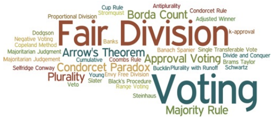
PHIL408Z
Individual and Group Decision Making

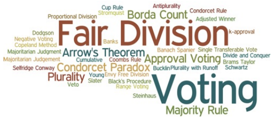
Eric Pacuit
University of Maryland, College Park
pacuit.org

Practicalities



- Course website
  https://myelms.umd.edu/courses/1133211
  - Weekly readings will be posted
  - Slides will be posted
  - Announcements (canceled classes, etc.)
  - Links to assignments (online quizzes, discussions, problem sets)
- Web: pacuit.org
- Email: epacuit@umd.edu
- Office: Skinner 1103A
- Office Hours: Wednesdays, 2.00 - 3.30 (or by appointment)

Practicalities: Hybrid course



- **In-class component**: meet twice a week (10.00 - 10.50) for lectures, discussions, and working sessions (on the problem sets)
- **Online component**: video lectures, online discussion
- **Homework**: Readings, problem sets, online quizzes

Practicalities: Grading

1. Attendance & Participation (10%): You must ask at least **1 question** about the readings and respond to **at least 2** questions for each module.

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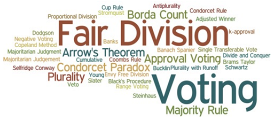
4. Final exam (30%): The final exam will be given in-class during exam week.

Practicalities: Modules



1. Preference and Choice (1/26 - 2/4)
2. Voting (2/9 - 2/25)
3. Social Choice Theory (3/2 - 4/1)
4. Aggregating Judgements (4/6 - 4/27)
5. Fair Division (4/9 - 5/11)

Methodological Issues

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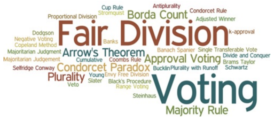

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Normative vs. Description Theories

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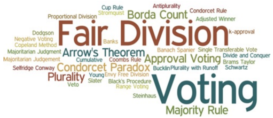
Normative vs. Description Theories: How can/should we incorporate *empirical data* into our *normative* theory of rationality? (reflective equilibrium)

What is this course about?



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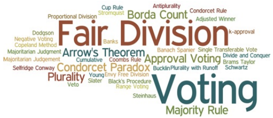
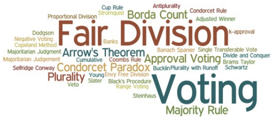
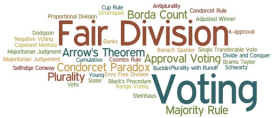


What does it mean (for an individual/group) to be *rational* (or *reasonable*) as opposed to *irrational* (or *unreasonable*)?



Two criteria for assessing “reasonableness” of a selected *option*:

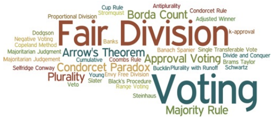


Two criteria for assessing "reasonableness" of a selected *option*:

1. An option is **feasible** if it can be chosen, if it is *possible* for the decision maker.

2. The **desirability** of an option is the degree to which the decision maker *wants* it.

Feasibility vs. Desirability



Aesop's Fox: One hot summer's day a Fox was strolling through the forest and spotted a bunch of grapes hanging from a high branch.

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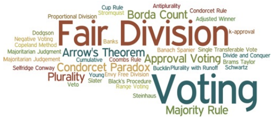

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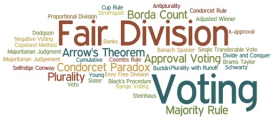

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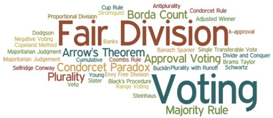

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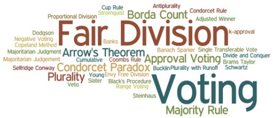
Groucho Marx's Club: "I don't care to belong to a club that accepts people like me as members"

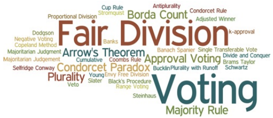
Feasibility vs. Desirability



"It appears irrational to mix the two...there is a sharp distinction between desirability and feasibility. By sharp distinction we mean not only that the two can be told apart but also that they are causally independent; one does not affect the other."

