PHPE 400
Individual and Group Decision Making

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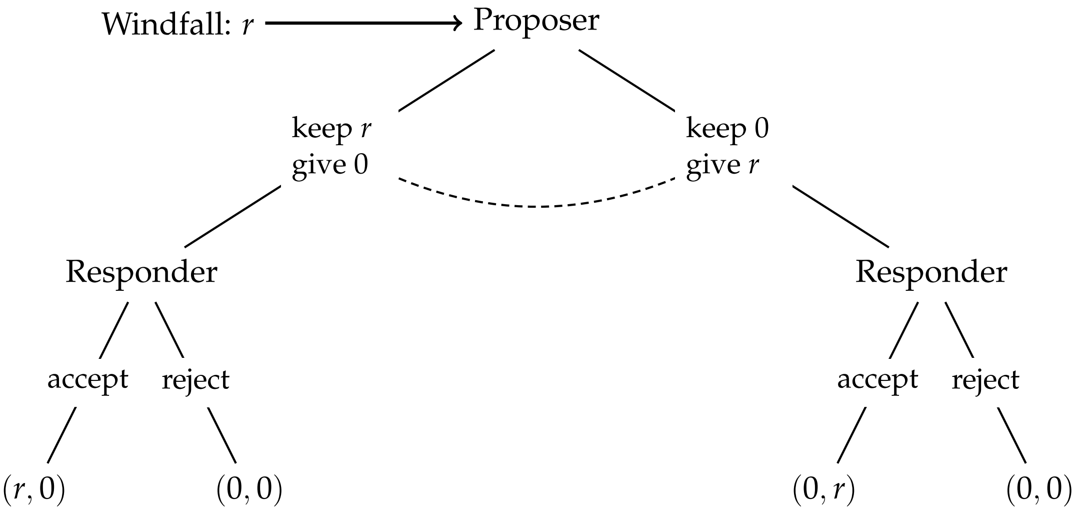
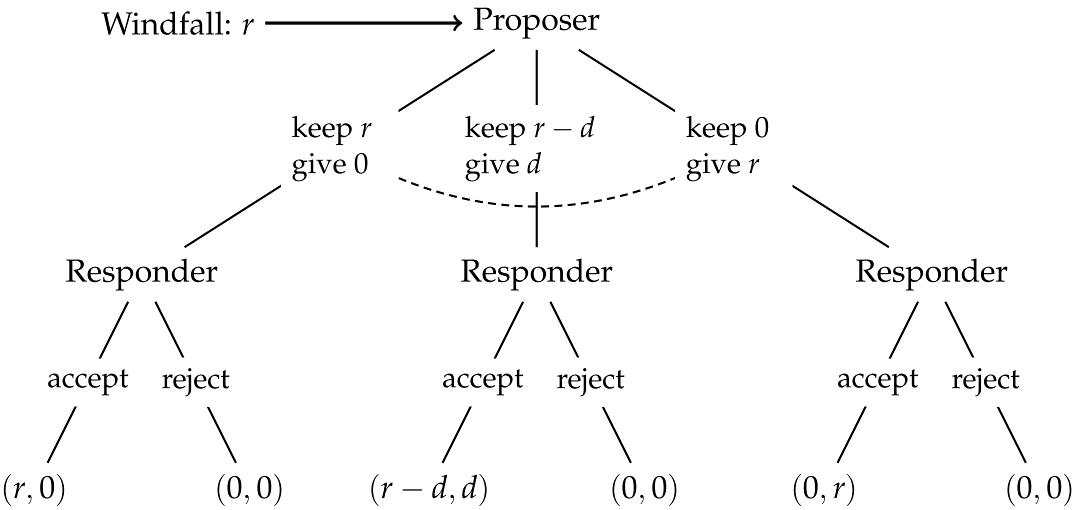
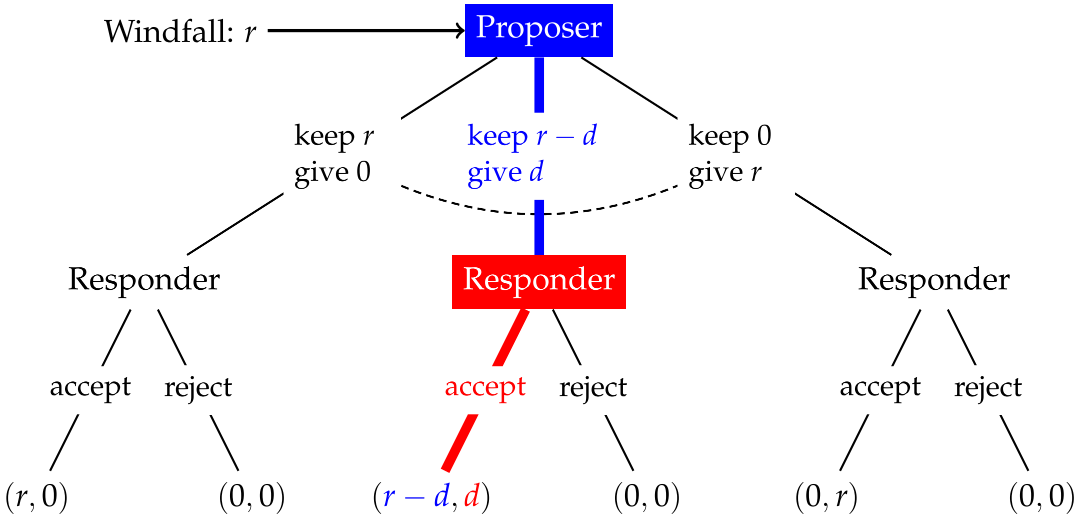
Ultimatum Game

