

DE MENS

geëvolueerd maar
ook evoluerend?



MIJN PERSPECTIEF



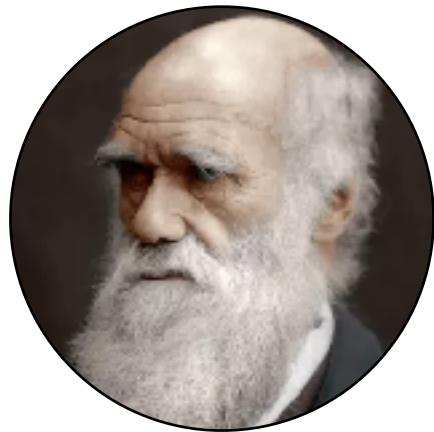
biology



AI
BSc



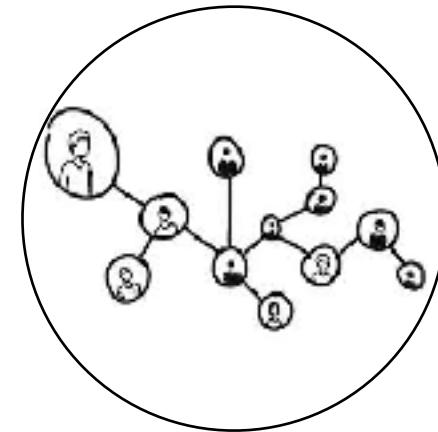
BCN
MSc



psychology
PhD



demography
post-doc



sociology
tenure

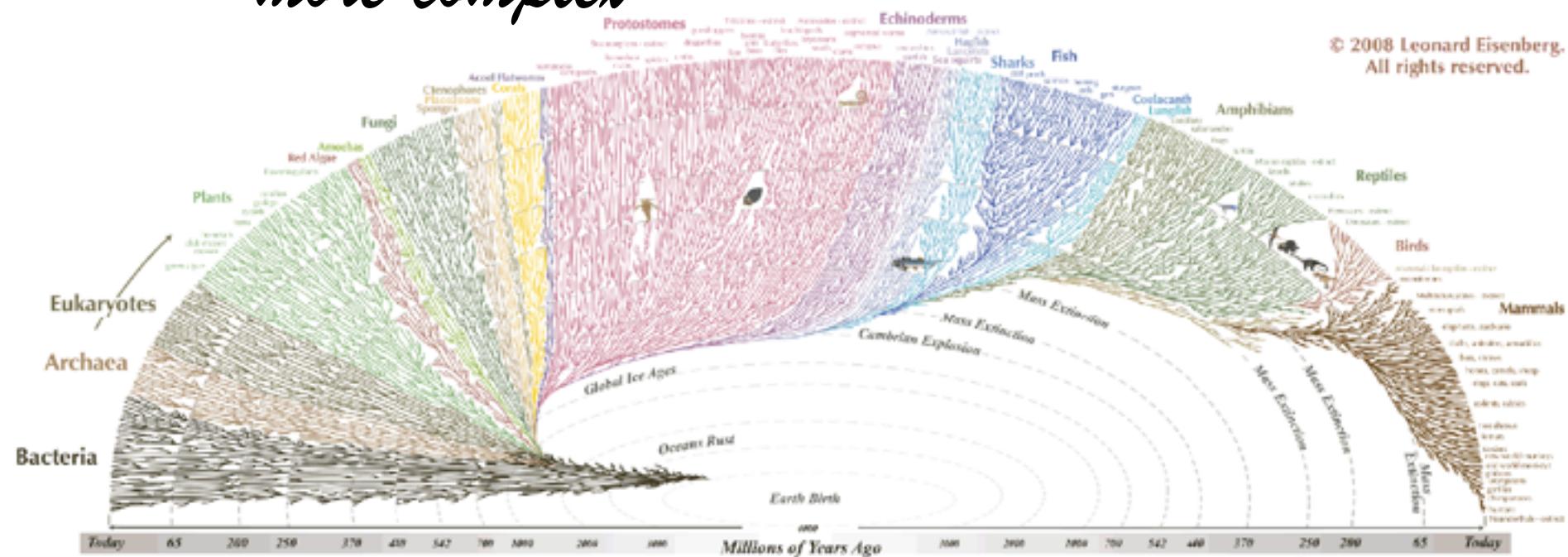
I think



I think
it's slightly
more complex



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All the major and many of the minor living branches of life are shown on this diagram, but only a few of those that have gone extinct are shown. Example: Dinosaurs - extinct



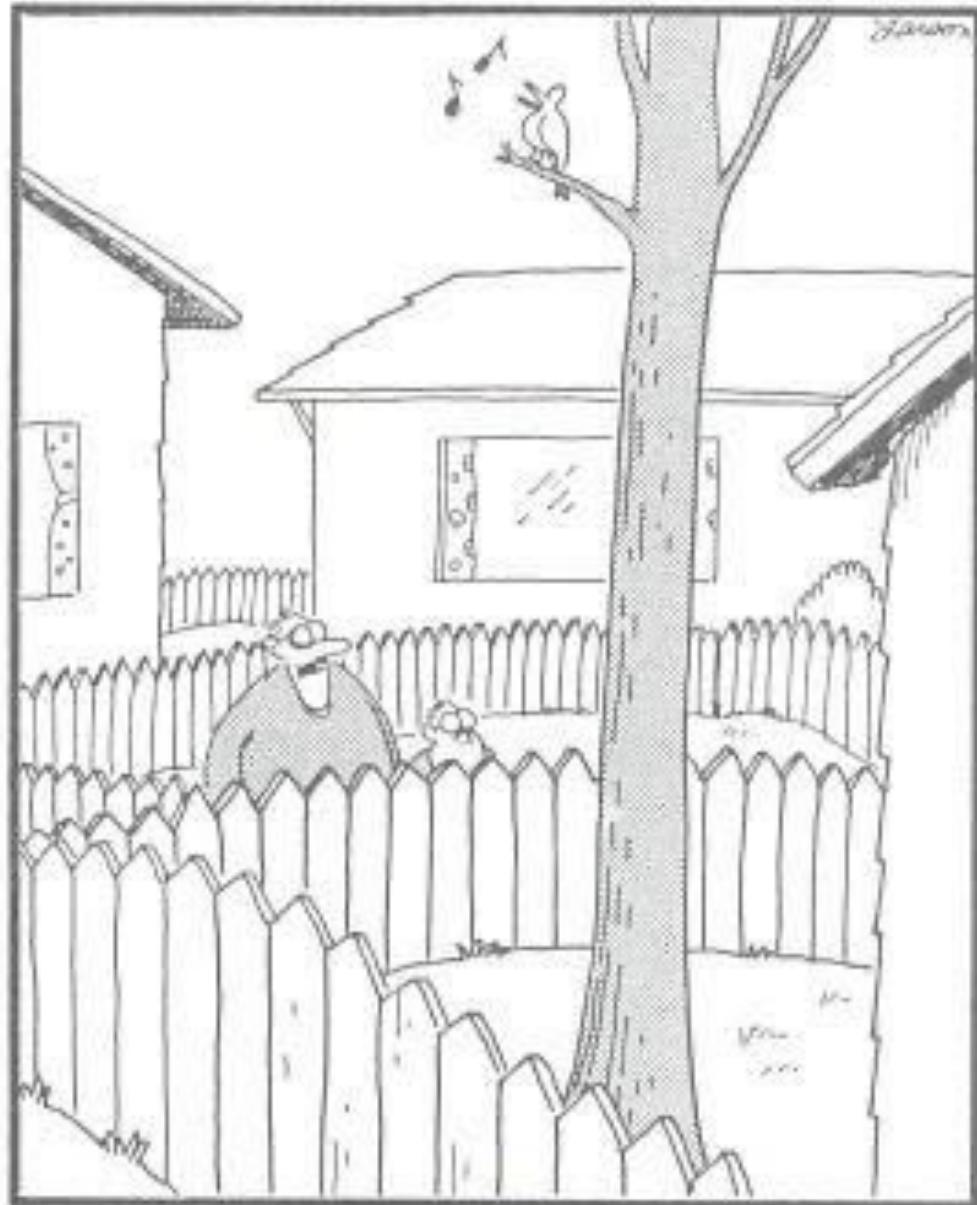
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WAAROM IS HET LASTIG OM 'DE MENS' TE BESTUDEREN?





**“and now, Randy, by use of
song, the male sparrow will
stake out his territory...
an instinct common in the
lower animals”**

Evolutionaire Psychologen
Sociobiologen
Ethologen
Humane Gedragsecologen
Culturele Evolutionisten
Ontwikkelingspsychologen
Vergelijkende Psychologen
Biologische Anthropologen
Paleoanthropologen
Evolutionaire Anthropologen

...

GEDRAGS- ECOLOGIE

Gedragsecologen met een
interesse in mensen

CENTRALE THESE
mensen zijn geëvolueerd
om flexibel met de
omgeving om te gaan op
een manier die fitness
verhoogt

WERKWIJZE
hoe gedragen mensen zich
in hun omgeving/ecologie

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Wiskundigen met een interesse in mensen

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sociaal leren maakt de mens tot succesvolle soort, maar dit leren kan ook tot maladaptief gedrag leiden

WERKWIJZE
wiskundige modellen en experimenten over sociaal leren

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Cognitieve psychologen met een interesse in evolutie

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WERKWIJZE
experimenten over percepties en voorkeuren

35STE NIBI-CONFERENTIE VOOR BIOLOGIEDOCENTEN BOVENBOUW HAVO EN VWO

FEIT/FICTIE

VRIJDAG 12 EN ZATERDAG 13 NOVEMBER 2021
HOTEL ZUIDERDUIN, EGMOND AAN ZEE

RONALD GIPHART
MARK VAN VUGT



MISMATCH

HOE WE DAELENDE WORDEN MISLEID
DOOR ONS OERDALENE BREIN

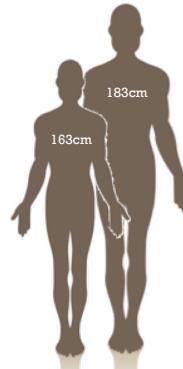
Sir David Attenborough: Humans have stopped evolving

Human beings have stopped evolving after becoming the only species to “put halt to natural selection of its own free will”, Sir David Attenborough has said, as he predicts the “cultural evolution” of the future.

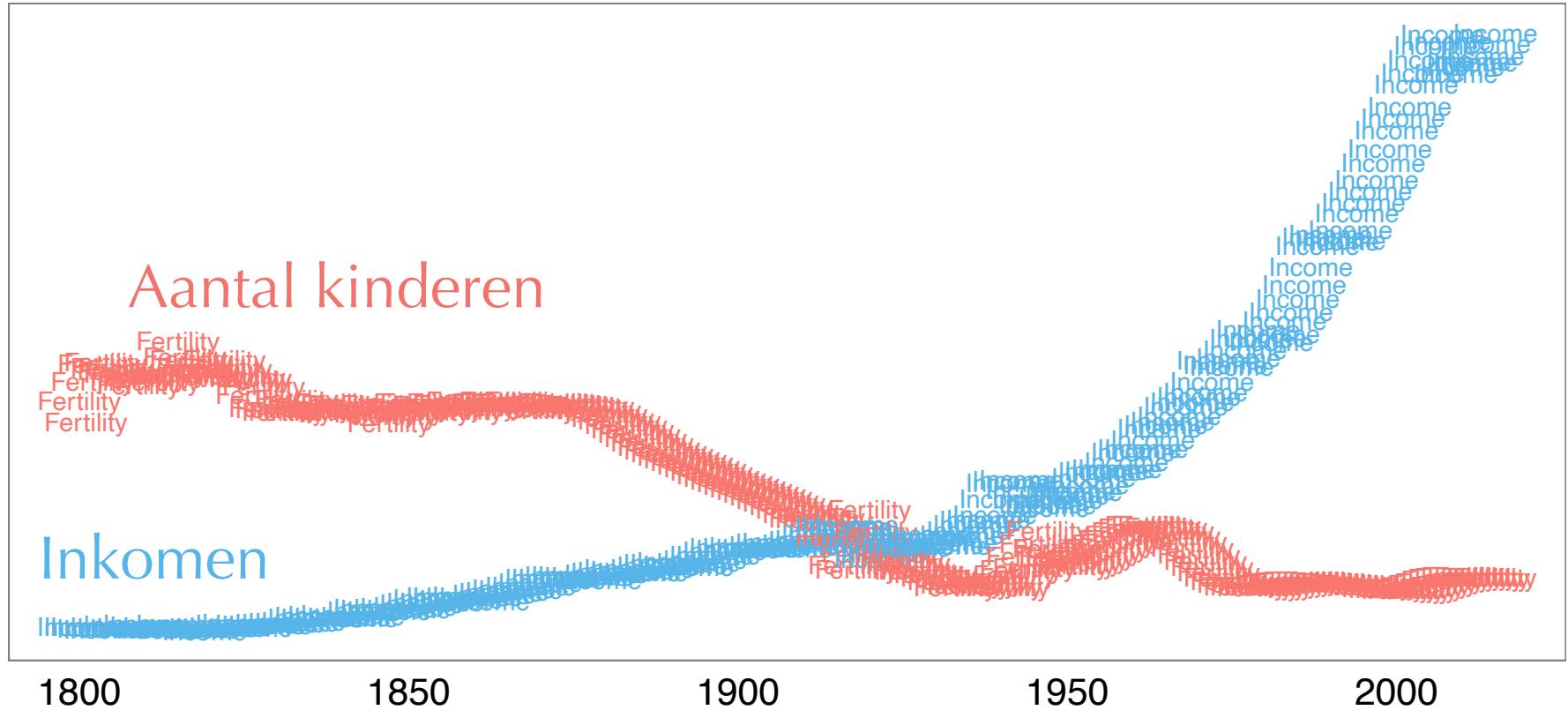


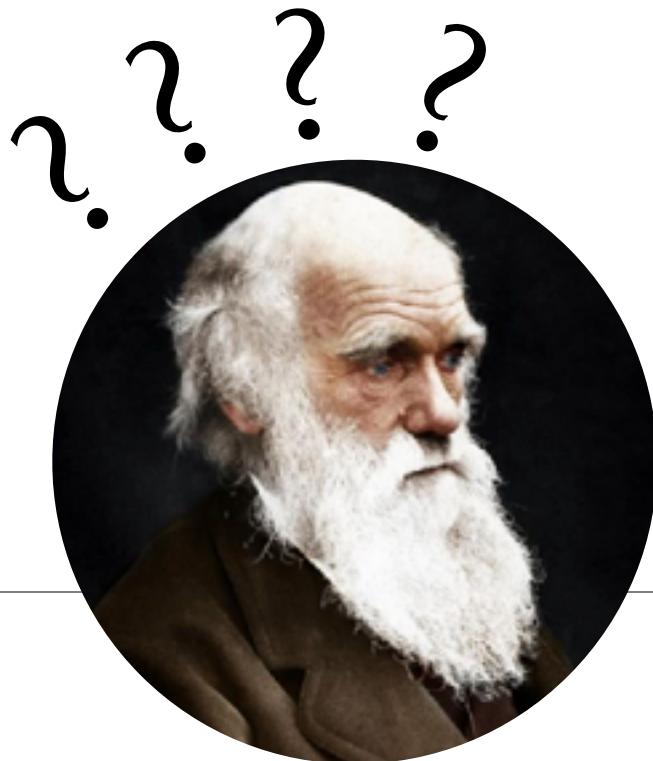
Sir David Attenborough at home in Richmond Photo: EDDIE MULHOLLAND

