Genes for clock timing
  - Dog breeding for 10,000 years

Simple genetic models

- Single gene models - classic Mendelian genetics
  - (One Gene, One Disease)
    Multiple alleles
  - Additive genetic variance
  - Non-additive (dominance/recessive) variance
  - Epistasis - interaction with other genes

Simple genetic models: selection for fitness

- Small variation in reproductive fitness leads to selection pressure to eliminate less fit allele
- Non additivity (dominance/recessive) makes it harder to select out or fixate.
- Balanced polymorphism has selective advantage for heterozygous rather than homozygous. (e.g., sickle cell, G6PD as defenses against malaria)
- Mutation rate of ≈ .0001 => 3/generation

Polygenetic models

- Polygenes as sum of separate genes
  - Biometric analysis rather than conventional Mendelian analysis
  - Polygenetic traits assumed to be the case for complex behaviors
- Work now starting with genes of interest and looking for behavioral differences

The concept of heritability - sources of variance

- Decomposition of phenotypic variance
  - V_p = Phenotypic variance
  - V_g = Additive genetic variance
  - V_d = Dominance (recessive) variance
  - V_i = epistatic (gene by gene interactions)
  - V_{am} = assortative mating variance
  - V_e = environmental variance
    - V_{es} = shared environmental - (variance between families)
    - V_e = non-shared enviromental (variance within families)
  - Cov (genetic by environment covariance)
  - V_{eg} (genetic by enviroment interaction)
  - V_{error} = variance due to poor measurement

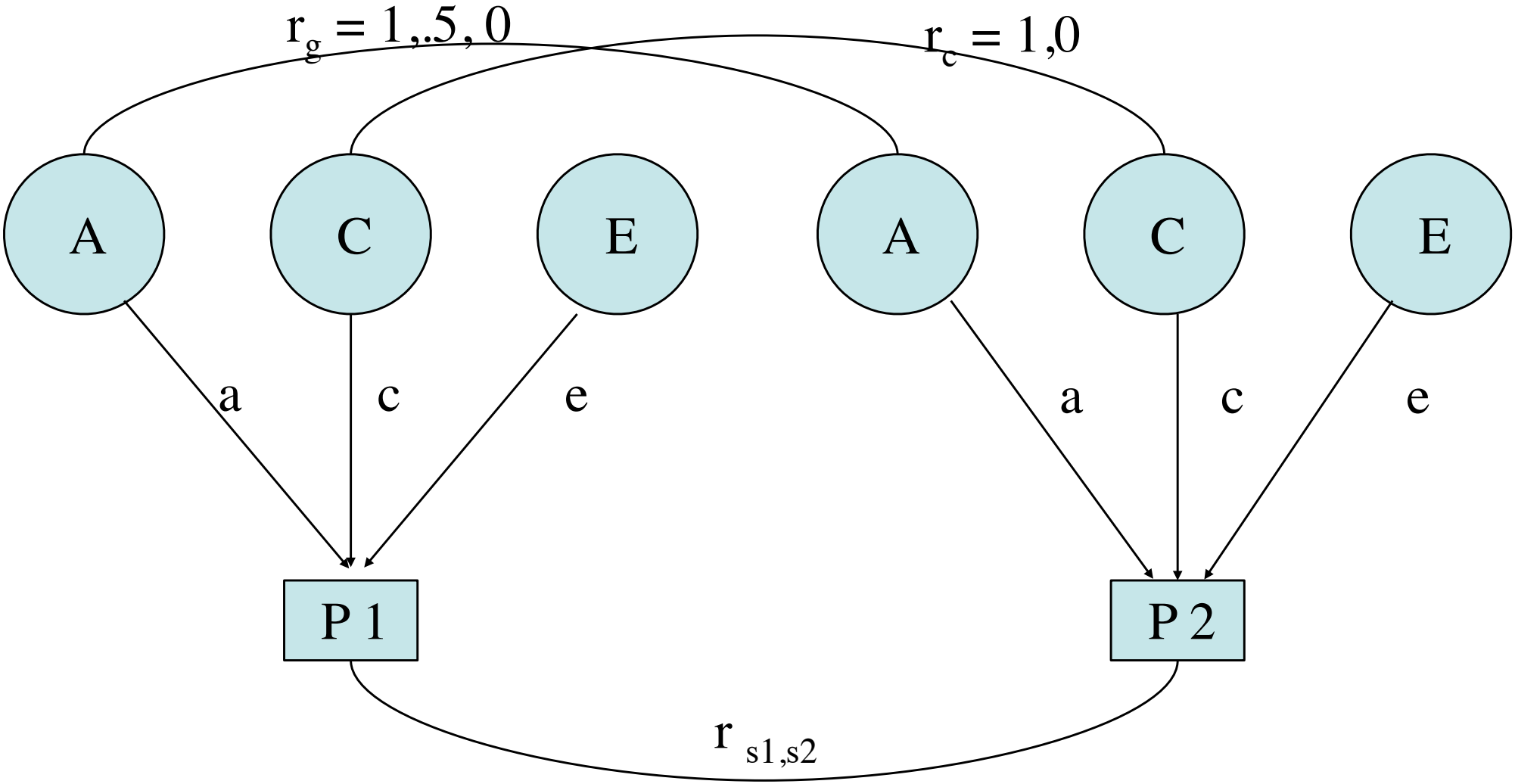
Heritability: a hodgepodge ratio

- $h^2 = V_g / V_p$ narrow heritability
- $h^2 = (V_g + V_d + V_i \ldots)/V_p$ Broad heritability
- Both estimates are dependent upon variance as observed and imply nothing about what would happen if situations change
  - Consider the case of height or CHD
    - Highly heritable but large environmental effects
    - CHD rates double for Japanese living in US
    - Height has gone up even though highly heritable

Estimating heritability

- Twins: Experiments of nature
  - MZa: identical genes,
  - DZ: 50% (on average) genetic relationship
- Family composition: experiments of humans
  - MZa: identical genes, no shared environment
  - DZa: 50% shared genes, no shared environment
  - MZt: identical genes, shared family environment
  - DZt: 50% shared genes, shared family environment
  - Adopted: 0% shared genes, shared family environment

Estimating the Genetics of Personality



A = additive genetic variance
C = Common family environment
E = Unique environment

r_g = 1 for MZ, .5 for DZ, sibs

r_c = 1 for together, 0 apart

Personality and Genetics

Trait	Narrow heritability	Broad heritability	Shared Environment
Extraversion	0.36	0.49	0
Neuroticism	0.28	0.39	0.09
Agreeableness	0.28	0.38	0.04
Conscientiousness	0.31	0.41	0.05
Openness	0.46	0.45	0.05
IQ	0.5	0.75	0.04

McGue and Bouchard, ARN, 1998

Personality and Genetics

Occupational interest	Narrow heritability	Broad heritability[a]	Shared Environment
Realistic	0.36	0.41	0.12
Investigative	0.36	0.66	0.1
Artistic	0.39	0.5	0.12
Social	0.38	0.52	0.08
Enterprising	0.31	0.5	0.11
Conventional	0.38	0.38	0.11

McGue and Bouchard, ARN, 1998

[a] estimated from MZ apart correlation

Personality and Genetics

Psychiatric illness	Broad heritability	Shared Environment
Schizophrenia	0.8	No
Major Depression	0.37	No
Panic disorder	.30-.40	No
Generalized Anx	0.3	Small, females
Phobias	.2-.4	No
Alcoholism	.50-.60	Yes

Personality and Genetics

Social Attitudes	Broad heritability	Shared Environment
Conservatism		
Under age 20	0	Yes
Over age 20	.45-.65	Yes, females
Right Wing Auth	.50-.64	.0-.16
Religiousness (adult)	.30-.45	.2-.4
Specific religion	0	NA

Bouchard, CDPS, 2004

Heritability: misconceptions

- High heritability => Constancy: but
  - Heritability changes by changing the environment
    - $h^2 = V_g / V_p = V_g / (V_g + V_e)$
  - Reducing environmental variation increases the heritability
    - Herrnstein's paradox: higher heritabilities imply more equal environments
    - Low heritability => high environmental inequality

Heritability: misconceptions - 2

- Heredity vs. environment
  - Genes code proteins, not behavior
  - Genes act through environment
  - As meaningless as asking “Which is more important in area of a rectangle: height or width?”
  - Environment affects gene expression
- Individuals versus populations
  - Variance estimates are population based, not for individual
  - Variations in environments affect estimates

Heritability and group differences

- Does within group heritability imply between group heritability?
- Consider the case of height
  - Within group differences are highly heritable
  - h^2 of roughly .8-.9
  - almost no known genes
  - Dutch have become taller over past 50 years
  - North-South Korean differences of 6 inches

Heritability and environment example of Phenylketonuria

- PKU as inability to process phenylalanine
  - PKU is a Mendelian recessive gene
  - Effect without environmental manipulation is severe brain retardation
  - Phenylalanine diet stops the effect
  - With proper diet, no effects (but girls are still carriers of PKU gene and their fetus is at risk if mother is not on PKU diet)

