


## The Cerebellum

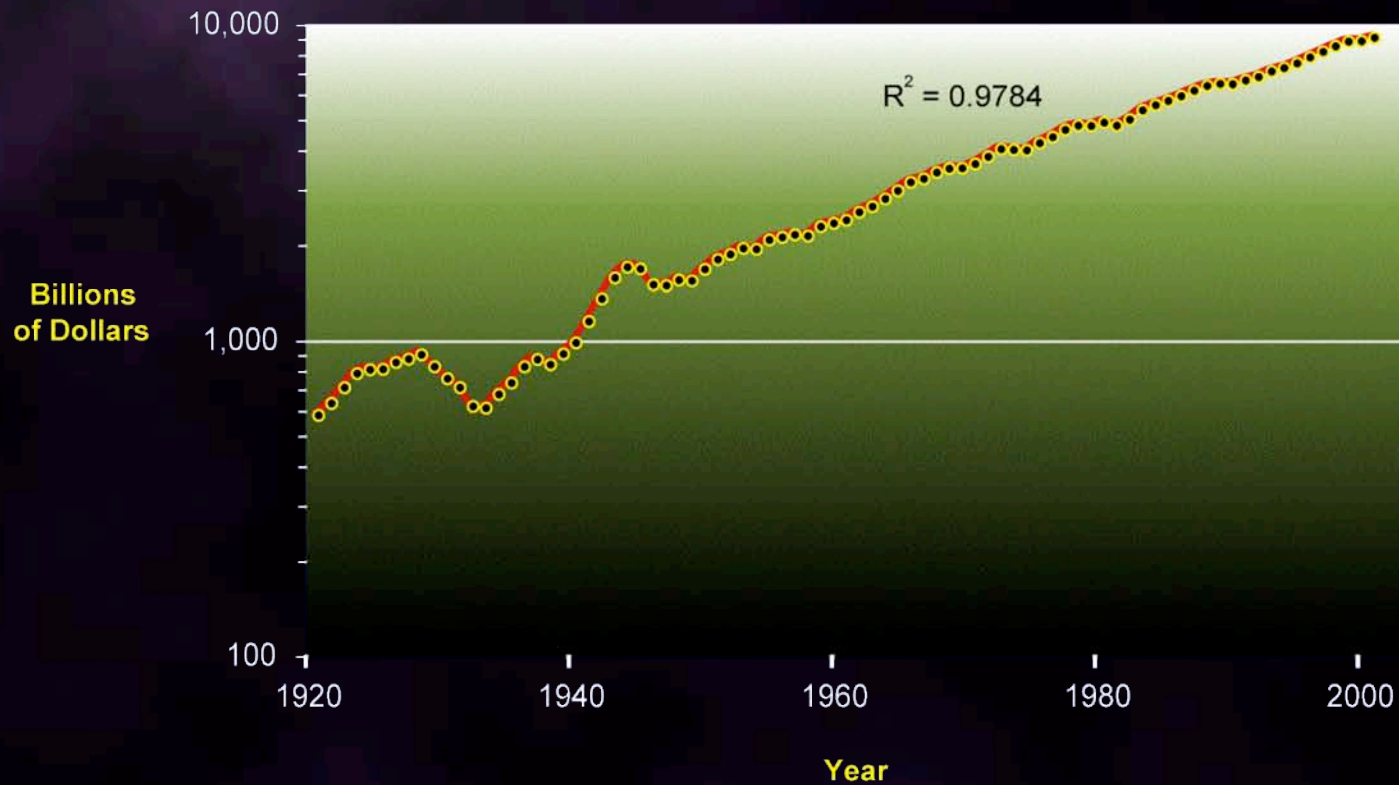
- Gathering data from multiple studies, Javier F. Medina, Michael D. Mauk, and their colleagues at the University of Texas Medical School devised a detailed bottom-up simulation of the cerebellum.
- Their simulation includes over 10,000 simulated neurons and 300,000 synapses, and includes all of the principal types of cerebellum cells.



