

# Scenarios of Cognitive Enhancement

# 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.”*

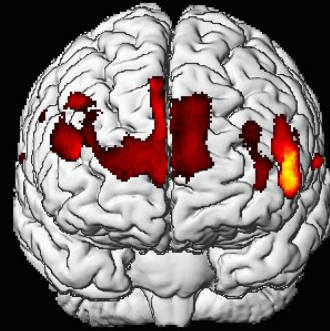
- Max More

the Proactionary Principle



Developing a balanced approach to decision making

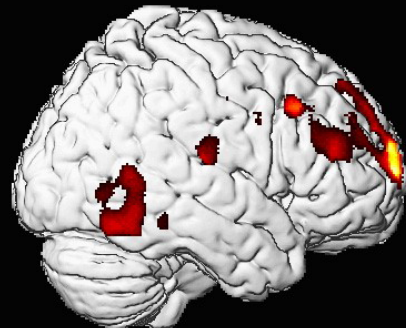
## **IQ/Gray Matter Correlations**



**Frontal  
Lobe**



**Left  
Hemisphere**



**Right  
Hemisphere**

# Techniques for Enhancement

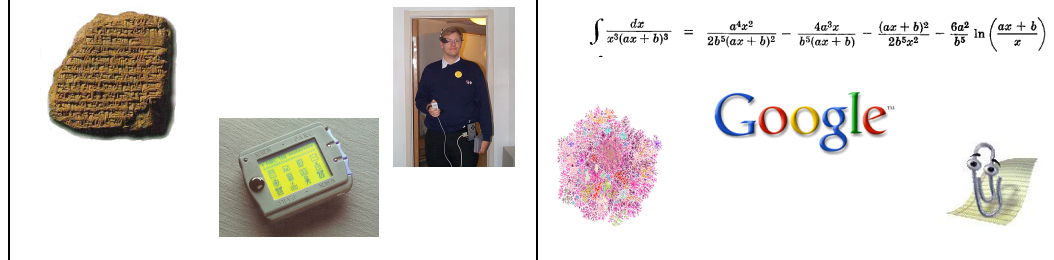
## Hardware

## Software

### Internal



### External





Recycle Bin

Cygwin

My Computer

TOSHIBA Warranty

My Documents

Emacs

Internet Explorer

Memory Authenticity

TOSHIBA Assist

Evolution heuristic

InterVideo WinDVD

Intelligence Happine...

TOSHIBA User's Manual

Beijing

Mozilla Firefox

Prenatal Enhancement

MATLAB R12

Social Impact

Intelligence - Wikipedia, the free encyclopedia - Mozilla Firefox

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http://en.wikipedia.org/wiki/Intelligence

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Dataphone Inter... SquirrelMail 1.4.8 Intelligence - ... The month of th... Problem loading ... magritte.jpg (JP...

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# 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** [hide]

- Definitions of intelligence
- Psychometric intelligence
  - Intelligence, IQ, and g
  - Criticisms of the psychometric approach
- One or several types of intelligence?
- Controversies
- References
- See also
- External links

Look up [intelligence](#) in Wiktionary, the free dictionary.

search

cognition

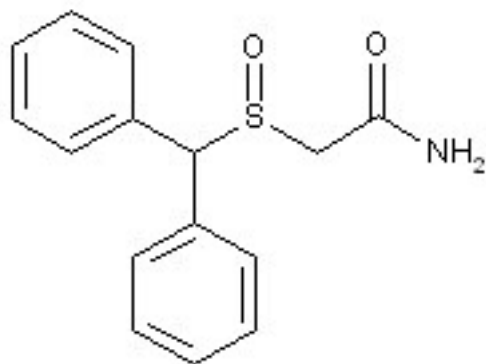
Go Search

toolbox

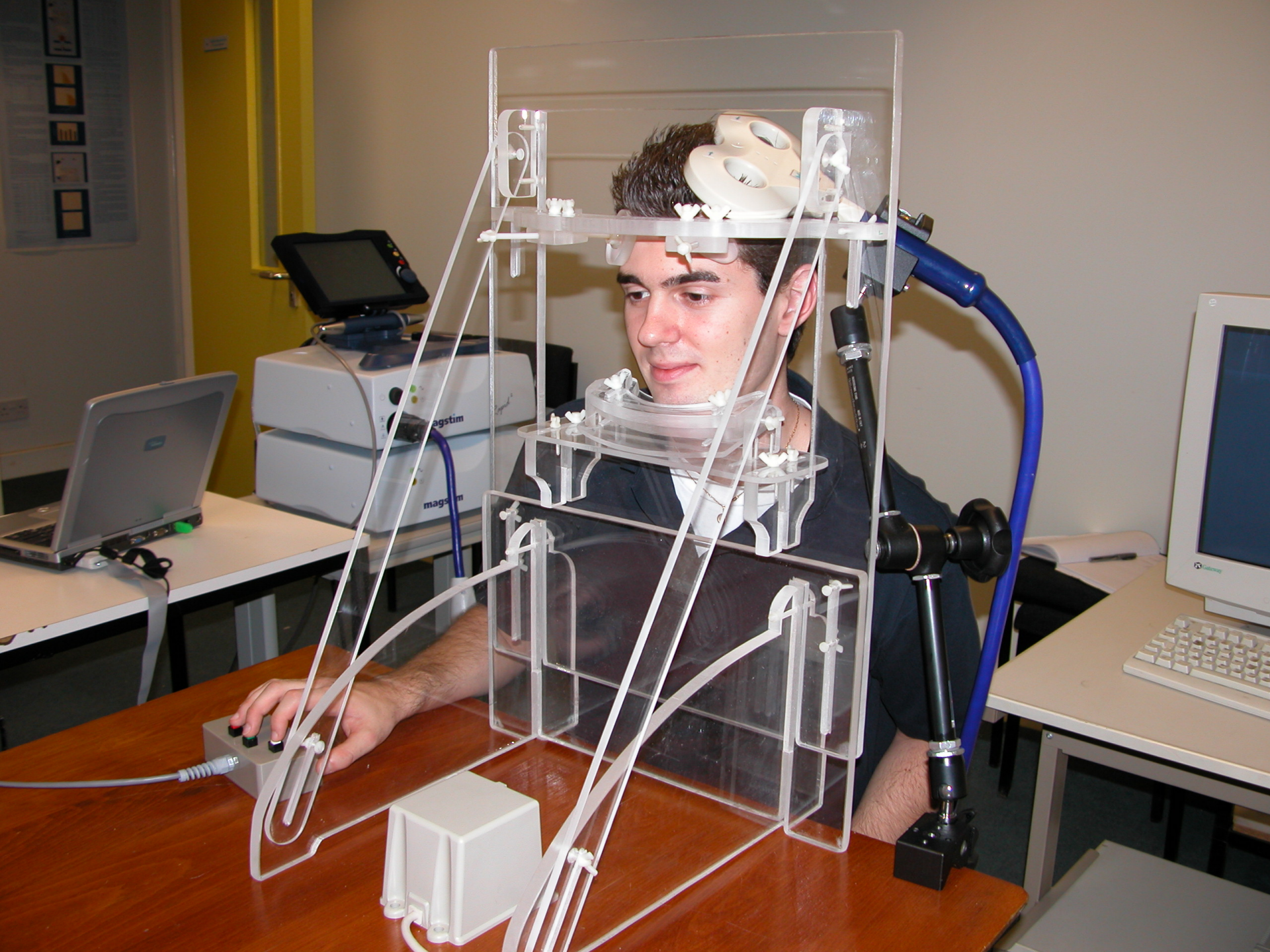
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- Related changes
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- Special pages
- Printable version

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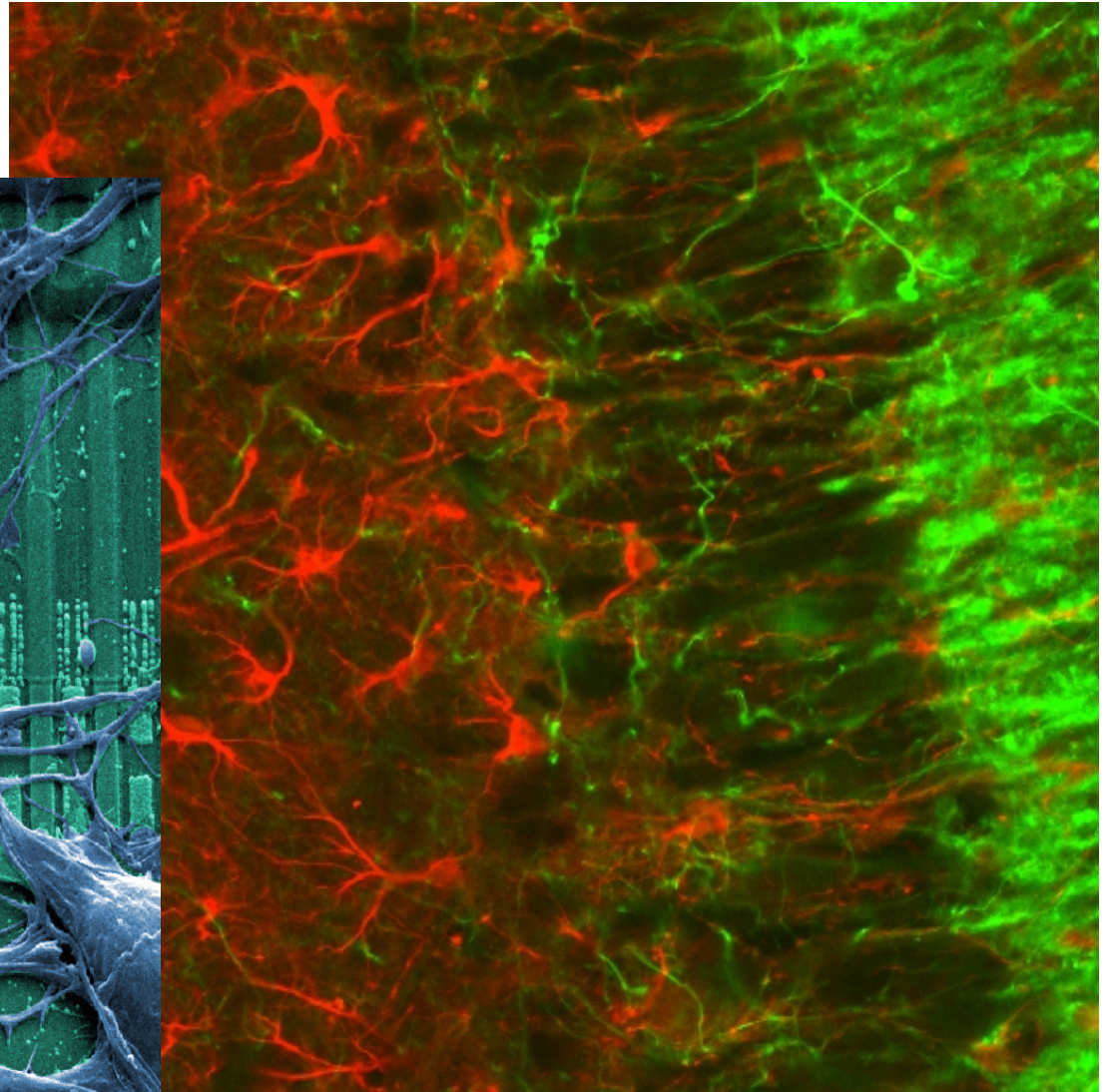
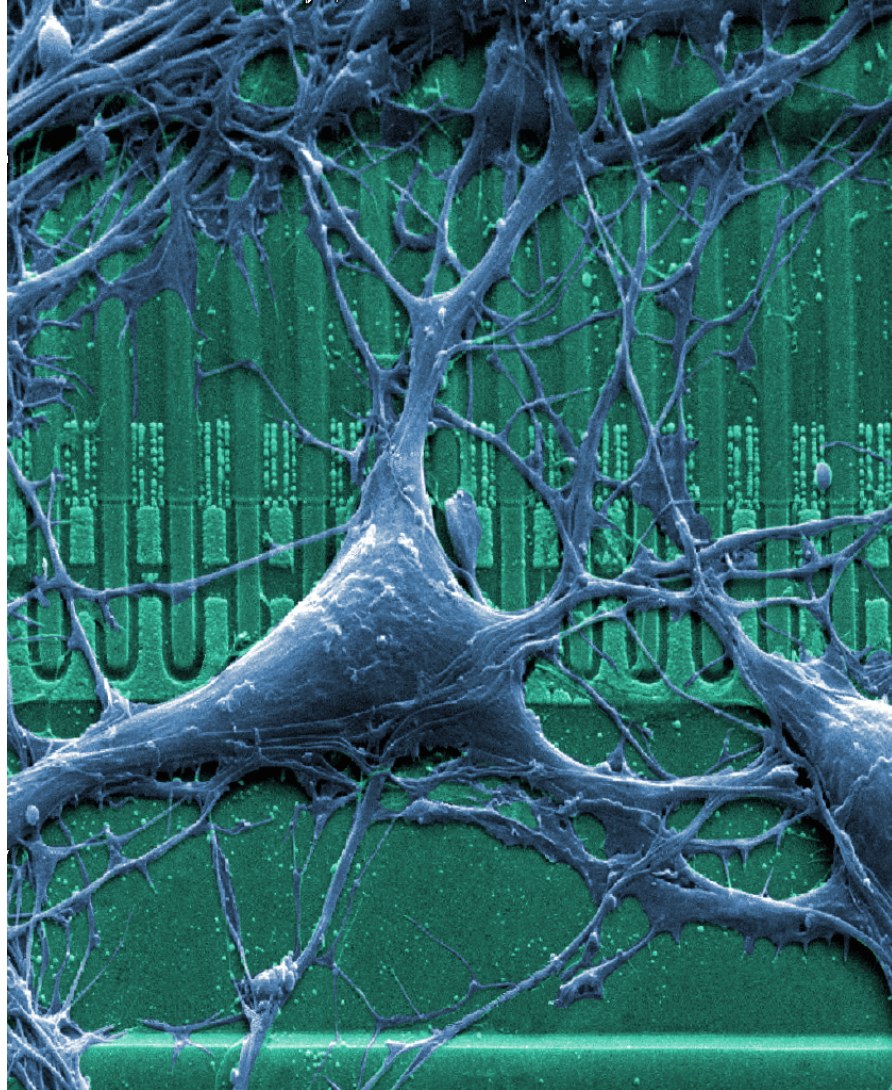


