

Breeders, Propagators, & Creators



Culture, Biology, and the Future of Human Evolution

A scientist among creatives



I have taught courses in:

- ★ Ecology
- ★ Evolution
- ★ The Evolution of Cooperation
- ★ The Evolution of Sex
- ★ The Evolution of Play
- ★ The Evolution of Music
- ★ Behavioral Ecology
- ★ Human Evolution

Pratt

*School of Liberal Arts & Sciences
Department of Mathematics & Science*

WARNING:

Portions of this presentation have the potential to offend, as I will be talking about...

- ★ The choice of whether or not to have children (and how many)
- ★ The genetic evolution of humans
- ★ The cultural evolution of humans

Inexplicable behaviors

Source: fiveten.com



Free soloing

Wingsuit
BASE
jumping



Source: buildering.net



Source: nydailynews.com

Highlining



Dean Potter
self-described
“aerialist”

Extreme behaviors are risky...

[Gear](#)[Travel](#)[Fitness](#)[Adventure](#)[Culture](#)[Photo](#)[Video](#)[Magazine](#)[Subscribe](#)

Dean Potter Killed in BASE-Jumping Accident

The climbing great died Saturday while attempting a wingsuit flight from Yosemite's Taft Point

By: Grayson Schaffer May 17, 2015



On the trail,
you're an animal.

Most Popular

1. Run for Your Life
2. Dean Potter's Final Essay on Love and Adventure
3. Sign Up for Surf Camp at 6 Idyllic Destinations
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6. Can Surfing Reprogram the Veteran's Brain?
7. Murder on the Appalachian Trail

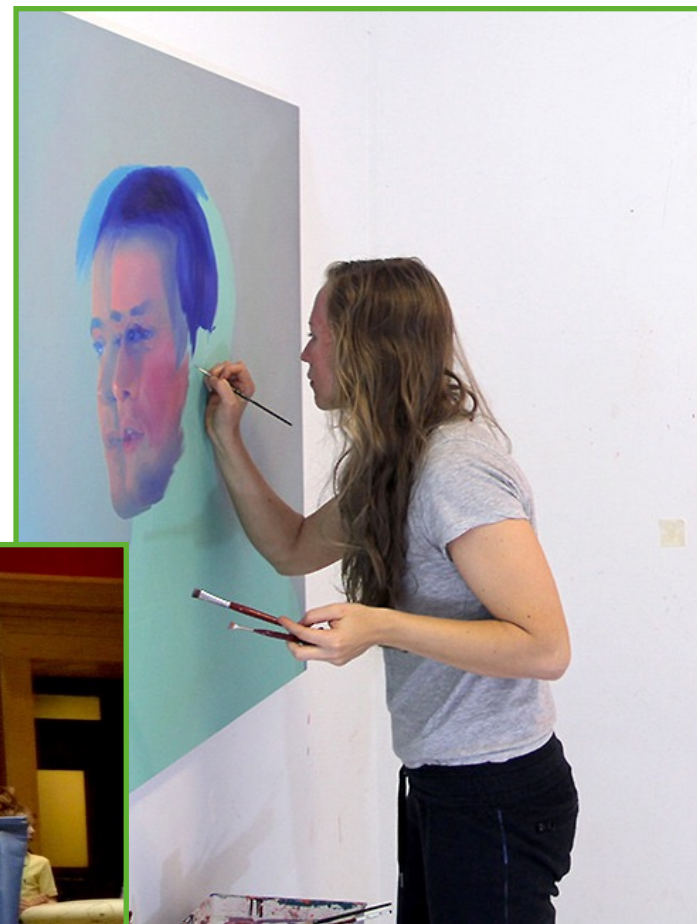
What seems surprising about Dean Potter's activities?



Why are Dean Potter's activities surprising to evolutionary biologists?

★ He failed to leave any offspring!

Plenty of us pursue our passions in lieu of pursuing parenthood



Plenty of us pursue our passions in lieu of pursuing parenthood

“Eighty-three countries had below-replacement fertility during 2010-2015, and in 25 of those countries, fertility was below 1.5 children per woman.”

- U.N. World Population Prospects Report

2014
birth rates

South Korea = 1.25

Singapore = 0.80

Cuba = 1.46

Ukraine = 1.30

Denmark = 1.73

Costa Rica = 1.91

Japan = 1.40

Azerbaijan = 1.91

U.K. = 1.90

Iran = 1.85

Paraguay = 1.96

China = 1.55

Three evolutionarily significant human (re)productive behaviors

- B** Breeding
- P** Propagating
- C** Creating

Breeding



“breeding” is about passing on genes

Breeding

Genes evolve

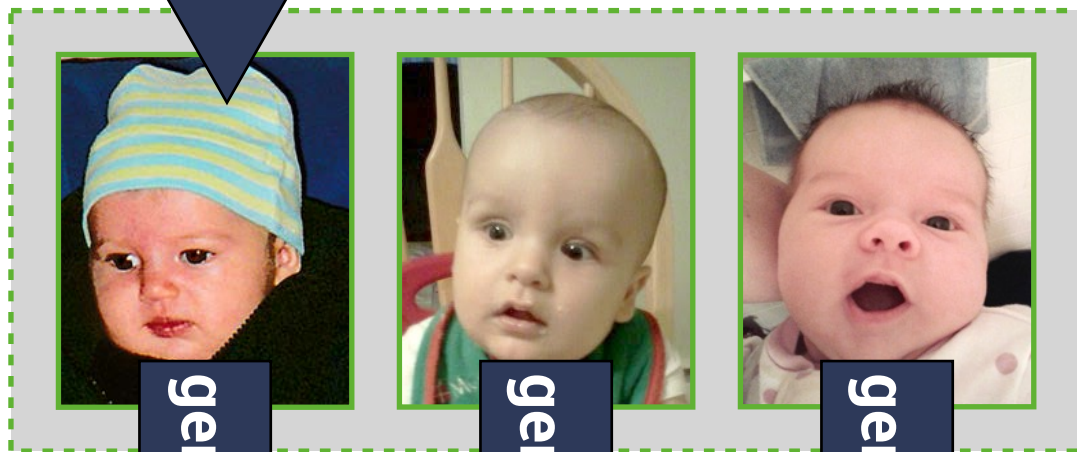
“success”



genes

Possible reasons for differential reproductive success:

- ★ survival?
- ★ ability to find a mate?
- ★ parental ability?



genes

genes

genes

“failure”



genes

0

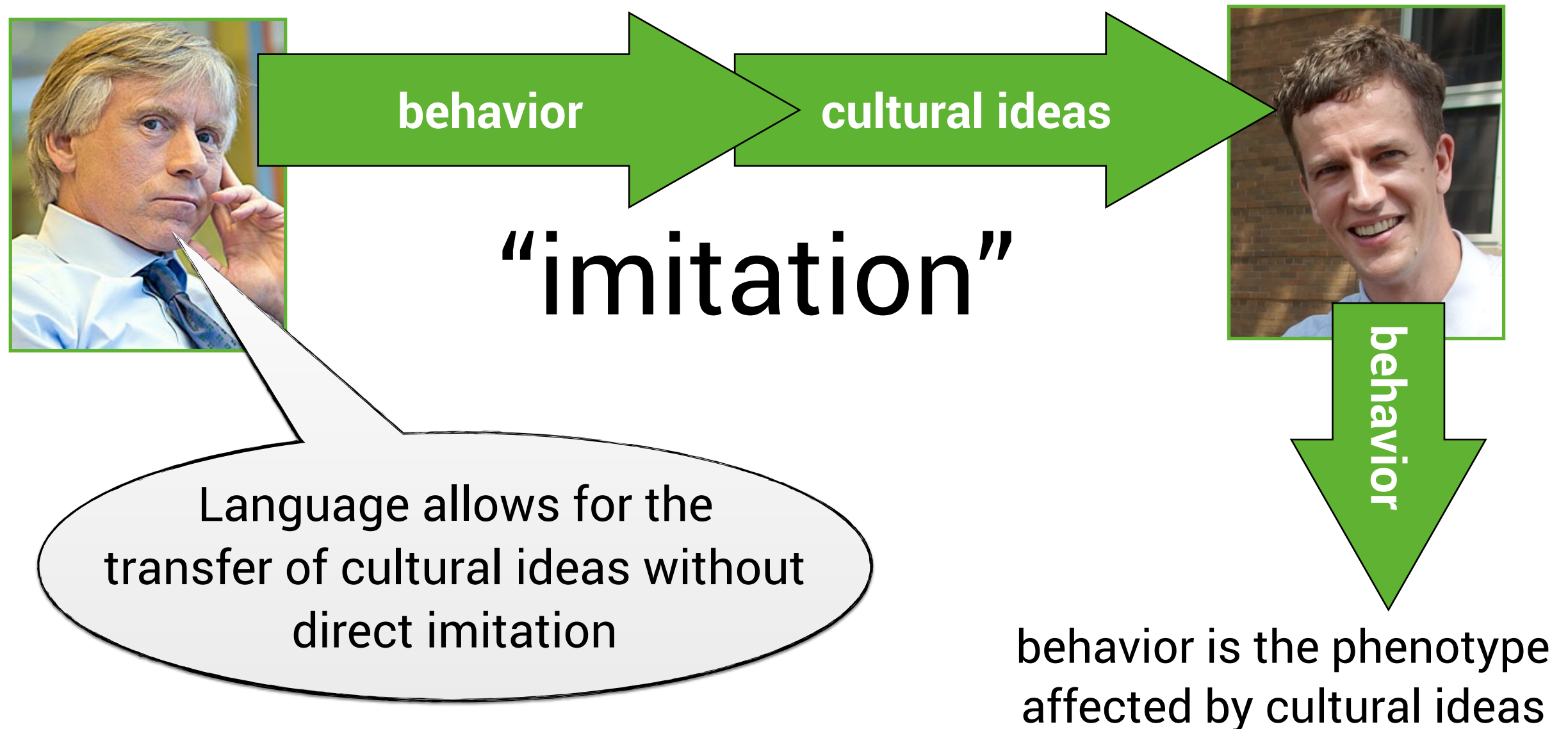
“breeding” is not “parenting”

How do we conceptualize parenting?

- ★ Parenting is about assuring the health and welfare of dependent children (*biological survival*)
- ★ Parenting is about teaching dependent children skills and values (*passing on culture*)

Propagating

What is culture? Where is culture?



