Intelligence

Instructor Manual

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Intelligence is a hard-to-define concept because there is more than one way to look at intelligence or what makes people smart. Is it high IQ and logical reasoning? Or do so called "street smarts" make a better definition of intelligence? These questions are covered in the module along with how we measure intelligence. There are many tests that measure various aspects of intelligence, and along with understanding how you define intelligence, it is important to understand what you are measuring.

Learning Objectives

- Relevant APA Learning Objectives (Version 2.0)

  - Describe key concepts, principles, and overarching themes in psychology (1.1)

  - Describe applications of psychology (1.3)

  - Use scientific reasoning to interpret psychological phenomena (2.1)

  - Demonstrate psychology information literacy (2.2)

  - Engage in innovative and integrative thinking and problem solving (2.3)

  - Incorporate sociocultural factors in scientific inquiry (2.5)

- Content Specific Learning Objectives: Intelligence

- List at least two common strategies for measuring intelligence.

- Name at least one "type" of intelligence.

- Define intelligence in simple terms.

- Explain the controversy relating to differences in intelligence between groups.

Abstract

Intelligence is among the oldest and longest studied topics in all of psychology. The development of assessments to measure this concept is at the core of the development of psychological science itself. This module introduces key historical figures, major theories of intelligence, and common assessment strategies related to intelligence. This module will also discuss controversies related to the study of group differences in intelligence.

Class Design Recommendations

Intelligence is ideally taught in one class period as a fast-paced, activity-based class. Please also refer to the Noba PowerPoint slides that compliment this outline.

1st class period (50 min – 75 min):

- Introduction
- Defining and Measuring Intelligence
- Types of Intelligence
- Correlates of Intelligence
- Conclusion

Module Outline

Introduction

- The Scripps National Spelling Bee is a yearly event with children competing to spell what are largely unknown words. Watching the bee you think these must be really smart kids. But what is smart?

- This module sets to cover different aspects of intelligence and to define and discuss methods to measure intelligence.

Defining and Measuring Intelligence

- When you talk about "smart people" there is an intuitive sense of what makes them smart and that it is more than knowing and remembering facts.

- A dog who learns commands seems smarter than a snake who cannot.

- There is general agreement that primates (including humans) are among the most intelligent animals.

- The social nature of primates is one source of intelligence. The social groups utilize communication and long term planning and primates have developed brains that allow these and other concepts.

- When talking about intelligence we typically mean intellectual ability. Charles Spearman proposed a "general factor" or "g" to note intelligence. This is after Spearman noted that people who perform well in one area tend to perform well in another.

- Francis Galton was among the first to measure psychological attributes systematically. He thought that intelligence was heritable and tracked family trees of top-scoring Cambridge students for 40 years. He was also among the first to study heritability using twins.

- Alfred Binet and his colleague Theodore Simon created a test for children's intellectual capacity. The first "IQ" test. The test items were meant to be answerable by children of given ages.

- The "IQ" score of the Binet-Simon test is the mental age/chronological age.

- Lewis Terman adapted the IQ test to create the Stanford-Binet test which is standardized on a bell curve. The Stanford-Binet test relies heavily on verbal ability.

- David Wechsler created the WAIS, which taps a range of intellectual abilities: the ability to remember, compute, understand language, reason well, and process information quickly.

- One interested effect of intelligence testing over time is the Flynn Effect. As new cohorts take IQ tests, they tend to score higher than the original sample from which the test was normed. There are several hypotheses to explain this, such as better nutrition, greater familiarity with testing, and more exposure to visual stimuli.

Types of Intelligence

- Weschler's approach to intelligence testing was based on the idea that there is not a single element that can be measured to note intelligence.

- There is a suggestion that there are different types of intelligence, such as "Street smarts" or "book smarts."

- Carroll divided intelligence into three levels going from the most abstract Level III (e.g., car) to the most specific Level I (e.g., Honda Civic); Level II would be in the middle (e.g., sedan).

- Carroll called Level III the general intelligence factor "g." Level II is things like fluid intelligence processing speed and Level I is the most specific breakdown with things like reaction time.

- Horn and Cattell gave the idea of fluid (thinking on your feet) and crystallized (what you know) intelligence. Fluid intelligence is stronger when you are young and crystallized intelligence can increase with age.

- Howard Gardner theorized multiple intelligence, with 8 intelligences identified (logic-math, visual-spatial, music-rhythm, verbal-linguistic, bodily-kinesthetic, interpersonal, intrapersonal, and naturalistic).