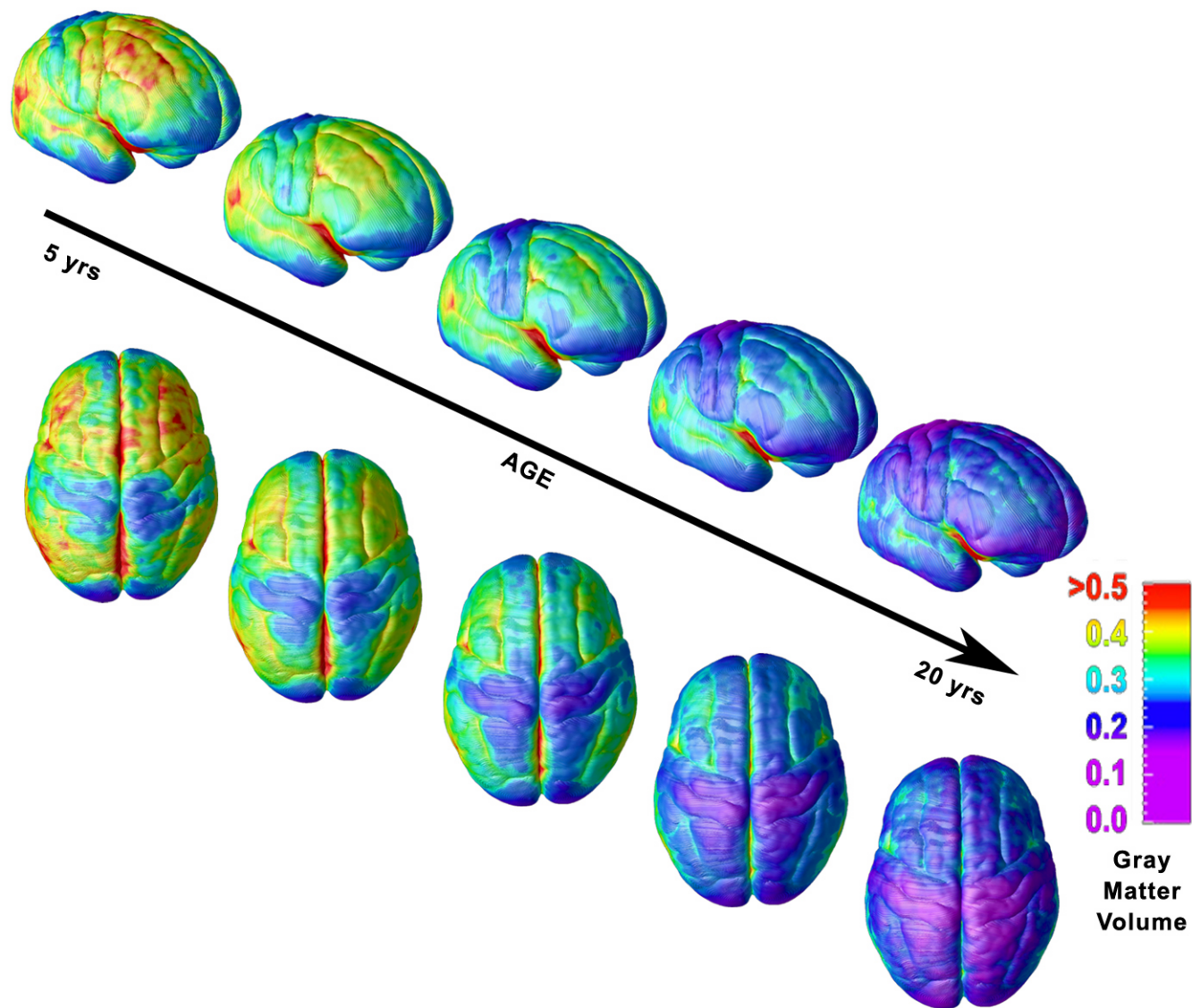














|                           | Internal software | Mental training | General thinking | Visualisation | Memory arts | Specific techniques | Meditation | Education | Enriched environments | Internal hardware | General health | Drugs | TMS | Genetic modification/selection | Prenatal supplements | Brain computer interfaces | External hardware/software | Objects | Software | Wearables | Ubiquitous computing | Social software |
|---------------------------|-------------------|-----------------|------------------|---------------|-------------|---------------------|------------|-----------|-----------------------|-------------------|----------------|-------|-----|--------------------------------|----------------------|---------------------------|----------------------------|---------|----------|-----------|----------------------|-----------------|
| <b>Memory/learning</b>    |                   | ●               |                  | ●             |             |                     |            |           | ●                     | ●                 | ●              | ●     | ●   |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| Working memory            |                   |                 |                  | ●             | ●           |                     |            |           |                       | ●                 | ●              | ●     | ●   |                                |                      |                           |                            | ●       | ●        | ●         | ●                    |                 |
| Long term memory          |                   |                 |                  |               | ●           |                     |            |           | ●                     | ●                 | ●              | ●     | ●   |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| Procedural memory         |                   |                 | ●                |               |             |                     |            |           | ●                     | ●                 | ●              | ●     | ●   |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| Cortical reorganisation   |                   |                 |                  | ●             |             |                     |            |           | ●                     | ●                 | ●              | ●     | ●   |                                |                      | ●                         |                            |         |          |           | ●                    |                 |
| Epistemology              |                   |                 |                  |               |             |                     | ●          |           |                       | ●                 | ●              | ●     | ●   |                                |                      |                           |                            | ●       |          |           | ●                    |                 |
| <b>Executive function</b> |                   | ●               |                  |               | ●           |                     |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      |                 |
| Attention                 |                   |                 |                  |               | ●           | ●                   | ●          |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      |                 |
| Self-control              |                   |                 |                  |               |             | ●                   | ●          |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      |                 |
| Metacognition             |                   |                 |                  |               |             |                     |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      |                 |
| <b>Intelligence</b>       |                   | ●               |                  |               | ●           |                     |            |           |                       | ●                 | ●              | ●     |     |                                | ●                    |                           |                            | ●       | ●        |           |                      | ●               |
| Problem solving           |                   |                 |                  |               | ●           | ●                   |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| Planning                  |                   |                 |                  |               | ●           | ●                   |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| Overview                  |                   |                 |                  |               | ●           | ●                   |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| Creativity                |                   |                 | ●                |               | ●           |                     |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| Avoiding biases           |                   |                 |                  |               | ●           |                     |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| <b>Perception</b>         |                   | ●               |                  |               | ●           |                     |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      |                 |
| Language ability          |                   |                 |                  |               |             |                     |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      | ●               |
| <b>Mental function</b>    |                   | ●               |                  |               |             |                     |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      |                 |
| Energy                    |                   |                 |                  |               |             |                     | ●          |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      |                 |
| Speed                     |                   |                 |                  |               |             |                     |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      |                 |
| Timing                    |                   |                 |                  |               |             |                     |            |           |                       | ●                 | ●              | ●     |     |                                |                      |                           |                            | ●       | ●        |           |                      |                 |
| Wake/sleep                |                   |                 |                  |               |             |                     | ●          |           |                       | ●                 | ●              | ●     |     |                                |                      | ●                         |                            | ●       | ●        |           |                      |                 |
| <b>New capacities</b>     |                   |                 |                  |               |             |                     |            |           |                       |                   |                |       |     |                                |                      |                           |                            |         |          |           |                      |                 |
| New senses                |                   |                 |                  |               |             |                     |            |           |                       |                   |                |       |     |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| New reflexes              |                   |                 |                  |               |             |                     |            |           |                       |                   |                |       |     |                                |                      |                           |                            | ●       | ●        | ●         | ●                    | ●               |
| Human-computer link       |                   |                 |                  |               |             |                     |            |           |                       |                   |                |       |     |                                |                      | ●                         |                            | ●       | ●        | ●         | ●                    | ●               |



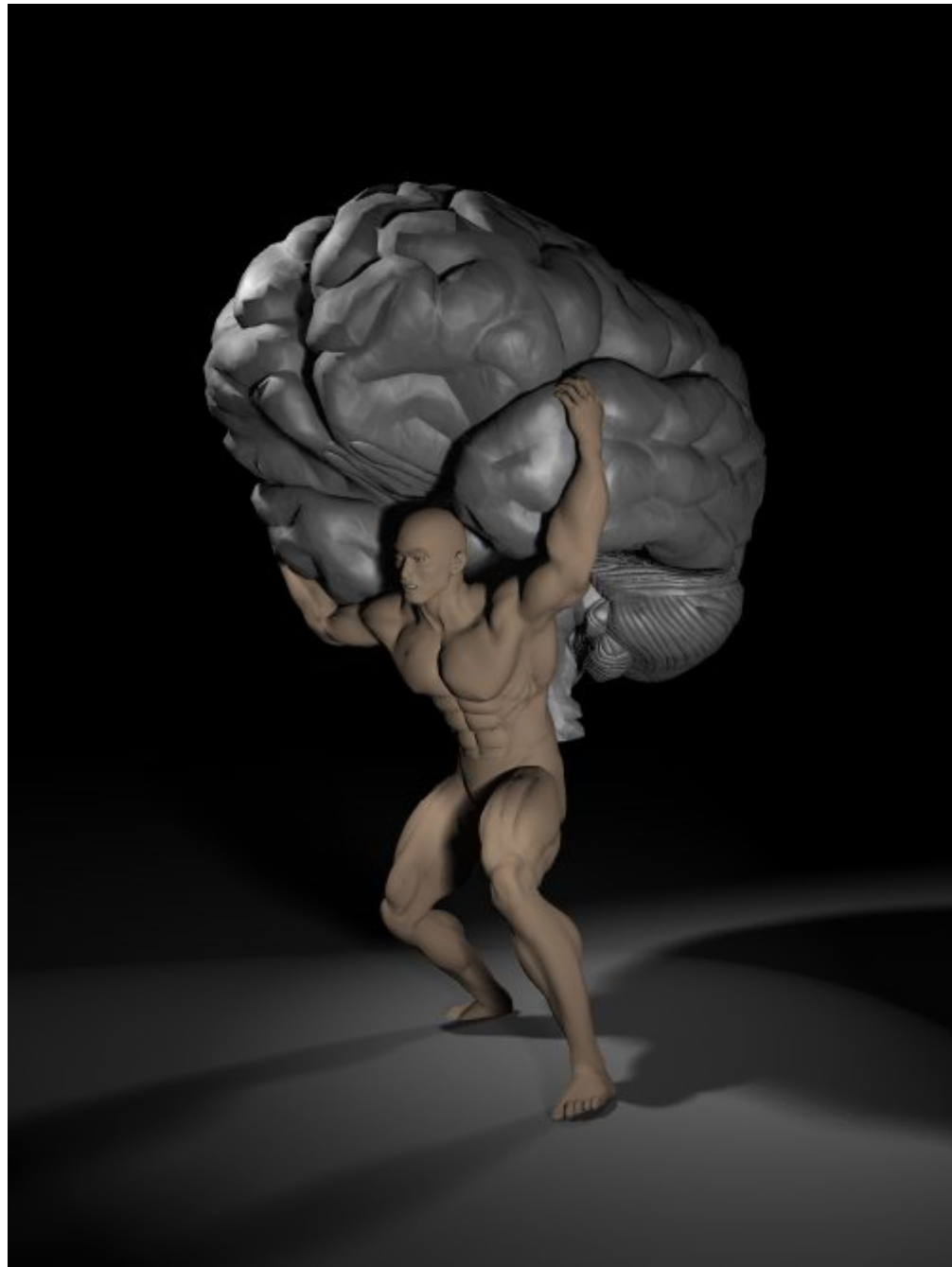
◆: Some evidence

◆ : Successful use

◆ : In use







| Regression Coefficients  |       |          |             |          | Test That Each Coefficient = 0 |                         |      |   |
|--------------------------|-------|----------|-------------|----------|--------------------------------|-------------------------|------|---|
|                          | B     | SE(B)    | Beta        | SE(Beta) | T-statistic                    | Probability             |      |   |
| AGE                      | -.001 | .001     | -.027       | .023     | -1.172                         | .242                    |      |   |
| SEX                      | -.033 | .024     | -.027       | .020     | -1.363                         | .174                    |      |   |
| RACE                     | .033  | .022     | .030        | .020     | 1.484                          | .138                    |      |   |
| EDUC                     | -.008 | .005     | -.037       | .023     | -1.619                         | .106                    |      |   |
| INCOME                   | -.015 | .006     | -.056       | .021     | -2.676                         | .008                    |      |   |
| MARITAL                  | .072  | .008     | .191        | .022     | 8.873                          | .000                    |      |   |
| ATTEND                   | -.016 | .005     | -.070       | .020     | -3.443                         | .001                    |      |   |
| HEALTH                   | .203  | .016     | .266        | .021     | 12.693                         | .000                    |      |   |
| VOTE96                   | -.005 | .022     | -.005       | .022     | -.232                          | .817                    |      |   |
| WORDSUM                  | .014  | .007     | .046        | .022     | 2.055                          | .040                    |      |   |
| Constant                 | 1.524 | .131     |             |          | 11.616                         | .000                    |      |   |
| Color coding:            |       | <-2.0    | <-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 |   |

