

PS416

Personality & Individual Differences

Intelligence C

Uses of Intelligence, Critiques of Intelligence

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Plan for my Three Topics

- 1) Topic A: Tools and Methods for Intelligence Testing
 - Reliability, Validity, Standard Error of Measurement
 - Intelligence test formats and items
- 2) Topic B: The Structure of Intelligence
 - Conceptualisations of intelligence
 - Single Factor, Hierarchical, Multiple Ability and Contextual theories
- 3) Topic C: Uses of Intelligence, Critiques of Intelligence
 - Criticisms of the construct of intelligence
 - Using intelligence tests to predict people's futures
 - Criticisms of the validity of intelligence tests

Uses and Critiques of Intelligence

- Why the focus on intelligence?
- Ways in which intelligence is critiqued
- Lamé objections to intelligence
- Criticisms of the intelligence construct
- Predicting people's futures
 - Educational contexts
 - Occupational contexts
- Objections to intelligence testing
 - Predictive validities are not high enough
 - Intelligence tests do not measure intelligence

Why the Focus on Intelligence?

- Intelligence research and applied psychometric testing affect people's futures
 - Social, political, and economic implications
 - Attracts the attention of social scientists outside of psychology
- Most intelligence research is inherently correlational
 - Definitive experiments on many aspects would have been unethical to conduct
 - Exposes intelligence findings to a certain style of critique
- Most psychological sub-disciplines, subject to similar levels of sustained attack, would have expired years ago

Ways in Which Intelligence is Critiqued

- **Lame criticisms**
 - Frequently-occurring general objections which lack detailed understanding of current research/literature
- **Criticisms of the construct of intelligence**
 - Assertions that there is insufficient evidence that such a construct has any utility, or even exists
 - By definition, intelligence tests must be invalid
- **Criticisms of the validity of intelligence tests**
 - Insufficient predictive power
 - Proxy measures for other constructs
 - Neutral about the reality of the construct itself

Lame Criticisms

- Is intelligence a legitimate topic for academic study/research?

No one can agree on a definition of intelligence and so there is no basis for taking it seriously as a research topic

- Responses
 - 1) The definitions share common features (Topic B), it is certainly not a random free-for-all
 - 2) There is excellent agreement amongst researchers as to how best to measure intelligence (Topics A and B)
 - 3) If there is disagreement, then it is because the topic is not fully understood, researchers **should** focus attention on important domains which are poorly understood!

Lame Criticisms

- Should intelligence tests be used to affect people's futures

Intelligence is not fully understood, therefore it is wrong to use tests to make decisions that affect people's futures

- Responses
 - 1) Many ideas/concepts/tools are used to affect people's futures even when there is not full understanding
 - 2) Intelligence tests seem to function quite well despite supposed problems, *understood enough*
 - 3) Worse alternatives to intelligence tests, in this respect, influence people's futures on a daily basis

Criticisms of the Intelligence Construct

- Construct is effectively worthless
 - 1) Intelligence is not an explanation
 - 2) Intelligence is irrelevant
 - 3) Intelligence is an oversimplification
- Construct is effectively a fiction
 - 4) Intelligence is really something else

Lame Criticisms

- Should the history of intelligence research affect the current status of the discipline?

Early intelligence researchers had an interest in eugenics, this taints all research and it should be disregarded

- Responses
 - 1) Just about every human discovery has been used to the detriment of people throughout history
 - 2) Any tools can be used or abused
 - 3) Intelligence research stands on the basis of modern findings conducted under modern ethical standards

Criticisms of the Intelligence Construct

- Intelligence is not an explanation (e.g., Howe, 1988)
 - Jargon words are convenient for researchers to use as shorthand labels, but what underlies them?
 - Why is X doing particularly well at school?
Because X is very *intelligent*
 - Howe: intelligence is so poorly understood that there is nothing useful underlying this jargon word
 - *Factory productivity* example a useful analogy
 - Researchers are just repackaging a particular phenomenon with a fancy name, not offering any underlying explanation
 - X is doing well at school because X is displaying a package of phenomena that we label as *intelligent* for convenience
 - Intelligence is vacuous, construct has no useful meaning

Criticisms of the Intelligence Construct

- Intelligence is not an explanation (e.g., Howe, 1988)
- Howe too pessimistic even in 1988
- Cognitive psychology and neuropsychology research has massively amplified understanding of intelligent behaviour