- Emotional Intelligence is the idea that emphasizes understating and identifying the emotions of others and oneself. There is a link with emotional intelligence and job performance.

- Carol Dweck studies mindset and has found that the children who do better on intelligence tests are the ones who believe they can improve, while those who underperform believe intelligence is set.

Correlates of Intelligence

- Research on mindset raises the question as to if humans have unlimited potential for intelligence. What is the genetic component?

- Are there differences in intelligence between groups of people? Gender differences are among the most studied. Is the inequality of fewer women represented in some fields do to the educational system, differences in socialization, or innate differences from men?

- Ceci and colleagues argue that it is a complex web of factors that account for many of the differences seen between women and men.

- Instead of asking which group is smarter, a better question is to ask in what ways men and women differ. Women appear superior on measures of fine motor skill, acquired

knowledge, and verbal/literacy tasks. Men appear superior in measures of fluid reasoning and math and science takes, and spatial tasks.

- Stereotype threat is the idea that men or women perform in line with stereotypes that they have heard about how they "should" perform. For example women who are told women tend to do worse on math tests will do worse on a math test than women who do not hear this.

- There are many biases that benefit or disadvantage some groups over others. However the intelligence tests are valid and do measure what they claim to measure.

Conclusion

- The kids in the Scripps Spelling Bee seem to have high verbal intelligence, but other types of intelligence would remain to be measured.

Difficult Terms

interpersonal
intrapersonal
stereotype threat
validity

Lecture Frameworks

This is a topic where students must use critical thinking to examine what they thought they knew about intelligence. The module allows students to redefine what makes someone smart and to think about if intelligence is something we can truly measure.

1st class period

- Discussion/warm-up

  - Start by asking students what they think intelligence is. What makes humans intelligent, or How is human intelligence different from the intelligence of other animals?

- Activity: Look at 30 items and write down 20 from memory. The debriefing of this activity helps students think about intelligence testing.

- Lecture – Refer to PowerPoint slides for the following:

  - Talk about general intelligence, "g", and some of the first tests to measure intelligence.
  - Talk about culture and how logic tests have been developed that do not rely on culture, but that in some cultures, like ours, children and adults are more used to testing than cultures where people may not attend school for as long or at all.

    - Talk about different tests we have and how they are scored, standardized, and normed.

      - Talk about the Flynn Effect

  - Get students to think about other definitions or types of intelligence. Talk about Street Smarts and Book Smarts (Sternberg) and the idea of Multiple Intelligences.

    - Carroll divided intelligence into three levels going from the most abstract Level III (e.g., car) to the most specific Level I (e.g., Honda Civic); Level II would be in the middle (e.g., sedan).
    - Horn and Cattell give us the idea of Fluid and Crystallized intelligence. There is a short activity that challenges students to identify examples of fluid and crystalized intelligence.
    - Gardner came up with the idea of multiple intelligences.
    - Emotional Intelligence is the ability to understand the emotions of others. There are a couple of theories as to what Emotion Intelligence is – its own domain or a combination of stress management and personality. Give Emotional Intelligence test.
    - Talk about Dweck and mindset. Does this mean intelligence is set or we have some control over it?

- Activity: *If you choose to do a different activity, here is a good place for it to go before finishing the lecture.*

- Lecture on correlates of intelligence – Refer to PowerPoint slides for the following:

 - Gender differences: talk about areas where men and women tend to show differences;

emphasize that these are tendencies among the population and not necessarily true about individuals.

- ○ Stereotype threat

- Conclusions: Ask students the same questions from the start of class. What is intelligence? Can we measure it? Have their answers changed?

