Problems with Group Decision Making

There are two ways of evaluating political systems.

1. Consequentialist ethics evaluate actions, policies, or institutions in regard to the outcomes they produce.

2. Deontological ethics evaluate actions, policies, or institutions in light of the rights, duties, or obligations of the individuals involved.

Many people like democracy because they believe it to be a fair way to make decisions.

One commonsense notion of fairness is that group decisions should reflect the preferences of the majority of group members.

Most people probably agree that a fair way to decide between two options is to choose the option that is preferred by the most people.

At its heart, democracy is a system in which the majority rules.

An actor is rational if she possesses a complete and transitive preference ordering over a set of outcomes.

An actor has a complete preference ordering if she can compare each pair of elements (call them x and y) in a set of outcomes in one of the following ways - either the actor prefers x to y, y to x, or she is indifferent between them.

An actor has a transitive preference ordering if for any x, y, and z in the set of outcomes, it is the case that if x is weakly preferred to y, and y is weakly preferred to z, then it must be the case that x is weakly preferred to z.

Condorcet's paradox illustrates that a group composed of individuals with rational preferences does not necessarily have rational preferences as a collectivity.

Individual rationality is not sufficient to ensure group rationality.

Imagine a city council made up of three individuals that must decide whether to:

1. Increase social services (I)
2. Decrease social services (D)
3. Maintain current levels of services (C)

Table 11.1 City Council Preferences for the Level of Social Service Provision

Left-wing councillors	Centrist councillors	Right-wing councillors
$I > C > D$	$C > D > I$	$D > I > C$

Let's suppose that the council employs majority rule to make its group decision.

One possibility is a round-robin tournament.

A round-robin tournament pits each competing alternative against every other alternative an equal number of times in a series of pair-wise votes.

Table 11.2 Outcomes from the Round-Robin Tournament

Round	Contest	Winner	Majority that produced victory
1	Increase vs. decrease	*D*	Centrist and right
2	Current vs. increase	*I*	Left and right
3	Current vs. decrease	*C*	Left and centrist

The group can't decide! Each alternative wins one round.

TABLE 11.2 **Outcomes from the Round-Robin Tournament**

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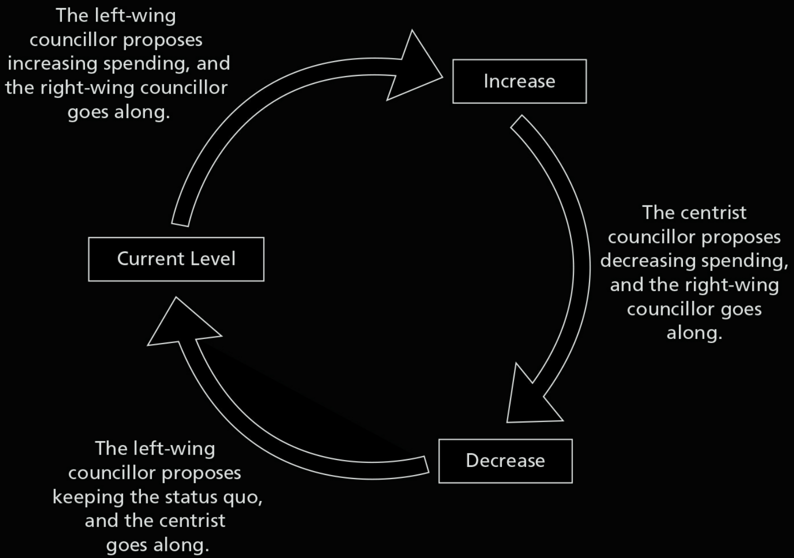
3	Current vs. decrease	*C*	Left and centrist

A group of rational individuals is incapable of making a rational decision for the group as a whole.

There is no 'majority' to speak of – a different majority supports the winning alternative or outcome in each round.

Figure 11.1 An Example of Cyclical Majorities



Our example demonstrates how a set of rational individuals can form a group with intransitive preferences.

In the real world, though, we see deliberative bodies make decisions all the time and they do not appear to be stuck in an endless cycle.

Why?

There are two broad reasons for this:

1. Preference orderings.

2. Decision-making rules.

The councillors having a particular set of preference orderings.

Suppose the right-wing councillor's preferences are now a mirror image of the left-wing councillor's.

His preferences are now $D > C > I$ instead of $D > I > C$.

If the right-wing councillor's preferences are $D > C > I$, then C is a Condorcet winner.

