

Class 16: Decoding Ourselves

CS183Startup

logistics

Final pitch sessions tomorrow

Contact your TA if no pitch scheduled yet

Problem set 5 due Friday at 11:59pm

Class 16 Decoding Ourselves

CS183Startup

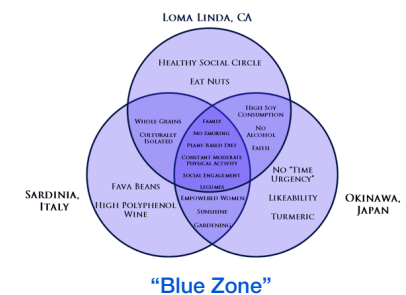
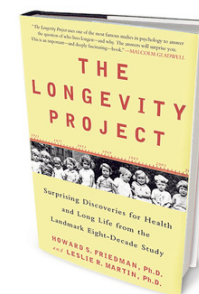
outline

1. the longevity project
2. life, luck and death
3. CS and biology
4. examples
5. perspectives

Class 16 Decoding Ourselves

CS183Startup

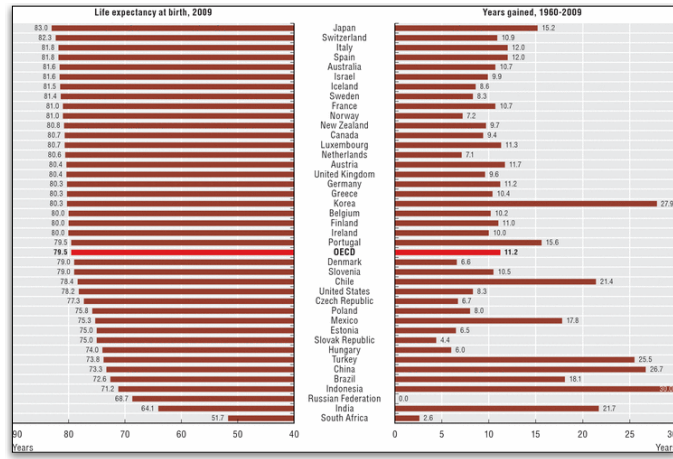
a life or death question



Class 16 Decoding Ourselves

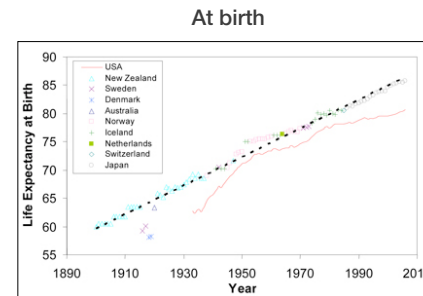
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life expectancies

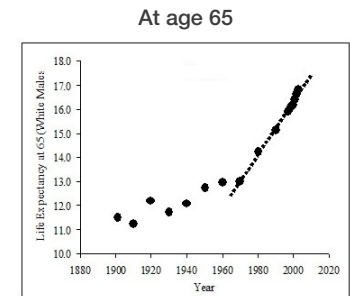


OECD average:
+11.2 years over 49-year period
Average of 2.3 years gained per decade

the moving horizon

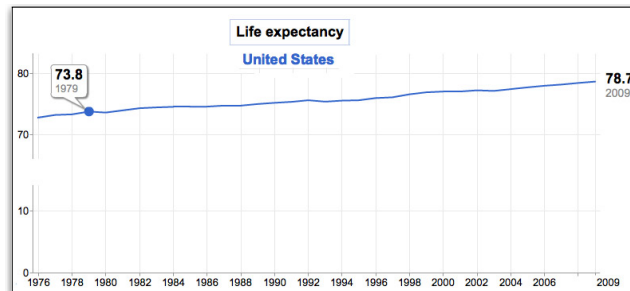


Top countries: 2.5 years/decade



US: 40 days/year

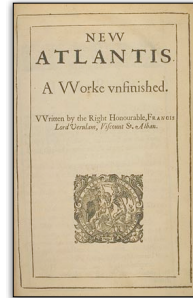
moving fast enough?



