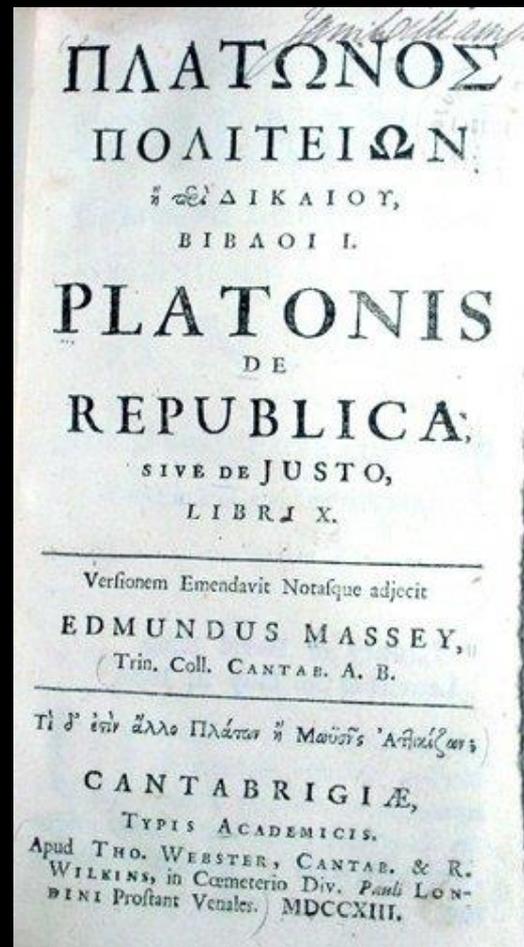


Hawk-Dove and “Rights”

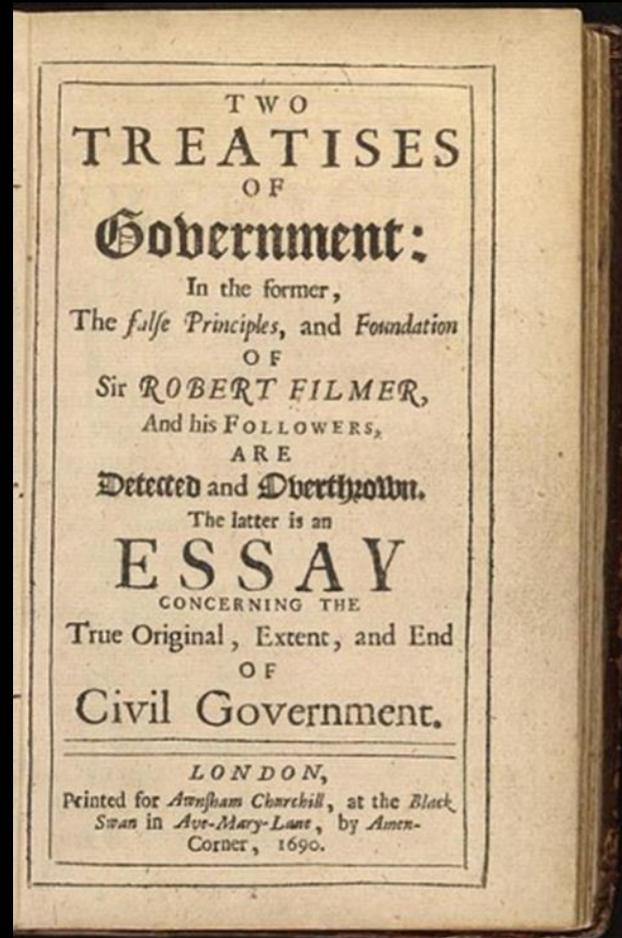
Recall:

Where do “rights” come from?

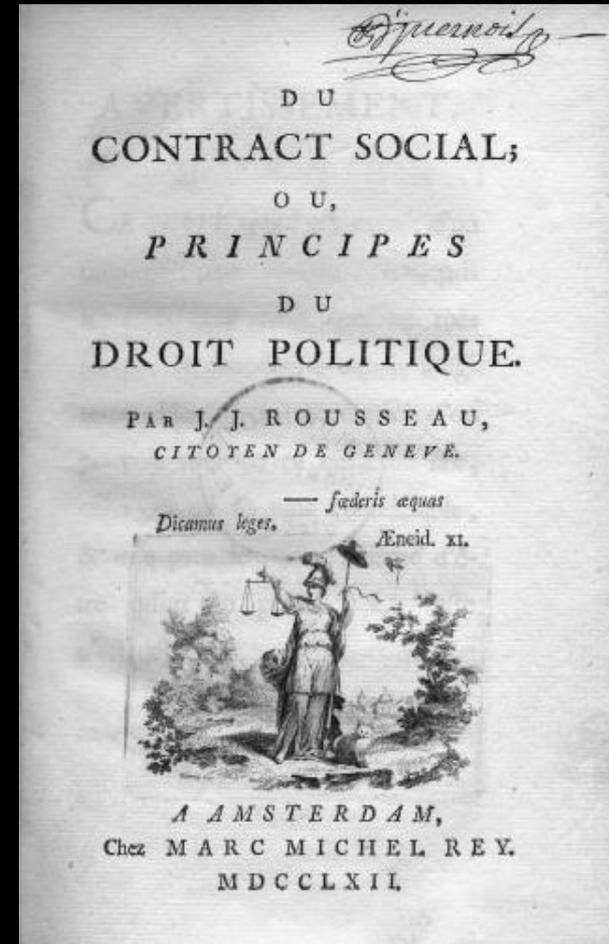
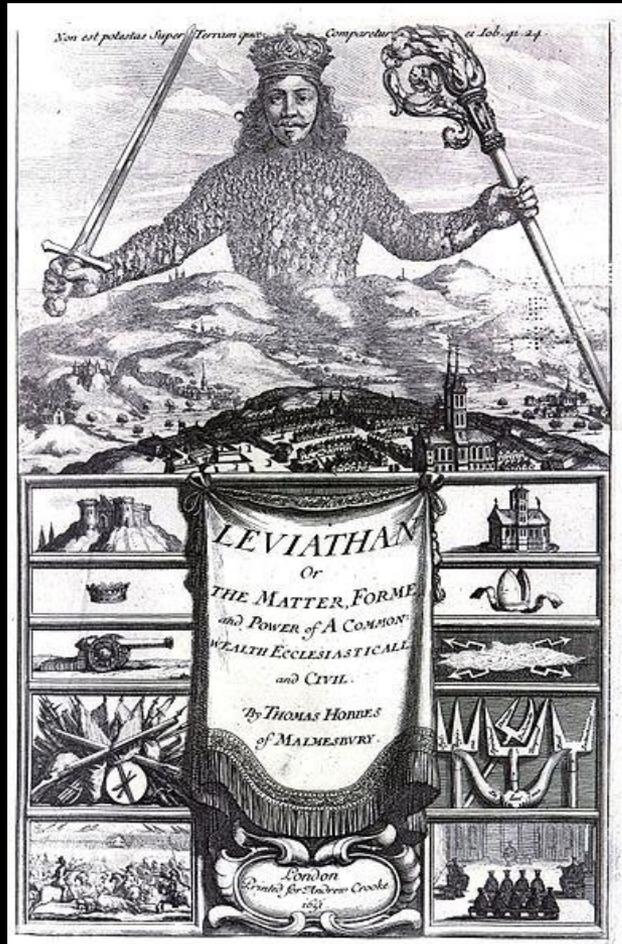
Might?



