Hawk-Dove and “Rights”
Recall:
Where do “rights” come from?
Self evident? The creator?

“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...”
Might?
The “state of nature”? 

Two Treatises of Government: In the former, The false Principles, and Foundation of Sir Robert Filmer, and his Followers, are Detected and Overthrown. The latter is an Essay Concerning the True Original, Extent, and End of Civil Government. 

London, 
Printed for Anngham Churchill, at the Black Swan in Ave-Mary-Lane, by Amen-Comter, 1690.
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)
Animal territoriality
Territoriality:

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

<table>
<thead>
<tr>
<th></th>
<th>Hawk</th>
<th>Dove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawk</td>
<td>$\frac{v-c}{2}$</td>
<td>$v$</td>
</tr>
<tr>
<td>Dove</td>
<td>0</td>
<td>$\frac{v}{2}$</td>
</tr>
</tbody>
</table>

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

(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”
If play B and other plays H, half the time you arrive first, and both play hawk and get \( \frac{v-c}{2} \), otherwise he arrives first and you play dove and he plays hawk, so get 0.

<table>
<thead>
<tr>
<th></th>
<th>Hawk</th>
<th>Dove</th>
<th>Bourgeois</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hawk</td>
<td>( \frac{v-c}{2} )</td>
<td>( v )</td>
<td>( \frac{3v-c}{4} )</td>
</tr>
<tr>
<td>Dove</td>
<td>0</td>
<td>( v )</td>
<td>( v )</td>
</tr>
<tr>
<td>Bourgeois</td>
<td>( \frac{v-c}{4} )</td>
<td>( \frac{3v}{4} )</td>
<td>( v )</td>
</tr>
</tbody>
</table>
-(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.


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

<table>
<thead>
<tr>
<th></th>
<th>Sunspot</th>
<th>Tree canopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of males</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>No. of females</td>
<td>22</td>
<td>5</td>
</tr>
<tr>
<td>No. of courtships</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>No. of courtships per male</td>
<td>4·0</td>
<td>0·2</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Passing object</th>
<th>Spiral flight</th>
<th>Courtship</th>
<th>Inspect and ignore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male speckled wood</td>
<td>384</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Female speckled wood</td>
<td>0</td>
<td>94</td>
<td>0</td>
</tr>
<tr>
<td>Another species of butterfly*</td>
<td>0</td>
<td>0</td>
<td>66</td>
</tr>
<tr>
<td>Another insect†</td>
<td>0</td>
<td>0</td>
<td>35</td>
</tr>
</tbody>
</table>

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?
Remove White

Black becomes owner

Re-release White

Black always wins
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
When arrived at same bush, had to decide whether to fight or flee:

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<td>Hawk</td>
<td>$\frac{\nu-c}{2}$</td>
<td>$\nu$</td>
<td>$\frac{3\nu-c}{4}$</td>
</tr>
<tr>
<td>Dove</td>
<td>$0$</td>
<td>$\frac{\nu}{2}$</td>
<td>$\nu$</td>
</tr>
<tr>
<td>Bourgeois</td>
<td>$\frac{\nu-c}{4}$</td>
<td>$\frac{3\nu}{4}$</td>
<td>$\nu$</td>
</tr>
</tbody>
</table>
Some players were bigger

Some players were healthier

And some simply arrived first
Turns out, this matters most:
Table 2
Patchy condition: green vs. brown shrubs

<table>
<thead>
<tr>
<th></th>
<th>Green</th>
<th>Brown</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Time/interaction (s)</td>
<td>4.60</td>
<td>5.56</td>
<td>2.10</td>
<td>1.99</td>
</tr>
<tr>
<td>Smiles/interaction</td>
<td>2.43</td>
<td>4.61</td>
<td>0.93</td>
<td>1.60</td>
</tr>
<tr>
<td>Strikes/interaction</td>
<td>0.50</td>
<td>1.25</td>
<td>0.11</td>
<td>0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>%</th>
<th>p^a</th>
<th>%</th>
<th>p^a</th>
<th>χ^2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident wins</td>
<td>75.54</td>
<td>&lt;.001</td>
<td>53.42</td>
<td>.33</td>
<td>45.57</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Larger wins^b</td>
<td>68.66</td>
<td>&lt;.001</td>
<td>58.52</td>
<td>.06</td>
<td>5.09</td>
<td>.024</td>
</tr>
<tr>
<td>Healthier wins^c</td>
<td>69.35</td>
<td>&lt;.001</td>
<td>53.13</td>
<td>.39</td>
<td>21.55</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

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?
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.
<table>
<thead>
<tr>
<th></th>
<th>Demand payment</th>
<th>Don’t insist on payment</th>
<th>Insist if hasn’t already paid</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Refuse to pay</strong></td>
<td>$10-c, $10-c</td>
<td>20, 0</td>
<td>$10-c, $10-c</td>
</tr>
<tr>
<td><strong>Agree to pay</strong></td>
<td>0, 20</td>
<td>10, 10</td>
<td>0, 20</td>
</tr>
<tr>
<td><strong>Pay if haven’t already paid</strong></td>
<td>0, 20</td>
<td>10, 10</td>
<td>0, 20</td>
</tr>
</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Case</th>
<th>Legal Citation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hannah v. Peel</td>
<td>Hannah v. Peel, K.B. 509 (1945).</td>
</tr>
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</table>
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 ½ subjects in the lab a mug and ask them how much they’d sell them for

Average: $5.25

Give the other ½ $4.50 and ask them how much they’d pay for the mug

Average: $2.50
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, \( P < 0.001 \))

<table>
<thead>
<tr>
<th>Prior ownership cue present</th>
<th>Spiral flight duration (s)</th>
<th>Mean ± 1 SE</th>
<th>(no. obs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.65 ± 0.23</td>
<td>(110)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.60 ± 7.35</td>
<td>(5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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And, again, same is true about us humans
“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?

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Source: DeScioli and Karpoff
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?
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?

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.

Ultimate

Trivers-Willard

Image courtesy of NOAA's National Ocean Service, CC BY
Both answers are right
Same thing is going on in our other examples
Fijian Food Taboos

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The Gods smite those who eat Rock Cod

Rock Cod carries more risk of disease

Image courtesy of NOAA's National Ocean Service. CC BY
Why is Indian cuisine spicier than Norwegian?
Indians find spicy food tasty and Norwegians find it painful.

Spices kill diseases which are more common in India than Norway.

Image courtesy of NOAA's National Ocean Service, CC BY
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

Ultimate

GAME THEORY + LEARNING/EVOLUTION

Image courtesy of NOAA’s National Ocean Service, CC BY
14.11 Insights from Game Theory into Social Behavior
Fall 2013

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