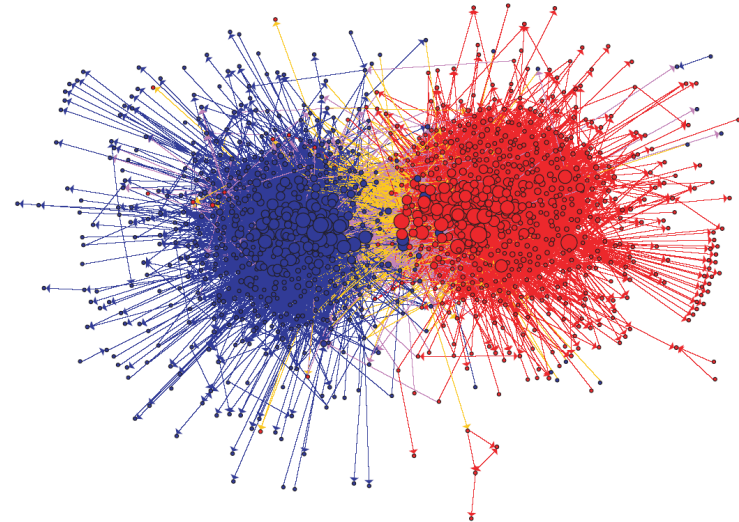
Analysis from General Social Surveys, 1972-2004. WORDSUM is a vocabulary test with about 0.83 correlation with IQ (Sigelman 1981). Table A is regression of stated happiness (HAPPY) against several different factors. Table B shows the distribution of HAPPY and WORDSUM scores. Note the strong unhappiness among the lower than average vocabulary scorers.

| Frequency Distribution                           |    |                    |                      |                          |                 |
|--------------------------------------------------|----|--------------------|----------------------|--------------------------|-----------------|
| Cells contain:<br>-Column percent<br>-N of cases |    | HAPPY              |                      |                          |                 |
|                                                  |    | 1<br>VERY<br>HAPPY | 2<br>PRETTY<br>HAPPY | 3<br>NOT<br>TOO<br>HAPPY | ROW<br>TOTAL    |
| WORDSUM                                          | 0  | .8<br>50           | .7<br>80             | 1.5<br>35                | .8<br>165       |
|                                                  | 1  | 2.0<br>131         | 1.5<br>166           | 3.5<br>79                | 1.9<br>376      |
|                                                  | 2  | 3.5<br>227         | 3.2<br>362           | 4.8<br>109               | 3.5<br>698      |
|                                                  | 3  | 5.9<br>379         | 6.0<br>684           | 10.4<br>237              | 6.5<br>1,300    |
|                                                  | 4  | 9.7<br>627         | 10.5<br>1,188        | 13.4<br>305              | 10.6<br>2,120   |
|                                                  | 5  | 15.8<br>1,017      | 16.1<br>1,833        | 18.5<br>420              | 16.3<br>3,270   |
|                                                  | 6  | 20.7<br>1,335      | 22.2<br>2,521        | 18.7<br>424              | 21.3<br>4,280   |
|                                                  | 7  | 16.1<br>1,040      | 15.6<br>1,778        | 10.8<br>245              | 15.2<br>3,063   |
|                                                  | 8  | 11.1<br>714        | 10.0<br>1,142        | 7.8<br>178               | 10.1<br>2,034   |
|                                                  | 9  | 8.1<br>524         | 8.1<br>918           | 6.1<br>138               | 7.9<br>1,580    |
|                                                  | 10 | 6.3<br>405         | 6.1<br>695           | 4.5<br>103               | 6.0<br>1,203    |
| COL TOTAL                                        |    | 100.0<br>6,449     | 100.0<br>11,367      | 100.0<br>2,273           | 100.0<br>20,089 |

|                 |                       |       |      |                      |      |      |   |
|-----------------|-----------------------|-------|------|----------------------|------|------|---|
| Color coding:   | <-2.0                 | <-1.0 | <0.0 | >0.0                 | >1.0 | >2.0 | Z |
| N in each cell: | Smaller than expected |       |      | Larger than expected |      |      |   |

"[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."

Kalfoglou A, Suthers, K, Scott J, & K Hudson, *Reproductive Genetic Testing: What America Thinks*, Washington, DC: Genetics and Public Policy Center, 2002



8

VALID

MORROW, JEROME  
011010100-09564

GLOBED GTACATGACTAAGTTAC EYES:BLUE TACCTG  
TAGTTCGTAGCTTGACCTCCCTGAAGTCACCAAGTTTCA  
GNQ9.8612 = VALIDITY JE7542DAN

OUTNOW.CH







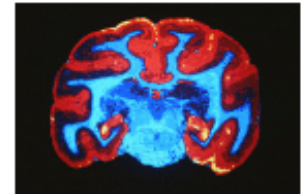
# Economy of Enhancement



- Benefits
  - Reduction of losses
  - Individual benefits
  - Societal benefits
- Costs
  - Individual
  - Competition

# **TOO MUCH TO DO? TOO LITTLE TIME?** **ACCOMPLISH IT ALL WITH** **BACKUP BRAIN™**

There just aren't enough hours in the day to do all the things on your plate. By the time you get home from work, your brain is totally fried. What you need is something to relieve the stress on your brain during the day so you arrive at home alert and refreshed. What you need is something to do your thinking for you when you don't want to. What you need is a minor surgical procedure: the implantation of a patented Backup Brain™.



It's a real brain taken from a fan of professional wrestling, so it's hardly been used at all!

## **Look at these happy customers!**



"I can get falling down drunk, but my trusty Backup Brain will drive me home safe and sound!"



"My poker game is incredible now that my Backup Brain is keeping track of the cards!"



"The stock market is no mystery to me! My Backup Brain is dedicated to detecting market trends!"



"I can sleep through boring meetings while my Backup Brain takes notes and looks interested!"

## **Look at all the stuff Backup Brain can do!**

Read War and Peace while you sleep • Help your kids with their homework and balance your checkbook at the same time • Tell the difference between presidential candidates • Cure cancer • Complete MYST without cheating • Prevents you from making career-ending remarks to your boss • Understand the ISO9000 standard • Be sensitive yet manly at the same time • Truly comprehend the opposite sex • Foil Microsoft's plans for world domination • And much more!



**Before**



**After**

**BACKUP BRAIN: IF YOU'VE GOT THE TIME WE'VE GOT THE BRAINS**

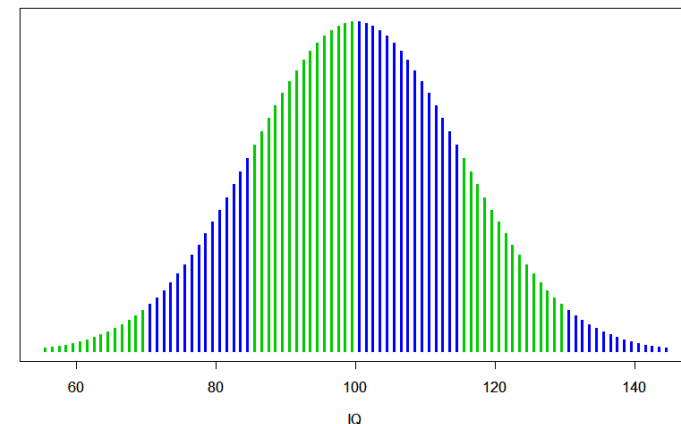
# Reduction of Losses

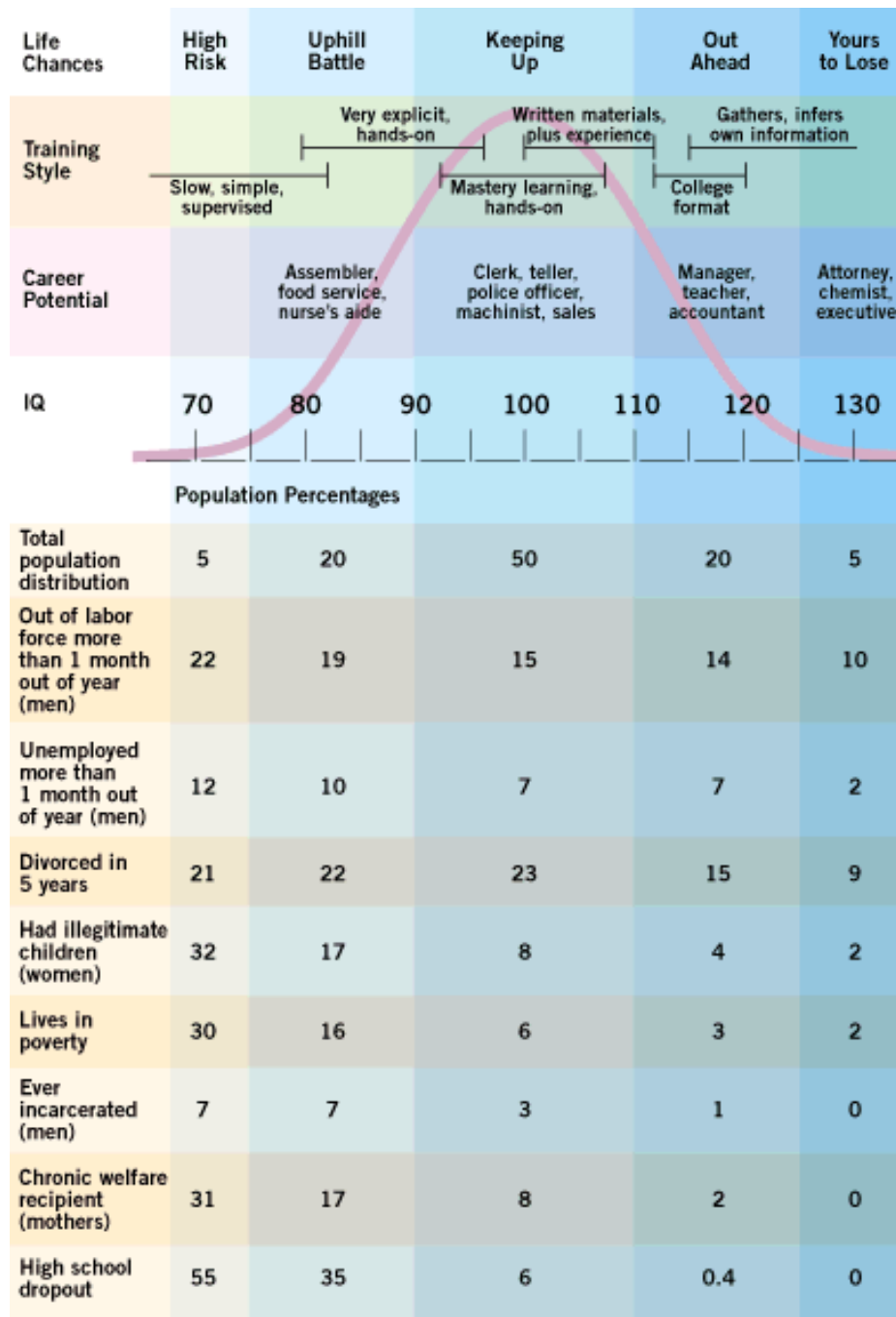
- Lost keys UK £250 million/year
- Forgotten standing payment orders: £400 million/month (\$53/month person)
- Sleepiness cause 15-20% road accidents (as well as work-related accidents, iatrogenic illness etc)
- Higher IQ likely reduces accident risks
- Can cognitive enhancement reduce this?