I. Gilboa. *Chapter 1 in Rational Choice*. The MIT Press, 2010.

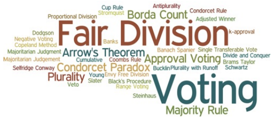
Are Walter's decisions *rational*?



Are Walter's decisions *rational*?

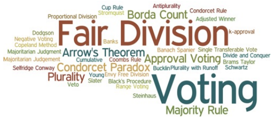
- What are his preferences?
- What does he believe?
- What is the *context* of the choice?

Decision Theory



Rational decision making is associated with both the capacity to order outcomes *and* to choose from the *top* of the order.

Context of a decision



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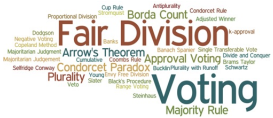

Individual decision-making (against nature)

- E.g., Gambling

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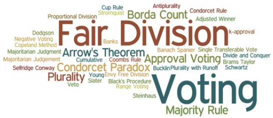

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Collective decision making

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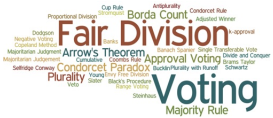

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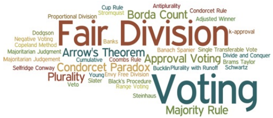
Collective decision making

- E.g., Carrying a piano
- E.g., Voting in an election

Preference, Choice, and Utility



- Representing *preferences*: relations, preference axioms
- *Revealed* preference theory: WARP, Sen's α and β, Revelation Theorem
- *Utility*: Ordinal vs. cardinal utility, interval scale, ratio scale
- *Expected utility theory*: (probability), von Neumann-Morgenstern Theorem, Allais paradox, Ellsberg paradox, (Other issues: framing effects, state-dependent utility, etc.)
- Interpersonal comparison of utilities

Mathematical background: Relations

Suppose that X is a set. A **relation** on X is a set of **ordered pairs** from X: $R \subseteq X \times X$.

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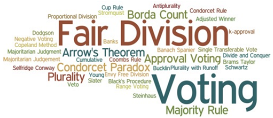

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E.g., $X = \{a, b, c, d\}$, $R = \{(a, a), (b, a), (c, d), (a, c), (d, d)\}$

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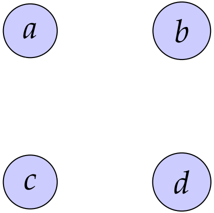

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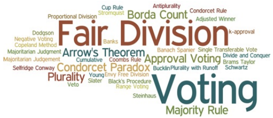

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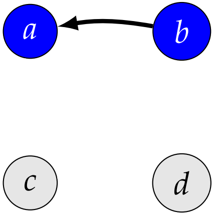

$b \; R \; a$

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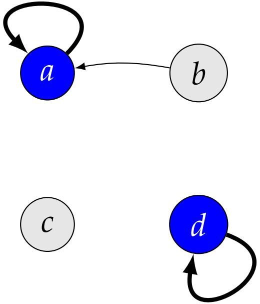

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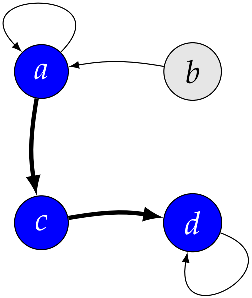

$a\ R\ a$
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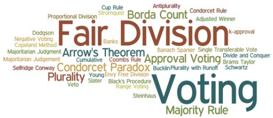

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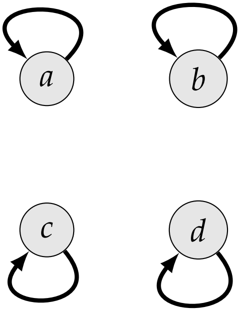

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Irreflexive relation: for all $x \in X$, $x \not R\, x$ (i.e., $(x, x) \not\in R$)

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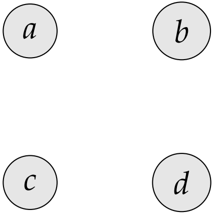

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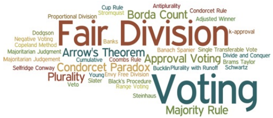