1850 rank: 11/12
2000 rank: 1/12

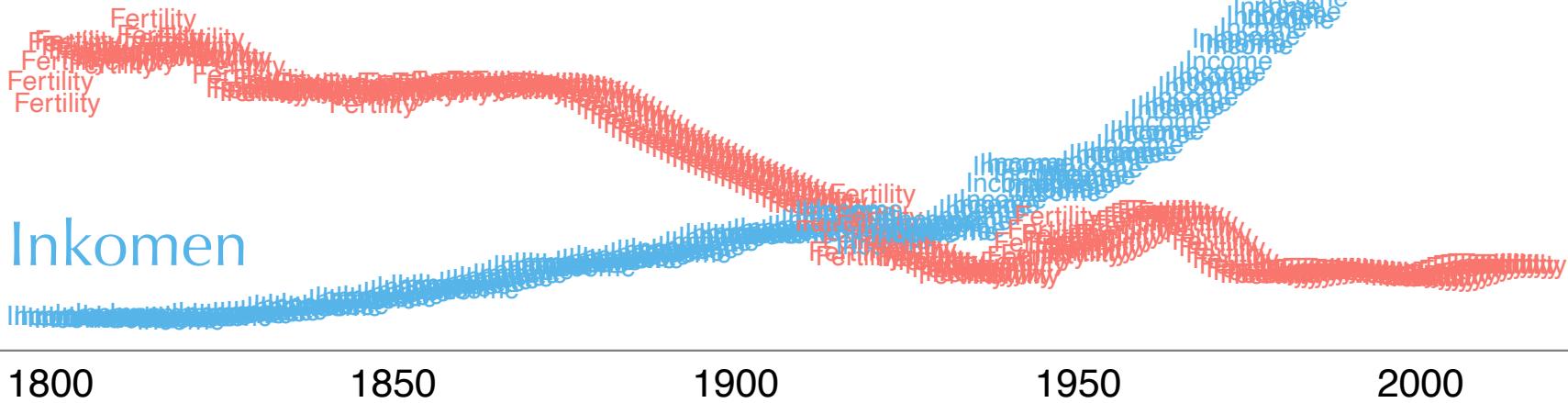


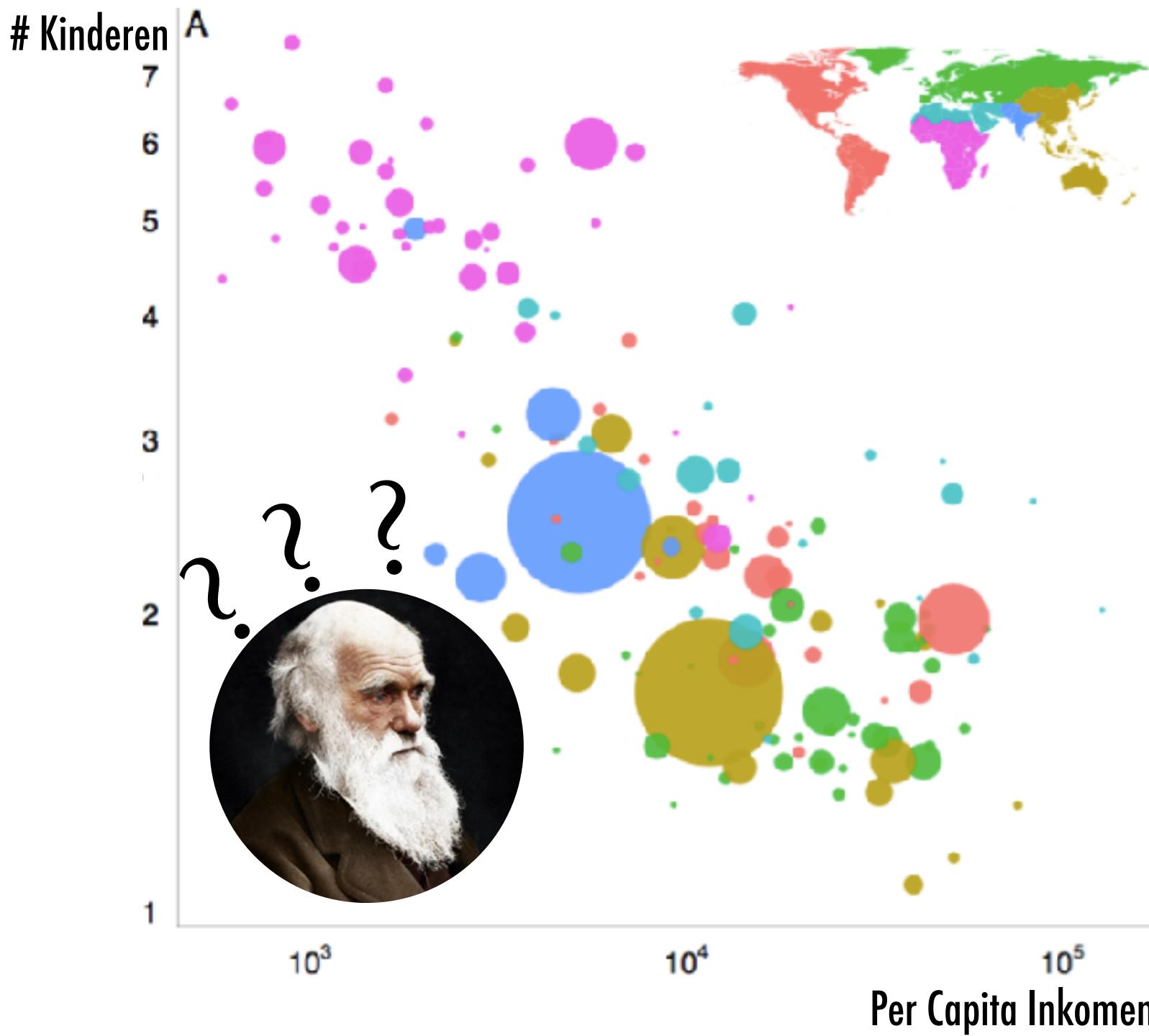
DE DEMOGRAFISCHE TRANSITIE





Aantal kinderen





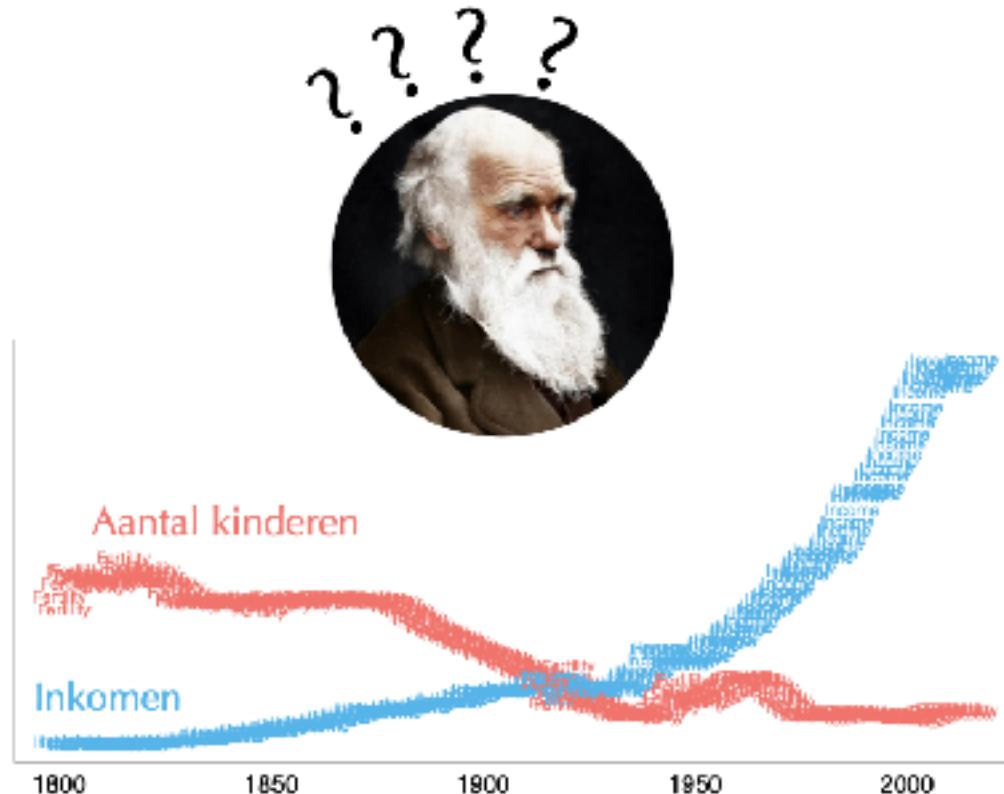
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Gedragsecologen met een interesse in mensen

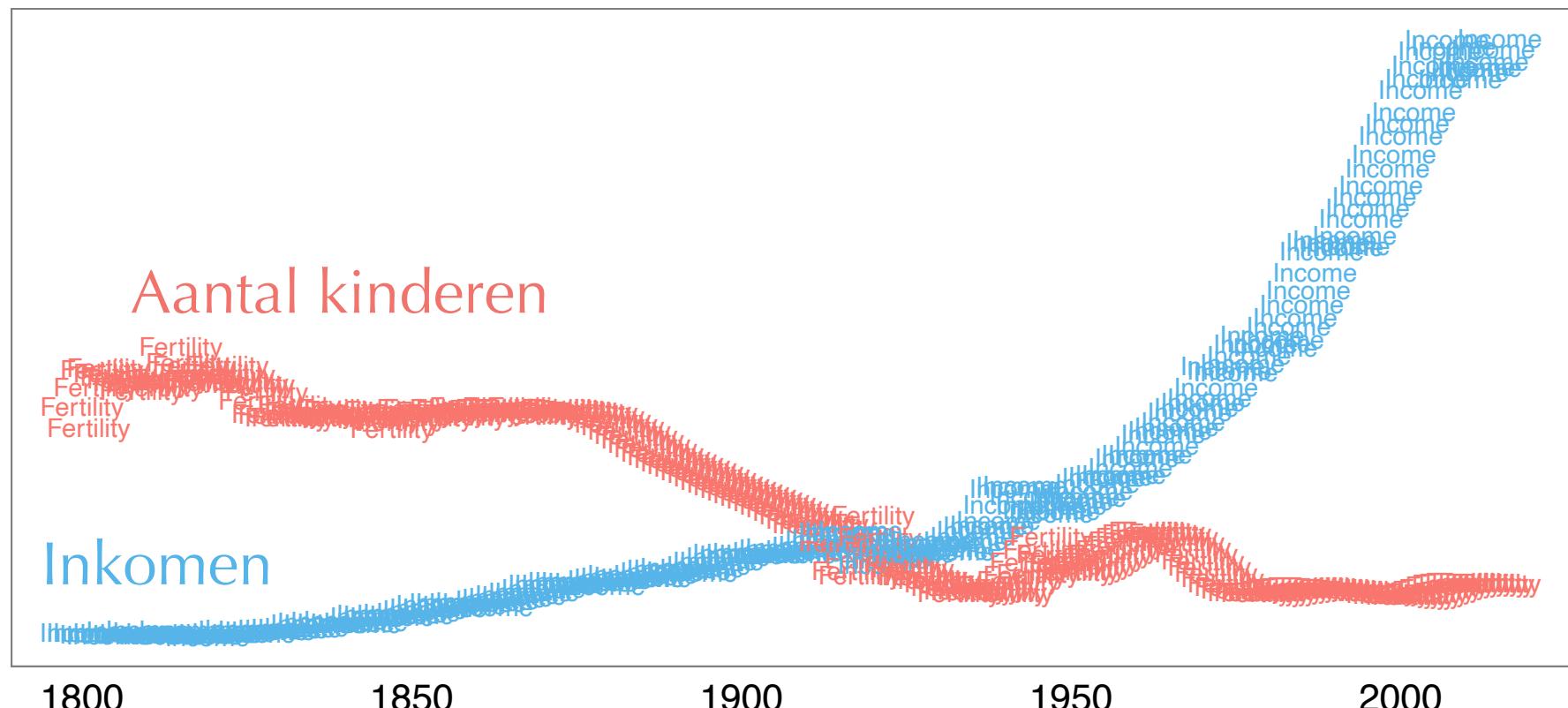
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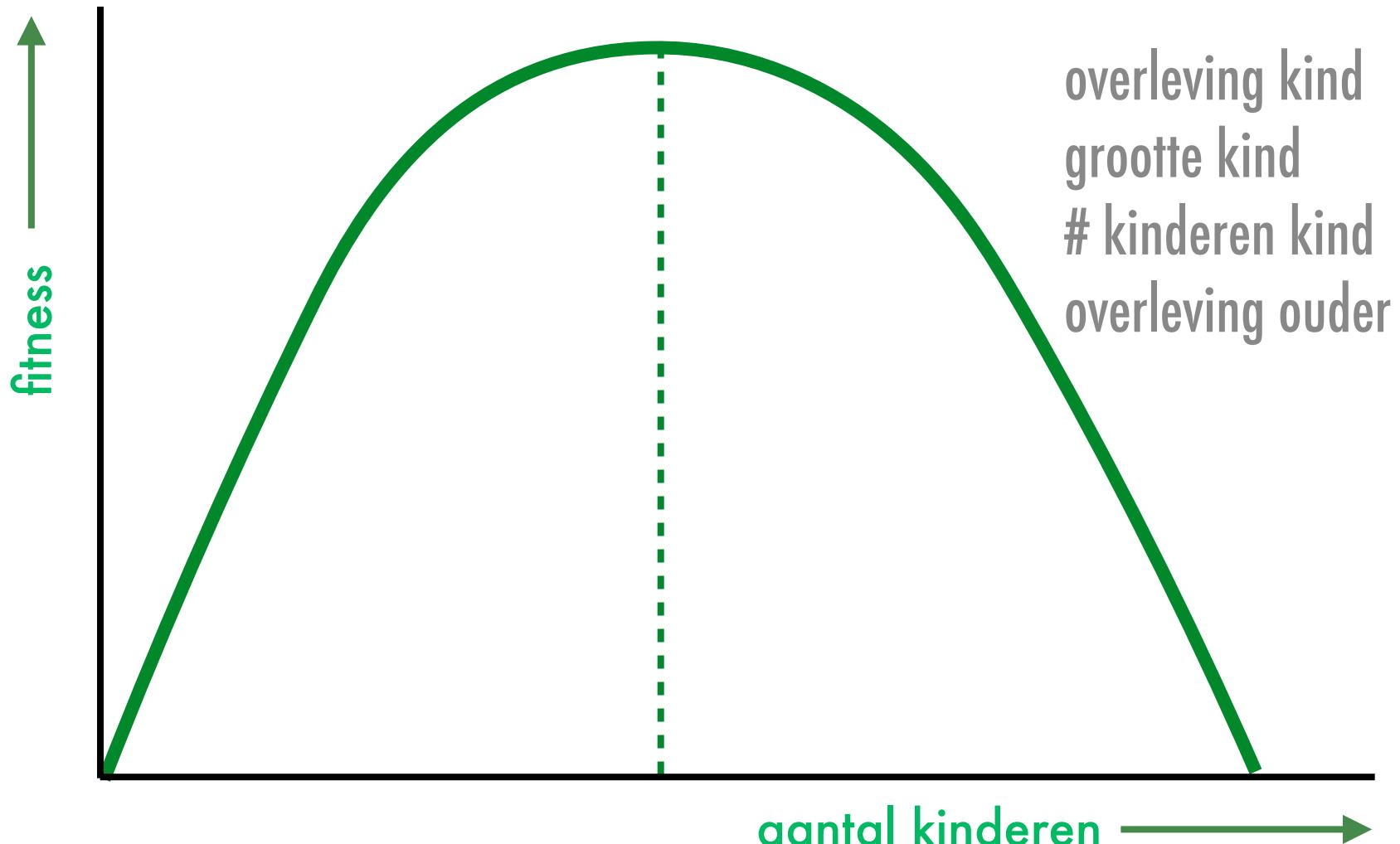
HOE ZOU EEN GEDRASGECOLOOG HIER NAAR KIJKEN?



The cost of raising a child from birth to age 18 for a middle-income, two-parent family averaged \$226,920 last year (not including college)

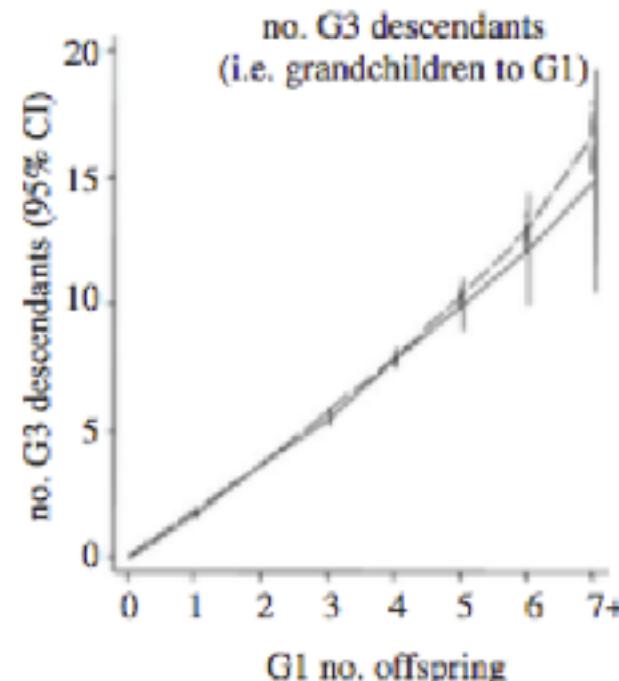


het aantal kinderen maximaliseren,
is niet hetzelfde als fitness maximaliseren



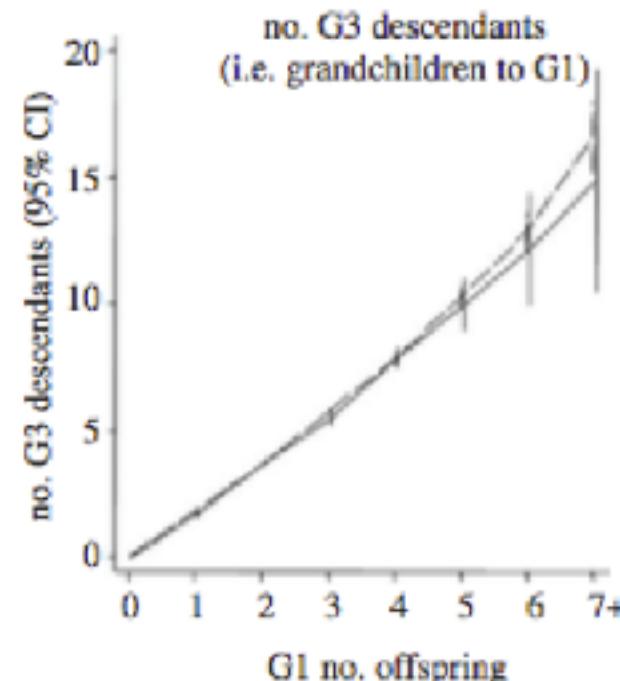
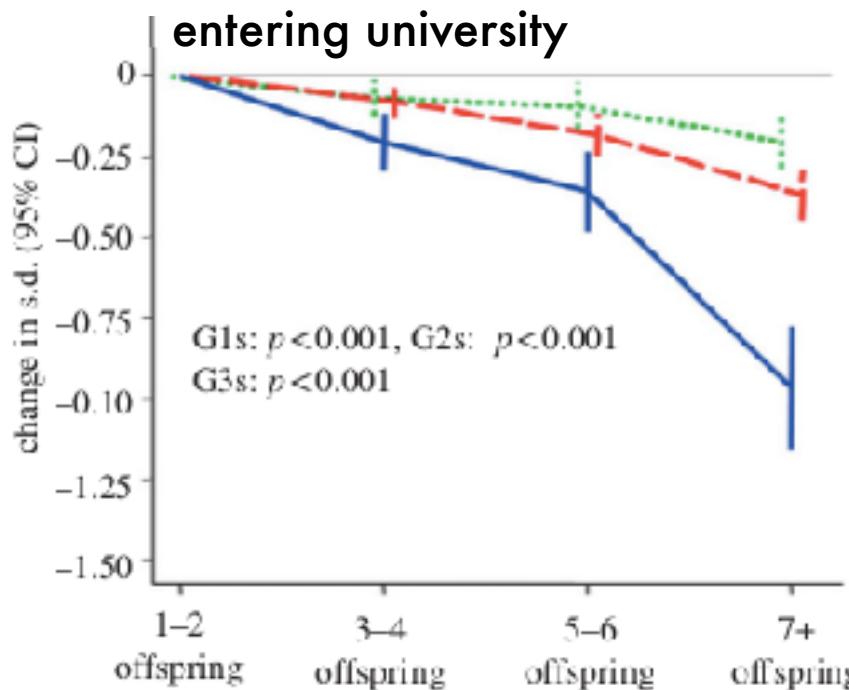
Low fertility increases descendant socioeconomic position but reduces long-term fitness in a modern post-industrial society

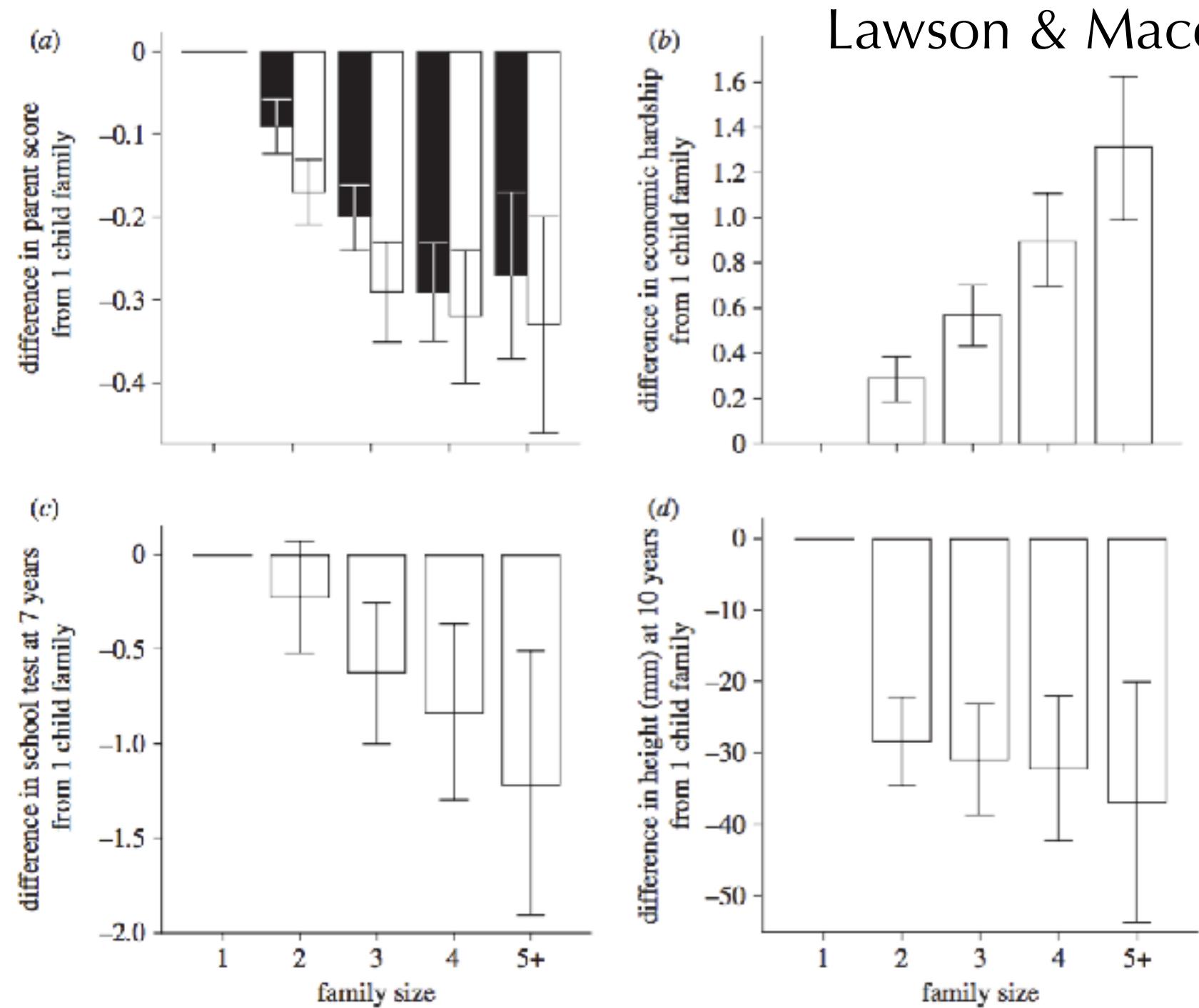
Anna Goodman^{1,2,*}, Ilona Koupil² and David W. Lawson³