## The Law of Accelerating Returns is driving economic growth

- The portion of a product or service's value comprised of information is asymptoting to 100%
- The cost of information at every level incurs deflation at ~ 50% per year
- This is a powerful deflationary force
  - Completely different from the deflation in the 1929 Depression (collapse of consumer confidence & money supply)

## Real Gross Domestic Product

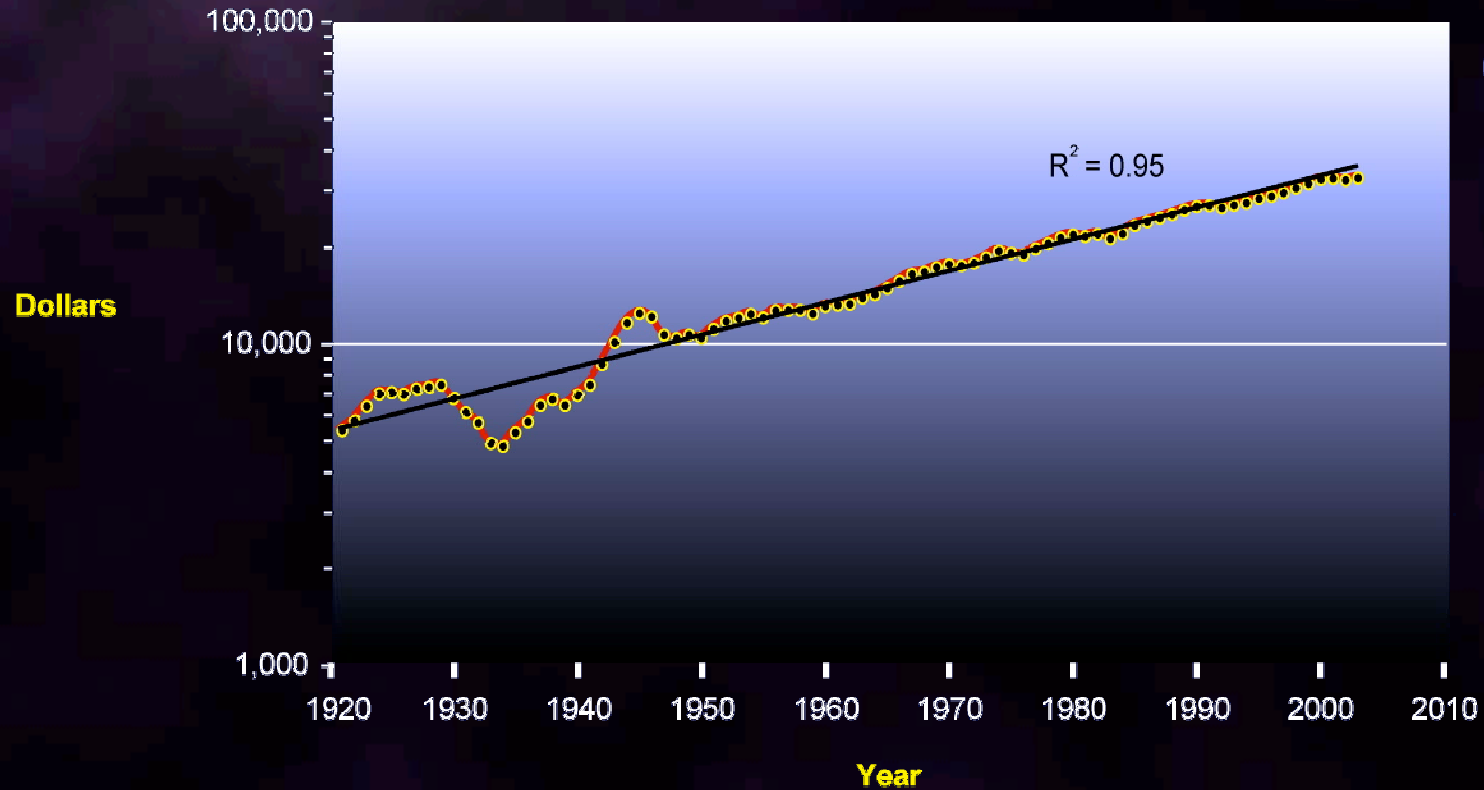


*Logarithmic Plot*

Data from: Bureau of Economic Analysis

## Per Capita GDP

*Logarithmic Plot*

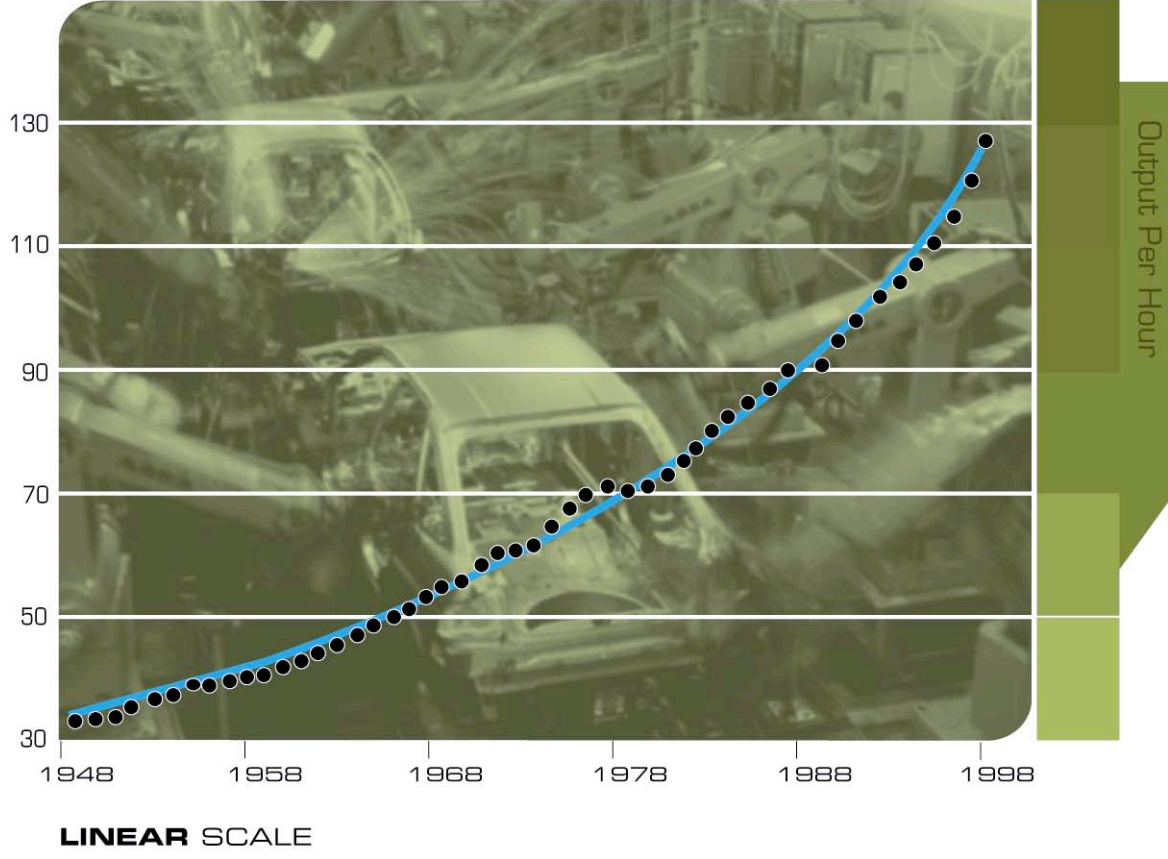