Cognitive and non-cognitive aspects of personality

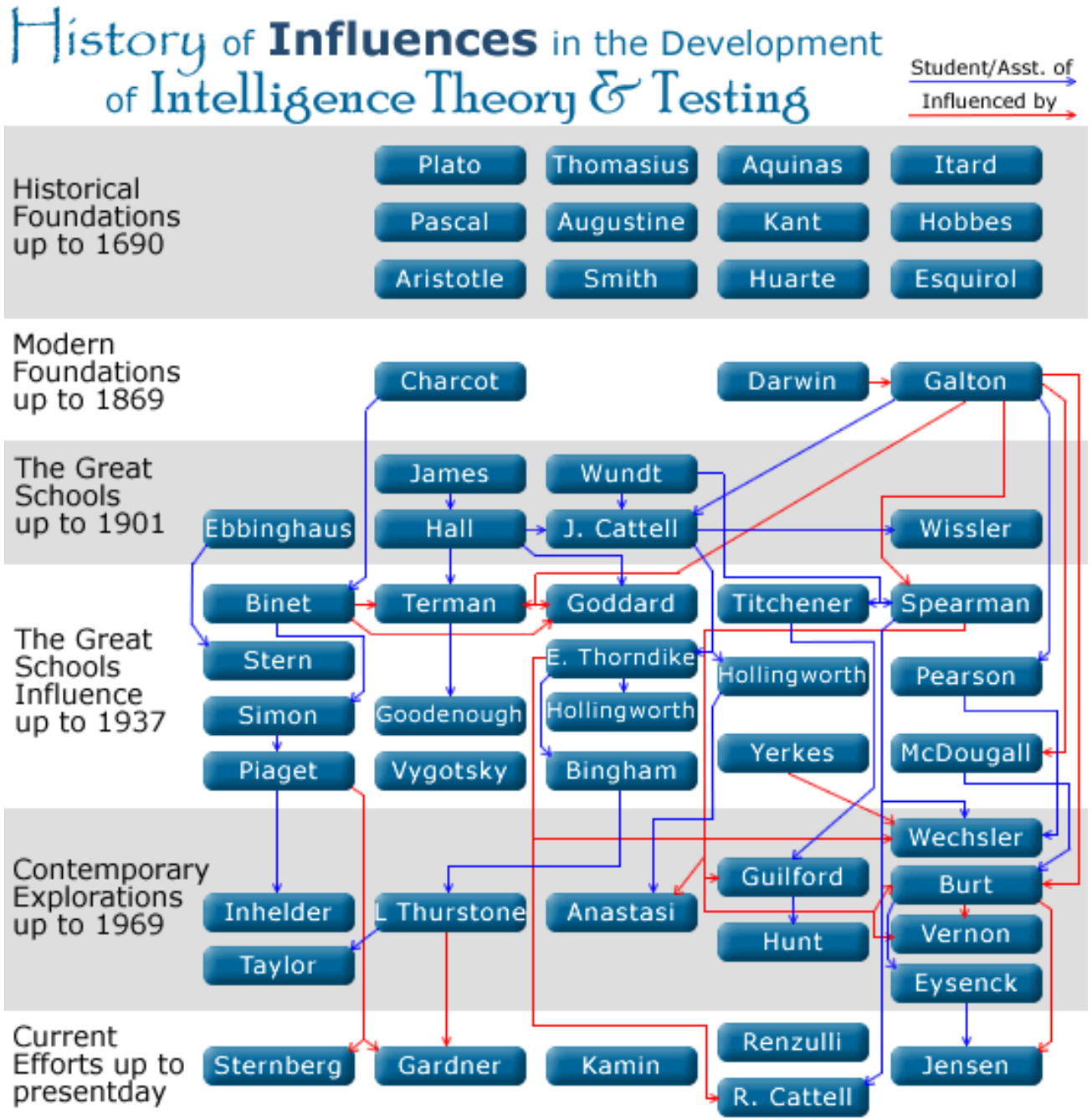
- Traditional personality variables are central tendencies of behavior: what do you like to do, how do you normally feel
- Cognitive Ability measures are limit measures: how much can you do, what are the limits of performance

Studies of Cognitive Skill

- Individual Differences approach to the study of intelligence
- Experimental/Cognitive Psychology approach to the study of task components

Cognitive Ability and Cognitive Psychology

- Ability studies emphasize individual differences and shared variance between divergent tests
  - Little emphasis upon cognitive processes
- Traditional cognitive psychology emphasizes development of processes and distinctions between processes
  - Little emphasis upon individual differences

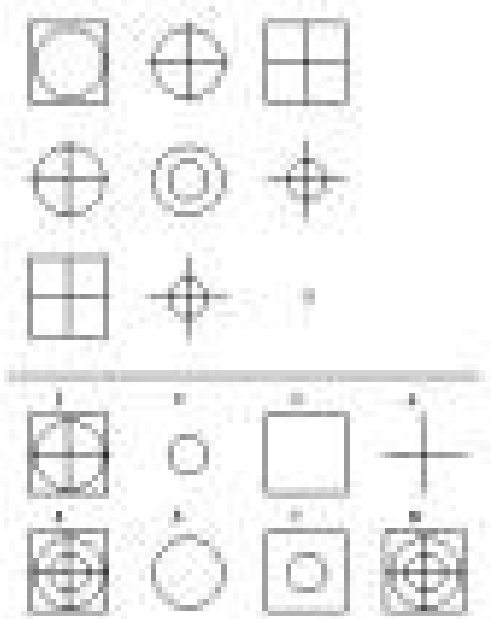


http://www.indiana.edu/~intell/map.shtml

Conventional measures of ability

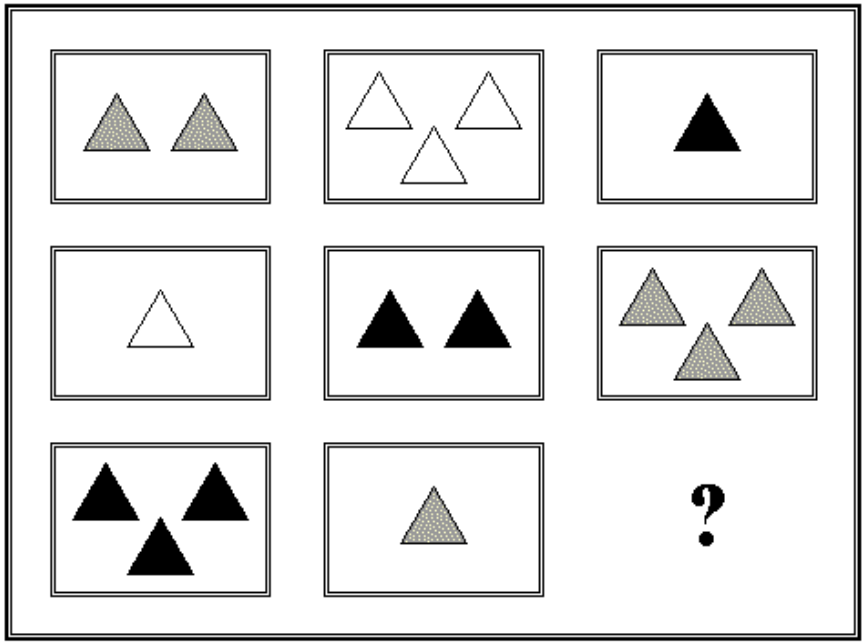
- Wechsler Adult Intelligence Scales
  - Verbal and Performance subscales
- Raven's Progressive Matrices
  abstract reasoning (culture fair?)
- SAT/ACT
  - How much has been learned in 12 years of schooling
  - Vocabulary/quantitative skills

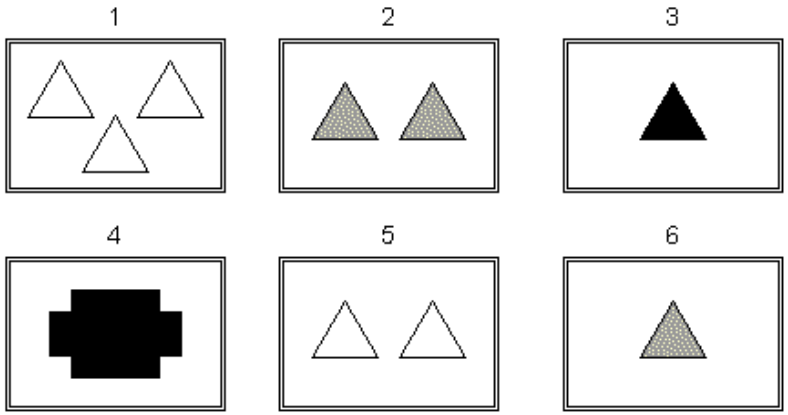
Raven's Progressive Matrices
Which one best completes the form?