- 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 reciprocity -18%

Out-of-wedlock births -15%

Gottfredson 2002

**IQ  
scores**

100

95

90

85

80

75

1910

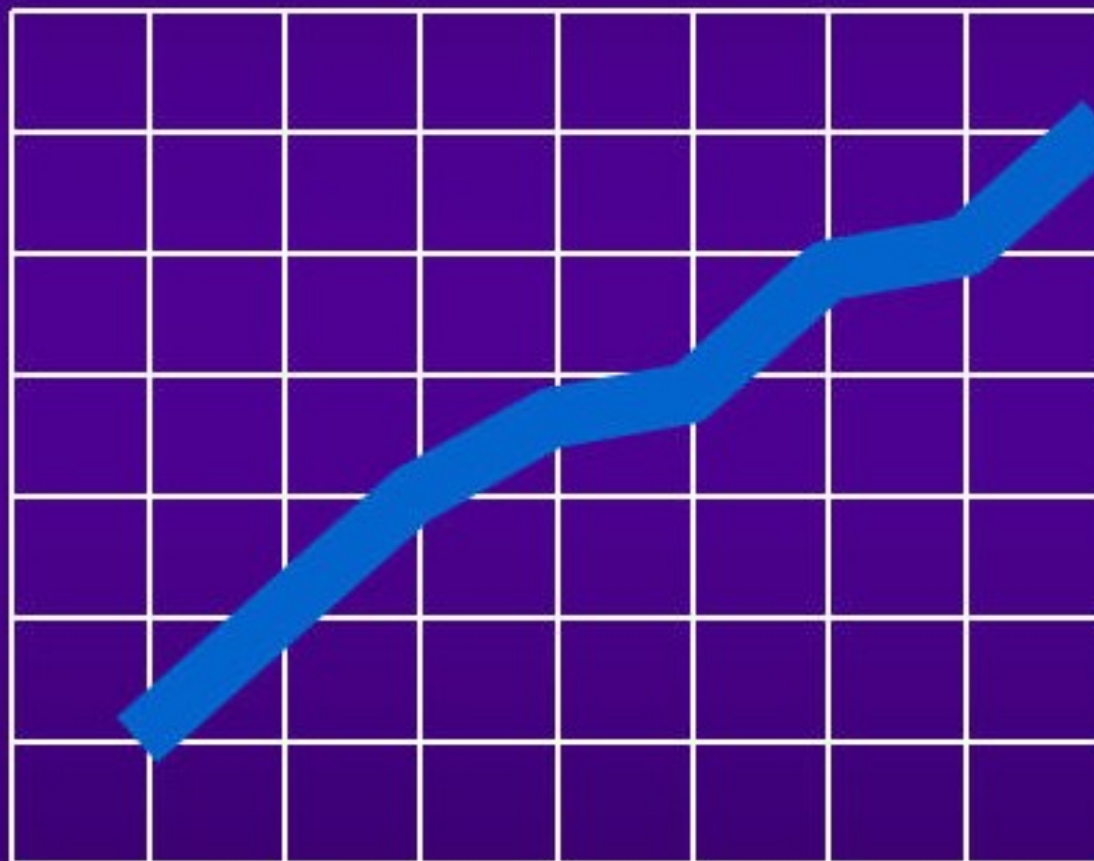
1930

1950

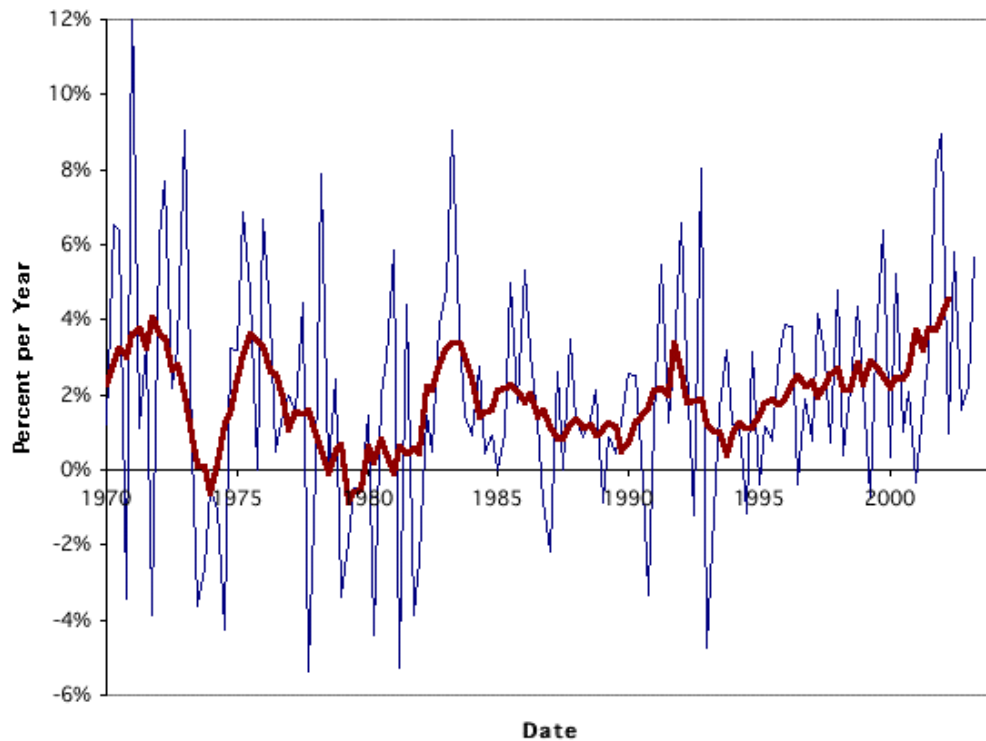
1970

1990

**Year**



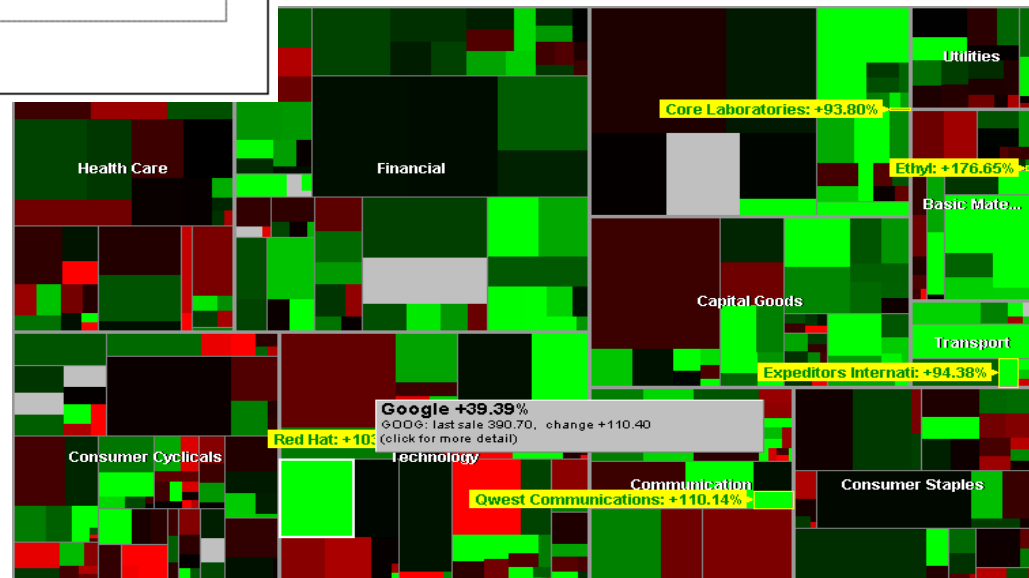
Nonfarm Business Productivity Growth

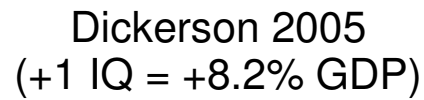


# Economy Impact

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

Cognition plays a sizeable role



$$y = 0.75128 + 3.4414e-2x \quad R^2 = 0.695$$


A scatter plot showing the relationship between State IQ (X-axis) and Median income (Y-axis). The X-axis ranges from 60 to 120, and the Y-axis ranges from 30,000 to 80,000. A red regression line is drawn through the data points, which are labeled with state abbreviations. The data points are as follows:

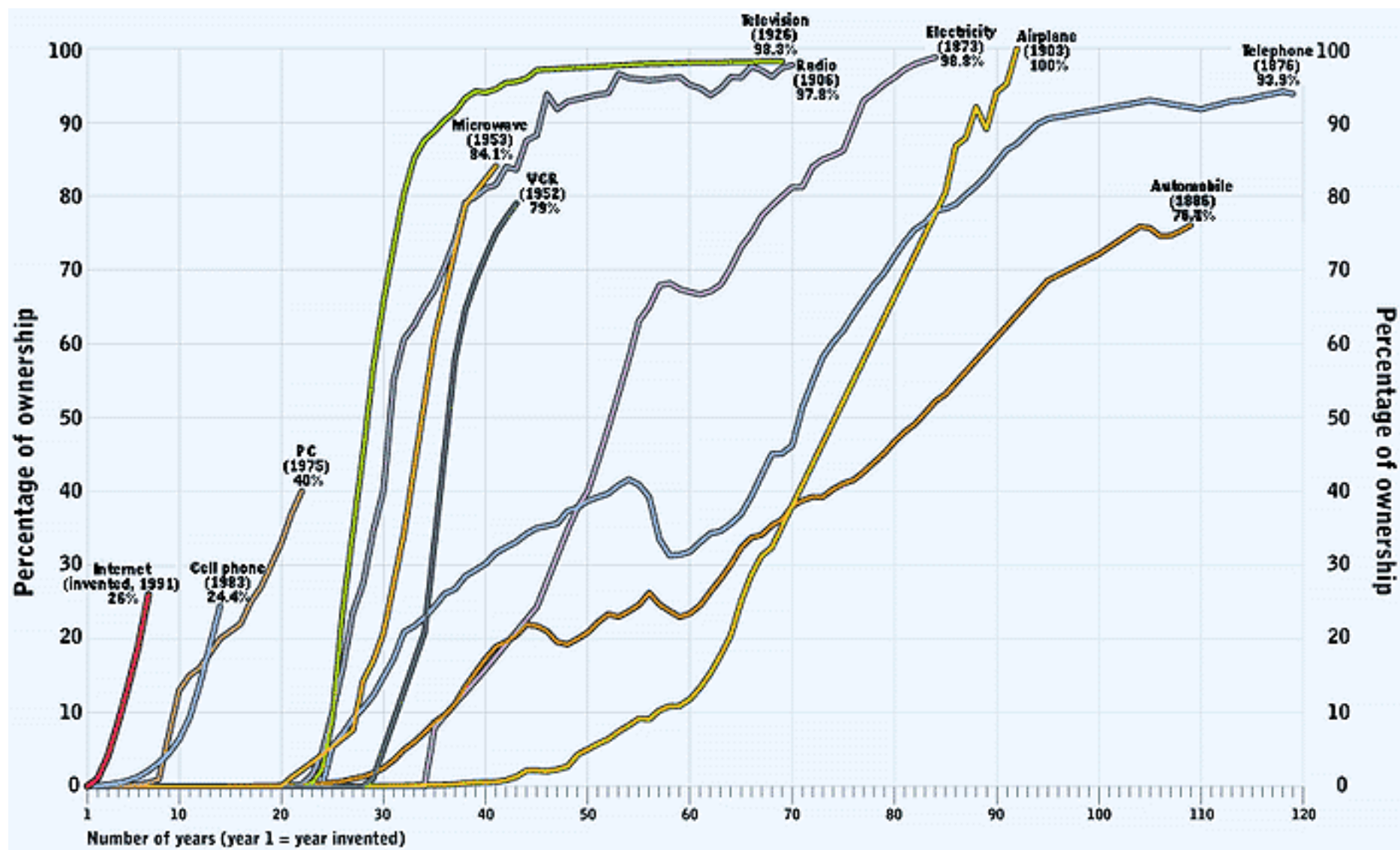
| State | State IQ (approx.) | Median income (approx.) |
|-------|--------------------|-------------------------|
| MS    | 62                 | 39,000                  |
| AR    | 74                 | 40,000                  |
| LA    | 76                 | 44,000                  |
| OK    | 78                 | 45,000                  |
| SD    | 76                 | 49,000                  |
| NE    | 79                 | 51,000                  |
| UT    | 77                 | 52,000                  |
| IA    | 78                 | 52,000                  |
| MO    | 79                 | 52,000                  |
| AL    | 80                 | 46,000                  |
| WI    | 78                 | 56,000                  |
| MI    | 82                 | 56,000                  |
| KS    | 82                 | 55,000                  |
| NY    | 82                 | 43,000                  |
| NM    | 83                 | 43,000                  |
| IL    | 85                 | 60,000                  |
| WY    | 87                 | 55,000                  |
| MN    | 89                 | 63,000                  |
| TN    | 88                 | 47,000                  |
| WV    | 89                 | 40,000                  |
| ID    | 92                 | 46,000                  |
| OH    | 97                 | 53,000                  |
| NV    | 98                 | 52,000                  |
| AZ    | 98                 | 49,000                  |
| TX    | 99                 | 49,000                  |
| MT    | 99                 | 45,000                  |
| CA    | 100                | 58,000                  |
| CO    | 98                 | 59,000                  |
| HI    | 103                | 65,000                  |
| AK    | 103                | 67,000                  |
| SC    | 101                | 47,000                  |
| NC    | 102                | 47,000                  |
| FL    | 101                | 50,000                  |
| GA    | 102                | 50,000                  |
| IN    | 103                | 51,000                  |
| ME    | 104                | 51,000                  |
| PA    | 104                | 55,000                  |
| DC    | 103                | 55,000                  |
| VA    | 105                | 61,000                  |
| RI    | 104                | 60,000                  |
| DE    | 104                | 60,000                  |
| VT    | 105                | 57,000                  |
| NY    | 106                | 57,000                  |
| MA    | 108                | 69,000                  |
| NH    | 109                | 68,000                  |
| MD    | 106                | 70,000                  |
| CT    | 107                | 74,000                  |
| NY    | 108                | 75,000                  |
| VT    | 109                | 75,000                  |

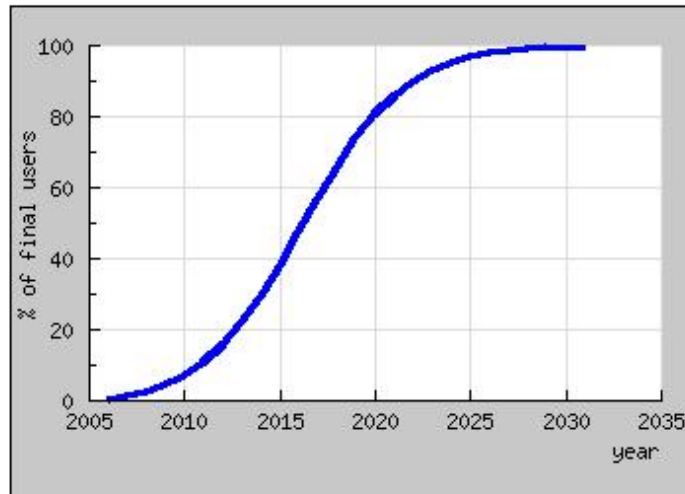


# Costs

- 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

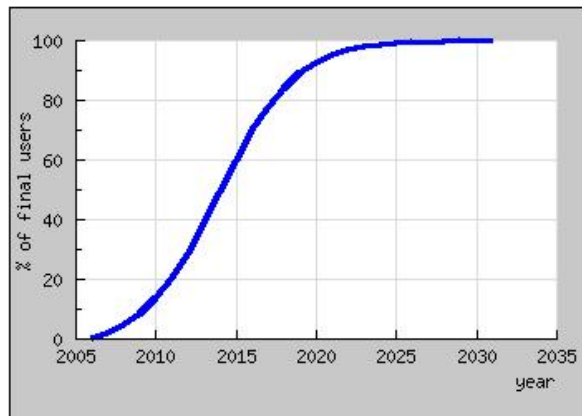






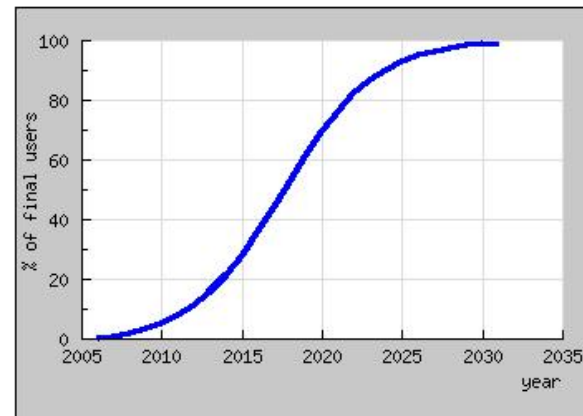
[View data](#)

