

# Test Construction



# How do we construct Intelligence tests?

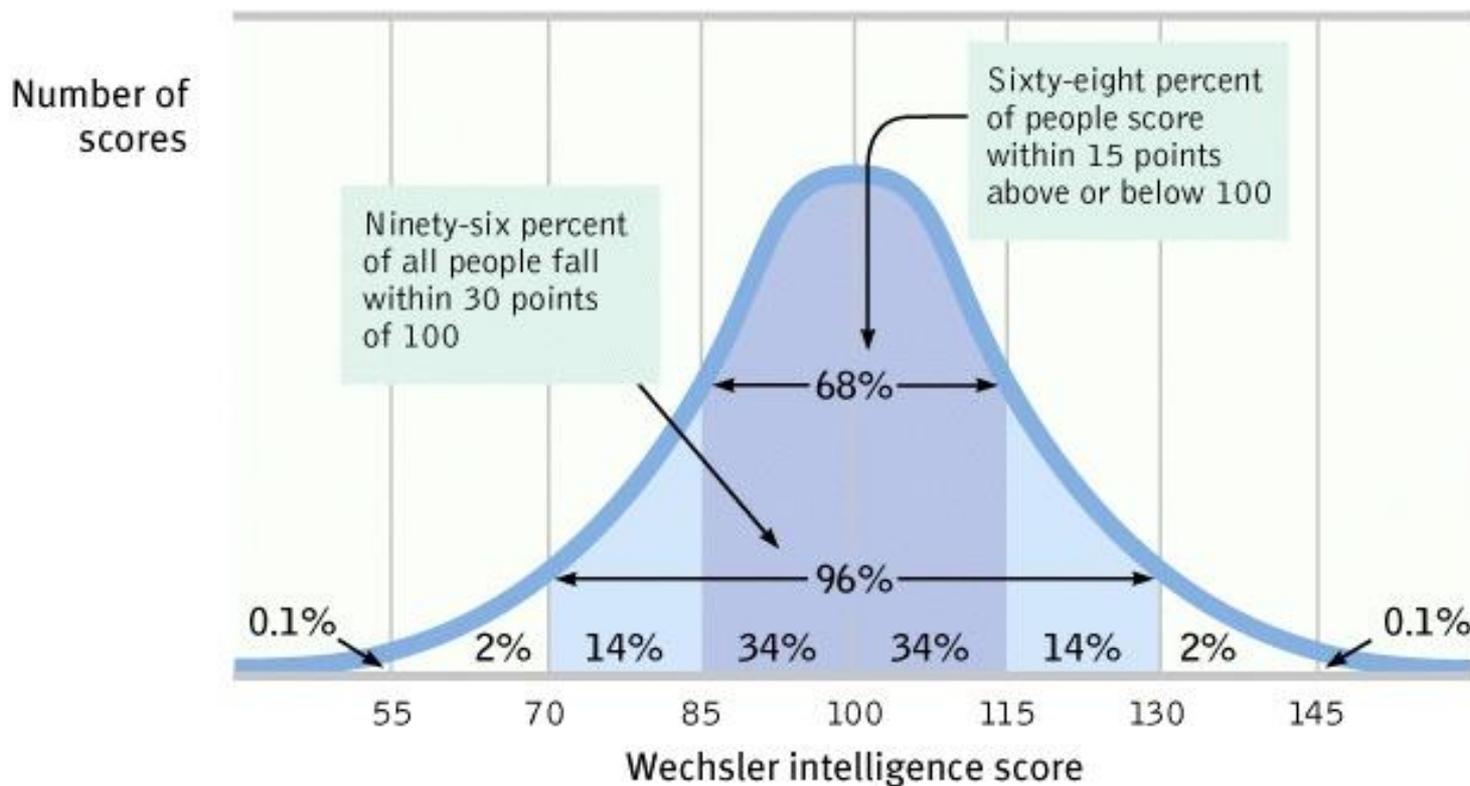
Tests must be:

- Standardized
  - Reliable
  - Valid



# Standardization

- The test must be pre-tested to a representative sample of people and form a normal distribution or bell curve
  - If we didn't have a representative sample to compare to, we wouldn't know what our scores meant!



