Intelligence as Warp and Woof of Human Affairs

Linda S. Gottfredson
School of Education
University of Delaware
Newark, DE 19716 USA

A keynote talk at the
International Society for the Study of Individual Differences
Chicago, IL
July 19, 2009
“Intelligence” = cognitive variation

A fact about populations, not individuals
Falsifiable hypothesis

“Cognitive variation within our species—specifically $g$—has become the prime, deep organizer of human affairs”

(Gordon, 1997)
Sociology’s claims in the 1970s

My focus of hypothesis testing at that time

• Empirical facts:
  – Education predicts job level better than IQ does
  – But education doesn’t predict job performance

• False inferences:
  – IQ can’t predict job performance
  – Virtually everyone could do all jobs

• Conclusion:
  – Education and IQ do not reflect “merit,” but social class in disguise. It’s a way the ruling classes maintain dominance.
  – IQ differences created by & are secret surrogate for social class

• Generalization (initial assumption confirmed!):
  – Occupational prestige ladder has no functional basis
  – Human inequality is socially constructed, the result of oppression and privilege

Generalized today to all group disparities—education, health, crime, etc.
SES-IQ-inequality nexus: What’s nearest its center?
Distribution(s) of contending “prime causes” of social disparities

IQ distribution

Many (failed) efforts to change it

US income distribution, 2005

Trends in educational attainment

Recent: 1995-2008

A longer look back: 1930-2008

Ages 18+

Ages 25+

IQ distribution

Trends in educational attainment

IQ distribution

Trends in educational attainment
All were conceptual “black boxes”

Much of my career on opening this box

Still black

IQ distribution

Trends in educational attainment

Recent: 1995-2008

A longer look back: 1930-2008

US income distribution, 2005

Still black
Falsifiable hypothesis

“Cognitive variation within our species—specifically $g$—has become the prime, deep organizer of human affairs”

Amount of education behaves like consumption item, not deep cause
Falsifiable hypothesis

“Cognitive variation within our species—specifically $g$—has become the prime, deep organizer of human affairs”

Income distributed very differently, like a multiplicative outcome (e.g., scientific productivity, patents, genius)
Why?

• Cognitive diversity is the prime generator of differential odds of success
Argument

First, only cognitive variation is a biological fact

*In all populations, too*

Converging evidence

- Psychometric
- Physiological
- Genetic
- Evolutionary
- Experimental
- Comparative
$g$ is enmeshed in brain physiology

(Deary, 2000; Jensen, 1998)

**IQ tests**
Accuracy on complex tasks

**Brain**
Structure Processes

**Elementary cognitive tasks (ECTs)**
Speed on simple tasks

- Higher if tasks cumulated

Size of brain (MRI)
Metabolic (PET scan)
Electrical (ERPs)

Inspection time
Reaction time
Genetically enmeshed in brain physiology
$g$ is not a place or a module in brain

But patterns of activation distributed across whole brain

(Jung & Haier, 2007)

Highly general across brain & genes
Fluid $g$ rises, then falls with biological age

*All fluid abilities move in tandem*

“Maximal” trait--much can interfere
Genetic portion of IQ variation rises with age. Family SES contributions to IQ variation wash away. Family background still matters for other outcomes, but not g.
Cognitive variation is highly structured

**g is core of all mental abilities**
- Proficiency in learning, reasoning, think abstractly
- Ability to spot problems, solve problems
- Not knowledge, but ability to accumulate and apply it

Construct clear—black box opened

MOST GENERAL
- Domain general
- More heritable
  - Psychometrically unitary
  - Physiologically distributed

NARROW

Where is “intelligence”??

IQ ≈ g ≈ g_{fluid}

Phenotypic structure appears to be replicated at genetic level
Cognitive variation is highly structured

**g is core of all mental abilities**
- Proficiency in learning, reasoning, think abstractly
- Ability to spot problems, solve problems
- Not knowledge, but ability to accumulate and apply it

No such conceptual clarity for “socioeconomic status” (social class), or its various markers
- income
- wealth
- years of education
- occupational status
- etc.

Phenotypic structure appears to be replicated at genetic level
What about other evolutionarily-rooted human differences?

Variation in $g$ has become the most **consistent** generator of differential (“unequal”) odds

Examples shortly…

- **Not personality**: More is always better with $g$, but not personality traits
- **Not physical capabilities**: Modernization raises premium on cognitive competence, but lowers it for physical
- **Not social relations**: Modern democracies atomize social life; increase anonymity, individualism, and formal (rather than informal) control—all favoring $g$
- **Not mating & sexual dimorphism**: Rising premium on $g$ reduces import of sexual dimorphism and incentive for family formation
Even miniscule differences in odds are powerful, if consistent, because consistency allows cumulation of small effects

- Recall Spearman-Brown Prophecy Formula for test reliability

Common variance = 
\[ k(r_{xx}) \div [1 + r_{xx}(k – 1)] \],

Where,
- \( k \) = number of items,
- \( r_{xx} \) = average intercorrelation of items

<table>
<thead>
<tr>
<th>( r_{xx} )</th>
<th>N=2</th>
<th>30</th>
<th>100</th>
<th>500</th>
<th>1,000</th>
<th>2,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>.5</td>
<td>67</td>
<td>97</td>
<td>99</td>
<td>99+</td>
<td>99+</td>
<td>99+</td>
</tr>
<tr>
<td>.4</td>
<td>57</td>
<td>95</td>
<td>98+</td>
<td>99+</td>
<td>99+</td>
<td>99+</td>
</tr>
<tr>
<td>.3</td>
<td>46</td>
<td>93</td>
<td>98</td>
<td>99+</td>
<td>99+</td>
<td>99+</td>
</tr>
<tr>
<td>.2</td>
<td>29</td>
<td>88</td>
<td>97+</td>
<td>99</td>
<td>99+</td>
<td>99+</td>
</tr>
<tr>
<td>.1</td>
<td>18</td>
<td>77</td>
<td>92</td>
<td>98</td>
<td>99</td>
<td>99+</td>
</tr>
<tr>
<td>.01</td>
<td>2</td>
<td>23</td>
<td>50</td>
<td>83</td>
<td>91</td>
<td>95</td>
</tr>
<tr>
<td>.001</td>
<td>&lt;1</td>
<td>3</td>
<td>11</td>
<td>33</td>
<td>50</td>
<td>67</td>
</tr>
</tbody>
</table>

Tiny \( g \)-based natural selection over 2,000 generations?
Spearman-Brown phenomenon in life’s everyday “tests”

<table>
<thead>
<tr>
<th>S</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>T</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
</tr>
<tr>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
<td>.1</td>
</tr>
</tbody>
</table>

Every day requires some reasoning & learning
What increases $k$ (number of items)?

