Cognitive Divide or a Mind-Meld?
Scenarios of Cognitive Enhancement

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Proactionary Principle

“People’s freedom to innovate technologically is highly valuable, even critical, to humanity. This implies several imperatives when restrictive measures are proposed: Assess risks and opportunities according to available science, not popular perception. Account for both the costs of the restrictions themselves, and those of opportunities foregone. Favor measures that are proportionate to the probability and magnitude of impacts, and that have a high expectation value. Protect people’s freedom to experiment, innovate, and progress.”

- Max More
# Techniques for Enhancement

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<tr>
<th>Internal</th>
<th>Hardware</th>
<th>Software</th>
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<tr>
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<td><img src="image2" alt="Hardware Image" /></td>
<td><img src="image3" alt="Software Image" /></td>
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<td><img src="image4" alt="External Hardware Image" /></td>
<td><img src="image5" alt="Hardware Image" /></td>
<td><img src="image6" alt="Software Image" /></td>
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\[
\int_{-\infty}^{\infty} e^{-ax^2} \, dx = a^{-1/2} \pi^{1/2}, \quad a > 0.
\]

- **Internal**
- **External**

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**Techniques for Enhancement**

- **Internal Hardware**
- **External Hardware**
- **Internal Software**
- **External Software**

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**Integration of Concepts**

- **Hardware**
  - Internal
  - External

- **Software**
  - Internal
  - External

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**Formulas**

- **Integration Formula**
  \[
  \int_{-\infty}^{\infty} e^{-ax^2} \, dx = a^{-1/2} \pi^{1/2}, \quad a > 0.
  \]

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**Tools and Resources**

- **Hardware**
  - Internal
  - External

- **Software**
  - Internal
  - External
  - Storage
  - Networking
  - Cloud Services

Intelligence

From Wikipedia, the free encyclopedia

For other uses, see Intelligence (disambiguation).

Intelligence is a property of mind that encompasses many related mental abilities, such as the capacities to reason, plan, solve problems, think abstractly, comprehend ideas and language, and learn.

Although many regard the concept of intelligence as having a much broader scope, for example in cognitive science and computer science, in some schools of psychology, the study of intelligence generally regards this trait as distinct from creativity, personality, character, or wisdom.

Contents

1 Definitions of intelligence
2 Psychometric intelligence
   2.1 Intelligence, IQ, and g
   2.2 Criticisms of the psychometric approach
3 One or several types of intelligence?
4 Controversies
5 References
6 See also
7 External links

Look up intelligence in Wiktionary, the free dictionary.
<table>
<thead>
<tr>
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<th>Memory/learning</th>
<th>Working memory</th>
<th>Long term memory</th>
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<th>Self-control</th>
<th>Metacognition</th>
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<th>Problem solving</th>
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<th>Language ability</th>
<th>Mental function</th>
<th>Energy</th>
<th>Timing</th>
<th>Waker/sleep</th>
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- ♦: Some evidence
- ♠: Successful use
- ♣: In use
Analysis from General Social Surveys, 1972-2004. WORDSUM is a vocabulary test with about 0.83 correlation with IQ (Sigelman 1981). Table A is regression of stated happiness (HAPPY) against several different factors. Table B shows the distribution of HAPPY and WORDSUM scores. Note the strong unhappiness among the lower than average vocabulary scorers.

### Table A: Regression Coefficients

<table>
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**Color coding:**
-4.0 < <1.0 <0.0 >0.0 >1.0 >2.0 T

**Effect of each variable:** Negative Positive

Multiple R = .380 R-Squared = .145 Std Error of Estimate = .568
"[I]t's not the poor families in Africa that are going to be doing this, it's going to be the very affluent who are going to at first have healthier children... and then it becomes the slippery slope, they will have stronger, faster, smarter children... Then you've got these two very disparate classes."

Economy of Enhancement
• Benefits
  – Reduction of losses
  – Individual benefits
  – Societal benefits

• Costs
  – Individual
  – Competition
Reduction of Losses

• Lost keys UK £250 million/year
• Forgotten standing payment orders: £400 million/month ($53/month/person)
• Sleepiness cause 15-20% road accidents (as well as work-related accidents, iatrogenic illness etc)
• Higher IQ likely reduces accident risks

• Can cognitive enhancement reduce this?
• Linda Gottfredson:
  – IQ 75: not likely to master the elementary school curriculum or function independently in adulthood in modern societies.
  – IQ 85: close to the upper boundary for Level 1 functional literacy, the lowest of five levels in the U.S. government’s 1992 National Adult Literacy Survey. (locating the expiration date on a driver’s license or totalling a bank deposit slip, but not writing a brief letter explaining an error in a credit card bill or find a piece of information in an article)
  – IQ 105: minimum threshold for achieving moderately high levels of success. Competitive for middle-level jobs (clerical, crafts and repair, sales, police and fire fighting)
  – IQ 115+: ability threshold for being competitive as a candidate for graduate or professional school in the U.S. and thus for high levels of socioeconomic success. Self-instructing and are expected to instruct, advise, and supervise others in their community and work environments. Range from which cultural leaders tend to emerge and be recruited.
Individual Effects