Item similar to Raven's

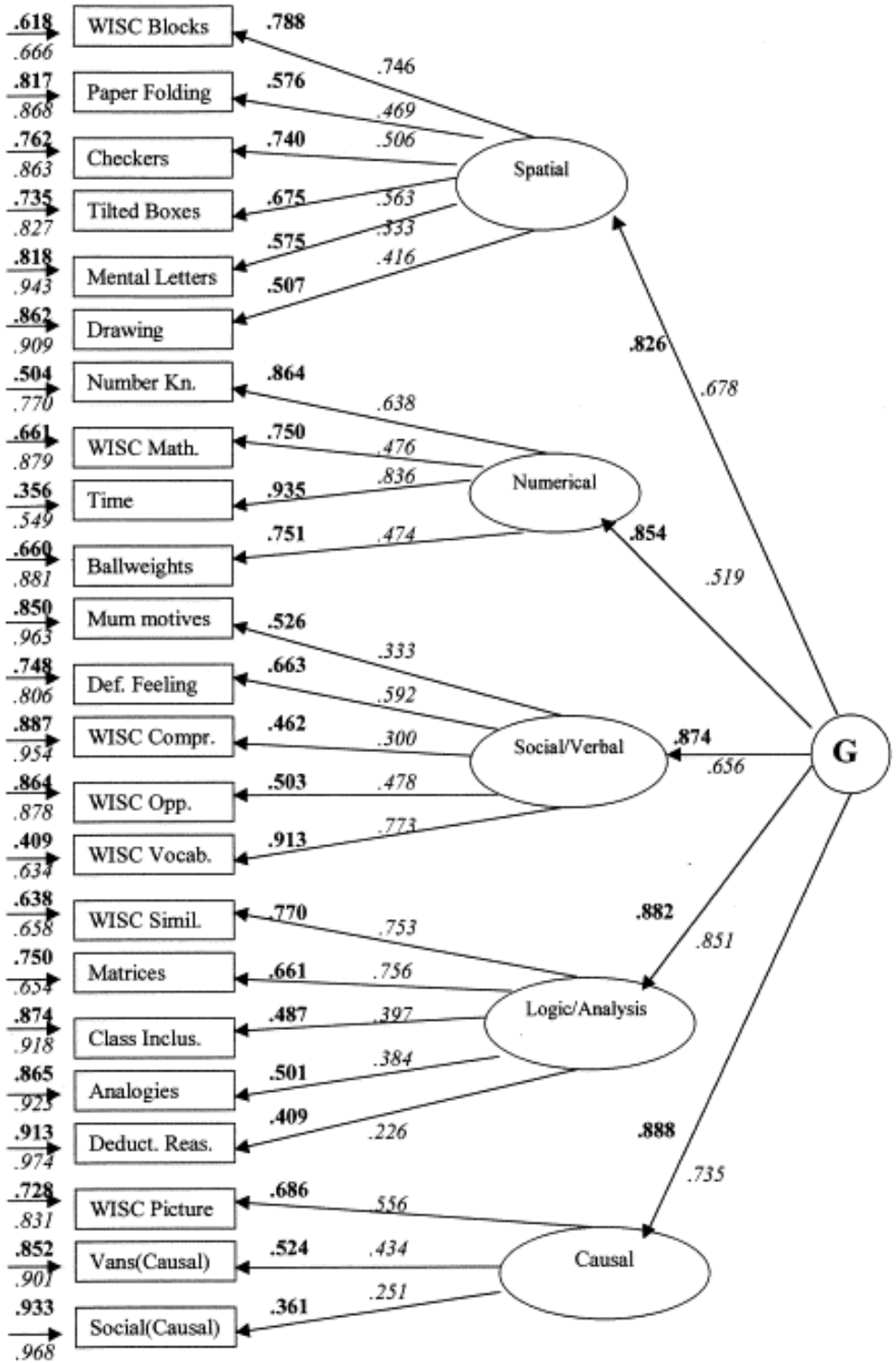
Which answer fits in the missing space to complete the pattern?





Wechsler Intelligence Test

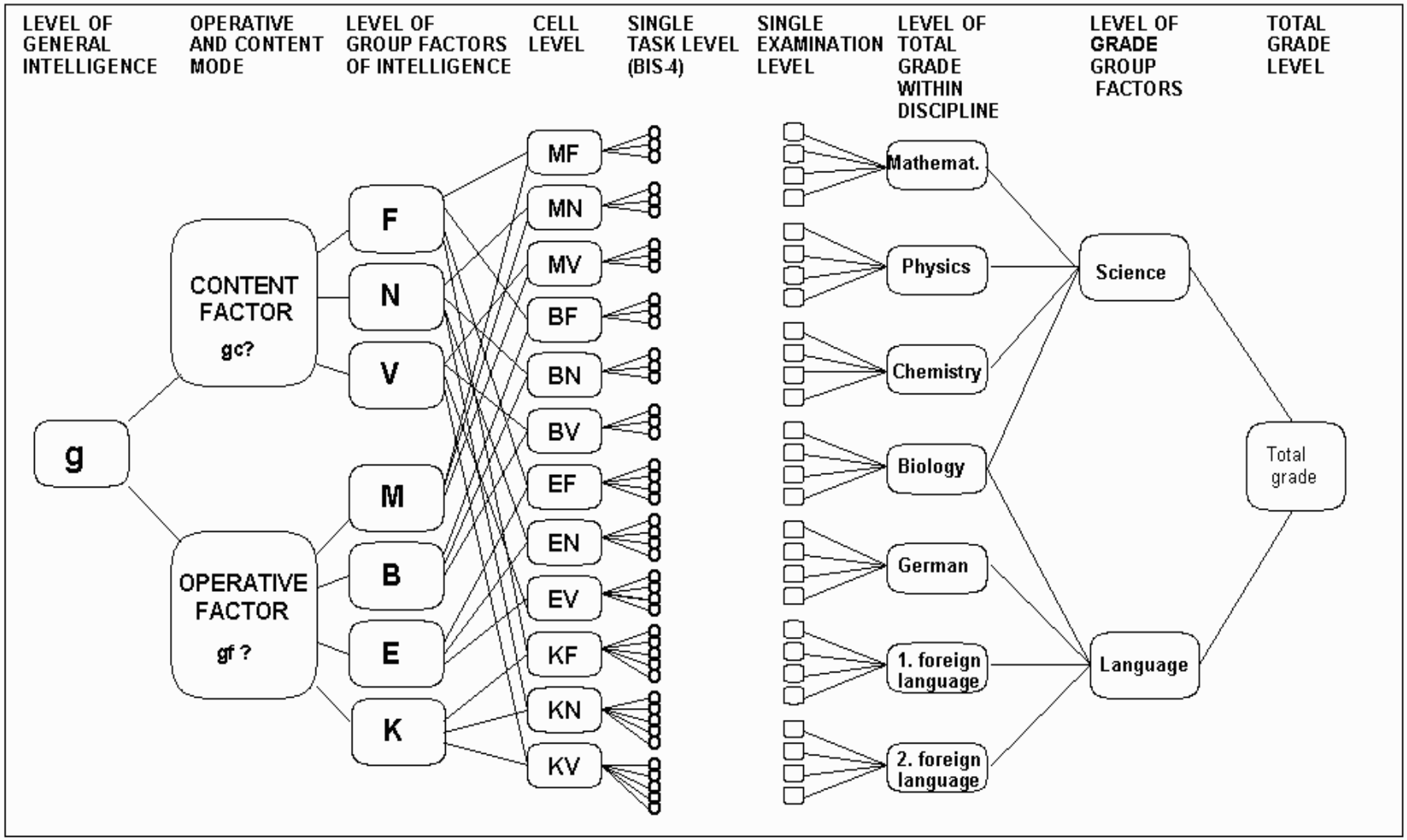
- **Verbal scales:**
  - Information
  - Comprehension:
  - Digit Span
  - Similarities
  - Vocabulary
  - Arithmetic
- **Performance Scales**
  - Object Assembly
  - Block Design
  - Digit Symbol/Coding
  - Picture Arrangement
  - Picture Concepts
  - Picture Completion


.618
.666
WISC Blocks
.817
.868
Paper Folding
.762
.863
Checkers
.735
.827
Tilted Boxes
.818
.943
Mental Letters
.862
.909
Drawing
.504
.770
Number Kn.
.661
.879
WISC Math.
.356
.549
Time
.660
.881
Ballweights
.850
.963
Mum motives
.748
.806
Def. Feeling
.887
.954
WISC Compr.
.864
.878
WISC Opp.
.409
.634
WISC Vocab.
.638
.658
WISC Simil.
.750
.654
Matrices
.874
.918
Class Inclus.
.865
.925
Analogies
.913
.974
Deduct. Reas.
.728
.831
WISC Picture
.852
.901
Vans(Causal)
.933
.968
Social(Causal)
.788
.576
.740
.675
.575
.507
.746
.469
.506
.563
.333
.416
Spatial
.864
.750
.935
.751
.638
.476
.836
.474
Numerical
.526
.663
.462
.503
.913
.333
.592
.300
.478
.773
Social/Verbal
.770
.661
.487
.501
.409
.753
.756
.397
.384
.226
Logic/Analysis
.686
.524
.361
.556
.434
.251
Causal
.826
.678
.854
.519
.874
.656
G
.882
.851
.888
.735

Standard hierarchical model of ability Carroll-Horn-Cattell

- g (general intelligence)
  - Gc (crystallized intelligence)
    - Domain specific
    - Increases over much of life span
  - Gf (fluid intelligence)
    - General processing speed and flexibility
    - Peaks around 20-25

Fig. 9: **Hierarchical version of the Berlin model of intelligence and a grade hierarchy model**