<table>
<thead>
<tr>
<th>IQ distribution for:</th>
<th>Odds cumulate with more:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tasks</td>
</tr>
<tr>
<td>Across units (decontextualized)</td>
<td></td>
</tr>
<tr>
<td>Individuals (probands)</td>
<td></td>
</tr>
<tr>
<td>Populations (aggregates)</td>
<td></td>
</tr>
<tr>
<td>Across systems (interpersonal contexts)</td>
<td></td>
</tr>
<tr>
<td>Subcultures</td>
<td></td>
</tr>
<tr>
<td>Political units</td>
<td></td>
</tr>
</tbody>
</table>

Need to look beyond individual-level, where processes will work on different scale

Critical in a social species
What increases \( r \) (intercorrelation among life’s mental “test” items)?

Most importantly,
\begin{itemize}
  \item Complexity of tasks (it increases their \( g \) loading)
  \item Tasks performed independently (without help)
  \item Performance objectively measured
  \item Measure is reliable
  \item As a consequence, instrumental rather than socioemotional tasks
\end{itemize}

Note that both \( k \) and \( r \) are task (not person) attributes
Will show: $g$-based odds cumulate, cascade & compound across lives, groups & cultures

Individual differences in success

$g$-based social clustering in schools, jobs, neighborhoods

Unemployed 12 10 7 7 2
Illegitimate child 32 17 8 4 2
Lives in poverty 30 16 8 3 2
Chronic welfare 31 17 2 0
HS dropout 55 35 0.4 0

Different interpersonal climates, help, risks

$g$-based sub-cultures; diffusion gradients for information, help, & regard

Social inequality, job hierarchies, intergroup competition, policy responses

GDP, health, innovation, modernization, functioning democracy, rule of law

$\downarrow = \text{counterproductive}$
How different are people, anyway?
Individual differences are meaningfully (shockingly) large

In criterion-related terms

Example: Functional literacy—one of life’s everyday “intelligence tests” for adults
## Estimated levels of usual cognitive functioning

U.S. Dept of Education 1993 survey of adult functional literacy
(nationally representative sample, ages 16+, N=26,091)

<table>
<thead>
<tr>
<th>NALS Level</th>
<th>% pop.</th>
<th>Simulated Everyday Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3%</td>
<td>• Use calculator to determine cost of carpet for a room&lt;br/&gt;• Use table of information to compare 2 credit cards</td>
</tr>
<tr>
<td>4</td>
<td>17%</td>
<td>• Use eligibility pamphlet to calculate SSI benefits&lt;br/&gt;• Explain difference between 2 types of employee benefits</td>
</tr>
<tr>
<td>3</td>
<td>31%</td>
<td>• Calculate miles per gallon from mileage record chart&lt;br/&gt;• Write brief letter explaining error on credit card bill</td>
</tr>
<tr>
<td>2</td>
<td>27%</td>
<td>• Determine difference in price between 2 show tickets&lt;br/&gt;• Locate intersection on street map</td>
</tr>
<tr>
<td>1</td>
<td>22%</td>
<td>• Total bank deposit entry&lt;br/&gt;• Locate expiration date on driver’s license</td>
</tr>
</tbody>
</table>

Routinely able to perform tasks only up to this level of difficulty.
## Estimated levels of usual cognitive functioning

U.S. Dept of Education 1993 survey of adult functional literacy  
(nationally representative sample, ages 16+, N=26,091)

<table>
<thead>
<tr>
<th>NALS Level</th>
<th>% pop.</th>
<th>Simulated Everyday Tasks</th>
</tr>
</thead>
</table>
| 5          | 3%     | • Use calculator to determine cost of carpet for a room  
            |        | • Use table of information to compare 2 credit cards |
| 4          | 17%    | • Use eligibility pamphlet to calculate SSI benefits  
            |        | • Explain difference between 2 types of employee benefits |
| 3          | 31%    | • Calculate miles per gallon from mileage record chart  
            |        | • Write brief letter explaining error on credit card bill |
| 2          | 27%    | • Determine difference in price between 2 show tickets  
            |        | • Locate intersection on street map |
| 1          | 22%    | • Total bank deposit entry  
            |        | • Locate expiration date on driver's license |

Difficulty based on “process complexity”

- level of inference
- abstractness of info
- distracting information

Not reading per se, but “problem solving”
## Estimated levels of usual cognitive functioning

**U.S. Dept of Education 1993 survey of adult functional literacy**
(nationally representative sample, ages 16+, N=26,091)

<table>
<thead>
<tr>
<th>NALS Level</th>
<th>% pop.</th>
<th>Simulated Everyday Tasks</th>
</tr>
</thead>
</table>
| 5          | 3%     | - Use calculator to determine cost of carpet for a room  
|            |        | - Use table of information to compare 2 credit cards |
| 4          | 17%    | - Use eligibility pamphlet to calculate SSI benefits |
| 2          | 27%    | - Determine difference in price between 2 show tickets  
|            |        | - Locate intersection on street map |
| 1          | 22%    | - Total bank deposit entry  
|            |        | - Locate expiration date on driver’s license |

US Dept of Education: People at levels 1-2 are below literacy level required to enjoy rights & fulfill responsibilities of citizenship
# Life as a test

Every day requires some reasoning & learning.
Item at NALS Level 1*

- Literal match
- One item
- Little distracting info

22% of US adults

78% of adults do better

Here is a Social Security card. Sign your name on the line that reads "signature."

