Sequential versus simultaneous debates

Glazer-Rubinstein 2001 — “Debates and Decisions”
Levy-Razin 2010 (WiP) — “When do simple policies win?”

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Outline

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Introduction

Two papers looking taking a mechanism design approach to debates.

The starting point is that the structure of the debate affects its equilibrium outcome.

Question: are some structures better than others?

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The model

Two debaters with conflicting views try to convince an uninformed listener by revealing pieces of information supporting their side.

- The state is a 5-tuple $\omega = (\omega_1, \ldots, \omega_5) \in \{1, 2\}^5$
  - If $\omega_i = 1$, aspect i is said to support outcome O_1.
- The listener wants to choose the outcome (1 or 2) supported by the majority of aspects, but does not know ω.
- Debater j knows ω and tries to induce the listener to choose outcome j by revealing aspects that support outcome O_j
  - Can only reveal outcome supporting one's own position
  - Procedural rule specifies the number of arguments and order of move
- A persuasion rule is a mapping from the arguments raised into the outcome.

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General question

If there was no constraint on the number of arguments that debaters can raise, the listener could guess the correct outcome for sure

- Put constraint on the number of arguments that can be raised in the debate (limited attention)

Question: given that we can choose an optimal peruasion rule, is there a procedural rule that minimises chances of a mistake?

Compare three procedures:

- *one-speaker debate*: one debaters has to choose two arguments
- *simultaneous debate*: each debaters simultaneously chooses one argument
- *sequential debate*: each debater sequentially chooses one argument

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One-speaker debate

Procedural rule: debater 1 has to present two arguments. The listener chooses the outcome depending on those two arguments.

Claim 1:
The minimal number of mistakes in the one-speaker debate is four.

It is induced by the following Persuasion rule: "Speaker is only persuasive if both arguments are either in positions $\{1, 2, 3\}$ or in $\{4, 5\}$; otherwise choose O_2"

- Mistakes are made in states $\{11222\}, \{12122\}, \{21122\}$ and $\{22211\}$, all in favour of 1.

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Simultaneous debate

Procedural rule: both debater simultaneously raise one argument.

Claim 2:
The minimal number of mistakes in the simultaneous debate is five.

It can be induced by the following Persuasion rule: "Choose O_2 iff debater 1 raises argument x and debater 2 raises argument $y \equiv x \pm 1 \pmod 5$"

- Mistakes can be made in 10 states: 5 states containing three non-consecutive arguments for 1; and 5 states containing exactly two arguments for 1, which are successive.
- Each of these states induce a coordination game with mixed equilibrium $(\frac{1}{2}, \frac{1}{2})$, so mistakes happen half of the times.

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Sequential Debate

Procedural rule: Debater 1 raises an argument, then Debater 2 raises another argument.

Claim 3:
The minimal number of mistakes in the sequential debate is three.

An optimal persuasion rule in the Sequential Debate

If debater 1 argues for...	Debater 2 wins iff he counter-argues with...
1	2
2	3 or 5
3	4
4	2 or 5
5	1 or 4

which induces three mistakes, two in favour of 1—in states {11222} and {22112}—and one in favour of 2—in state {12121}.

In this example you can also see that debater 2 can defeat argument 5 with argument 4, and argument 4 with argument 5.

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The Debate Consistency Principle

DC Principle: It is impossible that "x wins the debate" if y is brought up as a counterargument, but "y wins the debate" if x is brought up as a counterargument to y.

Claim 4:

Any optimal persuasion rule violates the DC principle.

In a sequential debate, any Persuasion Rule reaching 3 mistakes, has to feature some x and y such that neither is a persuasive counterargument to the other.

Interpreted as an illustration of Grice's principle: an utterance may acquire a meaning different in a conversation or than in isolation

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Discussion (1)

GR 2001 opens a new question: what is the best to organise a debate when there are constraints (attention, time) on the listener on the listener's part?
I.e. is it possible to design it in such a way to minimise the probability of the listener taking the wrong actions, given some constraints?

The main point is that sequential debates may have an advantage over simultaneous debate (from the listener's point of view); they make it easier for the debater with the correct outcome to "corner" his opponent.

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Discussion (2)

In standard mechanism design, the game is fixed and the state affects the preferences of the players

Here the preferences are fixed and the strategy space of each players depends on the state.

- Couldn't this be accomodated with $-\infty$ payoffs depending on the state?

Moreover limited attention/time makes full revelation (mistake-free debate) impossible.

Discussion (3)

- Mechanism (Persuasion rule) is known to debaters.
- Commitment problem always the case with mechanism design.
  - But this can be implemented as a sequential equilibrium in which listener chooses outcome after having heard the arguments (strat = that of the table)
- We don't observe persuasion rules like the one in the sequential debate
  - Additional constraints of natural language, which may break the advantage of sequential debate
- All mistakes are treated symmetrically.

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An uninformed DM with two attention slots has to choose an action but the alternatives are unknown.

Two debaters 1 and 2 compete for each attention slot, in order to promote their respective alternatives A and B, through an all-pay auction, with bids in $[c, \infty) \cup \{0\}$

Asymmetry: option A only needs one attention slot to be understood, while B needs two.

- If player A wins any of the two slots, it is chosen.
- Both alternatives cannot be understood together (relaxed later)

Difference with GR 2001

There is no normative consideration anymore: no decision is correct or not.

- The advantage now comes from one issue being simple. (No underlying uncertainty)

The paper investigates what debate structure, simultaneous or sequential, makes this advantage more salient.