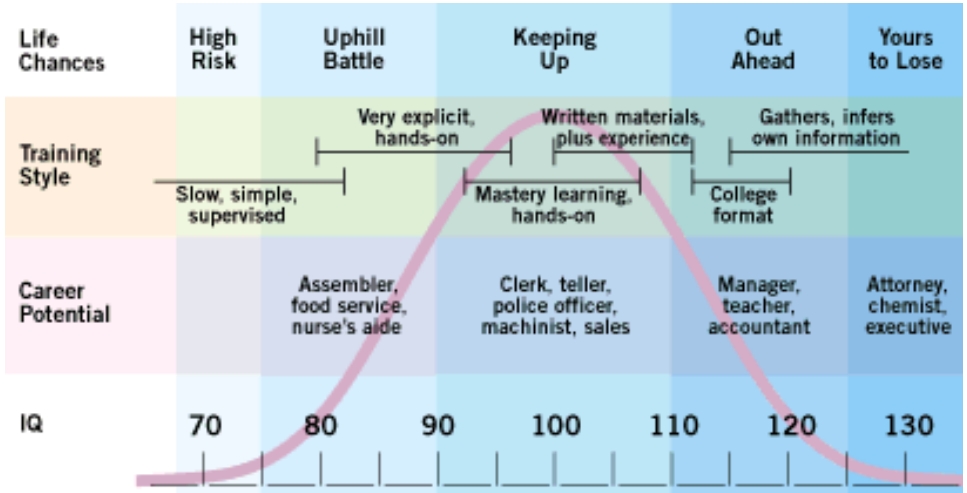


K: Processing capacity for complex information, i.e. reasoning
E: Creativity
B: Speed on relatively simple tasks
M: Memory, i.e. storage capacity for information

F: figural Intelligence
N: numerical Intelligence
V: verbal intelligence

Life as an intelligence test

- Conventional tests are short (30 minutes to 2-3 hours) and use representative content
- Continued performance across many situations is a continuing test of ability
- Job performance
- Health maintenance
- (see L. Gottfredson's web page:
  - http://www.udel.edu/educ/gottfredson/)



	Population Percentages				
Total population distribution	5	20	50	20	5
Out of labor force more than 1 month out of year (men)	22	19	15	14	10
Unemployed more than 1 month out of year (men)	12	10	7	7	2
Divorced in 5 years	21	22	23	15	9
Had illegitimate children (women)	32	17	8	4	2
Lives in poverty	30	16	6	3	2
Ever incarcerated (men)	7	7	3	1	0
Chronic welfare recipient (mothers)	31	17	8	2	0
High school dropout	55	35	6	0.4	0

Gottfredson, Scientific American

Life as a intelligence test (adapted from Gottfredson, 2002)

Relative risk (odds ratio) of this outcome for "dull" (IQ 75-90) vs. "bright" (IQ 110-125) persons: Young white adults	
High school dropout	133.9
Chronic welfare recipient (female)	10
Ever incarcerated (male)	7.5
Lives in poverty	6.2
Had illegitimate child (women)	4.9
Unemployed 1+ mo/yr (male)	1.5
Out of labor force 1+mo/yr (male)	1.4
Divorced in 5 years (ever married)	1.3

Life as an intelligence test (adapted from Gottfredson, 2002)

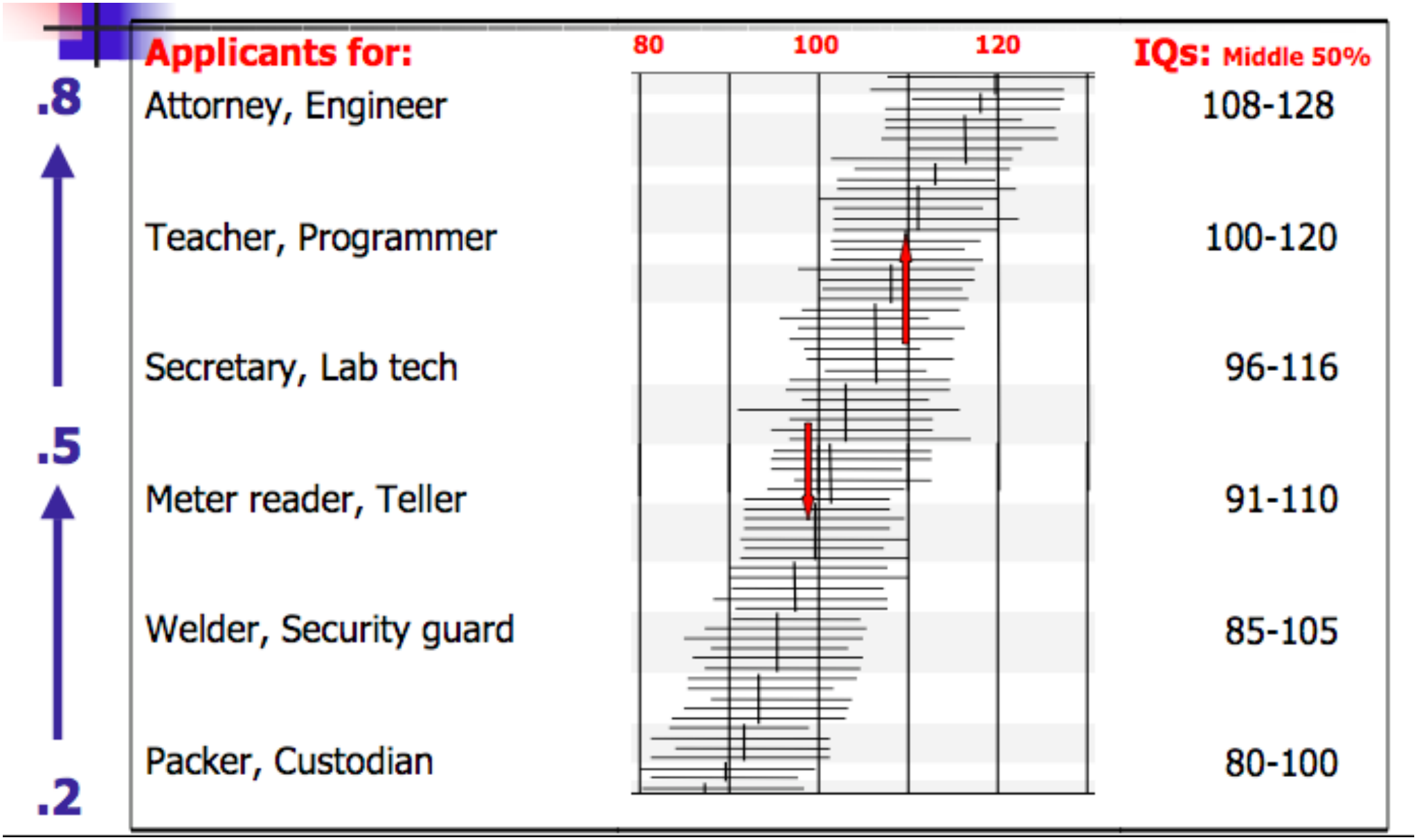
Common subtests, e.g.

- Elementary, secondary school
- Law-abiding, employed, married
- Rung on occupational & income ladders
- Daily self-maintenance (functional literacy)
- Personal health & safety

Different subtests, e.g.

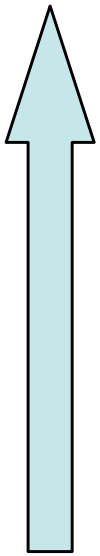
- Tertiary education & training
- Job performed
- Hobbies
- Type of civic participation