SOCIAL SECURITY
ACCOUNT NUMBER
301-02-0304
HAS BEEN ESTABLISHED FOR
FOR SOCIAL SECURITY PURPOSES • NOT FOR IDENTIFICATION

* 80% probability of correctly answering items of this difficulty level
You are a marketing manager for a small manufacturing firm. This graph shows your company's sales over the last three years. Given the seasonal pattern shown on the graph, predict the sales for Spring 1985 (in thousands) by putting an “x” on the graph.

- Simple inference
- Little distracting information

22% of US adults

27% of US adults

51%
Another item at NALS Level 2

22% 27% of US adults 51%

What is the gross pay for this year to date?

<table>
<thead>
<tr>
<th>HOURS</th>
<th>REGULAR</th>
<th>OVERTIME</th>
<th>GROSS</th>
<th>DEF. ANN.</th>
<th>NET PAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>62500</td>
<td>500</td>
<td>62500</td>
<td>45988</td>
<td></td>
</tr>
</tbody>
</table>

- Match two pieces of info

Reduced from original copy.
Item at NALS Level 3

31% of US adults

20%

You need to smooth wood in preparation for sealing and plan to buy garnet sandpaper. What type of sandpaper should you buy?

- Cycle through complex table
- Irrelevant info

SAFETY INFORMATION:
- Wear approved safety goggles when sanding.
- Use particle/dust mask or other means to prevent inhalation of sanding dust.
- When using power tools, follow manufacturer's recommended procedures and safety instructions.
On Saturday afternoon, if you miss the 2:35 bus leaving Hancock and Buena Ventura going to Flintridge and Academy, how long will you have to wait for the next bus?

**VISTA GRANDE**
This bus line operates Monday through Saturday providing "local service" to most neighborhoods in the northeast section. Buses run thirty minutes apart during the morning and afternoon rush hours Monday through Friday. Buses run one hour apart at all other times of day and Saturday on Sunday, holiday or night service.

You can transfer from this bus to another headed anywhere else in the city bus system.

### OUTBOUND

<table>
<thead>
<tr>
<th>Leave Downtown Terminal</th>
<th>Leave Hancock and Buena Ventura</th>
<th>Leave Rustic Hills</th>
<th>Leave North Carriage</th>
<th>Arrive Flintridge and</th>
<th>Leave Rustic Hills</th>
<th>Leave North Carriage</th>
<th>Leave Flintridge and</th>
<th>Leave Downtown Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:20</td>
<td>6:35</td>
<td>6:45</td>
<td>6:50</td>
<td>7:00</td>
<td>7:15</td>
<td>7:20</td>
<td>7:35</td>
<td>8:00</td>
</tr>
<tr>
<td>6:50</td>
<td>7:05</td>
<td>7:15</td>
<td>7:30</td>
<td>8:00</td>
<td>8:15</td>
<td>8:30</td>
<td>9:00</td>
<td>9:15</td>
</tr>
<tr>
<td>7:20</td>
<td>7:35</td>
<td>7:45</td>
<td>8:00</td>
<td>8:30</td>
<td>9:00</td>
<td>9:15</td>
<td>10:00</td>
<td>10:15</td>
</tr>
<tr>
<td>7:50</td>
<td>8:05</td>
<td>8:15</td>
<td>9:00</td>
<td>9:30</td>
<td>10:00</td>
<td>11:00</td>
<td>12:00</td>
<td>12:15</td>
</tr>
<tr>
<td>8:20</td>
<td>8:35</td>
<td>8:45</td>
<td>9:30</td>
<td>10:00</td>
<td>11:30</td>
<td>11:45</td>
<td>12:30</td>
<td>12:45</td>
</tr>
<tr>
<td>8:50</td>
<td>9:05</td>
<td>9:15</td>
<td>10:00</td>
<td>11:30</td>
<td>12:00</td>
<td>13:00</td>
<td>1:00</td>
<td>1:15</td>
</tr>
<tr>
<td>9:20</td>
<td>9:35</td>
<td>9:45</td>
<td>10:30</td>
<td>12:00</td>
<td>13:30</td>
<td>14:00</td>
<td>2:00</td>
<td>2:15</td>
</tr>
<tr>
<td>10:20</td>
<td>10:35</td>
<td>10:45</td>
<td>11:30</td>
<td>13:30</td>
<td>15:00</td>
<td>15:30</td>
<td>3:00</td>
<td>3:15</td>
</tr>
<tr>
<td>11:20</td>
<td>11:35</td>
<td>11:45</td>
<td>12:30</td>
<td>15:00</td>
<td>16:00</td>
<td>16:30</td>
<td>4:00</td>
<td>4:15</td>
</tr>
</tbody>
</table>

### INBOUND

<table>
<thead>
<tr>
<th>Leave Downtown Terminal</th>
<th>Leave Hancock and Buena Ventura</th>
<th>Leave Rustic Hills</th>
<th>Leave North Carriage</th>
<th>Arrive Flintridge and</th>
<th>Leave Rustic Hills</th>
<th>Leave North Carriage</th>
<th>Leave Flintridge and</th>
<th>Leave Downtown Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:15</td>
<td>2:30</td>
<td>2:45</td>
<td>3:00</td>
<td>3:15</td>
<td>3:30</td>
<td>3:45</td>
<td>4:00</td>
<td>4:15</td>
</tr>
<tr>
<td>2:45</td>
<td>3:05</td>
<td>3:15</td>
<td>3:45</td>
<td>4:00</td>
<td>4:15</td>
<td>4:30</td>
<td>5:00</td>
<td>5:15</td>
</tr>
<tr>
<td>3:15</td>
<td>3:35</td>
<td>3:45</td>
<td>4:15</td>
<td>4:30</td>
<td>5:00</td>
<td>5:15</td>
<td>5:45</td>
<td>6:00</td>
</tr>
<tr>
<td>3:45</td>
<td>4:05</td>
<td>4:15</td>
<td>4:45</td>
<td>5:00</td>
<td>5:15</td>
<td>6:00</td>
<td>6:45</td>
<td>7:00</td>
</tr>
<tr>
<td>4:15</td>
<td>4:35</td>
<td>4:45</td>
<td>5:15</td>
<td>5:45</td>
<td>6:00</td>
<td>6:15</td>
<td>7:30</td>
<td>7:45</td>
</tr>
<tr>
<td>4:45</td>
<td>5:05</td>
<td>5:15</td>
<td>5:45</td>
<td>6:15</td>
<td>6:30</td>
<td>7:00</td>
<td>8:30</td>
<td>9:00</td>
</tr>
<tr>
<td>5:15</td>
<td>5:35</td>
<td>5:45</td>
<td>6:15</td>
<td>6:30</td>
<td>7:00</td>
<td>8:00</td>
<td>9:30</td>
<td>10:00</td>
</tr>
<tr>
<td>5:45</td>
<td>6:05</td>
<td>6:15</td>
<td>6:45</td>
<td>7:00</td>
<td>8:00</td>
<td>9:00</td>
<td>10:30</td>
<td>11:00</td>
</tr>
<tr>
<td>6:15</td>
<td>6:35</td>
<td>6:45</td>
<td>7:00</td>
<td>8:00</td>
<td>9:00</td>
<td>10:00</td>
<td>11:30</td>
<td>12:00</td>
</tr>
</tbody>
</table>

