Majority Judgement

A New Voting Method

Rida Laraki
CNRS, LAMSADE and École Polytechnique, Paris

(Joint work with Michel Balinski)
LNMB conferences
The mathematics of operations research
January 14-16, 2014

Contents

Majority principle ?

- Every democratic country and institution pretends to elect its representatives by a majority principle, though the rules by which it does so vary.

Majority principle ?

- Every democratic country and institution pretends to elect its representatives by a majority principle, though the rules by which it does so vary.
- The methods of voting that are used differ in two ways : (1) how voters express their opinions – the inputs – and (2) how the various opinions are amalgamated – the outputs – .

Majority principle ?

- Every democratic country and institution pretends to elect its representatives by a majority principle, though the rules by which it does so vary.
- The methods of voting that are used differ in two ways : (1) how voters express their opinions – the inputs – and (2) how the various opinions are amalgamated – the outputs – .
- Every one of the methods is meant to be – and is commonly referred to being – a “majority decision.”

A challenge

The legitimating force of the majority rule is so pervasive that we often do not notice it and rarely do we question it : We usually take it for granted. [...]
It is much too powerful to make it vulnerable to a philosophical challenge.

(Wojciech Sadurski, 2008).

A challenge

The legitimating force of the majority rule is so pervasive that we often do not notice it and rarely do we question it : We usually take it for granted. [...]
It is much too powerful to make it vulnerable to a philosophical challenge.

(Wojciech Sadurski, 2008).

It is our contention to challenge the current philosophical view of what constitutes a majority decision and propose an alternative.

A tentative definition

Majority decision should be the answer to a specific, operationally pertinent question with which more than half of a jury or electorate can and does agree. The question posed is absolutely essential.

Our objections

More generally, we claim that :

Our objections

More generally, we claim that :

- The traditional methods of voting do not work : they often fail to elect the candidate sought by the voters.

Our objections

More generally, we claim that :

- The traditional methods of voting do not work : they often fail to elect the candidate sought by the voters.
- The traditional conception of voting—the underlying theoretical foundation that goes back to 1299—is based on false premises : it is a faulty model of reality.

Our objections

More generally, we claim that :

- The traditional methods of voting do not work : they often fail to elect the candidate sought by the voters.
- The traditional conception of voting—the underlying theoretical foundation that goes back to 1299—is based on false premises : it is a faulty model of reality.
- The model leads to an inconsistent theory : *real, unacceptable* paradoxes are unavoidable (e.g., Arrow's impossibility theorem, Condorcet's paradox).

Our objections

More generally, we claim that :

- The traditional methods of voting do not work : they often fail to elect the candidate sought by the voters.
- The traditional conception of voting—the underlying theoretical foundation that goes back to 1299—is based on false premises : it is a faulty model of reality.
- The model leads to an inconsistent theory : *real, unacceptable* paradoxes are unavoidable (e.g., Arrow's impossibility theorem, Condorcet's paradox).
- So, why on earth continue to use it ?

Our objections

More generally, we claim that :

- The traditional methods of voting do not work : they often fail to elect the candidate sought by the voters.
- The traditional conception of voting—the underlying theoretical foundation that goes back to 1299—is based on false premises : it is a faulty model of reality.
- The model leads to an inconsistent theory : *real, unacceptable* paradoxes are unavoidable (e.g., Arrow's impossibility theorem, Condorcet's paradox).
- So, why on earth continue to use it ?
- A new conception, a new model, a new theory with new methods are essential.

Our answer

Our answer

- A more realistic conception of how voters imagine their "preferences"—their likes and dislikes—leads to a new model, a new theory and new method of voting.

Our answer

- A more realistic conception of how voters imagine their "preferences"—their likes and dislikes—leads to a new model, a new theory and new method of voting.
- It has been tested in voting, committee decisions and wine competitions.

Our answer

- A more realistic conception of how voters imagine their "preferences"—their likes and dislikes—leads to a new model, a new theory and new method of voting.
- It has been tested in voting, committee decisions and wine competitions.
- The majority judgement is natural, simple, robust, avoids unacceptable paradoxes, resists gaming, and—we claim—is the best of all known methods for choosing a winner and order of finish because it comes closest to meeting all the criteria of a good method of election.

The Problem

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\text{inputs} \longrightarrow \text{ouputs}$$

The Problem

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\text{inputs} \longrightarrow \text{ouputs}$$
$$\text{messages} \longrightarrow \text{decisions}$$

The Problem

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\text{inputs} \longrightarrow \text{ouputs}$$
$$\text{messages} \longrightarrow \text{decisions}$$

The traditional model of social choice :

$$\text{voters' ``preferences''} \longrightarrow \text{society's ``preferences''}$$

The Problem

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\text{inputs} \longrightarrow \text{ouputs}$$
$$\text{messages} \longrightarrow \text{decisions}$$

The traditional model of social choice :

$$\text{voters' ``preferences''} \longrightarrow \text{society's ``preferences''}$$

by which is meant

$$\text{voters' rank-orderings} \longrightarrow \text{society's rank-ordering}$$

The Problem

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

inputs $\longrightarrow$ ouputs
messages $\longrightarrow$ decisions

The traditional model of social choice :

voters' "preferences" $\longrightarrow$ society's "preferences"

by which is meant

voters' rank-orderings $\longrightarrow$ society's rank-ordering

First, this leads to serious inconsistencies.

The Problem

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

inputs $\longrightarrow$ ouputs
messages $\longrightarrow$ decisions

The traditional model of social choice :

voters' "preferences" $\longrightarrow$ society's "preferences"

by which is meant

voters' rank-orderings $\longrightarrow$ society's rank-ordering

First, this leads to serious inconsistencies.

Second, this is an unrealistic vision :

Voters do not have lists of candidates in their minds –
the input messages are the wrong ones.

The answer

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\text{inputs} \longrightarrow \text{ouputs}$$

The answer

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\text{inputs} \longrightarrow \text{ouputs}$$
$$\text{messages} \longrightarrow \text{decisions}$$

The answer

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\text{inputs} \longrightarrow \text{ouputs}$$
$$\text{messages} \longrightarrow \text{decisions}$$

The new model of social choice :

$$\text{voters' ``evaluations''} \longrightarrow \text{society's ``evaluations''}$$

The answer

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\begin{aligned} \text{inputs} &\longrightarrow \text{ouputs} \\ \text{messages} &\longrightarrow \text{decisions} \end{aligned}$$

The new model of social choice :

$$\text{voters' ``evaluations''} \longrightarrow \text{society's ``evaluations''}$$

by which is meant

$$\text{voters' grades} \longrightarrow \begin{cases} \text{society's grades} \\ \text{society's rank-ordering} \end{cases}$$

The answer

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\begin{array}{rcl} \text{inputs} & \longrightarrow & \text{ouputs} \\ \text{messages} & \longrightarrow & \text{decisions} \end{array}$$

The new model of social choice :

$$\text{voters' ``evaluations''} \longrightarrow \text{society's ``evaluations''}$$

by which is meant

$$\text{voters' grades} \longrightarrow \begin{cases} \text{society's grades} \\ \text{society's rank-ordering} \end{cases}$$

First, this leads to a consistent theory.

The answer

The fundamental problem of electing and ranking : to find a *social decision function (SDF)* :

$$\text{inputs} \longrightarrow \text{ouputs}$$
$$\text{messages} \longrightarrow \text{decisions}$$

The new model of social choice :

$$\text{voters' ``evaluations''} \longrightarrow \text{society's ``evaluations''}$$

by which is meant

$$\text{voters' grades} \longrightarrow \begin{cases} \text{society's grades} \\ \text{society's rank-ordering} \end{cases}$$

First, this leads to a consistent theory.

Second, this is a much more realistic vision of what voters (and judges) have in mind.

Contents

The Condorcet Paradox (1786)

Traditionally, a voter input is assumed to be—*commonly* and *in the theory of social choice*—a **list** of candidates that is in his/her mind, **ordered from best to worst**.

The Condorcet Paradox (1786)

Traditionally, a voter input is assumed to be—*commonly* and *in the theory of social choice*—a **list** of candidates that is in his/her mind, **ordered from best to worst**.

The great hope—since Ramun Llull in 1299—has been to choose a *Condorcet-winner* : a candidate who beats every possible opponent face-to-face.

The Condorcet Paradox (1786)

Traditionally, a voter input is assumed to be—*commonly* and *in the theory of social choice*—a **list** of candidates that is in his/her mind, **ordered from best to worst**.

The great hope—since Ramun Llull in 1299—has been to choose a *Condorcet-winner* : a candidate who beats every possible opponent face-to-face.

Of course, there may be no Condorcet-winner :

30%	32%	38%
A	B	C
B	C	A
C	A	B

The Condorcet Paradox (1786)

Traditionally, a voter input is assumed to be—*commonly* and *in the theory of social choice*—a **list** of candidates that is in his/her mind, **ordered from best to worst**.

The great hope—since Ramun Llull in 1299—has been to choose a *Condorcet-winner* : a candidate who beats every possible opponent face-to-face.

Of course, there may be no Condorcet-winner :

30%	32%	38%
A	B	C
B	C	A
C	A	B

	A	B	C
A	–	68%	30%
B	32%	–	62%
C	70%	38%	–

The Condorcet Paradox (1786)

Traditionally, a voter input is assumed to be—*commonly* and *in the theory of social choice*—a **list** of candidates that is in his/her mind, **ordered from best to worst**.

The great hope—since Ramun Llull in 1299—has been to choose a *Condorcet-winner* : a candidate who beats every possible opponent face-to-face.

Of course, there may be no Condorcet-winner :

30%	32%	38%
A	B	C
B	C	A
C	A	B

	A	B	C
A	–	68%	30%
B	32%	–	62%
C	70%	38%	–

because

$$A(68\%) \succ B(62\%) \succ C(70\%) \succ A$$

The Condorcet Paradox (1786)

Traditionally, a voter input is assumed to be—*commonly* and *in the theory of social choice*—a **list** of candidates that is in his/her mind, **ordered from best to worst**.

The great hope—since Ramun Llull in 1299—has been to choose a *Condorcet-winner* : a candidate who beats every possible opponent face-to-face.

Of course, there may be no Condorcet-winner :

30%	32%	38%
A	B	C
B	C	A
C	A	B

	A	B	C
A	–	68%	30%
B	32%	–	62%
C	70%	38%	–

because

$$A(68\%) \succ B(62\%) \succ C(70\%) \succ A$$

The *Condorcet paradox*.

Borda's Method

In 1433, Nicolas Cusanus proposed what is known today as *Borda's method (1780)* :

Points	30%	32%	38%
2	A	B	C
1	B	C	A
0	C	A	B

Borda's Method

In 1433, Nicolas Cusanus proposed what is known today as *Borda's method (1780)* :

Points	30%	32%	38%
2	A	B	C
1	B	C	A
0	C	A	B

Borda score

A : 60+38=98

B : 30+64=94

C : 32+76=108

Borda's Method

In 1433, Nicolas Cusanus proposed what is known today as *Borda's method (1780)* :

Points	30%	32%	38%
2	A	B	C
1	B	C	A
0	C	A	B

Borda score
A : 60+38=98
B : 30+64=94
C : 32+76=108

Or,

	A	B	C	Borda score
A	–	68%	30%	98
B	32%	–	62%	94
C	70%	38%	–	108

Borda's Method

In 1433, Nicolas Cusanus proposed what is known today as *Borda's method (1780)* :

Points	30%	32%	38%
2	A	B	C
1	B	C	A
0	C	A	B

Borda score
A : 60+38=98
B : 30+64=94
C : 32+76=108

Or,

	A	B	C	Borda score
A	–	68%	30%	98
B	32%	–	62%	94
C	70%	38%	–	108

The *Borda-ranking* : $C \succ A \succ B$.

UK's, USA's, France's Methods

UK's, USA's, France's Methods

First-past-the-post (UK, USA, . . .) : A voter names one candidate (the input). The candidate most often named is elected (the output). The question asked to a voter is implicitly : which do you like best ?

UK's, USA's, France's Methods

First-past-the-post (UK, USA, . . .) : A voter names one candidate (the input). The candidate most often named is elected (the output). The question asked to a voter is implicitly : which do you like best ?

Two-past-the-post (France, . . .) : A voter names one candidate. If one candidate is named by more than 50% of the voters, he or she is elected. Otherwise, there is a run-off between the two candidates most often named.

UK's, USA's, France's Methods

First-past-the-post (UK, USA, . . .) : A voter names one candidate (the input). The candidate most often named is elected (the output). The question asked to a voter is implicitly : which do you like best ?