outline

1. the longevity project
2. life, luck and death
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overcoming accidents



the rise of the actuaries

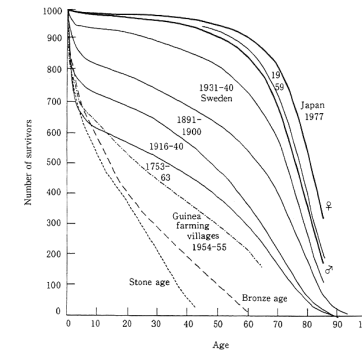
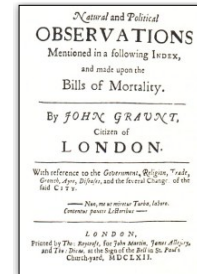


Table 1. Life table for the total population: United States, 2003

Age	Probability of dying during year x, age x to x+1	Number dying during year x, age x to x+1	Number living at start of year x, age x to x+1
0-1	0.00000	100,000	497
1-2	0.00000	99,999	47
2-3	0.00000	99,999	25
3-4	0.00000	99,999	13
4-5	0.00000	99,999	10
5-6	0.00000	99,999	10
6-7	0.00000	99,999	11
7-8	0.00000	99,999	12
8-9	0.00000	99,999	13
9-10	0.00000	99,999	14
10-11	0.00000	99,999	15
11-12	0.00000	99,999	16
12-13	0.00000	99,999	17
13-14	0.00000	99,999	18
14-15	0.00000	99,999	19
15-16	0.00000	99,999	20
16-17	0.00000	99,999	21
17-18	0.00000	99,999	22
18-19	0.00000	99,999	23
19-20	0.00000	99,999	24
20-21	0.00000	99,999	25
21-22	0.00000	99,999	26
22-23	0.00000	99,999	27
23-24	0.00000	99,999	28
24-25	0.00000	99,999	29
25-26	0.00000	99,999	30
26-27	0.00000	99,999	31
27-28	0.00000	99,999	32
28-29	0.00000	99,999	33
29-30	0.00000	99,999	34
30-31	0.00000	99,999	35
31-32	0.00000	99,999	36
32-33	0.00000	99,999	37
33-34	0.00000	99,999	38
34-35	0.00000	99,999	39
35-36	0.00000	99,999	40
36-37	0.00000	99,999	41
37-38	0.00000	99,999	42
38-39	0.00000	99,999	43
39-40	0.00000	99,999	44
40-41	0.00000	99,999	45
41-42	0.00000	99,999	46
42-43	0.00000	99,999	47
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45-46	0.00000	99,999	50
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59-60	0.00000	99,999	64
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64-65	0.00000	99,999	69
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247-248	0.00000	99,999	252
248-249	0.00000	99,999	253
249-250	0.00000	99,999	254

seven types of microscopic accidents

nuclear mutations

mitochondrial mutations

intracellular aggregates

extracellular aggregates

cell loss

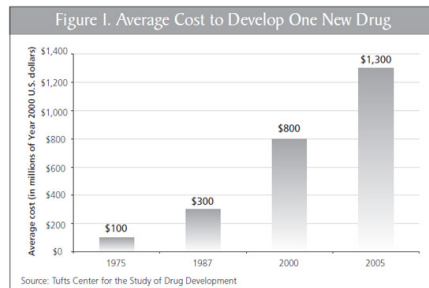
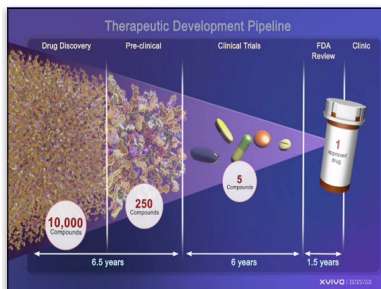
cell senescence