At $t = 1$, both debaters submit bid (b_1^1, b_2^1), (observe who won in sequential debate,) then submit (b_1^2, b_2^2) at $t = 2$.

The payoff is $v \cdot \mathbb{1}(win) - \sum_{t=1,2} b_i^t$. Tie-break: each player prefers the other option to be adopted rather than nothing.

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Sequential debate

Backward induction:

- If player 1 won the first round, the game is over (no one bids at $t = 2$). If no-one won the first round, then player 1 just bids the entry cost c and wins.
- If player 2 had won the first round, we get in the second round the equilibrium of a one-shot all pay auction:
  - Each player enters with prob $1 - \frac{c}{v}$, and draws bid from $\mathcal{U}[c, v]$
  - Each player wins with equal probability, and the expected payoff is zero.
- Given this equilibrium at $t = 2$, there is no incentive for player 2 to win the first round, therefore does not enter any round
  - Player 1 chooses any of the rounds to enter, and bids c
  - **In a sequential debate, the simple option wins for sure.**

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Simultaneous debate

Player 1 only needs to win one slot, so will only bid on one slot (she can always do better by pulling her two bids together on one slot).
But she must be mixing on the slot on which to bid, otherwise Player 2 could win that slot by bidding an ε more.

Equilibrium

- Player 1 randomises $(\frac{1}{2}, \frac{1}{2})$ on which slot to bid, and her bid is drawn from $\mathcal{U}[c, \frac{v}{2}]$
- Player 2 bids on both slots, and bids are drawn from a distribution of $[c, \frac{v}{2}]$
- Equilibrium probability of simple option winning is $\frac{3}{4}$

Comparison of debate structures

- The simple option is more likely to win in the sequential debate. This is because bidding wars are inefficient, and a sequential debate enable Player 2 to commit not to engage in such a war.
- More resources are spent in the simultaneous debates: DM more informed?

These results depend on tie-breaking assumption. If players prefer "no option" to the opponent's option, then Player 2 would still exert effort in the second stage of the sequential debate, winning with some probability. So that with positive prob, "no option" could be adopted by DM.

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Relaxing scarcity (1)

In the original model, time-constraint $T = 2$ means that if Player 2 cannot get both slots, she might as well get none.

Let $T > 3$, and assume that if the DM observe both options, she prefers the more complicated one with prob $p \in [0, 1]$.

(If $T = 3$, the simple option retains its advantage unless $p = 1$, in which case both options become symmetric.)

Relaxing scarcity (2)

We now get reversed results

Proposition 3:
When p is high enough option B wins both types of debate with a higher probability than A.
Moreover it wins in the sequential debate more often than in the simultaneous debate.

The sequential debate always end at a node where both options have been understood: outcome entirely depends on p

In the sequential debate, it cannot be that prob of player 2 winning goes to one. So there exists ε such that $\Pr(2 \text{ wins}) < 1 - \varepsilon$.
So for $p > 1 - \varepsilon$, Player 2 wins more often in the sequential debate.

Outline

Discussion (1)

When there is no scarcity, bidding in a sequential debate just creates rent dissipation.

When there is scarcity, allowing debaters to know what the listener thought at the intermediate stage provides way to defuse bidding wars. This puts the complicated option at a disadvantage.

Discussion (2)

One can take also reverse the question and ask: is it good to auction the right to speak?

If there is no auction, and both options are equally attractive to the DM, the simple option has a natural advantage.

LR's paper suggests that auctions may help to mitigate that advantage using a simultaneous debate. This comes at the cost of higher rent dissipation.

Outline

Conclusion

Both models are simple models that looks at how constraints (time, attention) on the listener's side shape debates.

Under those constraints, sequential debate tends to emphasise the advantage that one proposition may have, whether it comes from being right, or from being simple to understand.

Constraint is assumed instead of coming from equilibrium (as in cheap-talk)

Related Literature

Main difference with literature:

Committee decision
: In both papers, speakers have completely misaligned preferences, as opposed to committee, in which the efficient design is sought.

Cheap talk
: Here the constraint on communication is assumed, rather than an equilibrium result

Austen-Smith (1993)

Austen-Smith (1993), *Games and Econ. Behav.* "Multiple Referrals under Open Rule"

The House can ask two committees their advice, either simultaneously or jointly (cheap-talk)

Sequential cheap-talk yield more informative equilibria.

Gerardi-Yariv (2006)

Gerardi-Yariv (2006), *JET*: "Deliberative voting"

Voting in a committee is preceded by a deliberation (cheap-talk with public messages). Compare all threshold voting rules.

Conclusion: all voting rules except unanimity and veto induce the same set of sequential equilibria outcomes.

- An outcome with one rule can be implemented by the following protocol: at deliberation jurors determine the alternative to select, then all vote in favour of it.
- Hence, in all veto-free rule, no vote is pivotal.

Conclusion: maybe institution design is not so important and social-planner should focus on equlibrium selection?

Gershkov-Szentes (2009)

Gershkov-Szentes (2009), *JET*: "Optimal voting schemes with costly information acquisition"

- MD approach to committee decision when agents decide whether or not to acquire signal (standard truthful revelation doesn't apply)
- Optimal mechanism relies on sequentially asking each agent to acquire information and report it, without the agent knowing her order in the sequence or previous reports.
- Mechanism stops when posterior is higher than some cutoff, which is decreasing in the number of signals acquired.

- Conditional on being called, an agent is unlikely to be at the beginning of the sequence, hence the posterior is more likely to be imprecise, hence the agent is more likely to be pivotal, hence willing to acquire and report truthfully