Two-past-the-post (France, . . .) : A voter names one candidate. If one candidate is named by more than 50% of the voters, he or she is elected. Otherwise, there is a run-off between the two candidates most often named.

Approval voting permits a bit more information from voters. The voter may designate as many candidates as she wishes : which would you accept ?. The candidate most often designated wins.
AV was formally introduced by Robert Weber in 1977, though it seems to have been practiced in the Sparta of antique Greece...

Borda wrote :

> *I is generally accepted, and to my knowledge never challenged, that in an election the greatest number of votes always designates the will of the electorate... But I will show that this opinion, that is true when the election is between only two candidates , can mislead in all other cases...*

Borda's example : the winner depends on the method

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

Borda's example : the winner depends on the method

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : $A \succ B \succ C$

Borda's example : the winner depends on the method

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : $A \succ B \succ C$
- (2)Two-past-the-post : $B \succ A \succ C$

Borda's example : the winner depends on the method

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : $A \succ B \succ C$
- (2)Two-past-the-post : $B \succ A \succ C$
- (3) Borda : $C \succ B \succ A$ (and Condorcet)

Borda's example : the winner depends on the method

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : $A \succ B \succ C$
- (2)Two-past-the-post : $B \succ A \succ C$
- (3) Borda : $C \succ B \succ A$ (and Condorcet)

Strategic manipulation pays :

Borda's example : the winner depends on the method

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : $A \succ B \succ C$
- (2)Two-past-the-post : $B \succ A \succ C$
- (3) Borda : $C \succ B \succ A$ (and Condorcet)

Strategic manipulation pays :

- If with (1), the 28% vote for B : B wins.

Borda's example : the winner depends on the method

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : $A \succ B \succ C$
- (2)Two-past-the-post : $B \succ A \succ C$
- (3) Borda : $C \succ B \succ A$ (and Condorcet)

Strategic manipulation pays :

- If with (1), the 28% vote for B : B wins.
- If with (2), the 33% vote for C : C wins.

Borda's example : the winner depends on the method

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : $A \succ B \succ C$
- (2)Two-past-the-post : $B \succ A \succ C$
- (3) Borda : $C \succ B \succ A$ (and Condorcet)

Strategic manipulation pays :

- If with (1), the 28% vote for B : B wins.
- If with (2), the 33% vote for C : C wins.
- If with (3), the 28% vote $B \succ C \succ A$: B wins.

Arrow's paradox

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : A wins
- (2)Two-past-the-post : B wins
- (3) Borda : C wins.

Arrow's paradox

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : A wins
- (2)Two-past-the-post : B wins
- (3) Borda : C wins.

Arrow's paradox :

Arrow's paradox

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : A wins
- (2)Two-past-the-post : B wins
- (3) Borda : C wins.

Arrow's paradox :

- If with (1), C (a loser) drops out, B wins ; if B (a loser) drops out C wins.

Arrow's paradox

5%	33%	34%	28%
A	A	B	C
B	C	C	B
C	B	A	A

	A	B	C
A	–	38%	38%
B	62%	–	39%
C	62%	61%	–

- (1) First-past-the-post : A wins
- (2)Two-past-the-post : B wins
- (3) Borda : C wins.

Arrow's paradox :

- If with (1), C (a loser) drops out, B wins ; if B (a loser) drops out C wins.
- If with (2), A (a loser) drops out, C wins.

Arrow's paradox

33%	3%	16%	18%	30%
A	B	A	C	B
B	C	C	B	A
C	A	B	A	C

	A	B	C
A	–	49%	79%
B	51%	–	66%
C	21%	34%	–

Arrow's paradox

33%	3%	16%	18%	30%
A	B	A	C	B
B	C	C	B	A
C	A	B	A	C

	A	B	C
A	–	49%	79%
B	51%	–	66%
C	21%	34%	–

The Borda-ranking is $A \succ B \succ C$.

Arrow's paradox

33%	3%	16%	18%	30%
A	B	A	C	B
B	C	C	B	A
C	A	B	A	C

	A	B	C
A	–	49%	79%
B	51%	–	66%
C	21%	34%	–

The Borda-ranking is $A \succ B \succ C$.

Yet, B is the Condorcet-winner, $B \succ A \succ C$ the Condorcet-ranking.

Arrow's paradox

33%	3%	16%	18%	30%
A	B	A	C	B
B	C	C	B	A
C	A	B	A	C

	A	B	C
A	–	49%	79%
B	51%	–	66%
C	21%	34%	–

The Borda-ranking is $A \succ B \succ C$.

Yet, B is the Condorcet-winner, $B \succ A \succ C$ the Condorcet-ranking.

If C drops out :

B is the winner : Arrow's paradox !

Natural Axioms

Natural Axioms

A reasonable method of voting should satisfy :

Natural Axioms

A reasonable method of voting should satisfy :

- **A1) Impartiality** : Voters and candidates are treated equally.

Natural Axioms

A reasonable method of voting should satisfy :

- **A1) Impartiality** : Voters and candidates are treated equally.
- **A2) Unanimity** : A candidate judged to be the best by all voters is elected.

Natural Axioms

A reasonable method of voting should satisfy :

- **A1) Impartiality** : Voters and candidates are treated equally.
- **A2) Unanimity** : A candidate judged to be the best by all voters is elected.
- **A3) Rationality** : If the decision decrees A leads B and B leads C, then it should decrees that A leads C.

Natural Axioms

A reasonable method of voting should satisfy :

- **A1) Impartiality** : Voters and candidates are treated equally.
- **A2) Unanimity** : A candidate judged to be the best by all voters is elected.
- **A3) Rationality** : If the decision decrees A leads B and B leads C, then it should decrees that A leads C.
- **A4) Independence** : Adjoining or withdrawing a candidate does not change the order-of-finish.

Natural Axioms

A reasonable method of voting should satisfy :

- **A1) Impartiality** : Voters and candidates are treated equally.
- **A2) Unanimity** : A candidate judged to be the best by all voters is elected.
- **A3) Rationality** : If the decision decrees A leads B and B leads C, then it should decrees that A leads C.
- **A4) Independence** : Adjoining or withdrawing a candidate does not change the order-of-finish.
- **A5) Strategy Proof** : It is a dominant strategy to vote honestly.

Unavoidable conundrum of the traditional model

Unavoidable conundrum of the traditional model

When voters are asked to rank the candidates, then :

Unavoidable conundrum of the traditional model

When voters are asked to rank the candidates, then :

Theorem (Arrow's impossibility)

No rule meets A1, A2, A3 and A4.

Unavoidable conundrum of the traditional model

When voters are asked to rank the candidates, then :

Theorem (Arrow's impossibility)

No rule meets A1, A2, A3 and A4.

Theorem (Gibbard/Satterthwaite's impossibility)

No rule meets A1, A2, A3 and A5.

Contents

The unacceptable paradoxes are real !

2000 Election	Votes	Electoral votes	Florida votes
George W. Bush	50,456,002	271	2,912,790
Albert Gore	50,999,897	266	2,912,253
Ralph Nader	2,882,955	0	97,488

The unacceptable paradoxes are real !

2000 Election	Votes	Electoral votes	Florida votes
George W. Bush	50,456,002	271	2,912,790
Albert Gore	50,999,897	266	2,912,253
Ralph Nader	2,882,955	0	97,488

Florida had 25 electoral votes.

The unacceptable paradoxes are real !

2000 Election	Votes	Electoral votes	Florida votes
George W. Bush	50,456,002	271	2,912,790
Albert Gore	50,999,897	266	2,912,253
Ralph Nader	2,882,955	0	97,488

Florida had 25 electoral votes. Most who voted for Nader would have voted for Gore. Without Nader in Florida :

The unacceptable paradoxes are real !

2000 Election	Votes	Electoral votes	Florida votes
George W. Bush	50,456,002	271	2,912,790
Albert Gore	50,999,897	266	2,912,253
Ralph Nader	2,882,955	0	97,488

Florida had 25 electoral votes. Most who voted for Nader would have voted for Gore. Without Nader in Florida :

2000 Election	Electoral votes
George W. Bush	246
Albert Gore	291

The unacceptable paradoxes are real !

2000 Election	Votes	Electoral votes	Florida votes
George W. Bush	50,456,002	271	2,912,790
Albert Gore	50,999,897	266	2,912,253
Ralph Nader	2,882,955	0	97,488

Florida had 25 electoral votes. Most who voted for Nader would have voted for Gore. Without Nader in Florida :

2000 Election	Electoral votes
George W. Bush	246
Albert Gore	291

Arrow's paradox : a candidate's presence (having no chance of winning whatsoever) can change the outcome.

Are elected Presidents those *wished* by the voters ?

Are elected Presidents those *wished* by the voters ?

First round results 2002 (16 candidates, 72% participation) :

Chirac	Le Pen	Jospin	Bayrou	Laguiller	Chévènement
19,88%	16,86%	16,18%	6,84%	5,72%	5,33%

Mamère	Besancenot	Saint-Josse	Madelin	Hue	Mégret
5,25%	4,25%	4,23%	3,91%	3,37%	2,34%

(Pasqua)	Taubira	Lepage	Boutin	Gluckstein
0%	2,32%	1,88%	1,19%	0,47%

Are elected Presidents those *wished* by the voters ?

First round results 2002 (16 candidates, 72% participation) :

Chirac	Le Pen	Jospin	Bayrou	Laguiller	Chévènement
19,88%	16,86%	16,18%	6,84%	5,72%	5,33%

Mamère	Besancenot	Saint-Josse	Madelin	Hue	Mégret
5,25%	4,25%	4,23%	3,91%	3,37%	2,34%

(Pasqua)	Taubira	Lepage	Boutin	Gluckstein
0%	2,32%	1,88%	1,19%	0,47%

Second round results 2002 (80% participation) :

Chirac	Le Pen
82,21%	17,79%

Are elected Presidents those *wished* by the voters ?

First round results 2002 (16 candidates, 72% participation) :

Chirac	Le Pen	Jospin	Bayrou	Laguiller	Chévènement
19,88%	16,86%	16,18%	6,84%	5,72%	5,33%

Mamère	Besancenot	Saint-Josse	Madelin	Hue	Mégret
5,25%	4,25%	4,23%	3,91%	3,37%	2,34%

(Pasqua)	Taubira	Lepage	Boutin	Gluckstein
0%	2,32%	1,88%	1,19%	0,47%

Second round results 2002 (80% participation) :

Chirac	Le Pen
82,21%	17,79%

Chirac	Jospin
$<$ 50% ?	$>$ 50% ?

Are elected Presidents those *wished* by the voters ?

First round results 2002 (16 candidates, 72% participation) :

Chirac	Le Pen	Jospin	Bayrou	Laguiller	Chévènement
19,88%	16,86%	16,18%	6,84%	5,72%	5,33%

Mamère	Besancenot	Saint-Josse	Madelin	Hue	Mégret
5,25%	4,25%	4,23%	3,91%	3,37%	2,34%

(Pasqua)	Taubira	Lepage	Boutin	Gluckstein
0%	2,32%	1,88%	1,19%	0,47%

Second round results 2002 (80% participation) :

Chirac	Le Pen
82,21%	17,79%

Chirac	Jospin
$<$ 50% ?	$>$ 50% ?

Jospin	Le Pen
$>$ 75%	$<$ 25%

Are elected Presidents those *wished* by the voters ?

First round results 2002 (16 candidates, 72% participation) :

Chirac	Le Pen	Jospin	Bayrou	Laguiller	Chévènement
19,88%	16,86%	16,18%	6,84%	5,72%	5,33%

Mamère	Besancenot	Saint-Josse	Madelin	Hue	Mégret
5,25%	4,25%	4,23%	3,91%	3,37%	2,34%

(Pasqua)	Taubira	Lepage	Boutin	Gluckstein
0%	2,32%	1,88%	1,19%	0,47%

Second round results 2002 (80% participation) :

Chirac	Le Pen
82,21%	17,79%

Chirac	Jospin
$<$ 50% ?	$>$ 50% ?

Jospin	Le Pen
$>$ 75%	$<$ 25%

Arrow paradoxes and strategic manipulation galore !

Are elected Presidents those *wished* by the voters?

2007 presidential election.

In response to 2002, 30% of French voters did not vote for their first choices in 2007 : they voted strategically ("le vote utile").

Are elected Presidents those *wished* by the voters ?

2007 presidential election.

In response to 2002, 30% of French voters did not vote for their first choices in 2007 : they voted strategically ("le vote utile").