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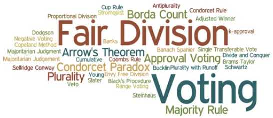

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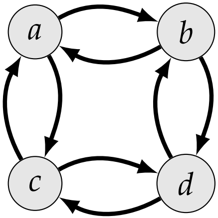

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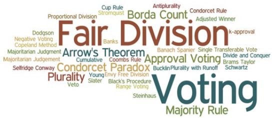

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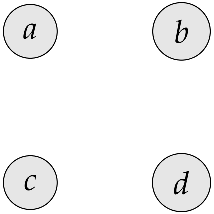

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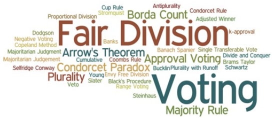

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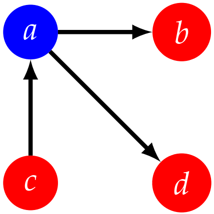

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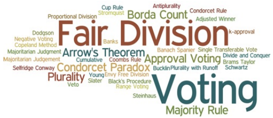

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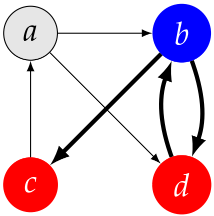

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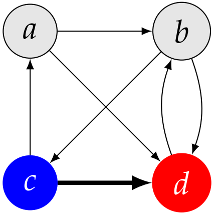

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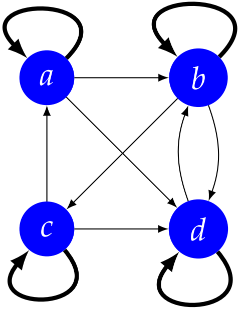
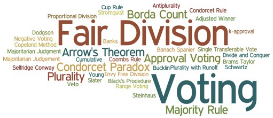


Mathematical background: Relations



Suppose that X is a set and $R \subseteq X \times X$ is a relation.

Transitive relation: for all $x, y, z \in X$, if $x \; R \; y$ and $y \; R \; z$, then $x \; R \; z$

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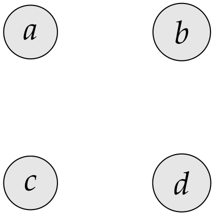

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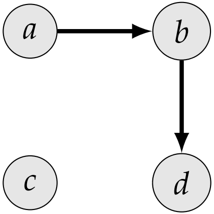

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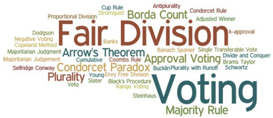

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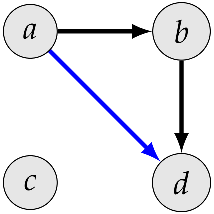

Mathematical background: Relations

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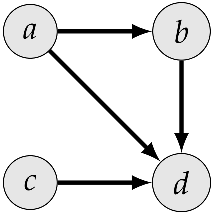

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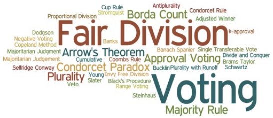

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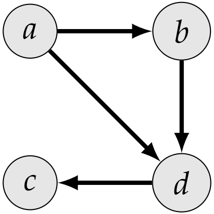

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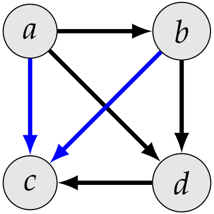
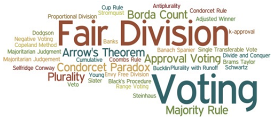


Maximal elements, Cycles



Suppose that $R \subseteq X \times X$ is a relation.

$x \in X$ is **maximal** with respect to R provided there is no $y \in X$ such that $y \; R \; x$.

For $Y \subseteq X$, let $\max_R(Y) = \{x \in Y \mid \text{ there is no } y \in Y \text{ such that } y \; R \; x\}$

Maximal elements, Cycles

Suppose that $R \subseteq X \times X$ is a relation.

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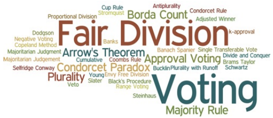
For $Y \subseteq X$, let $\max_R(Y) = \{x \in Y \mid \text{ there is no } y \in Y \text{ such that } y\ R\ x\}$

A **cycle** is a set of distinct elements $x_1, \ldots, x_n$ such that

$$x_1\ R\ x_2 \cdots x_{n-1}\ R\ x_n\ R\ x_1$$

R is **acyclic** if it does not contain any cycles.