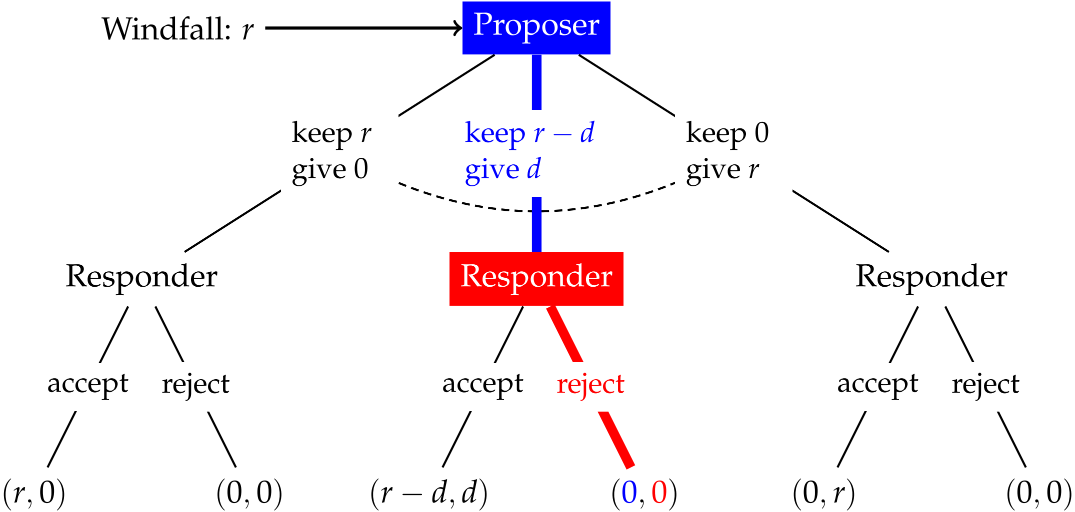
Ultimatum Game: Two players receive a windfall. One of the players suggests a division. After learning of the first player's proposal, the second must either accept or reject it. If the second accepts, both receive the amounts suggested by the first, otherwise they receive nothing.


Windfall: r
Proposer
keep r
give 0
keep 0
give r
Responder
Responder
accept
reject
accept
reject
(r, 0)
(0, 0)
(0, r)
(0, 0)


Windfall: r
Proposer
keep r
give 0
keep r − d
give d
keep 0
give r
Responder
Responder
Responder
accept
reject
accept
reject
accept
reject
(r, 0)
(0, 0)
(r − d, d)
(0, 0)
(0, r)
(0, 0)



Proposer gets $r - d$ and Responder gets d



Proposer gets 0 and Responder gets 0

Sequential Rationality

If the proposer offers a split which gives the second any positive amount, the second does strictly worse by refusing the offer. So, no rejection strategies are sequentially rational.