3. How Does Our Own *g* Level Affect the Life Tests We Take?

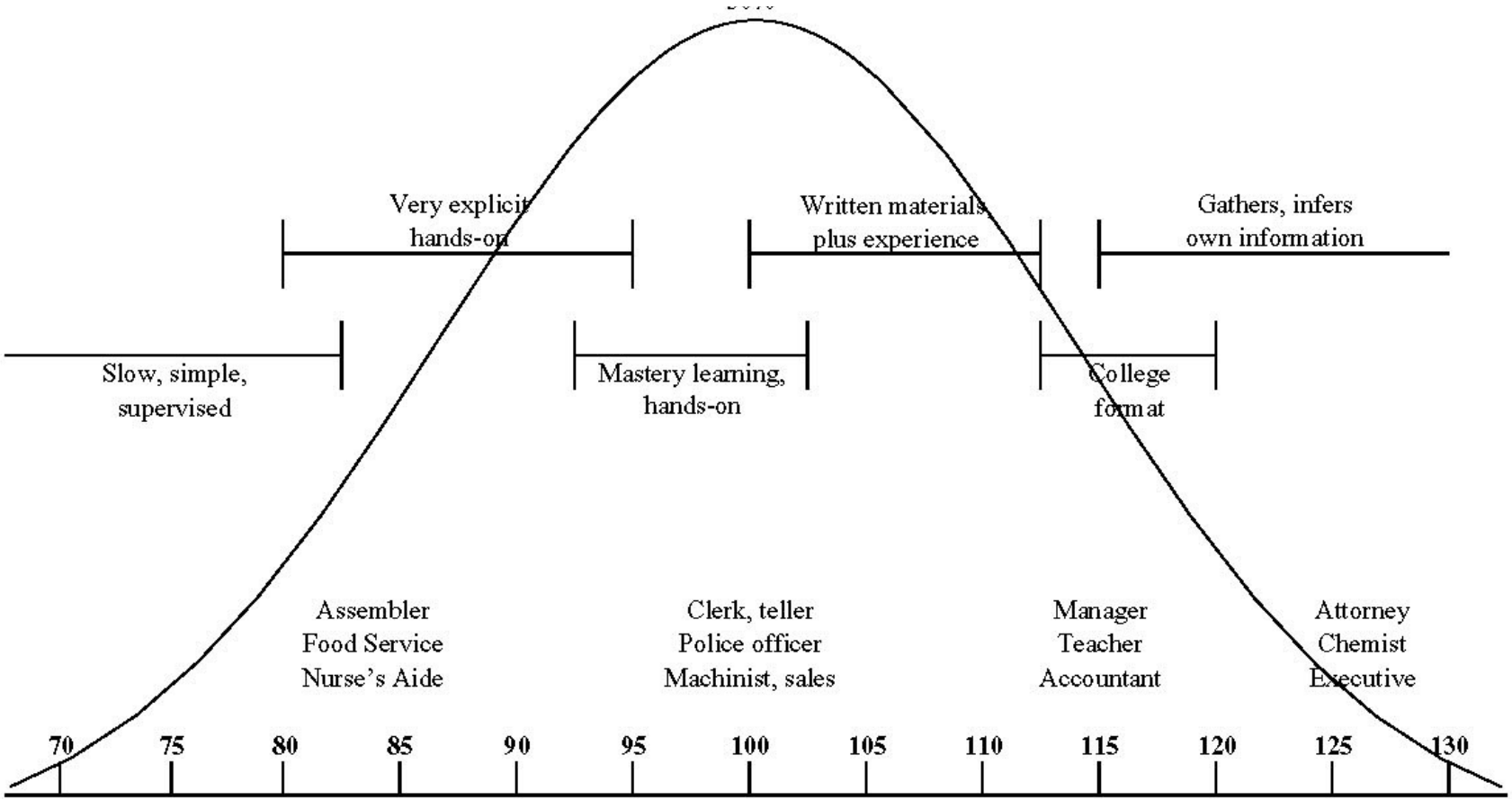


g-Related Relative Risk Varies by Kind of Outcome

Complex
Cumulative



Simple
Episodic



Intelligence: unanswered questions

- Stability and change over time within individuals and between individual
- The “Flynn Effect”
- Cultural effects
- Genetic Effects

Intelligence: long term stability and outcomes

- 3 major studies
  - Terman's study of intellectual accomplishment
    - selected group for high IQ at age 10- studied over the next 80 years
  - Deary et al. study of the intellectual stability over the life
    - sample of entire Scottish population from 1932
  - Stanley-Benbow-Lubinski study of precocious youth

Terman study of ability

- Lewis M. Terman and Melita Odem at Stanford
- Subjects selected from 1921-1922
  - grades 3-8, teacher ratings of 1st, 2nd, 3rd brightest and the youngest
  - name of brightest child from previous year
  - group test of intelligence
  - best scorers then tested with Stanford Binet
  - IQ > 140 (a few 135-140)

Terman study of ability

- Main sample was 661: 354 male, 307 female
  - selected from school population of ≈ 160,000
  - supplemental sample of ≈ 900 meeting similar criterion
- Materials
  - 12 page Home information Blank
  - 8 page school information blank
  - 1 hour medical exam
  - 37 anthropometric measurements
  - school achievement battery ...

Terman study and followups

- 1921: original data collection
- 1927-28 : the promise of youth
- later followups:
  - 1936
  - 1940
  - 1945: Accomplishments
  - 2003: Friedman -- personality predictors from age 10 of life span

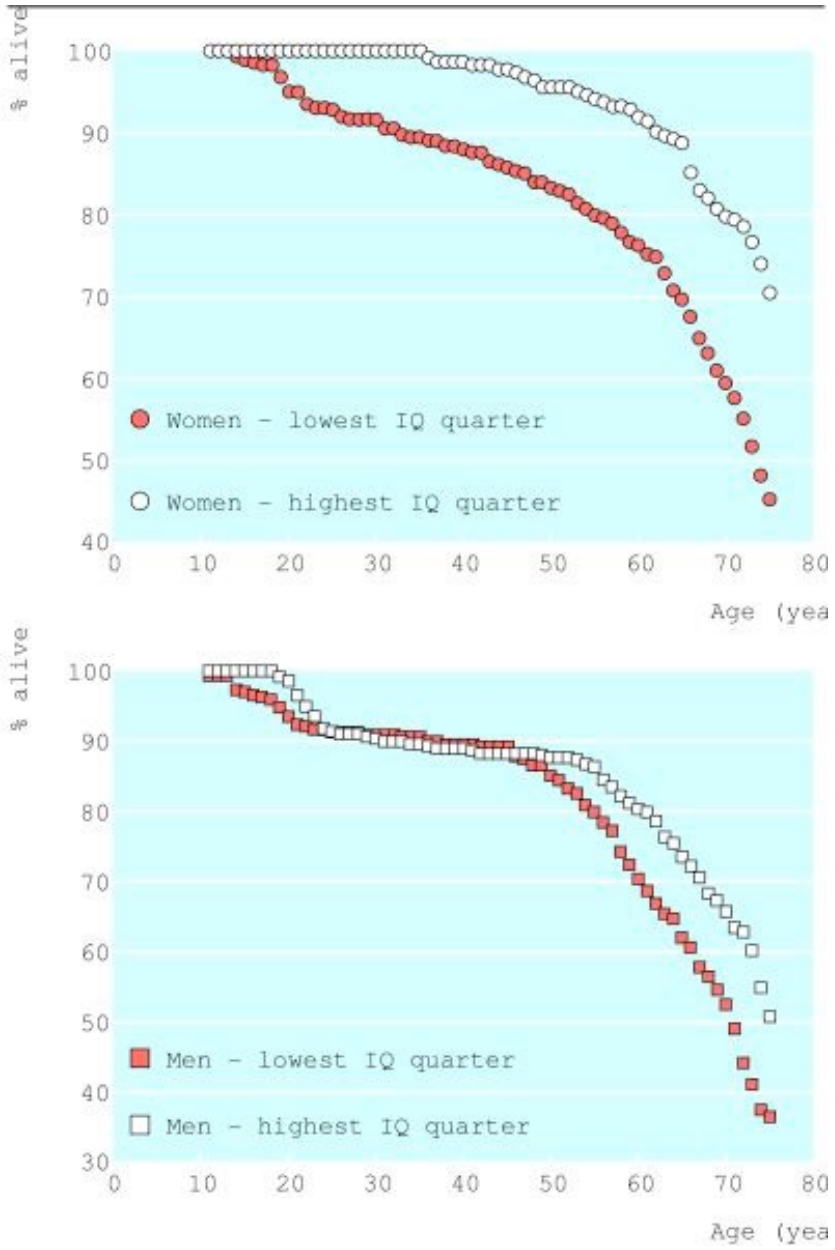
The Scottish Longitudinal Study

- June 1, 1932, all children age 11 attending school in Scotland (N=87,498) took a 45 minute IQ test (Moray House Test)
- Followup studies from Ian Deary and his colleagues (N>600) have examined mortality risk, test retest correlations, MRI scans, Alzheimer onset, etc.

Scotland Longitudinal Study

- Test retest (age 11 to age 77) r = .63, corrected for range restriction = .73
- Mean scores on Moray House Test increased from age 11 to age 77 (43 to 54, sd = 11).
- IQ at age 11 predicted relative risk of dying before 80

Intelligence and Mortality
Deary - Midlothian study



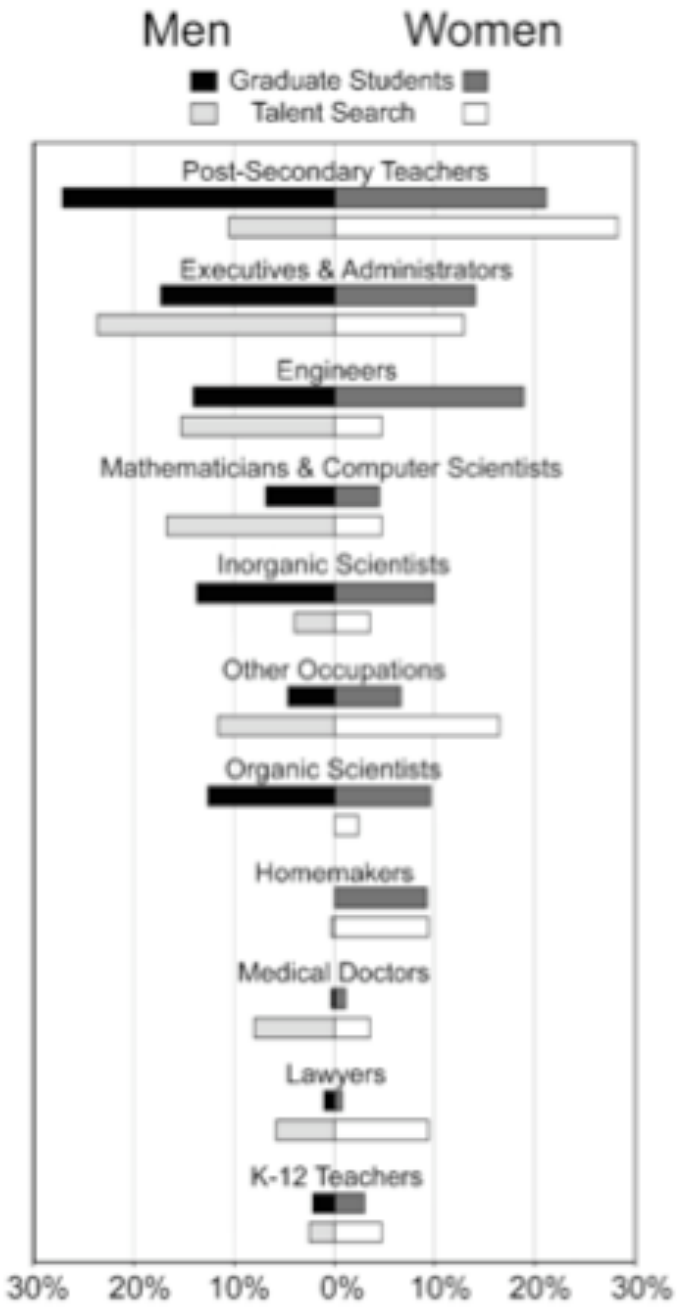
Study of Mathmatically Precocious Youth

- Originated at Johns Hopkins by Julian Stanley
- Continued by Camilla Benbow and David Lubinski (1972-2008)
- Before age 13
  - SAT M > 700
  - SAT V > 630
  - top .01%
- followup studies after 20 years