Criticisms of the Intelligence Construct

- Intelligence is irrelevant (e.g., Simon, 1990)
 - Performance at any given task is overwhelmingly determined by experience/practice
 - Who would you rather be operated on by?
 - Inexperienced medical student, IQ 190
 - Surgeon with twenty years experience, IQ 160
 - Even if the construct can be identified in research, in real life absolutely no role for intelligence as a predictor

Criticisms of the Intelligence Construct

- Intelligence is irrelevant (e.g., Simon, 1990)
- Combines *straw man argument* with *false dichotomy*
 - No serious intelligence researcher would suggest that high intelligence can counter inexperience
- Fully block the design and then choose
 - Inexperienced medical student, IQ 160
 - Inexperienced medical student, IQ 190
 - Surgeon with twenty years experience, IQ 160
 - Surgeon with twenty years experience, IQ 190
- Important roles for intelligence predicting:
 - Rate of expertise acquisition
 - Effective use of expertise in novel situations

Criticisms of the Intelligence Construct

- Intelligence is an oversimplification (e.g., Medawar, 1982)
 - Intelligence researchers attempt to summarise human intellectual potential as one single number
 - Many examples of attempts to summarise complex things with single numbers, all problematic
 - Soil quality
 - Economic health (GDP/GNP)
 - In a similar way, the entire space of human ability, skill, potential cannot be summarised by one single number

Criticisms of the Intelligence Construct

- Intelligence is an oversimplification (e.g., Medawar, 1982)
- *Straw man argument*: no intelligence researcher makes these claims (Topic B)
 - **g** is not claimed to be an absolute predictor, merely the best that can be measured
 - Hierarchical theorists try to summarise human potential with multiple numbers
 - Proponents of these arguments would probably never be satisfied no matter how many numbers proposed

Criticisms of the Intelligence Construct

- Analogies can be helpful for illustrating arguments but are not logically valid, may be true, may be false
 - E.g., age is not a perfect summary of the complexities of human health, but is it completely useless?
- If the construct of intelligence is an oversimplification, then tests will have no predictive utility (see later)

Criticisms of the Intelligence Construct

- Intelligence is really something else (e.g., Howe, 1990)
 - Many different constructs can predict success
 - General motivation trait: some people try hard at everything, some people do not try hard at everything?
 - Personality traits: people at certain levels more likely to succeed than people at other levels?
 - Socio-economic status: intelligence tests merely proxies for quality of upbringing environment
 - All test predictive power can be explained by other constructs, No need for intelligence construct
- Explored later, inadequate evidence, extremely unlikely

Predicting People's Futures

- Intelligence tests *should* have predictive validity, otherwise effort in creating them was worthless
- BUT whatever the results, they cannot conclusively (in)validate the construct of intelligence nor the test
 - *Test has predictive validity*: could still be predicting for the wrong reasons (see previous section)
 - *Test does not have predictive validity*: perhaps the prediction measures lacked reliability and/or validity

Predicting People's Futures

- Educational settings
 - Correlations between IQ and eventual educational success (e.g., Jensen, 1980; 1981)
 - $r = .6 \sim .7$ at primary school
 - $r = .3 \sim .4$ at university postgraduate entry
 - Better than teacher predictions
 - Better predictor than any other measure
 - High scorers "... acquire ... knowledge more quickly and easily, get better marks, like school better and stay in [education] longer"

Predicting People's Futures

- Educational settings
 - Kline (1991); education is complex, would never expect perfect correlations
 - How much is each subject enjoyed?
 - How much work is done?
 - How good is the teaching?
 - How good is health and home environment?
 - "... what is surprising is that IQ scores should be correlated at all"

Predicting People's Futures

- Educational settings
 - No need for extensive literature review, even the fiercest critics of intelligence agree with this
 - Rose, Lewontin and Kamin (1984)
 - “the empirical fact is that there exist tests that predict reasonably well how children will perform at school”
- Disagreements concern ...
 - What the tests are really measuring, i.e. their validity
 - Underlying reasons for differences in scores; nature versus nurture
- ... not whether these tests function in a useful way

Predicting People's Futures

- Occupational settings
 - Correlations between IQ and eventual occupational success (e.g., Ghiselli, 1966; in Kline, 1991)
 - $r = .3 \sim .4$ (to .7 but rare, .3 is typical finding)
- Schmidt and Hunter (1981)
 - Meta-analysis of 370,000 job application candidates
 - “Professionally developed cognitive ability tests are valid predictors of job performance on the job and in training for all jobs ... in all settings”