Low fertility increases descendant socioeconomic position but reduces long-term fitness in a modern post-industrial society

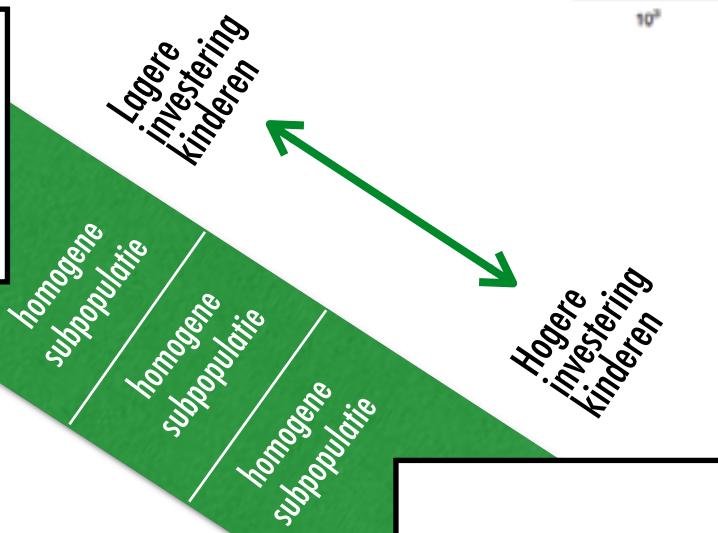
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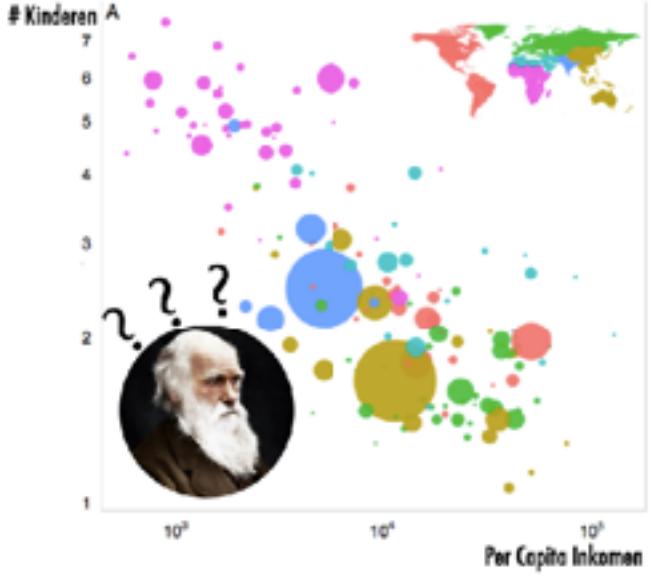
Platteland



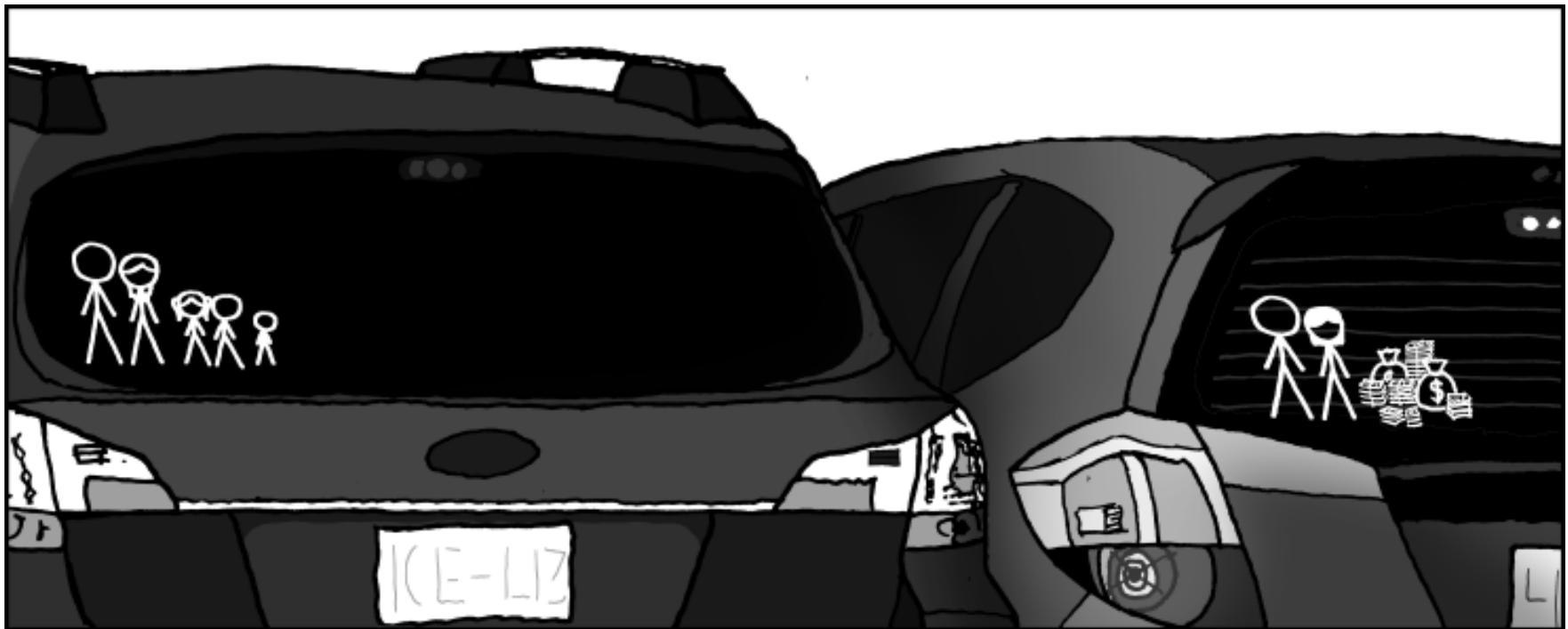
Lagere investering kinderen

Hogere investering kinderen

Rijkdom



Hoe hangt rijkdom samen met kindertal?



[een belangrijke vraag in de humane evolutionaire biologie omdat rijkdom en kindertal positief samenhangt in pre-industriële samenlevingen]

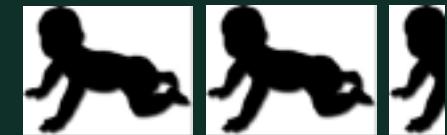
Forbes WORLD'S BILLIONAIRES LIST

Forbes 400



5000%

30%



Henk & Ingrid

GEDRAGS- ECOLOGIE

Gedragsecologen met een interesse in mensen

CENTRALE THESE

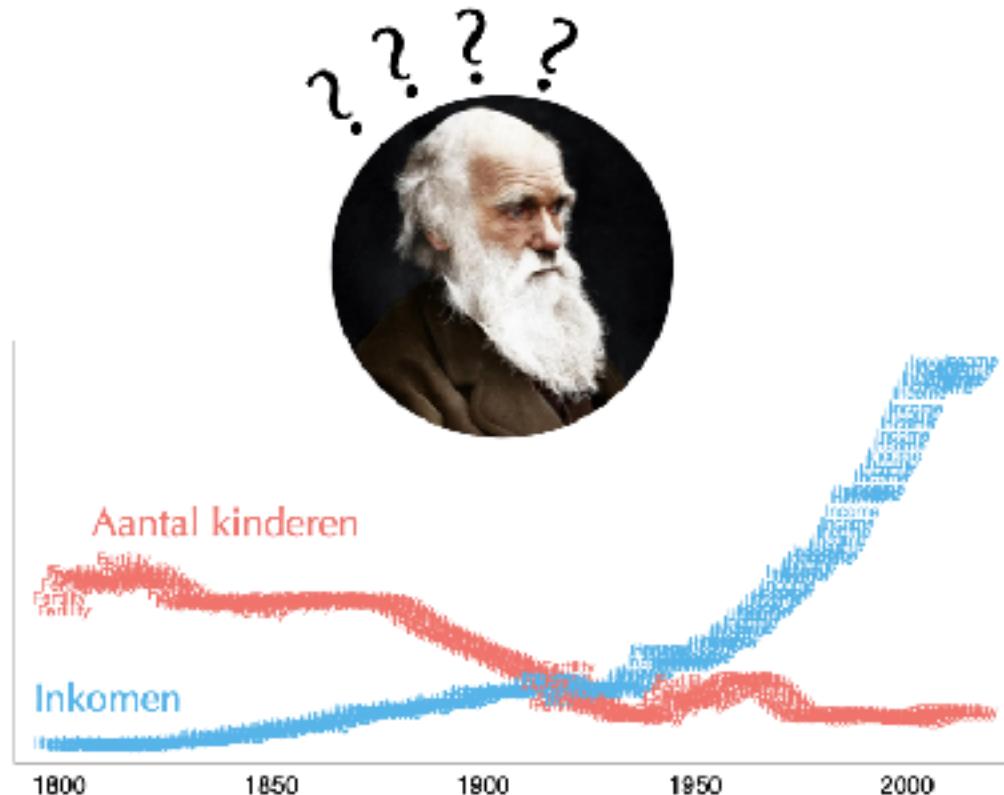
mensen zijn evolueerd om flexibel omgaan op een verhoogde fitness verhou



WERKWIJZE

hoe gedragen mensen zich in hun omgeving/ecologie

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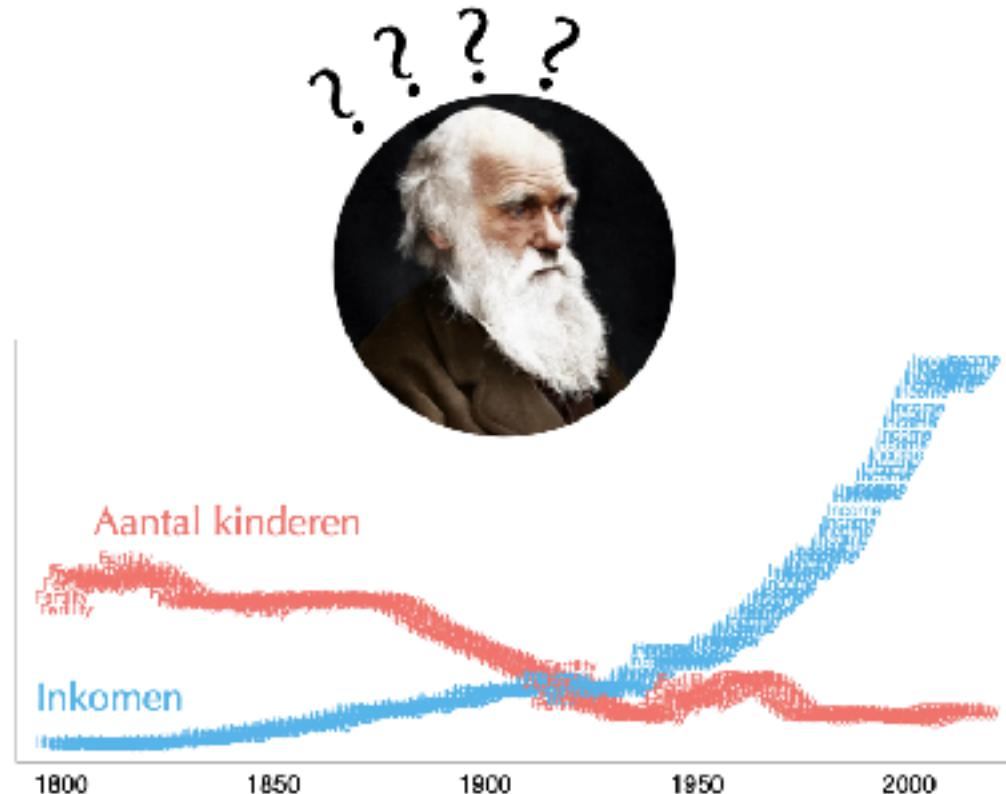
CULTUREEL EVOLUTIONISME

Wiskundigen met een
interesse in mensen

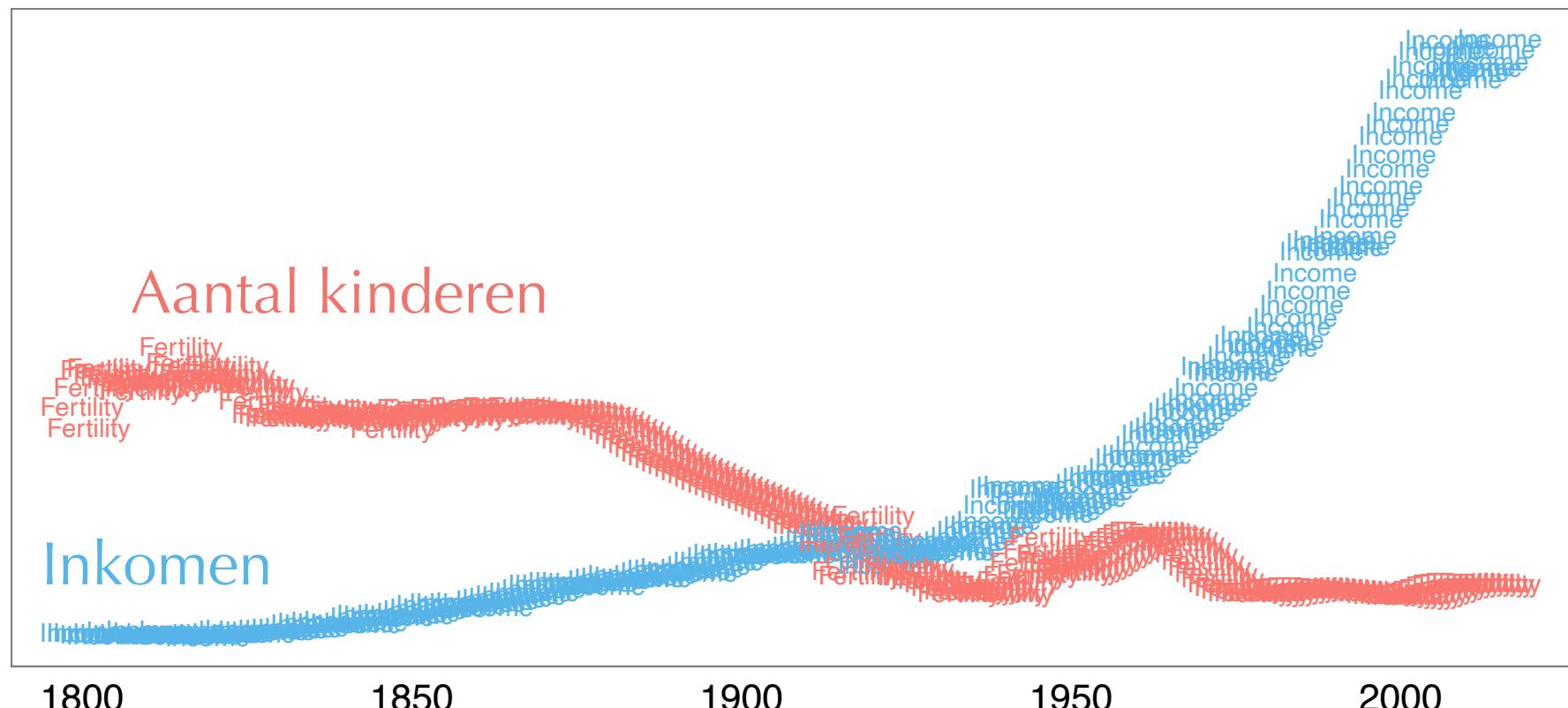
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WERKWIJZE
wiskundige modellen en
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leren

HOE ZOU EEN CULTURELE EVOLUTIONIST HIER NAAR KIJKEN?

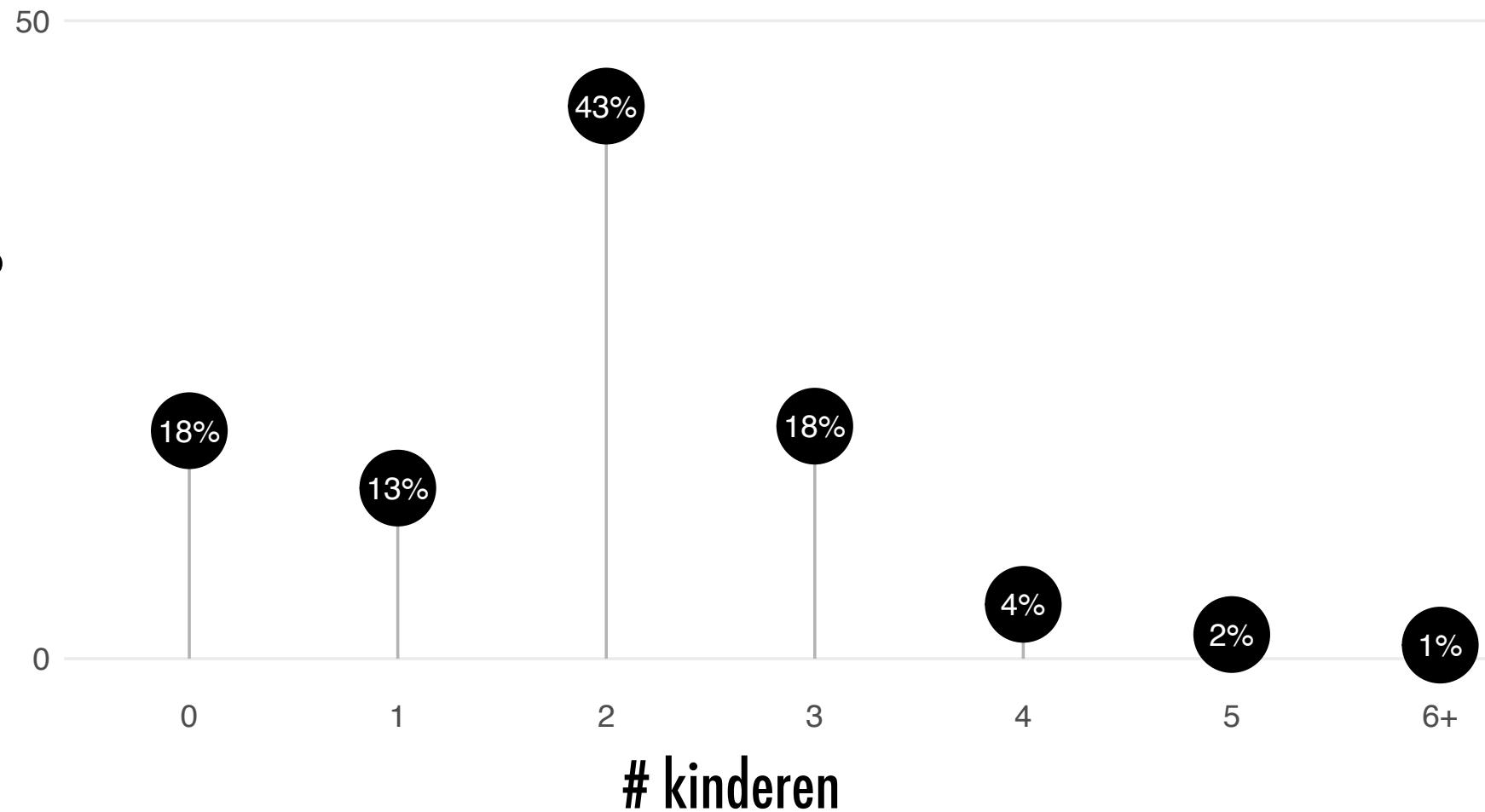


The cost of raising a child from birth to age 18 for a middle-income, two-parent family averaged \$226,920 last year (not including college)





40% van de Nederlanders heeft twee kinderen,
ongeveer 20% is kinderloos (of 'kindvrij')



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ongeveer 20% is kinderloos (of 'kindvrij')