Minor candidates of the left obtained 27% in 2002, only 11% in 2007.

Are elected Presidents those *wished* by the voters ?

2007 presidential election.

In response to 2002, 30% of French voters did not vote for their first choices in 2007 : they voted strategically (“le vote utile”).

Minor candidates of the left obtained 27% in 2002, only 11% in 2007.

Minor candidates of the right obtained 16% in 2002, only 3% in 2007.

2007 election, first round, 12 candidates

First round results :

Sarkozy	Royal	Bayrou	Le Pen	Besancenot	de Villiers
31,18%	25,87%	18,57%	10,44%	4,08%	2,23%

Buffet	Voynet	Laguiller	Bové	Nihous	Schivardi
1,93%	1,57%	1,33%	1,32%	1,15%	0,34%

2007 election, first round, 12 candidates

First round results :

Sarkozy	Royal	Bayrou	Le Pen	Besancenot	de Villiers
31,18%	25,87%	18,57%	10,44%	4,08%	2,23%

Buffet	Voynet	Laguiller	Bové	Nihous	Schivardi
1,93%	1,57%	1,33%	1,32%	1,15%	0,34%

Sarkozy was the winner with two-past-the-post system :

Nicolas Sarkozy 53%   Ségoléne Royal 47%

Are elected Presidents those *wished* by the voters ?

Second round poll of March 20 (TNS-SOFRES) :

	Bayrou	Le Pen	Royal	Sarkozy
Bayrou	—	84%	57%	54%
Le Pen	16%	—	25%	16%
Royal	46%	75%	—	46%
Sarkozy	46%	84%	54%	—

These estimates confirmed by many polls and experiments.

Are elected Presidents those *wished* by the voters ?

Second round poll of March 20 (TNS-SOFRES) :

	Bayrou	Le Pen	Royal	Sarkozy
Bayrou	—	84%	57%	54%
Le Pen	16%	—	25%	16%
Royal	46%	75%	—	46%
Sarkozy	46%	84%	54%	—

These estimates confirmed by many polls and experiments. The same poll stated that

- among Royal voters, 72% for Bayrou against Sarkozy in the second round, and
- among Sarkozy voters, 75% for Bayrou against Royal in the second round.

Are elected Presidents those *wished* by the voters ?

Second round poll of March 20 (TNS-SOFRES) :

	Bayrou	Le Pen	Royal	Sarkozy
Bayrou	—	84%	57%	54%
Le Pen	16%	—	25%	16%
Royal	46%	75%	—	46%
Sarkozy	46%	84%	54%	—

These estimates confirmed by many polls and experiments. The same poll stated that

- among Royal voters, 72% for Bayrou against Sarkozy in the second round, and
- among Sarkozy voters, 75% for Bayrou against Royal in the second round.

Bayrou the Condocet-winner and Borda-winner, Sarkozy the first-past-the-post-winner and two-past-the-post winner ! ! !

Arrow's paradox : 1997 European Championships, men's free skating

	J_1	J_2	J_3	J_4	J_5	J_6	J_7	J_8	J_9	Mark	Place
Candeloro	3	2	5	2	3	3	5	6	6	3/5	2^{nd}
Kulik	2	4	2	3	6	5	3	4	5	4/6	5^{th}
Urmanov	1	1	1	1	1	2	1	1	1	1/8	1^{st}
Yagudin	4	3	3	6	4	6	4	3	2	4/7	4^{th}
Zagorodniuk	5	5	4	4	2	4	2	2	3	4/7	3^{rd}
Vlascenko	6	6	6	5	5	1	6	5	4	5/5	6^{th}

Arrow's paradox : 1997 European Championships, men's free skating

	J_1	J_2	J_3	J_4	J_5	J_6	J_7	J_8	J_9	Mark	Place
Candeloro	3	2	5	2	3	3	5	6	6	3/5	2^{nd}
Kulik	2	4	2	3	6	5	3	4	5	4/6	5^{th}
Urmanov	1	1	1	1	1	2	1	1	1	1/8	1^{st}
Yagudin	4	3	3	6	4	6	4	3	2	4/7	4^{th}
Zagorodniuk	5	5	4	4	2	4	2	2	3	4/7	3^{rd}
Vlascenko	6	6	6	5	5	1	6	5	4	5/5	6^{th}

Before the performance of Vlascenko, the order was :
1^{st} Urmanov, 2^{nd} Zagorodniuk, 3^{rd} Candeloro... ! ! !

Strategic manipulations in skating

- The outcry over this flip-flop was so strident that the rules used for many years were changed. The ISU adopted the OBO rule ("one-by-one") in 1998 :
  - Rank the competitors by their number of wins (Condorcet's) ;
  - break any ties by using Borda's rule.

Strategic manipulations in skating

- The outcry over this flip-flop was so strident that the rules used for many years were changed. The ISU adopted the OBO rule ("one-by-one") in 1998 :
    - Rank the competitors by their number of wins (Condorcet's) ;
    - break any ties by using Borda's rule.

Strategic manipulations in skating

- The outcry over this flip-flop was so strident that the rules used for many years were changed. The ISU adopted the OBO rule ("one-by-one") in 1998 :
  - Rank the competitors by their number of wins (Condorcet's) ;
  - break any ties by using Borda's rule.

Strategic manipulations in skating

- The outcry over this flip-flop was so strident that the rules used for many years were changed. The ISU adopted the OBO rule ("one-by-one") in 1998 :
  - Rank the competitors by their number of wins (Condorcet's) ;
  - break any ties by using Borda's rule.
- This rule was proposed by Dasgupta and Maskin with elaborate theoretical arguments, calling it "the fairest vote of all".

Strategic manipulations in skating

- The outcry over this flip-flop was so strident that the rules used for many years were changed. The ISU adopted the OBO rule ("one-by-one") in 1998 :
  - Rank the competitors by their number of wins (Condorcet's) ;
  - break any ties by using Borda's rule.
- This rule was proposed by Dasgupta and Maskin with elaborate theoretical arguments, calling it "the fairest vote of all".
- Namely, if voters are naturally restricted in their domain (because of some ideological opinions, such as a left right spectra), then it best avoids Arrow's paradox and combats strategic manipulations, among all raking-based methods.

Strategic manipulations in skating

- The outcry over this flip-flop was so strident that the rules used for many years were changed. The ISU adopted the OBO rule ("one-by-one") in 1998 :
  - Rank the competitors by their number of wins (Condorcet's) ;
  - break any ties by using Borda's rule.
- This rule was proposed by Dasgupta and Maskin with elaborate theoretical arguments, calling it "the fairest vote of all".
- Namely, if voters are naturally restricted in their domain (because of some ideological opinions, such as a left right spectra), then it best avoids Arrow's paradox and combats strategic manipulations, among all raking-based methods.
- We prove it to be subject to Arrow's paradox, in a real skating competition (see our forthcoming OR paper).

Strategic manipulations in skating

Accumulated evidence shows that judges in skating had strong national biases :

> *"The data suggests that countries are divided into two blocs, with the United States, Canada, Germany and Italy on one side and Russia, the Ukraine, France and Poland on the other" (Zitzewitz 2006).*

Strategic manipulations in skating

The big "scandal" of the 2002 Olympic games in Salt Lake City : the first two finishers in the pairs figure skating competition.

Strategic manipulations in skating

The big “scandal” of the 2002 Olympic games in Salt Lake City : the first two finishers in the pairs figure skating competition.

- The Russian pair first, the Canadian pair second ;
- the public (and some experts) outraged ;

Strategic manipulations in skating

The big “scandal” of the 2002 Olympic games in Salt Lake City : the first two finishers in the pairs figure skating competition.

- The Russian pair first, the Canadian pair second ;
- the public (and some experts) outraged ;
- a French judge confessed having favored the Russians (under pressure) ...then denied it ;

Strategic manipulations in skating

The big "scandal" of the 2002 Olympic games in Salt Lake City : the first two finishers in the pairs figure skating competition.

- The Russian pair first, the Canadian pair second ;
- the public (and some experts) outraged ;
- a French judge confessed having favored the Russians (under pressure) . . . then denied it ;
- the decision amended : both pairs finished first ;

Strategic manipulations in skating

The big “scandal” of the 2002 Olympic games in Salt Lake City : the first two finishers in the pairs figure skating competition.

- The Russian pair first, the Canadian pair second ;
- the public (and some experts) outraged ;
- a French judge confessed having favored the Russians (under pressure) . . . then denied it ;
- the decision amended : both pairs finished first ;
- deep divisions in the skating world leading to the formulation of a new system (replacing the newly adopted OBO rule).

Strategic manipulations in skating

The big "scandal" of the 2002 Olympic games in Salt Lake City : the first two finishers in the pairs figure skating competition.

- The Russian pair first, the Canadian pair second ;
- the public (and some experts) outraged ;
- a French judge confessed having favored the Russians (under pressure) ...then denied it ;
- the decision amended : both pairs finished first ;
- deep divisions in the skating world leading to the formulation of a new system (replacing the newly adopted OBO rule).
- the new system is based only on evaluations and its supposed (without any theoretical support) to avoid Arrow's paradox and combat strategic manipulations. It does in some extend, but not optimally.

Contents

Condorcet's method

In 1789, the Marquis the Condorcet proposed the *Condorcet-ranking*. It is known as Kemeny's rule. It associates a score to each possible rank ordering.

Condorcet's method

In 1789, the Marquis the Condorcet proposed the *Condorcet-ranking*. It is known as Kemeny's rule. It associates a score to each possible rank ordering.

A voter contributes k *Condorcet-points* to a rank-ordering if his input agrees in k pair-by-pair comparisons.

Condorcet's method

In 1789, the Marquis the Condorcet proposed the *Condorcet-ranking*. It is known as Kemeny's rule. It associates a score to each possible rank ordering.

A voter contributes k *Condorcet-points* to a rank-ordering if his input agrees in k pair-by-pair comparisons.

The *Condorcet-score* of a rank-ordering is the sum of its Condorcet-points over all voters.

Condorcet's method

In 1789, the Marquis the Condorcet proposed the *Condorcet-ranking*. It is known as Kemeny's rule. It associates a score to each possible rank ordering.

A voter contributes k *Condorcet-points* to a rank-ordering if his input agrees in k pair-by-pair comparisons.

The *Condorcet-score* of a rank-ordering is the sum of its Condorcet-points over all voters.

The *Condorcet-ranking* is the ranking that maximizes the Condorcet-score.

Condorcet's method

In 1789, the Marquis the Condorcet proposed the *Condorcet-ranking*. It is known as Kemeny's rule. It associates a score to each possible rank ordering.

A voter contributes k *Condorcet-points* to a rank-ordering if his input agrees in k pair-by-pair comparisons.

The *Condorcet-score* of a rank-ordering is the sum of its Condorcet-points over all voters.

The *Condorcet-ranking* is the ranking that maximizes the Condorcet-score.

Property 1 : the method is Condorcet consistent : the *Condorcet-winner* —(when he exists)—is always the first-ranked by the Condorcet-ranking.

Condorcet's method

In 1789, the Marquis the Condorcet proposed the *Condorcet-ranking*. It is known as Kemeny's rule. It associates a score to each possible rank ordering.

A voter contributes k *Condorcet-points* to a rank-ordering if his input agrees in k pair-by-pair comparisons.

The *Condorcet-score* of a rank-ordering is the sum of its Condorcet-points over all voters.

The *Condorcet-ranking* is the ranking that maximizes the Condorcet-score.

Property 1 : the method is Condorcet consistent : the *Condorcet-winner* —(when he exists)—is always the first-ranked by the Condorcet-ranking.
Property 2 : computing a Condorcet-Kemeny ranking is NP-hard (Bartholdi, Tovey, and Trick, 1989).

Winners and rankings ?

Is Borda's method good for designating a winner, or a ranking, or both ?

Winners and rankings ?

Is Borda's method good for designating a winner, or a ranking, or both ?
Is Condorcet's method good for designating a winner, or a ranking, or both ?

Winners and rankings ?

Is Borda's method good for designating a winner, or a ranking, or both ?
Is Condorcet's method good for designating a winner, or a ranking, or both ?
Intuitively, both :

Winners and rankings ?

Is Borda's method good for designating a winner, or a ranking, or both ?
Is Condorcet's method good for designating a winner, or a ranking, or both ?
Intuitively, both :

- Given a method of ranking, the first-placed candidate is the winner.

Winners and rankings ?