Predicting People's Futures

- Occupational settings
 - Even the $r = .3$ correlation is impressive considering
 - Most job advertisements solicit/attract a restricted range of applicants
 - Jobs may require specific abilities, or even certain personality traits
 - Often impossibly difficult to measure job success

Objections to Intelligence Testing

1) Predictive validities are not high enough

- Prediction errors cause more harm than the benefits of prediction successes
- Intelligence testing should be abandoned

[see next section]

2) Tests are invalid, not measuring intelligence

- For example, measuring level at a motivational trait, such as general willingness to try hard
- The tests can continue to be used, they should simply be renamed

[see next section]

Objections to Intelligence Testing

3) Tests discriminate unfairly

- Certain types of people systematically perform badly at tests, but would have performed fine at the jobs
- Intelligence tests **must** be redesigned to remove the bias

[not for this topic]

4) Various moral/political objections

- E.g. widespread testing would create a permanent underclass of unemployable people
- Not for psychologists to assert an answer, there are wider societal issues

[not for this topic]

Predictive Validities are not High Enough?

- Correlation between intelligence test score and job success typically $r = .3$
- Tenopir (1981): other widely used alternatives even worse
- Examples of worse methods that have been used
 - Personality tests (at the very best $r = .2$)
 - Unstructured interviews (typical $r = .1$)
 - Graphology ($r = 0$)
 - Astrology!
- Futile arguing about whether numbers are 'good enough', need an objective method of evaluation
- *Utility theory*

Predictive Validities are not High Enough?

- Utility theory
 - Good employees generate more profit for a company than bad employees
 - Can attempt to quantify this
 - Bad employees generate £6,000 per year profit
 - Neutral employees generate £8,000 per year profit
 - Good employees generate £10,000 per year profit
- Suppose these are the typical proportions in the applicant pool
 - 20% of applicants will become bad employees
 - 60% of applicants will become neutral employees
 - 20% of applicants will become good employees

Predictive Validities are not High Enough?

- Utility theory
 - If employer chooses ten of the above at random then on average:
 - 2 bad employees, $£6,000 \times 2 = £12,000$ a year profit
 - 6 neutral employees, $£8,000 \times 6 = £48,000$ a year profit
 - 2 good employees, $£10,000 \times 2 = £20,000$ a year profit
 - Total profit: £80,000 per year for this cohort

Predictive Validities are not High Enough?

- Utility theory
 - Even a small predictive validity will tilt towards an improved chance of finding good employees
 - 1 bad employee, $\text{£}6,000 \times 1 = \text{£}6,000$ a year profit
 - 6 neutral employees, $\text{£}8,000 \times 6 = \text{£}48,000$ a year profit
 - 3 good employees, $\text{£}10,000 \times 3 = \text{£}30,000$ a year profit
 - Total profit: $\text{£}84,000$ per year for this cohort
- Net benefit of using intelligence test: $\text{£}4,000$ per year
- Cost of administering intelligence test to applicants: ???

Predictive Validities are not High Enough?

- Utility theory
 - Predictive validity does not need to be high for net benefits to exceed costs
 - Predictive validity only needs to be genuine
 - Even small predictive validities can make testing worthwhile for large companies
 - N.B. assessing costs/benefits of bad/good employees not always straightforward

Predictive Validities are not High Enough?

- Utility theory
 - Schmidt & Hunter (1981)
 - Several case histories
 - US Steel ceased intelligence testing for applicants and ...
 - Scores on tests during training fell
 - Drop-outs during training increased
 - Average training time/costs increased
 - Average job ratings declined

Predictive Validities are not High Enough?

- Utility theory
 - Schmidt & Hunter (1981)
 - Not using tests:
one cause of slow-down in US growth in late 1970s
 - Using tests:
increase US GNP by \$100 000 000 000 per year
 - BUT someone has to employ the low test scorers
 - Individual companies benefit the most from intelligence testing if their competitors do not do this
 - Should economic benefits be the only consideration?