An option is a Condorcet winner if it beats all of the other options in a series of pair-wise contests.

Majority rule is not necessarily incompatible with rational group preferences.

Condorcet's Paradox only shows that it is possible for a group of individuals with transitive preferences to produce a group that behaves as if it has intransitive preferences.

How often are individuals likely to hold preferences that cause intransitivity?

Table 11.3 Proportion of Possible Strict Preference Orderings without a Condorcet Winner

Number of alternatives	Number of voters: 3	5	7	9	11 →	Limit
3	0.056	0.069	0.075	0.078	0.080	0.088
4	0.111	0.139	0.150	0.156	0.160	0.176
5	0.160	0.200	0.215			0.251
6	0.202					0.315
↓						↓
Limit	1.000	1.000	1.000	1.000	1.000	1.000

In general, we cannot rely on majority rule to produce a coherent sense of what the group wants, especially if there are no institutional mechanisms for keeping the number of voters small or weeding out some of the alternatives.

Many political decisions involve bargaining and hence an infinite number of alternatives!

Condorcet's Paradox indicates that restricting group decision making to sets of rational individuals is no guarantee that the group as a whole will exhibit rational tendencies.

Group intransitivity is unlikely when the set of feasible options is small, but it is almost certain when the set of feasible alternatives gets large.

As a result, it is impossible to say that the majority 'decides' except in very restricted circumstances.

The analytical insight from Condorcet's Paradox suggests that group intransitivity should be common.

But we observe a surprising amount of stability in group decision making in the real world.

Perhaps this has something to do with the decision-making rules that we use.

1. The Borda count.

2. A powerful agenda setter.

The Borda count asks individuals to rank potential alternatives from their most to least preferred and then assign points to reflect this ranking.

The alternative with the most ‘points’ wins.

Table 11.4 Determining the Level of Social Service Provision Using the Borda Count

	Points awarded			
Alternative	**Left-wing**	**Centrist**	**Right-wing**	**Borda count total**
Increase spending	3	1	2	6
Decrease spending	1	2	3	6
Current spending	2	3	1	6

Using the same preferences as before, the Borda count does not provide a clear winner either.

A more troubling aspect of this decision rule can be seen if we consider the introduction of a fourth alternative, future cuts (FC).

TABLE 11.5 City Council Preferences for the Level of Social Service Provision (Four Alternatives)

Left-wing	Centrist	Right-wing
$I > C > D > FC$	$C > D > FC > I$	$D > FC > I > C$

TABLE 11.6 Determining the Level of Social Service Provision Using the Borda Count with a Fourth Alternative

	Points awarded			
Alternative	Left-wing	Centrist	Right-wing	Borda count total
Increase spending	3	0	1	4
Decrease spending	1	2	3	6
Current spending	2	3	0	5
Future cuts in spending	0	1	2	3

The Borda count now produces a clear winner! The choice has been influenced by the introduction of what might be called an ‘irrelevant alternative.’

Decision rules that are not ‘independent of irrelevant alternatives’ allow wily politicians to more easily manipulate the outcome of a decision making process to produce their most preferred outcome.

Rather than making persuasive arguments about the desirability of his most preferred outcome, a politician might get her way by the imaginative introduction of an alternative that has no chance of winning, but that can influence the alternative that is ultimately chosen.

Agenda Setting

An alternative decision-making mechanism that overcomes the potential instability of majority rule in round-robin tournaments requires actors to begin by considering only a subset of the available pair-wise alternatives.

A voting agenda is a plan that determines the order in which votes occur.

- First round: I vs. D.
- Second round: Winner of first round vs. C.

Table 11.7 Pair-Wise Contests and Different Voting Agendas

Agenda	1st Round	1st-Round winner	2nd Round	2nd-Round winner	Councillor obtaining her most preferred outcome
1	*I* vs. *D*	*D*	*D* vs. *C*	*C*	Centrist councillor
2	*C* vs. *I*	*I*	*I* vs. *D*	*D*	Right-wing councillor
3	*C* vs. *D*	*C*	*C* vs. *I*	*I*	Left-wing councillor

The agenda setter can get her most preferred outcome. The agenda setter is a dictator!

But should we expect all the councillors to vote sincerely?

A strategic or sophisticated vote is a vote in which an individual votes in favor of a less preferred option because she believes doing so will ultimately produce a more preferred outcome.