Is Borda's method good for designating a winner, or a ranking, or both ?
Is Condorcet's method good for designating a winner, or a ranking, or both ?
Intuitively, both :

- Given a method of ranking, the first-placed candidate is the winner.
- Given a method of designating a winner (or loser), he is the first-ranked (or last-ranked) ; the second-ranked is the winner among the remaining candidates ; . . .

Borda for winners

Given a profile of preferences, a *candidate-scoring method* assigns a nonnegative score to every candidate.

Borda for winners

Given a profile of preferences, a *candidate-scoring method* assigns a nonnegative score to every candidate.
It should :

Borda for winners

Given a profile of preferences, a *candidate-scoring method* assigns a nonnegative score to every candidate.
It should :

- (1) *assign a 0 to the worst possible candidate* : give a 0 to a candidate last on every voter's list ;

Borda for winners

Given a profile of preferences, a *candidate-scoring method* assigns a nonnegative score to every candidate.
It should :

- (1) *assign a 0 to the worst possible candidate* : give a 0 to a candidate last on every voter's list ;
- (2) *correctly reward a minimal improvement* : when a voter inverts two successive candidates of his list, the score of the candidate who moves up increases by 1.

Borda for winners

Given a profile of preferences, a *candidate-scoring method* assigns a nonnegative score to every candidate.
It should :

- (1) *assign a 0 to the worst possible candidate* : give a 0 to a candidate last on every voter's list ;
- (2) *correctly reward a minimal improvement* : when a voter inverts two successive candidates of his list, the score of the candidate who moves up increases by 1.

Theorem

Borda-score characterization. *The Borda-score is the unique candidate-scoring method that assigns a 0 to the worst possible candidate and correctly rewards minimal improvements.*

Borda for winners

Given a profile of preferences, a *candidate-scoring method* assigns a nonnegative score to every candidate.
It should :

- (1) *assign a 0 to the worst possible candidate* : give a 0 to a candidate last on every voter's list ;
- (2) *correctly reward a minimal improvement* : when a voter inverts two successive candidates of his list, the score of the candidate who moves up increases by 1.

Theorem

Borda-score characterization. *The Borda-score is the unique candidate-scoring method that assigns a 0 to the worst possible candidate and correctly rewards minimal improvements.*

Moral : The Borda-score concerns *winners*.

Condorcet for rankings

Given a profile of preferences, a *rank-scoring method* assigns a nonnegative score to every ranking.

Condorcet for rankings

Given a profile of preferences, a *rank-scoring method* assigns a nonnegative score to every ranking.

The *opposite* of a ranking $A \succ B \succ C \succ D \succ \ldots$ is $A \prec B \prec C \prec D \prec \ldots$.

Condorcet for rankings

Given a profile of preferences, a *rank-scoring method* assigns a nonnegative score to every ranking.

The *opposite* of a ranking $A \succ B \succ C \succ D \succ \ldots$ is $A \prec B \prec C \prec D \prec \ldots$.

A rank-scoring method should :

Condorcet for rankings

Given a profile of preferences, a *rank-scoring method* assigns a nonnegative score to every ranking.

The *opposite* of a ranking $A \succ B \succ C \succ D \succ \ldots$ is $A \prec B \prec C \prec D \prec \ldots$.

A rank-scoring method should :

- (1) *assign a 0 to the worst possible ranking* : give a 0 to a ranking if every voter's preference is the opposite ranking ;

Condorcet for rankings

Given a profile of preferences, a *rank-scoring method* assigns a nonnegative score to every ranking.

The *opposite* of a ranking $A \succ B \succ C \succ D \succ \dots$ is $A \prec B \prec C \prec D \prec \dots$.

A rank-scoring method should :

- (1) *assign a 0 to the worst possible ranking* : give a 0 to a ranking if every voter's preference is the opposite ranking ;
- (2) *correctly reward a minimal improvement* : when one voter inverts two successive candidates of his list, the score of every order that agrees with the change increases by 1.

Condorcet for rankings

Given a profile of preferences, a *rank-scoring method* assigns a nonnegative score to every ranking.

The *opposite* of a ranking $A \succ B \succ C \succ D \succ \ldots$ is $A \prec B \prec C \prec D \prec \ldots$.

A rank-scoring method should :

- (1) *assign a 0 to the worst possible ranking* : give a 0 to a ranking if every voter's preference is the opposite ranking ;
- (2) *correctly reward a minimal improvement* : when one voter inverts two successive candidates of his list, the score of every order that agrees with the change increases by 1.

Theorem

Condorcet-score characterization. *The Condorcet-score is the unique rank-scoring method that assigns a 0 to the worst possible order and correctly rewards minimal improvements.*

Condorcet for rankings

Given a profile of preferences, a *rank-scoring method* assigns a nonnegative score to every ranking.

The *opposite* of a ranking $A \succ B \succ C \succ D \succ \ldots$ is $A \prec B \prec C \prec D \prec \ldots$.

A rank-scoring method should :

- (1) *assign a 0 to the worst possible ranking* : give a 0 to a ranking if every voter's preference is the opposite ranking ;
- (2) *correctly reward a minimal improvement* : when one voter inverts two successive candidates of his list, the score of every order that agrees with the change increases by 1.

Theorem

Condorcet-score characterization. *The Condorcet-score is the unique rank-scoring method that assigns a 0 to the worst possible order and correctly rewards minimal improvements.*

Moral : The Condorcet-score concerns *rankings*.

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

$333 : A \succ B \succ C \qquad 333 : B \succ C \succ A \qquad 333 : C \succ A \succ B$

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

$333 : A \succ B \succ C$ $\quad$ $333 : B \succ C \succ A$ $\quad$ $333 : C \succ A \succ B$

$1 : A \succ C \succ B.$

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

$333 : A \succ B \succ C \qquad 333 : B \succ C \succ A \qquad 333 : C \succ A \succ B$

$1 : A \succ C \succ B.$

- By Borda :

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

$333 : A \succ B \succ C \qquad 333 : B \succ C \succ A \qquad 333 : C \succ A \succ B$

$1 : A \succ C \succ B.$

- By Borda :
  - A is the winner, B the loser : reasonable

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

$333 : A \succ B \succ C$ $\quad$ $333 : B \succ C \succ A$ $\quad$ $333 : C \succ A \succ B$

$1 : A \succ C \succ B.$

- By Borda :
  - A is the winner, B the loser : reasonable
  - Thus, society's order is $A \succ_S C \succ_S B$: unreasonable

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

$333 : A \succ B \succ C$ $333 : B \succ C \succ A$ $333 : C \succ A \succ B$

$1 : A \succ C \succ B.$

- By Borda :
  - A is the winner, B the loser : reasonable
  - Thus, society's order is $A \succ_S C \succ_S B$: unreasonable
- By Condorcet :
  - $A \succ_S B \succ_S C$ and $C \succ_S A \succ_S B$ tied for first : reasonable

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

$333 : A \succ B \succ C$ $\quad$ $333 : B \succ C \succ A$ $\quad$ $333 : C \succ A \succ B$

$1 : A \succ C \succ B.$

- By Borda :
  - A is the winner, B the loser : reasonable
  - Thus, society's order is $A \succ_S C \succ_S B$: unreasonable
- By Condorcet :
  - $A \succ_S B \succ_S C$ and $C \succ_S A \succ_S B$ tied for first : reasonable

No reasonable ranking function must choose $A \succ C \succ B$.

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

$333 : A \succ B \succ C$ $\quad$ $333 : B \succ C \succ A$ $\quad$ $333 : C \succ A \succ B$

$1 : A \succ C \succ B.$

- By Borda :
  - A is the winner, B the loser : reasonable
  - Thus, society's order is $A \succ_S C \succ_S B$: unreasonable
- By Condorcet :
  - $A \succ_S B \succ_S C$ and $C \succ_S A \succ_S B$ tied for first : reasonable

No reasonable ranking function must choose $A \succ C \succ B$.
Any reasonable choice function must choose $A \succ C \succ B$..

Winners or rankings ?

Are ranking and designating winners two sides of one coin ?

$333 : A \succ B \succ C$ $\quad$ $333 : B \succ C \succ A$ $\quad$ $333 : C \succ A \succ B$

$1 : A \succ C \succ B.$

- By Borda :
  - A is the winner, B the loser : reasonable
  - Thus, society's order is $A \succ_S C \succ_S B$: unreasonable
- By Condorcet :
  - $A \succ_S B \succ_S C$ and $C \succ_S A \succ_S B$ tied for first : reasonable

No reasonable ranking function must choose $A \succ C \succ B$.
Any reasonable choice function must choose $A \succ C \succ B$..
A fundamental incompatibility between electing and ranking.

Contents

Majority judgement : ranking three wines

Anjou	Bourgogne	Chablis
Very good	*Excellent*	*Excellent*
Very good	*Very good*	*Excellent*
Good	*Good*	*Good*
Good	*Good*	*Passable*
Passable	*Mediocre*	*Mediocre*

Majority judgement : ranking three wines

Anjou	Bourgogne	Chablis
Very good	*Excellent*	*Excellent*
Very good	*Very good*	*Excellent*
Good	*Good*	*Good*
Good	*Good*	*Passable*
Passable	*Mediocre*	*Mediocre*

Anjou	Bourgogne	Chablis
Very good	*Excellent*	*Excellent*
Very good	*Very good*	*Excellent*
Good	*Good*	*Passable*
Passable	*Mediocre*	*Mediocre*

Majority judgement : ranking three wines

Anjou	Bourgogne
Very good	*Excellent*
Very good	*Very good*
Passable	*Mediocre*

Majority judgement : ranking three wines

Anjou	Bourgogne
Very good	*Excellent*
Very good	*Very good*
Passable	*Mediocre*

Anjou	Bourgogne
Very good	*Excellent*
Passable	*Mediocre*

Majority judgement : ranking three wines

Anjou	Bourgogne
Very good	*Excellent*
Very good	*Very good*
Passable	*Mediocre*

Anjou	Bourgogne
Very good	*Excellent*
Passable	*Mediocre*

Therefore : Anjou $\succ$ Bourgogne $\succ$ Chablis

The majority judgement : voters judge each candidate

Ballot : Election of the President of France 2007

To be president of France,
having taken into account all considerations,
I judge, in conscience, that this candidate would be :

	Excellent	*Very Good*	*Good*	*Acceptable*	*Poor*	*to Reject*
Olivier Besancenot						
Marie-George Buffet						
Gérard Schivardi						
François Bayrou						
José Bové						
Dominique Voynet						
Philippe de Villiers						
Ségolène Royal						
Frédéric Nihous						
Jean-Marie Le Pen						
Arlette Laguiller						
Nicolas Sarkozy						

Check one single grade in the line of each candidate.
No grade checked in the line of a candidate means to Reject the candidate.

The new point of view

The new point of view

- Voters do not vote : they judge candidates in a *common language* of grades.

The new point of view

- Voters do not vote : they judge candidates in a *common language* of grades.
- With 12 candidates, first- or two-past-the-vote allows a voter 13 or 39 ($= 13 \times 3$) possible messages ; the majority judgement with a common language of 6 grades allows a voter 6^{12}, *i.e.*, over 2 billion possible messages : voters can really express their opinions.

The new point of view

- Voters do not vote : they judge candidates in a *common language* of grades.
- With 12 candidates, first- or two-past-the-vote allows a voter 13 or 39 ($= 13 \times 3$) possible messages ; the majority judgement with a common language of 6 grades allows a voter 6^{12}, *i.e.*, over 2 billion possible messages : voters can really express their opinions.
- A candidate's set of grades determines his/her *majority-grade* : it is the "final-grade" conferred upon the candidate by the electorate.

The new point of view

- Voters do not vote : they judge candidates in a *common language* of grades.
- With 12 candidates, first- or two-past-the-vote allows a voter 13 or 39 ($= 13 \times 3$) possible messages ; the majority judgement with a common language of 6 grades allows a voter 6^{12}, *i.e.*, over 2 billion possible messages : voters can really express their opinions.
- A candidate's set of grades determines his/her *majority-grade* : it is the "final-grade" conferred upon the candidate by the electorate.
- The candidates are ranked according to their majority-grades : the first among them is the winner.

The charge to voters, and the common language

It is important to pose a clear and *solemn* question.

The charge to voters, and the common language

It is important to pose a clear and *solemn* question.

By and large people—in particular, voters and judges—try to answer the question posed.

The charge to voters, and the common language

It is important to pose a clear and *solemn* question.

By and large people—in particular, voters and judges—try to answer the question posed.

A common language of grades is essential.

The charge to voters, and the common language

It is important to pose a clear and *solemn* question.