Tests are Invalid, not Measuring Intelligence

- Four criticisms evaluated; intelligence tests ...
 - Really measure motivation
 - Really measure personality
 - Really measure social class
 - Create a self-fulfilling prophecy
- If these are refuted, then intelligence construct genuine by definition, cannot measure something that does not exist

Tests Really Measure Motivation

- Skill at *specific* tasks is related to experience (see earlier)
- But intelligence tests make *general* predictions, e.g., about how effectively *all* school subjects will be learnt
- Perhaps, instead of intelligence, there is a *general motivation trait*
 - People who try hard generally succeed generally
 - People who try hard at very little succeed at very little
- Accounts for predictive validity of intelligence tests?

Tests Really Measure Motivation

- Howe (1990): historical survey
 - No one has a talent or ability head start at anything people who are great achievers had to practice
 - E.g. Mozart, precocious musician and composer, intensively coached by father as a 'stage act'
 - The people who achieve the most, practice the most
- But the desired implication is not supported by anecdotes
 - Showing that ***even Mozart had to Practice*** does not entail that ***anyone who practices enough can become Mozart***
- Historical anecdotes futile in this respect

Tests Really Measure Motivation

- Not everyone practices and succeeds, how does Howe (1990) explain this?
 - “too much determination to succeed can be counter-productive”
- With an unfalsifiable get-out clause; any pattern of behaviour and outcomes can be explained ***after the event***
- Informal position that lacks predictive power
 - *Intelligence tests predict outcomes **before** the event*

Tests Really Measure Motivation

- Motivation explanations
 - Positive evidence is needed to support an assertion that there exists a general motivation trait
 - Positive evidence is needed to support an assertion that this renders concept of intelligence redundant
 - Providing circumstantial evidence and attacking intelligence testing is not positive evidence

Tests Really Measure Motivation

- What evidence needed to show that a *general motivation trait* underlies intelligence test predictive validity?
- Ideally
 - Give an operational definition of motivation that distinguishes it from intelligence
 - Devise a test that measures this trait, without using intelligence-test type items
 - Show that predictive validities are at least as good as, or better than for intelligence tests

Tests Really Measure Motivation

- Example: *Need for Cognition Scale*
 - Quantitatively measures “the tendency for an individual to engage in and enjoy thinking”
Cacioppo & Petty (1982)
 - Eighteen self-rated questions, for example
 - *I find satisfaction in deliberating hard and for long hours*
 - *The notion of thinking abstractly is appealing to me*
 - *Thinking is not my idea of fun*
 - *I prefer my life to be filled with puzzles that I must solve*
 - *I feel relief rather than satisfaction after completing a task that required a lot of mental effort*

Tests Really Measure Motivation

- Example: *Need for Cognition Scale*
 - Problematic for many reasons
 - Only 18 questions, *Standard Error of Measurement* issues
 - Question style
 - To get a high score at an intelligence test, it is necessary *to be intelligent*: to get answers correct
 - For an accurate score at NFC, must imagine situations (displaced) and rate oneself (subjective) – implicitly with respect to other people (baseline problem)
 - No interesting validity findings, ever
 - High intelligence necessary for high NFC to have an effect (Hill *et al.*, 2016)

Tests Really Measure Motivation

- Measuring intelligence in the style of a personality questionnaire (!)

I am a person ...

whose first attempt at an answer is usually correct

who people often ask for help in solving complex problems

who has to think slowly otherwise I mentally trip up

who has difficulty following instructions for appliances

who is very clever

who was good at most subjects at school

who is often not sure about the validity of my answers

Tests Really Measure Motivation

- Intelligence explanations
 - Positive evidence is needed to assert that general cognitive ability underlies intelligence test predictions
 - Many studies have identified underlying differences between high and low test scorers
 - Cognitive psychology: individual differences in information processing effectiveness (e.g., Carpenter *et al.*, 1990)
 - Cognitive neuropsychology: individual differences in brain structure and function (e.g., Chabris, 2007)
- Intelligence/ability does not obliterate motivation as an explanation, and motivation cannot obliterate intelligence
- Eventual success is a combination of the two

Tests Really Measure Personality

- Some personality levels more likely to succeed at intellectual tasks than others?
 - Question from EPI extraversion scale:
Generally do you prefer reading to meeting people?
 - High extroverts likely to perform worse at academic tasks than introverts?
 - Question from EPI neuroticism scale:
Do you worry about awful things that might happen?
 - Highly anxious people less resilient when faced with important, difficult tasks?
- Intelligence test score and lifetime achievements are really determined by temperament, not ability?