The “state of nature”?



A “social contract”?



What does this mean?

Where **DO** rights come from?

We will explain using the Hawk-Dove game

First, let us discuss a related phenomena in animals

(recall, our “parsimony” argument: if we see similar phenomena in animals, probably same cause)

Territoriality:

Animal more likely to behave aggressively to defend a resource (land, mate, food) if arrived at first

Even if arriving first doesn't affect value of resource, or likelihood of winning combat

Why would it matter if got there first?

Will explain using (extension of) Hawk-Dove
Game

Recall: Hawk Dove Game

	Hawk	Dove
Hawk	$\frac{v-c}{2}$	v
Dove	0	$\frac{v}{2}$

- Object worth v
- Cost of fighting c
- Get object if only H
- O.W.split
- $C > V > 0$

Image by MIT OpenCourseWare.

(except this time only pay c if lose, and only shows payoff for player 1)

Now extend this game as follows:

Assume that can play “hawk if arrived first”
(bourgeois)

Assume that randomly determined before each
encounter who “arrived first”

	Hawk	Dove	Bourgeois
Hawk	$\frac{v-c}{2}$	v	$\frac{3v-c}{4}$
Dove	0	$\frac{v}{2}$	$\frac{v}{4}$
Bourgeois	$\frac{v-c}{4}$	$\frac{3v}{4}$	$\frac{v}{2}$

Image by MIT OpenCourseWare.

If play B and other plays H, half the time you arrive first, and both play hawk
 And get $(v-c)/2$, otherwise he arrives first and you play dove and he plays hawk,
 So get 0.

	Hawk	Dove	Bourgeois
Hawk	$\frac{v-c}{2}$	v	$\frac{3v-c}{4}$
Dove	0	$\frac{v}{2}$	$\frac{v}{4}$
Bourgeois	$\frac{v-c}{4}$	$\frac{3v}{4}$	$\frac{v}{2}$

Image by MIT OpenCourseWare.

- (B, B) is **only “symmetric” pure Nash**. (will prove in homework)
- Symmetric = where both players do same. (makes sense when both drawn from single population).
- In fact, you will show in computer simulations that **evolutionary process** leads to (B,B) regardless of starting position.

Thus, we expect animals to **pay attention to who arrived first!**

Even if arriving first has NO impact on value of resource or likelihood of winning combat

Disclaimer:

We could ALSO have written model where play **Hawk if arrive second**.

Play Hawk if second would be **unique symmetric equilibrium** in that game as well.

But we **don't ever observe** Hawk if arrive second. Why not?

Would make a good **Final project**.

Uncorrelated asymmetry:

Difference between the two players that doesn't (directly) impact payoffs

e.g. “who arrived first”

e.g. “who has darker skin”

Open questions:

Which uncorrelated asymmetries **can** (in theory) dictate who plays hawk?

Which uncorrelated asymmetries in practice **do** (empirically) dictate who plays hawk?

Now we will present evidence that H-D-B game explains animal territoriality

Wood speckled butterflies mate in sunspots in
the forest

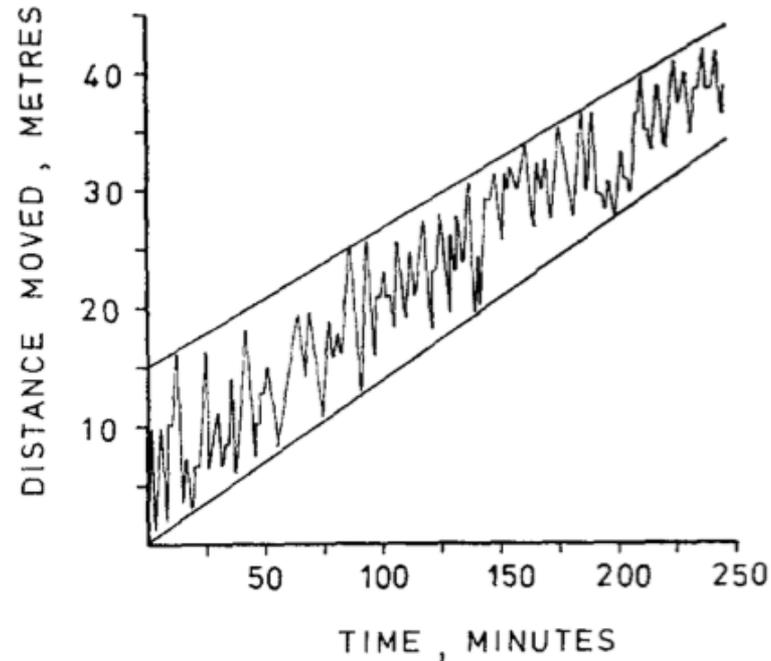


Fig. 3. The behaviour of a territorial male observed continuously for 240 min. The straight lines indicate the boundaries of the sunspot. During the observation period, the sunspot moved a distance of 30 m, as the sun travelled across the sky. It also decreased in size. The continuous zig-zag line indicates flights by the butterfly. For the sake of clarity, the 62 short flights of < 2 m have not been included. Note how the butterfly spends all the time within the sunspot boundary, faithfully following its travel across the woodland floor.

Courtesy of Elsevier, Inc., <http://www.sciencedirect.com>. Used with permission.

Males patrol these sunspots

Table III. Sunspots Versus the Tree Canopy above. The Number of Females see in a 7·5-h watch

	Sunspot	Tree canopy
No. of males	1	5
No. of females	22	5
No. of courtships	4	1
No. of courtships per male	4·0	0·2

Courtesy of Elsevier, Inc., <http://www.sciencedirect.com>. Used with permission.

And wait for females to come by

Table I. Behaviour of Males in Sunspots. They Perch on Prominent Vegetation and Sally out to Inspect Passing Objects. How They Behave Depends on the Identity of These Objects

Passing object	No. of occasions		
	Spiral flight	Courtship	Inspect and ignore
Male speckled wood	384	—	—
Female speckled wood	—	94	—
Another species of butterfly*	—	—	66
Another insect†	—	—	35

Courtesy of Elsevier, Inc., <http://www.sciencedirect.com>. Used with permission.