A sincere vote is a vote for an individual's most preferred option.

Agenda 1: I vs. D, with winner against C.

The councillors know that the second round will involve either D vs. C (C wins) or I vs. C (I wins).

Thus, the councillors know that if D wins the first round, then the outcome will be C, and that if I wins the first round, then the outcome will be I.

This means that the first round of voting is really a contest between C and I (even if they are voting on I and D).

Put yourself in the shoes of the right-wing councillor, $D > I > C$.

If she votes for her preferred option (D) in the first round, she will end up with C (her worst preferred option) as the final outcome.

Thus, she has a strong incentive to vote strategically for I in the first round, since this will lead to I (her second preferred option) as the final outcome.

Some analysts find strategic voting lamentable and prefer decision rules that induce sincere voting.

It is possible to avoid the potential for group intransitivity by imposing an agenda.

Unfortunately, the outcome of such a process is extremely sensitive to the agenda chosen, and, consequently, either of two things is likely to happen:

1. The instability of group decision making shifts from votes on outcomes to votes on the agendas expected to produce those outcomes.

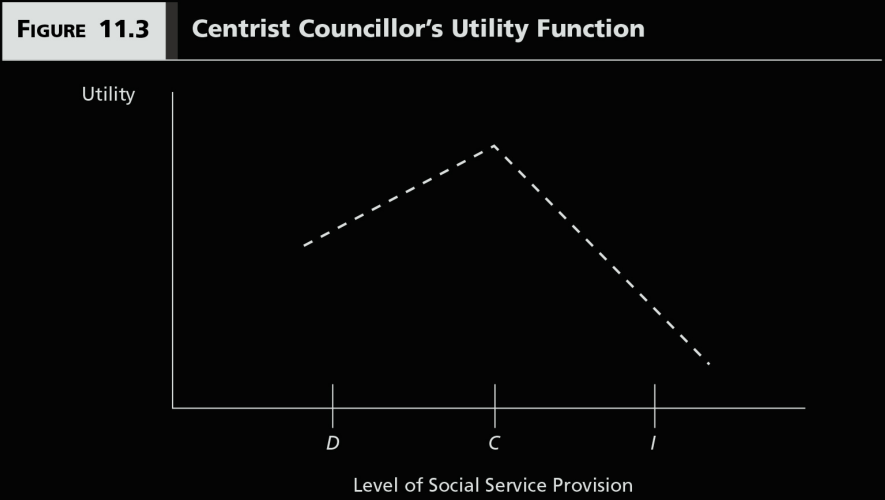
2. Some subset of actors is given power to control the agenda and, therefore, considerable influence over the outcome likely to be produced.

Another way in which stable outcomes might be produced is by placing restrictions on the preferences actors might have.

It is possible to convey an individual's preference ordering in terms of a utility function.

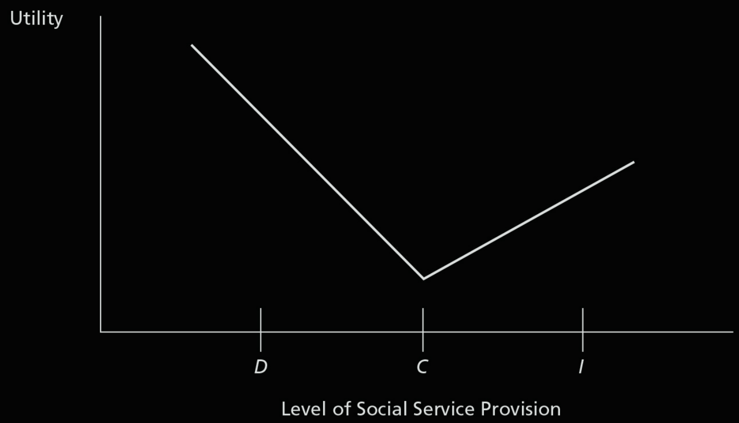
A utility function is essentially a numerical scaling in which higher numbers stand for higher positions in an individual's preference ordering.

A single-peaked preference ordering is characterized by a utility function that reaches a maximum at some point and slopes away from this maximum on either side, such that a movement away from the maximum never raises the actor's utility.



The centrist councillor has single-peaked preferences.

Figure 11.2 Right-Wing Councillor's Utility Function



The right-wing councillor did not have single-peaked preferences.