# Reliability

- The extent which a test yields consistent results over time.
- What is a "reliable" friend?
- *Split halves, alternative forms, or test-retest methods.*



# Validity

- The extent to which a test measures or predicts what it is supposed to measure.
- Two types:  
Content Validity  
and Predictive Validity
  - We'll come back to these in a minute



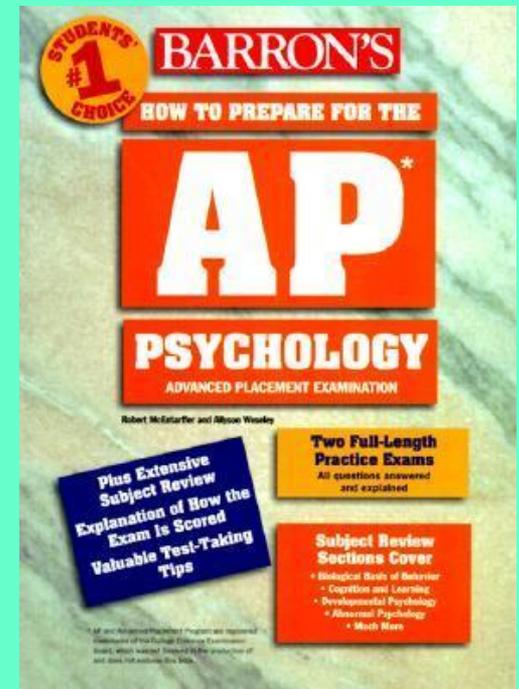
"I don't reimburse. I validate. I listen and acknowledge how difficult it was for you to find a place to park."

# Aptitude v. Achievement Tests

## Achievement Test

- A test designed to assess what a person has learned.
  - Examples: Psychology exams, driver's tests

Content Validity: does the test do a good job of sampling the criterion that it is supposed to?

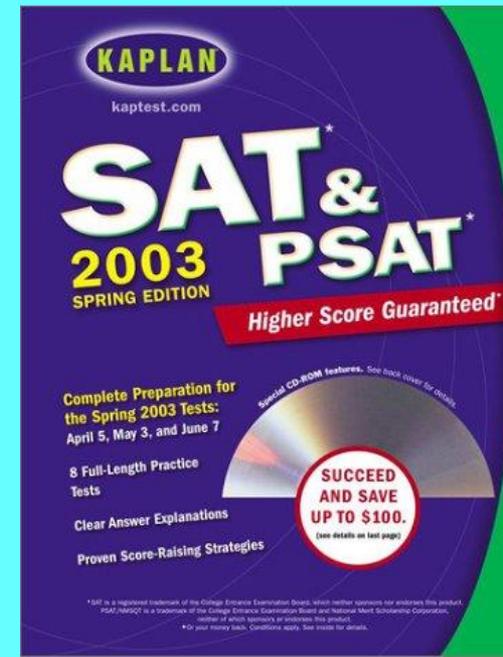


# Aptitude v. Achievement Tests

## Aptitude Test

- A test designed to predict a person's future performance.
- The ability for that person to learn.
  - Examples: SAT, Career Assessments

**Predictive Validity**: does the test do a good job of predicting the **criterion** that it is supposed to?



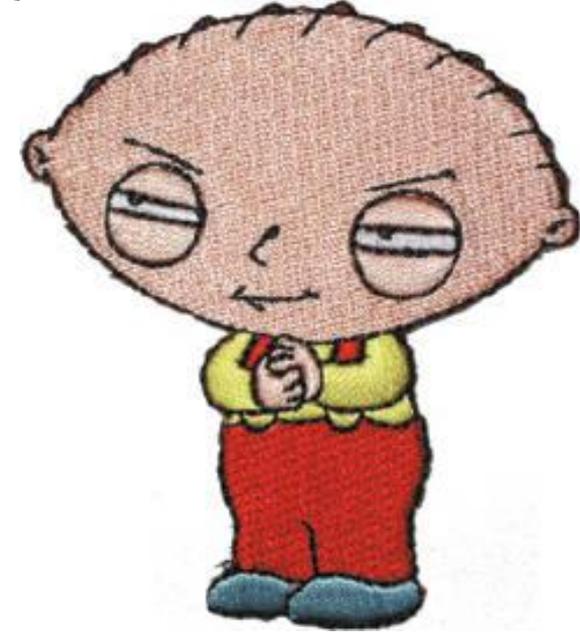
© Original Artist  
Reproduction rights obtainable from  
[www.CartoonStock.com](http://www.CartoonStock.com)