Propagating

Animals that learn from their environment



Animals that imitate
innovations of others



“cumulative culture”

Humans who can build
on the innovations of others



Propagating

*The power of
cumulative culture*

Imitation without
novel innovation

Accumulation of
cultural innovations



*Lower paleolithic
3.3Ma to 300 ka*



*Upper paleolithic
40ka to 10 ka*

Propagating

Culture evolves

“success”



behavior

cultural ideas

Possible reasons for differential cultural success:

- ★ social connections?
- ★ prestige?
- ★ popularity?
- ★ perceived value?



behavior

cultural ideas

“failure”



behavior



behavior



behavior

Propagating

Culture can be “mutualistic” or “parasitic” to biology



use antibiotics for infection

cultural ideas



genes



go wingsuit BASE jumping

cultural ideas



genes

0

"failure"

genes

culture

Propagating

*Culture is propagated
both vertically and
horizontally/obliquely*

peers,
celebrities,
media

"success"

culture



behavior

behavior

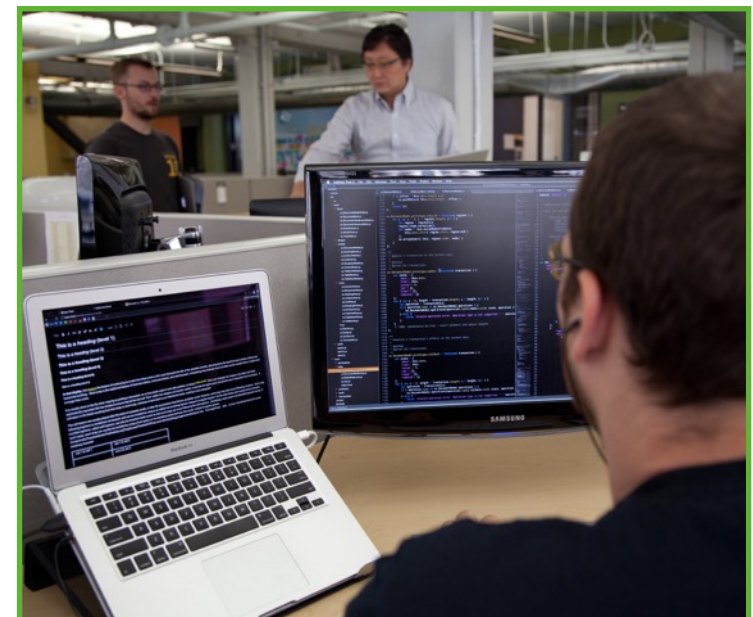
behavior



*it is possible to be culturally
successful without ever
having offspring*

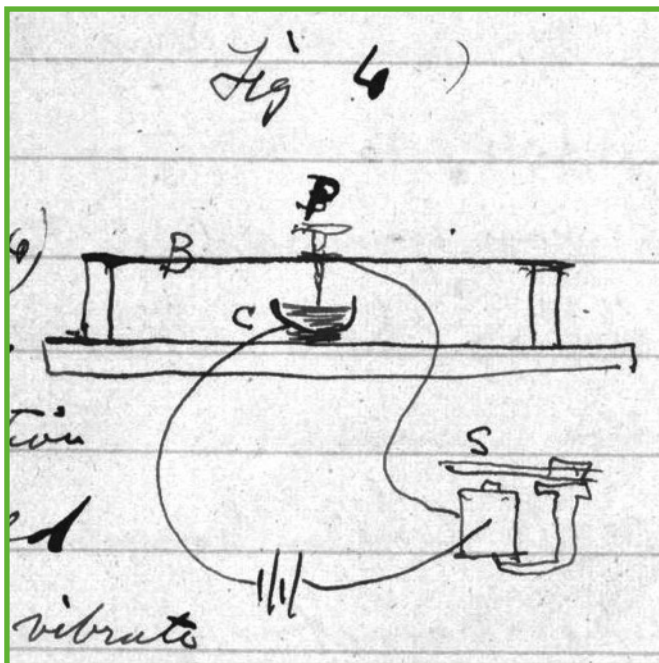
Creating

What makes these
“creative” endeavors?



Creating

adding novel ideas to existing culture



unlike mutations,
novel cultural
variants can be the
product of intent



cultural variation
is what makes
cultural
evolution
possible



our propensity for creating new cultural variants
drives the rapid pace of cultural evolution

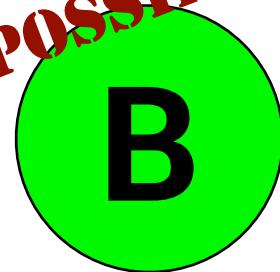
A behavioral trade-off

Limited
resources

How to spend limited resources?
(time, materials, social connections)

*“pure”
strategies*

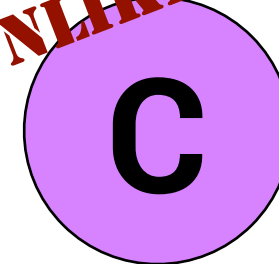
IMPOSSIBLE



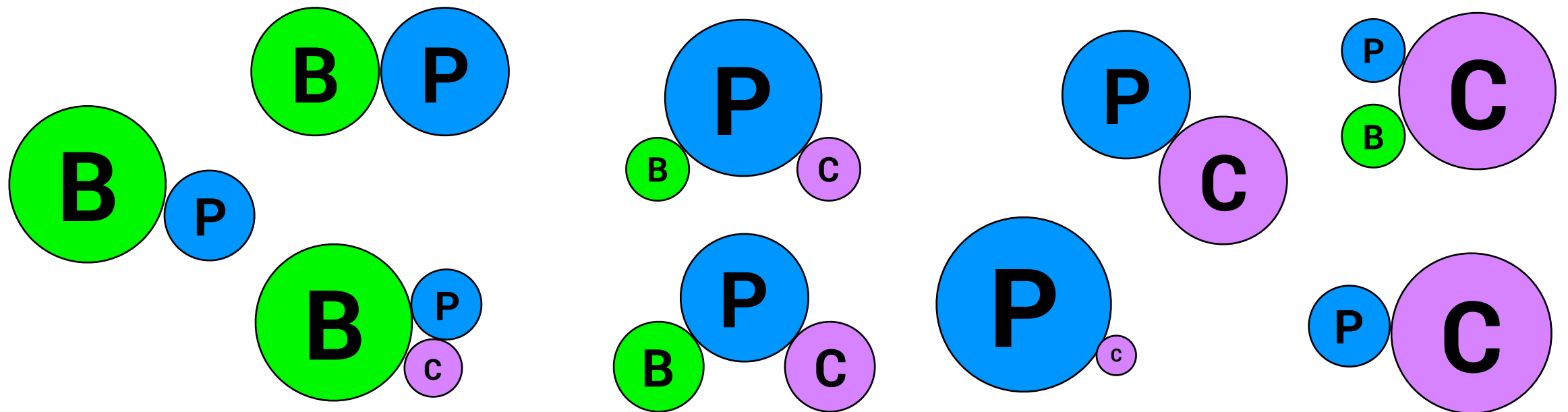
MAYBE?



UNLIKELY



“mixed” strategies

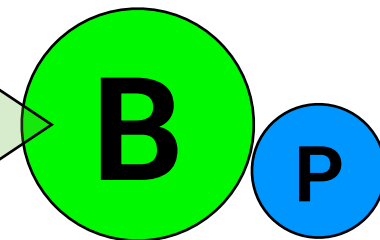


An unstable configuration?

Our current civilization would be unstable if...

People with
Genotype B

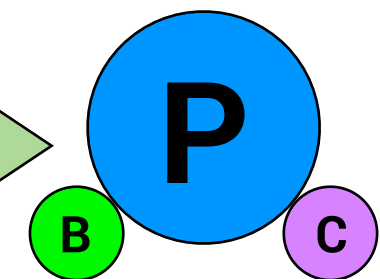
are most likely to pursue this strategy



GENETICS COULD NOT BE THIS SIMPLE BUT...

People with
Genotype P

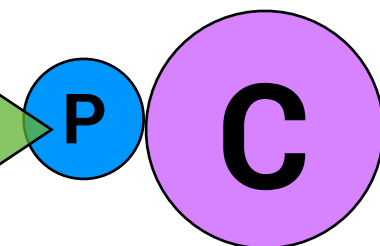
are most likely to pursue this strategy



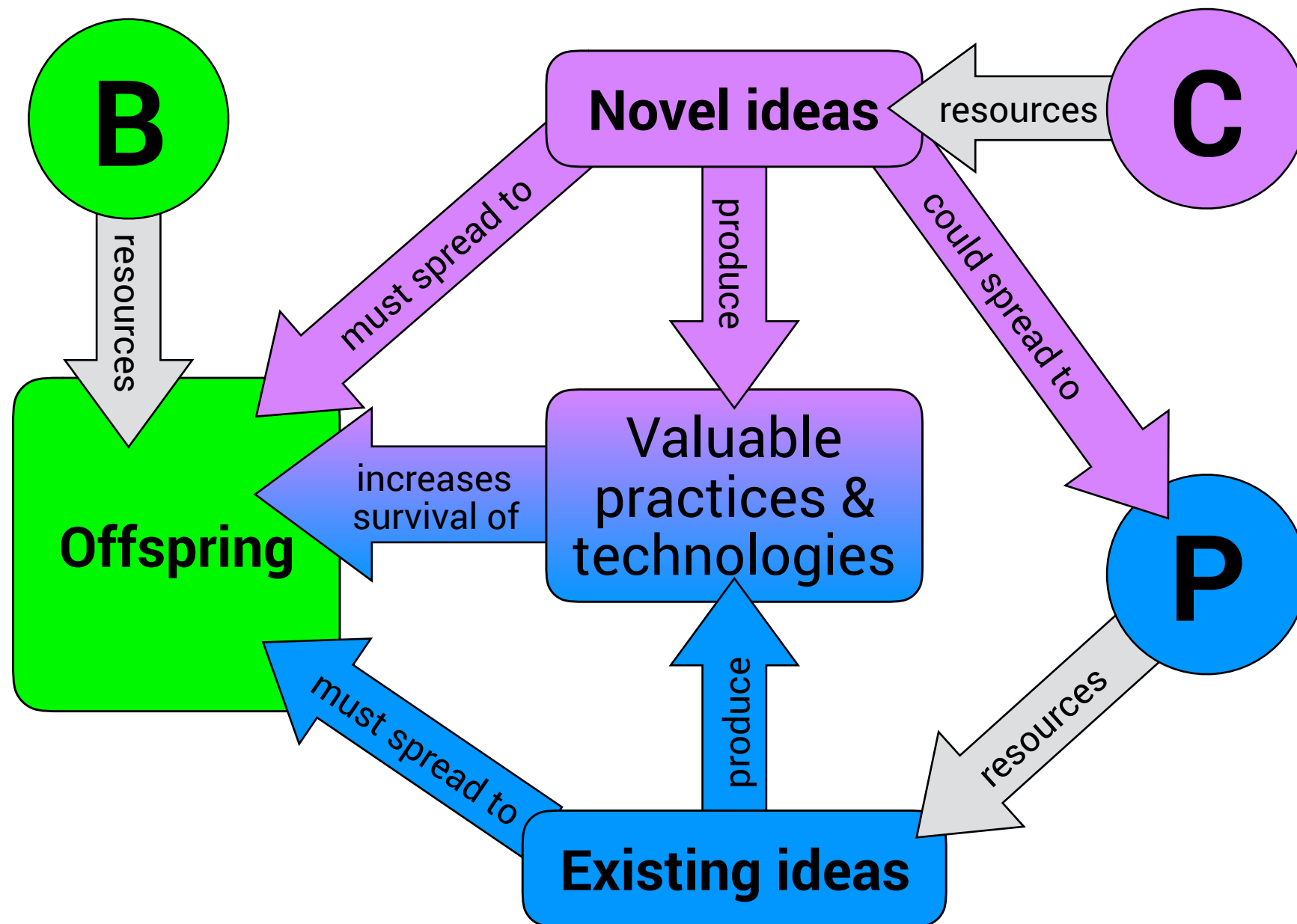
...THAT DOESN'T PRECLUDE GENETIC INFLUENCE