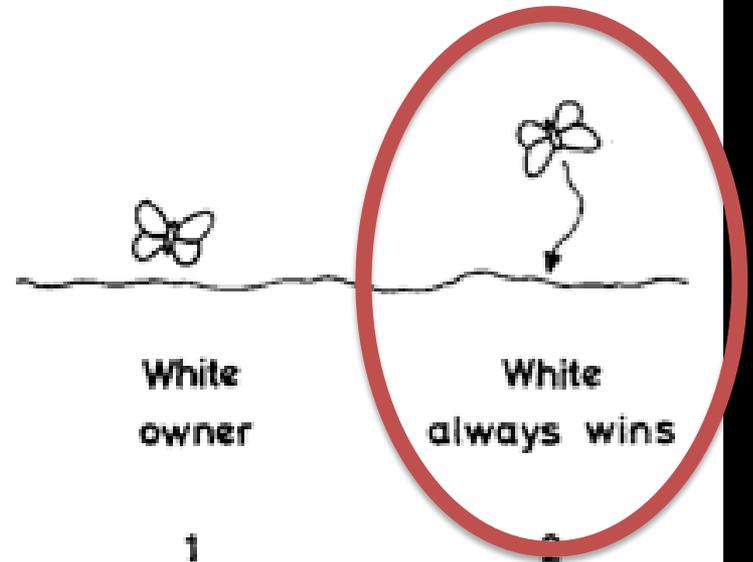
Source: Davies 1978

Spiral flight is symbolic:

Lasts <5 secs

Neither male is hurt

Original owner always wins



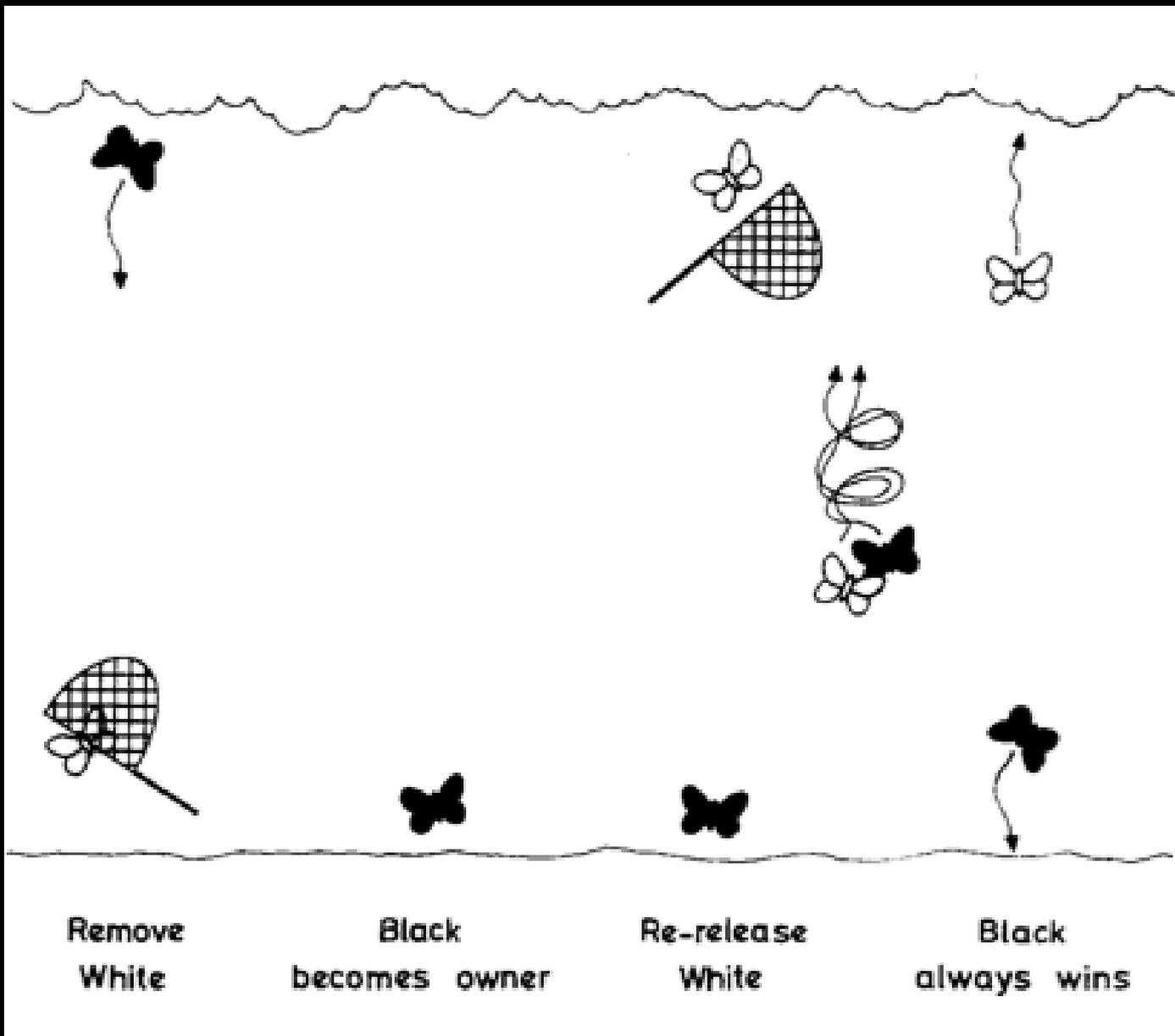
Why don't the butterflies *actually* fight over spots?

Life is short (c is high)
and spots are abundant (v is low)

So $v < c$

B is equilibrium of this H-D-B game

How can we be sure this isn't driven by some kind of home court advantage?



© Elsevier. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <http://ocw.mit.edu/help/faq-fair-use/>.