Data from: U.S. Census Bureau

Doubling time: 30 years

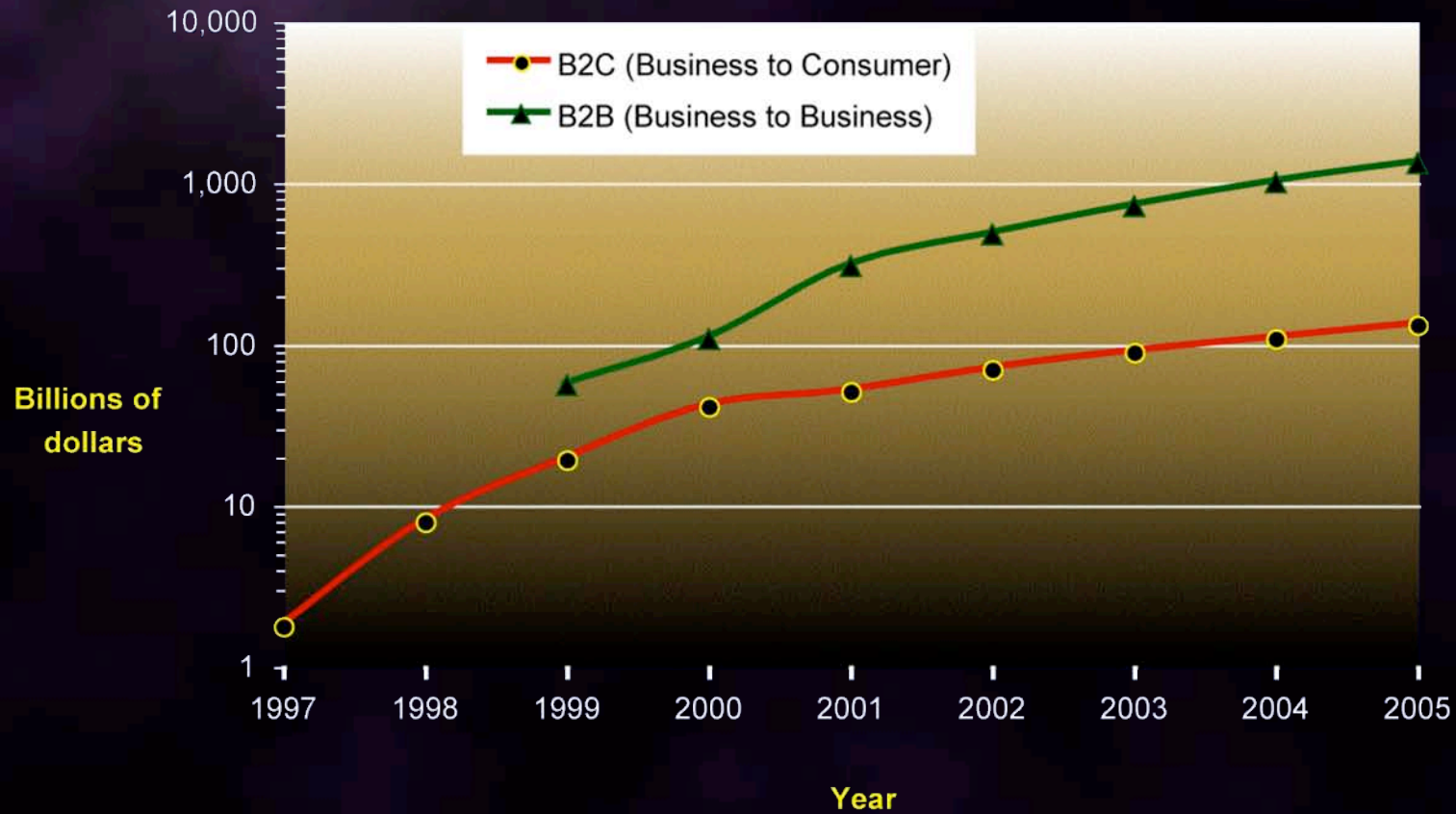


# U.S. PRIVATE MANUFACTURING



LINEAR SCALE

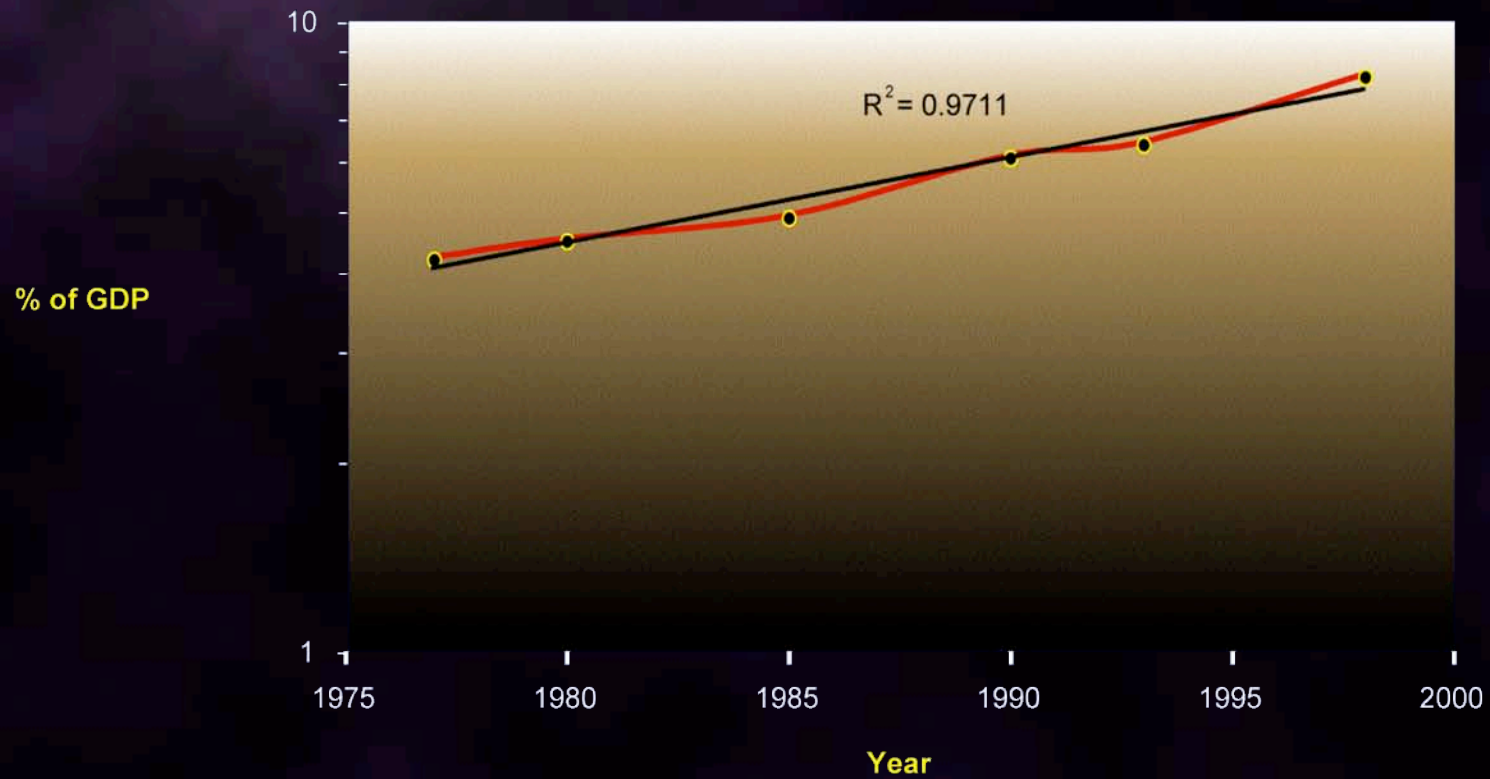
## E-Commerce Revenues in U.S.