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



[View data](#)

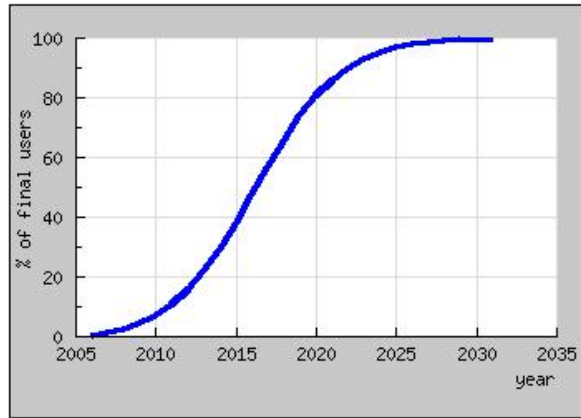
Prediction for:  
 Industry: medical  
 Introduction in: 2006  
 Degree of Innovation: standard  
 Degree of Imitation: standard



[View data](#)

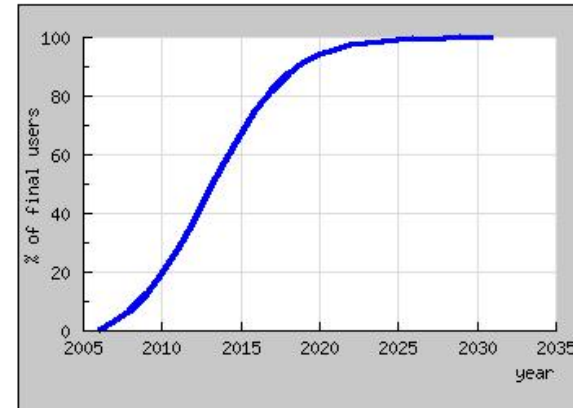
Prediction for:  
 Industry: non durable  
 Introduction in: 2006  
 Degree of Innovation: standard  
 Degree of Imitation: standard





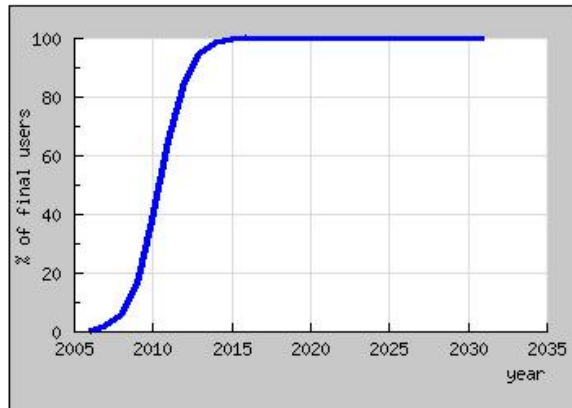
[View data](#)

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



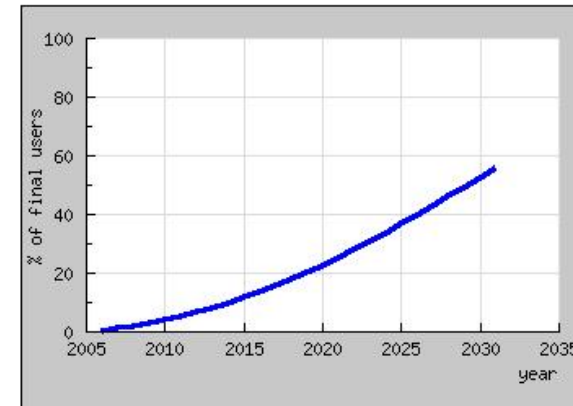
[View data](#)

Prediction for:  
 Industry: general  
 Introduction in: 2006  
 Degree of Innovation: +3  
 Degree of Imitation: standard



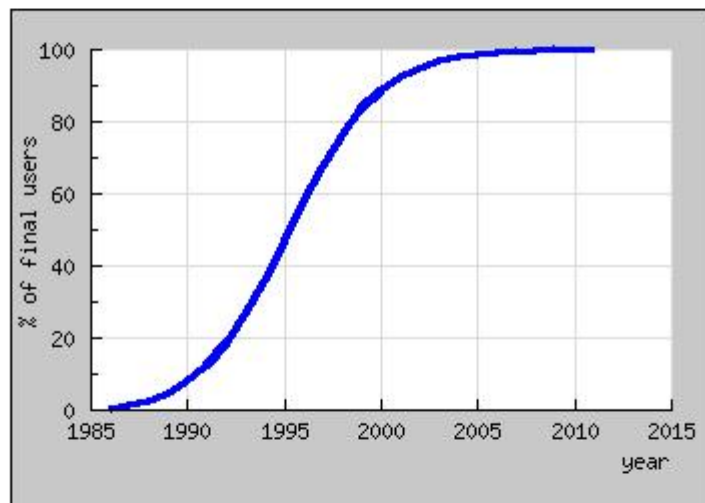
[View data](#)

Prediction for:  
 Industry: general  
 Introduction in: 2006  
 Degree of Innovation: standard  
 Degree of Imitation: +3



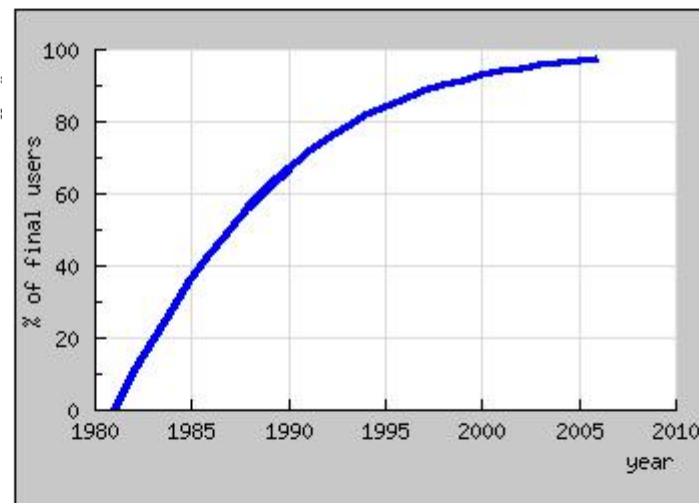
[View data](#)

Prediction for:  
 Industry: general  
 Introduction in: 2006  
 Degree of Innovation: standard  
 Degree of Imitation: -3



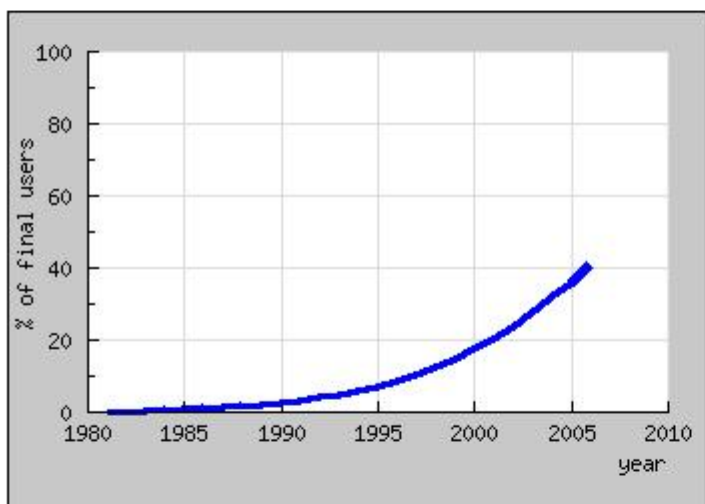
Cellular telephone  
 [Source: Lilien (1999),  
<http://www.ebusiness.com>]

[View data](#)



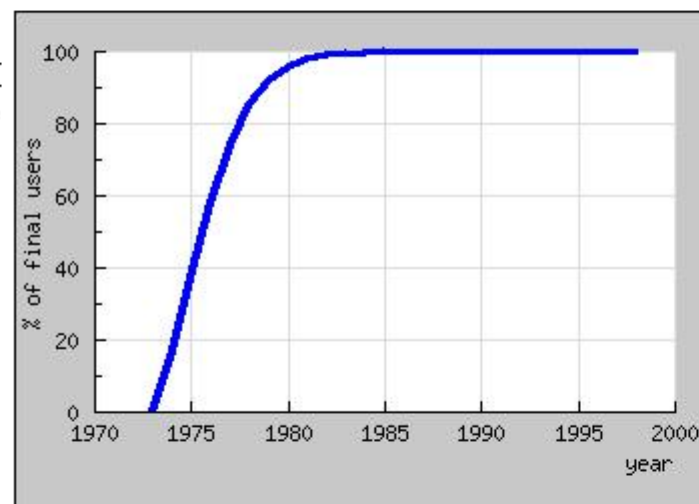
Cable television  
 [Source: Lilien (1999),  
<http://www.ebusiness.com>]

[View data](#)



PC  
 [Source: Frank Bass (1999),  
<http://www.utdallas.edu>]

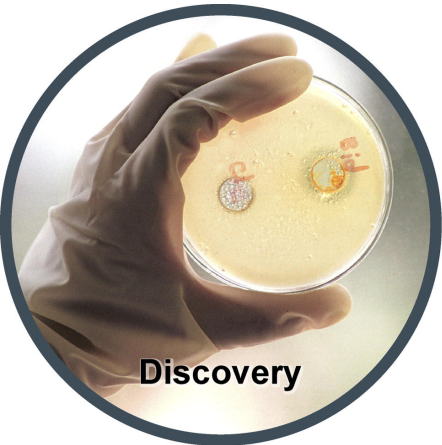
[View data](#)



Calculators  
 [Source: Lilien (1999),  
<http://www.ebusiness.com>]

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## 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).

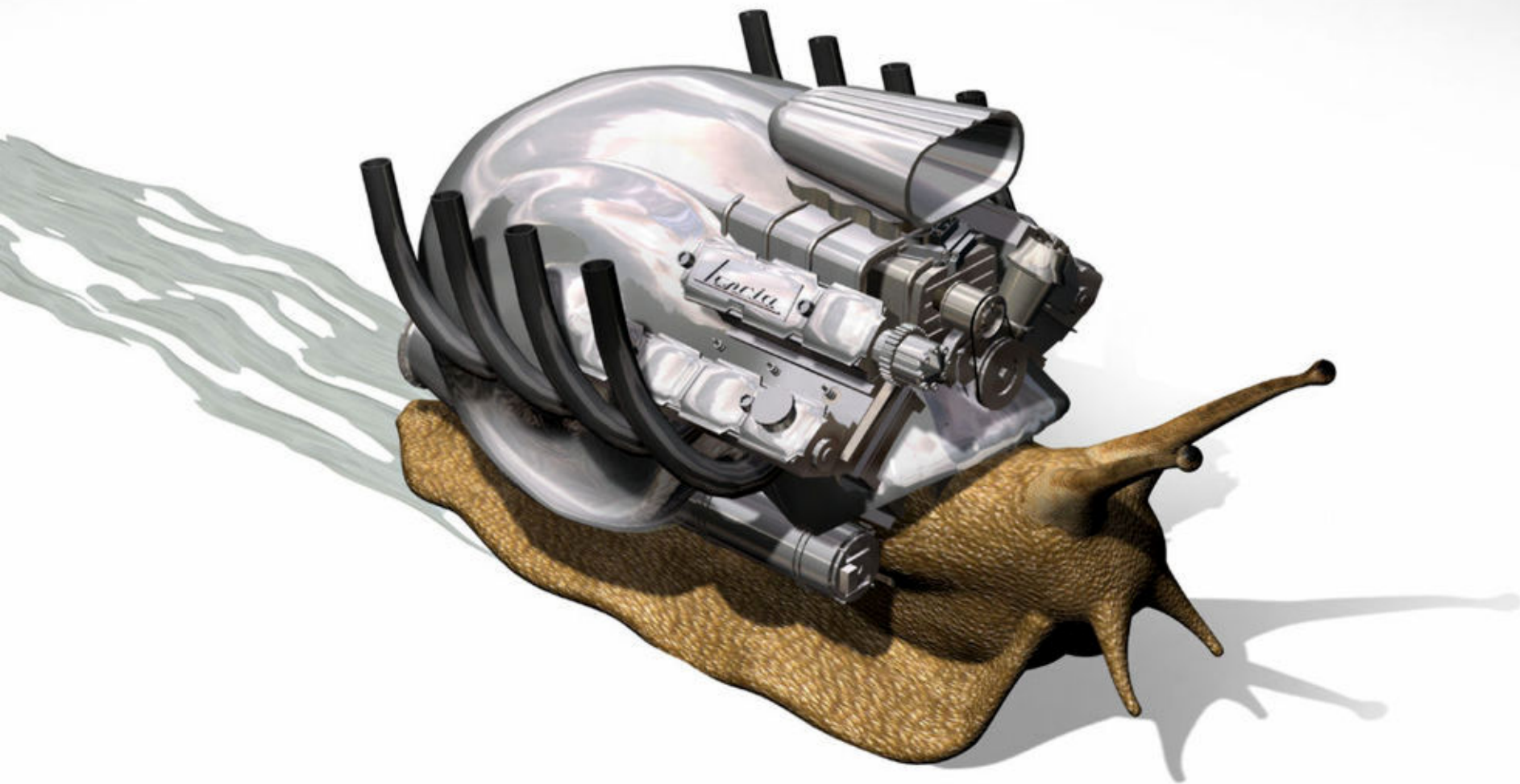


**Availability to patients**



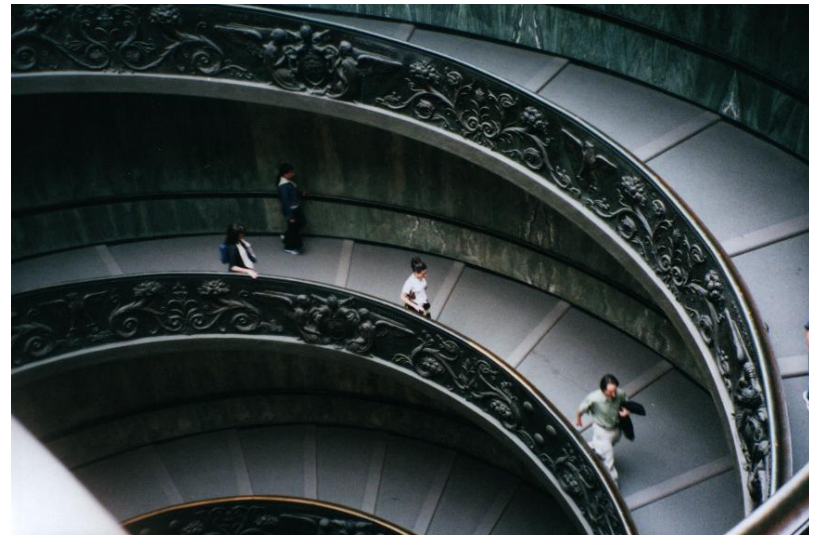
$$\begin{aligned}
 & \int \phi^\dagger \psi \psi^R \\
 & R = G^R \left( \frac{1}{e^R} - \frac{Q}{e^N} \right) (G^N) \\
 & = \psi^R \\
 & G^R |k_0\rangle = \int \frac{d^3 k'}{(2\pi)^3} \langle \psi^R(k_0) | \phi(k') \rangle \\
 & \quad \left( \frac{Q(k') e^R(k')}{e^N(k')} \right) e^R(k') \langle \phi(k') | \psi^R(k_0) \rangle \\
 & \quad \text{Pauli } Q(k') = 0 \\
 & E(k') = \frac{e^R(k')}{e^N} [e^N(k') - Q(k') e^R(k')] \\
 & F(k') = k'^2 \int \frac{d^3 Q'}{(2\pi)^3} \langle \phi(k_0) | \psi(k_0) \rangle^2 \\
 & \langle k_0 | G^N - G^R | k_0 \rangle = \int F(k') E(k') \alpha \\
 & (2\pi)^{-3} \int_0^{k_F} d^3 k' e^{i k \cdot (r - r')} \\
 & k_F r - k_F r \cos k_F r \\
 & 3S \ 3D
 \end{aligned}$$