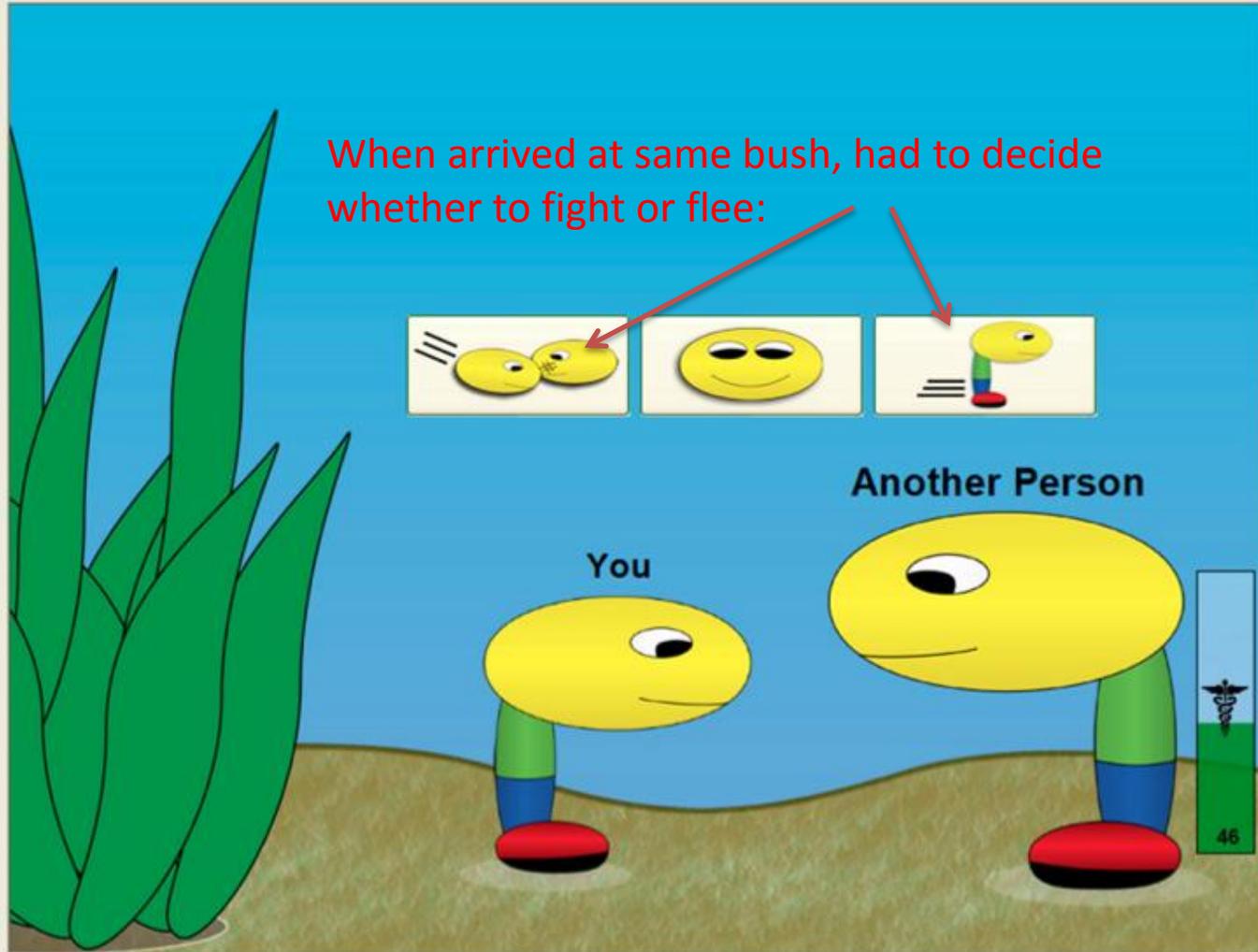
What does this have to do with humans?

In an experiment, humans did the same thing as
the butterflies

Multiple players simultaneously played a
computer game

To stay alive, had to find berries in bushes

Client 1



Health Points



46

Bonus Berries

0

Earnings per Minute

\$0.58

Earnings

\$3.76

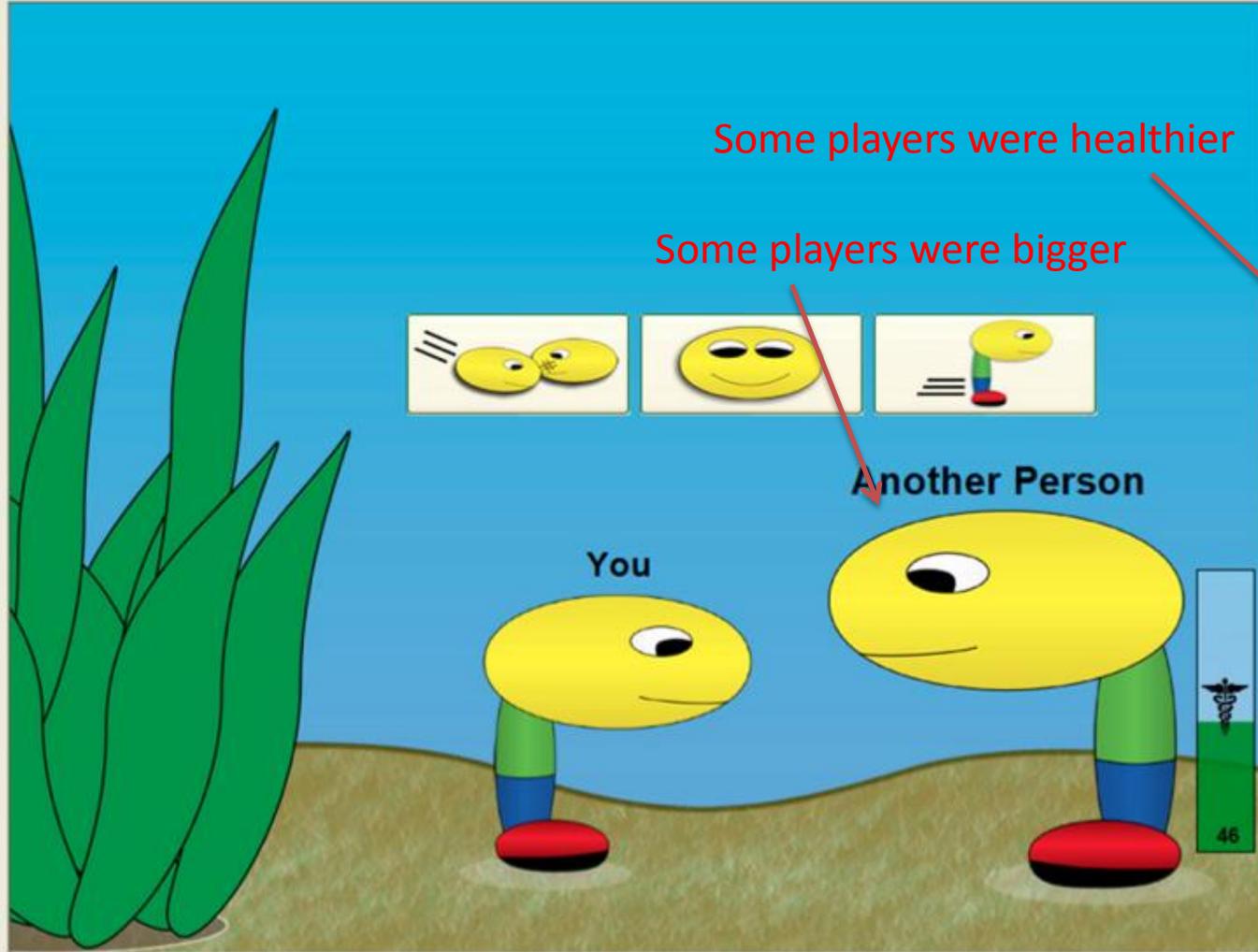
Period 5 Time Remaining 00:36

Courtesy of Elsevier, Inc., <http://www.sciencedirect.com>. Used with permission.

	Hawk	Dove	Bourgeois
Hawk	$\frac{v-c}{2}$	v	$\frac{3v-c}{4}$
Dove	0	$\frac{v}{2}$	$\frac{v}{4}$
Bourgeois	$\frac{v-c}{4}$	$\frac{3v}{4}$	$\frac{v}{2}$

Image by MIT OpenCourseWare.