Data from: eMarketer

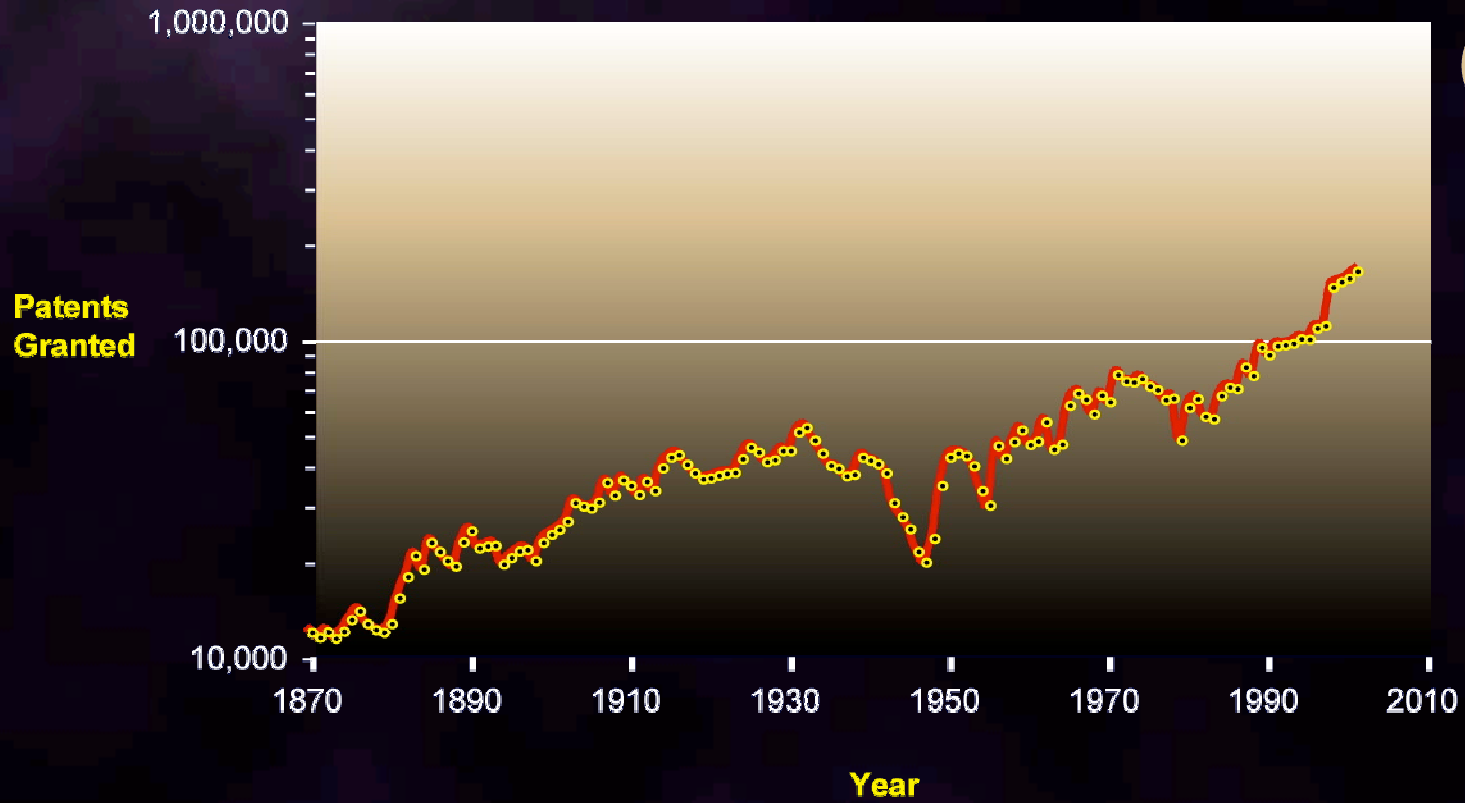


## IT's Share of the Economy



Data from: U.S. Department of Commerce