**"If I believed in aptitude tests I'd still be washing cars in Accrington."**

# Brain Size and Intelligence

## Is there a link?



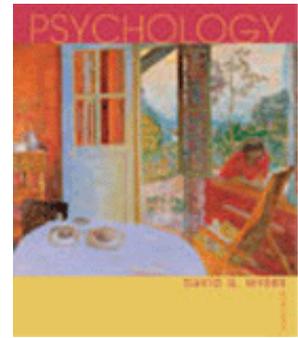
- Small  $+0.15$  correlation between head size and intelligence scores (relative to body size).
- Using an MRI we found  $+0.44$  correlation with brain size and IQ score.
- Portion sizes vary as well
  - Einstein had abnormally large parietal lobes
- Environmental experiences impact
  - Highly educated people die with 17% more synapses than counterparts



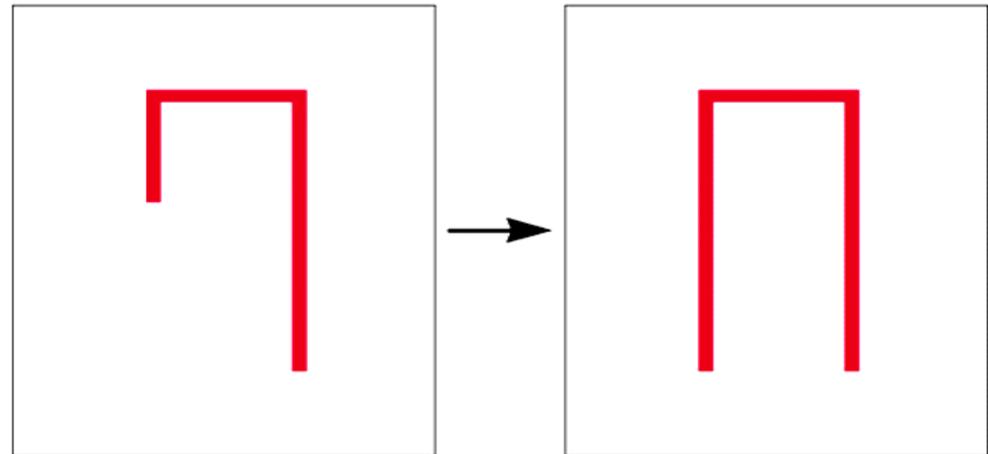
# Other Environmental Influences

- Infants who suffer from extreme malnutrition during infancy average 20 I.Q. points lower than other children (Stock and Smythe, 1963)
- Toxins in the environment such as lead found in some paints are associated with reduced I.Q. (Needleman, 1990)
- Intelligence declines with family size; the fewer children there are the smarter you are likely to be (Zajonc, 1975)
- Intelligence declines with birth order; first-borns tend to be brighter (Zajonc, 1975)
- I.Q. is negatively correlated with family risk factors, such as social class or absence of father figure (1989)

# Brain Function and Intelligence



- Correlation between fast perceptual speed and general intelligence
  - People who can perceive the stimulus very quickly tend to score somewhat higher on intelligence tests



