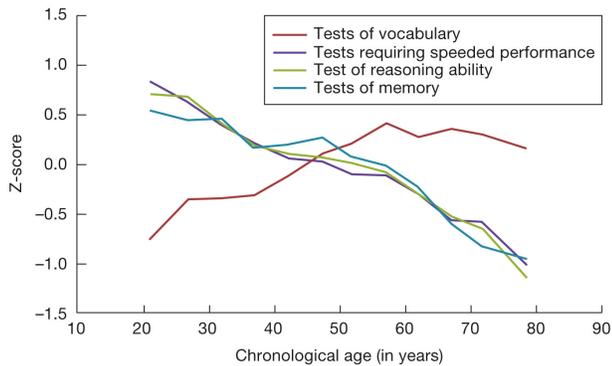


Fluid and Crystallized Intelligence

- **Crystallized intelligence (Gc):** your accumulated knowledge, as reflected in tests of vocabulary and facts about the world
- **Fluid intelligence (Gf):** involves content independent analytical processes which come into play when discerning patterns in the environment understanding analogies, and drawing inferences



Horn & Noll (1994)

Raven's Progressive Matrices test people's abilities to perceive and learn patterns involving unfamiliar stimuli

Problem 1 Problem 2 Problem 3

1 2 3 4 1 2 3 4 1 2 3 4

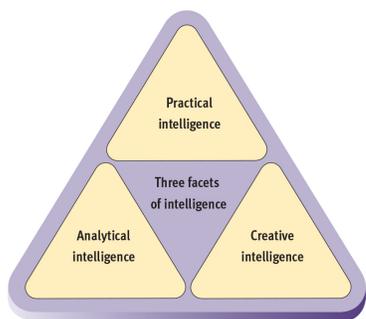
5 6 7 8 5 6 7 8 5 6 7 8

People with savant syndrome are exceptional in some abilities (often one) and significantly impaired in others



They show that it is possible to have extreme talent that is separate from the intelligence measured on IQ tests

Triarchic Theory of Intelligence

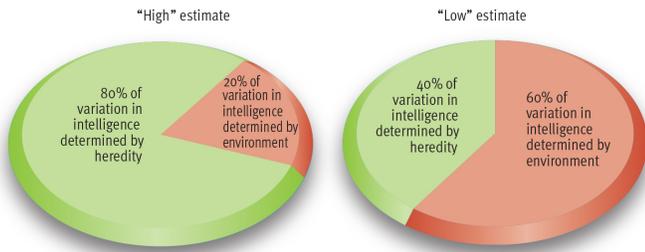


Effectiveness in life is determined by the extent to which the three aspects of intelligence interact and work together

Gardner's Multiple Intelligences theory: several distinct intelligences are each supported by independent brain areas

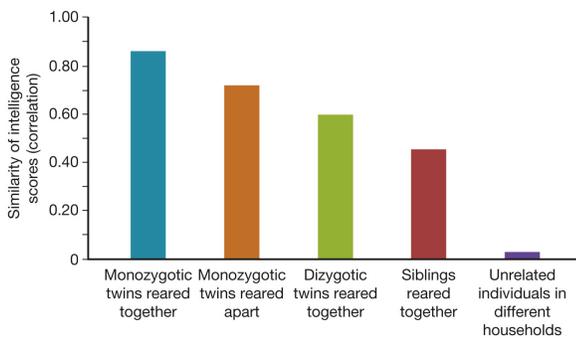
TYPE OF INTELLIGENCE							
<p>Logical-mathematical</p>	<p>Linguistic</p>	<p>Musical</p>	<p>Spatial</p>	<p>Bodily-kinesthetic</p>	<p>Interpersonal</p>	<p>Intrapersonal</p>	<p>Naturalist</p>
CORE COMPONENTS							
Sensitivity to, and capacity to discern, logical or numerical patterns; ability to handle long chains of reasoning	Sensitivity to the sounds, rhythms, and meanings of words; sensitivity to the different functions of language	Abilities to produce and appreciate rhythm, pitch, and timbre; appreciation of the forms of musical expressiveness	Capacities to perceive the visual-spatial world accurately and to perform transformations on one's initial perceptions	Abilities to control one's body movements and to handle objects skillfully	Capacities to discern and respond appropriately to the moods, temperaments, motivations, and desires of other people	Access to one's own feelings and the ability to discriminate among them and draw upon them to guide behaviour; knowledge of one's own strengths, weaknesses, desires, and intelligences	Abilities to recognize and categorize objects and processes in nature