Client 1



Health Points



46

Bonus Berries

0

Earnings per Minute

\$0.58

Earnings

\$3.76

Period

5

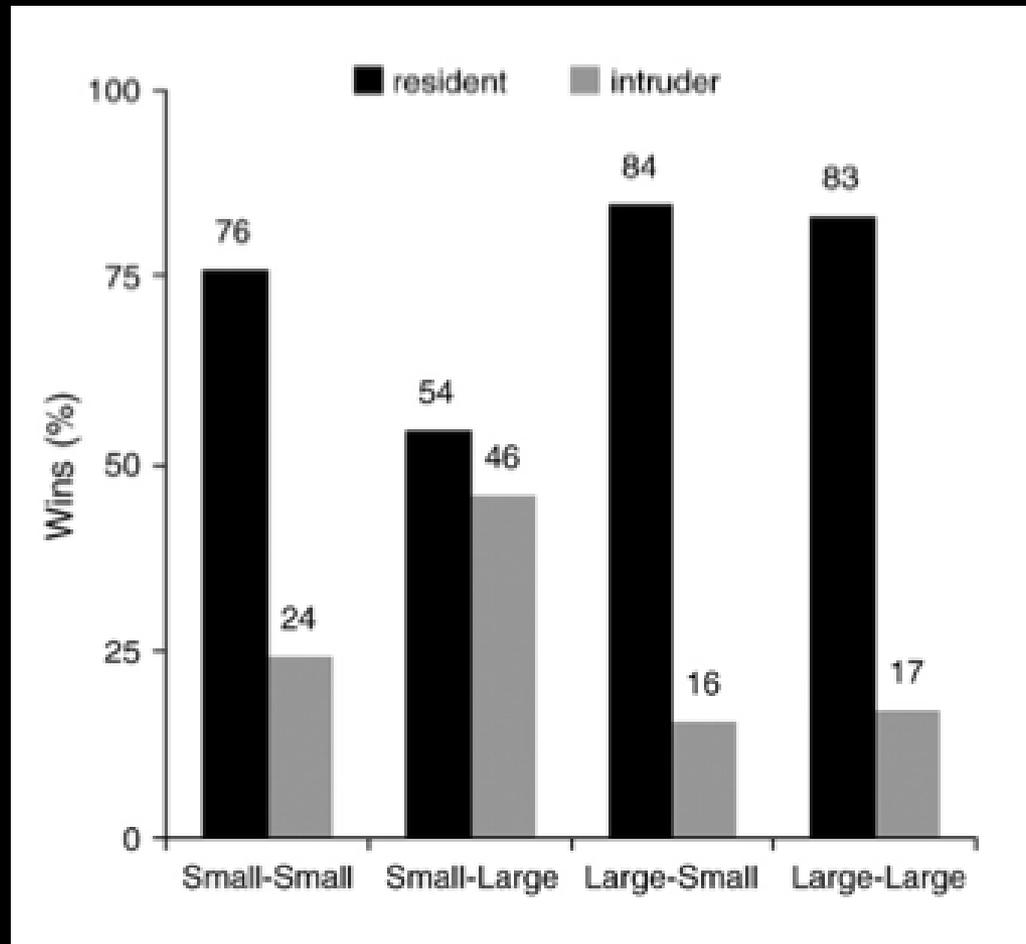
Time Remaining

00:36

Courtesy of Elsevier, Inc., <http://www.sciencedirect.com>. Used with permission.

And some simply arrived first

Turns out, this matters most:



Courtesy of Elsevier, Inc., <http://www.sciencedirect.com>. Used with permission.

Table 2
Patchy condition: green vs. brown shrubs

	Green		Brown		<i>t</i>	<i>p</i>
	Mean	S.D.	Mean	S.D.		
Time/interaction (s)	4.60	5.56	2.10	1.99	6.78	<.001
Smiles/interaction	2.43	4.61	0.93	1.60	4.89	<.001
Strikes/interaction	0.50	1.25	0.11	0.05	5.48	<.001
	%	<i>p</i> ^a	%	<i>p</i> ^a	χ^2	<i>p</i>
Resident wins	75.54	<.001	53.42	.33	45.57	<.001
Larger wins ^b	68.66	<.001	58.52	.06	5.09	.024
Healthier wins ^c	69.35	<.001	53.13	.39	21.55	<.001

In the patchy condition, statistics for interactions in green ($n=1014$) and brown ($n=234$) shrubs.

^a The *p* value for the hypothesis test against 50% chance levels.

^b There was a size difference in $n=584$ interactions in green shrubs and $n=178$ in brown shrubs.

^c There was a health difference in $n=995$ interactions in green shrubs and $n=224$ in brown shrubs.

As H-D-B predicts, humans, like butterflies,
attend to who arrived first even with size
difference

“Who got there first?”

is just one example of an uncorrelated
asymmetry

What about in this real-world situation?



Image courtesy of [Joe Shlabotnik](#) on Flickr. CC BY-NC-SA.

Why do you pay? Why not just leave?

If the cabby complains to a cop you can claim you paid in cash? No evidence that you didn't.

If pay with cash, why doesn't the cabby claim you didn't pay even if you did?

You can't complain to a cop—there's no evidence that you paid.

Cabby gets angry if you didn't already pay for the service.

You get angry if you did pay for the service and he claims you didn't.

	Demand payment	Don't insist on payment	Insist if hasn't already paid
Refuse to pay	$\$10-c, \$10-c$	20, 0	$\$10-c, \$10-c$
Agree to pay	0, 20	10, 10	0, 20
Pay if haven't already paid	0, 20	10, 10	0, 20

The uncorrelated asymmetry

Here are some more uncorrelated asymmetries

In a study, subjects were asked to determine who deserved a found object and why for 10 legal cases

Corpus of Ten Finders Cases

CASE	LEGAL CITATION
Hannah v. Peel	Hannah v. Peel, K.B. 509 (1945).
Ferguson v. Ray	Danielson v. Roberts, 44 Ore. 10S, 74 Pac. 913, 914 (1904).
Danielson v. Roberts	Ferguson v. Ray, 44 Ore. 557, 77 Pac. 600 (1904).
Ford v. Sharman	South Staffordshire Water Co. v. Sharman, 2 Q.B 44 (1896).
Goddard v. Winchell	Goddard v. Winchell, N.W. 1124 (1892).
Elwes v. Brigg Gas Co.	Elwes v. Brigg Gas Co., 33 Ch D 562 (1886).
Durfee v. Jones	Durfee v. Jones, 11 R. I. 588 (1877).
McAvoy v. Medina	McAvoy v. Medina, 87 Am. Dec. 733 (1866).
Bridges v. Hawkesworth	Bridges v. Hawkesworth, 21 L.J. Q.B. 75 (1851).
Armory v. Delamirie	Armory v. Delamirie, 1 Sess. Cas. K.B. 505 (1722).

Image by MIT OpenCourseWare.

Commonly stated “why”s:

Who found the lost item

Whose land it was on

Who lost it

Who made it (like John Locke said)

Note that **the red “why”s** don't effect payoffs from keeping the object, and the others often don't either

These are examples of other uncorrelated asymmetries

Also note that behavior in these examples is guided by emotions, and is not strategic or deliberative

We get angry when:

We aren't paid for our services

Someone takes something we made

And we play hawk when we're angry

Behavior in these examples could also be guided
by beliefs / ideologies about what's right

We believe:

If I haven't paid, the cabby is right to demand the money

If I made something, I am right to keep it

And we are willing to play hawk when our rights are violated

And, of course, our emotions or ideologies are
learned or evolved

If everyone believes it's right to pay when you
haven't yet paid, and you deviate, you'll get in a
lot of fights and quickly learn "what's right"

You'll show this in your HW simulation

In addition to anger and beliefs/ideologies,
there are other things that might guide our play
in Hawk-Dove

Here are two examples...