The median voter theorem states that the ideal point of the median voter will win against any alternative in a pair-wise majority-rule election if (i) the number of voters is odd, (ii) voter preferences are single-peaked, (iii) voter preferences are arrayed along a single-issue dimension, (iv) and voters vote sincerely.

When voters are arrayed along a single-policy dimension in terms of their ideal points, the median voter is the individual who has at least half of all the voters at his position or to his right and at least half of all the voters at his position or to his left.

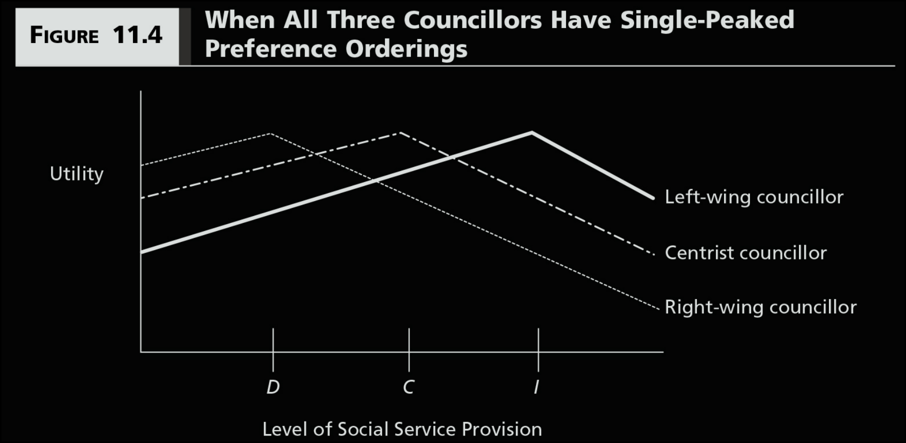
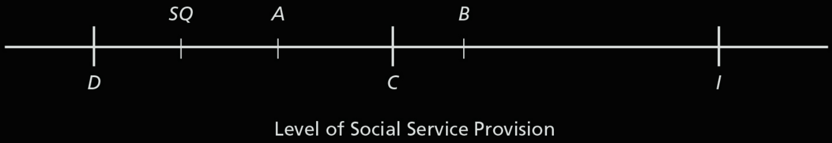


FIGURE 11.4
When All Three Councillors Have Single-Peaked Preference Orderings
Utility
Left-wing councillor
Centrist councillor
Right-wing councillor
D
C
I
Level of Social Service Provision

C wins.

Figure 11.5 Illustrating the Power of the Median Voter



Any proposals will converge on the position of the median voter, i.e. C.

The MVT shows that the difficulties we encountered with Condorcet's Paradox can be avoided if we are willing to both rule certain preference orderings 'out of bounds' and reduce the policy space to a single dimension.

Unfortunately, neither of these restrictions is uncontroversial.

- There is nothing intrinsically troubling about individual preferences that are not single-peaked.
- Many political questions are inherently multi-dimensional.

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- Many political questions are inherently multi-dimensional.

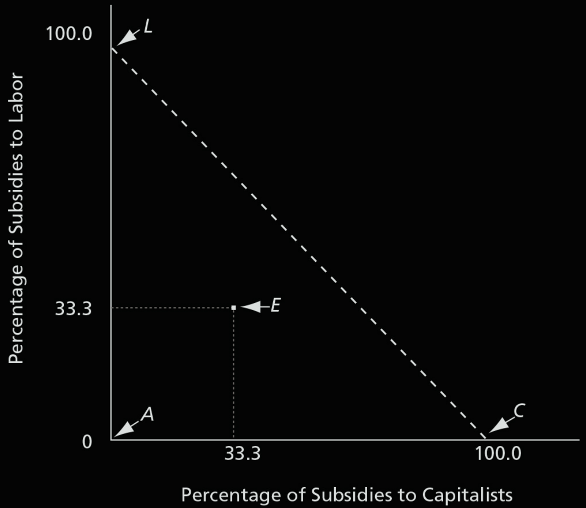
What if we increase the number of dimensions?

Labor, capital, and agriculture are deciding how to divide a pot of subsidies from the government's budget.

Each constituency only cares about maximizing subsidies to its own constituency.

The decision-making situation can be represented by a two-dimensional policy space.

Figure 11.6 Two-Dimensional Voting



An indifference curve is a set of points such that an individual is indifferent between any two points in the set.

The winset of some alternative z is the set of alternatives that will defeat z in a pair-wise contest if everyone votes sincerely according to whatever voting rules are being used.