Heritability ratio: an estimate of the portion of variation in a trait that is determined by heredity, with the remainder presumably determined by the environment



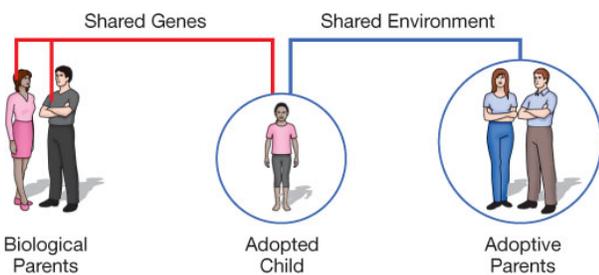
Heritability estimates for intelligence are about 50%

Genetic factors play a role in shaping intelligence: MZ twins IQ scores are more alike than DZ twin scores



Bouchard & McGue (1981)

The adoption method: compares the correlation of IQ scores of adopted children and their adoptive parents, to the correlation of IQ scores of adopted children and their biological parents



Adopted children's IQ scores are more similar to their biological parents than their adoptive parents

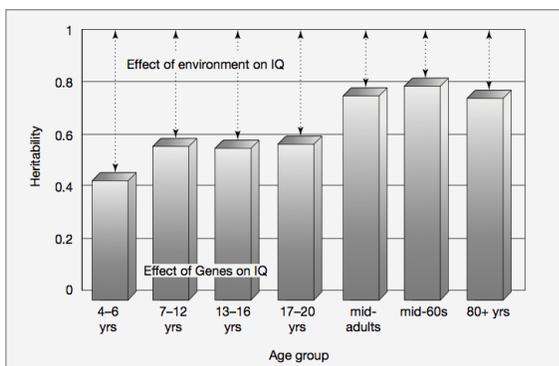
Identical twins reared together	+ .86
Fraternal twins reared together	+ .60
Siblings reared together	+ .47
Child and biological parent by whom child is reared	+ .42
Child and biological mother separated from the child by adoption	+ .31
Child and unrelated adoptive mother	+ .17

Bouchard & McGue (1981)

Intelligence and the Brain

- Most imaging studies fail to show a correlation between brain size and intelligence (Basten et al., 2013)
- Intelligence is positively related to the number of neurons in the prefrontal cortex (Glaser et al., 2010)
- Intelligence is negatively related to the speed of information processing (Sternberg, 2003)
- During brain development, highly intelligent people show a pattern of cortical thickening and thinning that is different from the pattern shown by less intelligent people (Shaw et al., 2008)

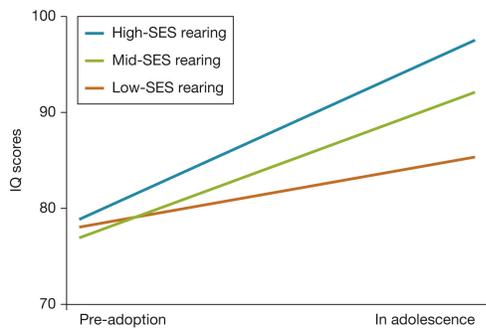
The influence of the environment on intelligence is strongest in childhood and adolescence — the heritability estimate increases across the lifespan



Environmental Influences

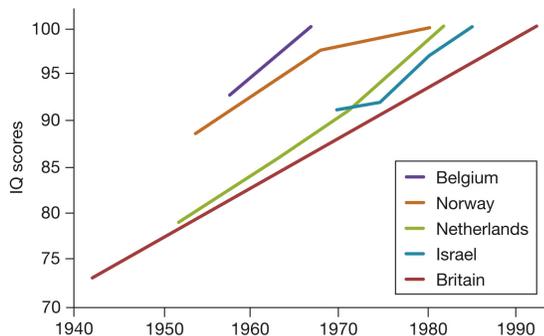
- Correlations of IQ scores for pairs of siblings are smaller in siblings widely separate in age than those that were closer in age (Sundet et al., 2008)
- **Cumulative deprivation hypothesis:** the longer a child remains in an impoverished environment the greater the harm to his or her intelligence (Asher, 1935)

Improvement in intelligence due to change in environment: children's IQ scores increased after adoption into a better environment, especially if adopted into a high-SES family



Duyme et al. (1999)

The Flynn effect: the improvement in IQ scores that has been occurring in many places in the world must be explained largely in environmental (not genetic) terms



Trajan et al. (2014)
