

# On the Potential and Limitations of Proxy Voting: DELEGATION WITH INCOMPLETE VOTES

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In elections over multiple proposals, where voters have incomplete preferences  
imperfect outcomes are expected!



Could have been  
n-times worse than  
the optimal!

Direct  
Voting  
winner

OPT sol/  
if voters  
had complete  
preferences

Could delegation come to the rescue?



majority  
agreement

For agreement threshold =  $\frac{1}{2}$ , all voters will delegate,  
and the optimal proposal will be selected, thanks to the proxy.

## Elections' Setting

single winner election  
m candidate proposals,  
n voters

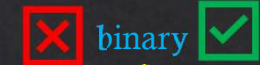
Who casts a ballot?

voters who didn't  
delegate

dReps (weight=#voters  
they represent)

proposal with maximal  
approvals wins

## Voters' Preferences



for all issues  
(intrinsic)

for a subset of  
the issues  
(revealed)

## Delegate Representatives (dReps)

attract voters  
(if there is a sufficient agreement)  
by advertising intended ballots

## GOAL

specify advertised ballots for all dReps to achieve a  $p$ -apx

elect a proposal of  
intrinsic score  $\geq$   
maximal intrinsic score/ $p$

## OPTIMISTIC BEST-CASE SCENARIO

- ★ I do know voters' full preferences.
- ★ I have good intentions and no personal preferences.

Negative Results: limitations  
transfer to realistic settings

Positive Results: limits of  
intractability, starting point for realistic setting

## RESULTS.

### Single dRep

$\exists$  instance: nothing better than  $n$ -apx can be achieved,  
with any advertised ballot, for any threshold bound.



Bounded guarantee: degrades smoothly  
as the size of the largest coherent set  
grows and agreement threshold decreases.

Majority Agreement  
S: largest coherent set

voters who see the same proposals

$3n/|S|$  apx

3 apx

no 1/6 apx

Majority Agreement  
Same Revealed Set

NP-hard

### Two dReps

Majority Agreement

OPT

### Multiple dReps

Any Agreement

Same Revealed Set

Bounded guarantee: dependent on  
agreement threshold, coherence, number of dReps.