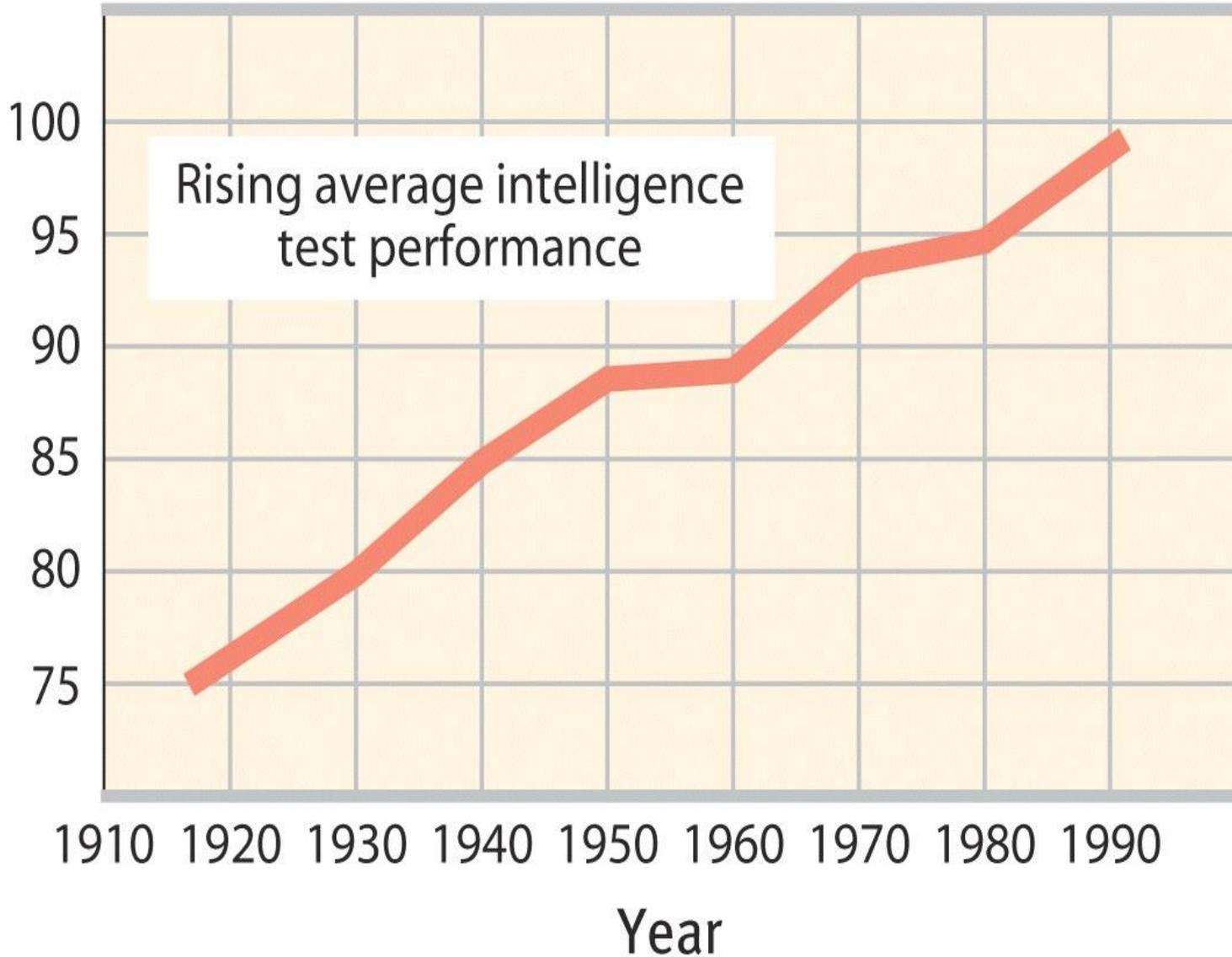
**Stimulus**                      **Mask**  
**Question: Long side on left or right?**

## Neurological Speed

Correlation between intelligence and neurological processing

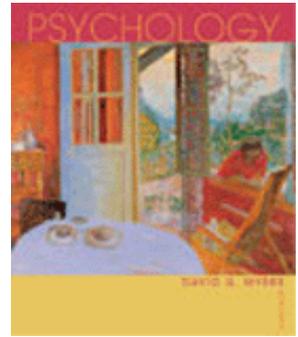
# Flynn Effect

Intelligence scores, based on 1996 standards



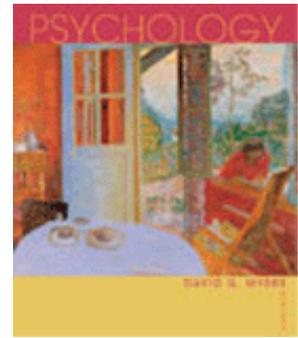
**Flynn Effect:**  
IQ scores going up about 3 points per decade

# Assessing Intelligence



- Wechsler Adult Intelligence Scale (WAIS)
  - most widely used intelligence test
  - subtests
    - verbal
    - performance (nonverbal)

# Assessing Intelligence: Sample Items from the WAIS



## VERBAL

**General Information**  
**Similarities**  
**Arithmetic Reasoning**  
**Vocabulary**  
**Comprehension**  
**Digit Span**

## PERFORMANCE

**Picture Completion**  
**Picture Arrangement**  
**Block Design**  
**Object Assembly**  
**Digit-Symbol Substitution**

## VERBAL

### General Information

What day of the year is Independence Day?

### Similarities

In what way are *wool* and *cotton* alike?

### Arithmetic Reasoning

If eggs cost 60 cents a dozen, what does 1 egg cost?

### Vocabulary

Tell me the meaning of corrupt.

### Comprehension

Why do people buy fire insurance?

### Digit Span

Listen carefully, and when I am through, say the numbers right after me.

7 3 4 1 8 6

Now I am going to say some more numbers, but I want you to say them backward.

