The Mathematics of Power

Weighted Voting

Topic 02 // Lesson 01

O: to evaluate a weighted voting system

One person = one vote

One person = x vote(s) ⟵ **POWER?**

Different amount of votes mean different amounts of say.

Topic 02 // Lesson 01

weighted voting system

Any formal voting arrangement in which voters are not necessarily equal in terms of the number of votes they control.

motions

"Yes – No votes"
→ those with only two choices

O: to evaluate a weighted voting system

3 Elements of every Weighted Voting Systems ▼

1. players

Voters in a weighted voting system
→ could be individuals, corporations, states, agencies, countries, etc

→ N: # of players

O: to evaluate a weighted voting system

3 Elements of every Weighted Voting Systems ▼

2. weights

The number of votes controlled by a player

→ V: total # of votes

→ w_1, w_2, w_3, ...

$$V = w_1 + w_2 + w_3 + ... + w_N$$

O: to evaluate a weighted voting system

3 Elements of every Weighted Voting Systems ▼

3. quota

The minimum number of votes rerquired to pass a motion, **q**

→ Senate: simple majority for ordinary law

→ Senate: 60 votes to stop filibuster

→ Senate: 2/3s to override a presidential veto

→ Sometimes: 3/4s or 100%

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► *Notation:*

$$[q : w_1, w_2, w_3, ..., w_N]$$

quota   **weights**

O: to evaluate a weighted voting system

Ex 2.1 **Venture Capitalism**

Four partners (P_1, P_2, P_3, and P_4) are starting a business. P_1 buys 8 shares, P_2 buys 7 shares, P_3 buys 3 shares, and P_4 buys 2 shares.

The quota is set at 2/3s.

Use the Notation.

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*Ex 2.2 **Anarchy***

Four partners (P_1, P_2, P_3, and P_4) are starting a business. P_1 buys 8 shares, P_2 buys 7 shares, P_3 buys 3 shares, and P_4 buys 2 shares.

The quota is set at 10.

A: Math Anarchy

What happens?

O: to evaluate a weighted voting system

Ex 2.3 **Gridlock**

Four partners (P_1, P_2, P_3, and P_4) are starting a business. P_1 buys 8 shares, P_3 buys 3 shares, and P_4 buys 2 shares.

The quota is set at 21.

What happens?   A: Math Gridlock

$$V/2 < q \leq V$$

O: to evaluate a weighted voting system

Ex 2.4 One Partner – One Vote

[19: 8, 7, 3, 2]

The quota is set at 19.

What happens?

A: still needs 100% vote to pass. Its like a 1-1

A: impossibility = deception

O: to evaluate a weighted voting system

Ex 2.5 **Dictators**

[11: 12, 5, 4]

The quota is set at 11.

What happens?

Dictator: a player whose weight is bigger than or equal to the quota.

Dummies: a player who has no power

*a dictator is not necessary for there to be a dummy

Ex 2.6 **Unsuspecting Dummies**

[30: 10, 10, 10, 9]

The quota is set at 3/4s.

What happens?

A: q = 30. this means last person with 9 has no power if other 3 make a decision. No real impact on votes

Ex 2.7 **Veto Power**

[12: 9, 5, 4, 2]

The quota is set at 12.

What happens? A: P_1 is a spoiler

A: P1 is not a dictator, but can stop a vote

Ex 2.7 **Veto Power**

Veto Power: a player who if they do not vote for a motion, then it cannot pass.

A player has veto power iff
w < q and V − w < q

The Mathematics of Power

Weighted Voting Practice

p.66 (1-10)