People with
Genotype C

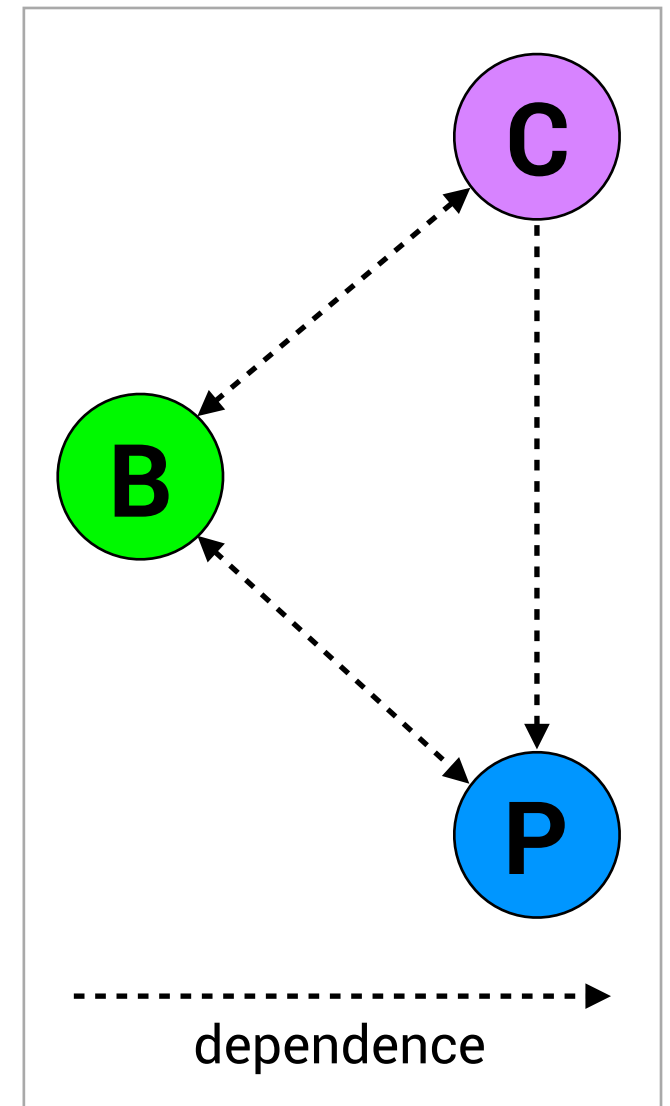
are most likely to pursue this strategy



Breeders vs. propagators vs. creators

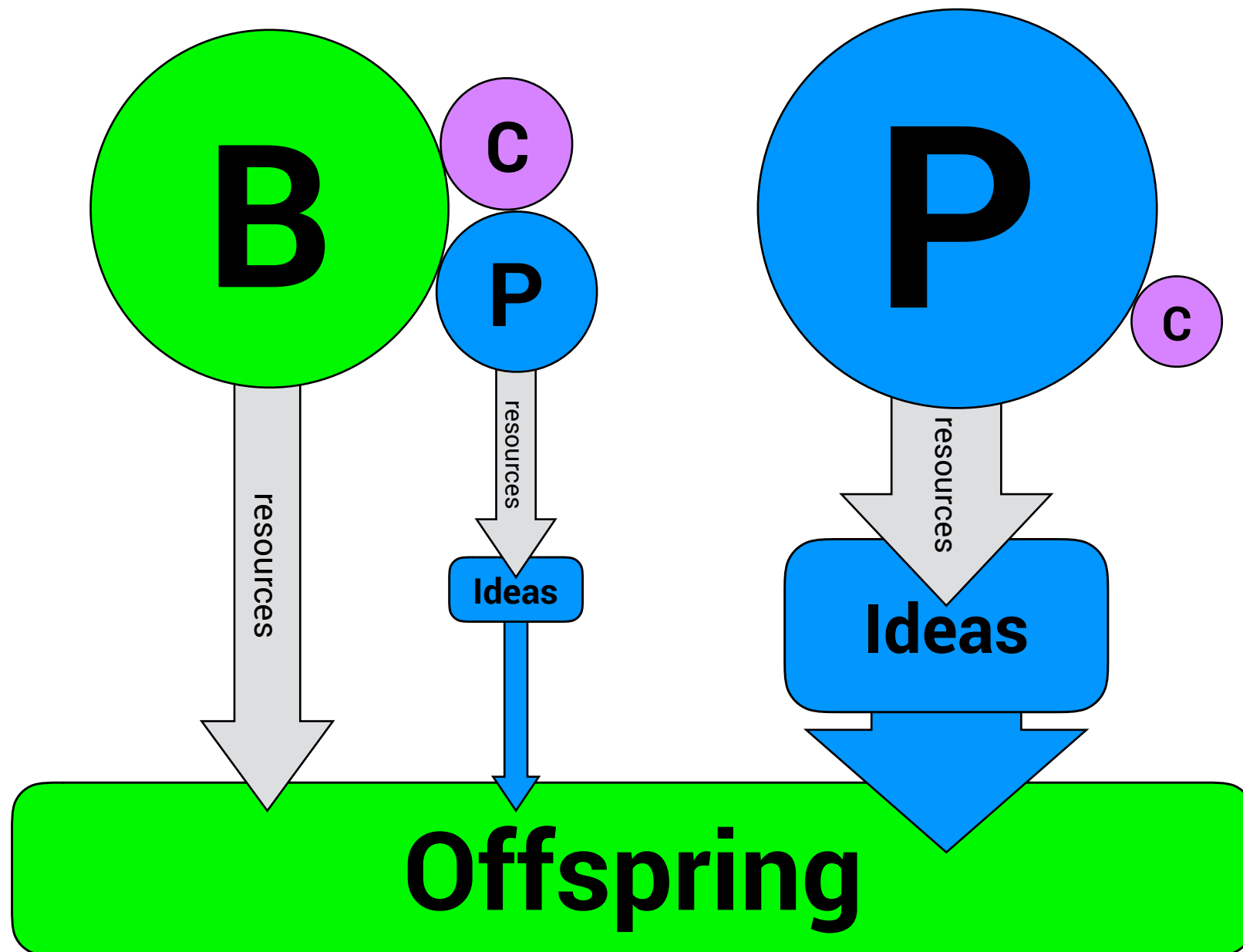


*incomplete
interdependence*

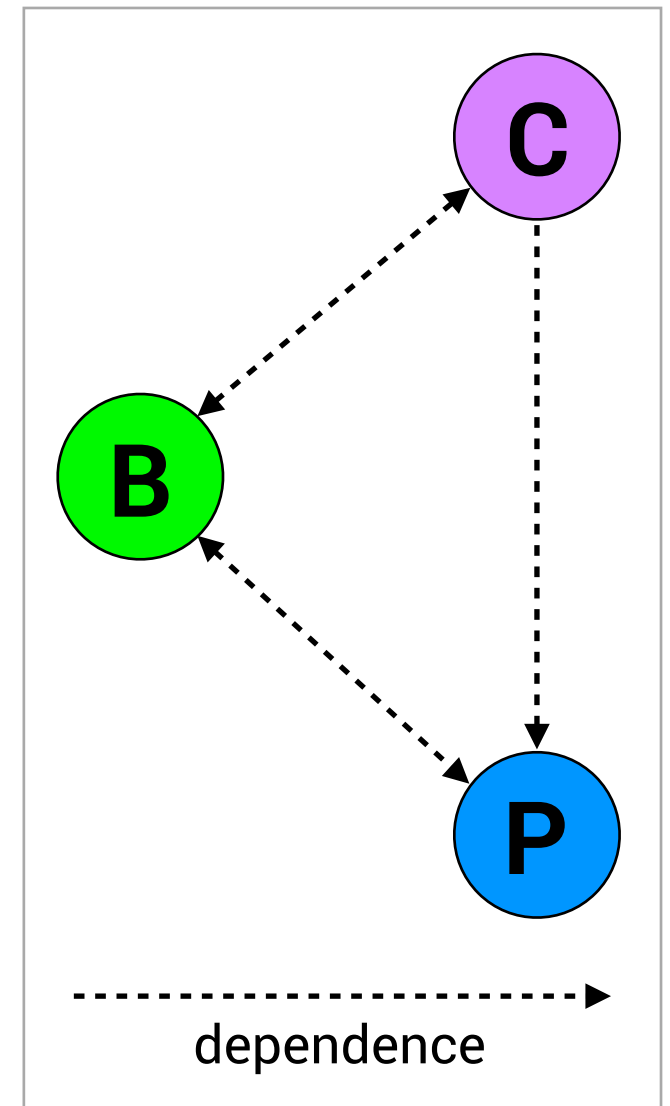


The *Biocultural Paradox*: Who's exploiting whom?