3 8 4 1 6

## PERFORMANCE

### Picture Completion

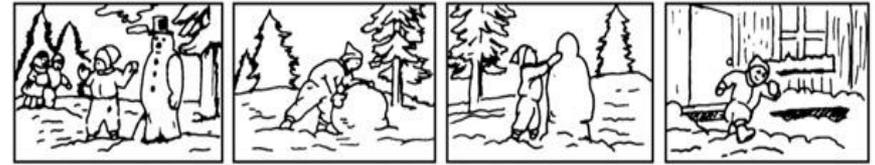
I am going to show you a picture with an important part missing. Tell me what is missing.

'85

SUN	MON	TUE	WED	THU	FR	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

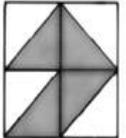
## Picture Arrangement

The pictures below tell a story. Put them in the right order to tell the story.



## Block Design

Using the four blocks, make one just like this.



## Object Assembly

If these pieces are put together correctly, they will make something. Go ahead and put them together as quickly as you can.



## Digit-Symbol Substitution

Code

1	2	3	4	5

Test

1	5	4	2	1	3	5	4	1	5

# Emotional Intelligence (EQ)



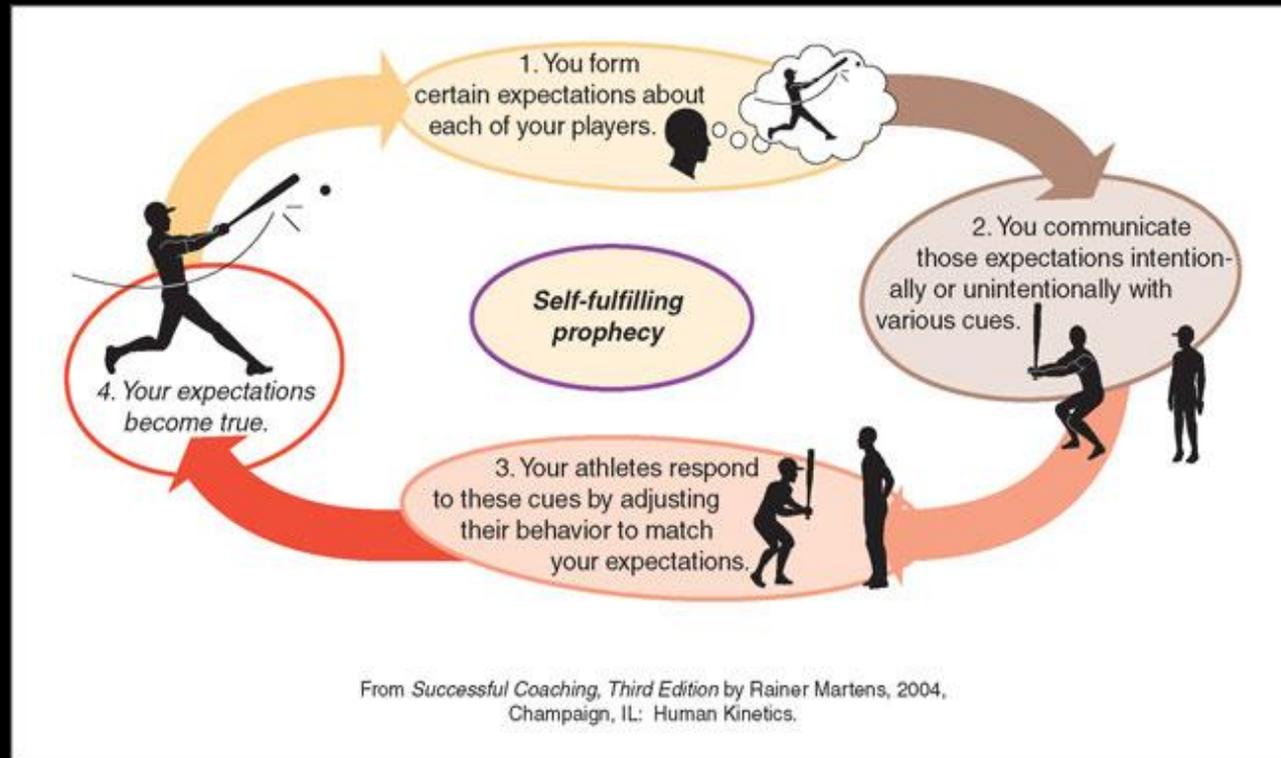
- First called social intelligence.
- The ability to perceive, express, understand, and regulate emotions.
- Some studies show EQ to be a greater predictor for future success than IQ