---

**Item at NALS Level 4**

- More elements to match
- More inferences
- More distracting information

**Or,**

17% of US adults

Solved
Item at NALS Level 5

3% of US adults

Using the information in the table, write a brief paragraph summarizing the extent to which parents and teachers agreed or disagreed on the statements about issues pertaining to parental involvement at their school.

- Search through complex displays
- Multiple distractors
- Make high-level text-based inferences
- Use specialized knowledge

### Parents and Teachers Evaluate Parental Involvement at Their School

<table>
<thead>
<tr>
<th>Do you agree or disagree that...?</th>
<th>Level of School</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Elementary</td>
<td>Junior High</td>
<td>High School</td>
</tr>
<tr>
<td>Our school does a good job of encouraging parental involvement in sports, arts, and other nonsubject areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>77</td>
<td>76</td>
<td>74</td>
<td>79</td>
</tr>
<tr>
<td>Teachers</td>
<td>77</td>
<td>73</td>
<td>77</td>
<td>85</td>
</tr>
<tr>
<td>Our school does a good job of encouraging parental involvement in educational areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>73</td>
<td>82</td>
<td>71</td>
<td>64</td>
</tr>
<tr>
<td>Teachers</td>
<td>80</td>
<td>84</td>
<td>78</td>
<td>70</td>
</tr>
<tr>
<td>Our school only contacts parents when there is a problem with their child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>55</td>
<td>48</td>
<td>62</td>
<td>63</td>
</tr>
<tr>
<td>Teachers</td>
<td>23</td>
<td>18</td>
<td>22</td>
<td>33</td>
</tr>
<tr>
<td>Our school does not give parents the opportunity for any meaningful roles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>22</td>
<td>18</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>Teachers</td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: The Metropolitan Life Survey of the American Teacher, 1987
Enmeshed in nexus of social problems: Odds ratios* by NALS literacy level

(Literacy-level comparisons of social “failure rates”)

*Odds ratios have good statistical properties for group-level differences
Odds ratios, by health literacy level, for not knowing how to use info to determine:

(Literacy-level comparisons of item failure rates)

- Number of pills in Rx should take
- When next appt is
- Financial eligibility
- Times can fill Rx
- How take meds 4/day
- How take meds on empty stomach

Differences remain after controlling for SES, etc.
Correlates of $g$ variation are highly patterned and predictable

Individual differences in success

$g$-based social clustering in schools, jobs, neighborhoods

Unemployed 12 10 7 7 2
Illegitimate child 32 17 8 2
Lives in poverty 30 16 6 3 2
Chronic welfare 31 17 8 2 0
HS dropout 55 35 6 0.4 0

Different interpersonal climates, help, risks

$g$-based sub-cultures; diffusion gradients for information, help, & regard

Social inequality, job hierarchies, intergroup competition, policy responses

GDP, health, innovation, modernization, functioning democracy, rule of law

↓ = counterproductive
Gradients differ systematically by outcome

Correlations with continuous outcomes

- Standardized academic achievement: .8
- Job performance—**complex jobs***: .4-.5
- Years of education: .6
- Occupational level
- Job performance—**middle-level jobs***: .4-.5
- Income: .3-.4
- Delinquency: -.25
- Job performance—**simple jobs***: .2

* Correlations corrected for attenuation & restriction in range
Gradients differ systematically by outcome

Correlations with continuous outcomes

- Standardized academic achievement: 0.8
- Job performance—complex jobs*: 0.6
- Years of education: 0.4-0.5
- Occupational level: 0.3-0.4
- Income: -0.25
- Delinquency: -0.2
- Job performance—simple jobs*: 0.2

* Correlations corrected for attenuation & restriction in range
Gradients differ systematically by outcome

Correlations with continuous outcomes

- Standardized academic achievement
- Job performance—complex jobs* \(0.8\)
- Years of education \(0.6\)
- Occupational level
- Job performance—middle-level jobs* \(0.4-0.5\)
- Income \(0.3-0.4\)
- Delinquency \(-0.25\)
- Job performance—simple jobs* \(0.2\)

* Correlations corrected for attenuation & restriction in range
Conversely, SES outcomes function as differentially valid surrogates for $g$