Give $\frac{1}{2}$ subjects in the lab a mug
and ask them how much they'd sell
them for

Average: \$5.25

Give the other $\frac{1}{2}$ \$4.50 and ask
them how much they'd pay for the
mug

Average: \$2.50

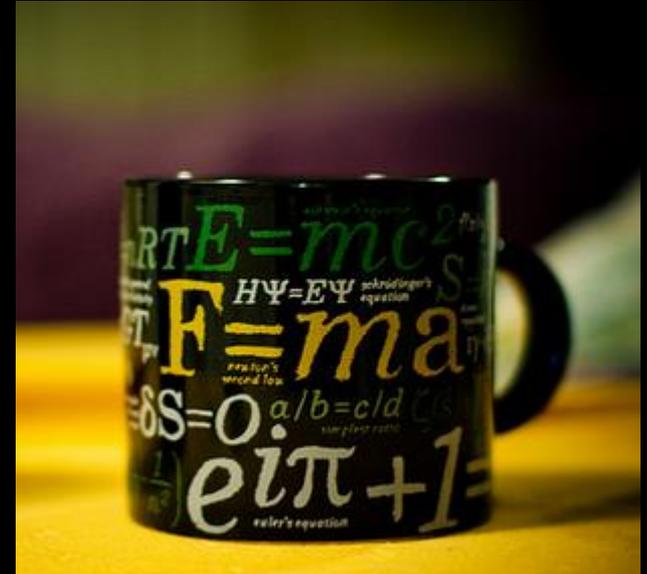


Image courtesy of [Tom Cochrane](#) on Flickr. CC NC-By-SA.

We value things we possess more than identical things we don't possess (even if possession is randomly determined and short-lived)

This is called the *endowment effect*

(and relates to *loss aversion*, see Kahneman,
Knetsch, and Thaler 1990)

Hawk-Dove predicts that we fight harder for something we possess

One way to implement this is to get us to value things we possess more

This *is* the endowment effect and loss aversion

Open question: Need to rule out alternative explanations

This would make a great final project!

Another example...

Hawk-Dove predicts that we fight harder for something we made

One way to implement this is to get us to value things we worked hard on more than identical things we didn't

This is the *sunk cost fallacy*!

Open question: Need to rule out alternative explanations

This would make a great final project!

Hawk-Dove can predicts that conflicts arise
when there it isn't clear who got there first

(Or who made the object, or...)

Let's go back to the butterflies

What happens when there is ambiguity over
who arrived first?

They actually fight:

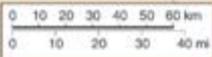
Table VII. The Spiral Flight Between Two Males is Much Longer in Duration when Both Regard Themselves as Residents than when the Role of Resident and Intruder is Clear to the Contestants. (Mann-Whitney *U*-test, Two-tailed, $P < 0.001$)

	Spiral flight duration (s)	
	Mean \pm 1 SE	(no. obs.)
Prior ownership cue present	3.65 \pm 0.23	(110)
Prior ownership cue lacking	39.60 \pm 7.35	(5)

And, again, same is true about us humans

ISRAEL WITH THE WEST BANK, GAZA STRIP, AND GOLAN HEIGHTS

- National capital
- District (mehoz) centre
- City, town
- ✈ Airport
- International boundary
- - - Boundary of former Palestine Mandate
- - - Armistice Demarcation Line
- - - District (mehoz) boundary
- Main road
- Secondary road
- Railroad
- Oil pipeline



“But in **the ancient home** we are welcomed
heartily”

- Theodore Herzl (1896)

“The Palestinian revolution's basic concern is the uprooting of the Zionist entity from **our land** and liberating it.”

- Yasser Arafat (1970)

And conflict may also rise if two uncorrelated asymmetries apply, and they conflict

Remember the 10 cases we referenced earlier?

Corpus of Ten Finders Cases

CASE	LEGAL CITATION
Hannah v. Peel	Hannah v. Peel, K.B. 509 (1945).
Ferguson v. Ray	Danielson v. Roberts, 44 Ore. 10S, 74 Pac. 913, 914 (1904).
Danielson v. Roberts	Ferguson v. Ray, 44 Ore. 557, 77 Pac. 600 (1904).
Ford v. Sharman	South Staffordshire Water Co. v. Sharman, 2 Q.B 44 (1896).
Goddard v. Winchell	Goddard v. Winchell, N.W. 1124 (1892).
Elwes v. Brigg Gas Co.	Elwes v. Brigg Gas Co., 33 Ch D 562 (1886).
Durfee v. Jones	Durfee v. Jones, 11 R. I. 588 (1877).
McAvoy v. Medina	McAvoy v. Medina, 87 Am. Dec. 733 (1866).
Bridges v. Hawkesworth	Bridges v. Hawkesworth, 21 L.J. Q.B. 75 (1851).
Armory v. Delamirie	Armory v. Delamirie, 1 Sess. Cas. K.B. 505 (1722).

Image by MIT OpenCourseWare.

In these and many other cases, the source of the dispute is two conflicting uncorrelated asymmetries

E.g., You found it...

... on my land

So... where do the human rights in the
Declaration of Independence and the
Constitution come from?

IN CONGRESS, JULY 4, 1776.
A DECLARATION
 BY THE REPRESENTATIVES OF THE
UNITED STATES OF AMERICA,
 IN GENERAL CONGRESS ASSEMBLED.

WHEN in the Course of human Events, it becomes necessary for one People to dissolve the Political Bands which have connected them with another, and to assume among the Powers of the Earth, the separate and equal Station to which the Laws of Nature and of Nature's God entitle them, a decent Respect to the Opinions of Mankind requires that they should declare the causes which impel them to the Separation.

We hold these Truths to be self-evident, that all Men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty, and the Pursuit of Happiness--That to secure these Rights, Governments are instituted among Men, deriving their just Powers from the Consent of the Governed, that whenever any Form of Government becomes destructive of these Ends, it is the Right of the People to alter or to abolish it, and to institute new Government, laying its Foundation on such Principles, and organizing its Powers in such Form, as to them shall seem most likely to effect their Safety and Happiness. Prudence, indeed, will dictate that Governments long established should not be changed for light and transient Causes; and accordingly we have suffered long by Sufferances, but when a long Train of such Abuses, and Usurpations, has converged to the same Object, evinces a Design to reduce them under absolute Despotism, it is their Right, it is their Duty, to throw off such Government, and to provide new Guards for their future Security. Such has been the patient Sufferance of these Colonies, and such has been the hearty Consent of the united Brethren of Great-Britain to a late Act of Parliament, that by that Act, His Majesty King George the Third, has in direct Object the Establishment of an absolute Tyranny over these States. To prove this, let Facts be submitted to a candid World.

He has refused his Assent to Laws, the most wholesome and necessary for the public Good.