Breeders vs. propagators vs. creators



*incomplete
interdependence*

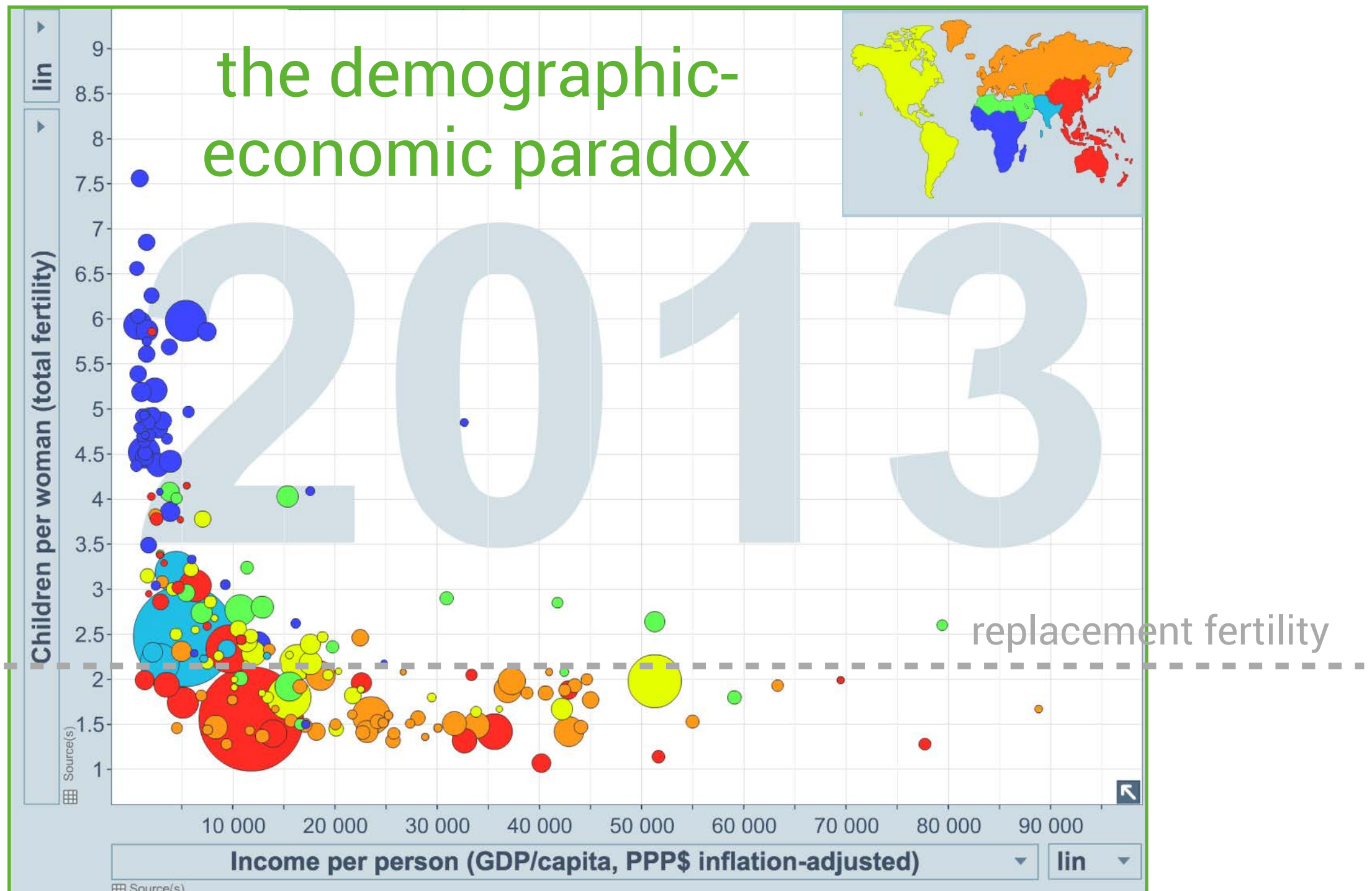


The *Biocultural Paradox*: Potential conflict

Who's breeding?

Are the dramatic variations in reproductive success we see between and within human populations genetically heritable?

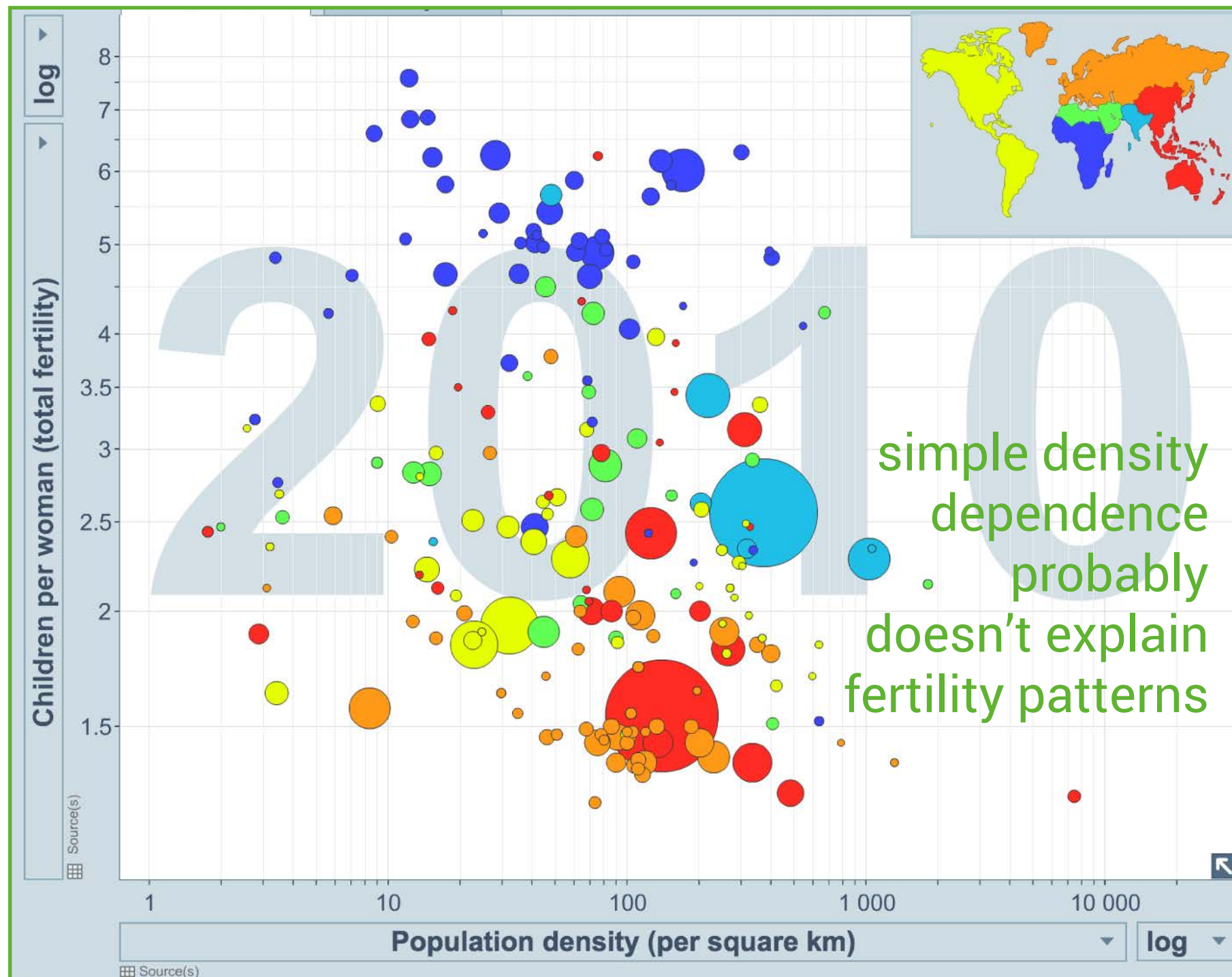
Who's breeding?



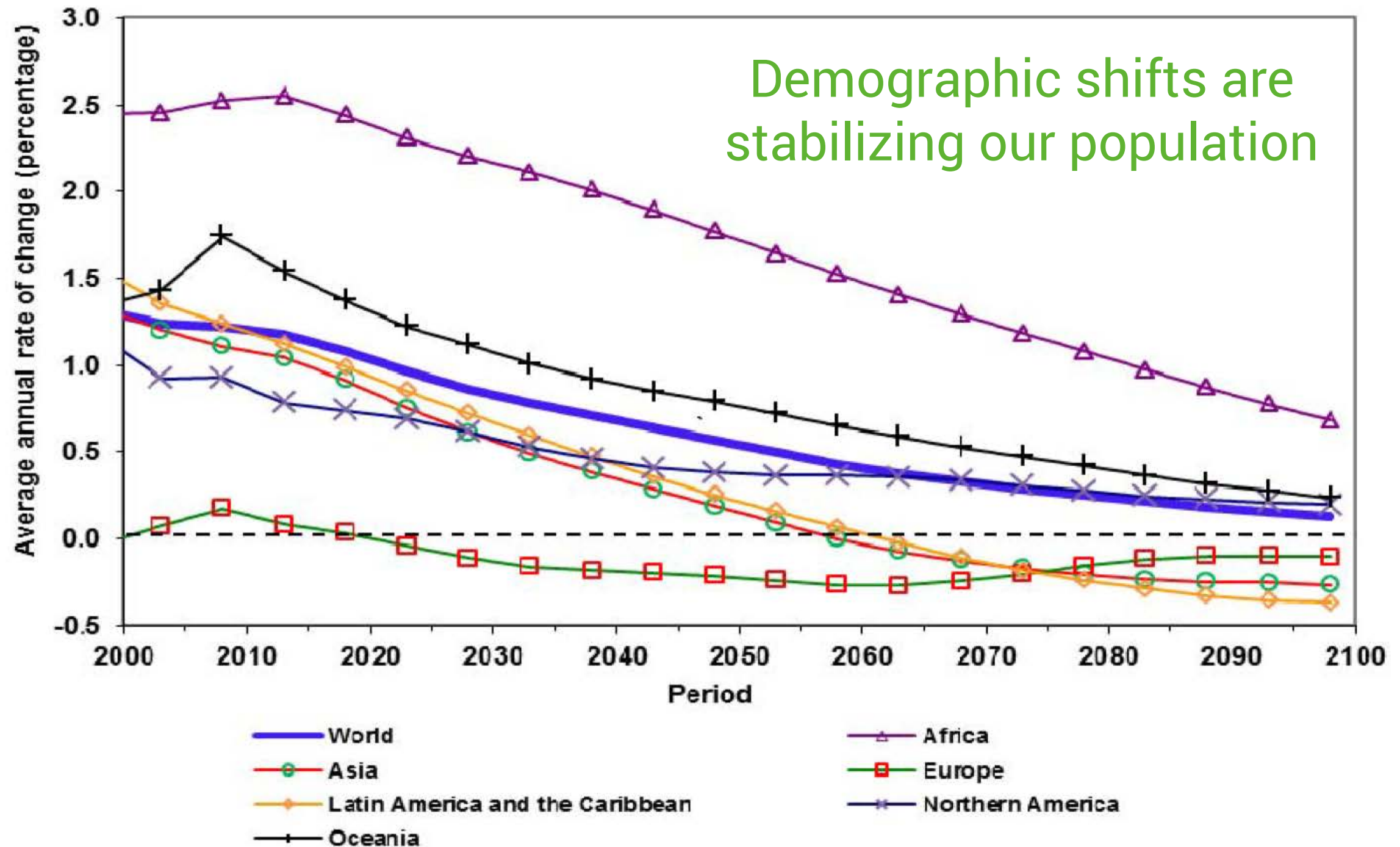
Who's breeding?