Activities & Demonstrations
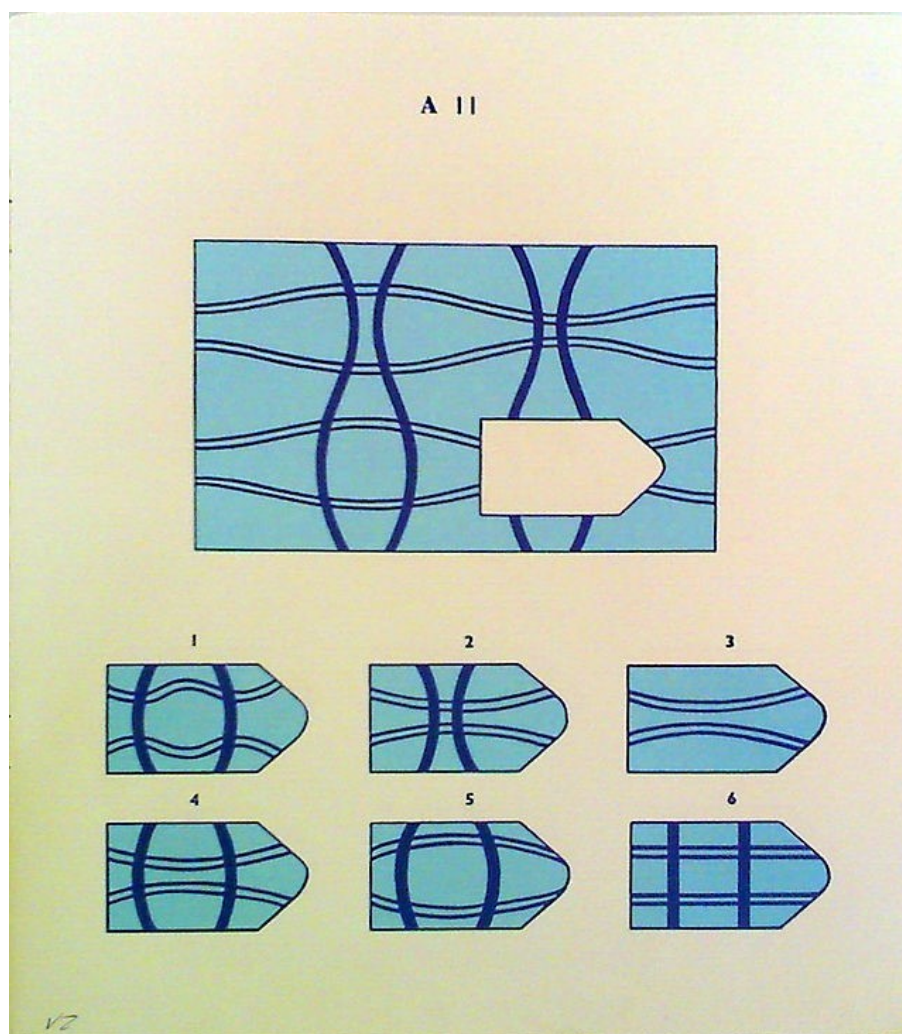
Intelligence Tests

A test of "*g*" is what most students will likely think of when they hear Intelligence Test. If you have access to the first page of a test like Culture Fair (Cattell & Cattell 1963) it is fun to give students the first set of questions. (If your institution has a subject pool of students it's a good
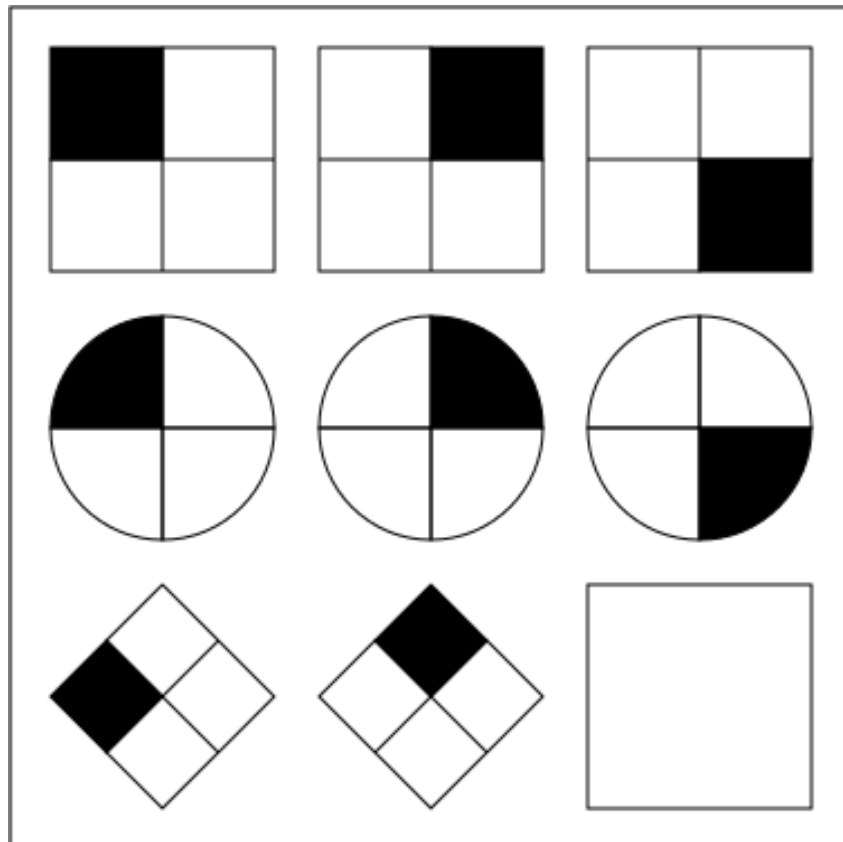
idea to check with your department that no one is using it for a current experiment). The images below are examples of what students would see on a test of *g*. You can show these and talk about what they are measuring and what that tells us about intelligence. Use a show of hands to see who does well at figuring out these kinds of questions and who finds it frustrating.