Knowing this, the first player ought to offer the smallest amount possible to the second player.

This is not what is observed:

> ...offers typically average about 30-40 percent of the total, with a 50-50 split often the mode. Offers of less than 20 percent are frequently rejected. These facts are not now in question. What remains controversial is how to interpret the facts and how best to incorporate what we have learned into a more descriptive version of game theory.
>
> (p. 210, Camerer and Thaler)

C. Camerer and R. Thaler (1995). *Anomalies: Ultimatums, Dictators and Manners*. The Journal of Economic Perspectives, 9(2), pp. 209-219.

- Rejecting low offers is impossible to reconcile with a theory of *payoff maximization*.

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- Rejecting low offers is impossible to reconcile with a theory of *payoff maximization*.
- Making a non-zero offer is consistent with payoff maximization, if a proposer believes that the responder will reject too low an offer.
  - However, offers are typically larger than the amount that proposers believe would result in acceptance.

    Joseph Henrich, Robert Boyd, Samuel Bowles, Colin Camerer, Ernst Fehr, Herbert Gintis, and Richard McElreath (2001). *In search of homo economicus: Behavioral experiments in 15 small-scale societies*. American Economic Review, 91(2), pp. 73–78.

Dictator Game

In the dictator game, the first player, called the Allocator, makes a unilateral decision regarding the split of the pie. The second player, the Recipient, has no choice and receives only the amount that the dictator decides to give.

Since dictators have no monetary incentives to give, a payoff-maximizing dictator would keep the whole amount.

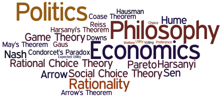
Dictator Game

Experimental Regularity: A significant number of Allocators give some money in the dictator game. Moreover, the distribution of donations tend to be bimodal, with peaks at zero and at half the total.

Daniel Kahneman, Jack L. Knetsch, and Richard Thaler (1986). *Fairness as a Constraint on Profit Seeking: Entitlements in the Market*. American Economic Review, 76, pp. 728 - 741.

Christoph Engel (2011). *Dictator games: A meta study*. Experimental Economics, 14(4), pp. 583 - 610.

Methodological Individualism



Traditional economic models presume that individuals do not take an interest in the interests of those with whom they interact. **More particularly, the assumption of *non-tuism* implies that the utility function of each individual, as a measure of her preferences, is strictly independent of the utility functions of those with whom she interacts.**

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Cristina Bicchieri and Jiji Zhang (2012). *An Embarrassment of Riches: Modeling Social Preferences in Ultimatum Games*. Handbook of the Philosophy of Science, Volume 13: Philosophy of Economics.