By and large people—in particular, voters and judges—try to answer the question posed.

A common language of grades is essential.

In our new theory Arrow's impossibility theorem says : without a common language there can be no consistent collective decision.

The charge to voters, and the common language

It is important to pose a clear and *solemn* question.

By and large people—in particular, voters and judges—try to answer the question posed.

A common language of grades is essential.

In our new theory Arrow's impossibility theorem says : without a common language there can be no consistent collective decision.

Common languages definitely do exist in practice (e.g., diving, gymnastic and figure skating competitions, wine competitions, students' grades, . . .).

The charge to voters, and the common language

It is important to pose a clear and *solemn* question.

By and large people—in particular, voters and judges—try to answer the question posed.

A common language of grades is essential.

In our new theory Arrow's impossibility theorem says : without a common language there can be no consistent collective decision.

Common languages definitely do exist in practice (e.g., diving, gymnastic and figure skating competitions, wine competitions, students' grades, . . .).

The words used in the French experiment constitute—for France—a common language. This is proven by extensive statistical analyses of the majority judgement ballots cast in the "2007 Orsay experiment."

The majority-grade

A candidate's majority-grade is the middlemost (or median) of his or her grades :

Excellent	Very Good	Good	Acceptable	Poor	To Reject
8%	23%	27%	12%	19%	11%

The majority-grade

A candidate's majority-grade is the middlemost (or median) of his or her grades :

Excellent	Very Good	Good	Acceptable	Poor	To Reject
8%	23%	27%	12%	19%	11%

A majority of voters have assigned the candidate at least this grade,

$$8\% + 23\% + 27\% = 58\% \text{ of voters assign at least ``Good''}$$

The majority-grade

A candidate's majority-grade is the middlemost (or median) of his or her grades :

Excellent	Very Good	Good	Acceptable	Poor	To Reject
8%	23%	27%	12%	19%	11%

A majority of voters have assigned the candidate at least this grade,

$$8\% + 23\% + 27\% = 58\% \text{ of voters assign at least ``Good''}$$

A majority of voters have assigned the candidate at most this grade,

$$27\% + 12\% + 19\% + 11\% = 69\% \text{ of voters assign at most ``Good''}$$

Strategy Proof in Grading

Excellent	Very Good	Good	Acceptable	Poor	To Reject
8%	23%	27%	12%	19%	11%

Strategy Proof in Grading

Excellent	Very Good	Good	Acceptable	Poor	To Reject
8%	23%	27%	12%	19%	11%

Suppose a voter or bloc of voters judged this candidate "Very Good" : he/she or they have no reason to exaggerate the grade by giving an "Excellent."

Strategy Proof in Grading

Excellent	Very Good	Good	Acceptable	Poor	To Reject
8%	23%	27%	12%	19%	11%

Suppose a voter or bloc of voters judged this candidate "Very Good" : he/she or they have no reason to exaggerate the grade by giving an "Excellent."

Suppose a voter or bloc of voters judged this candidate "Acceptable" : he/she or they have no reason to exaggerate the grade by giving a "Poor" or "to Reject."

Strategy Proof in Grading

Excellent	Very Good	Good	Acceptable	Poor	To Reject
8%	23%	27%	12%	19%	11%

Suppose a voter or bloc of voters judged this candidate "Very Good" : he/she or they have no reason to exaggerate the grade by giving an "Excellent."

Suppose a voter or bloc of voters judged this candidate "Acceptable" : he/she or they have no reason to exaggerate the grade by giving a "Poor" or "to Reject."

Theorem

The majority-grade is strategy-proof-in-grading

Strategy Proof in Grading

Excellent	Very Good	Good	Acceptable	Poor	To Reject
8%	23%	27%	12%	19%	11%

Suppose a voter or bloc of voters judged this candidate "Very Good" : he/she or they have no reason to exaggerate the grade by giving an "Excellent."

Suppose a voter or bloc of voters judged this candidate "Acceptable" : he/she or they have no reason to exaggerate the grade by giving a "Poor" or "to Reject."

Theorem

The majority-grade is strategy-proof-in-grading

The majority-grade respects a majority opinion : If a majority gives a grade of (say) "Acceptable" then that is the majority-grade.

Strategy Proof in Grading

Excellent	Very Good	Good	Acceptable	Poor	To Reject
8%	23%	27%	12%	19%	11%

Suppose a voter or bloc of voters judged this candidate "Very Good" : he/she or they have no reason to exaggerate the grade by giving an "Excellent."

Suppose a voter or bloc of voters judged this candidate "Acceptable" : he/she or they have no reason to exaggerate the grade by giving a "Poor" or "to Reject."

Theorem

The majority-grade is strategy-proof-in-grading

The majority-grade respects a majority opinion : If a majority gives a grade of (say) "Acceptable" then that is the majority-grade.

The majority-grade uniquely satisfies these and other properties.

French President elections experiment at Orsay, April 23, 2007

French President elections experiment at Orsay, April 23, 2007

- Experiment conducted in 3 of Orsay's 12 voting bureaux.

French President elections experiment at Orsay, April 23, 2007

- Experiment conducted in 3 of Orsay's 12 voting bureaux.
- These three are not representative of France.

French President elections experiment at Orsay, April 23, 2007

- Experiment conducted in 3 of Orsay's 12 voting bureaux.
- These three are not representative of France.
- Potential participants informed by mailings, local publications and posters with active participation of the Mayor's office.

French President elections experiment at Orsay, April 23, 2007

- Experiment conducted in 3 of Orsay's 12 voting bureaux.
- These three are not representative of France.
- Potential participants informed by mailings, local publications and posters with active participation of the Mayor's office.
- After casting their official ballots, voters invited to cast majority judgment ballots (at adjacent tables and booths).

French President elections experiment at Orsay, April 23, 2007

- Experiment conducted in 3 of Orsay's 12 voting bureaux.
- These three are not representative of France.
- Potential participants informed by mailings, local publications and posters with active participation of the Mayor's office.
- After casting their official ballots, voters invited to cast majority judgment ballots (at adjacent tables and booths).
- Carried out under identical conditions : ballots filled out in booths, inserted in envelopes and deposited in transparent urns.

French President elections experiment at Orsay, April 23, 2007

- Experiment conducted in 3 of Orsay's 12 voting bureaux.
- These three are not representative of France.
- Potential participants informed by mailings, local publications and posters with active participation of the Mayor's office.
- After casting their official ballots, voters invited to cast majority judgment ballots (at adjacent tables and booths).
- Carried out under identical conditions : ballots filled out in booths, inserted in envelopes and deposited in transparent urns.
- 2,360 voted officially, 1,752 (74%) participated in experiment, 1,733 ballots valid. 1,705 were different.

French President elections experiment at Orsay, April 23, 2007

- Experiment conducted in 3 of Orsay's 12 voting bureaux.
- These three are not representative of France.
- Potential participants informed by mailings, local publications and posters with active participation of the Mayor's office.
- After casting their official ballots, voters invited to cast majority judgment ballots (at adjacent tables and booths).
- Carried out under identical conditions : ballots filled out in booths, inserted in envelopes and deposited in transparent urns.
- 2,360 voted officially, 1,752 (74%) participated in experiment, 1,733 ballots valid. 1,705 were different.
- Television interviews prove the satisfaction of voters.

Results French Presidential elections, Orsay 3 Bureaux

A politically aware observer of France is able to fill in the blanks.

	Excel.	V.Good	Good	Accpt.	Poor	Rej.	Blank
	13.6%	30.7%	25.1%	14.8	8.4%	4.5%	2.9%
	16.7%	22.7%	19.1%	16.8%	12.2%	10.8%	1.8%
	19.1%	19.8%	14.3%	11.5%	7.1%	26.5%	1.7%
Voynet	2.9%	9.3%	17.5%	23.7%	26.1%	16.2%	4.3%
Besancenot	4.1%	9.9%	16.3%	16.0%	22.6%	27.9%	3.2%
Buffet	2.5%	7.6%	12.5%	20.6%	26.4%	26.1%	4.3%
Bové	1.5%	6.0%	11.4%	16.0%	25.7%	35.3%	4.2%
Laguiller	2.1%	5.3%	10.2%	16.6%	25.9%	34.8%	5.3%
Nihous	0.3%	1.8%	5.3%	11.0%	26.7%	47.8%	7.2%
Villiers	2.4%	6.4%	8.7%	11.3%	15.8%	51.2%	4.3%
Schivardi	0.5%	1.0%	3.9%	9.5%	24.9%	54.6%	5.8%
	3.0%	4.6%	6.2%	6.5%	5.4%	71.7%	2.7%

Red indicates the majority-grade.

Results French Presidential elections, Orsay 3 Bureaux

A politically aware observer of France is able to fill in the blanks.

	Excel.	V.Good	Good	Accpt.	Poor	Rej.	Blank
Bayrou	13.6%	30.7%	25.1%	14.8	8.4%	4.5%	2.9%
Royal	16.7%	22.7%	19.1%	16.8%	12.2%	10.8%	1.8%
Sarkozy	19.1%	19.8%	14.3%	11.5%	7.1%	26.5%	1.7%
Voynet	2.9%	9.3%	17.5%	23.7%	26.1%	16.2%	4.3%
Besancenot	4.1%	9.9%	16.3%	16.0%	22.6%	27.9%	3.2%
Buffet	2.5%	7.6%	12.5%	20.6%	26.4%	26.1%	4.3%
Bové	1.5%	6.0%	11.4%	16.0%	25.7%	35.3%	4.2%
Laguiller	2.1%	5.3%	10.2%	16.6%	25.9%	34.8%	5.3%
Nihous	0.3%	1.8%	5.3%	11.0%	26.7%	47.8%	7.2%
Villiers	2.4%	6.4%	8.7%	11.3%	15.8%	51.2%	4.3%
Schivardi	0.5%	1.0%	3.9%	9.5%	24.9%	54.6%	5.8%
Le Pen	3.0%	4.6%	6.2%	6.5%	5.4%	71.7%	2.7%

Red indicates the majority-grade.

Majority-grades, majority-gauges majority-ranking : French Presidential Elections, Orsay : Many voters

		Higher M-G	The M-G	Lower M-G	Official vote	Ntnl vote
3	Bayrou	44.3%	Good+	30.6%	25.5%	18.6%
2	Royal	39.4%	Good-	41.5%	29.9%	25.9%
1	Sarkozy	38.9%	Good-	46.9%	29.0%	31.2%
8	Voynet	29.8%	Acceptable-	46.6%	1.7%	1.6%
5	Besancenot	46.3%	Poor+	31.2%	2.5%	4.1%
7	Buffet	43.2%	Poor+	30.5%	1.4%	1.9%
10	Bové	34.9%	Poor-	39.4%	0.9%	1.3%
9	Laguiller	34.2%	Poor-	40.0%	0.8%	1.3%
11	Nihous	45.0%	To reject	-	0.3%	1.2%
6	Villiers	44.5%	To reject	-	1.9%	2.2%
12	Schivardi	39.7%	To reject	-	0.2%	0.3%
4	Le Pen	25.7%	To reject	-	5.9%	10.4%

Majority-gauge $(p, \alpha^{\pm}, q)$

Could strategic voting have made Royal the winner ?

Could strategic voting have made Royal the winner ?

$\underline{\text{Bayrou}}$: (44.3%,Good+,30.6%) $\succ$ $\underline{\text{Royal}}$: (39.4%,Good−,41.5)

How could a voter who graded Royal above Bayrou manipulate ? By lowering Bayrou's majority-gauge and raising Royal's.

Could strategic voting have made Royal the winner ?

Bayrou : (44.3%,Good+,30.6%) $\succ$ Royal : (39.4%,Good−,41.5)

How could a voter who graded Royal above Bayrou manipulate ? By lowering Bayrou's majority-gauge and raising Royal's.

Among voters who rated Royal above Bayrou : one who can lower Bayrou's majority-gauge cannot raise Royal's ; one who can raise Royal's cannot lower Bayrou's.

Could strategic voting have made Royal the winner ?

Bayrou : (44.3%,Good$+$,30.6%) $\succ$ Royal : (39.4%,Good$-$,41.5)

How could a voter who graded Royal above Bayrou manipulate ? By lowering Bayrou's majority-gauge and raising Royal's.

Among voters who rated Royal above Bayrou : one who can lower Bayrou's majority-gauge cannot raise Royal's ; one who can raise Royal's cannot lower Bayrou's.

Theorem

No method is strategy-proof-in-ranking. The majority judgement is partially strategy-proof-in-ranking.