Region	Children per Woman 2005-2010	Children per Woman 2010-2015
Africa	4.90	4.70
Asia/Oceania	2.30	2.20
Latin America & the Caribbean	2.30	2.15
North America	2.00	1.86
Europe	1.55	1.60

Who's breeding?



Who's breeding?



Who's breeding?

Within-population variation may have a more significant effect on biological evolution

National Health
Statistics Reports

Like continental
data, these
trends don't
confirm any sort
of genetic
selection

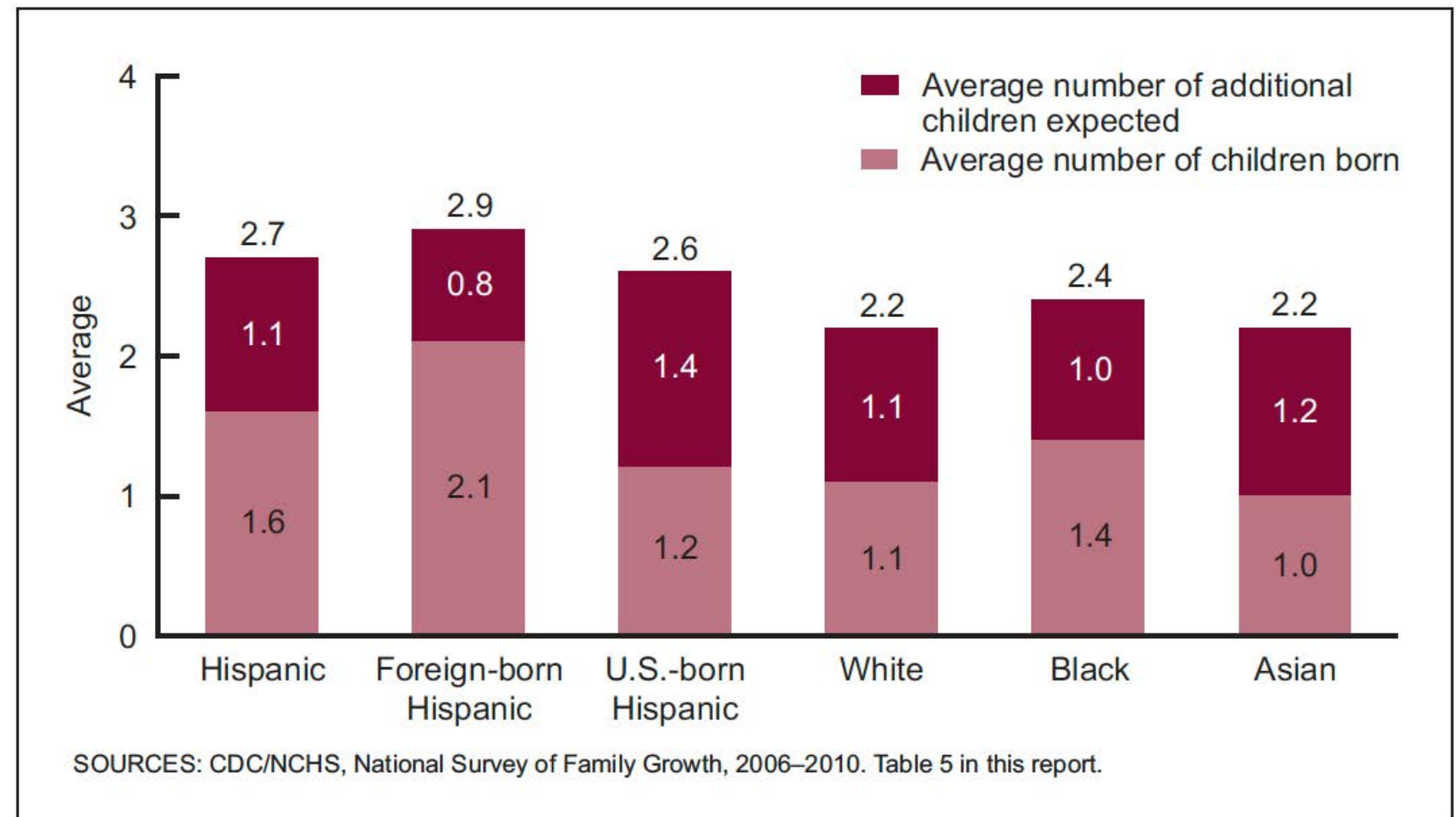


Figure 2. Average number of children born, additional children expected, and total births expected for women aged 15–44 years, by Hispanic origin and race: United States, 2006–2010

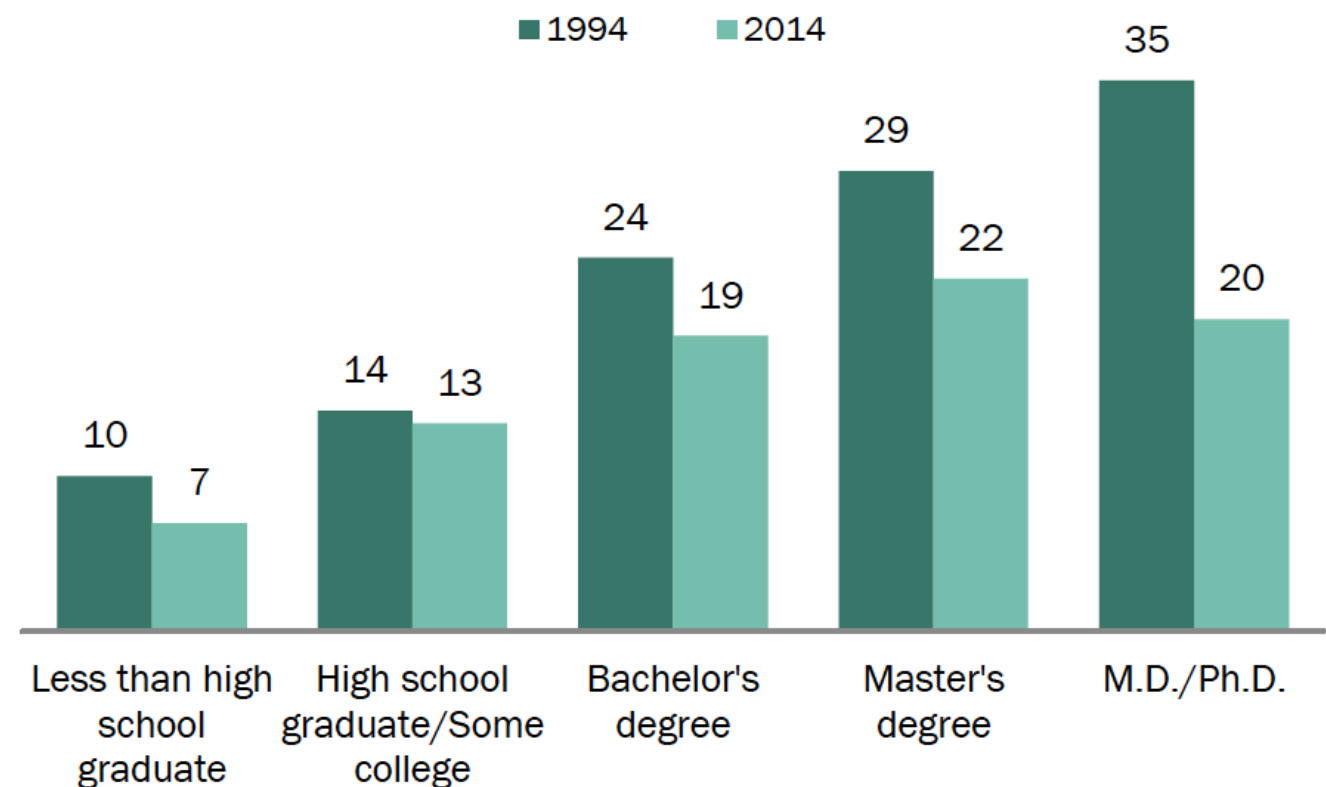
Who's breeding?

Within-population variation may have a more significant effect on biological evolution