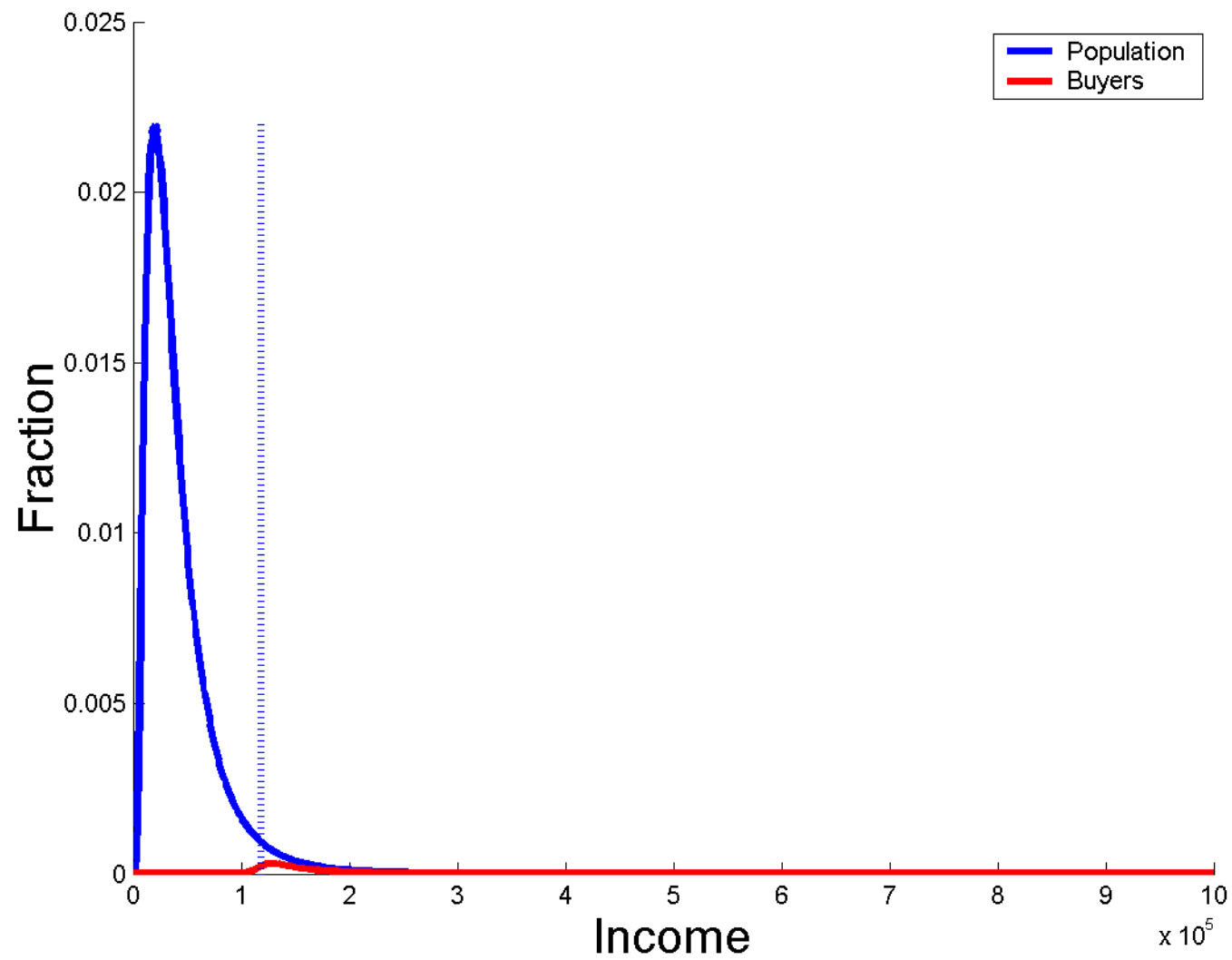


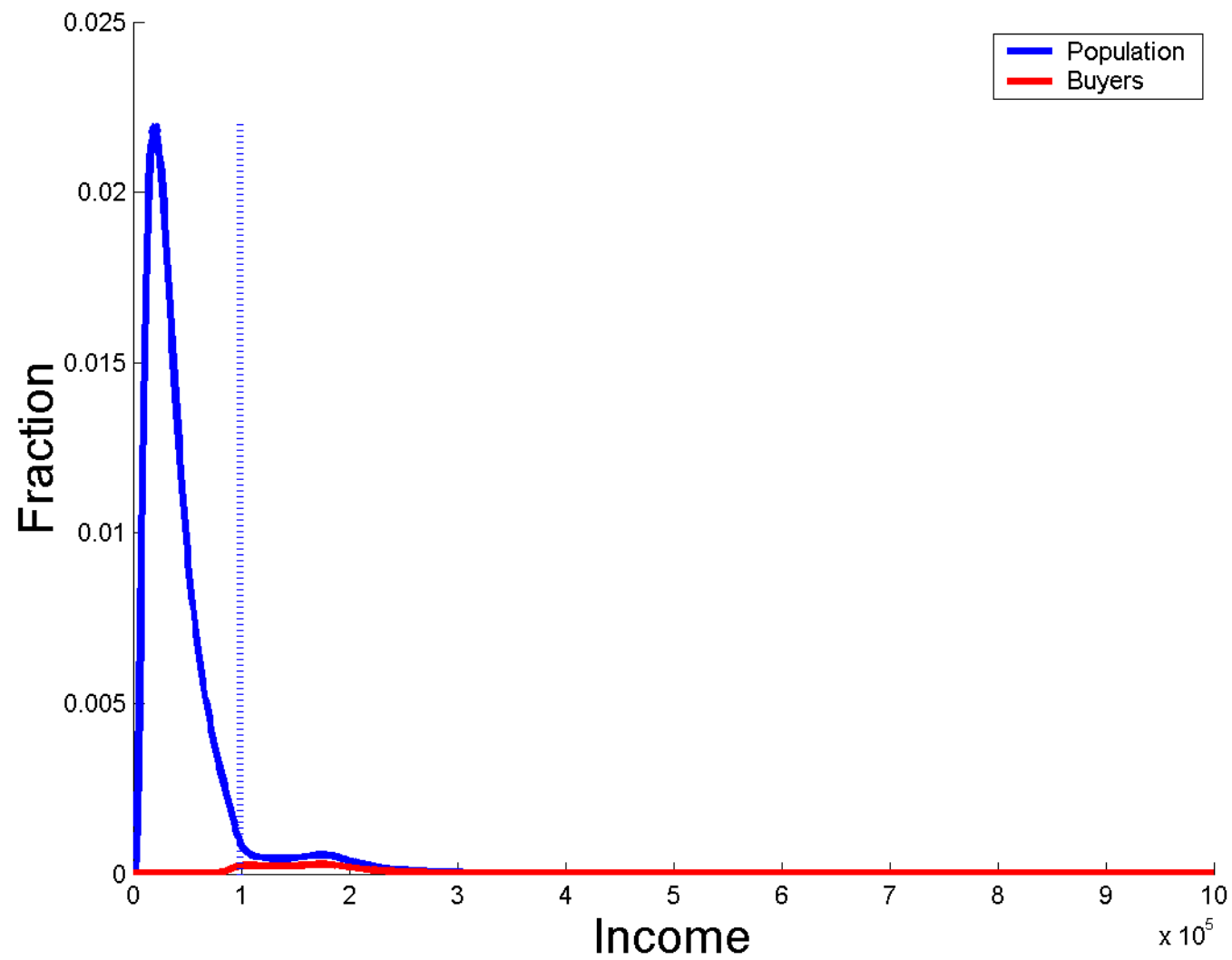
# Simulation

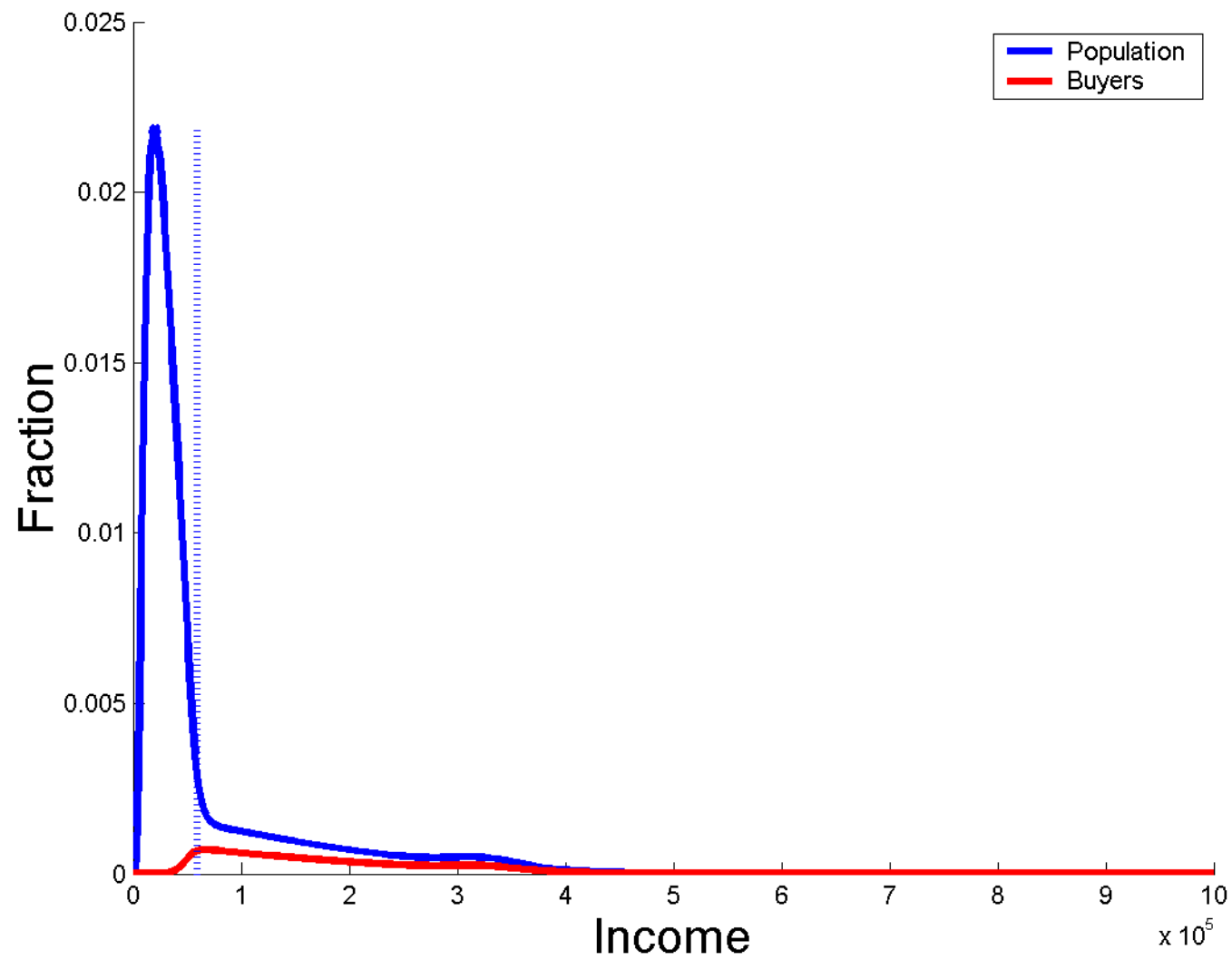
- Initial experiments with income-enhancement models
- Enhancements that increase earning ability constant factor, decreasing to a low price
- Assumes no redistribution