Raven's Matrix Images found here (**http://de.wikipedia.org/wiki/Culture_Fair_Intellig...**

http://de.wikipedia.org/wiki/Culture_Fair_Intellig...

http://de.wikipedia.org/wiki/Culture_Fair_Intellig...

- For the test of Multiple Intelligences, (**http://www.literacynet.org/mi/assessment/findyours...**, it can be helpful to ask for a student volunteer to fill out the test before class or during a break as there are a lot of questions. Then when you get to this point, the results are there and you can talk about how the test works, the kinds of questions, and the graph output.

- The Emotional Intelligence test is paper and pencil with slides. Click here for the slides. For each picture read the two emotion options, then students write down their answer. At the end, go back for any that were missed. Then have students self-grade and discuss as a class. Click here to download the **Faces**test: **http://www.autismresearchcentre.com/arc_tests**

- The test was developed by Simon Baron-Cohen and colleagues at the Autism Research Centre and is free to download. Click here to get key.

- For all of these tests, go through them quickly as time is often a factor in taking intelligence tests. For example the Culture Fair test is a timed test.

Additional Activities

Test your Emotional Intelligence – images of eyes only: **http://kgajos.eecs.harvard.edu/mite/**

Additional Emotional Intelligence tests from the Autism Research Centre: **http://www.autismresearchcentre.com/arc_tests**

http://www.pbs.org/wgbh/nova/body/memory-intellige...

With the latest imaging techniques, we peer inside David Pogue's mind, witness the firing of his brain cells, and look at how scientists are beginning to map the complex neural networks that are the key to intelligence, memory, and problem solving.

Outside Resources

Blog: Dr. Jonathan Wai has an excellent blog on Psychology Today discussing many of the most interesting issue related to intelligence.

http://www.psychologytoday.com/blog/finding-the-next-einstein

Video: Hank Green gives a fun and interesting overview of the concept of intelligence in this installment of the Crash Course series.
https://www.youtube.com/watch?v=9xTz3QjcloI

Evidence-Based Teaching

Hunt, E. (2013). Teaching intelligence: Why, why it is hard and perhaps how to do it. *Intelligence, 42156-165. doi:10.1016/j.intell.2013.06.018*

- This paper details some of the reasons that it is important to teach intelligence and also why in many schools it is no longer its own course of study. There are some tricky areas to cover such as the associations of intelligence with elitism and racism, but also ideas for how to discuss these issues. The primary idea is to start with teaching an understanding for what intelligence is and the biological and environmental causes of intelligence.

Suggestions from the Society for Teaching's Introductory Psychology Primer

Keeley, J. (2013). Intelligence and thinking. In S.E. Afful, J. J. Good, J. Keeley, S. Leder, & J. J. Stiegler-Balfour (Eds.). Introductory Psychology teaching primer: A guide for new teachers of Psych 101. Retrieved from the Society for the Teaching of Psychology web site: http://teachpsych.org/ebooks/intro2013/index.php

POSSIBLE ASSESSMENTS (In or Out of Class)

Have students create their own (brief) intelligence test by generating questions. Can occur before or after discussions of culture fair tests. (LO 1.2b, 5.5)

ACTIVITIES & TECHNIQUES (In Class)

The Hamburger Test of Intelligence – Have students describe their favorite toppings on a

hamburger. Have them immediately repeat the task. Then provide a bogus list of acceptable "intelligent" toppings. The exercise is a fun way to distinguish between the reliability (very reliable) and validity (terribly invalid) of a test. (LO 4.3) (IC)