Could strategic voting have made Royal the winner ?

Bayrou : (44.3%,Good+,30.6%) $\succ$ Royal : (39.4%,Good−,41.5)

How could a voter who graded Royal above Bayrou manipulate ? By lowering Bayrou's majority-gauge and raising Royal's.

Among voters who rated Royal above Bayrou : one who can lower Bayrou's majority-gauge cannot raise Royal's ; one who can raise Royal's cannot lower Bayrou's.

Theorem

No method is strategy-proof-in-ranking. The majority judgement is partially strategy-proof-in-ranking.

Can exaggeration change the outcome ? Yes, if *many* voters manipulate. But if only some 30% of those who can do so—and polls estimated that 30% of French voters cast votes not in accord with their convictions—they would have failed.

Contents

Why grading ?

Practical people use measures or grades that are well defined absolute common languages of evaluation to define decision mechanisms :

Why grading ?

Practical people use measures or grades that are well defined absolute common languages of evaluation to define decision mechanisms :

- in figure skating, diving and gymnastics competitions ;

Why grading ?

Practical people use measures or grades that are well defined absolute common languages of evaluation to define decision mechanisms :

- in figure skating, diving and gymnastics competitions ;
- in piano, flute and orchestra competitions ;

Why grading ?

Practical people use measures or grades that are well defined absolute common languages of evaluation to define decision mechanisms :

- in figure skating, diving and gymnastics competitions ;
- in piano, flute and orchestra competitions ;
- in classifying wines at wine competitions ;

Why grading ?

Practical people use measures or grades that are well defined absolute common languages of evaluation to define decision mechanisms :

- in figure skating, diving and gymnastics competitions ;
- in piano, flute and orchestra competitions ;
- in classifying wines at wine competitions ;
- in ranking university students ;

Why grading ?

Practical people use measures or grades that are well defined absolute common languages of evaluation to define decision mechanisms :

- in figure skating, diving and gymnastics competitions ;
- in piano, flute and orchestra competitions ;
- in classifying wines at wine competitions ;
- in ranking university students ;
- in classifying hotels and restaurants, *e.g.*,the Ritz Hotel is a *****, the Michelin's *** to the Tour d'Argent restaurant.

Why grading ?

Practical people use measures or grades that are well defined absolute common languages of evaluation to define decision mechanisms :

- in figure skating, diving and gymnastics competitions ;
- in piano, flute and orchestra competitions ;
- in classifying wines at wine competitions ;
- in ranking university students ;
- in classifying hotels and restaurants, *e.g.*,the Ritz Hotel is a *****, the Michelin's *** to the Tour d'Argent restaurant.

Indeed, the decision mechanism used to operate markets itself uses a measure : money.

Why grading ?

Practical people use measures or grades that are well defined absolute common languages of evaluation to define decision mechanisms :

- in figure skating, diving and gymnastics competitions ;
- in piano, flute and orchestra competitions ;
- in classifying wines at wine competitions ;
- in ranking university students ;
- in classifying hotels and restaurants, *e.g.*,the Ritz Hotel is a *****, the Michelin's *** to the Tour d'Argent restaurant.

Indeed, the decision mechanism used to operate markets itself uses a measure : money.

Money plays the role of Language in the economy.

Why grading ?

Practical people use measures or grades that are well defined absolute common languages of evaluation to define decision mechanisms :

- in figure skating, diving and gymnastics competitions ;
- in piano, flute and orchestra competitions ;
- in classifying wines at wine competitions ;
- in ranking university students ;
- in classifying hotels and restaurants, *e.g.*,the Ritz Hotel is a *****, the Michelin's *** to the Tour d'Argent restaurant.

Indeed, the decision mechanism used to operate markets itself uses a measure : money.

Money plays the role of Language in the economy.

Language plays the role of Money in the new theory of social choice.

Basic model

There are :

Basic model

There are :

- A *common language* Λ, a set of strictly ordered *grades* : $\alpha, \beta, \gamma, \ldots$;

Basic model

There are :

- A *common language* Λ, a set of strictly ordered *grades* : $\alpha, \beta, \gamma, \ldots$;
- A finite set of m *competitors* (alternatives, candidates, performances, competing goods) $\mathcal{C} = \{A, B, \ldots, I, \ldots, Z\}$; and

Basic model

There are :

- A *common language* Λ, a set of strictly ordered *grades* : $\alpha, \beta, \gamma, \ldots$;
- A finite set of m *competitors* (alternatives, candidates, performances, competing goods) $\mathcal{C} = \{A, B, \ldots, I, \ldots, Z\}$; and
- A finite set of n *judges* $\mathcal{J} = \{1, \ldots, j, \ldots, n\}$.

Basic model

There are :

- A *common language* Λ, a set of strictly ordered *grades* : $\alpha, \beta, \gamma, \dots$;
- A finite set of m *competitors* (alternatives, candidates, performances, competing goods) $\mathcal{C} = \{A, B, \dots, I, \dots, Z\}$; and
- A finite set of n *judges* $\mathcal{J} = \{1, \dots, j, \dots, n\}$.

A problem is specified by a *profile* $\Phi = \Phi(\mathcal{C}, \mathcal{J})$: an m by n matrix of grades assigned to the competitors (rows) by the judges (columns).

Axioms in Ranking

A *method of ranking* is a complete binary relation $\succeq_S$ that, for a given profile Φ, compares any two competitors. It should possess certain minimal properties.

Axioms in Ranking

A *method of ranking* is a complete binary relation $\succeq_S$ that, for a given profile Φ, compares any two competitors. It should possess certain minimal properties.

- **Axiom I** neutral : *$A \succeq_S B$ for the profile Φ implies $A \succeq_S B$ for the profile $\sigma\Phi$, for σ any permutation of the competitors (or rows).*

Axioms in Ranking

A *method of ranking* is a complete binary relation $\succeq_S$ that, for a given profile Φ, compares any two competitors. It should possess certain minimal properties.

- **Axiom I** neutral : *$A \succeq_S B$ for the profile Φ implies $A \succeq_S B$ for the profile $\sigma\Phi$, for σ any permutation of the competitors (or rows).*
- **Axiom II** anonymous : *$A \succeq_S B$ for the profile Φ implies $A \succeq_S B$ for the profile $\Phi\sigma$, for σ any permutation of the judges (or columns).*

Axioms in Ranking

A *method of ranking* is a complete binary relation $\succeq_S$ that, for a given profile Φ, compares any two competitors. It should possess certain minimal properties.

- **Axiom I** neutral : *$A \succeq_S B$ for the profile Φ implies $A \succeq_S B$ for the profile $\sigma\Phi$, for σ any permutation of the competitors (or rows).*
- **Axiom II** anonymous : *$A \succeq_S B$ for the profile Φ implies $A \succeq_S B$ for the profile $\Phi\sigma$, for σ any permutation of the judges (or columns).*
- **Axiom III** transitive : *$A \succeq_S B$ and $B \succeq_S C$ implies $A \succeq_S C$.*

Axioms in Ranking

A *method of ranking* is a complete binary relation $\succeq_S$ that, for a given profile Φ, compares any two competitors. It should possess certain minimal properties.

- **Axiom I** neutral : *$A \succeq_S B$ for the profile Φ implies $A \succeq_S B$ for the profile $\sigma\Phi$, for σ any permutation of the competitors (or rows).*
- **Axiom II** anonymous : *$A \succeq_S B$ for the profile Φ implies $A \succeq_S B$ for the profile $\Phi\sigma$, for σ any permutation of the judges (or columns).*
- **Axiom III** transitive : *$A \succeq_S B$ and $B \succeq_S C$ implies $A \succeq_S C$.*
- **Axiom IV** independent of irrelevant alternatives : *if $A \succeq_S B$ for the profile Φ then $A \succeq_S B$ for any profile Φ' obtained from Φ by eliminating or adjoining some other competitor (or row).*

Social Ranking Functions

A method of ranking *respects grades* if the rank-order between two candidates A and B depends only on their sets of grades (i.e. the distribution of grades). Thus, It matters not which judge gave which grade.

Social Ranking Functions

A method of ranking *respects grades* if the rank-order between two candidates A and B depends only on their sets of grades (i.e. the distribution of grades). Thus, It matters not which judge gave which grade.

Theorem

A method of ranking is neutral, anonymous, transitive and independent of irrelevant alternatives if and only if it is transitive, and respects grades.

Social Ranking Functions

A method of ranking *respects grades* if the rank-order between two candidates A and B depends only on their sets of grades (i.e. the distribution of grades). Thus, It matters not which judge gave which grade.

Theorem

A method of ranking is neutral, anonymous, transitive and independent of irrelevant alternatives if and only if it is transitive, and respects grades.

A social ranking function (SRF) is a method of ranking that satisfies the four axioms.

Implications of respecting grades

Suppose an electorate evaluated two candidates as follows :

	Good	*Pass*	*Bad*
X :	40%	35%	25%
Y :	35%	30%	35%

There is no doubt that X leads Y. What does a majority vote say ?

Implications of respecting grades

Suppose an electorate evaluated two candidates as follows :

	Good	*Pass*	*Bad*
X :	40%	35%	25%
Y :	35%	30%	35%

There is no doubt that X leads Y. What does a majority vote say ?
If the preference profile is

	30%	10%	10%	25%	25%
X :	*Good*	*Good*	*Pass*	*Pass*	*Bad*
Y :	*Pass*	*Bad*	*Good*	*Bad*	*Good*

X wins with 65% That's correct.

Implications of respecting grades

Suppose an electorate evaluated two candidates as follows :

	Good	*Pass*	*Bad*
X :	40%	35%	25%
Y :	35%	30%	35%

There is no doubt that X leads Y. What does a majority vote say ?
If the preference profile is

	30%	10%	10%	25%	25%
X :	*Good*	*Good*	*Pass*	*Pass*	*Bad*
Y :	*Pass*	*Bad*	*Good*	*Bad*	*Good*

X wins with 65% That's correct.
However, if the profile is

	5%	35%	35%	25%
X :	*Good*	*Good*	*Pass*	*Bad*
Y :	*Pass*	*Bad*	*Good*	*Pass*

Y wins with 60%.

Implications of respecting grades

Suppose an electorate evaluated two candidates as follows :

	Good	*Pass*	*Bad*
X :	40%	35%	25%
Y :	35%	30%	35%

There is no doubt that X leads Y. What does a majority vote say ?
If the preference profile is

	30%	10%	10%	25%	25%
X :	*Good*	*Good*	*Pass*	*Pass*	*Bad*
Y :	*Pass*	*Bad*	*Good*	*Bad*	*Good*

X wins with 65% That's correct.
However, if the profile is

	5%	35%	35%	25%
X :	*Good*	*Good*	*Pass*	*Bad*
Y :	*Pass*	*Bad*	*Good*	*Pass*

Y wins with 60%.

Majority voting may fail even with 2 candidates !

Axioms in Grading

An *aggregation function* is a function

$f : \Lambda^n \to \Lambda$

judges' grades of one competitor $\longrightarrow$ final grade of competitor

$f(\text{exc.}, \text{good}, \text{good}, \text{poor}, \text{v. good}) = \text{v.good}$

satisfying :

Axioms in Grading

An *aggregation function* is a function

$f : \Lambda^n \to \Lambda$

judges' grades of one competitor $\longrightarrow$ final grade of competitor

$f(\text{exc., good, good, poor, v. good}) = \text{v.good}$

satisfying :

- *anonymity* : $f(\ldots,\alpha,\ldots,\beta,\ldots) = f(\ldots,\beta,\ldots,\alpha,\ldots)$;

Axioms in Grading

An *aggregation function* is a function

$$f : \Lambda^n \to \Lambda$$

judges' grades of one competitor $\longrightarrow$ final grade of competitor

$$f(\text{exc.}, \text{good}, \text{good}, \text{poor}, \text{v. good}) = \text{v.good}$$

satisfying :

- *anonymity* : $f(\ldots, \alpha, \ldots, \beta, \ldots) = f(\ldots, \beta, \ldots, \alpha, \ldots)$;
- *unanimity* : $f(\alpha, \alpha, \ldots, \alpha) = \alpha$; and

Axioms in Grading

An *aggregation function* is a function

$$f : \Lambda^n \to \Lambda$$

judges' grades of one competitor $\longrightarrow$ final grade of competitor

$$f(\text{exc.}, \text{good}, \text{good}, \text{poor}, \text{v. good}) = \text{v.good}$$

satisfying :

- *anonymity* : $f(\ldots,\alpha,\ldots,\beta,\ldots) = f(\ldots,\beta,\ldots,\alpha,\ldots)$;
- *unanimity* : $f(\alpha,\alpha,\ldots,\alpha) = \alpha$; and
- *monotonicity* :

$$\alpha_j \preceq \beta_j \Rightarrow f(\alpha_1,\ldots,\alpha_j,\ldots,\alpha_n) \preceq f(\alpha_1,\ldots,\beta_j,\ldots,\alpha_n)$$

and

$$(\alpha_1,\ldots,\alpha_n) \prec (\beta_1,\ldots,\beta_n) \Rightarrow f(\alpha_1,\ldots,\alpha_n) \prec f(\beta_1,\ldots,\beta_n).$$

Social Grading Functions

In practice, the common language is usually parameterized. Small changes in the parametrization or the grades should imply small changes in the outputs.