50

Percentage

18%

Two Is Best? The Persistence of a Two-Child Family Ideal in Europe

TOMÁŠ SOBOTKA
ÉVA BEAUJOUAN

0

0

1

2

3

4

5

6+

kinderen

4%

2%

1%



jewly ann
PHOTOGRAPHY

Bright-Side Economics / Pope & Change / Plus: What's next for today's Morning

TIME

THE CHILDFREE LIFE

When having it all means not having children

BY LINDSEY VAN DORN



EVOLUTIONAIRE PSYCHOLOGEN

Cognitieve psychologen met een interesse in evolutie

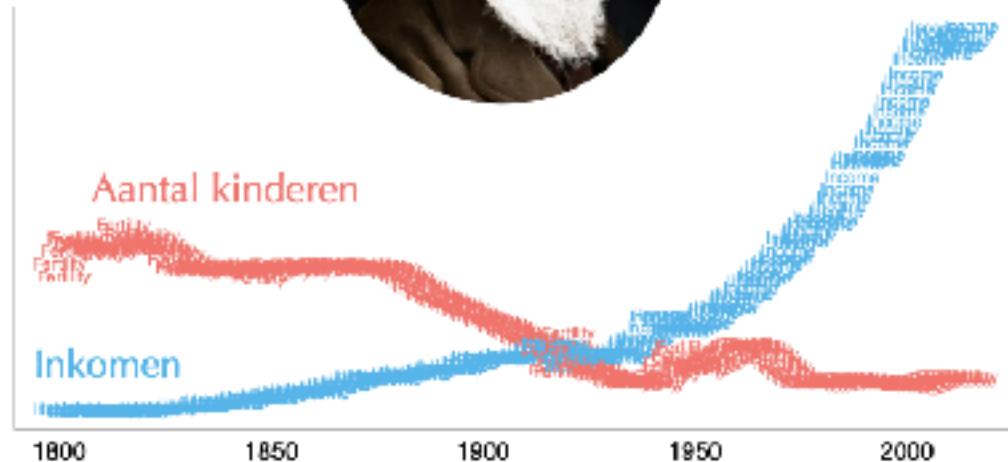
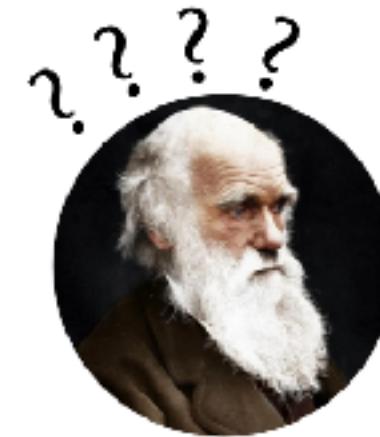
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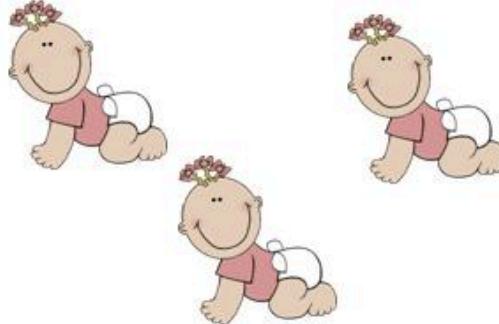
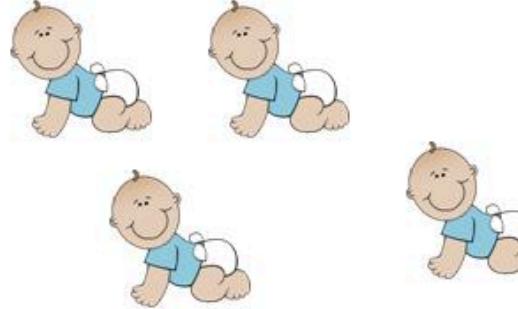
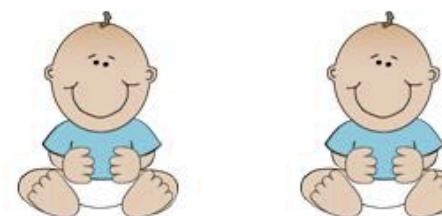


People in the modern world fail to maximize fitness in innumerable ways, and there are innumerable differences between modern and natural environments

Symons, 1986

“babies tellen”

Directions: Count the babies. Circle the correct number.

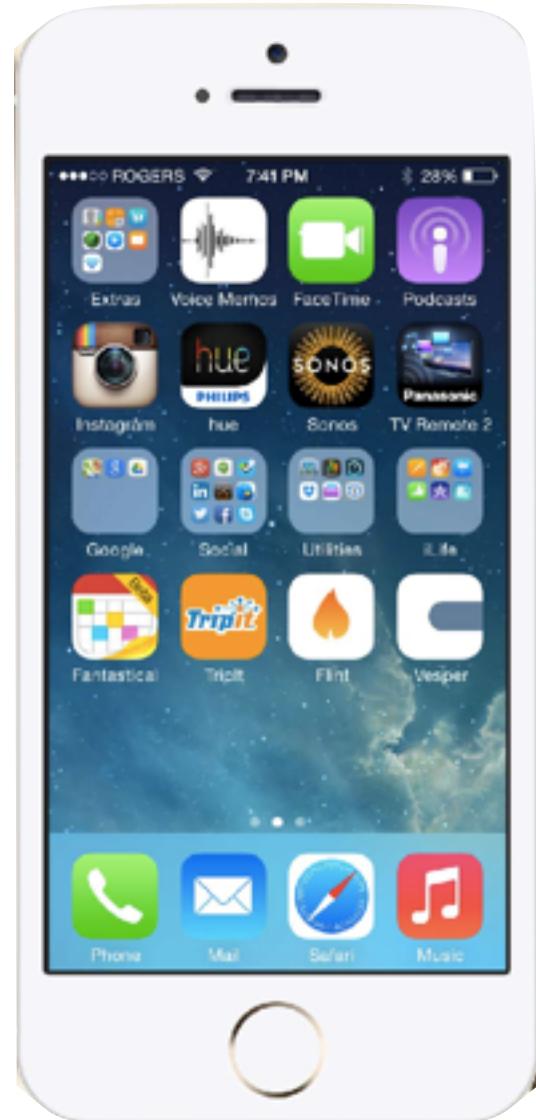
| | |
|--|--|
|  Three babies are crawling on their stomachs. Two are wearing pink shirts and one is wearing a blue shirt. Each baby has a small flower crown on their head. 1 3 4 |  Four babies are crawling on their stomachs. Three are wearing blue shirts and one is wearing a pink shirt. Each baby has a small flower crown on their head. 1 3 4 |
|  Two babies are sitting cross-legged. Both are wearing blue shirts. Each baby has a small flower crown on their head. 2 5 4 |  Five babies are sitting cross-legged. Three are wearing pink shirts and two are wearing blue shirts. Each baby has a small flower crown on their head. 2 5 4 |

“babies tellen”

... a surprising lapse in many excellent evolutionary researchers' thought...

Cosmides & Tooby, 1997

het brein
is een orgaan
geëvolueerd om
terugkerende adaptieve problemen
op te lossen
in de
omgeving van
evolutionaire aanpassing



Omgeving van Evolutionaire Aanpassing



ziektes vermijden

voedsel vinden

gevaarlijke lui vermijden

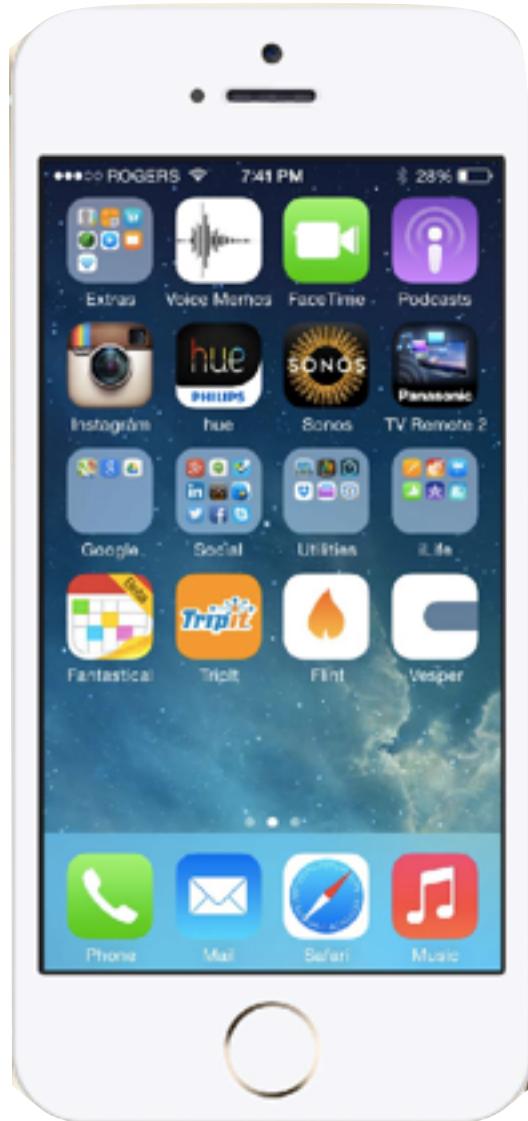
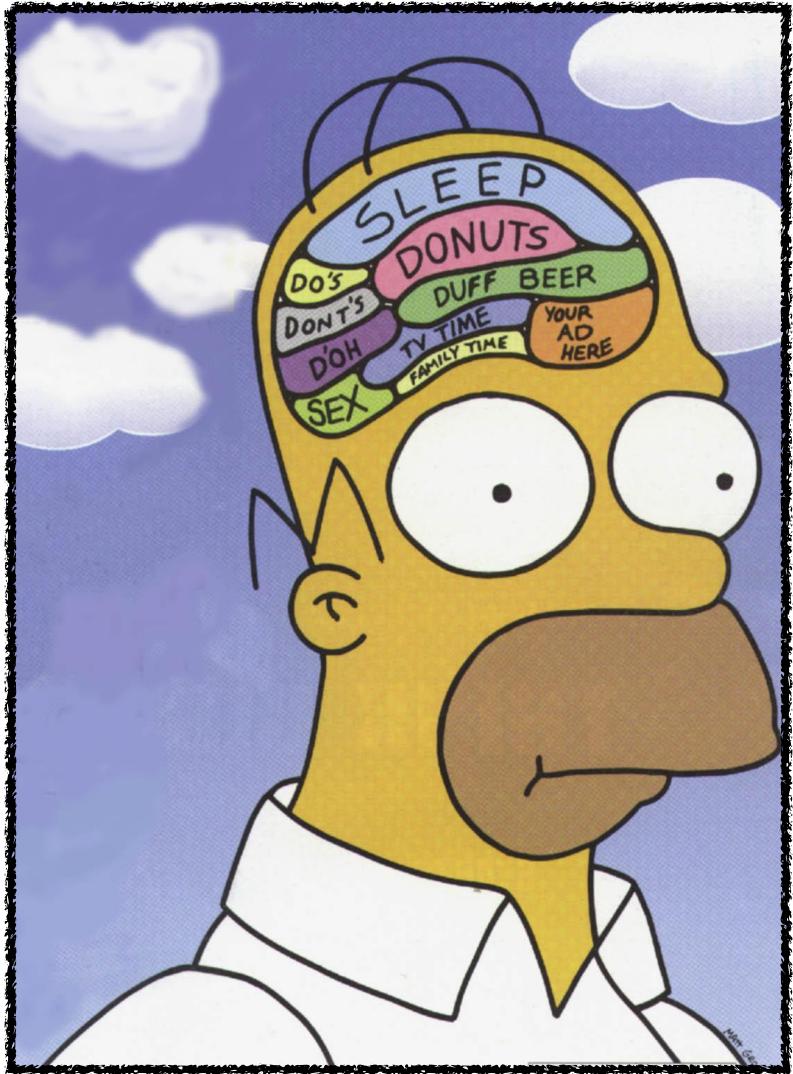
goede partner vinden/behouden

wedijveren om partners

kinderen opvoeden

samenwerken met anderen

geïncludeerd worden



Our modern skull houses a stone-age mind
oerbrein

reflects completed rather than ongoing selection

MISMATCH

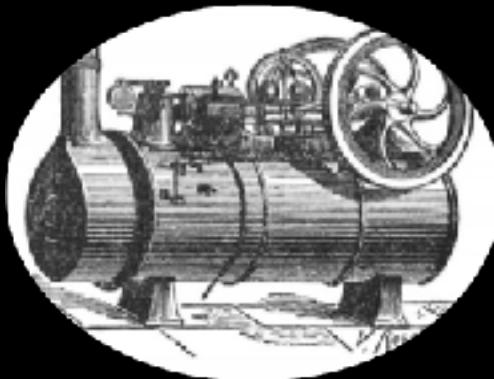


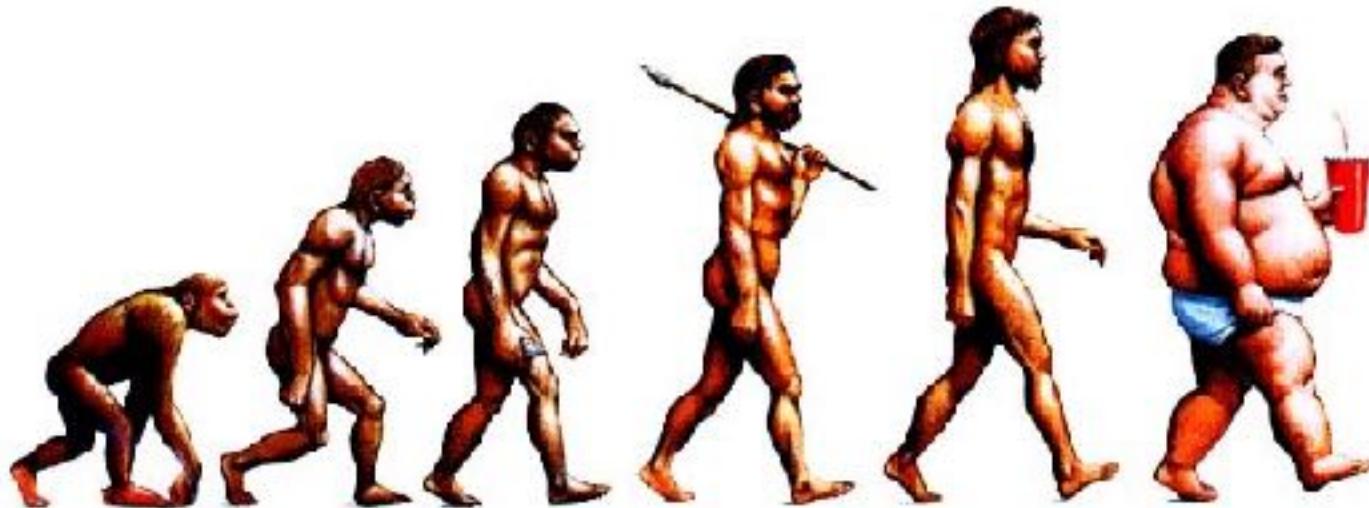
environment



phenotypic change

MISMATCH





RONALD GIPHART MARK VAN VUGT



MISMATCH

HOE WE DAGELIJKS WORDEN MISLEID
DOOR ONS OEROUDE BREIN



Mark Van Vugt @markvanvugt1 · 15 aug.

Natuurlijk gedrag uit de oertijd geeft #mismatch - Uw Hersenen



Natuurlijk gedrag uit de oertijd geeft mismatch - U...

Ons brein is niet opgewassen tegen de moderne maatschappij. Dat komt omdat wij voor een belangrijk deel nog net zo geprogrammeerd zijn als onze prehisto...
uwherenen.nl

6 1 17 1 1 ...





Mark Van Vugt

@markvanvugt1



Volgen

Is #eu mismatch? Pleased that we are talking to publisher @littlebrown about the book rights of #Mismatch @ronaldgiphart @uitg_podium

Vertaling bekijken

RETWEETS

2

VIND-IK-LEUKS

2



03:59 - 25 jun. 2016



2



2

...



Mark Van Vugt

@markvanvugt1



Volgen

#NiceAttack shows #mismatch in how humans are unable to cope with evolutionarily novel dangers like trucks and bombs. large crowds=threat

Vertaling bekijken

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01:22 - 16 jul. 2016

MISMATCH

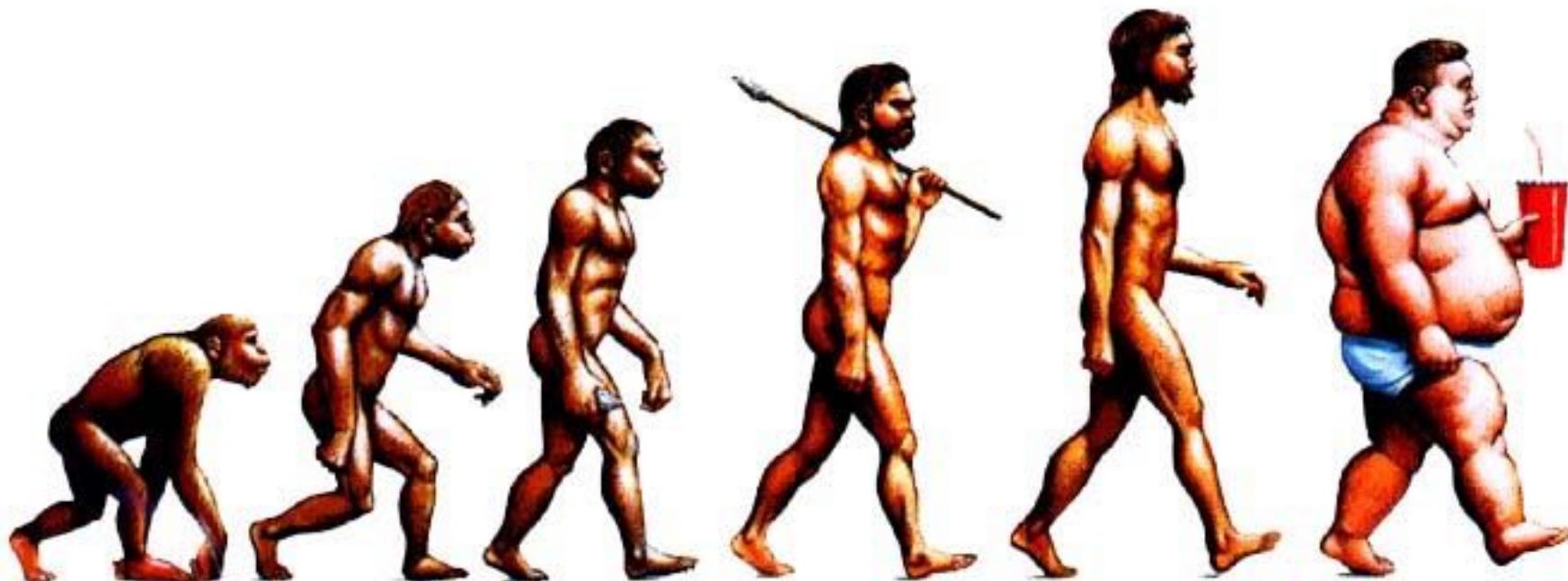


Het geëvolueerde brein bezit mechanismen
die mogelijkerwijs minder goed zijn
aangepast aan de moderne wereld