FIGURE 11.7 **Two-Dimensional Voting with Winsets**

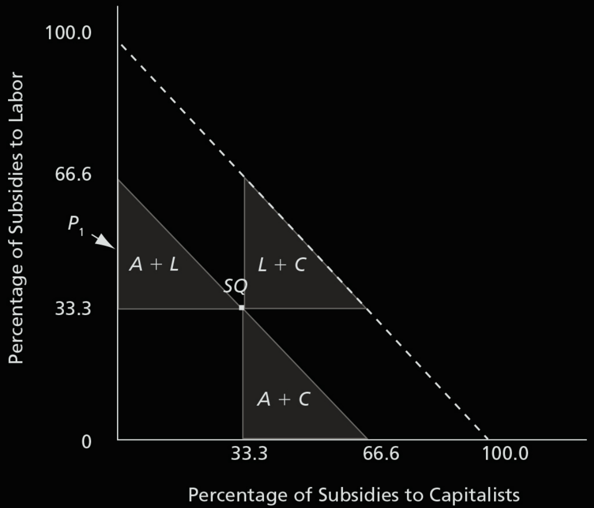


FIGURE 11.8 Two-Dimensional Voting with a New Status Quo (P_1)

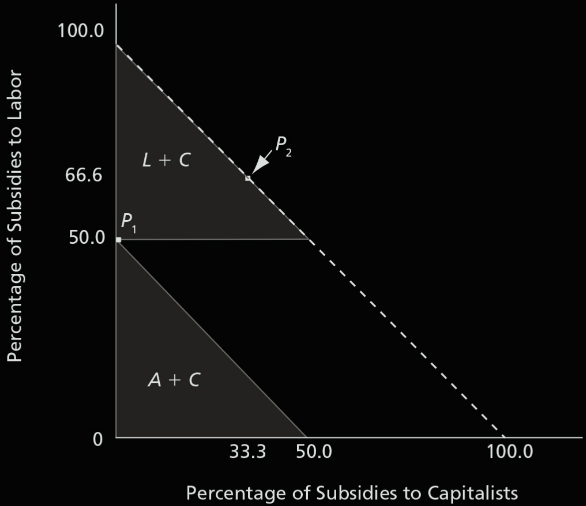
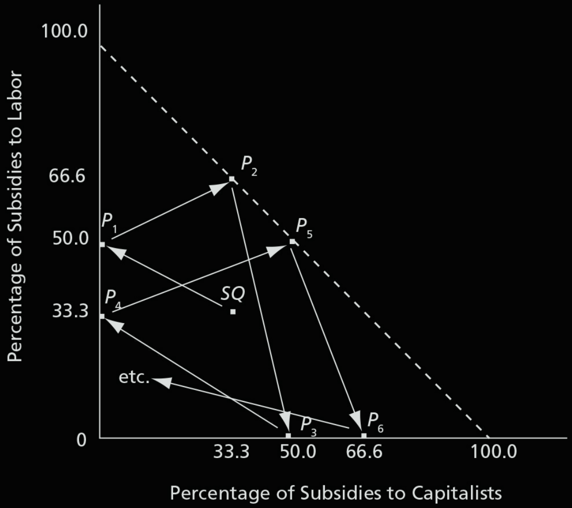


FIGURE 11.9 **Two-Dimensional Voting with Cyclical Majorities**



The Chaos Theorem states that if there are two or more issue dimensions and three or more voters with preferences in the issue space who all vote sincerely, then except in the case of a rare distribution of ideal points, there will be no Condorcet winner.

Unless we are lucky enough to have a set of actors who hold preferences that do not lead to cyclical majorities, then either of two things will happen:

1. The decision-making process will be indeterminate and policy outcomes hopelessly unstable.

2. There will exist an actor – the agenda setter – with the power to determine the order of votes in such a way that she can produce her most favored outcome.

Summary So Far

Condorcet's Paradox shows that a set of rational individuals can form a group that is incapable of choosing rationally in round-robin tournaments.

Alternative voting schemes like the Borda count allow clear winners in some cases, but the outcomes are not necessarily robust.

If we employ ‘single elimination’ tournaments that form a voting agenda, the cyclical majorities may be avoided but whoever controls the agenda can dictate the outcome.

The problem of instability can be overcome if we have a single-issue dimension *and* each voter has single-peaked preferences.

But why should we restrict people's preferences and what about multi-dimensional problems?

So, should we just drop majority rule?