Collective decision making

Voter 1  $>$  $>$ 

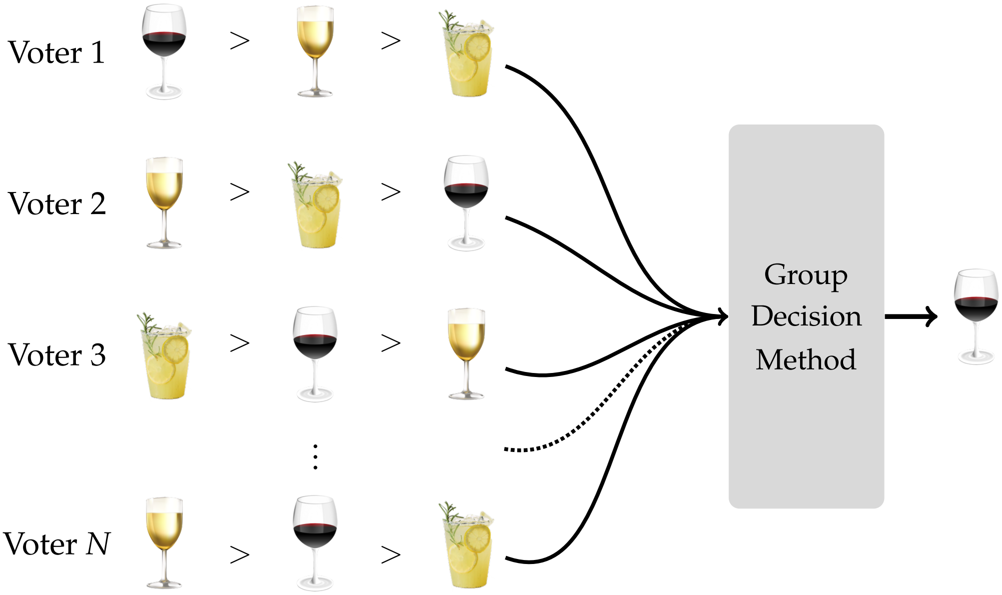
Voter 2  $>$  $>$ 

Voter 3  $>$  $>$ 

$\vdots$

Voter N  $>$  $>$ 


Voter 1
>
>
Voter 2
>
>
Voter 3
>
>
⋮
Voter N
>
>
Group
Decision
Method


Voter 1
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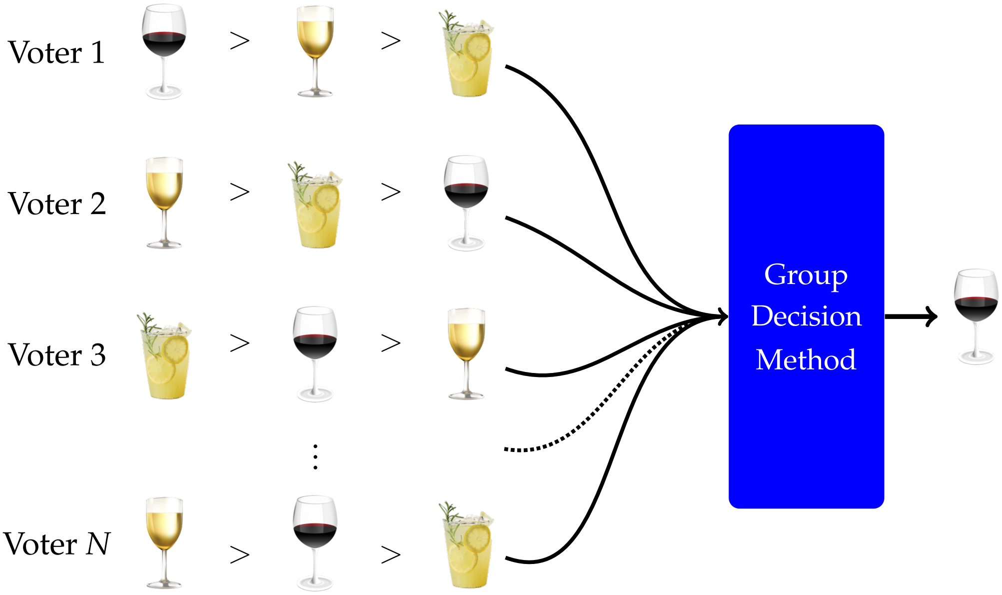
Voter 1
>
>
Voter 2
>
>
Voter 3
>
>
Voter N
>
>
Group Decision Method

Which candidate *should* be chosen?

40	35	25
t	r	k
k	k	r
r	t	t

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- No candidate is the **majority winner**.
  No candidate has a **majority** of 1st place votes.

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  The plurality is the candidate that is ranked first by the most voters.

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- The **Instant Runoff** winner is r
  After k is removed since it is ranked first by the fewest number of voters, candidate r is the majority winner.

40	35	25
t	r	k
k	k	r
r	t	t

What about candidate k?

Margin

Suppose that **P** is an election (a record of the ballots submitted by the voters) and a and b are two candidates in **P**.

The **margin of** a **over** b in **P**, denoted $Margin_{\mathbf{P}}(a, b)$, is the number of voters that rank a above b in **P** minus the number of voters that rank b above a in **P**.