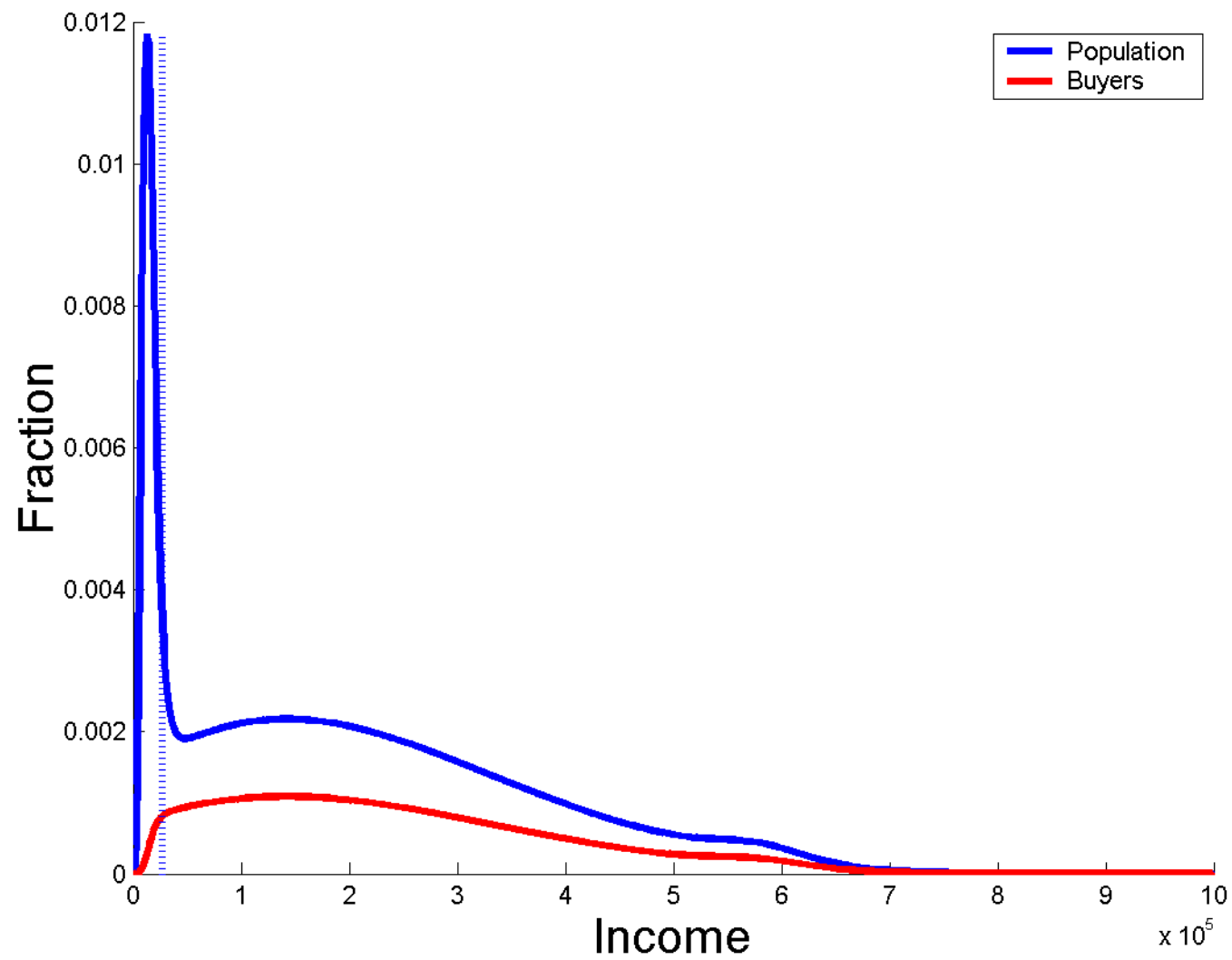




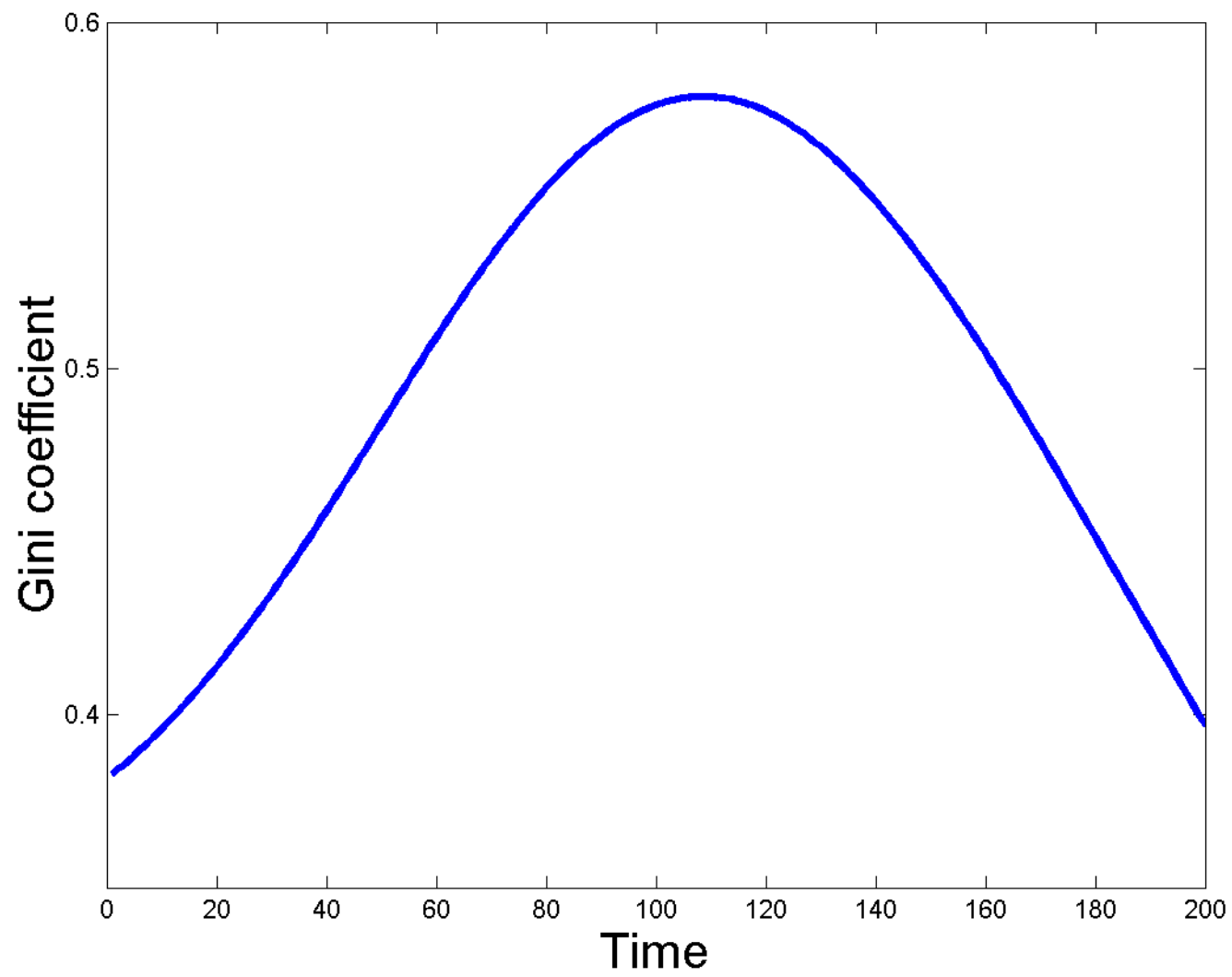




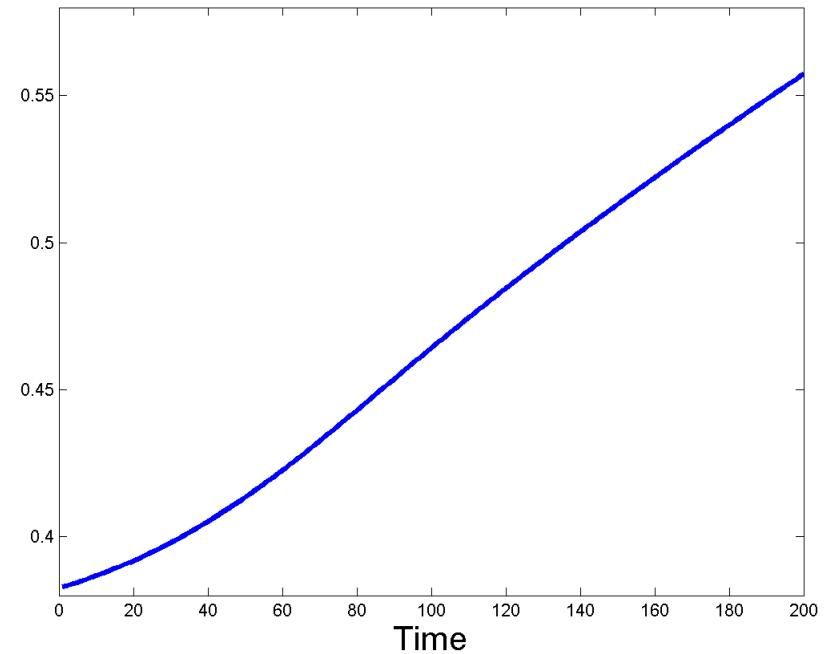
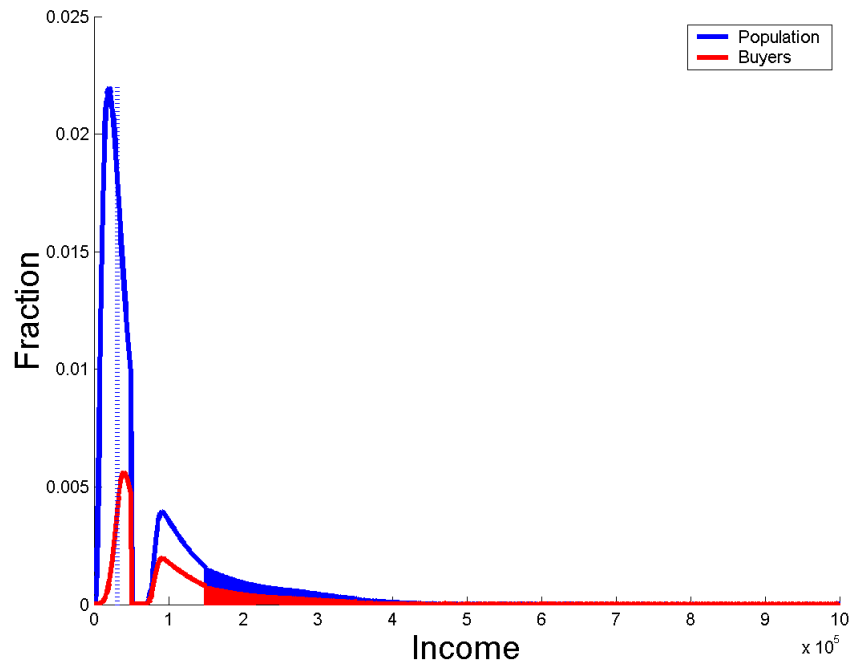




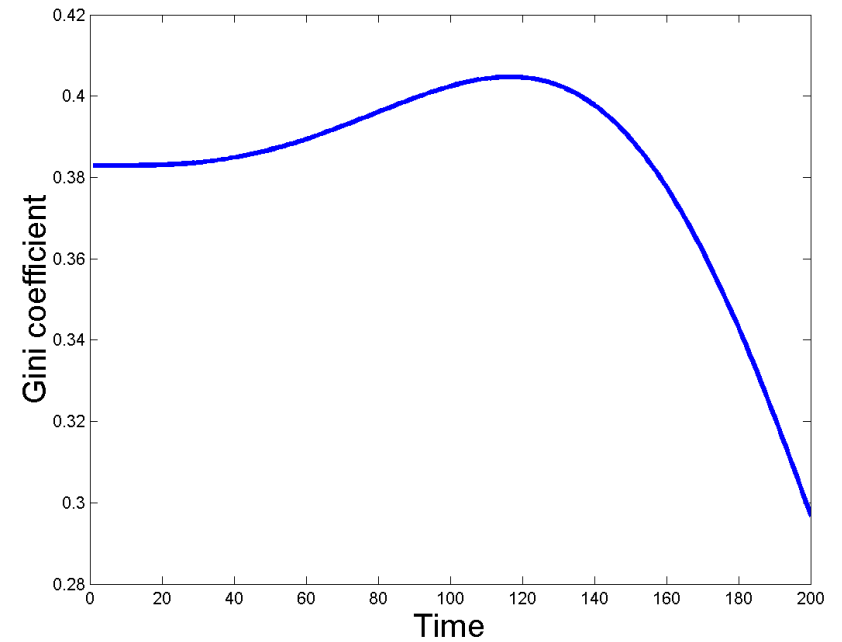
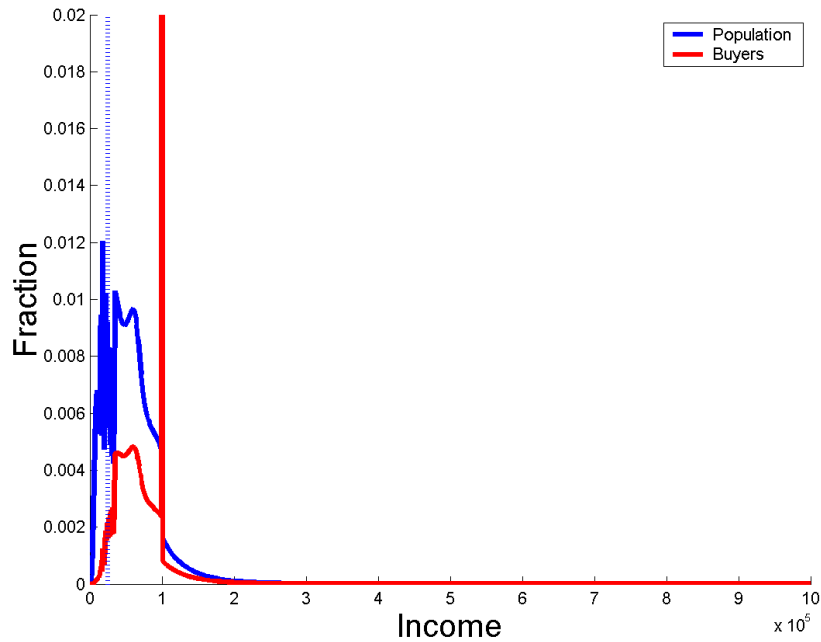