Talent search vs. top graduate students

- Grad students at top math, engineering and physical science departments in 1992

	GRE V	GRE Q	N
Male	627	750	299
Female	615	736	287


Men
Women
Graduate Students
Talent Search
Post-Secondary Teachers
Executives & Administrators
Engineers
Mathematicians & Computer Scientists
Inorganic Scientists
Other Occupations
Organic Scientists
Homemakers
Medical Doctors
Lawyers
K-12 Teachers
30%
20%
10%
0%
10%
20%
30%

Future Outcome

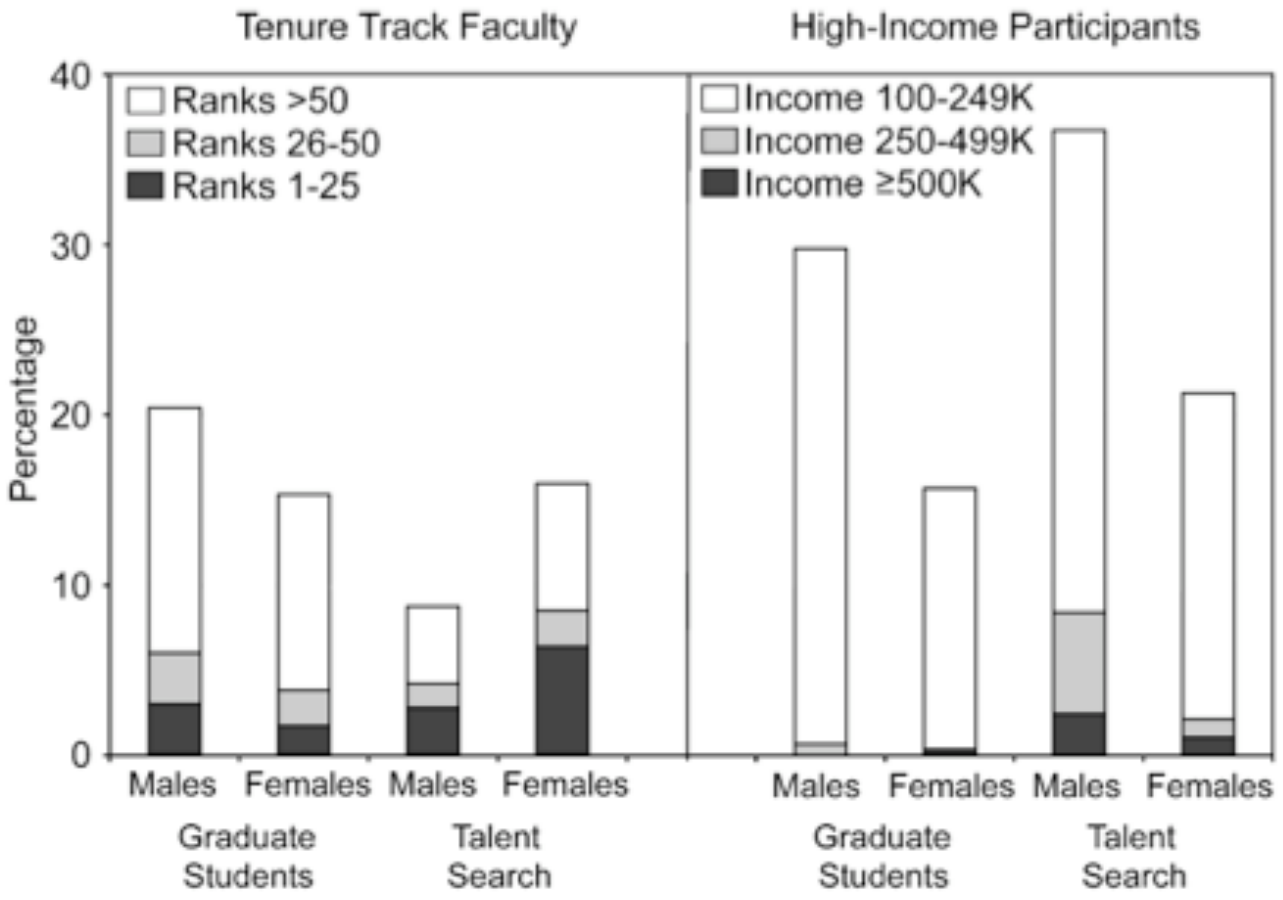


Fig. 2. Percentage of graduate-student (GS) and talent-search (TS) participants with tenure-track or tenured positions (left) and annual incomes of $100,000 or more (right). The data shown here are based on the complete samples: 299 and 287 male and female GS participants, respectively, and 286 and 94 male and female TS participants, respectively.

IQ increases: the "Flynn Effect"

- Although normed for a mean of 100, sd=15, IQ scores have increased over time
  - Comparisons of standardization samples given older and newer tests
- IQ scores on "culture fair" tests have tended to go up about 1 sd/generation
- IQ scores on "crystallized" tests have not increased as much

The Flynn effect: shadows on the wall

- Flynn effect is on observed variables, but what about change on the unobserved?
- Jensen and Plato's cave
  - Latent variables as real heights
  - Observed variables as shadow heights
  - Shadow length is changing (Flynn effect) but are the real heights?

Group differences and heritability

- Group differences of 1 standard deviation
- Heritability within groups of .6-.8
- Is the between group difference genetic?
- Lewontin's pot example
  - Consider a bag of seed, take two random handfuls, put one into a pot with good soil and the other into a pot with fewer nutrients. Within pot differences are all genetic, between pot differences are all environmental.
  - Within group heritability implies nothing about between group differences

Heritability and group differences

- The example of height
  - high heritability
  - no single genes
  - very large changes over time (health?)
  - large group differences
    - the example of Korea

Stability of personality across time

- Longitudinal studies
  - Age trends
  - Correlational patterns
  - Absolute changes
- Cross sectional studies
  - Mean scores as a function of age