Social Grading Functions

In practice, the common language is usually parameterized. Small changes in the parametrization or the grades should imply small changes in the outputs. As Laplace suggested, suppose $\Lambda = [0, R]$, and assume f to be continuous.

Social Grading Functions

In practice, the common language is usually parameterized. Small changes in the parametrization or the grades should imply small changes in the outputs. As Laplace suggested, suppose $\Lambda = [0, R]$, and assume f to be continuous.

A *social grading function (SGF)* f is a continuous method of grading that satisfies the 3 axioms.

The Game of Voting

The utility of a voter is some function $u_j(\mathbf{r}^*, \mathbf{r}, f, \mathcal{C}, \Lambda)$ that may depend on many factors (the decision rule, the set of candidates, honesty, the set of messages, other's types and votes, etc).

The Game of Voting

The utility of a voter is some function $u_j(\mathbf{r}^*, \mathbf{r}, f, \mathcal{C}, \Lambda)$ that may depend on many factors (the decision rule, the set of candidates, honesty, the set of messages, other's types and votes, etc).

Given the mechanism and some private information, a voter chooses the message that maximizes his (unknown to us) utility function.

The Game of Voting

The utility of a voter is some function $u_j(\mathbf{r}^*, \mathbf{r}, f, \mathcal{C}, \Lambda)$ that may depend on many factors (the decision rule, the set of candidates, honesty, the set of messages, other's types and votes, etc).

Given the mechanism and some private information, a voter chooses the message that maximizes his (unknown to us) utility function.

We are going to prove that majority judgement is strategy-proof for a large class of utility functions. When it is not, it is shown that it combats manipulations in many well defined senses.

Strategy in Grading

An aggregation function is *strategy-proof-in-grading* if

Strategy in Grading

An aggregation function is *strategy-proof-in-grading* if

- when the final grade is r and if a judge's honest input grade is some grade $r^+ > r$, he cannot increase the final grade ;

Strategy in Grading

An aggregation function is *strategy-proof-in-grading* if

- when the final grade is r and if a judge's honest input grade is some grade $r^+ > r$, he cannot increase the final grade ;
- and if when a judge's honest input grade is some grade $r^- < r$, he cannot decrease the final grade.

Strategy in Grading

An aggregation function is *strategy-proof-in-grading* if

- when the final grade is r and if a judge's honest input grade is some grade $r^+ > r$, he cannot increase the final grade ;
- and if when a judge's honest input grade is some grade $r^- < r$, he cannot decrease the final grade.

Strategy-proof-in-grading implies it is a *dominant strategy* for a judge to honestly assign grades when his utility is single-peaked :

$$u_j = -|r_j^* - f(r_1, \ldots, r_n)|$$

Strategy in Grading

The function that associates to a set of grades the kth highest grade is called the *kth-order function* f^k.

Strategy in Grading

The function that associates to a set of grades the kth highest grade is called the *kth-order function* f^k. Order functions are clearly strategy-proof-in-grading.

Strategy in Grading

The function that associates to a set of grades the kth highest grade is called the *kth-order function* f^k. Order functions are clearly strategy-proof-in-grading.

Theorem

The unique strategy-proof-in-grading SGFs are the order functions.

Strategy in Grading

The function that associates to a set of grades the kth highest grade is called the *kth-order function* f^k. Order functions are clearly strategy-proof-in-grading.

Theorem

The unique strategy-proof-in-grading SGFs are the order functions.

If the mechanism is a point-summing method (the mean with respect to some parametrization), for almost all profiles, all voters can manipulate.

Strategy in Ranking

A SGF is *strategy-proof-in-ranking* if for any two candidates A and B,

Strategy in Ranking

A SGF is *strategy-proof-in-ranking* if for any two candidates A and B, if the final grade of A is below the final grade of B : $r^A < r^B$

Strategy in Ranking

A SGF is *strategy-proof-in-ranking* if for any two candidates A and B, if the final grade of A is below the final grade of B : $r^A < r^B$ and if some judge j has the opposed ranking : $r_j^A > r_j^B$,

Strategy in Ranking

A SGF is *strategy-proof-in-ranking* if for any two candidates A and B, if the final grade of A is below the final grade of B : $r^A < r^B$ and if some judge j has the opposed ranking : $r_j^A > r_j^B$,

- judge j cannot decrease B's final grade ; and

Strategy in Ranking

A SGF is *strategy-proof-in-ranking* if for any two candidates A and B, if the final grade of A is below the final grade of B : $r^A < r^B$ and if some judge j has the opposed ranking : $r_j^A > r_j^B$,

- judge j cannot decrease B's final grade ; and
- judge j cannot increase A's final grade ;

Strategy in Ranking

A SGF is *strategy-proof-in-ranking* if for any two candidates A and B, if the final grade of A is below the final grade of B : $r^A < r^B$ and if some judge j has the opposed ranking : $r_j^A > r_j^B$,

- judge j cannot decrease B's final grade ; and
- judge j cannot increase A's final grade ;

Strategy-proof-in-ranking implies it is a *dominant strategy* for a judge to honestly assign the grades whenever his utility function depends solely on the final ranking (or only on who is the winner).

Strategy in Ranking

A SGF is *strategy-proof-in-ranking* if for any two candidates A and B, if the final grade of A is below the final grade of B : $r^A < r^B$ and if some judge j has the opposed ranking : $r_j^A > r_j^B$,

- judge j cannot decrease B's final grade ; and
- judge j cannot increase A's final grade ;

Strategy-proof-in-ranking implies it is a *dominant strategy* for a judge to honestly assign the grades whenever his utility function depends solely on the final ranking (or only on who is the winner).

Theorem (Extending Gibbard-Satterthwaite)

There exists no SGF that is strategy-proof-in-ranking.

Strategy in Ranking

A SGF is *partially strategy-proof-in-ranking* if : for any two candidates A and B,

Strategy in Ranking

A SGF is *partially strategy-proof-in-ranking* if : for any two candidates A and B, if the final grade of A is below the final grade of B,

Strategy in Ranking

A SGF is *partially strategy-proof-in-ranking* if : for any two candidates A and B, if the final grade of A is below the final grade of B, and if some judge j believes the opposite then,

Strategy in Ranking

A SGF is *partially strategy-proof-in-ranking* if : for any two candidates A and B, if the final grade of A is below the final grade of B, and if some judge j believes the opposite then,

- if j can decrease B's final grade, he cannot increase A's final grade ; and

Strategy in Ranking

A SGF is *partially strategy-proof-in-ranking* if : for any two candidates A and B, if the final grade of A is below the final grade of B, and if some judge j believes the opposite then,

- if j can decrease B's final grade, he cannot increase A's final grade ; and
- if j can increase A's final grade, he cannot decrease B's final grade.

Strategy in Ranking

A SGF is *partially strategy-proof-in-ranking* if : for any two candidates A and B, if the final grade of A is below the final grade of B, and if some judge j believes the opposite then,

- if j can decrease B's final grade, he cannot increase A's final grade ; and
- if j can increase A's final grade, he cannot decrease B's final grade.

Theorem

The unique SGFs that are partially strategy-proof-in-ranking are the order functions.

Middlemost Aggregation Functions

The *middlemost* aggregation functions are (for $r_1 \geq \ldots \geq r_n$),

$$f(r_1, \ldots, r_n) = r_{(n+1)/2} \text{ when } n \text{ is odd, and}$$

$$r_{n/2} \geq f(r_1, \ldots, r_n) \geq r_{(n+2)/2} \text{ when } n \text{ is even.}$$

$f^{n/2}$ and $f^{(n+2)/2}$ are the *upper-middlemost* and *lower-middlemost* order functions.

Middlemost Aggregation Functions

The *middlemost* aggregation functions are (for $r_1 \geq \ldots \geq r_n$),

$f(r_1, \ldots, r_n) = r_{(n+1)/2}$ when n is odd, and

$r_{n/2} \geq f(r_1, \ldots, r_n) \geq r_{(n+2)/2}$ when n is even.

$f^{n/2}$ and $f^{(n+2)/2}$ are the *upper-middlemost* and *lower-middlemost* order functions.

Theorem

The unique aggregation functions that assign a final grade of r when a majority of judges assign r are the middlemost.

Minimizing Manipulability for SGF

Given an aggregation function f and input $\mathbf{r} = (r_1, \ldots, r_n)$, let

Minimizing Manipulability for SGF

Given an aggregation function f and input $\mathbf{r} = (r_1, \ldots, r_n)$, let

- $\mu^-(f, \mathbf{r}) =$ nbre of judges who can decrease the final grade,

Minimizing Manipulability for SGF

Given an aggregation function f and input $\mathbf{r} = (r_1, \ldots, r_n)$, let

- $\mu^-(f, \mathbf{r})$ = nbre of judges who can decrease the final grade,
- $\mu^+(f, \mathbf{r})$ = nbre of judges who can increase the final grade,

Minimizing Manipulability for SGF

Given an aggregation function f and input $\mathbf{r} = (r_1, \ldots, r_n)$, let

- $\mu^{-}(f, \mathbf{r})$ = nbre of judges who can decrease the final grade,
- $\mu^{+}(f, \mathbf{r})$ = nbre of judges who can increase the final grade,

Let λ = probability a judge wishes to increase the final grade. The *probability of effective-manipulability* of f is

$$EM(f) = \max_{\mathbf{r}=(r_1,\ldots,r_n)} \max_{0 \le \lambda \le 1} \frac{\lambda \mu^{+}(f, \mathbf{r}) + (1-\lambda)\mu^{-}(f, \mathbf{r})}{n}.$$

Minimizing Manipulability for SGF

Given an aggregation function f and input $\mathbf{r} = (r_1, \ldots, r_n)$, let

- $\mu^-(f, \mathbf{r})$ = nbre of judges who can decrease the final grade,
- $\mu^+(f, \mathbf{r})$ = nbre of judges who can increase the final grade,

Let λ = probability a judge wishes to increase the final grade. The *probability of effective-manipulability* of f is

$$EM(f) = \max_{\mathbf{r}=(r_1,\ldots,r_n)} \max_{0\leq\lambda\leq 1} \frac{\lambda\mu^+(f,\mathbf{r}) + (1-\lambda)\mu^-(f,\mathbf{r})}{n}.$$

Theorem

The unique aggregation functions that minimize the probability of effective-manipulability are the middlemost.

Minimizing Manipulability for SGF

Given an aggregation function f and input $\mathbf{r} = (r_1, \ldots, r_n)$, let

- $\mu^-(f, \mathbf{r})$ = nbre of judges who can decrease the final grade,
- $\mu^+(f, \mathbf{r})$ = nbre of judges who can increase the final grade,

Let λ = probability a judge wishes to increase the final grade. The *probability of effective-manipulability* of f is

$$EM(f) = \max_{\mathbf{r}=(r_1,\ldots,r_n)} \max_{0\leq\lambda\leq 1} \frac{\lambda\mu^+(f,\mathbf{r}) + (1-\lambda)\mu^-(f,\mathbf{r})}{n}.$$

Theorem

The unique aggregation functions that minimize the probability of effective-manipulability are the middlemost. Point-summing-methods, f^1 and f^n maximize this probability.

More an order function is close to the middle, less it is manipulable.

Minimizing Manipulability for SRF

A SRF is choice-monotone if $A \succeq_S B$ and one judge raises the grade he gives to A then $A \succ_S B$.

This is a natural idea that helps to resolve potential ties.

Minimizing Manipulability for SRF

A SRF is choice-monotone if $A \succeq_S B$ *and one judge raises the grade he gives to* A *then* $A \succ_S B$.

This is a natural idea that helps to resolve potential ties.

Theorem

The majority ranking is the unique choice-monotone, meaningful SRF that minimizes the probability of cheating and rewards consensus.