Pew Research Center

For the Highly Educated, Dramatic Declines in Childlessness

% of women ages 40 to 44 who are childless



Educational attainment is becoming less predictive of fertility

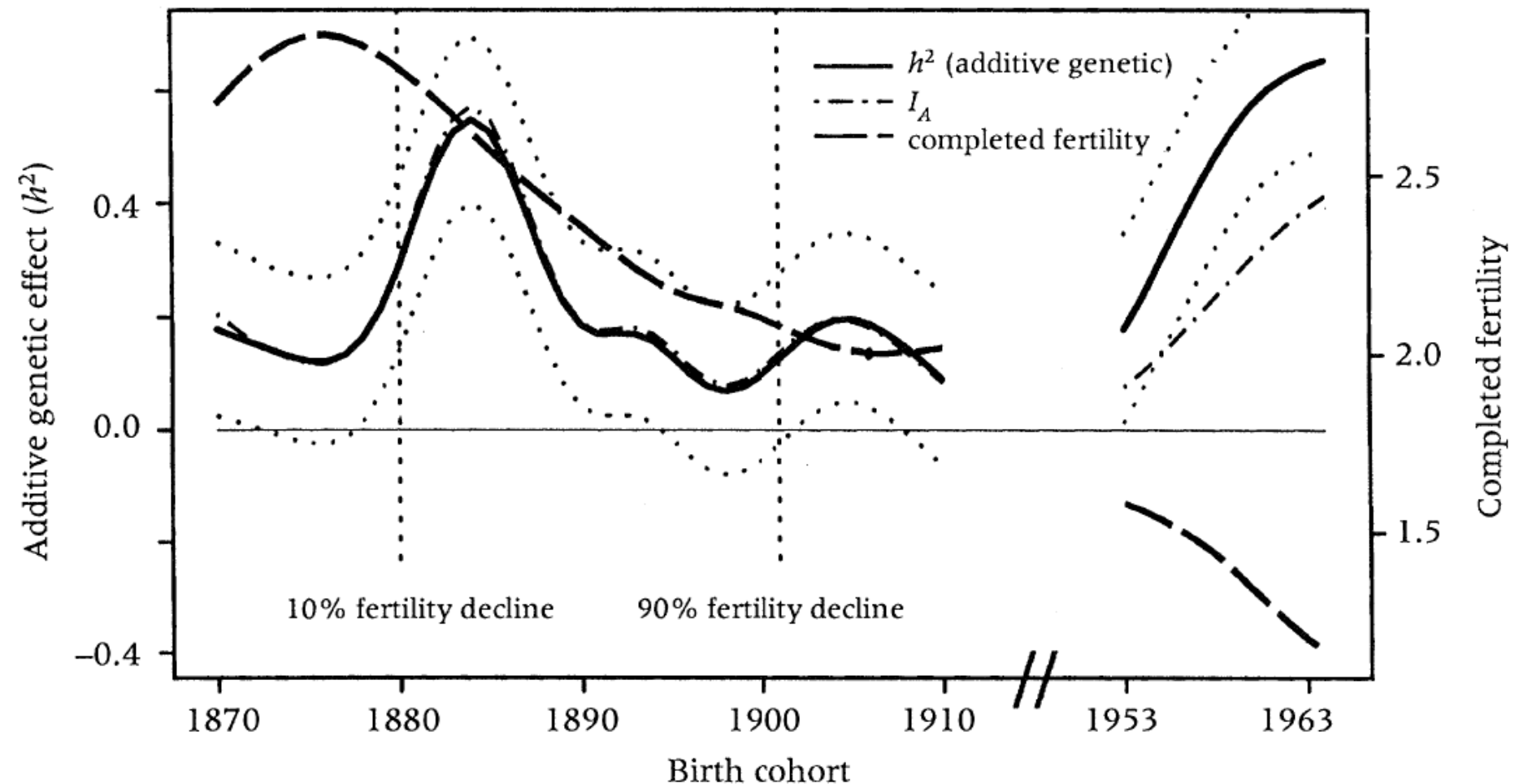
Who's breeding?

Within-population variation may have a more significant effect on biological evolution

Is Fertility Behavior in Our Genes? Findings from a Danish Twin Study

HANS-PETER KOHLER
JOSEPH L. RODGERS
KAARE CHRISTENSEN

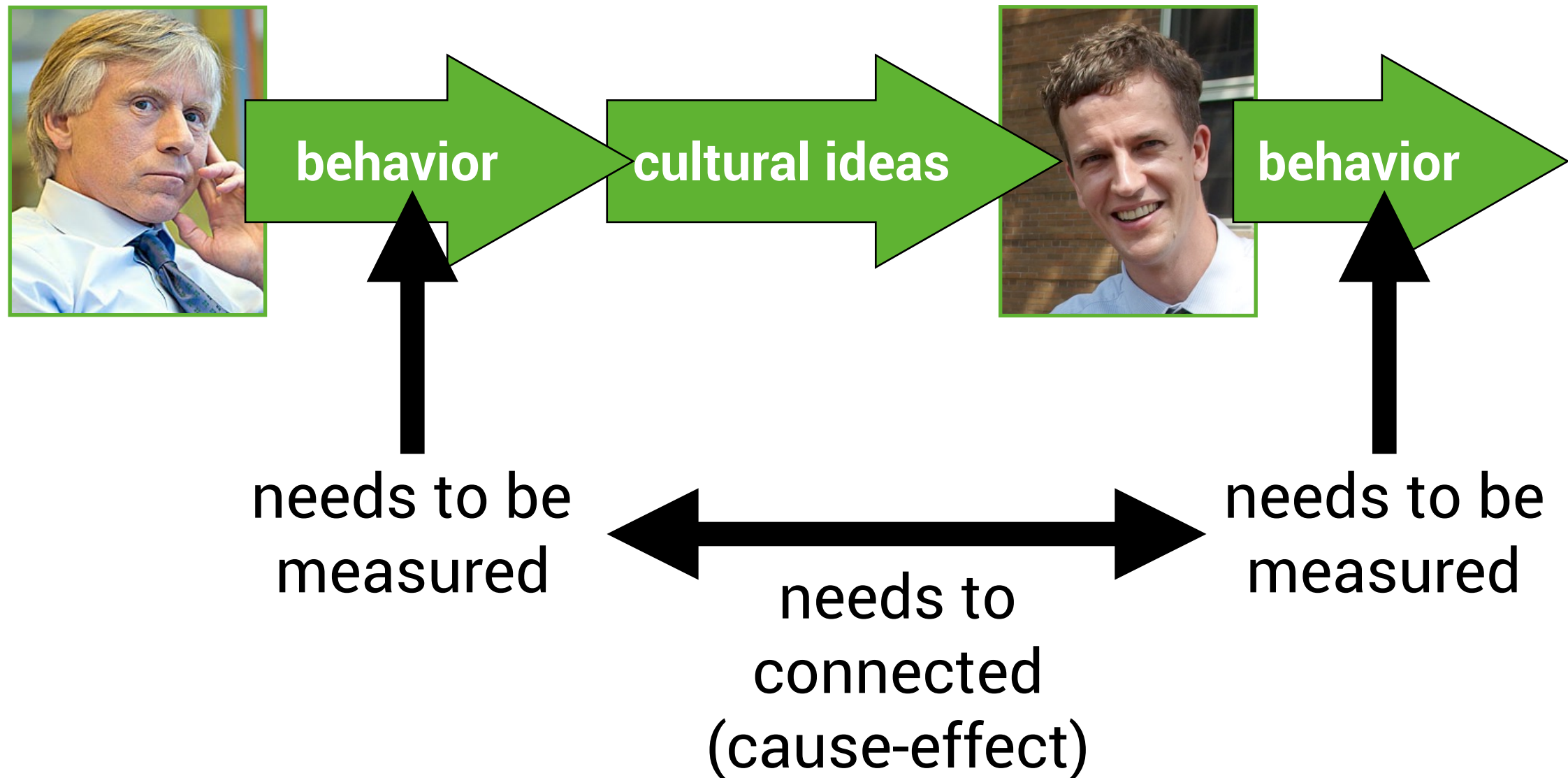
"We argue that genetic influences on fertility are most relevant when the number of children results from a deliberate and conscious decision, and when social norms and economic conditions allow a relatively broad range of life-course alternatives."



Heritability of female fertility increases as overall fertility declines

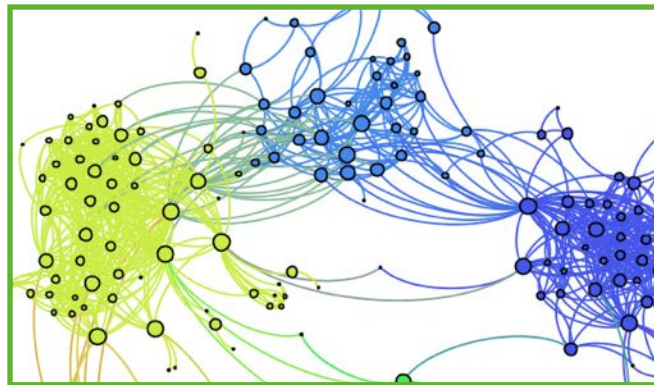
Who's propagating?

"Cultural fitness" is not easy to measure



Who's propagating?

What are some reasonable proxies for “cultural fitness”?



Social connection defines the potential for propagation, so looking at social networks is a good start



Change in population prevalence of a behavior whose origin is known



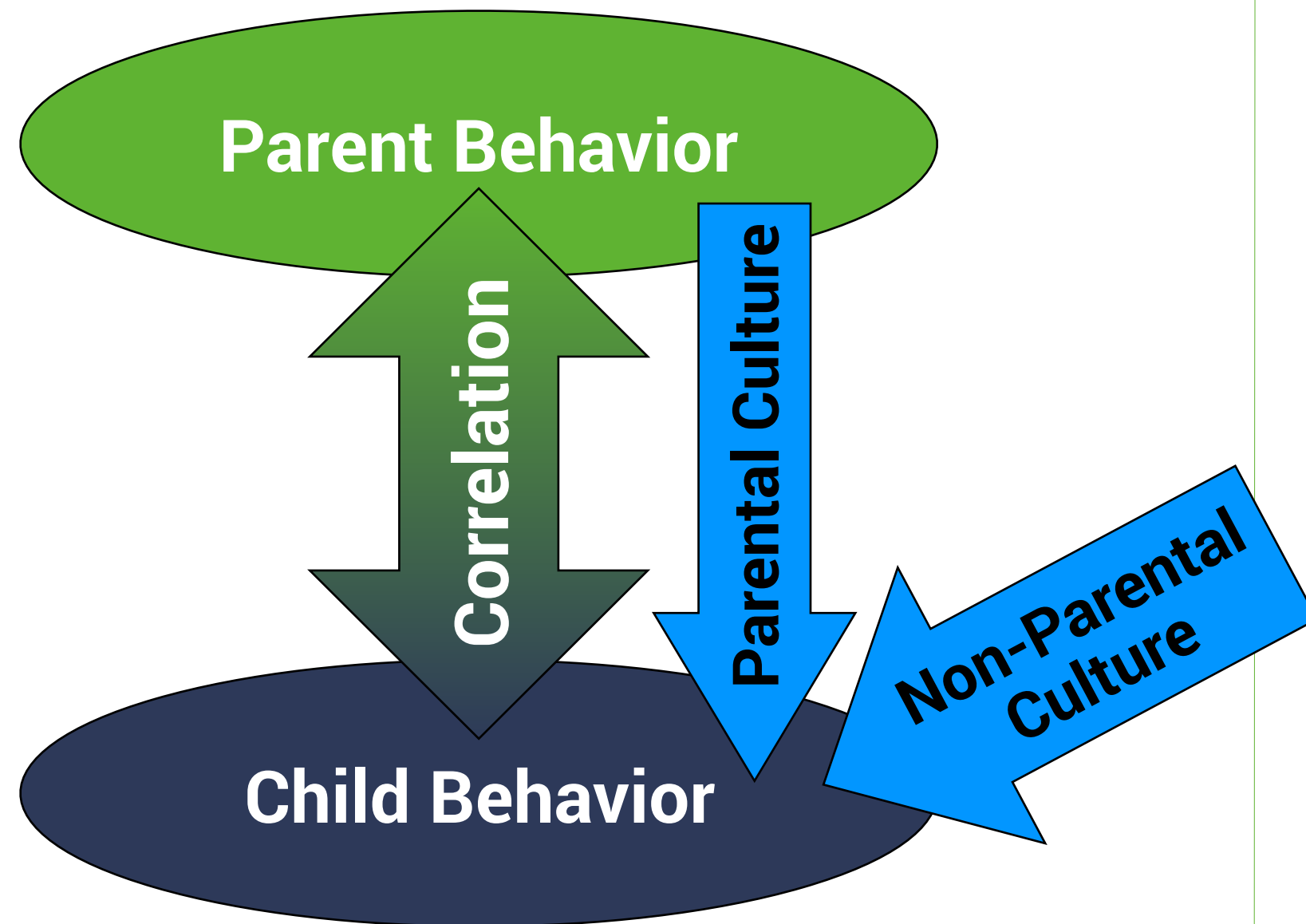
Patterns of change in behavior - evidence of “net export” of culture

Breeding & parenting to propagate

How effectively do parents propagate culture?