Administer the intelligence test given to American soldiers in WWI (available at http://historymatters.gmu.edu/d/5293). This activity highlights the cultural dependency of many intelligence tests for factual knowledge, and can lead to a discussion of crystallized versus fluid intelligence. It tends to be fun for students. (LO 5.5) (IC)

Introduce the book "The Bell Curve" by Richard Herrnstein and Charles Murray (1994). (*Students could also read an excerpt before class and come prepared to discuss*.) Have students discuss one of the more controversial claims of the book that intelligence is largely inherited and not influenced much by ethnicity or socio-economic status. Have students describe the possible implications of that statement. This activity highlights a difficult core concept for many students. (LO 5.5) (IC/OC)

RELEVANT TOP ARTICLES (Annotated Bibliography)

This article presents a demonstration of the definition of intelligence by presenting visual word puzzles as a quick test of intelligence. It involves repeated presentation of items varying in difficulty as prompts for discussion of the topics of reliability and situational factors in testing. All materials necessary for the test are in the text. Griggs, R. A. (2000). A one minute "intelligence" test. *Teaching of Psychology*, *27*, 132-135. 44

THINKING*: COVERAGE SUGGESTIONS* 1 class period (50 min – 75 min): Define cognition (LO 1.2a) _Introduce concepts (prototypes, exemplars) and classification (hierarchies) (LO 1.3c) _Problem solving, including heuristics (LO 3.1e) _Decision making, including common biases (representativeness, availability, overconfidence) (LO 3.1e, 5.2) Through the use of three "intelligence tests," this article provides demonstrations of multicultural awareness. Specifically, the demonstrations highlight language and cultural biases that can exist in intelligence tests. Warren, C. S. (2006). Incorporating multiculturalism into undergraduate psychology courses: Three simple active learning activities. *Teaching of Psychology*, *33*, 105-109. **LEARNING OBJECTIVES_1.2a:**Demonstrate knowledge and understanding representing appropriate breadth and depth in selected content areas of psychology (1) learning and cognition _**1.3c:**Interpret behavior and mental processes at an appropriate level of complexity _**3.1e:**Recognize and defend against common fallacies in thinking _**5.2:**Demonstrate reasonable skepticism and intellectual curiosity by asking questions about causes of behavior *(as suggested by APA guidelines, 2007)* 45

Links to ToPIX Materials

Activities, demonstrations, handouts, etc.:
http://topix.teachpsych.org/w/page/19980978/Cognition%20in%20the%20Classroom

Thinking-Language Intelligence In the News:
http://topix.teachpsych.org/w/page/26682121/Cognition%20in%20the%20News

Video, Books and Film:
http://topix.teachpsych.org/w/page/39237027/

Video:
http://topix.teachpsych.org/w/page/19980979/Cognition%20

Teaching Topics

Teaching The Most Important Course
https://nobaproject.com/documents/1_Teaching_The_Most_Important_Course.pdf

Content Coverage
https://nobaproject.com/documents/2_Content_Coverage.pdf

Motivating Students
https://nobaproject.com/documents/3_Motivating_Students_Tips.pdf

Engaging Large Classes
https://nobaproject.com/documents/4_Engaging_Large_Classes.pdf

Assessment Learning
https://nobaproject.com/documents/5_Assessment_Learning.pdf

Teaching Biological Psychology
https://nobaproject.com/documents/6_Teaching_Bio_Psych.pdf

PowerPoint Presentation

This module has an associated PowerPoint presentation. Download it at https://nobaproject.com//images/shared/supplement_editions/000/000/125/Intelligence.ppt?1416598900.

About Noba

The Diener Education Fund (DEF) is a non-profit organization founded with the mission of re-inventing higher education to serve the changing needs of students and professors. The initial focus of the DEF is on making information, especially of the type found in textbooks, widely available to people of all backgrounds. This mission is embodied in the Noba project.

Noba is an open and free online platform that provides high-quality, flexibly structured textbooks and educational materials. The goals of Noba are three-fold:

- To reduce financial burden on students by providing access to free educational content
- To provide instructors with a platform to customize educational content to better suit their curriculum
- To present material written by a collection of experts and authorities in the field

The Diener Education Fund is co-founded by Drs. Ed and Carol Diener. Ed is the Joseph Smiley Distinguished Professor of Psychology (Emeritus) at the University of Illinois. Carol Diener is the former director of the Mental Health Worker and the Juvenile Justice Programs at the University of Illinois. Both Ed and Carol are award- winning university teachers.

Acknowledgements

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