He has forbidden his Governors to pass Laws of immediate and pressing Importance, unless suspended in their Operation till his Assent should be obtained; and when so suspended, he has utterly neglected to attend to them.

He has refused to pass other Laws for the Accommodation of large Districts of People, unless those People would relinquish the Right of Representation in the Legislature, a Right inestimable to them, and formidable to Tyrants only.

He has called together Legislative Bodies at Places unusual, uncomfortable, and distant from the Depository of their public Records, for the sole Purpose of fatiguing them into Compliance with his Measures.

He has dissolved Representative Houses repeatedly, for opposing with manly Firmness his Invasions on the Rights of the People.

He has refused for a long Time, after such Dissolutions, to cause others to be elected; whereby the Legislative Powers, incapable of Annihilation, have returned to the People at large for their exercise; the State remaining in the mean time exposed to all the Dangers of Invasion from without, and Convulsions within.

He has endeavoured to prevent the Population of these States; for that Purpose obtruding the Laws for Naturalization of Foreigners; refusing to pass others to encourage their Migrations hither, and raising the Conditions of new Appropriations of Lands.

He has obstructed the Administration of Justice, by refusing his Assent to Laws for establishing Judiciary Powers.

He has made Judges dependent on his Will alone, for the Tenure of their Offices, and the Amount and Payment of their Salaries.

He has erected a Multitude of new Offices, and sent hither Swarms of Officers to harass our People, and eat out their Substance.

He has kept among us, in Times of Peace, Standing Armies, without the Consent of our Legislatures.

He has affected to render the Military independent of and superior to the Civil Power.

He has combined with others to subject us to a Jurisdiction foreign to our Constitution, and unacknowledged by our Laws; giving his Assent to their Acts of pretended Legislation:

For quartering large Bodies of Armed Troops among us;

For protecting them, by a mock Trial, from Punishment for any Murders which they should commit on the Inhabitants of these States;

For cutting off our Trade with all Parts of the World;

For imposing Taxes on us without our Consent;

For depriving us, in many Cases, of the Benefits of Trial by Jury;

For transporting us beyond Seas to be tried for pretended Offences;

For abolishing the free System of English Laws in a neighbouring Province, establishing therein an arbitrary Government, and enlarging its Boundaries, so as to render it at once an Example and fit Instrument for introducing the same arbitrary Rule into these Colonies;

For taking away our Charters, abolishing our most valuable Laws, and altering fundamentally the Forms of our Governments;

For suspending our own Legislatures, and declaring themselves invested with Power to legislate for us in all Cases whatsoever.

For suspending our own Legislatures, and declaring themselves invested with Power to legislate for us in all Cases whatsoever.

He has abdicated Government here, by declaring us out of his Protection and waging War against us.

He has plundered our Seas, ravaged our Coasts, burnt our Towns, and destroyed the Lives of our People.

He has plundered our Seas, ravaged our Coasts, burnt our Towns, and destroyed the Lives of our People.

He is, at this Time, transporting large Armies of foreign Mercenaries to compleat the Works of Death, Desolation, and Tyranny, already begun with circumstances of Cruelty and Perfidy, scarcely paralleled in the most barbarous Ages, and totally unworthy the Head of a civilized Nation.

He has constrained our fellow Citizens taken Captive on the high Seas to bear Arms against their Country, to become the Executioners of their Friends and

“We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights...”

Of course, modeling human rights such as these would require some modifications to the Hawk-Dove game

But the key insight from today's lecture will still
hold...

Rights can be self- sustaining even if not given
by God or social contract.

We expect to have them, and a government that
violates them should expect a revolution
(e.g., American Revolution)

It is false to say that rights are God-given or inalienable, or that all humans are born with them.

Such beliefs are useful because if we deviate from them we do worse, but that doesn't make them right.

Evidence needed!

Lots more open questions....

Why do we have these particular rights?

Are some rights more inalienable than others?

And why do rights appear to be “increasing”
over time? (See Pinker’s Better Angels)

For example, collective punishment is decreasingly accepted:

“Thus says the Lord of hosts, ‘I have noted what Amalek did to Israel in opposing them on the way when they came up out of Egypt. 3 Now go and strike Amalek and devote to destruction all that they have. Do not spare them, but kill both man and woman, and infant, ox and sheep, camel and donkey.’” (1 Sam. 15:2-3).”

What's the evidence that these rights are H-D?

What prescriptions does H-D give? Can it help us resolve the Israeli-Palstinian conflict?

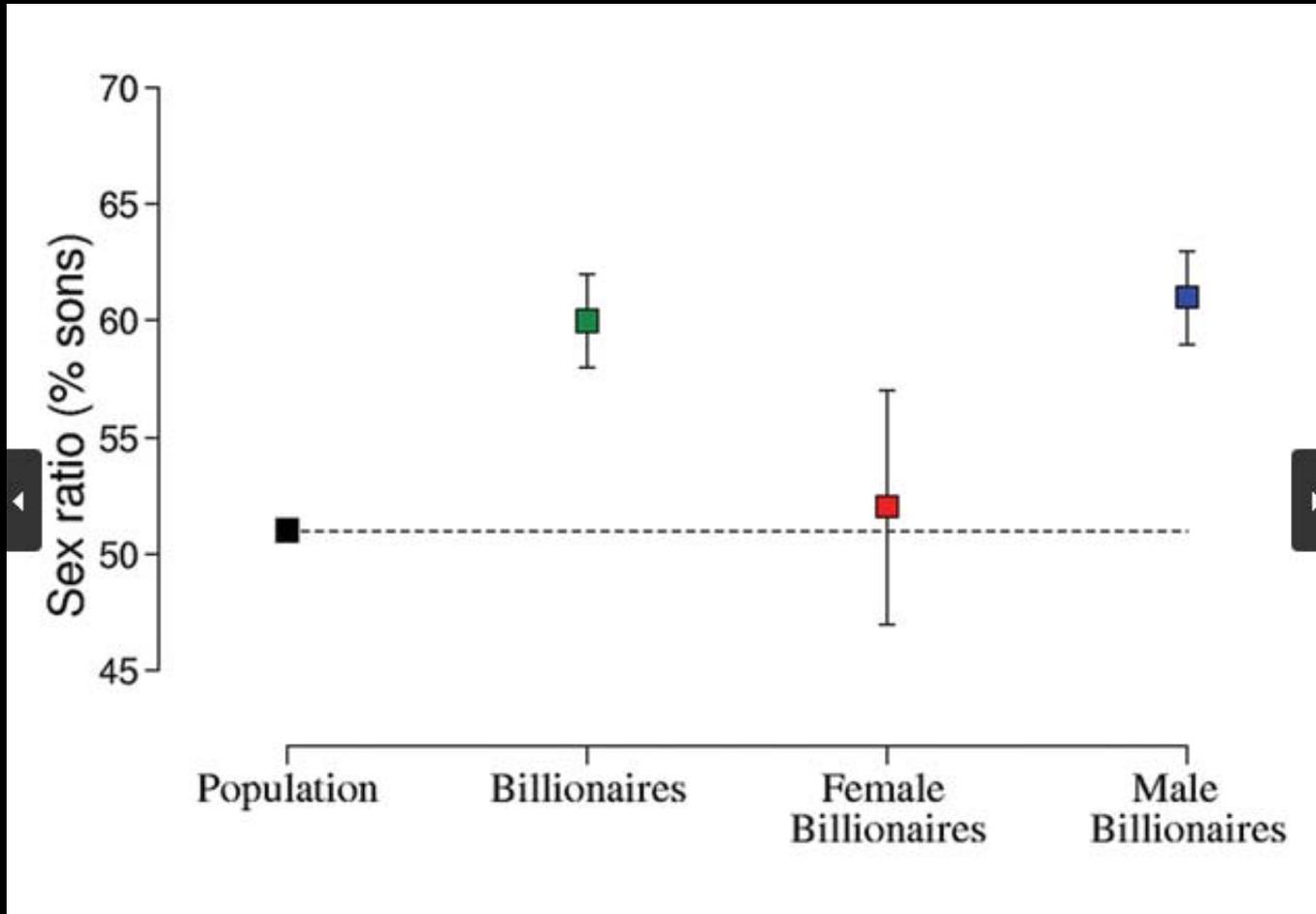
These, too, would make great final projects!