Arrow's Theorem states that every decision-making process that we could possible design must sacrifice at least one of Arrow's fairness conditions – non-dictatorship, universal admissibility, unanimity, or independence from irrelevant alternatives – if it is to guarantee group transitivity and, hence, stable outcomes.

Arrow presented four fairness conditions that he believed all decision-making processes should meet.

1. The non-dictatorship condition states that there must be no individual who fully determines the outcome of the group decision-making process in disregard of the preferences of the other group members.

2. The universal admissibility condition states that individuals can adopt any rational preference ordering over the available alternatives.

3. The unanimity or pareto optimality condition states that if all individuals in a group prefer x to y, then the group preferences must reflect a preference for x to y as well.

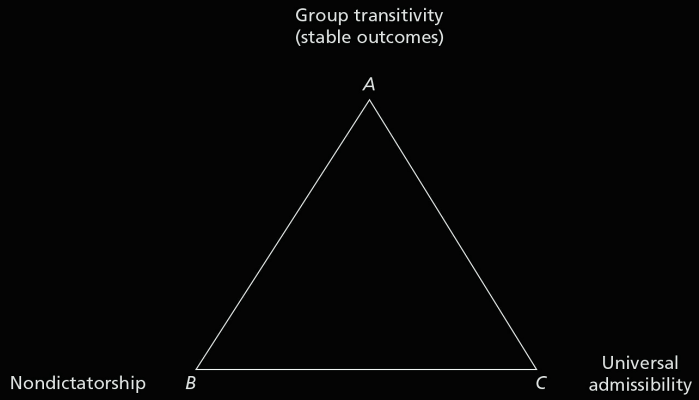
- Basically, the unanimity condition states that if everybody prefers x to y, the group should not choose y if x is available.

4. The independence of irrelevant alternatives condition states that group choice should be unperturbed by changes in the rankings of irrelevant alternatives.

- Suppose that, when confronted with a choice between x, y, and z, a group prefers x to y.

- The IIA condition states that if one individual alters their ranking of z, then the group must still prefer x to y.

Figure 11.10 **Arrow's Institutional Trilemma**



If we take Arrow's conditions of unanimity and IIA as uncontroversial, then we face an institutional 'trilemma' between stable outcomes, universal admissibility, and non-dictatorship.

Arrow's Theorem basically states that when designing institutions, we can choose one and only one side of the triangle.

- If we want group rationality and stable outcomes, then we must give up either non-dictatorship or universal admissibility.

- If we want to avoid dictatorship, then we must give up group rationality or universal admissibility.

- If we hold individual preferences inviolable, then we must give up non-dictatorship or group rationality.

Arrow's Theorem shows that it is difficult to interpret the outcome of any group decision-making process as necessarily reflecting the will of the group.

- When a group comes to a clear decision, it may mean that individual preferences lined up in a way that allowed for a clear outcome that represented the desires of a large portion of the group.

- But it may also mean that individuals with inconvenient preferences were excluded from the process, or that some actor exercised agenda control.

- In such cases, outcomes may reflect the interest of some powerful subset of the group rather than the preferences of the group as a whole, or even some majority of the group.

Every decision-making mechanism must grapple with the trade-offs posed by Arrow's Theorem, and every system of government represents a collection of such decision-making mechanisms.

Thus, we can evaluate different systems of government in terms of how their decision-making mechanisms tend to resolve the trade-offs between group rationality and Arrow's fairness criteria.

There is no perfect set of decision-making institutions.

A piece of legislation cannot cover all conceivable contingencies for which it might be relevant.

This requires that in any specific instance a judge, bureaucrat, or lawyer must determine whether a specific statute is applicable or not.

Judges often ask, “What did Congress *intend* in passing this law?”

Liberals (in the American sense) have developed principles of statutory interpretation to enable broad meaning to be read into acts of Congress.

Conservatives, on the other hand, insist on requiring judges to stick to the plain meaning of the statutory language.

But who is right?

But who is right?

Short of appealing to our own prejudices and policy preferences, we can provide an analytical perspective based on Arrow's Theorem.

Arrow's Theorem cautions against assigning individual properties to groups. Individuals are rational, but a group is not.

If this is true, how can one make reference to the intent of a group?

Legislators may have an intention, but a *legislature* does not.

Because groups differ from individuals and may be incoherent, legislative intent is an oxymoron!

The Daily Show and Social Choice Theory ▸ here