MAAR

1. Geëvolueerde psychologie is bijna nooit
de enige oorzaak

Obesitas

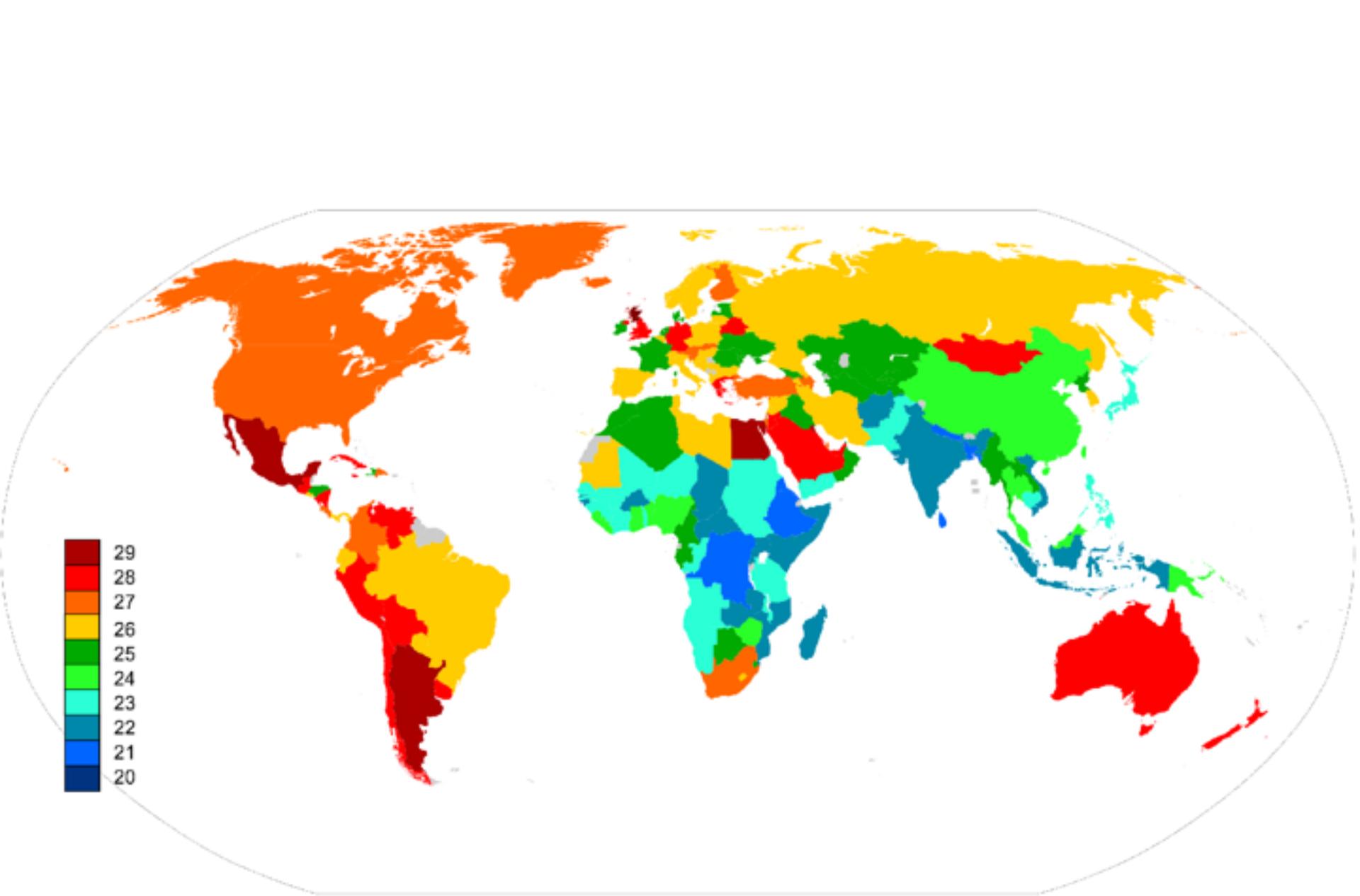


6

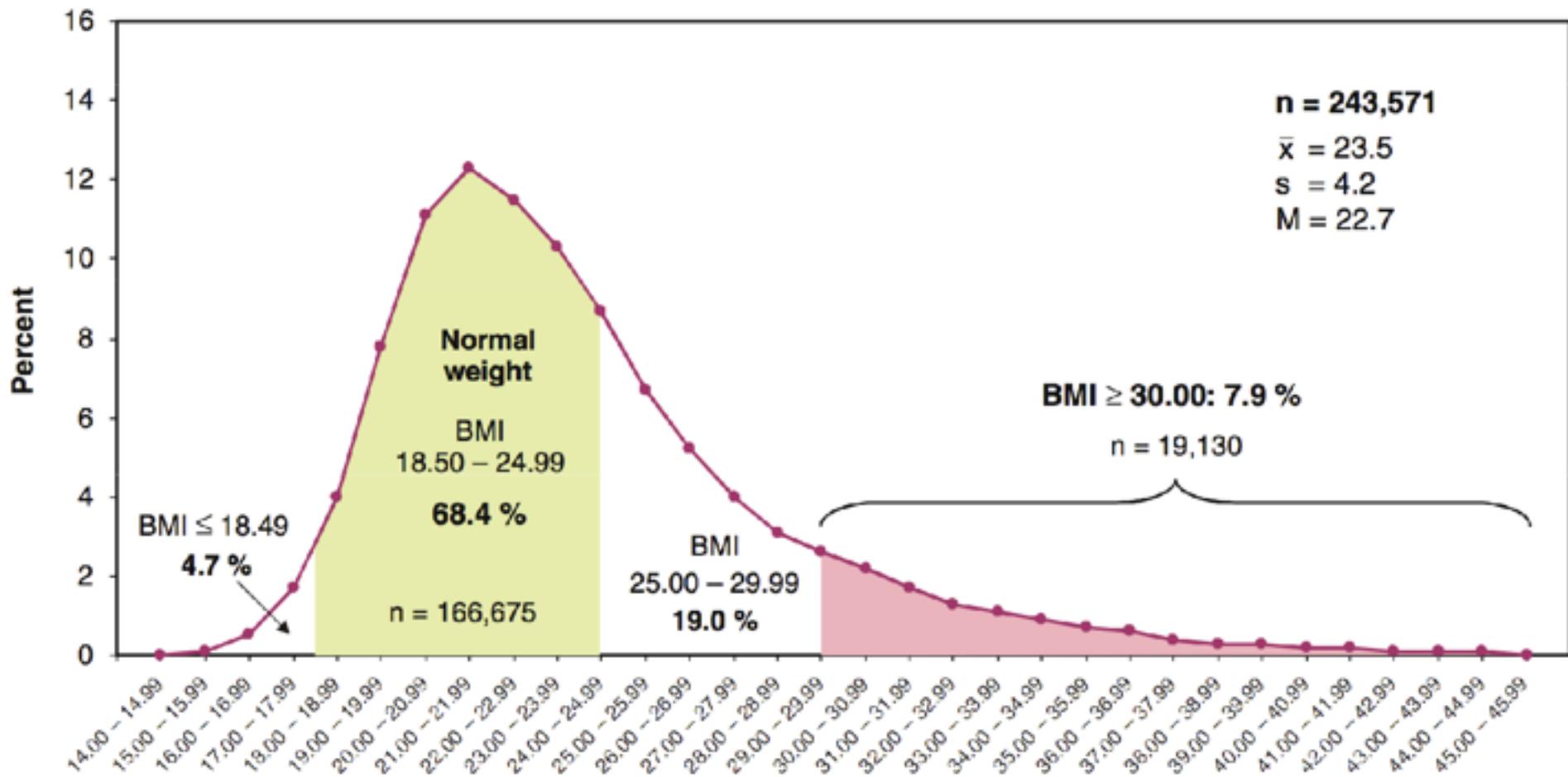
Blame our evolved
gustatory preferences

Gad Saad, 1997

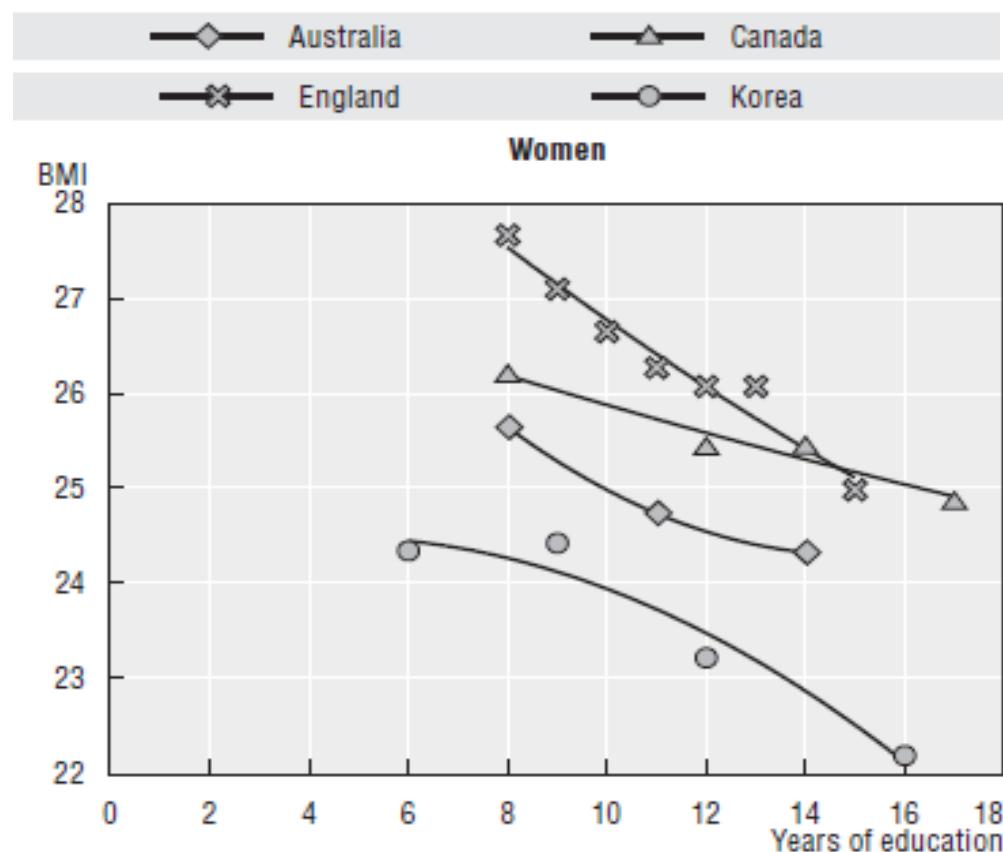
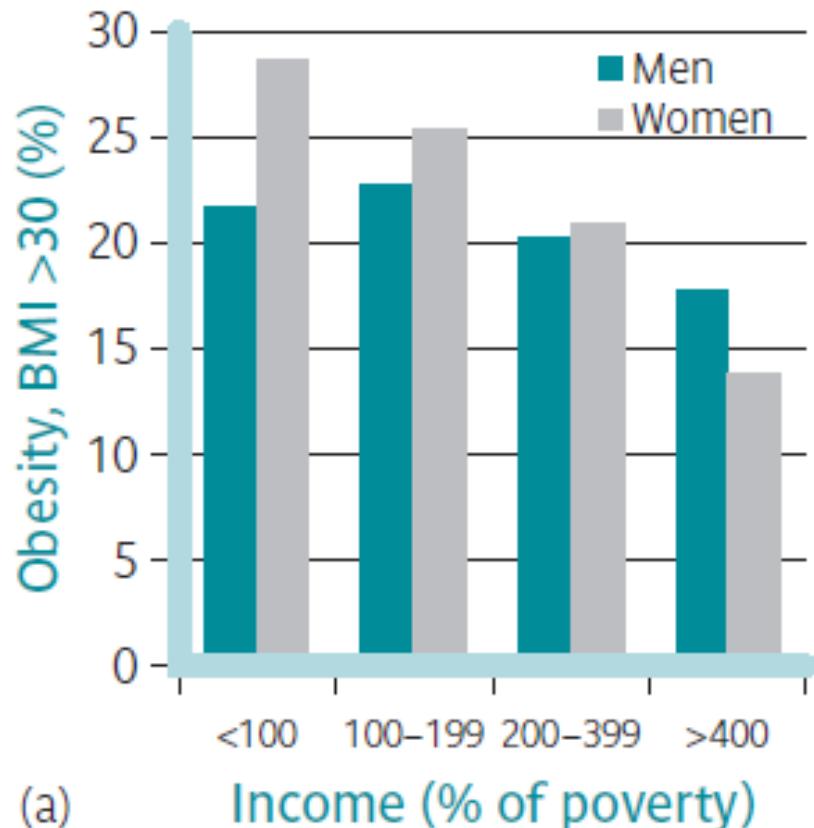




Verdeling van BMI



Obesitas en Achtergrond





Babies form flavor preferences as early as in the womb.

The taste of things to come

Early postnatal, and even prenatal, experiences shape culinary tastes

Underwood, 2014

“ Childhood obesity today seems to be largely confined to those whose same-sex parents are obese, and the link does not seem to be genetic

Perez-Pastor, 2009

MISMATCH



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1. Geëvolueerde psychologie is bijna nooit de enige oorzaak
2. Het blijft speculeren wat de evolutionair optimale situatie is ("paleofantasy")

#GoPaleo

Psychology Today



“Let's make it safer for gender outlaws to transform and go beyond our culture's gender dichotomy.”

Michael Friedman, Ph.D.

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Darwin's Subterranean World

Evolution, Mind, and Mating Intelligence

by Glenn Geher, Ph.D.



Glenn Geher, Ph.D., is professor and chair of psychology at the State University of New York at New Paltz.
[more...](#)

The Paleo Diet as Straightforward and Obviously Right

Evolutionary Psychology and the Human Condition: Part 1 – Physical Health

Published on August 4, 2014 by Glenn Geher, Ph.D. in Darwin's Subterranean World

“

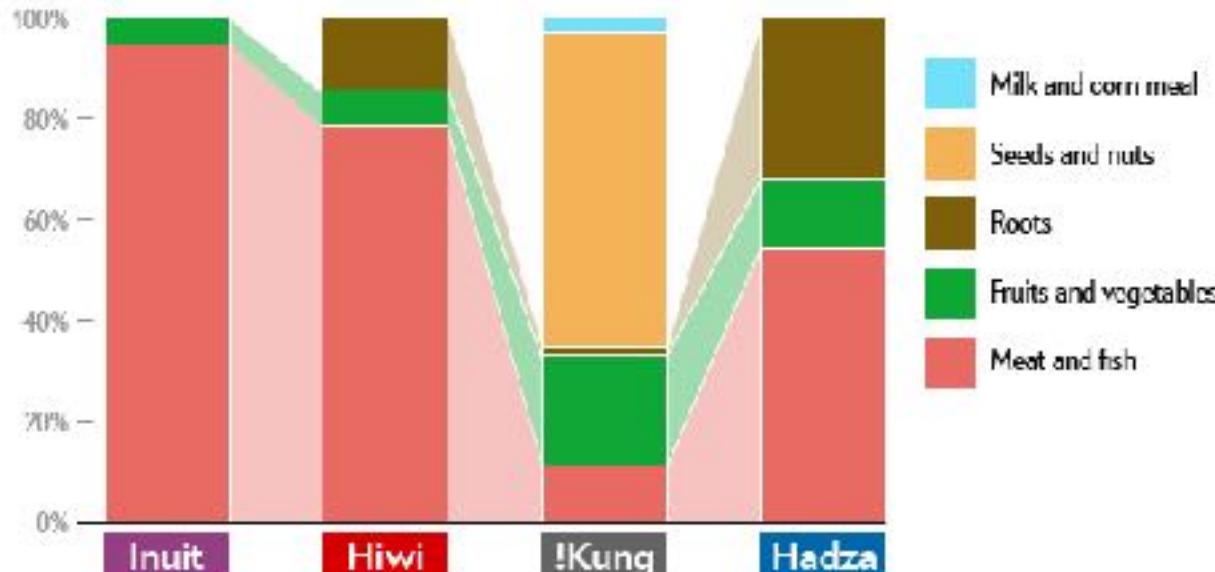
[If Americans] all ate Paleo diets and did CrossFit, mental and physical health would soar



PALEO DIET

How Hunter-Gatherer Diets Vary by Geography

Percentage of Different Foods in Diet

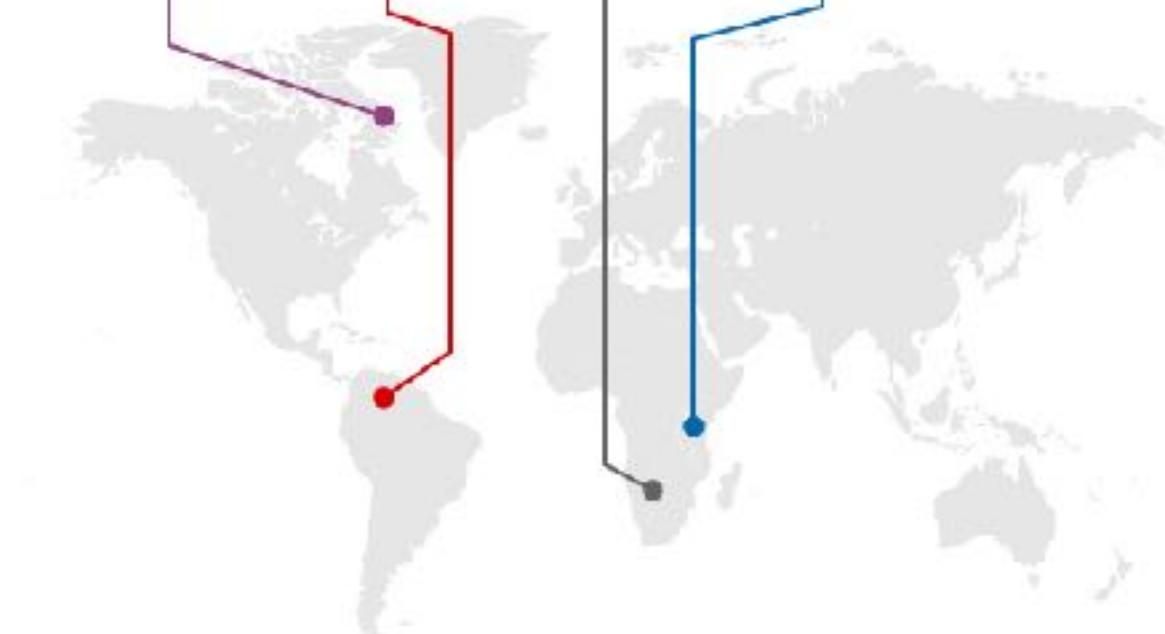


Inuit

Hiwi

!Kung

Hadza





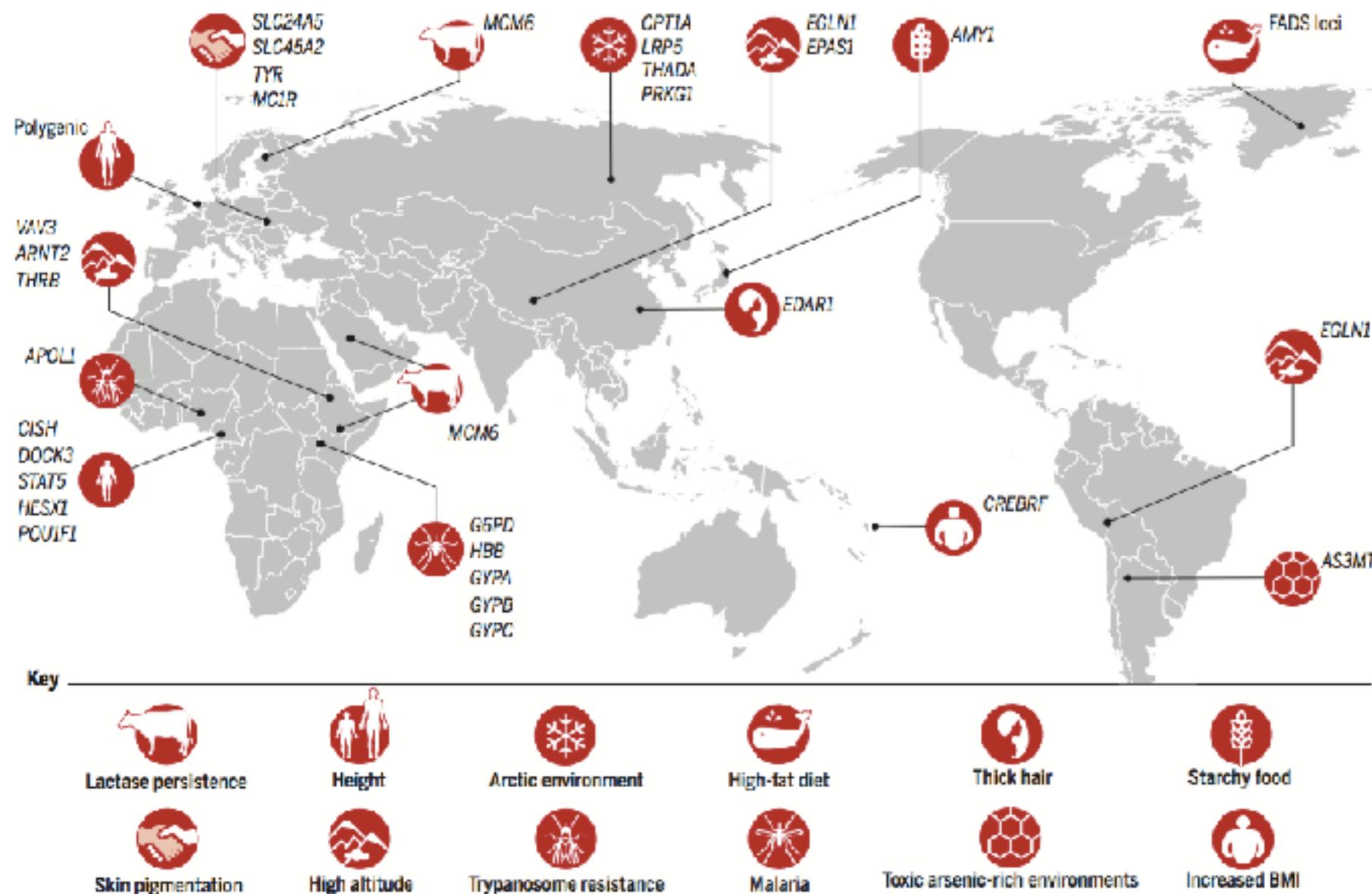
LIVE
FAST
AND
DIE
YOUNG

MILK



Going global by adapting local: A review of recent human adaptation

Shaobua Fan,^{1,*} Matthew E. B. Hansen,^{1,*} Yancy Lo,^{1,2,3} Sarah A. Tishkoff^{1,2,4}