Tests Really Measure Personality

- Structure of intelligence AND personality have been extensively analysed together
 - Cattell has researched both: personality factors separate from intelligence (Cattell & Butcher, 1968)
- No justification for this objection from any analysis of questionnaire/test data

Tests Really Measure Personality

- The *proxy argument*
 - If intelligence tests are measuring personality factors, they are doing so by accident
 - They were never designed to assess temperament, so they are likely to be imperfect measures
 - Personality questionnaires are designed from the ground up to provide assessments of personality
 - THEREFORE
IF intelligence tests predict the future because they accidentally measure personality
THEN personality questionnaires should have higher predictive validity than intelligence tests

Tests Really Measure Personality

- The *proxy argument*
 - Higher predictive validities for personality questionnaires are virtually unheard of
 - Rutter (1989) is one of the few exceptions
 - Therefore, intelligence tests are unlikely to really be measuring personality variables
- No support from data that intelligence tests really measure personality

Tests Really Measure Social Class

- Intelligence test score is merely an expression of a person's Socio-Economic Status (SES)?
 - But intelligence test score still predicts even when SES/amount of schooling controlled
 - "With [schooling and socioeconomic background] held constant, a child in the top 10% of IQ has only *twice ... the chance* of winding up in the top 10% of income as a child in the lowest IQ group."
- Rose, Lewontin & Kamin (1984) *itallics: MJR*
- This is a very harsh test: intelligence creates SES, and yet still predicts over and above SES

Tests Really Measure Social Class

- High socio-economic status (SES) unlikely to create high test scores by itself, needs an intermediary variable
- Motivation? Personality? Already discussed these
- Hard to see what else SES might be a proxy for
- Environments associated with high SES might facilitate learning general cognitive skills, but this = intelligence
- SES arguments don't rebut validity of intelligence tests
- Instead, these are arguments that differences in intelligence level are owing to environment

Tests Create a Self-Fulfilling Prophecy

- *Labelling*: a popular concept in 1960s social psychology
 - People get labelled in various ways
 - Treated in line with their labels
 - Learn to behave in line with their labels
- Intelligence is nothing more than a label
 - Children obtain high intelligence test scores for arbitrary reasons
 - They are treated as being intelligent by their teachers, receive priority, encouragement, challenges
 - As a result, they learn to behave intelligently?

Tests Create a Self-Fulfilling Prophecy

- Rosenthal & Jacobson (1968)
 - Schoolchildren tested, some *randomly* designated as ***late bloomers***
 - Teachers informed that they should expect these children to develop rapidly
 - Children not put in a special set
 - Children/parents did not know

Tests Create a Self-Fulfilling Prophecy

- Rosenthal & Jacobson (1968)
 - One year later, targeted children gained in IQ scores compared with non-targeted children
 - Intelligent performance results merely as a labelling phenomenon, a self-fulfilling prophecy?

Tests Create a Self-Fulfilling Prophecy

- Rosenthal & Jacobson (1968)
- But there were other findings too (1)
 - No improvement in reading, language arithmetic
 - The manipulation improved IQ test score, not school subject scores
 - *This is absurd, teachers would not have been coaching IQ tests, would have been coaching school subjects*

Tests Create a Self-Fulfilling Prophecy

- Rosenthal & Jacobson (1968)
- But there were other findings too (2)
 - Teacher ratings predicted rate of improvement in school performance
 - Didn't believe experimenters about late bloomers?
 - Still evidence for self-fulfilling prophecy?
 - Teachers' ratings self-fulfilling, but only for school performance, not IQ scores
 - Experimental manipulation self-fulfilling, but only for IQ scores not school performance
 - *Double dissociation makes no sense*

Tests Create a Self-Fulfilling Prophecy

- Rosenthal & Jacobson (1968)
- Full package of findings is incoherent
- A controversial contradictory study
- Many failures to replicate
- *Cannot dismiss intelligence testing on the basis of these data*

Summary

- Intelligence tests are amongst the best predictors of the individuals futures
- Most criticisms of the intelligence construct ...
 - Invoke parodies of intelligence theories
 - Neglect key findings and literature
- Most criticisms of intelligence test validity
 - Give insufficient evidence/arguments for alternatives
 - Are contradicted by research findings
- No theoretical or practical reasons why intelligence should not be researched or tested
- ***Intelligence probably does exist and we can be reasonably confident that it is being measured by intelligence tests***

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