40	35	25
t	r	k
k	k	r
r	t	t

$$
\begin{aligned}
Margin_{\mathbf{P}}(t, k) &= 40 - 60 = -20 \\
Margin_{\mathbf{P}}(k, t) &= 60 - 40 = 20 \\
Margin_{\mathbf{P}}(k, r) &= 30 \\
Margin_{\mathbf{P}}(r, k) &= -30 \\
Margin_{\mathbf{P}}(t, r) &= -20 \\
Margin_{\mathbf{P}}(r, t) &= 20
\end{aligned}
$$

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k	k	r
r	t	t

$$
\begin{aligned}
Margin_{\mathbf{P}}(t,k) &= 20\\
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Margin_{\mathbf{P}}(k,r) &= 65-35=30\\
Margin_{\mathbf{P}}(r,k) &= 35-65=-30\\
Margin_{\mathbf{P}}(t,r) &= -20\\
Margin_{\mathbf{P}}(r,t) &= 20
\end{aligned}
$$

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40	35	25
t	r	k
k	k	r
r	t	t

$$\begin{aligned}
Margin_{\mathbf{P}}(t,k) &= 20 \\
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Margin_{\mathbf{P}}(k,r) &= 30 \\
Margin_{\mathbf{P}}(r,k) &= -30 \\
Margin_{\mathbf{P}}(t,r) &= 40 - 60 = -20 \\
Margin_{\mathbf{P}}(r,t) &= 60 - 40 = 20
\end{aligned}$$

Majority Graph

Suppose that **P** is an election (a record of the ballots submitted by the voters) and a and b are two candidates in **P**.

We say that a is **majority preferred** to b in **P** when more voters rank a above b than rank b above a.

Alternatively, a is majority preferred to b when $Margin_{\mathbf{P}}(a, b) > 0$.

40	35	25
t	r	k
k	k	r
r	t	t

$$\begin{aligned} Margin_{\mathbf{P}}(t,k) &= -20 \\ Margin_{\mathbf{P}}(k,t) &= 20 \\ Margin_{\mathbf{P}}(k,r) &= 30 \\ Margin_{\mathbf{P}}(r,k) &= -30 \\ Margin_{\mathbf{P}}(t,r) &= -20 \\ Margin_{\mathbf{P}}(r,t) &= 20 \end{aligned}$$

- k is majority preferred to t
- k is majority preferred to r
- r is majority preferred to t

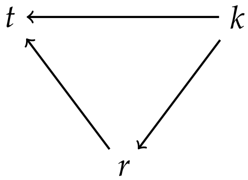
Majority Graph

Suppose that **P** is an election (a record of the ballots submitted by the voters) and a and b are two candidates in **P**.

A **majority graph** is a diagram displaying all the candidates in the election with an arrow from candidate a to candidate b when a is majority preferred to b (i.e., $Margin_{\mathbf{P}}(a, b) > 0$).

40	35	25
t	r	k
k	k	r
r	t	t

$$
\begin{aligned}
Margin_{\mathbf{P}}(t, k) &= -20\\
Margin_{\mathbf{P}}(k, t) &= 20\\
Margin_{\mathbf{P}}(k, r) &= 30\\
Margin_{\mathbf{P}}(r, k) &= -30\\
Margin_{\mathbf{P}}(t, r) &= -20\\
Margin_{\mathbf{P}}(r, t) &= 20
\end{aligned}
$$



Margin Graph

Suppose that **P** is an election (a record of the ballots submitted by the voters) and a and b are two candidates in **P**.

A **margin graph** is the majority graph in which all the arrows are labeled with the margins. That is, it is a diagram displaying all the candidates in the election with an arrow from candidate a to candidate b when a is majority preferred to b, and the arrow has the label $Margin_{\mathbf{P}}(a, b)$.

40	35	25
t	r	k
k	k	r
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$$\begin{aligned}
Margin_{\mathbf{P}}(t,k) &= -20\\
Margin_{\mathbf{P}}(k,t) &= 20\\
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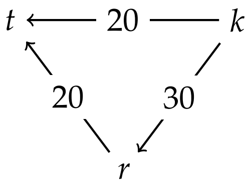
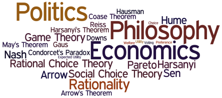
\end{aligned}$$



Important Distinction



1	1	1
a	a	d
b	c	a
c	d	b
d	b	c

Do all of the voters rank a and b in the same way?

Do all of the voters rank a and b in the same *position*?

Important Distinction

1	1	1
a	a	d
b	c	a
c	d	b
d	b	c

Do all of the voters rank a and b in the same way?

Yes: All of the voters rank a above b.

Do all of the voters rank a and b in the same *position*?

No: The first group ranks a in first-place and b in second-place, the second group ranks a in first-place and b is last place, and the third group ranks a is second-place and b in third-place.