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Pete Evans paleo for kids cookbook put on hold amid health concerns

Public Health Association president says recipe in book co-authored by celebrity chef has 10 times safe daily intake of vitamin A for babies



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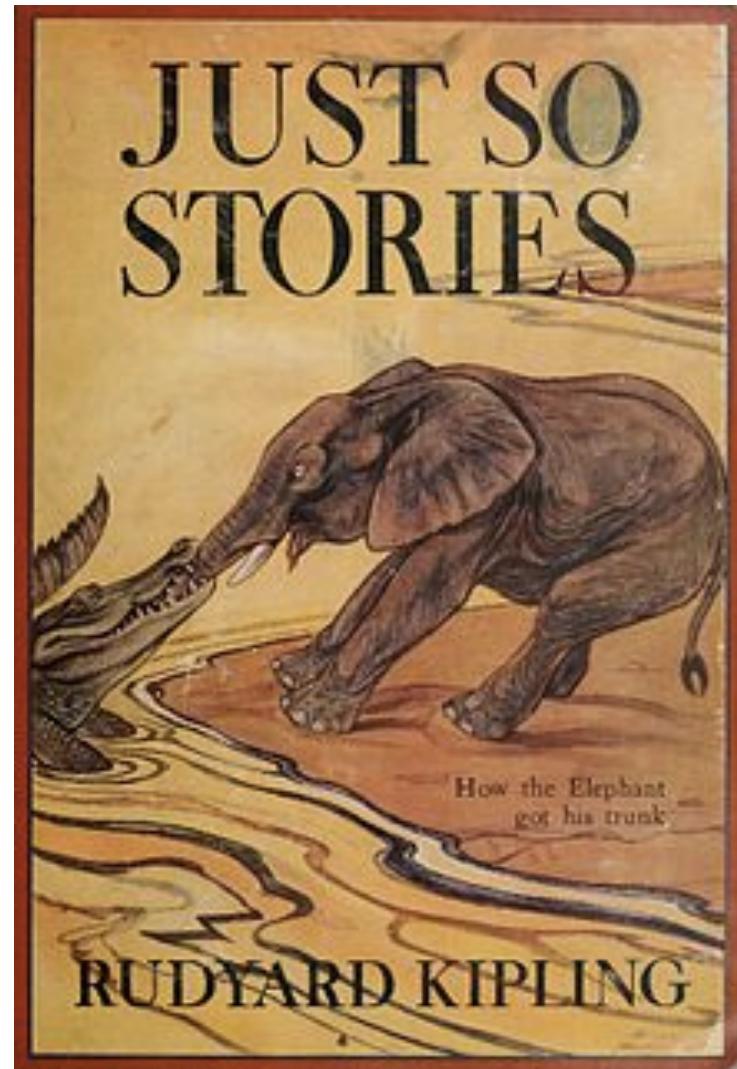
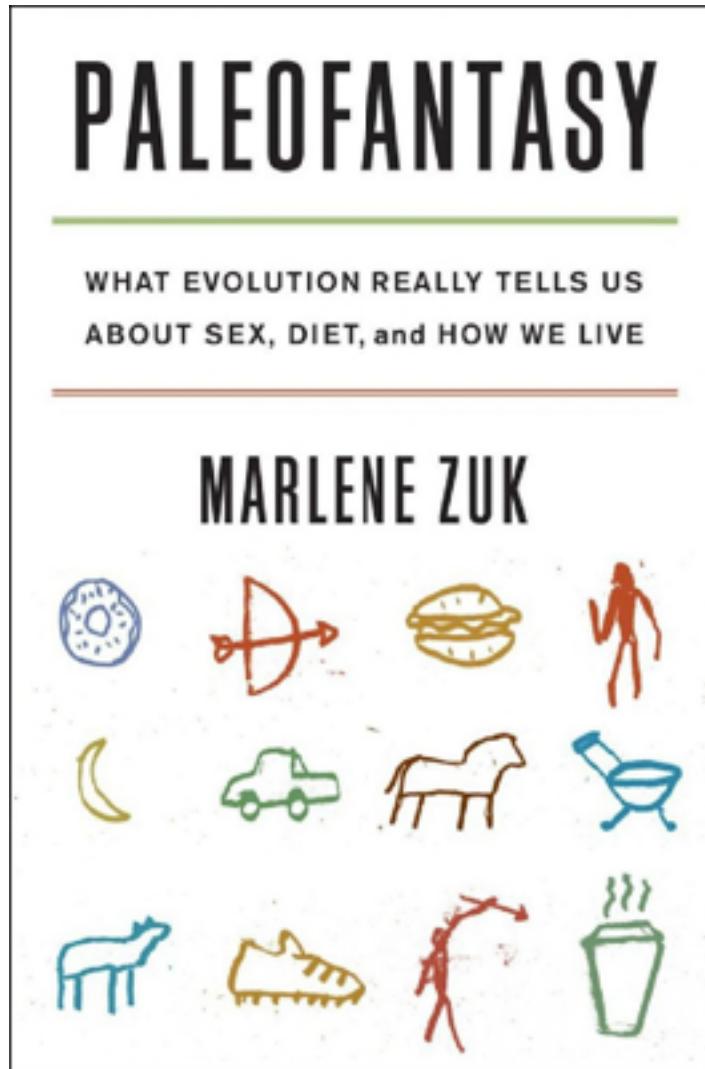
SBS HOME ON DEMAND GUIDE PROGRAMS RADIO SHOP | NEWS CYCLING FOOTBALL MOVIES FOX

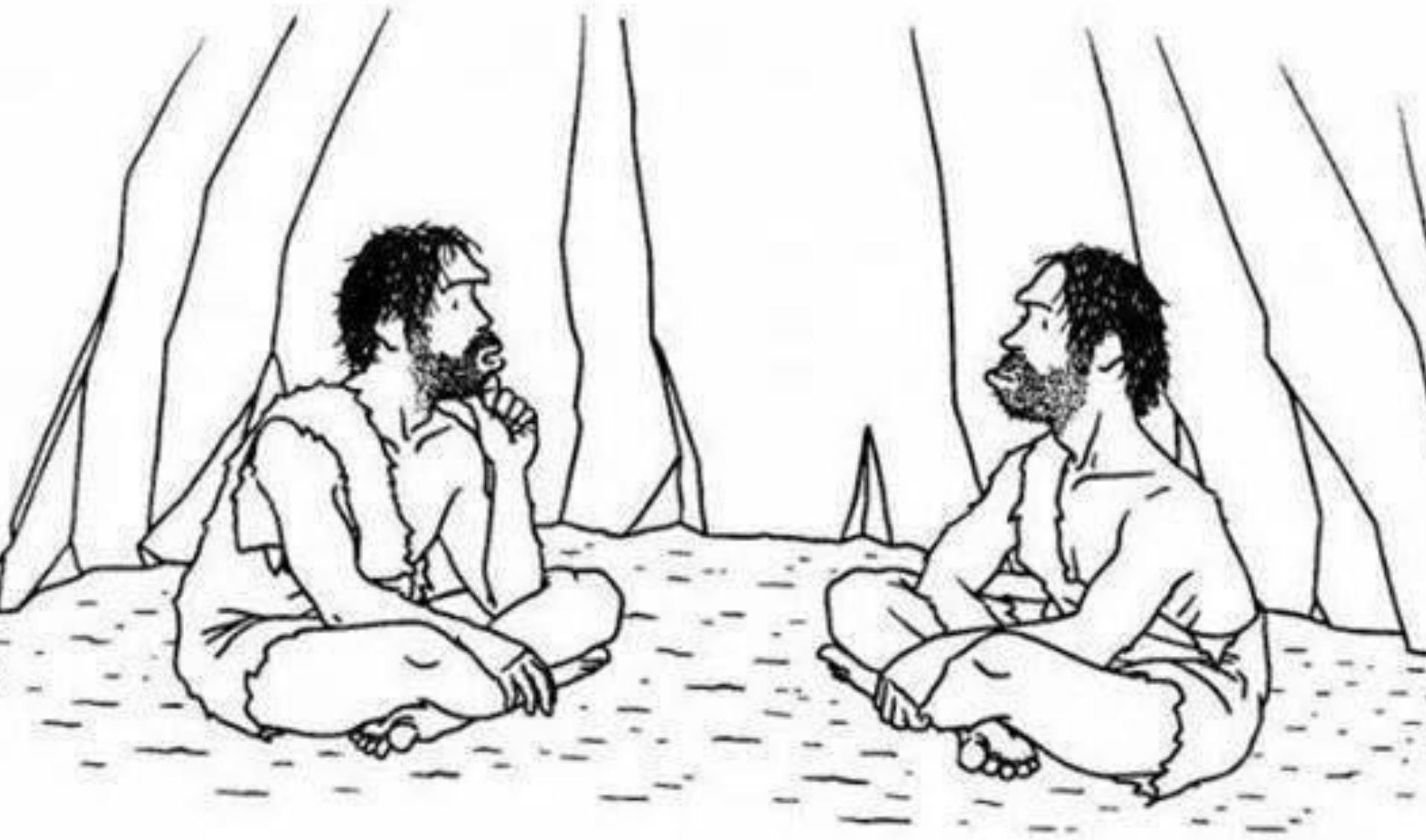
Comedy home Articles The Backburner Video

13 MAR 2015 - 4:27PM

Baby Paleo Diet Aims For Caveman Infant Mortality Rate

paleofantasies & just-so stories





**"I'm thinking of converting to the 20th Century Diet.
I heard they can live up to 100".**

MISMATCH



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3. Voor psychologische eigenschappen is mismatch lastiger vast te stellen



Mark Van Vugt
@markvanvugt1



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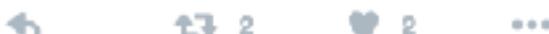
[Vertaling bekijken](#)

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03:59 - 25 jun. 2016



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01:22 - 16 jul. 2016

MISMATCH



our evolved followership mechanisms often [...] use cues reliably associated with good leadership in ancestral times. [...] the selection of leaders on these bases has been predicted to result in suboptimal outcomes for modern organizations



Li et al 2017

MISMATCH



Het geëvolueerde brein bezit mechanismen die mogelijkerwijs minder goed zijn aangepast aan de moderne wereld

MAAR

1. Geëvolueerde psychologie is bijna nooit de enige oorzaak
2. Het blijft speculeren wat de evolutionair optimale situatie is ("paleofantasy")
3. Voor psychologische eigenschappen is mismatch lastiger vast te stellen

Our modern skull has a stone-age mind
oerbrein

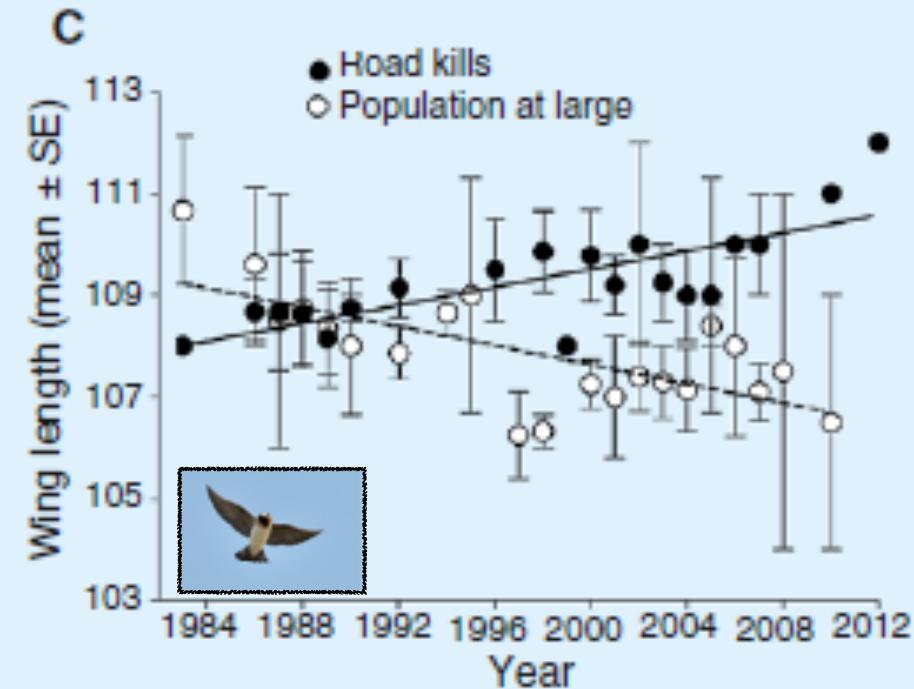
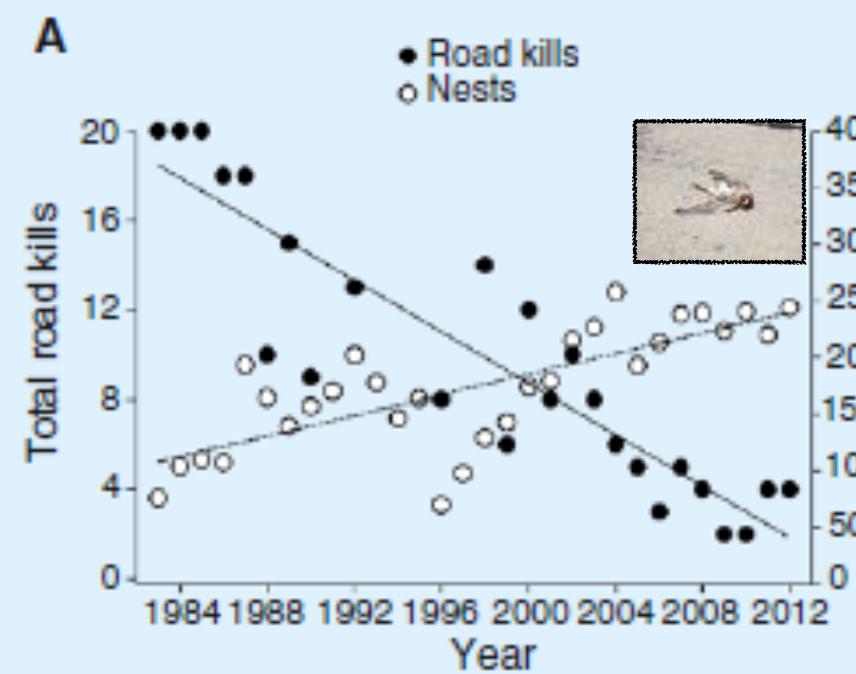


reflects completed rather than ongoing selection

IS NATUURLIJKE SELECTIE LANGZAAM?



Waar is alle “roadkill” gebleven?



IS NATUURLIJKE SELECTIE LANGZAAM?



Recent acceleration of human adaptive evolution

John Hawks^{*†}, Eric T. Wang[‡], Gregory M. Cochran[§], Henry C. Harpending[¶], and Robert K. Moyzis^{¶||}

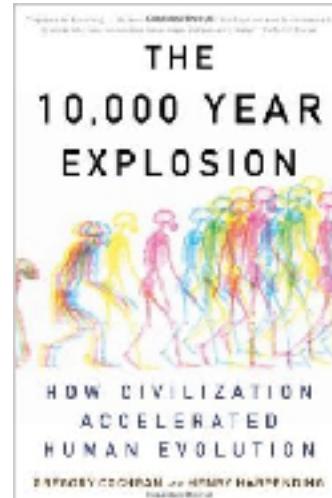
^{*}Department of Anthropology, University of Wisconsin, Madison, WI 53706; [‡]Department of Algorithm Development and Data Analysis, Affymetrix, Inc., Santa Clara, CA 95051; [§]Department of Anthropology, University of Utah, Salt Lake City, UT 84112; and [¶]Department of Biological Chemistry and Institute of Geromics and Bioinformatics, University of California, Irvine, CA 92697

Contributed by Henry C. Harpending, August 13, 2007 (sent for review May 24, 2007)

Genomic surveys in humans identify a large amount of recent positive selection. Using the 3.9-million HapMap SNP dataset, we found that selection has accelerated greatly during the last 40,000 years. We tested the null hypothesis that the observed age distri-

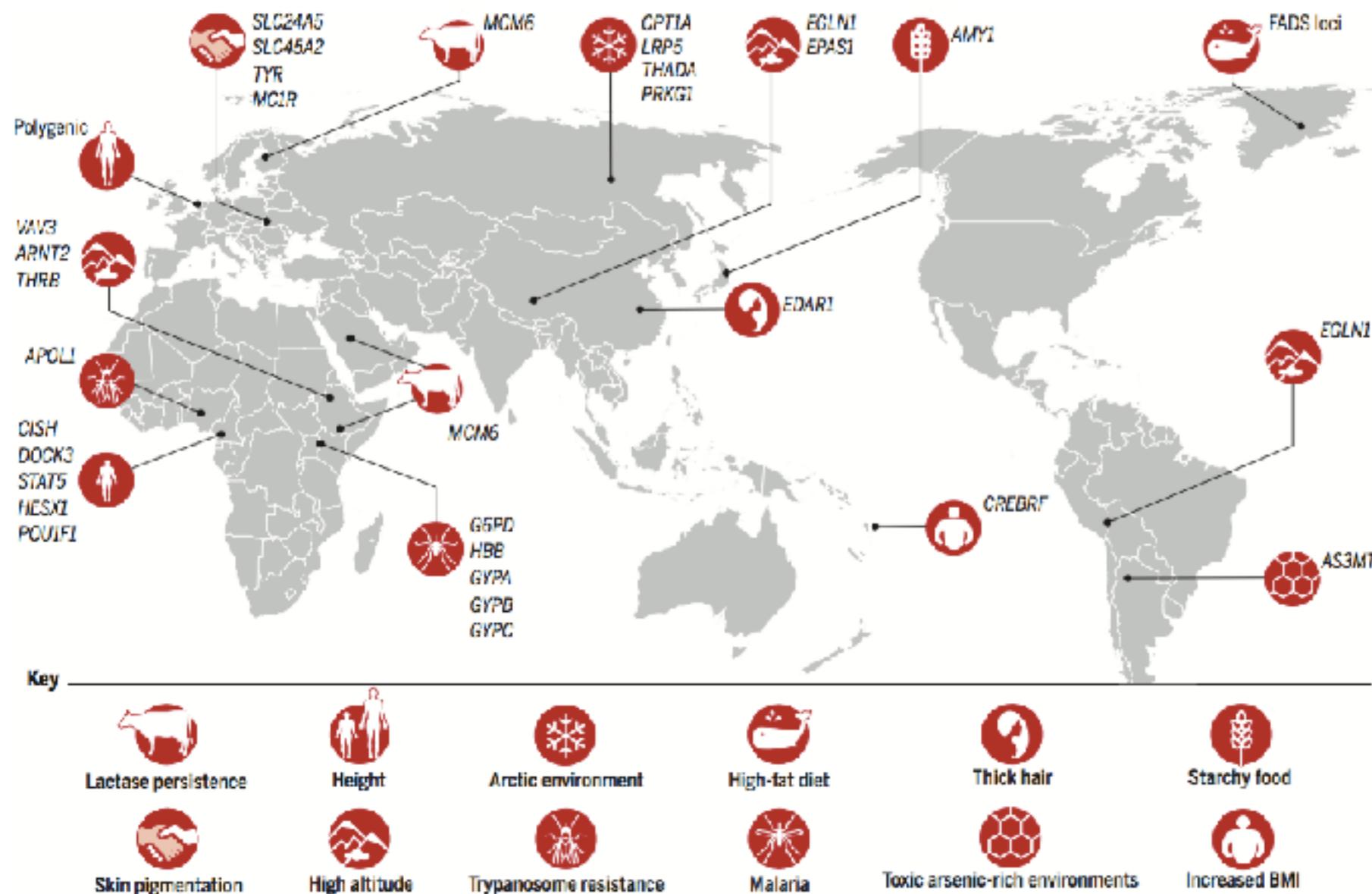
Human genetic variation appears consistent with a recent acceleration of positive selection. A new advantageous mutation that escapes genetic drift will rapidly increase in frequency, more quickly than recombination can shuffle it with other genetic variants (1).