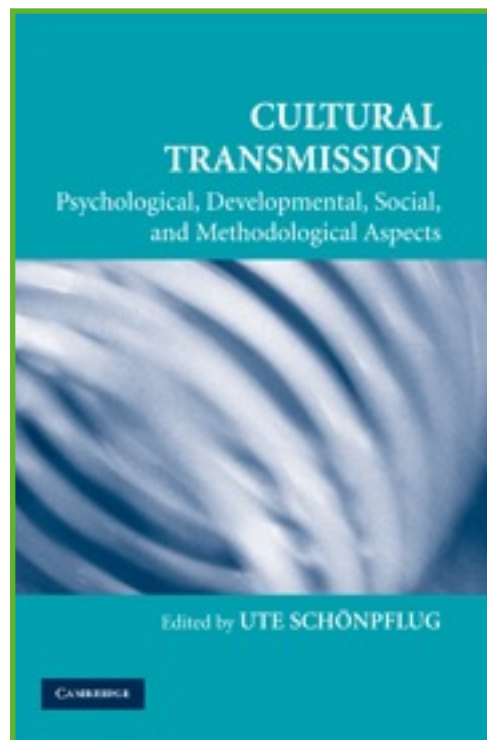
Parent- Offspring Correlation

*Similarity of
behaviors assumed
to be a good proxy
for vertical cultural
transmission*



Breeding & parenting to propagate

How effectively do parents propagate culture?



- ★ affluence and educational are correlated with reduced intensity of family ties
- ★ variations in parental values and behaviors influence the intensity of vertical transmission
- ★ variation in orientation towards youth versus adults influences correlation of parent and offspring cultural values
- ★ parent-offspring cultural correlations tend to be higher among cultural minorities

But, many of the significant correlations are relatively small, rare, and scattered in these studies

Breeding & parenting to propagate

Religious beliefs in the United States

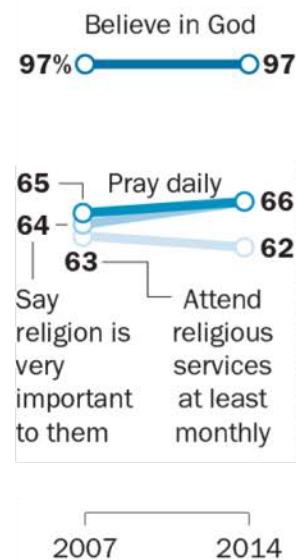
How does religiosity affect fertility?

Importance of Religion	Fertility
Very	2.3
Somewhat	2.1
Not	1.8

How the U.S. Public Became Less Religious

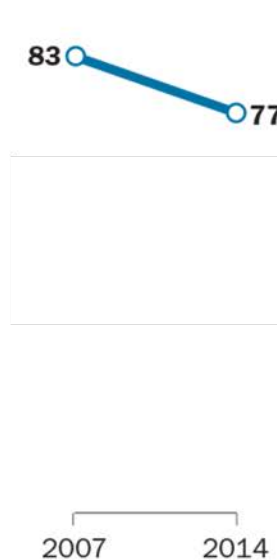
As of 2014, the religiously affiliated are, by and large, about as religious as they were in 2007 ...

Among the religiously affiliated



... but the percentage of adults who describe themselves as religiously affiliated has shrunk.

% of adults who are religiously affiliated



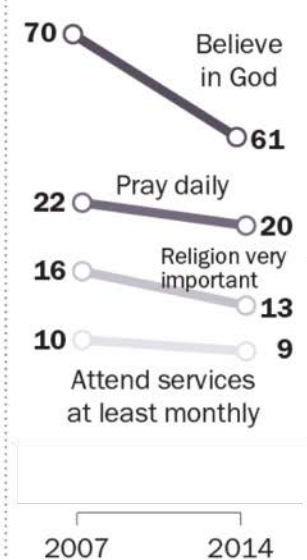
At the same time, the percentage of adults who are religiously unaffiliated has jumped about 7 points ...

% of adults who are religiously unaffiliated



... and the "nones" have become even more secular in their beliefs and practices.

Among religiously unaffiliated



The **net result** is an overall U.S. adult population that has become slightly less religious.

Among all U.S. adults



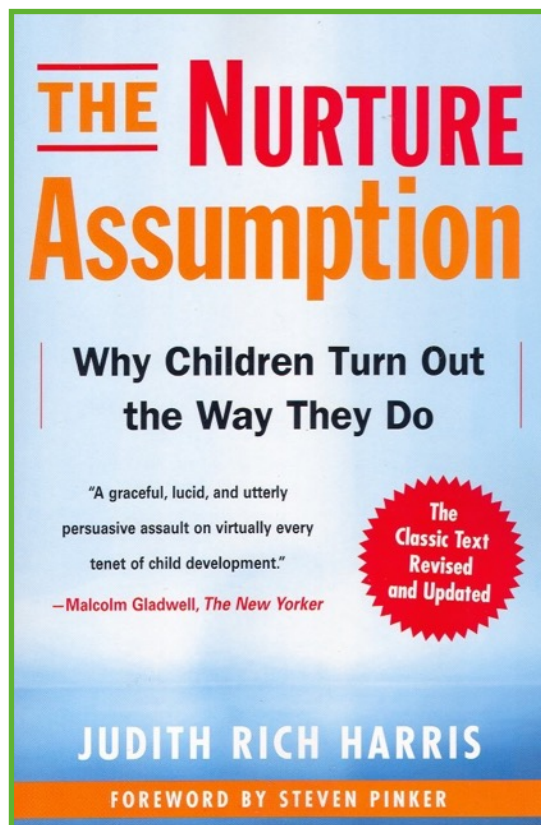
Source: 2014 Religious Landscape Study, conducted June 4-Sept. 30, 2014.

PEW RESEARCH CENTER

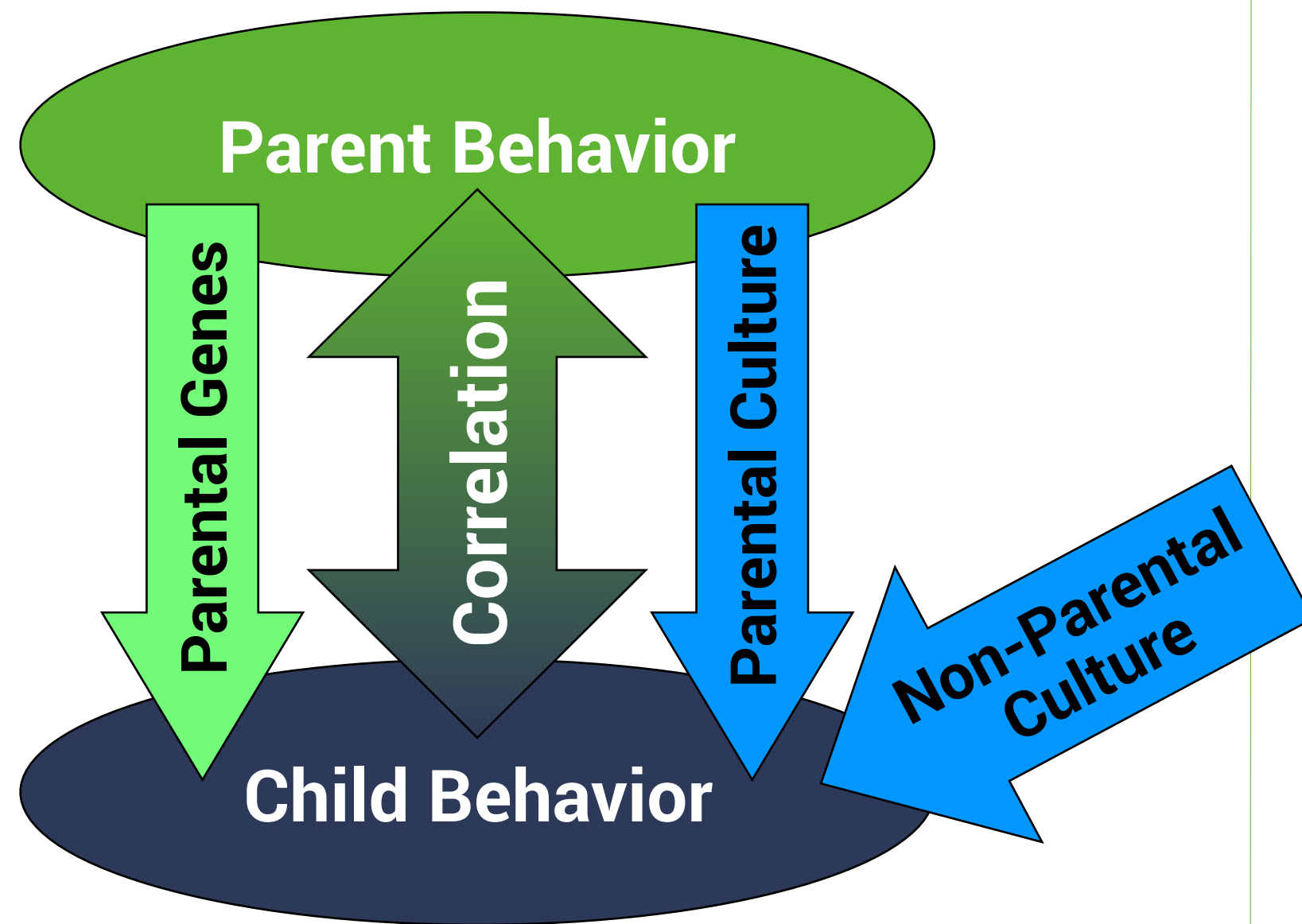
Breeding & parenting to propagate

How effectively do parents propagate culture?

Parents vs. Peers?



Need for twin studies that unravel the influence of genes from home environment from non-home environment...



Breeding & parenting to propagate

How effectively do parents propagate culture?