**Emotional Intelligence Test**

# Tracking

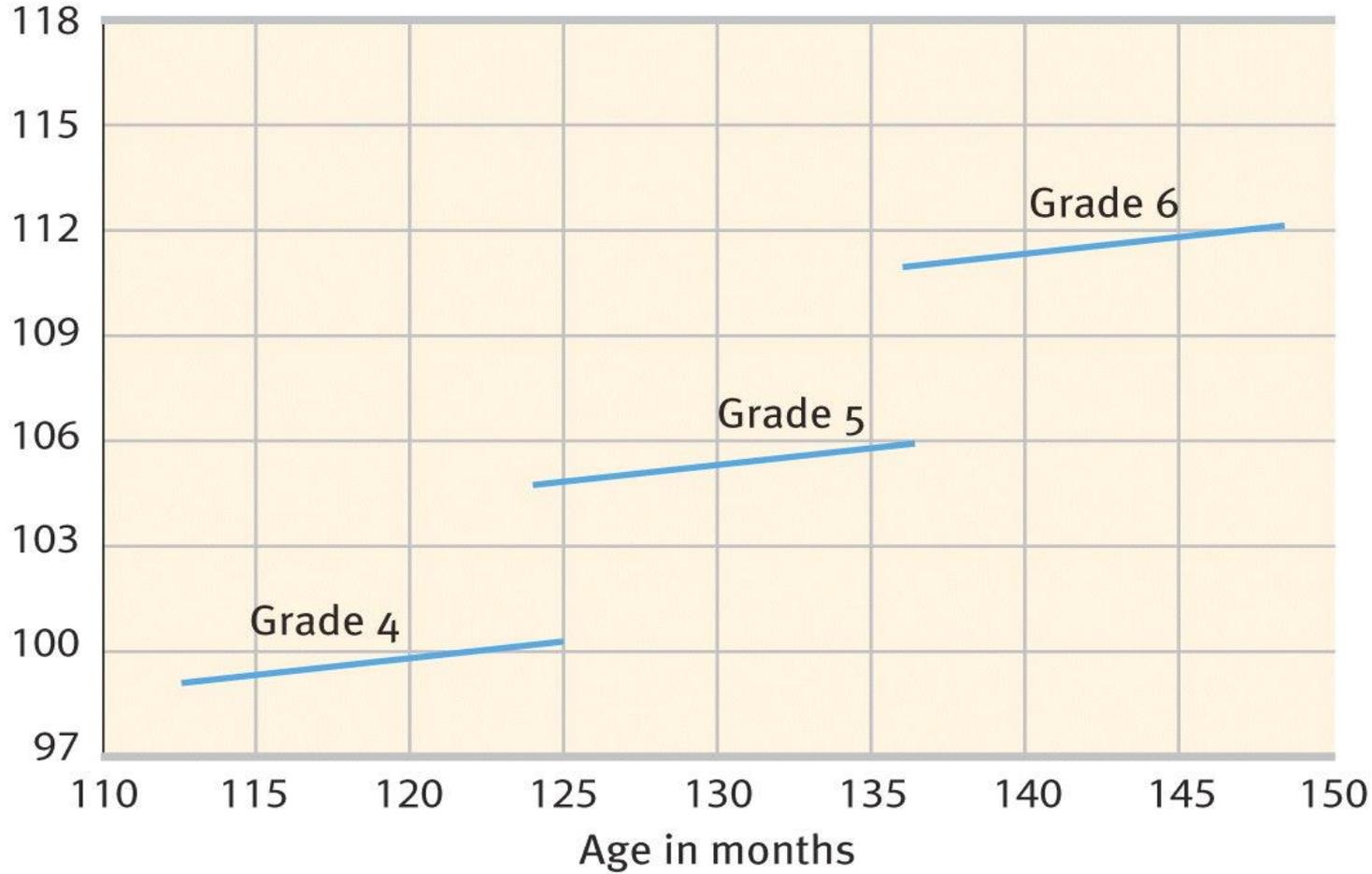
- From early age students are often tracked into “gifted” programs and “remedial” programs... what’s a potential problem with this?

## – Self-Fulfilling Prophecy



Intelligence test score gains relative to grade 4 baseline

Intelligence scores drop over the summer when students are not in school



# Group Differences

- Average IQ scores vary by racial groups
  - Whites: Roughly 100
  - Blacks: Roughly 85
  - Hispanics: Roughly 92/93
- Differences are diminishing over time
- What might explain these differences?

# Group Differences

## ■ Stereotype Threat

- A self-confirming concern that one will be evaluated based on a negative stereotype

- Example: Women score higher on math tests when no male test-takers are in the room