DNAS



Going global by adapting local: A review of recent human adaptation

Shaobua Fan,^{1,*} Matthew E. B. Hansen,^{1,*} Yancy Lo,^{1,2,3} Sarah A. Tishkoff^{1,2,4}



Sir David Attenborough: Humans have stopped evolving

Human beings have stopped evolving after becoming the only species to “put halt to natural selection of its own free will”, Sir David Attenborough has said, as he predicts the “cultural evolution” of the future.

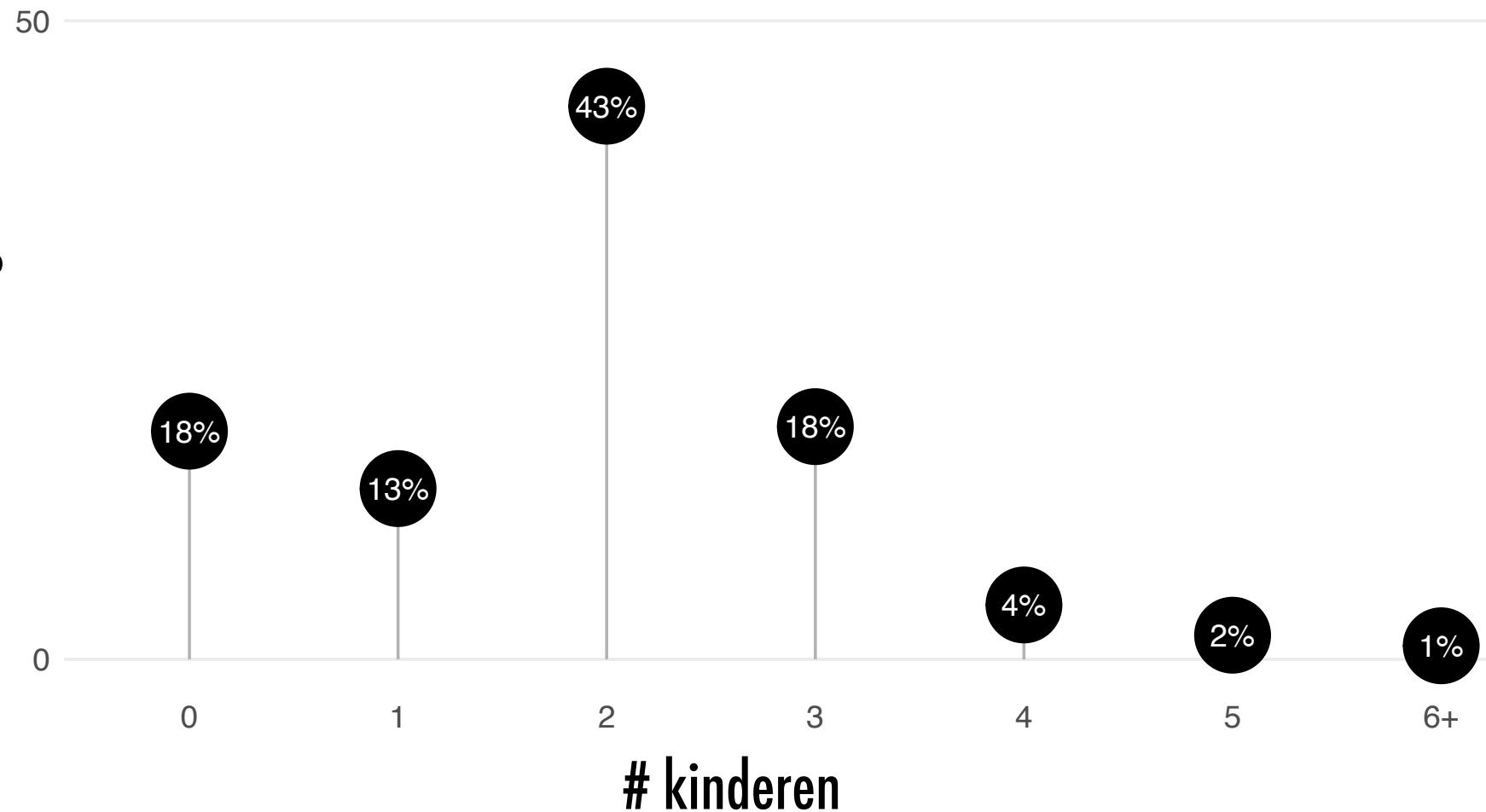


Sir David Attenborough at home in Richmond Photo: EDDIE MULHOLLAND

I think



40% van de Nederlanders heeft twee kinderen,
ongeveer 20% is kinderloos (of 'kindvrij')



Natural selection in a contemporary human population

Sean G. Byars^a, Douglas Ewbank^b, Diddahally R. Govindaraju^c, and Stephen C. Stearns^{a,1}

^aDepartment of Ecology and Evolutionary Biology, Yale University, New Haven, CT 06520-8102; ^bPopulation Studies Center, University of Pennsylvania, Philadelphia, PA 19104-6299; and ^cDepartment of Neurology, Boston University School of Medicine, Boston, MA 02118-2526

Edited by Peter T. Ellison, Harvard University, Cambridge, MA, and approved September 16, 2009 (received for review June 25, 2009)

Our aims were to demonstrate that natural selection is operating on contemporary humans, predict future evolutionary change for

sity to identify factors that contribute to cardiovascular disease. It is the longest running multigenerational study in medical

Evidence of directional and stabilizing selection in contemporary humans

Jaleal S. Sanjak^{a,b}, Julia Sidorenko^{c,d}, Matthew R. Robinson^{c,d,e}, Kevin R. Thornton^{a,b}, and Peter M. Visscher^{c,d,1}

^aDepartment of Ecology and Evolutionary Biology, University of California, Irvine, CA 92697; ^bCenter for Complex Biological Systems, University of California, Irvine, CA 92697; ^cQueensland Brain Institute, The University of Queensland, Brisbane, QLD 4072, Australia; ^dInstitute for Molecular Biosciences, The University of Queensland, Brisbane, QLD 4072, Australia; and ^eDepartment of Computational Biology, University of Lausanne, Lausanne 1010, Switzerland

Edited by Aravinda Chakravarli, Johns Hopkins University School of Medicine, Baltimore, MD, and approved November 3, 2017 (received for review May 1, 2017)



RESEARCH ARTICLE

Human Fertility, Molecular Genetics, and Natural Selection in Modern Societies

Feliz C. Tropf^{1*}, Gert Stulp², Nicola Barban³, Peter M. Visscher^{4,5}, Jian Yang^{4,5}, Harold Snieder⁶, Melinda C. Mills³

Natural selection in a contemporary human population

Sean G. Byars^a, Douglas Ewbank^b, Diddahally R. Govindaraju^c, and Stephen C. Stearns^{a,1}

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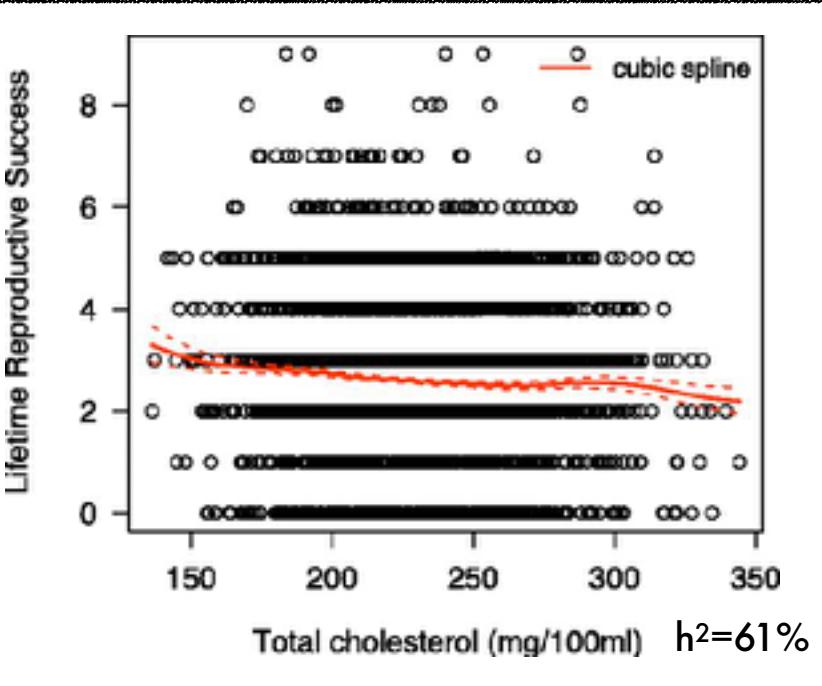
Our aims were to demonstrate that natural selection is operating on contemporary humans, predict future evolutionary change for society to identify factors that contribute to cardiovascular disease. It is the longest running multigenerational study in medical

Ingrediënten natuurlijke selectie

1. Variatie

2. Erfelijkheid

3. Selectie

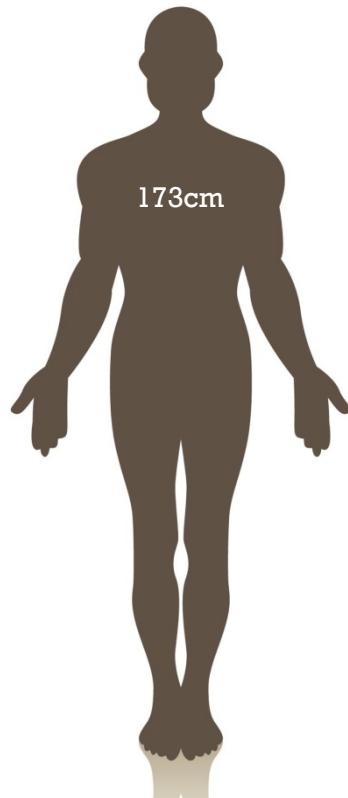


Na 10 generaties:

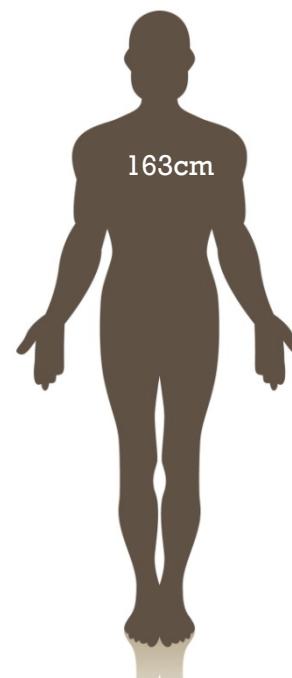
1. 4% daling cholesterolgehalte
2. 2% daling bloeddruk
3. menstruatie 1 jaar eerder
4. menopause 1 jaar later
5. 2 cm langer



1850 rank: 1/12

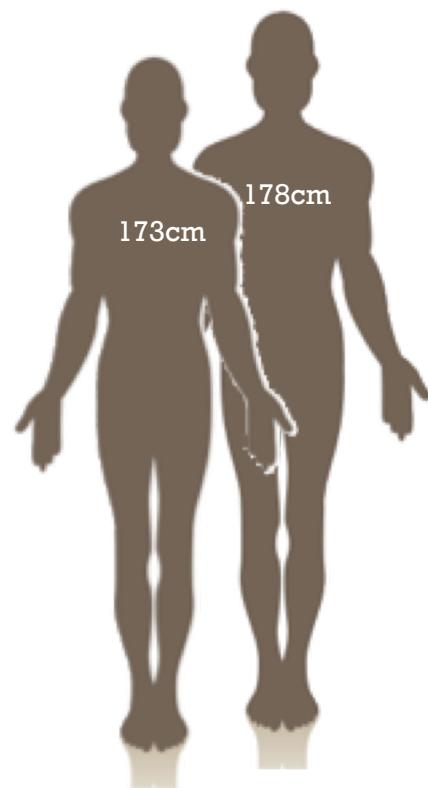


1850 rank: 11/12

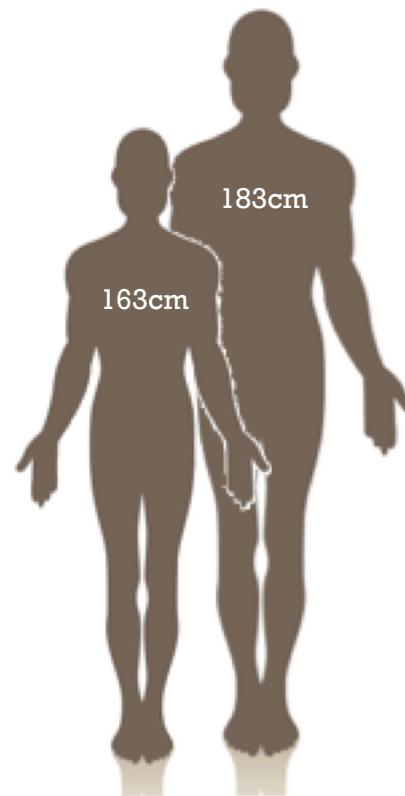




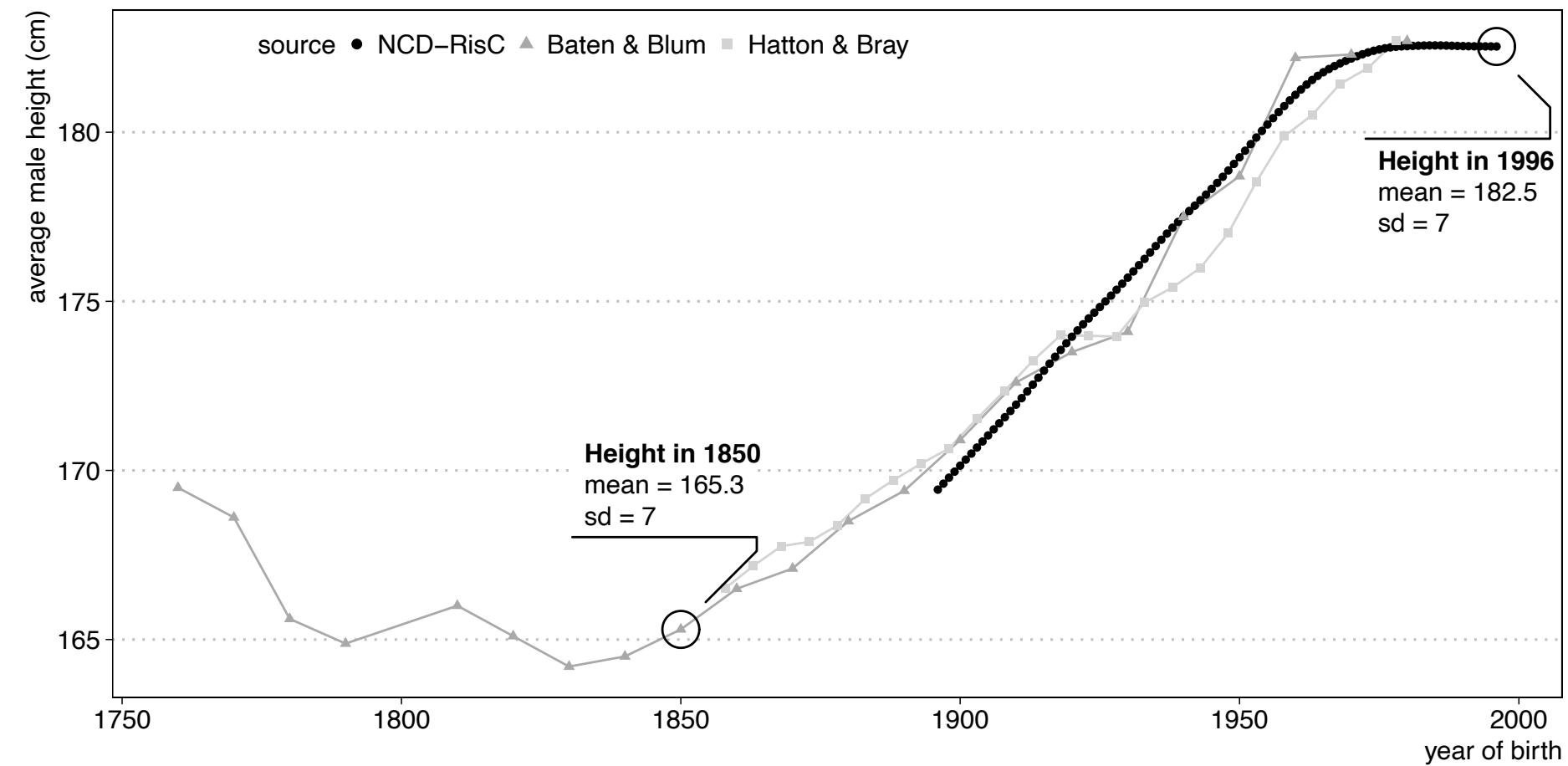
1850 rank: 1/12
2000 rank: 9/12



1850 rank: 11/12
2000 rank: 1/12



De Weg naar de Top



Waarom zijn Nederlanders zo lang?

- gelijkheid
- dieet vol met zuivel
- verzorgingsstaat
- part-time werkcultuur



Waarom zijn Nederlanders zo lang?

gelijkheid
dieet vol met zuivel
verzorgingsstaat
part-time werkcultuur
natuurlijke selectie?

PROCEEDINGS B

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Research

Cite this article: Stulp G, Barrett L, Tropf FC, Mills M. 2015 Does natural selection favour taller stature among the tallest people on earth? *Proc. R. Soc. B* **282**: 20150211.



Does natural selection favour taller stature among the tallest people on earth?