One More Thing....

Proximate vs. Ultimate

Remember our billionaires?

Why do they have more boys?



Cameron, Elissa Z., and Frederik Dalerum. "A Trivers-Willard Effect in Contemporary Humans: Male-Biased Sex Ratios among Billionaires." *PLoS ONE* 4, no. 1 (2009): e4195. CC BY.

Because boys are more likely to survive when
resources are abundant

But why are they more likely to survive?

Trivers-Willard

These are different levels of analysis...

Proximal

Males more likely to be miscarried
when nutrients are scarce.



Image courtesy of [NOAA's National Ocean Service](#). CC BY

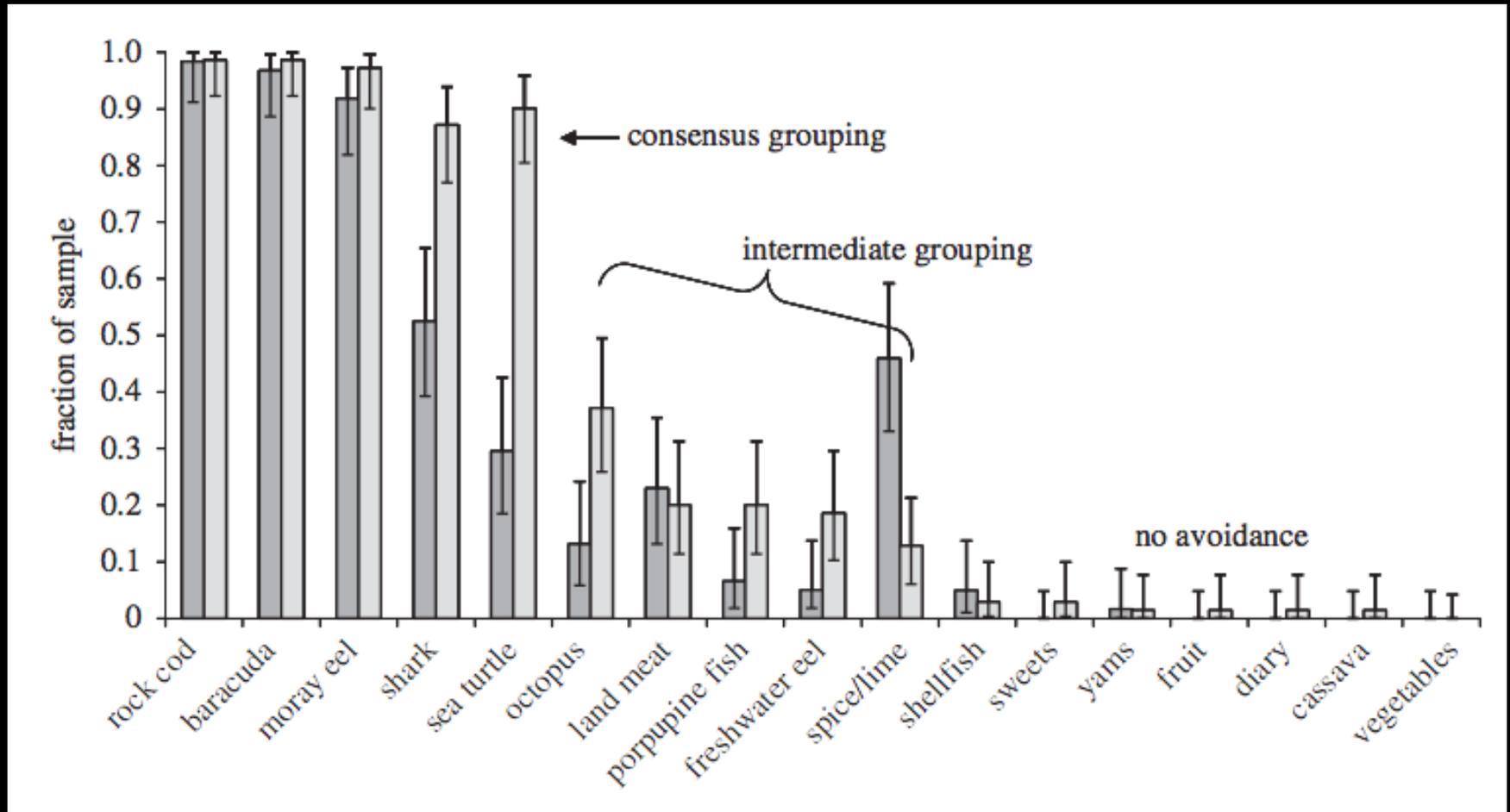
Ultimate

Trivers-Willard

Both answers are right

Same thing is going on in our other examples

Fijian Food Taboos



© The Royal Society. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <http://ocw.mit.edu/help/faq-fair-use/>.

Proximal



Image courtesy of [NOAA's National Ocean Service](#). CC BY

The Gods smite those who eat
Rock Cod

Ultimate

Rock Cod carries more risk of
disease

Why is Indian cuisine spicier than Norwegian?

Proximal

Indians find spicy food tasty and
Norwegians find it painful



Image courtesy of [NOAA's National Ocean Service](#). CC BY

Ultimate

Spices kill diseases which are more
common in India than Norway



Image courtesy of [Joe Shlabotnik](#) on Flickr. CC BY-NC-SA.

Proximal

Cab driver gets **angry** if you don't pay

Ultimate

Hawk-Dove + Learning



Image courtesy of [NOAA's National Ocean Service](#). CC BY

Throughout class, when trying to answer why,
we will focus on ultimate

Proximal

EMOTIONS, BELIEFS, IDEOLOGIES,
PREFERENCES



Image courtesy of [NOAA's National Ocean Service](#). CC BY

Ultimate

GAME THEORY
+ LEARNING/EVOLUTION

MIT OpenCourseWare
<http://ocw.mit.edu>

14.11 Insights from Game Theory into Social Behavior
Fall 2013

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.