## U.S. Patents Granted



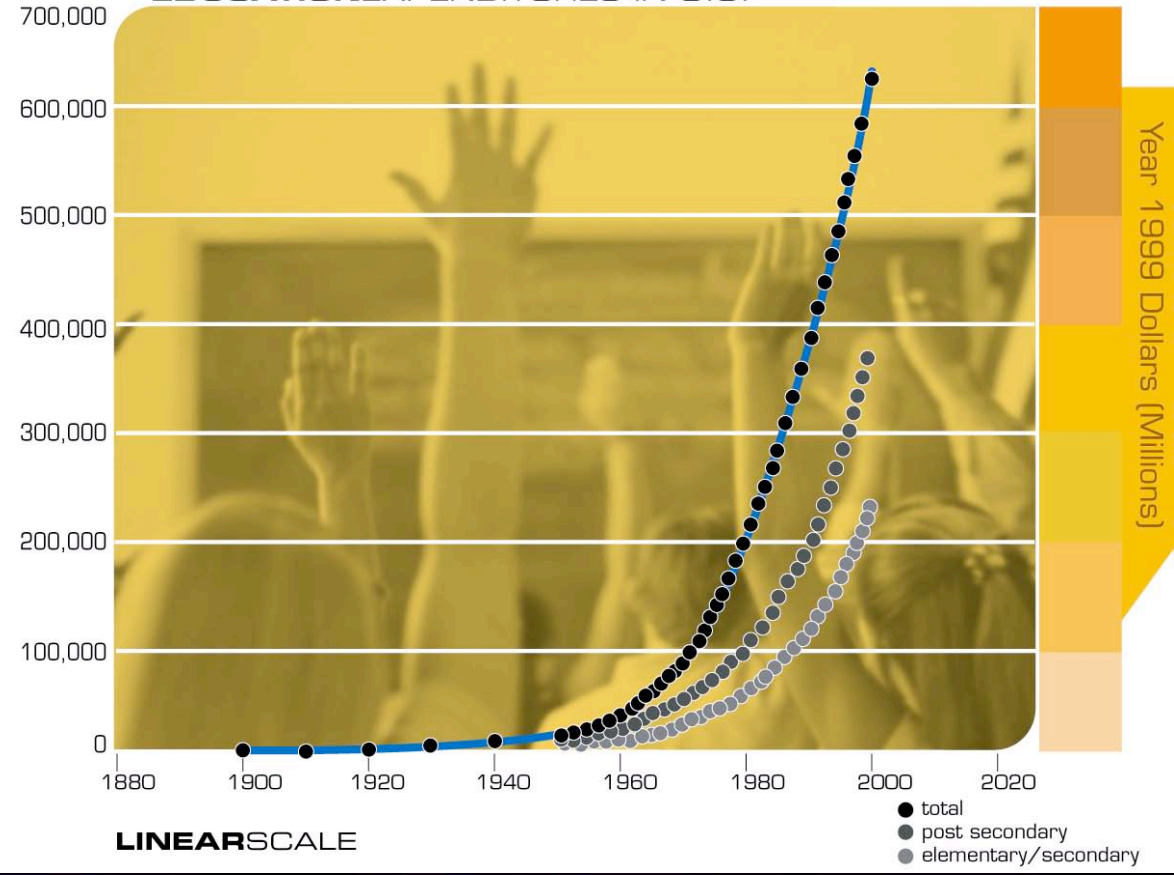
Data from: U.S. Patent and Trademark Office