- Standardized academic achievement \( .8 \)
- Job performance—complex jobs* \( \frac{.4-.5}{.6} \)
- Years of education \( .6 \)
- Occupational level
- Job performance—middle-level jobs* \( .4-.5 \)
- Income \( .3-.4 \)
- Delinquency \( -.25 \)
- Job performance—simple jobs* \( .2 \)
Still-typical social science assumptions about causes of different (“unequal”) outcomes
Some corrective facts about causation

```
<table>
<thead>
<tr>
<th>BACKGROUND INFLUENCES</th>
<th>PERSONAL TRAITS</th>
<th>SOCIOECONOMIC OUTCOMES</th>
<th>OTHER OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NON-SHARED</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SHARED</td>
<td>% heritable:</td>
<td>60-70</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>% jointly with IQ:</td>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>IQ (adolescent)</td>
<td>Acad achiev</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Personality</td>
<td>Yrs educ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GENES</td>
<td>Occ level</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

"Controlling" for education, occupation & income removes valid variance in g—much of it genetic
Social policy has aimed to change this machine

**BACKGROUND INFLUENCES**

- **NON-SHARED**
- **SHARED**

**PERSONAL TRAITS**

- (Specific skills/habits)
- (adolescent)
- Personality

**SOCIOECONOMIC OUTCOMES**

- Acad
- Yrs
- Occ
- $ (specific skills/habits)

**OTHER OUTCOMES**

- Health
- Subjective well-being

**GENES**

- (Opportunities/barriers)
Distribution of g-linked outcomes along the IQ continuum

*Criterion-related outcomes by IQ range*

<table>
<thead>
<tr>
<th>Life chances:</th>
<th>% pop.</th>
</tr>
</thead>
<tbody>
<tr>
<td>“High Risk”</td>
<td>5%</td>
</tr>
<tr>
<td>“Up-Hill Battle”</td>
<td>20%</td>
</tr>
<tr>
<td>“Keeping Up”</td>
<td>50%</td>
</tr>
<tr>
<td>“Out Ahead”</td>
<td>20%</td>
</tr>
<tr>
<td>“Yours to Lose”</td>
<td>5%</td>
</tr>
</tbody>
</table>

**Training potential:**
- Slow, simple, supervised
- Mastery learning, hands-on
- College format
- Gathers, infers own information

**Career potential:**
- Assembler
- Food Service Nurse’s Aide
- Clerk, teller
- Police officer
- Machinist, sales
- Manager
- Teacher
- Accountant
- Attorney
- Chemist
- Executive

Borderline ability to function as independent adult

Odds of socioeconomic success & productivity increase
3 thresholds (step functions): “trainability” for military enlistment

- Most military jobs require at least 30th percentile
- Military policy forbids induction below 15th percentile
- US law forbids induction below 10th percentile
NALS 2 represents another critical level

Military enlistment thresholds

Rights & responsibilities of citizenship
Associated nexus of social problems

Odds of social problems increase
Large or small, effects are relentless

Compound & cumulate

- Life chances:
  - High Risk: 5%
  - Battle: 20%
  - Up: 50%
  - Ahead: 20%
  - Yours to Lose: 5%

- Training potential:
  - Slow, simple, supervised
  - Mastery learning, hands-on
  - College format

- Career potential:
  - WAIS IQ:
    - 70-75: Assembler, Food Service, Nurse's Aide
    - 80-85: Clerk, teller, Police officer, Machinist, sales
    - 90-95: Manager, Teacher, Accountant
    - 100-120: Attorney, Chemist, Executive

- Ever incarcerated (%, white men):
  - 7%

- Chronic welfare recipient (%, white mothers):
  - 31%

- Had illegitimate child (%, white women):
  - 35%

- High school dropout (% whites):
  - 55%

- Poor health, Accidents:
  - 6%
  - 0.4%
  - 0%
Odds ratios for social problems, by IQ range

(IQ-range comparisons of social “failure rates”)

Odds depend on available partners too (“IQ context”)

- Lives in poverty*
- Out-of-wedlock child**
- Chronic welfare**
- Unemployed*
- Out of labor force*

* Incidence
** Prevalence
We live in groups.
There is $g$-based social clustering in occupations, schools, neighborhoods, friendships, & marriage

Individual differences in success

$g$-based social clustering in schools, jobs, neighborhoods

- Unemployed: 12, 10, 7, 7, 2
- Illegitimate child: 32, 17, 8, 2
- Lives in poverty: 30, 16, 6, 3, 2
- Chronic welfare: 31, 17, 8, 2, 0
- HS dropout: 55, 35, 6, 0.4, 0

Different interpersonal climates, help, risks

$g$-based sub-cultures; diffusion gradients for information, help, & regard

Social inequality, job hierarchies, intergroup competition, policy responses

GDP, health, innovation, modernization, functioning democracy, rule of law

↓ = counterproductive

Nested levels of analysis
- Individuals (probands)
- Interpersonal contexts
- Populations
- Cultural institutions
- Political systems (units)
IQ-based clustering across occupations & neighborhoods

Life chances: % pop:

- "High Risk" 5%
- "Up-Hill Battle" 20%
- "Keeping Up" 50%
- "Out Ahead" 20%
- "Yours to Lose" 5%

Training potential:
- Slow, simple, supervised
- Mastery learning, hands-on
- College format
- Gathers, infers own information

Career potential:
- Assembler, Food Service, Nurse's Aide
- Clerk, teller, Police officer, Machinist, sales
- Manager, Teacher, Accountant
- Attorney, Chemist, Executive

WAIS IQ:
- 70 75 80 85 90 95 100 105 110 115 120 125 130

Ever incarcerated (%, white men):
- 7 7 3 1 0

Chronic welfare recipient (%, white mothers):
- 31 17 8 2 0

Had illegitimate child (%, white women):
- 32 17 8 4 2

High school dropout (%, whites):
- 55 35 6 0.4 0

IQ-based clustering of social failure & success
They are spheres of reciprocity & rapport
But relations between spheres are vexed

envy & admiration

help & contempt

“lazy”  false attributions  “tricky”

IQ isolation
These clusters represent “IQ contexts” for individuals in them (Gordon, 1997)

A

Individual differences in success

B

g-based social clustering in schools, jobs, neighborhoods

C

Unemployed 12 10 7 7 2
Illegitimate child 32 17 8 1 2
Lives in poverty 30 16 6 3 2
Chronic welfare 31 17 8 2 0
HS dropout 55 35 6 0.4 0

C

Different interpersonal climates, help, risks

D

g-based sub-cultures; diffusion gradients for information, help, & regard

E

Social inequality, job hierarchies, intergroup competition, policy responses

F

GDP, health, innovation, modernization, functioning democracy, rule of law

↓ = counterproductive

Nested levels of analysis

Individuals (probands)

Interpersonal contexts

Populations

Cultural institutions

Political systems (units)
IQ contexts indirectly created by education and occupational clustering: WAIS-R IQ (mean ± 1 SD) representative US adults ages 16-74

IQ clusters create distinctive environments & sustain differentially competent subcultures.

- More chaotic

$g$-based odds rest not just on probands’ own $g$ levels, but also those of people in their near social context.

Matriarch’s challenge will differ depending on her group’s IQ context.
Moreover, children regress to the mean for genetic reasons.

Imagine children of same IQ (say, 100 😊) raised in different IQ contexts.

Expectations, values, quality of help, risks, human capital all differ.
IQ-contexts are differentially effective cultural conduits, transmission belts