Gert Stulp^{1,2}, Louise Barrett^{3,4}, Felix C. Tropf² and Melinda Mills⁵

¹Department of Population Health, London School of Hygiene and Tropical Medicine, London WC1E 7HT, UK

²Department of Sociology, University of Groningen, Grote Rozenstraat 31, Groningen 9712 TG, The Netherlands

³Department of Psychology, University of Lethbridge, 4401 University Drive West, Lethbridge, Alberta, Canada T1 K 3M4

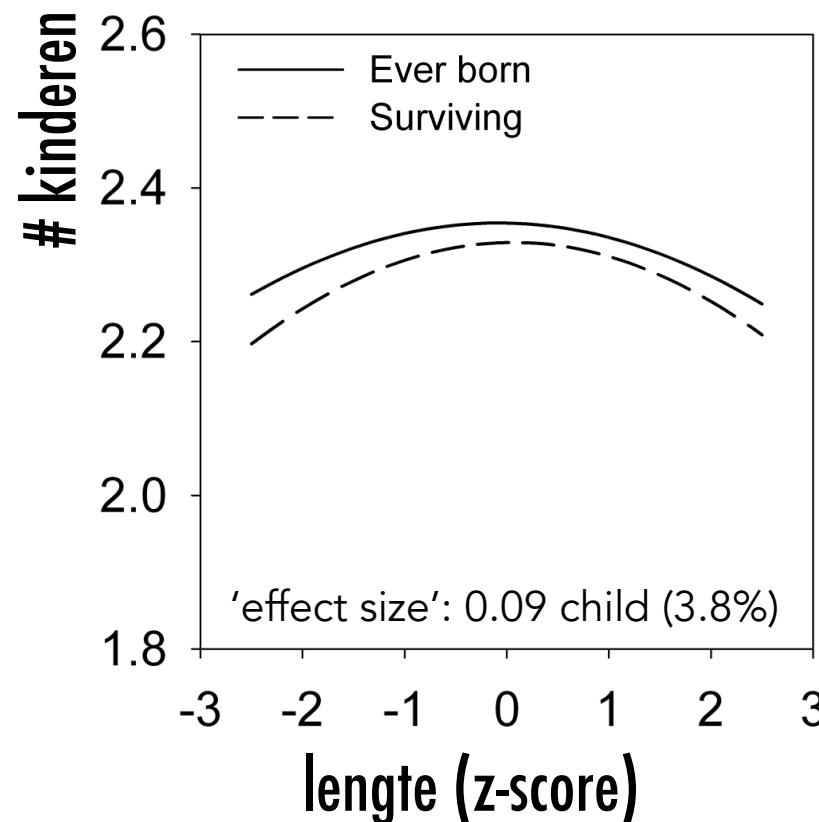
⁴Applied Behavioural Ecology and Ecosystems Research Unit, University of South Africa, Private Bag X6 Florida 1710, Johannesburg, South Africa

⁵Nuffield College/Department of Sociology, Manor Road, Oxford OX1 3UQ, UK

GS, 0000-0003-0173-5554; MM, 0000-0003-1704-0001



SELECTIE OP LENGTE VROUWEN

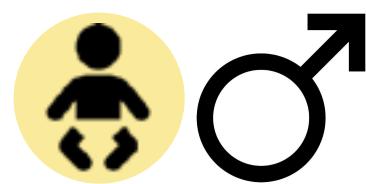


Gemiddelde vrouwen hadden:

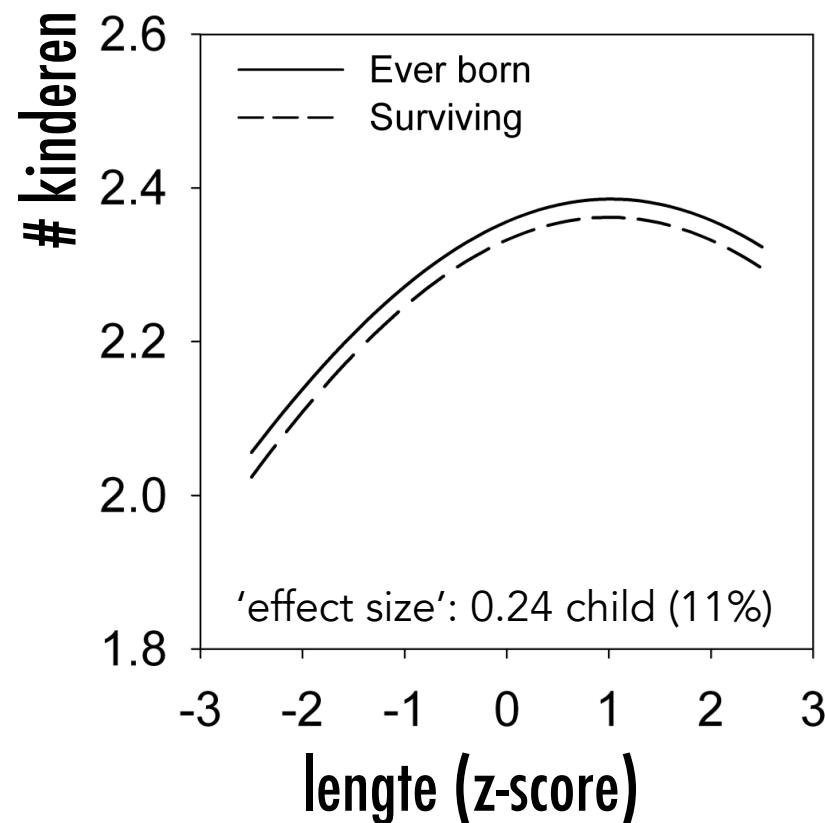
- Meer kinderen
- Vaker partner

Langere vrouwen hadden:

- Latere leeftijd eerste geboorte
- Meer kinderen binnen een relatie



SELECTIE OP LENGTE MANNEN



Langere mannen hadden:

- Meer kinderen
- Vakker een partner
- Latere leeftijd eerste geboorte
- Meer kinderen binnen een relatie

PROCEEDINGS B

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Research



Cite this article: Stulp G, Barrett L, Tropf FC, Mills M. 2015 Does natural selection favour taller stature among the tallest people on earth? *Proc. R. Soc. B* **282**: 20150211.

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Did natural selection make the Dutch taller? A cautionary note on the importance of quantification in understanding evolution

Maja Tarka,^{1,2} Geir H. Bolstad,³ Sebastian Wacker,⁴ Katja Räsänen,^{5,6} Thomas F. Hansen,⁷
and Christophe Pélabon¹

“only assessed natural selection in a qualitative manner

the predicted evolutionary increase in height is 2.28 mm

35STE NIBI-CONFERENTIE VOOR BIOLOGIEDOCENTEN BOVENBOUW HAVO EN VWO

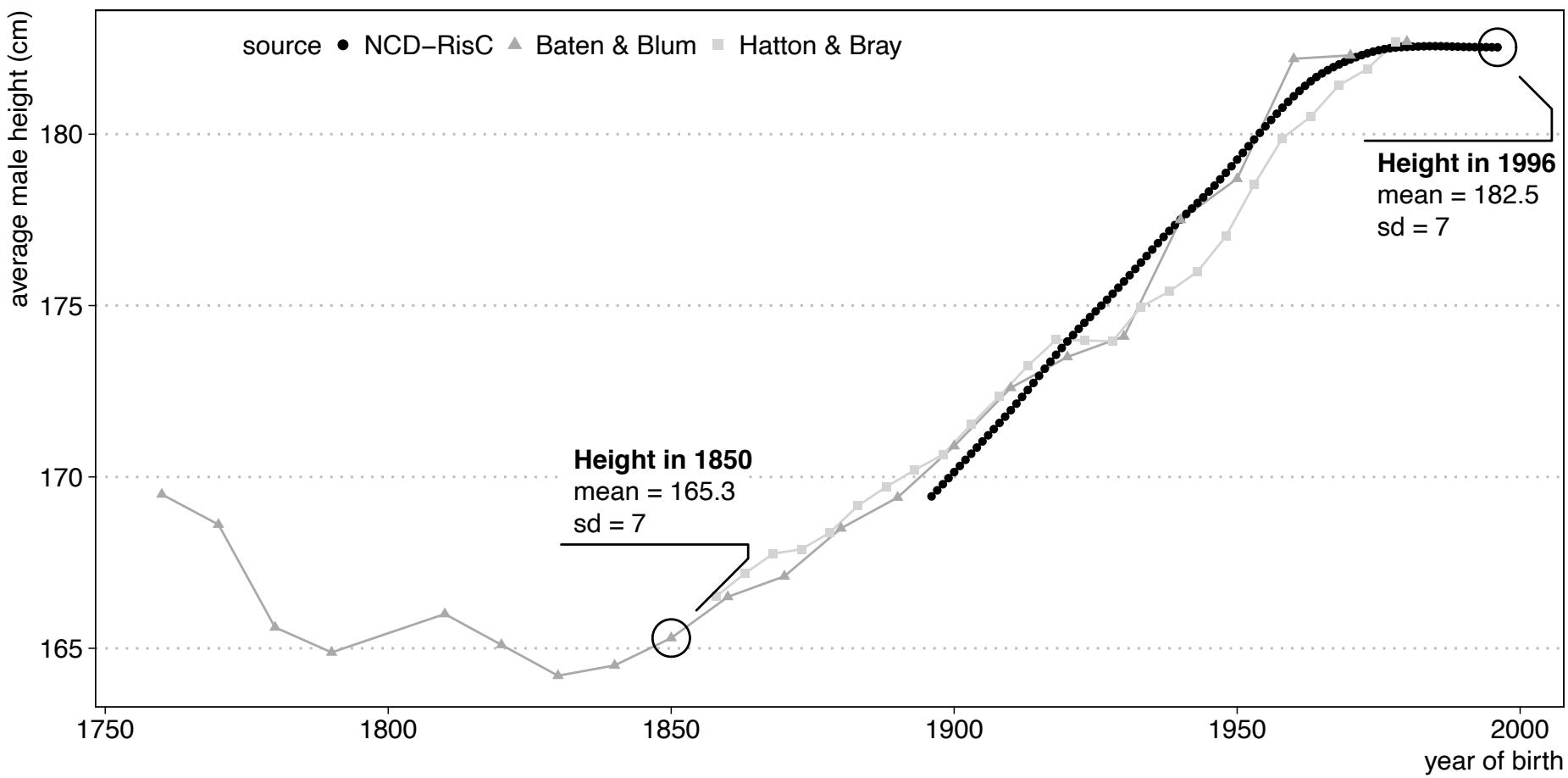
FEIT/FICTIE

VRIJDAG 12 EN ZATERDAG 13 NOVEMBER 2021
HOTEL ZUIDERDUIN, EGMOND AAN ZEE

EVOLUTION
LITERATURE AND METHODS

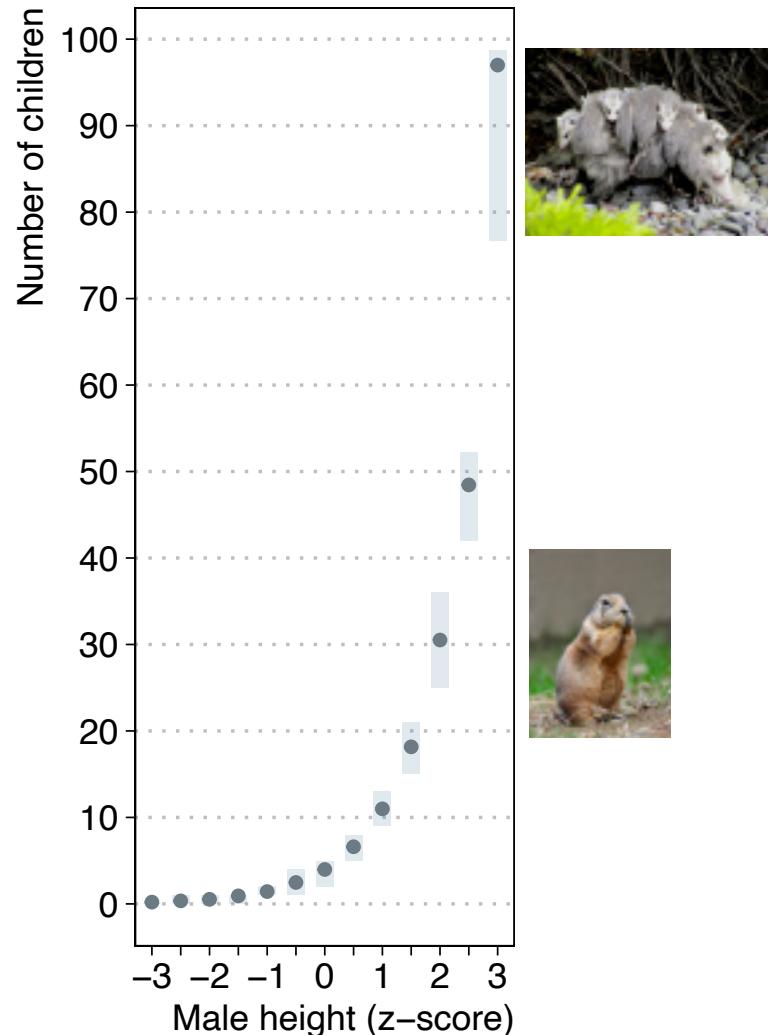
Wat als het allemaal Natuurlijke Selectie was?

In 150 jaar, 17.2 cm toename in gemiddelde lichaamslengte



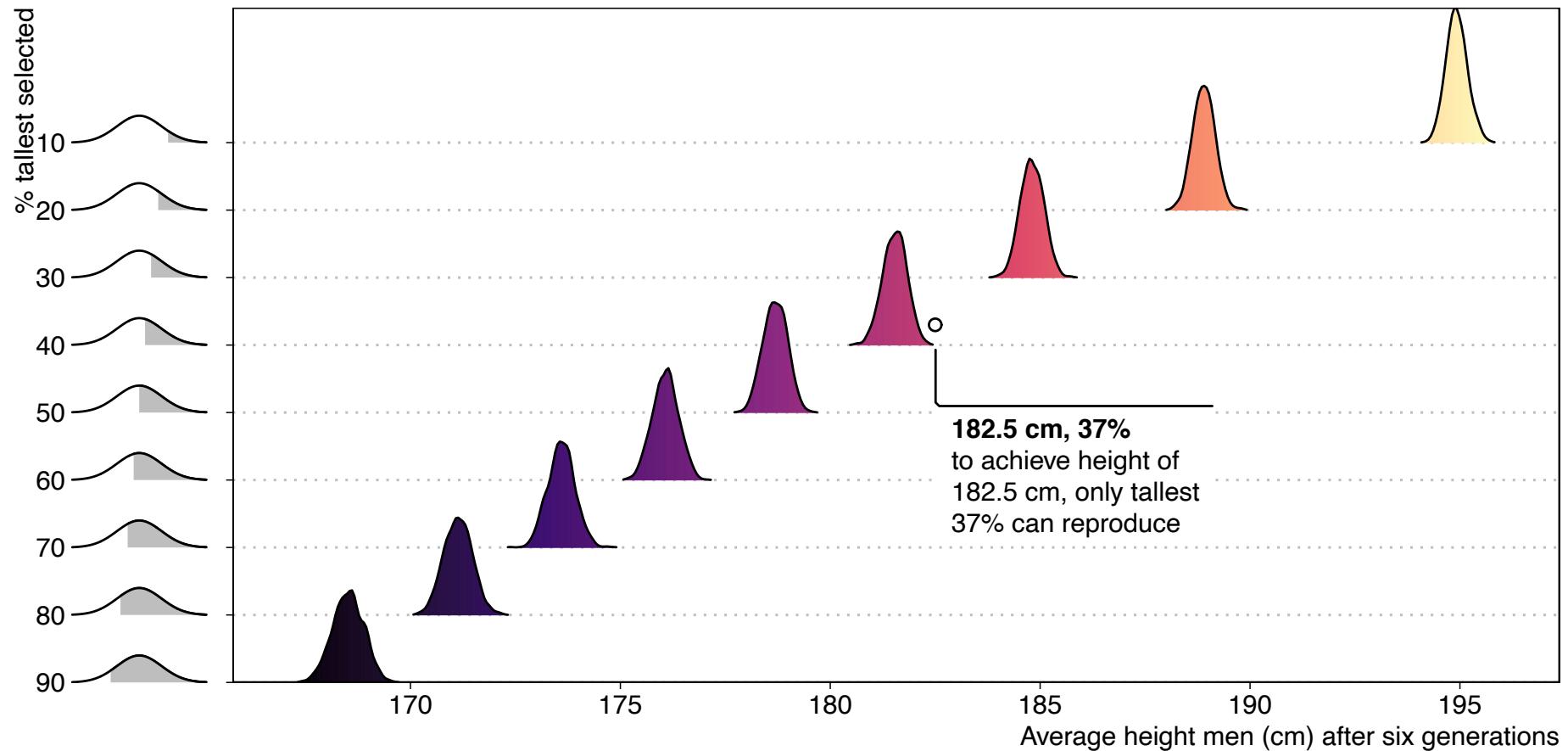
Wat als het allemaal Natuurlijke Selectie was?

Als de toename in lichaamslengte puur het resultaat is van langere mannen die meer reproduceren, dan zou het volgende waar moeten zijn in elke generatie:



Wat als het allemaal Natuurlijke Selectie was?

als 6 generaties lang, alleen de 37% langste mannen reproduceren,
wordt de toename van 17.2 cm bereikt



The New York Times

Natural Selection May Help Account for Dutch Height Advantage



By [Carl Zimmer](#)

April 9, 2015

35STE NIBI-CONFERENTIE VOOR BIOLOGIEDOCENTEN BOVENBOUW HAVO EN VWO

FEIT/FICTIE

VRIJDAG 12 EN ZATERDAG 13 NOVEMBER 2021
HOTEL ZUIDERDUIN, EGMOND AAN ZEE

Veel
verschillende
studies
rapporteren
selectie op
lengte

PLOS ONE

REVIEW
Human Fertility, Molecular Genetics, and Natural Selection in Modern Societies

EVOLUTIONARY REVIEWS
doi:10.1371/journal.evr.12012

Evolutionary perspectives on human height variation

Gen. Sust.

Original Research Article

The Effect of Female Height on Reproductive Success is Negative in Western Populations, But More Variable in Non-Western Populations

PNAS

A curvilinear effect of height on reproductive success in human males

Gen. Biol.
Evidence of directional and stabilizing selection in contemporary humans

PNAS

Natural selection in a contemporary human population

Bewijs voor genetische verschillen tussen populaties onderliggende aan lichaamslengte

Indirect Evidence for the Genetic Determination of Short Stature in African Pygmies

Julien A. Gobert,¹ Paul Verhaeghe,² Alain Froment,¹ Sylvie de Dreu,¹ Thierry Pagny,¹ Denis Belonostchikov,¹ and Jean-Pierre Marais¹

¹ INRA, MIAU, UMR 1060, Institut National de la Recherche Agronomique, Jouy-en-Josas, France; ² Department of Human Genetics, Katholieke Universiteit Leuven, Leuven, Belgium

ARTICLES

human genetics

A large-scale genome-wide association study of Asian populations uncovers genetic factors influencing eight quantitative traits

Economics and Human Biology

The role of nutrition and genetics as key determinants of the positive height trend

P. Chavas et al.

Journal homepage: www.elsevier.com/locate/econbiol

LETTERS

human genetics

Evidence of widespread selection on standing variation in Europe at height-associated SNPs

LETTERS

human genetics

Population genetic differentiation of height and body mass index across Europe

Economics and Human Biology

Identifying the limits to socioeconomic influences on human growth

David J. Blundell,^a Joachim K. Halkoske,^b and Greg J.^b

Journal homepage: www.elsevier.com/locate/econbiol

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Sir David Attenborough at home in Richmond Photo: EDDIE MULHOLLAND

I think



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Sir David Attenborough at home in Richmond Photo: EDDIE MULHOLLAND

I think not



Our modern skull has a stone-age mind
oerbrein



reflects completed reasoning than ongoing selection





Fleischman: 'Evolutie bepaalt gendifferschil'

Waarom is slechts 19 procent van de RUG-professoren vrouw? Dat komt door de evolutie – niet door discriminatie, zegt evolutiepsycholoog Diana Fleischman.

DOOR TATIANA COBA

Tijdens een debat op 20 september dat werd georganiseerd door de Young Academy Groningen, stond Fleischman – University of Portsmouth, UK – lijnrecht tegenover evolutionair socioloog Gert Stulp en cultureel geograaf Bettina van Hoven, beide van de RUG.

Politieke correctheid?

“

the risks we take in [medical] research are weighed against the gains to be had from the innovations under study. In evaluating the case for [insert controversial topic] determining social behaviour, the consequence of falsely coming down on the side of [insert controversial topic] is very bad, so I set the evidentiary bar high for that conclusion

Cohen 2014



The Telegraph

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Shopping styles of men and women all down to evolution, claim scientists

The reason women love to spend hours browsing in shops while men prefer to be in and out of the high street in minutes is down to their hunter-gathering past, claim scientists.

DE MENS

geëvolueerd maar
ook evoluerend?