Doubling time: 16 years



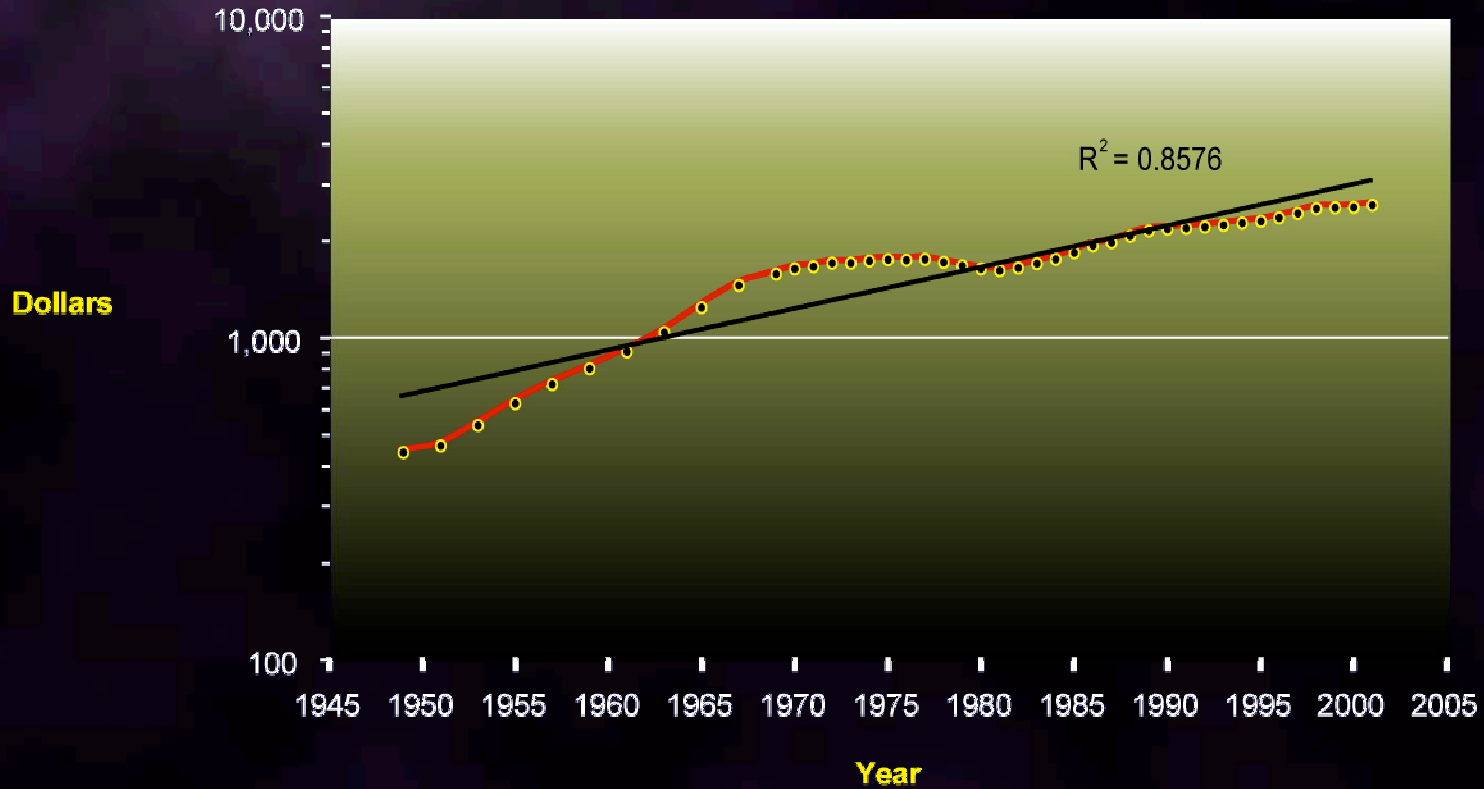


### EDUCATION EXPENDITURES IN U.S.



# U.S. Education Expenditure Per Capita (constant 2001-2002 dollars)

*Logarithmic Plot*



Data from: National Center for Education Statistics

Doubling time: 23 years



## Contemporary Examples of Self-organizing systems

- The bulk of human intelligence is based on **pattern recognition**: the quintessential example of self-organization



## Contemporary Examples of Self-organizing systems

- Machines are rapidly improving in pattern recognition
- Progress will be accelerated now that we have the tools to reverse engineer the brain
- Human pattern recognition is limited to certain types of patterns (faces, speech sounds, etc.)
- Machines can apply pattern recognition to any type of pattern
- Humans are limited to a couple dozen variables, machines can consider thousands simultaneously