Diffusion of information & innovation, contagion of error

Often described as the “hard to reach.” Have trouble adhering to medical treatment.

Pumping more info & resources into system increases disparities
Technology makes life ever more complex, putting increasing premium on g
Higher “accident” rates in poorer neighborhoods:
Odds ratios for unintentional deaths, by neighborhood income (1980-86)
Human cognitive variation yields & sustains major structural features of a culture: Example

E

Individual differences in success

B

$g$-based social clustering in schools, jobs, neighborhoods

C

Different interpersonal climates, help, risks

D

$g$-based sub-cultures; diffusion gradients for information, help, & regard

E

Social inequality, job hierarchies, intergroup competition, policy responses

F

GDP, health, innovation, modernization, functioning democracy, rule of law

$\downarrow =$ counterproductive

Nested levels of analysis

Individuals (probands)

Interpersonal contexts

Populations

Cultural institutions

 Political systems (units)
### Occupational prestige hierarchy

- Dominant organizing axis of entire division of labor
- Same worldwide. Why?
- Where did it come from?
- Does it have a functional basis?
- Could it be different?

#### Facts from testing claims from 1970s

- Occ prestige tracks mean incumbent IQs, not education or income
- Higher-level jobs are more complex \((g\text{ loaded})\)
- IQ predicts performance better when jobs are more complex
- Ergo, higher level work really does require higher \(g\)

#### Proposed explanation for prestige hierarchy

- A division of labor must accommodate the constraints imposed by recurring human variation
- As work tasks were increasingly segregated into more specialized sets (occupations), only those sets survived for which there was a reliable pool of workers with the necessary ability profiles
- The hierarchical structure of human cognitive abilities determines the frequency of available worker profiles
- \(g\) is the major axis of cognitive variation across human populations; secondary axes are weak
- Grouping tasks by \(g\) loading proceeded very gradually as tasks were shifted across workers, & vice versa.
### Occupational Prestige Hierarchy

- Dominant organizing axis of entire division of labor
- Same worldwide. Why?
- Where did it come from?
- Does it have a functional basis?
- Could it be different?

#### Facts from testing claims from 1970s
- Occupational prestige tracks mean incumbent IQs, not education or income
- Higher-level jobs are more complex ($g_{loaded}$)
- IQ predicts performance better when jobs are more complex
- Ergo, higher-level work really does require higher $g$

#### Proposed explanation for prestige hierarchy
- A division of labor must accommodate the constraints imposed by recurring human variation
- As work tasks were increasingly segregated into more specialized sets (occupations), only those sets survived for which there was a reliable pool of workers with the necessary ability profiles
- The hierarchical structure of human cognitive abilities determines the frequency of available worker profiles
- $g$ is the major axis of cognitive variation across human populations; secondary axes are weak
- Grouping tasks by $g$ loading proceeded very gradually as tasks were shifted across workers, & vice versa.

#### Duties that Correlate with Job Complexity

<table>
<thead>
<tr>
<th>Duty</th>
<th>Complexity Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compile information</td>
<td>.90</td>
</tr>
<tr>
<td>Advise</td>
<td>.86</td>
</tr>
<tr>
<td>Plan</td>
<td>.83</td>
</tr>
<tr>
<td>Negotiate</td>
<td>.79</td>
</tr>
<tr>
<td>Responsibility</td>
<td>.76</td>
</tr>
<tr>
<td>Instruct</td>
<td>.67</td>
</tr>
<tr>
<td>Code/decode</td>
<td>.68</td>
</tr>
<tr>
<td>Recognize/Identify</td>
<td>.36</td>
</tr>
<tr>
<td>Specified pace of work</td>
<td>-.26</td>
</tr>
<tr>
<td>Repetitive activities</td>
<td>-.49</td>
</tr>
<tr>
<td>Physical exertion</td>
<td>-.56</td>
</tr>
<tr>
<td>Supervision</td>
<td>-.73</td>
</tr>
<tr>
<td>Structure</td>
<td>-.79</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percentile of motion (among all adults)</th>
<th>Position Number</th>
<th>WABT IQ</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
<th>130</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>91</td>
<td>Attorney</td>
<td></td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>88</td>
<td>Research Analyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>Editor &amp; Assistant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>Manager, Advertising Chemist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>Engineer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>Manager, Trainee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Systems Analyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>Auditor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>Copywriter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Accountant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>Manager, Supervisor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Manager, Sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Programmer, Analyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>Teacher</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>Adjuster</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>Manager, General</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>Purchasing Agent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>Nurse, Registered</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Sales, Account Exec.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Administrative Asst.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Manager, Store</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Bookkeeper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>Clerk, Credit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>Drafter, Designer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Lab Tester &amp; Tech.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Manager, Assistant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Sales, General</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Sales, Telephone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Secretary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Clerk, Accounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Collector, Bed Debt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Operator, Computer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Repro, Sales Rep.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Insurance Technician</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Automotive Salesman</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Clerk, Typist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Dispatcher</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Office, General</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Police, Patrol Off.