Cognition important for good life

Environmental toxin models

+1 IQ point = +1.763% income (Schwartz), +2.094/3.631% (Salkever, m/f)

Annual gain / IQ point US $55-65 billion 0.4-0.5% GDP

Effects on schooling, participation rate, social costs

Weiss 1998: 3 point IQ increase:
- Poverty rate -25%
- Males in jail -25%
- High school dropouts -28%
- Parentless children -20%
- Welfare recipiency -18%
- Out-of-wedlock births -15%

Gottfredson 2002
Economy Impact

Growth residual due to productivity increase due to technology, human capital and other factors

Cognition plays a sizeable role
Data from "IQ/GDP, 81 & 195 nations"

\[ y = 0.75128 + 3.44148 \times x \quad R^2 = 0.695 \]

Kanazawa 2006

Dickerson 2005

(+1 IQ = +8.2% GDP)
Costs

- Technology diffusion
  - Devices spread fast and thoroughly
  - Country gap
- Drugs
  - Monthly Modafinil cost ~3% of UK median income
- (Medical) services
  - Cost set by expert salaries
Prediction for:
Industry: general
Introduction in: 2006
Degree of Innovation: standard
Degree of Imitation: standard

Prediction for:
Industry: medical
Introduction in: 2006
Degree of Innovation: standard
Degree of Imitation: standard

Prediction for:
Industry: non-durable
Introduction in: 2006
Degree of Innovation: standard
Degree of Imitation: standard

Prediction for:
Industry: general
Introduction in: 2006
Degree of innovation: standard
Degree of imitation: standard

Prediction for:
Industry: general
Introduction in: 2006
Degree of innovation: +3
Degree of imitation: standard

Prediction for:
Industry: general
Introduction in: 2006
Degree of innovation: standard
Degree of imitation: -3

Prediction for:
Industry: general
Introduction in: 2006
Degree of innovation: standard
Degree of imitation: standard
Drug Development Pipeline

**Discovery**

**gap 1**
Basic research is published but preclinical research is not considered worthwhile.

**Predevelopment**

**gap 2**
Validated candidate drugs don’t enter clinical development because of profit-based company choices.

**Development**

**gap 3**
Drugs never reach the patient (registration problems, lack of production, high prices or drugs poorly adapted to local conditions).

**Availability to patients**
Simulation

• Initial experiments with income-enhancement models

• Enhancements that increase earning ability constant factor, decreasing to a low price

• Assumes no redistribution
Enhancement proportional to income
Decreasing Margins
• Gadgets come down in price, problematic if enhances earning capacity proportionally
• Decreasing margins stabilize
• Services likely to be problematic
• Temporary increases in inequality may be worth it if they speed transition
• “We shouldn’t sacrifice the poor of tomorrow for the poor of today”
• Most relevant where small increases have big effect
  – Competitive areas
  – Rising above threshold
  – Little effect in areas of diverse talents

• Compounding
  – Problem when new “must have” enhancements arrive faster than the old reduce in price
• Near-term enhancements
  – Gadgets and drugs
  – Decreasing margins
  – Narrow task improvements
  – Hence unlikely to be major disruptors
  – Biological enhancements at first less significant than external software, hardware
  – Important tryout for handling more radical enhancement
Approaches

• Laissez-faire
• Rawls: are benefits to worst off worth it?
  – The parties to the social contract "want to insure for their descendants the best genetic endowment (assuming their own to be fixed)."
  – Kaldor Hicks – enhanced pay compensation to the unenhanced through improved economy

• Create a no-envy situation
• Capability approach
• Lottery
• Taxing enhancements
• Taxing enhanceds
• Speed diffusion
• Risks making people fundamentally unequal?
  – Liberal democracy already based on idea of common society of unequal individuals

• Competition
  – Worst off are those who can compete in the fewest domains
  – Many enhancements non-positional (e.g. reducing accidents)
Conclusions

- Potential gains very large
- Spread across society
- Lowest performers likely gain most
- Competition may increase, but also overall wealth and opportunities
- Risks manageable near term
- Need for ecological studies
- Collective enhancement
H+ Things to Do

• Support morphological/cognitive freedom
• “I’m not a genetic determinist, but everybody else is”
  – Need to counteract stupid biologism
• Patient choice
• Harm reduction
• Speed development
OUT OUT!!
YOU DEMONS OF STUPIDITY!!
% Population Online vs. PPP per capita