Representing Preferences

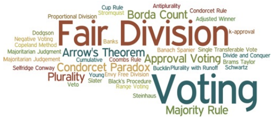


Let X be a set of options/outcomes. A decision maker's *preference* over X is represented by a *relation* $\succeq \subseteq X \times X$.

Representing Preferences

Given $x, y \in X$, there are four possibilities:

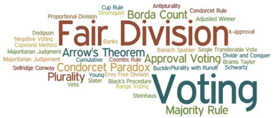
Representing Preferences



Given $x, y \in X$, there are four possibilities:

1. $x \succeq y$ and $y \not\succeq x$: *The decision maker ranks x above y* (the decision maker strictly prefers x to y).

Representing Preferences



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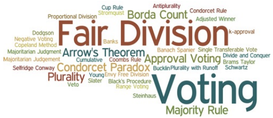

Given $x, y \in X$, there are four possibilities:

1. $x \succeq y$ and $y \not\succeq x$: *The decision maker ranks* x *above* y (the decision maker strictly prefers x to y).

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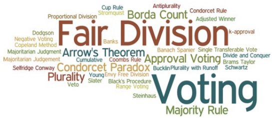
3. $x \succeq y$ and $y \succeq x$: The agent is *indifferent* between x and y.

Representing Preferences



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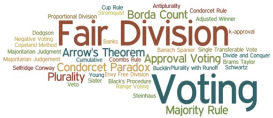
4. $x \not\succeq y$ and $y \not\succeq x$: The agent *cannot compare* x and y

Representing Preferences



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3. $x \succeq y$ and $y \succeq x$: The agent is ***indifferent*** between x and y.

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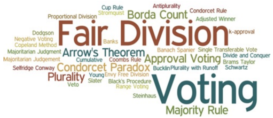
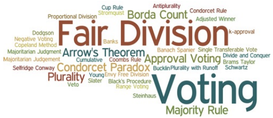
Representing Preferences



A relation $\succeq \subseteq X \times X$ is a **preference relation** (for a decision maker) provided

1. $\succeq$ is complete (and hence reflexive)
2. $\succeq$ is transitive

Representing Preferences



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1. $\succeq$ is complete (and hence reflexive)
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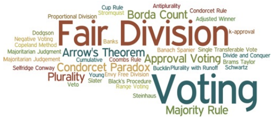
Suppose that $\succeq$ is a preference relation. Then,

- **Strict preference**: $x \succ y$ iff $x \succeq y$ and $y \not\succeq x$
- **Indifference**: $x \sim y$ iff $x \succeq y$ and $y \succeq x$

Concepts of *preference*

1. *Enjoyment comparison*: I prefer red wine to white wine means that I *enjoy* red wine more than white wine

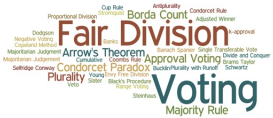
Concepts of *preference*



1. *Enjoyment comparison*: I prefer red wine to white wine means that I *enjoy* red wine more than white wine

2. *Comparative evaluation*: I prefer candidate *A* over candidate *B* means “I judge *A* to be *superior* to *B*”. This can be *partial* (ranking with respect to some criterion) or *total* (with respect to every relevant consideration).

Concepts of *preference*



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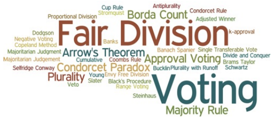
Concepts of *preference*



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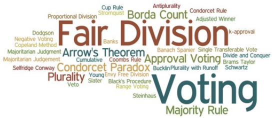
3. *Favoring*: Affirmative action calls for racial/gender preferences in hiring.

4. *Choice ranking*: In a restaurant, when asked "do you prefer red wine or white wine", the waiter wants to know which option I choose.



Next class:

- Quiz 1 is due before class (answers may be discussed in class) pacuit.org/quiz/spr2015/phil408z/q1
- Reading: Hausmann Chapter 1 & 2 (and my Section 1 of my notes *Preference, Choice, Utility*)