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Receptionist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Cashier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Clerk, General</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Inside Sales Clerk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Meter Reader</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Printer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Teller</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Data Entry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Electrical Helper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Machinist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Manager, Food Dept.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Quality Control Chkr.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Claims Clerk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Driver, Deliverman</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Guard, Security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Labor, Unskilled</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Operator, Machine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Aro Welder, Die Setter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Mechanic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Medical-Dental Asst.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Messenger</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Production, Factory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Assembler</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Food Service Worker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Nurse's Aide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Warehouseman</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Custodian &amp; Janitor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Material Handler</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Packer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Occupational prestige hierarchy

- Dominant organizing axis of entire division of labor
- Same worldwide. Why?
- Where did it come from?
- Does it have a functional basis?
- Could it be different?

Facts from testing claims from 1970s

- Occupational prestige tracks mean incumbent IQs, not education or income
- Higher-level jobs are more complex (g loaded)
- IQ predicts performance better when jobs are more complex
- Ergo, higher level work really does require higher g

Proposed explanation for prestige hierarchy

- A division of labor must accommodate the constraints imposed by recurring human variation
- As work tasks were increasingly segregated into more specialized sets (occupations), only those sets survived for which there was a reliable pool of workers with the necessary ability profiles
- The hierarchical structure of human cognitive abilities determines the frequency of available worker profiles
- g is the major axis of cognitive variation across human populations; secondary axes are weak
- Grouping tasks by g loading proceeded very gradually as tasks were shifted across workers, & vice versa.

Social “structure” is a crystallized pattern of recurring activity within a population

Human variation in g shapes and constrains those patterns, and hence the cultural “institutions” that emerge from them
Human cognitive variation creates social inequality & group disparities

A

Individual differences in success

B

$g$-based social clustering in schools, jobs, neighborhoods

C

Different interpersonal climates, help, risks

D

$g$-based sub-cultures; diffusion gradients for information, help, & regard

E

Social inequality, job hierarchies, intergroup competition, policy responses

F

GDP, health, innovation, modernization, functioning democracy, rule of law

= counterproductive
Racial-ethnic IQ gaps are the rule on unbiased tests

Disparities largest at the “tails”---leads to much litigation
g variation yields clockwork-like patterns of effect gradients: Example

- Can predict “disparate impact” in test passing rates in any job or school setting from knowing:
  - Typical IQ distributions of tested groups
  - \(g\) loading of predictors
  - Criterion type (technical vs. citizenship)
  - Reliability of predictor and criterion
  - Race-neutrality of scoring
  - Selection ratio
$g$ variation yields clockwork-like patterns of effect gradients: Example

- Can predict “disparate impact” in test passing rates in any job or school setting from knowing:
  - Typical IQ distributions of tested groups
  - $g$ loading of predictors
  - Criterion type (technical vs. citizenship)
  - Reliability of predictor and criterion
  - Race-neutrality of scoring
  - Selection ratio

Lack of racial balance ("disparate impact") constitutes prima facie evidence of illegal discrimination, so…
Quite predictably, many have used this knowledge to reverse engineer selection procedures to reduce “disparate impact”

- Can predict “disparate impact” in test passing rates in any job or school setting from knowing:
  - Typical IQ distributions of tested groups
  - \( g \) loading of predictors
  - Criterion type (technical vs. citizenship)
  - Reliability of predictor and criterion
  - Race-neutrality of scoring
  - Selection ratio

Note: I am **not** recommending these strategies. Some illegal, & all impinge—predictably—on other goals.

Which illustrates my point: highly predictable \( g \)-rooted phenomena evoke highly predictable political tensions
# Early crude forecasts

(Gottfredson, 1985)

<table>
<thead>
<tr>
<th>z scores for IQ range from which most workers are recruited</th>
<th>Prestige level</th>
<th>Major IQ range of recruitment (in SB metric)</th>
<th>% of population above minimum IQ required</th>
<th>% of population in IQ range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8+</td>
<td>Physician</td>
<td>88</td>
<td>114+</td>
<td>1.1 23.0</td>
</tr>
<tr>
<td>0.5 to 2.0</td>
<td>Engineer</td>
<td>66</td>
<td>108–134</td>
<td>3.3 35.2</td>
</tr>
<tr>
<td>–0.5 to 1.0</td>
<td>Secondary teacher</td>
<td>63</td>
<td>91–117</td>
<td>28.4 74.5</td>
</tr>
<tr>
<td>–0.8 to 0.7</td>
<td>Real estate sales</td>
<td>48</td>
<td>86–112</td>
<td>42.5 83.1</td>
</tr>
<tr>
<td></td>
<td>Fire fighter</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Police officer</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electrician</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Truck driver</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meat cutter</td>
<td>32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B/W ratio for % of male workers employed in each occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970s</td>
</tr>
<tr>
<td>.23</td>
</tr>
<tr>
<td>.12</td>
</tr>
<tr>
<td>.59</td>
</tr>
<tr>
<td>.18</td>
</tr>
<tr>
<td>.27</td>
</tr>
<tr>
<td>.69</td>
</tr>
<tr>
<td>.33</td>
</tr>
<tr>
<td>1.59</td>
</tr>
<tr>
<td>.98</td>
</tr>
</tbody>
</table>
Unemployed 12
Illegitimate child 32
Lives in poverty 30
Chronic welfare 31
HS dropout 55

Cascadin, Multi-Level Effects
74781017
221663217