Values in Middle Childhood: Social and Genetic Contributions

Florina Uzefovsky^{1,2}, Anna K. Döring³ and Ariel Knafo-Noam¹

¹The Hebrew University

²University of Cambridge

³University of Westminster

Abstract

Theories of value development often identify adolescence as the period for value formation, and cultural and familial factors as the sources for value priorities. However, recent research suggests that value priorities can be observed as early as in middle childhood, and several studies, including one on preadolescents, have suggested a genetic contribution to individual differences in values. In the current study, 174 pairs of monozygotic and dizygotic seven-year-old Israeli twins completed the Picture-based Value Survey for Children (PBVS-C). We replicated basic patterns of relations between value priorities and variables of socialization—gender, religiosity, and socioeconomic status—that have been found in studies with adults. Most important, values of Self-transcendence, Self-enhancement, and Conservation, were found to be significantly affected by genetic factors (29 percent, 47 percent, and 31 percent, respectively), as well as non-shared environment (71 percent, 53 percent, and 69 percent, respectively). Openness to change values, in contrast, were found to be unaffected by genetic factors at this age and were influenced by shared (19 percent) and non-shared (81 percent) environment. These findings support the recent view that values are formed at earlier ages than had been assumed previously, and they further our understanding of the genetic and environmental factors involved in value formation at young ages.

Influence of “non-shared” environment

Breeding & parenting to propagate

How effectively do parents propagate culture?

RESEARCH REPORT

The role of genes in tobacco smoking during adolescence and young adulthood: a multivariate behaviour genetic investigation

Victoria M. White¹, John L. Hopper², Alexander J. Wearing³ & David J. Hill¹

Centre for Behavioural Research in Cancer, The Cancer Council Victoria, Victoria, Australia¹, Department of Genetic Epidemiology, University of Melbourne, Parkville, Victoria, Australia² and Department of Psychology, University of Melbourne, Parkville, Victoria, Australia³

“peers, and not parents, have the major role in influencing the smoking behaviours of adolescents”

Who cares?

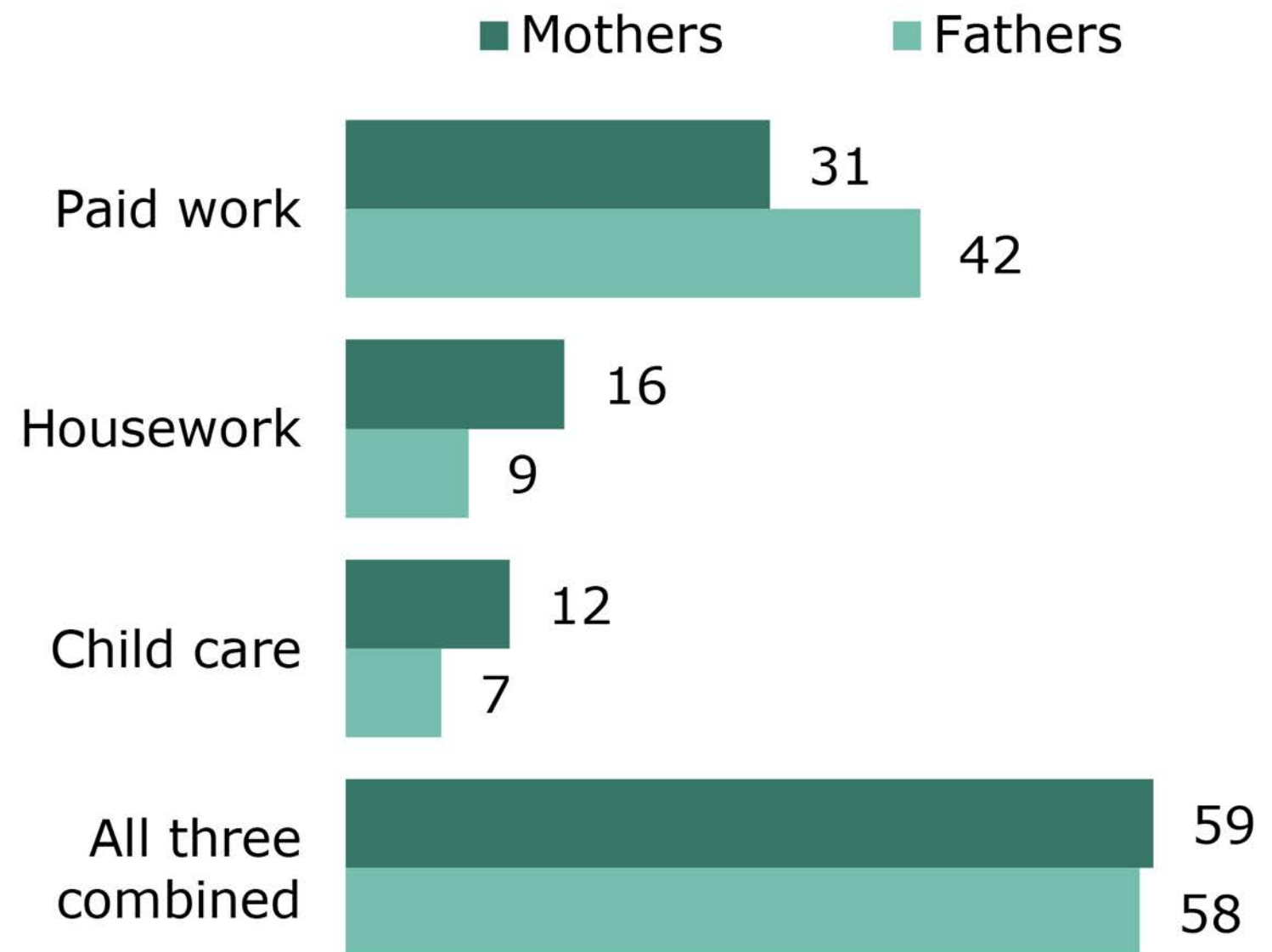
Why does it matter whether parental or non-parental culture exerts a stronger influence on future generations?

Breeders vs. propagators vs. creators

Parenting is “expensive”

How dual-income parents divide their time in the United States

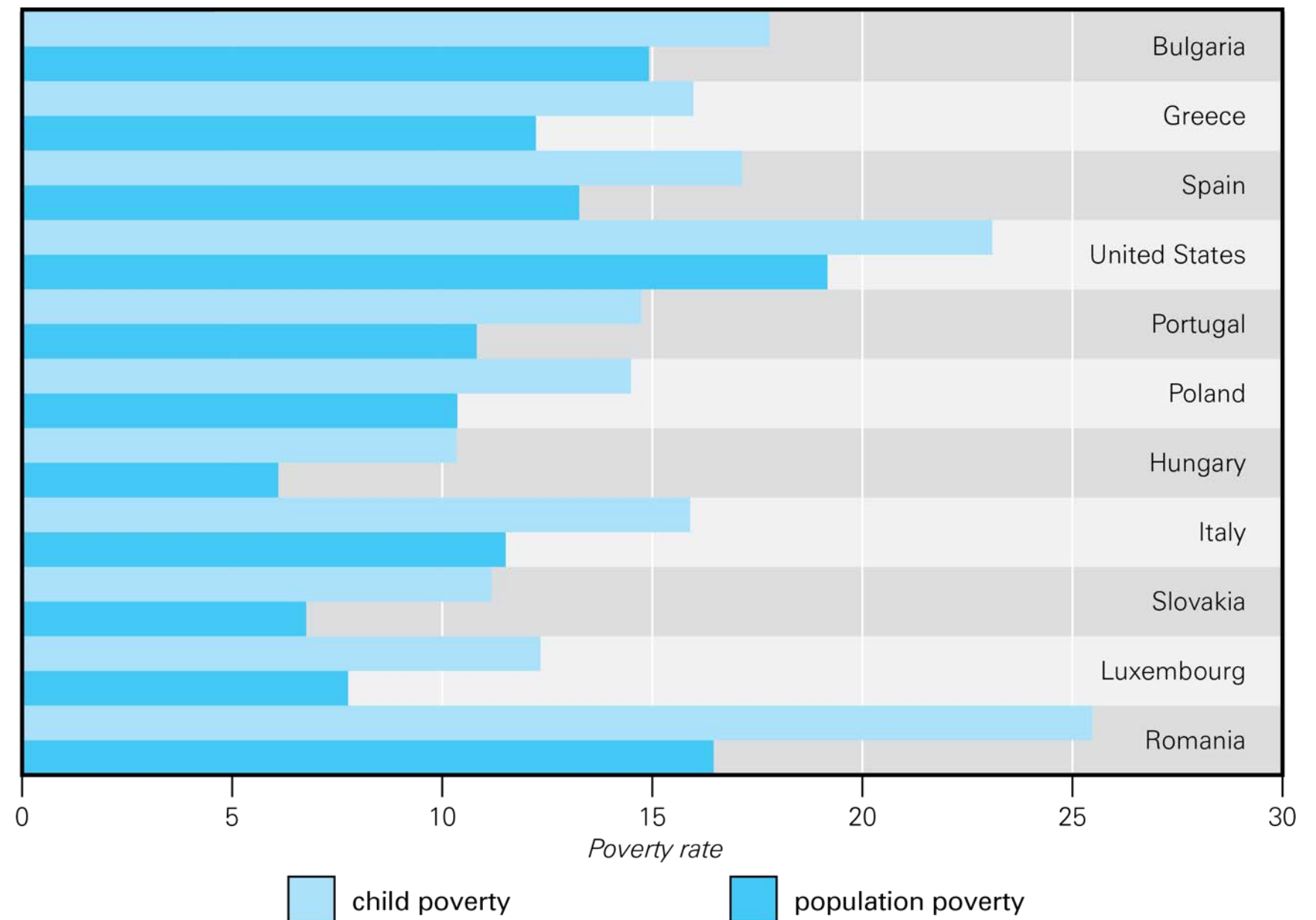
(hours per week)



Breeders vs. propagators vs. creators

We aren't devoting our resources to children

In 25 of 35 developed countries, children experience higher poverty rates than the general population



Breeders vs. propagators vs. creators

We aren't devoting our resources to children

Globally:

20% poverty
rate overall



45% child
poverty rate



poverty line

1 in 5 people over poverty line are children

1 in 3 people under poverty line are children

Who cares?

Why we need to better understand the nature of our breeding, propagating, and creating

- ★ If there's a conflict between genetic and cultural evolution in our societies, that conflict is likely to manifest itself as a variety of social problems
- ★ We don't know how sustainable our current culture is... especially if there is a meaningful difference between who does and does not produce offspring

Thoughts or questions?

www.cxjj.us