Conley's meta analysis of personality stability

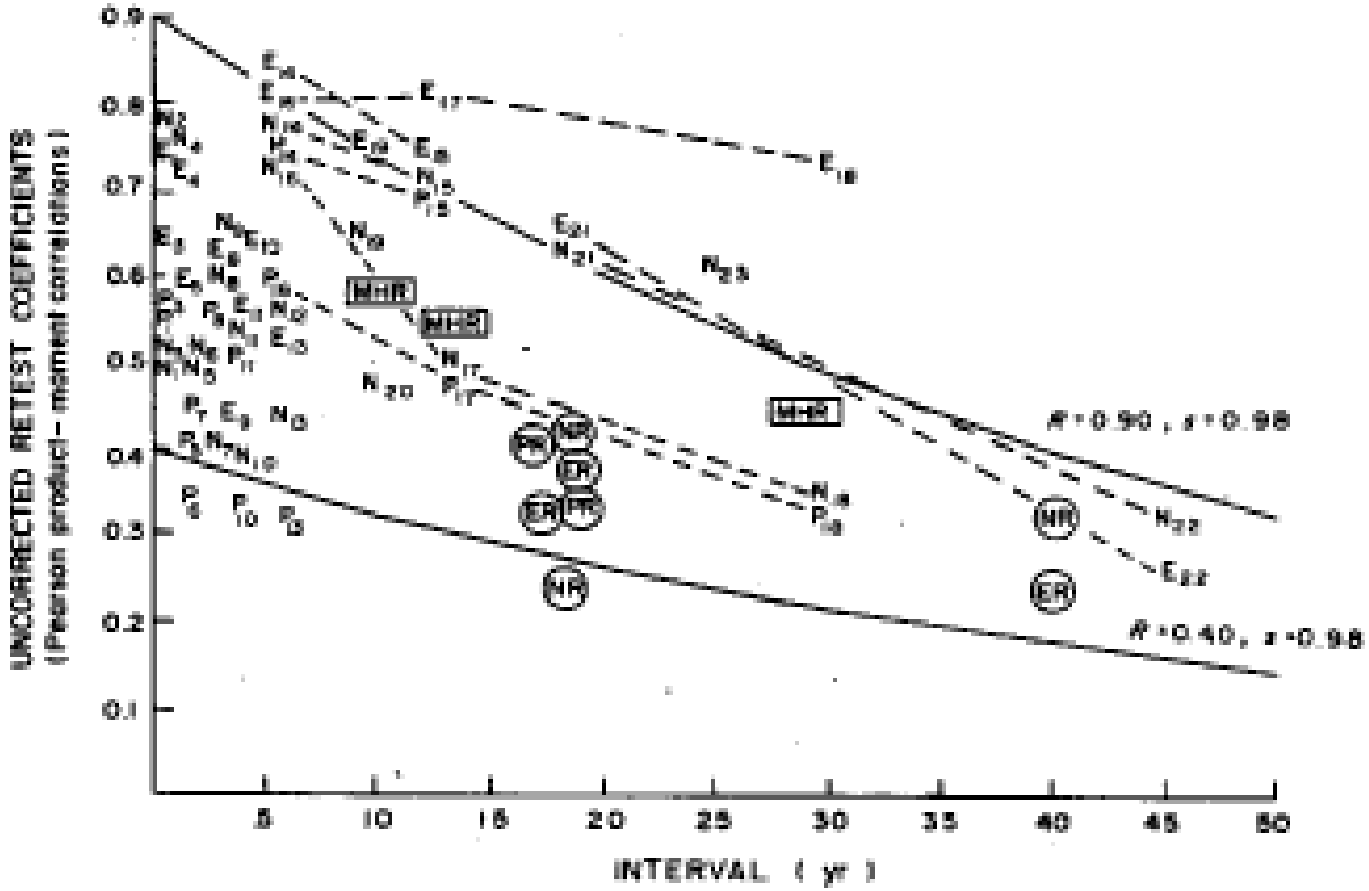


Fig. 3. Results of longitudinal studies of personality traits. (Numbers correspond to those in Table 3. N = neuroticism, E = extraversion, P = psychoticism.)

Year to year correlations (correcting for initial reliability) = .98

Years	1	5	10	20	30	40
Consistentcy	.98	.90	.82	.67	.55	.45

Longitudinal studies of personality

- Jack Block; Lives through Time
- Terri Moffitt and Avshalom Caspi: the Dunedin study
  - Birth cohort in Dunedin, NZ has been followed for 20 years
  - Examining, among other things, risk for impulsivity, criminality, effects of stressful childrearing

Moffitt and Caspi: genes for sensitivity or resilience?

- Effect of child upbringing interacts with specific genes
- Good vs abusive parents
- MAOA gene interacts with parental effects to lead to adult criminality and psychopathology
- 5HTT gene interacts with family effects in relationship childhood and adult depression

Cognitive-Affective Personality Systems (CAPS)

- Mischel, W. & Shoda, Y
- If ... Then ... production systems and individual signatures

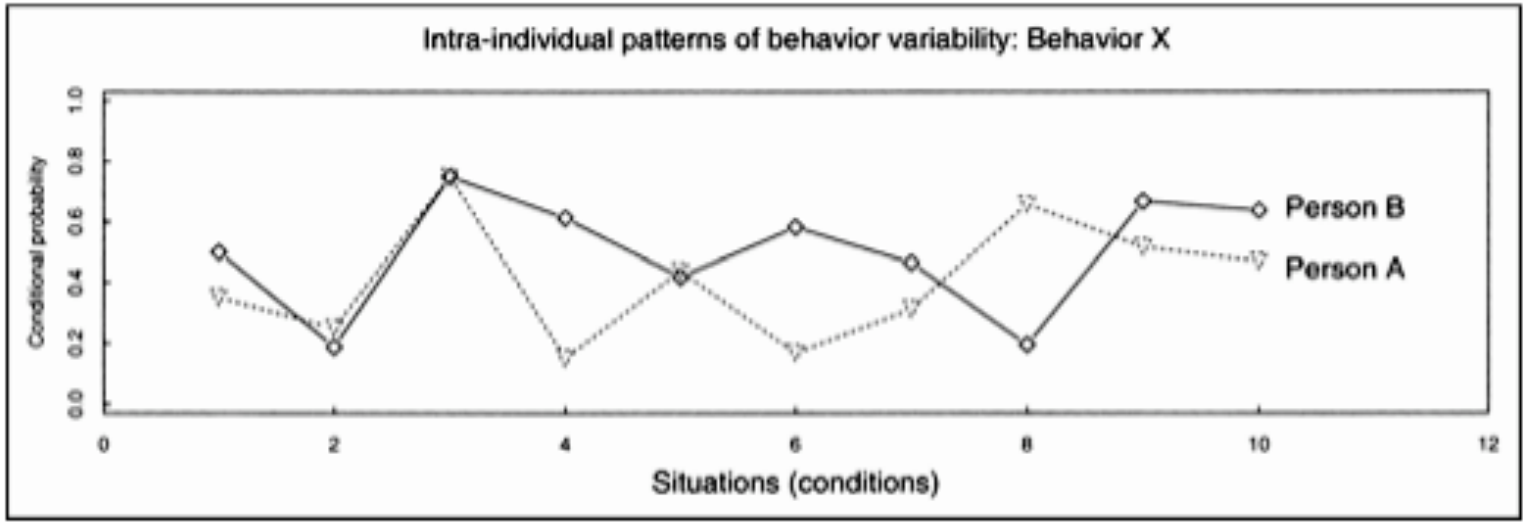
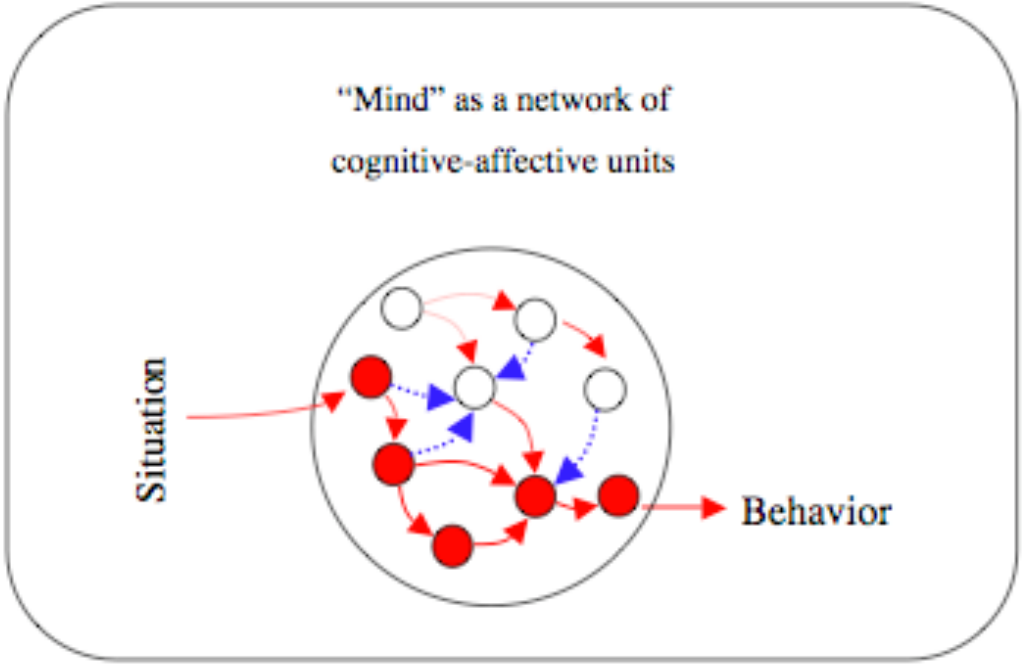


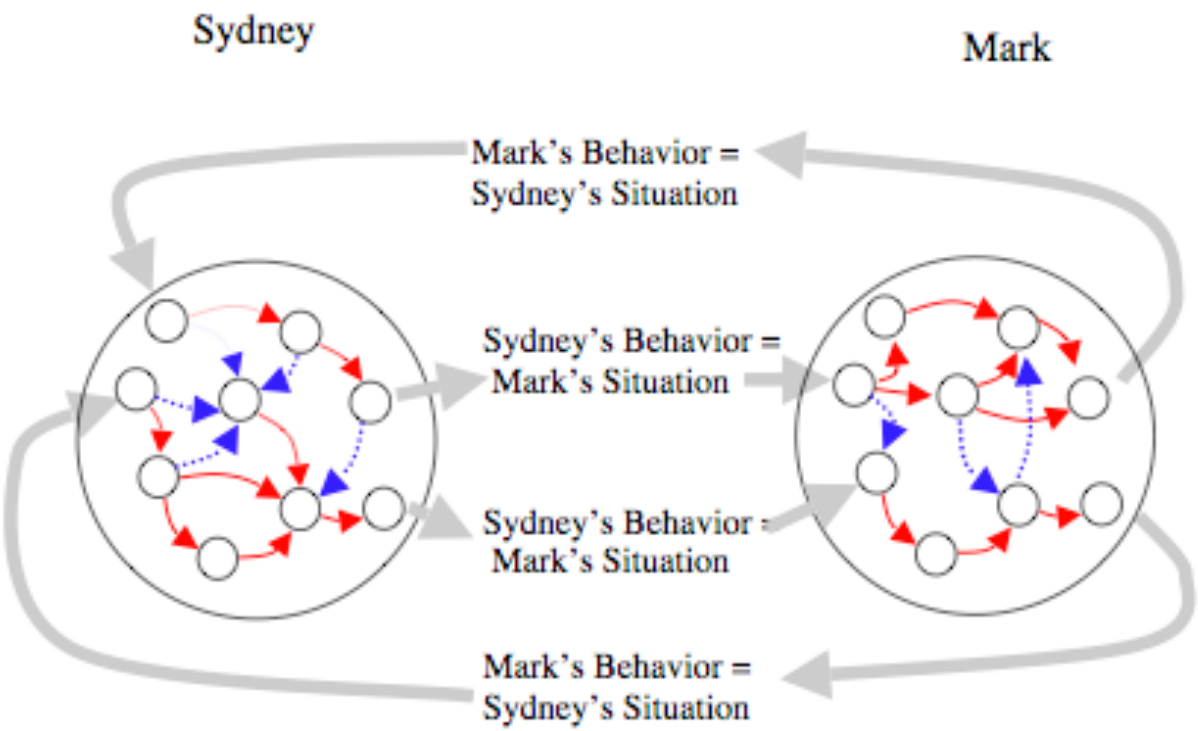
Fig. 1. Typical individual differences in the conditional probability of a type of behavior in different situations. Reprinted by permission from Mischel and Shoda (1995, Fig. 1, p. 247).