Social inequality, job hierarchies, intergroup competition, policy responses

Individual differences in success

Different interpersonal climates, help, risks

$g$-based sub-cultures; diffusion gradients for information, help, & regard

$g$-based social clustering in schools, jobs, neighborhoods

GDP, health, innovation, modernization, functioning democracy, rule of law

↓ = counterproductive
System-level implications: Carrying capacity

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% pop.</td>
<td>5%</td>
<td>20%</td>
<td>50%</td>
<td>20%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Training potential:
- Slow, simple, supervised
- Mastery learning, hands-on
- College format
- Gather, infers own information

Career potential:
- Assembler, Food Service, Nurse’s Aide
- Clerk, teller, Police officer, Machinist, sales
- Manager, Teacher, Accountant
- Attorney, Chemist, Executive

Waist IQ:
- 70
- 75
- 80
- 85
- 90
- 95
- 100
- 105
- 110
- 115
- 120
- 125
- 130

Tail wind
- Higher
- Higher & less equal

Head wind
- Mean 100/SD 15
- Mean 105
- Mean 105, SD 17

Dependents
- 5%
- 2.3%
- 3.9%

Maintainers
- 50%
- 62.9%
- 61.6%

Innovators
- 5%
- 9.2%
- 11.5%

IQ > 100
- 50%
- 62.9%
- 61.6%

IQ < 100
- 50%
- 37.1%
- 38.4%
System-level implications: Carrying capacity

Current standard
(Mean 100/SD 15)

Innovators = 5% 1.0
Dependents = 5% 1.0

> IQ 100 = 50% 1.0
< IQ 100 = 50%
System-level implications: 5-point rise

**Current standard**  
(Mean 100/SD 15)

<table>
<thead>
<tr>
<th></th>
<th>Innovators</th>
<th>Dependents</th>
<th>&gt; IQ 100</th>
<th>&lt; IQ 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>% pop.</td>
<td>5%</td>
<td>5%</td>
<td>58%</td>
<td>50%</td>
</tr>
<tr>
<td>IQ</td>
<td>95%</td>
<td>2.3%</td>
<td>62.9%</td>
<td>37.1%</td>
</tr>
</tbody>
</table>

**Higher**  
(Mean 105)

<table>
<thead>
<tr>
<th></th>
<th>Innovators</th>
<th>Dependents</th>
<th>&gt; IQ 100</th>
<th>&lt; IQ 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>% pop.</td>
<td>9.2%</td>
<td>2.3%</td>
<td>62.9%</td>
<td>37.1%</td>
</tr>
<tr>
<td>IQ</td>
<td>90%</td>
<td>1.7%</td>
<td>1.7%</td>
<td>1.7%</td>
</tr>
</tbody>
</table>

Quadruples the ratio
Almost doubles the ratio
Current racial differences in carrying capacity

<table>
<thead>
<tr>
<th>Life chances: % pop.</th>
<th>Current Standard (Mean 100/SD 15)</th>
<th>Current Black (in West) (Mean 87, SD 13)</th>
<th>Current White (Mean 101, SD 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“High Risk”</td>
<td>5%</td>
<td>0.3%</td>
<td>5%</td>
</tr>
<tr>
<td>“Up-Hill Battle”</td>
<td>20%</td>
<td>18%</td>
<td>4%</td>
</tr>
<tr>
<td>“Keeping Up”</td>
<td>50%</td>
<td>16%</td>
<td>54%</td>
</tr>
<tr>
<td>“Out Ahead”</td>
<td>20%</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>“Yours to Lose”</td>
<td>5%</td>
<td>0.02</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Innovators

Dependents

Maintainers

Innovators

<table>
<thead>
<tr>
<th>Training potential:</th>
<th>Current Standard</th>
<th>Current Black (in West)</th>
<th>Current White</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAIS IQ:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| > IQ 100            | 50%               | 16%                     | 54%           |
| < IQ 100            | 50%               | 84%                     | 46%           |
Current racial differences in carrying capacity

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependents</td>
<td>5%</td>
<td>20%</td>
<td>50%</td>
<td>20%</td>
<td>5%</td>
</tr>
<tr>
<td>Innovators</td>
<td>5%</td>
<td>0.3%</td>
<td>5%</td>
<td>10%</td>
<td>&gt; IQ 100</td>
</tr>
<tr>
<td>Maintainers</td>
<td>18%</td>
<td>16%</td>
<td>54%</td>
<td>46%</td>
<td>&lt; IQ 100</td>
</tr>
<tr>
<td>Black</td>
<td>5%</td>
<td>0.3%</td>
<td>5%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>E Asian</td>
<td>5%</td>
<td>18%</td>
<td>4%</td>
<td>2%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Training potential:
- Slow, simple, supervised
- Assembly, food service
- Nurse’s aide

Career potential:
- Clerks, teller, police officer
- Machinist, sales
- Manager, teacher, accountant
- Attorney, chef, executive

WAIS IQ:
- 70 to 85: Dependents
- 85 to 95: Maintainers
- 95 to 105: Innovators

15)

<table>
<thead>
<tr>
<th>Current Standard (Mean 100/SD 15)</th>
<th>Current Black (in West) (Mean 87, SD 13)</th>
<th>Current White (Mean 101, SD 15)</th>
<th>Current East Asian (Mean 106, SD 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovators = 5%</td>
<td>Current Black = 0.3%</td>
<td>Current White = 5%</td>
<td>Current East Asian = 10%</td>
</tr>
<tr>
<td>Dependents = 5%</td>
<td>= 0.02</td>
<td>= 1.2</td>
<td>= 5.0</td>
</tr>
<tr>
<td>&gt; IQ 100 = 50%</td>
<td>16%</td>
<td>54%</td>
<td>66%</td>
</tr>
<tr>
<td>&lt; IQ 100 = 50%</td>
<td>84%</td>
<td>46%</td>
<td>34%</td>
</tr>
</tbody>
</table>
International differences

<table>
<thead>
<tr>
<th>Life chances:</th>
<th>&quot;High Risk&quot;</th>
<th>&quot;Up-Hill Battle&quot;</th>
<th>&quot;Keeping Up&quot;</th>
<th>&quot;Out Ahead&quot;</th>
<th>&quot;Yours to Lose&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>% pop.</td>
<td>5%</td>
<td>20%</td>
<td>50%</td>
<td>20%</td>
<td>5%</td>
</tr>
</tbody>
</table>

- Training potential:
  - Slow, simple, supervised
  - Mastery learning, hands-on
  - Gathers, infers own information

- Career potential:
  - WAIS IQ: 70 75 80 85 90 95 100 105 110 115 120 125 130
  - Assenbler, Food Service, Nurse's Aide
  - Clerk, Police Officer, Machinist, sales
  - Manager, Teacher, Accountant
  - Attorney, Chemist, Executive

Estimated world average

GNP, rule of law, democracy, political liberty, modernization
(e.g., Lynn & Vanhanen; Rindermann; Whetzel & McDaniel)
Summary

- Human cognitive diversity is a biological reality with social effects.
- Tasks and environments differ in the degree to which they bring out or expose the cognitive variation in a population, say, in schools.
- The mix of influences that create within-group differences in outcomes (“inequalities”) are not necessarily the same as those that create between-group differences (“disparities”). Thus, inferences about the causal power of IQ differences at the individual-level cannot be generalized to the group-level.
- The impact of cognitive variation cumulates and compounds at each higher level of analysis (individual, group, cultural system), making intelligence an increasing deep and profound “fundamental cause” of social-political phenomena at successively higher levels.
- Democratic, egalitarian societies react to intelligence-based inequalities and disparities by trying to eliminate either cognitive variation or its power to create differential outcomes.
- Such attempts provoke countervailing social pressures when they defy the reality of human cognitive diversity.
- The “democratic dilemma”—the trade-off between equal opportunity and equal outcomes—is just one of various third-order effects of the cognitive diversity that exists within and between human populations.
Thank you.
References