# Enhancement proportional to income



# 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

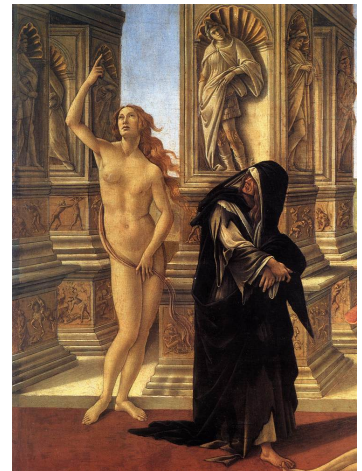


- Near-term enhancements
  - Gadgets and drugs
  - Decreasing margins
  - Narrow task improvements
  - Hence unlikely to be major disruptors
  - Biological enhancements at first less significant than external software, hardware
  - Important tryout for handling more radical enhancement

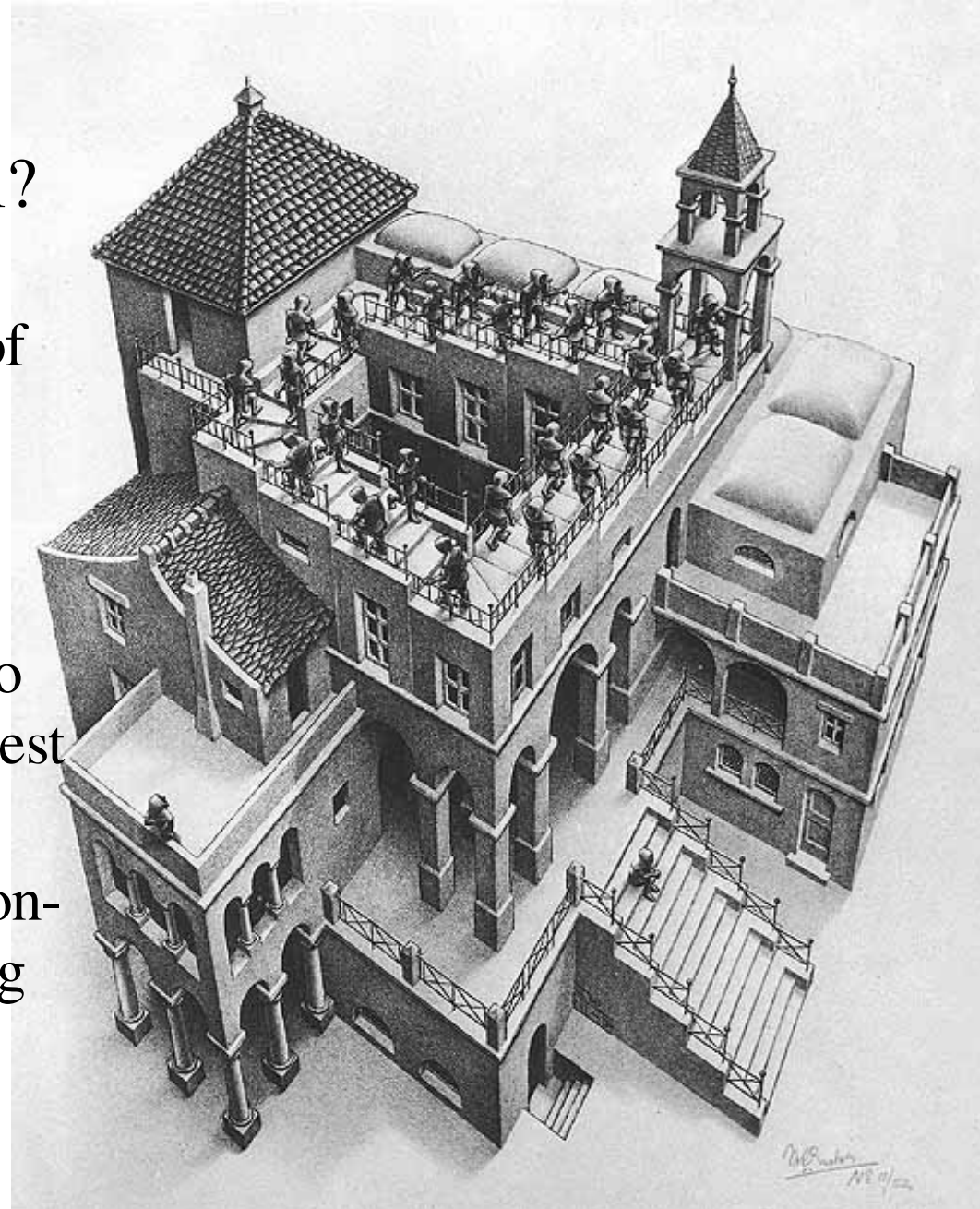


# Approaches

- 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)





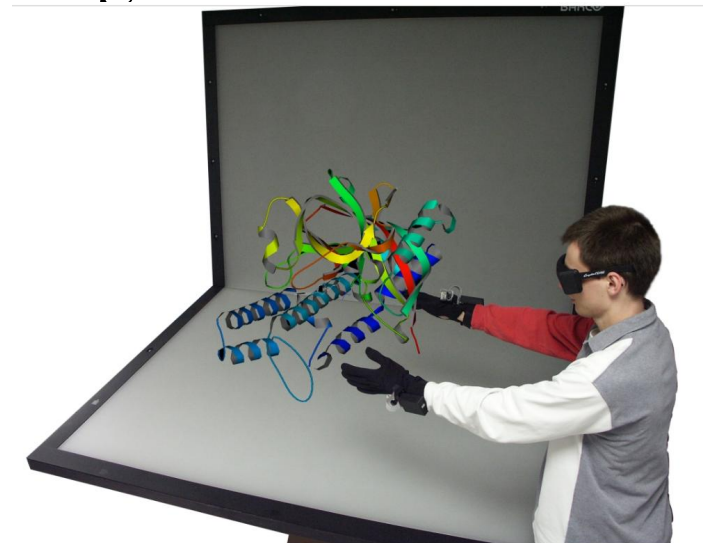
# Conclusions

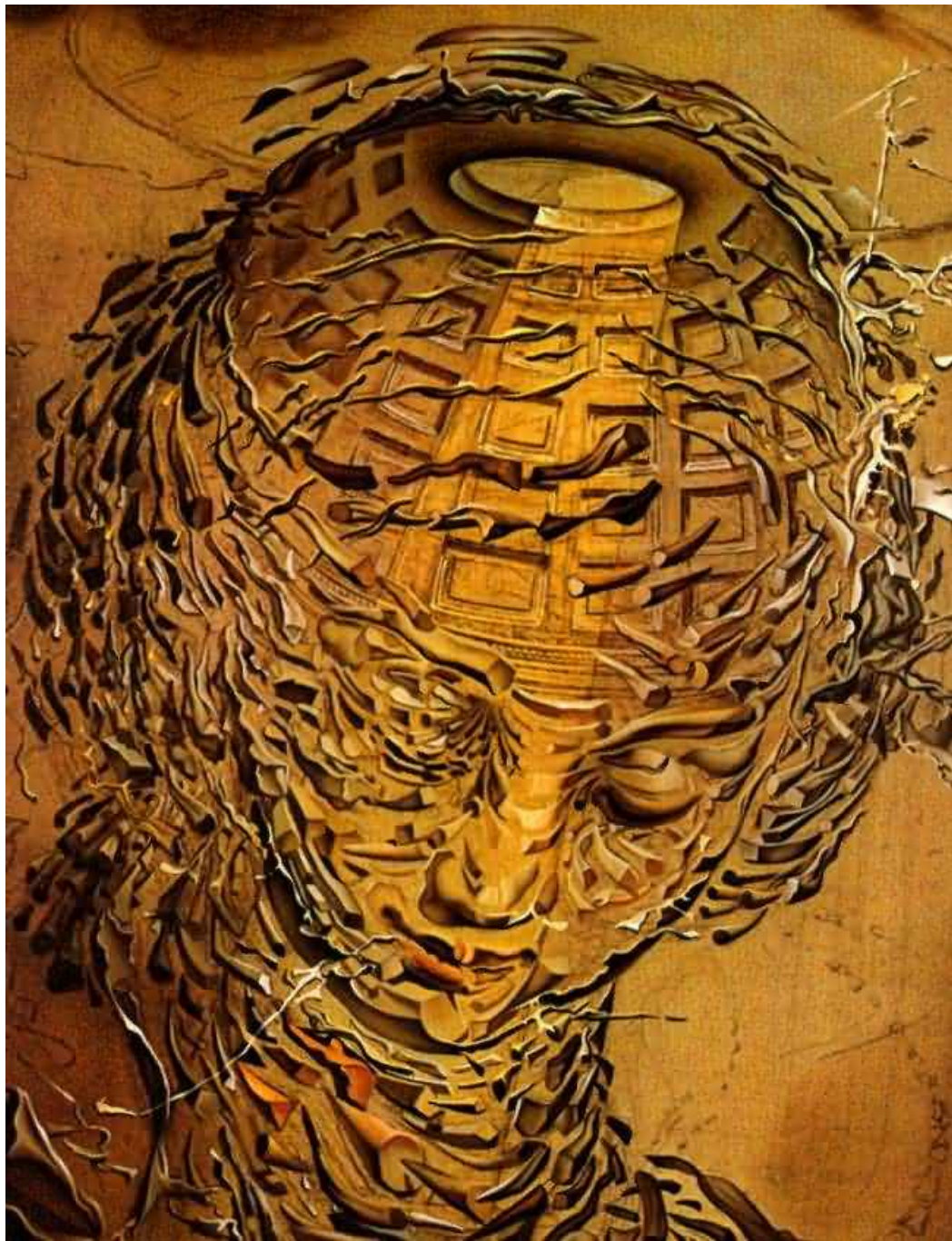
- Potential gains very large
- Spread across society
- Lowest performers likely gain most
- Competition may increase, but also overall wealth and opportunities
- Risks manageable near term
- Need for ecological studies
- Collective enhancement



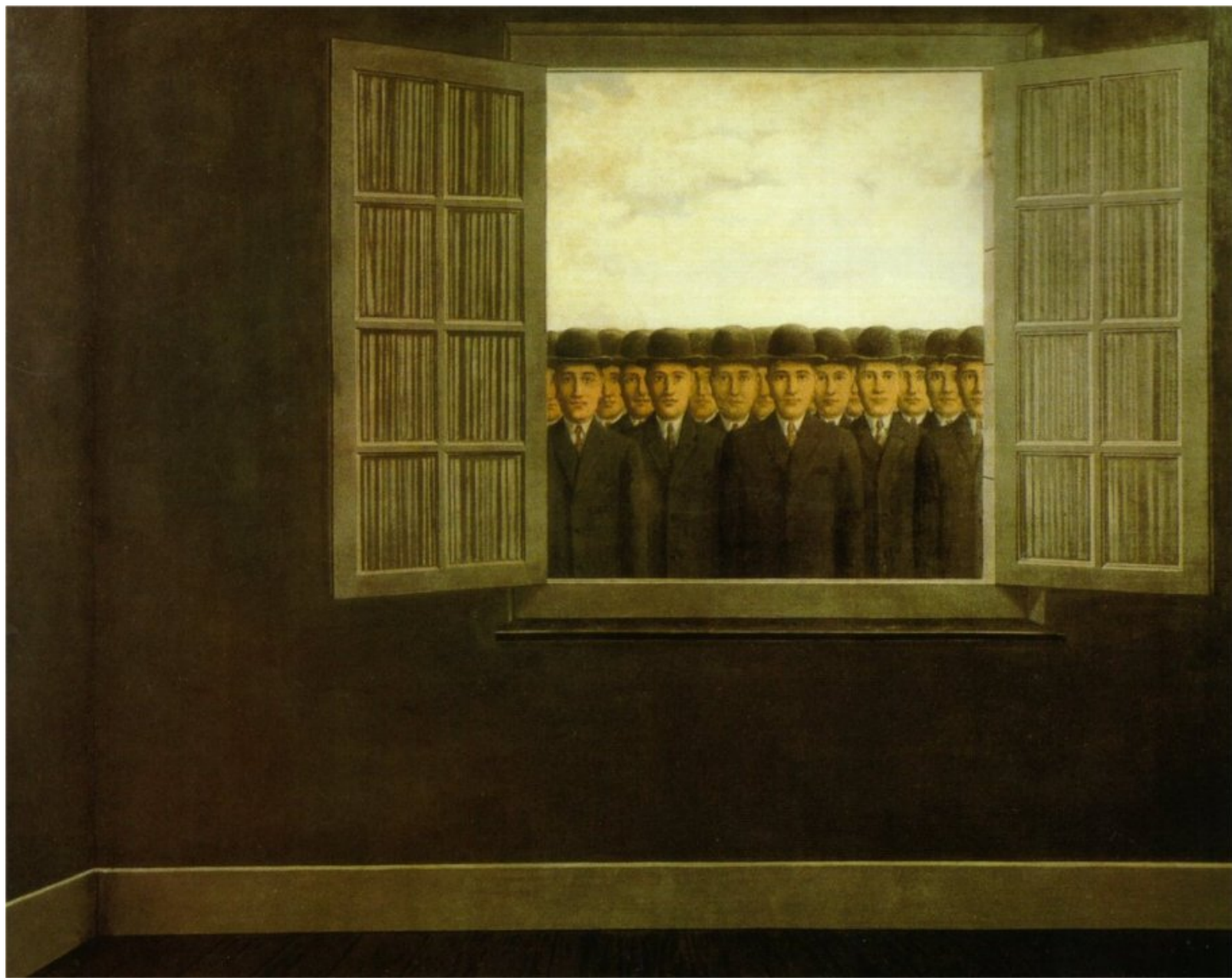
# H+ Things to Do

- 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