CAPS: a network of cognitive affective units



from Vivian Zayas http://shodalab.psych.washington.edu/publications/dissertations/zayas,2003.pdf

CAPS and social interaction: Vivian Zayas



http://shodalab.psych.washington.edu/publications/dissertations/zayas.2003.pdf

Affective Dynamics

- Personality traits as rates of change in affect
- Tracking affect across time and situation
- Within subject affective measures aggregated across time to estimate individual parameters of sensitivity
- Between subject patterning as a result of these within subject parameters

Personality Research: Review

- Individual differences versus experimentalism
- Theories of individual differences
  - Descriptive taxonomies
    - Folk taxonomies
    - Recent work in folk taxonomy: the Big 5
    - Five Factor Model of Traits

  Causal models

Psychometric theory

The ABCDs of personality

Affect	What we feel
Behavior	What we do
Cognition	What we think
Desire	What we want
Environment	Where we are

Achievement Motivation and the ABCDs

- Achievement as positive Affect upon success
- Achievement as approach Behavior
- Achievement motivation as Cognitive appraisals of task difficulty
- Achievement motivation as Goal setting

Extraversion and the ABCDs

- Extraversion as positive Affect
- Extraversion as approach Behavior
- Extraversion as cognitive bias towards rewards
- Extraversion as performance approach Desires

Anxiety and the ABCDs

- Anxiety as negative Affect
- Anxiety as avoidance Behavior
- Anxiety as cognitive bias towards threats
- Anxiety as performance avoidance Desires

Ways of studying Personality coherence and Affect, Behavior, Cognition, and Goals

- Between individual differences across items
- Between individual differences across situations and across time
- Within person variation across items, situation and time
- Are within person patterns different across people?

The ABCDs of personality

Affect	What we feel
Behavior	What we do
Cognition	What we think
Desire/Goals	What we want
Environment	Where we are

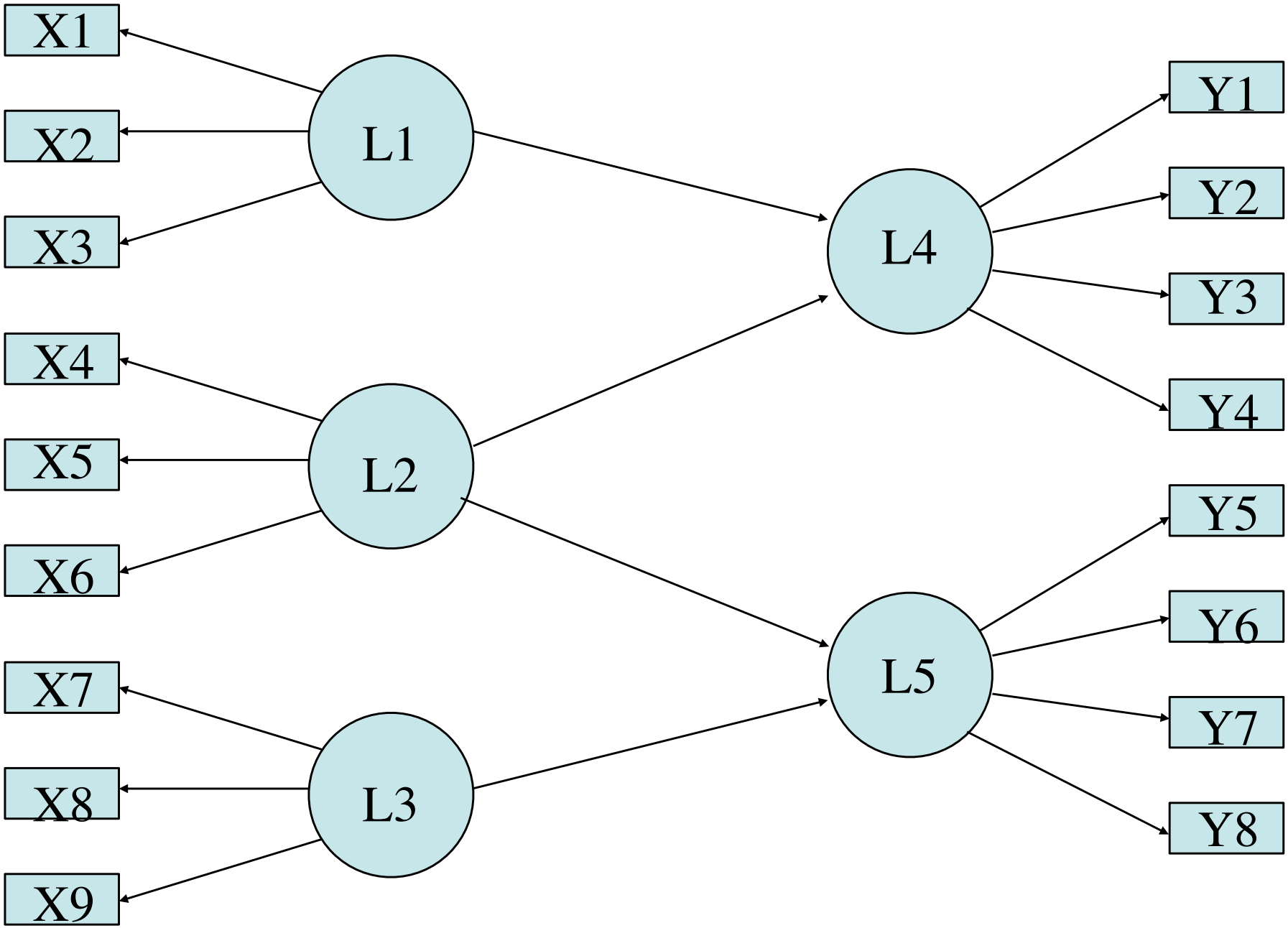
The Big 5 and the ABCDs

		E	N	C	A	O
Affect	Pos	+	0		+?	+
	Neg	0	+			0
Behavior	App	+	0		+	+
	Avoid/ Inhibit*	0	+			
	F/F/F				+	
Cognition	+ bias	+				
	- bias	0	+	+		
	broad	+		-		+
Desires	mastery			+		+
	success	+		+		
	avoid	0	+	+?		
	long term	-		+		

Causal Models

- Approach and Inhibitory traits
  - Approach/Positive Affect/Positive Emotionality
    - Extraversion/impulsivity/Achievement
    - Problems with simple state theories
    - Traits as central tendency of state
    - Traits as likelihood of state
    - Traits as rates of change in state
  - Avoidance/Inhibition/negative Emotionality
    - Anxiety/Depression

Psychometric Theory: A conceptual Syllabus



Personality theory and personality measurement

- If it exists, it exists in some amount …
- Issues in measurement
  - Latent constructs - observed variables
  - Shape of relationship between latent and observed
  - Reliability of measurement
    - Multiple forms of reliability

Reliability

- How well are we measuring whatever we are measuring?
  - Internal consistency of measures
    - Domain sampling, true score theory
  - Stability of measures
    - Traits versus states
  - Alternate forms/alternate people

Validity

- How well are we measuring what we think we are measuring
  - Face, Concurrent, Predictive, Construct
  - Construct
    - Do measures of the same thing go together/
    - Do measures of different things not go together
    - So what (does it make a difference)

Methods of scale construction

- Empirical
- Rational/Theoretical
- Homogeneous

Do they make a difference?

How to do it

Sources of data

- Not limited to simple self report, need to be sensitive to threats to validity from many sources
- Multi-traits - multi methods and the principles of convergent and discriminant validity

Final research project

- Introduction
  - Review of relevant literature
  - Why is the problem an interesting problem
- Method
  - Enough to be replicated
- Results
  - Appropriate analysis
- Discussion
  - What does it all mean?

Final research project

- Additional comments
  - APA style throughout
  - Writing to be yours, thoughts can be shared with research partners (and others)
  - Analysis - can be done with me
    - Schedule appointments - walk in, email, etc.

Due June 13 (or so).