extracellular crosslinks

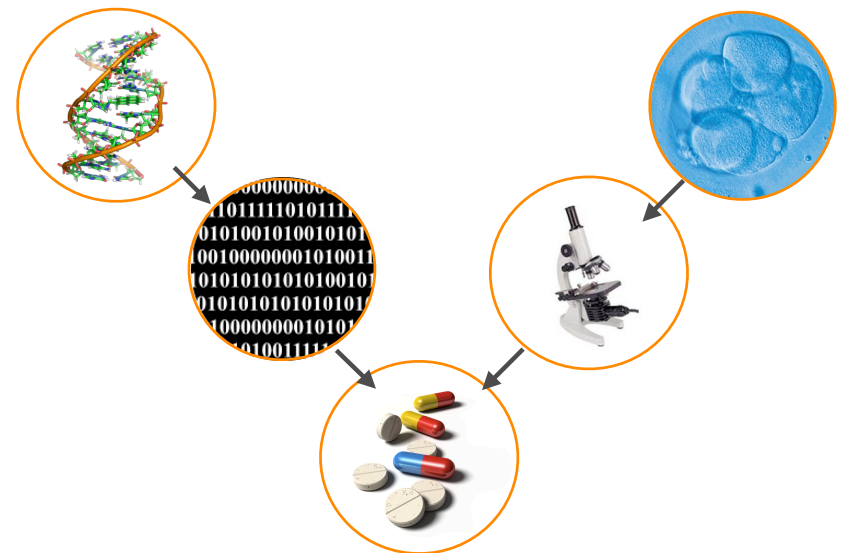
outline

1. the longevity project
2. life, luck and death
3. CS and biology
4. examples
5. perspectives

traditional drug discovery



how big is the search space?



the shift to computation

biological processes

luck

irreversible

degradation

mortality

traditional therapeutics

computational processes

agency

reversible

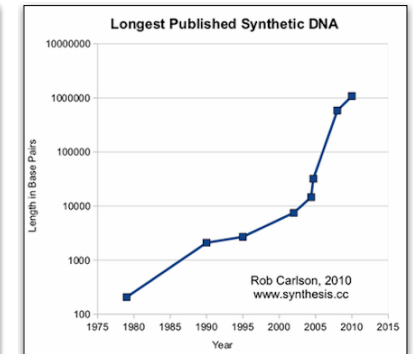
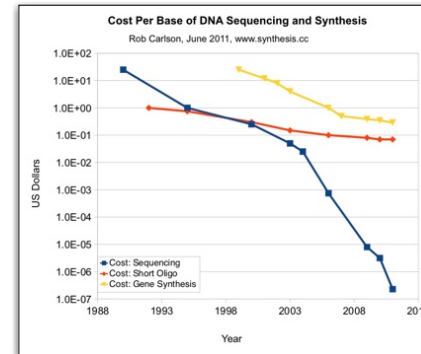
rejuvenation

immortality

computational biology



the rise of bioinformatics



hope of the human genome project



"[it will] revolutionize the diagnosis, prevention and treatment of most, if not all, human diseases."

-Bill Clinton, 2000

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different approaches



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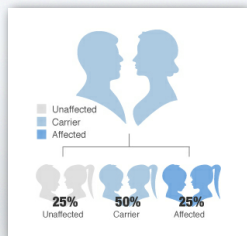


Counsyl



Counsyl

Simple pre-pregnancy test for parents with Mendelian diseases



Reducing the cost of carrier testing by literally one hundred fold



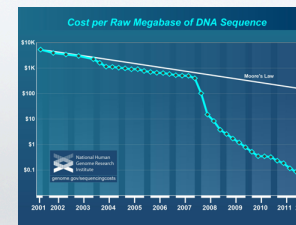
www.counsyl.com



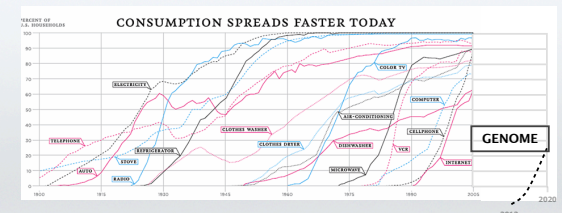
Counsyl

Genomics

To understand genomics requires only two plots



The supra-exponential decline in sequencing costs



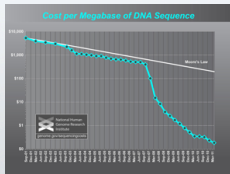
The increasingly steep curve of technology adoption



www.counsyl.com

The Ramp

We know that adoption ramp is real...because we're experiencing it.
Have quietly grown to test ~1.5% of all births in the US since 2010.



Why the internet-like ramp? Because genomics is now driven by CS.

Further details: balajis@counsyl.com



www.counsyl.com

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