Nash and Strong Equilibria

Suppose utilities depend only on the winner and the method is :

Nash and Strong Equilibria

Suppose utilities depend only on the winner and the method is :

> *BR-Majoritariane : for any candidate X and any strategy of a minority, the majority has a strategy that elects X.*

Nash and Strong Equilibria

Suppose utilities depend only on the winner and the method is :

> *BR-Majoritariane : for any candidate X and any strategy of a minority, the majority has a strategy that elects X.*

Examples : All reasonable methods : Borda, Condorcet, approval, 1- and 2-past-the-post, transferable-vote, majority-judgement.

Nash and Strong Equilibria

Suppose utilities depend only on the winner and the method is :

> *BR-Majoritariane : for any candidate X and any strategy of a minority, the majority has a strategy that elects X.*

Examples : All reasonable methods : Borda, Condorcet, approval, 1- and 2-past-the-post, transferable-vote, majority-judgement.

Theorem

Any candidate could be a Nash-equilibrium winner.

Nash and Strong Equilibria

Suppose utilities depend only on the winner and the method is :

> *BR-Majoritariane : for any candidate X and any strategy of a minority, the majority has a strategy that elects X.*

Examples : All reasonable methods : Borda, Condorcet, approval, 1- and 2-past-the-post, transferable-vote, majority-judgement.

Theorem

Any candidate could be a Nash-equilibrium winner. If a candidate is a strong-equilibrium winner, it must be a Condorcet-winner.

Nash and Strong Equilibria

Suppose utilities depend only on the winner and the method is :

> *BR-Majoritariane : for any candidate X and any strategy of a minority, the majority has a strategy that elects X.*

Examples : All reasonable methods : Borda, Condorcet, approval, 1- and 2-past-the-post, transferable-vote, majority-judgement.

Theorem

Any candidate could be a Nash-equilibrium winner. If a candidate is a strong-equilibrium winner, it must be a Condorcet-winner.

Theorem

No method elects the Condorcet-winner as a Nash equilibrium with the honest grades.

Nash and Strong Equilibria

Suppose utilities depend only on the winner and the method is :

> *BR-Majoritariane : for any candidate X and any strategy of a minority, the majority has a strategy that elects X.*

Examples : All reasonable methods : Borda, Condorcet, approval, 1- and 2-past-the-post, transferable-vote, majority-judgement.

Theorem

Any candidate could be a Nash-equilibrium winner. If a candidate is a strong-equilibrium winner, it must be a Condorcet-winner.

Theorem

No method elects the Condorcet-winner as a Nash equilibrium with the honest grades. With majority judgement, there exists strong-equilibria where

Nash and Strong Equilibria

Suppose utilities depend only on the winner and the method is :

> *BR-Majoritariane : for any candidate X and any strategy of a minority, the majority has a strategy that elects X.*

Examples : All reasonable methods : Borda, Condorcet, approval, 1- and 2-past-the-post, transferable-vote, majority-judgement.

Theorem

Any candidate could be a Nash-equilibrium winner. If a candidate is a strong-equilibrium winner, it must be a Condorcet-winner.

Theorem

No method elects the Condorcet-winner as a Nash equilibrium with the honest grades. With majority judgement, there exists strong-equilibria where the Condorcet winner is elected with his true majority grade and the majority of grades received a candidate are honest.

Contents

"Meaningfulness" of the common language

We rejected the usual [0,20] French grades :

"Meaningfulness" of the common language

We rejected the usual [0,20] French grades :

- The language is not natural but numerical so abstract.

"Meaningfulness" of the common language

We rejected the usual [0,20] French grades :

- The language is not natural but numerical so abstract.
- It may not define a common language in a large electorate (15 or 16 is good in math but superb in philosophy).

"Meaningfulness" of the common language

We rejected the usual [0,20] French grades :

- The language is not natural but numerical so abstract.
- It may not define a common language in a large electorate (15 or 16 is good in math but superb in philosophy).
- It contains many levels which makes it more difficult to be common.

"Meaningfulness" of the common language

We rejected the usual [0,20] French grades :

- The language is not natural but numerical so abstract.
- It may not define a common language in a large electorate (15 or 16 is good in math but superb in philosophy).
- It contains many levels which makes it more difficult to be common.
- The difference between 11 and 12 may not be meaningful.

“Meaningfulness” of the common language

We rejected the usual [0,20] French grades :

- The language is not natural but numerical so abstract.
- It may not define a common language in a large electorate (15 or 16 is good in math but superb in philosophy).
- It contains many levels which makes it more difficult to be common.
- The difference between 11 and 12 may not be meaningful.
- Words that carry meanings have a greater chance to be absolute than numbers

"Meaningfulness" of the common language

We rejected the usual [0,20] French grades :

- The language is not natural but numerical so abstract.
- It may not define a common language in a large electorate (15 or 16 is good in math but superb in philosophy).
- It contains many levels which makes it more difficult to be common.
- The difference between 11 and 12 may not be meaningful.
- Words that carry meanings have a greater chance to be absolute than numbers
- With a numerical scale, voters assume the scores are summed, a clear invitation to manipulate—the greater the spread, the greater the opportunity.

"Meaningfulness" of the common language

We rejected the usual [0,20] French grades :

- The language is not natural but numerical so abstract.
- It may not define a common language in a large electorate (15 or 16 is good in math but superb in philosophy).
- It contains many levels which makes it more difficult to be common.
- The difference between 11 and 12 may not be meaningful.
- Words that carry meanings have a greater chance to be absolute than numbers
- With a numerical scale, voters assume the scores are summed, a clear invitation to manipulate—the greater the spread, the greater the opportunity.
- It must, in any case, be realized that adding numbers (or computing their averages) makes absolutely no sense unless the numbers belong to an *interval measure*.

Voting "behavior"

Voting "behavior"

Percent of electors who used k ($k = 1, \ldots, 6$) grades :

No. grades :	1	2	3	4	5	6
percentages :	1%	2%	10%	31%	42%	14%

Voting "behavior"

Percent of electors who used k ($k = 1, \ldots, 6$) grades :

No. grades :	1	2	3	4	5	6
percentages :	1%	2%	10%	31%	42%	14%

Average numbers of each grade per ballot show the language was common :

	3 prcts.	1^{st} prct.	6^{th} prct.	12^{th} prct.	Samples of 100 Avg. (σ)	Rg	Dsjt samples of 50 Avg. (σ)	Rg
Excll	0.7	0.7	0.7	0.7	0.7 (.07)	0.6/0.8	0.7 (.12)	0.5/0.9
V.Good	1.3	1.2	1.2	1.4	1.2 (.13)	1.1/1.5	1.3 (.16)	1.1/1.5
Good	1.5	1.5	1.4	1.6	1.5 (.13)	1.4/1.7	1.5 (.27)	0.9/1.8
Accp	1.7	1.7	1.7	1.8	1.8 (.15)	1.7/2.1	1.7 (.27)	2.1/2.6
Poor	2.3	2.3	2.3	2.2	2.3 (.19)	2.1/2.7	2.3 (.19)	2.1/2.6
Rjct	4.6	4.8	4.6	4.3	4.5 (.29)	4.1/4.8	4.5 (.41)	4.1/5.3

Voting “behavior”

Percent of electors who used k ($k = 1, \ldots, 6$) grades :

No. grades :	1	2	3	4	5	6
percentages :	1%	2%	10%	31%	42%	14%

Average numbers of each grade per ballot show the language was common :

	3 prcts.	1^{st} prct.	6^{th} prct.	12^{th} prct.	Samples of 100 Avg. (σ)	Samples of 100 Rg	Dsjt samples of 50 Avg. (σ)	Dsjt samples of 50 Rg
Excll	0.7	0.7	0.7	0.7	0.7 (.07)	0.6/0.8	0.7 (.12)	0.5/0.9
V.Good	1.3	1.2	1.2	1.4	1.2 (.13)	1.1/1.5	1.3 (.16)	1.1/1.5
Good	1.5	1.5	1.4	1.6	1.5 (.13)	1.4/1.7	1.5 (.27)	0.9/1.8
Accp	1.7	1.7	1.7	1.8	1.8 (.15)	1.7/2.1	1.7 (.27)	2.1/2.6
Poor	2.3	2.3	2.3	2.2	2.3 (.19)	2.1/2.7	2.3 (.19)	2.1/2.6
Rjct	4.6	4.8	4.6	4.3	4.5 (.29)	4.1/4.8	4.5 (.41)	4.1/5.3

Yet, the majority judgement winner not the same in all 3 precincts. Extensive statistical analyses of a large number of samples show the same stability.

A proof that the traditional model is not realistic

A proof that the traditional model is not realistic

- 11% of ballots had at least two *Excellents*,

A proof that the traditional model is not realistic

- 11% of ballots had at least two *Excellents*,
- 16% of ballots at least two *Very Good*, no *Excellent*,

A proof that the traditional model is not realistic

- 11% of ballots had at least two *Excellents*,
- 16% of ballots at least two *Very Good*, no *Excellent*,
- 6% of ballots at least two *Goods*, no better grade,

A proof that the traditional model is not realistic

- 11% of ballots had at least two *Excellents*,
- 16% of ballots at least two *Very Good*, no *Excellent*,
- 6% of ballots at least two *Goods*, no better grade,
- At least one third of the voters expressed no single preferred candidate !

A proof that the traditional model is not realistic

- 11% of ballots had at least two *Excellents*,
- 16% of ballots at least two *Very Good*, no *Excellent*,
- 6% of ballots at least two *Goods*, no better grade,
- At least one third of the voters expressed no single preferred candidate !
- A same ranking may carry very different meanings, as shown by the distributions of the highest, second highest and third highest grades :

A proof that the traditional model is not realistic

- 11% of ballots had at least two *Excellents*,
- 16% of ballots at least two *Very Good*, no *Excellent*,
- 6% of ballots at least two *Goods*, no better grade,
- At least one third of the voters expressed no single preferred candidate !
- A same ranking may carry very different meanings, as shown by the distributions of the highest, second highest and third highest grades :

Grades :	*Exclt*	*V Good*	*Good*	*Accp*	*Poor*	*Rejct*
Highest	52%	37%	9%	2%	0%	1%
Second highest	–	35%	41%	16%	5%	3%
Third highest	–	–	26%	40%	22%	13%

A proof that the traditional model is not realistic

- 11% of ballots had at least two *Excellents*,
- 16% of ballots at least two *Very Good*, no *Excellent*,
- 6% of ballots at least two *Goods*, no better grade,
- At least one third of the voters expressed no single preferred candidate !
- A same ranking may carry very different meanings, as shown by the distributions of the highest, second highest and third highest grades :

Grades :	*Exclt*	*V Good*	*Good*	*Accp*	*Poor*	*Rejct*
Highest	52%	37%	9%	2%	0%	1%
Second highest	–	35%	41%	16%	5%	3%
Third highest	–	–	26%	40%	22%	13%

Input messages that are voters' rank-orders are meaningless !

Statistical comparisons : favoring the centrist

Statistical comparisons : favoring the centrist

From the 1,733 ballots we have been able to deduce a left-right political spectrum along which all 12 candidates are placed, with Bayrou the unique candidate at the center.

Statistical comparisons : favoring the centrist

From the 1,733 ballots we have been able to deduce a left-right political spectrum along which all 12 candidates are placed, with Bayrou the unique candidate at the center.

The principal candidates were Bayrou, Royal and Sarkozy : with every one of the methods we applied, one of these three candidates always is the winner in every random sample of ballots.

Statistical comparisons : favoring the centrist

From the 1,733 ballots we have been able to deduce a left-right political spectrum along which all 12 candidates are placed, with Bayrou the unique candidate at the center.

The principal candidates were Bayrou, Royal and Sarkozy : with every one of the methods we applied, one of these three candidates always is the winner in every random sample of ballots.

From the 1,733 ballots, a random sample of 501 was found that is approximately representative of the national vote in France.

Statistical comparisons : favoring the centrist

From the 1,733 ballots we have been able to deduce a left-right political spectrum along which all 12 candidates are placed, with Bayrou the unique candidate at the center.

The principal candidates were Bayrou, Royal and Sarkozy : with every one of the methods we applied, one of these three candidates always is the winner in every random sample of ballots.

From the 1,733 ballots, a random sample of 501 was found that is approximately representative of the national vote in France.

From these 501 ballots random samples of 201 were drawn and the winners determined according to five different methods.

Statistical comparisons : (3) favoring the centrist

Statistical comparisons : (3) favoring the centrist

10,000 random samples of 201 from 501 “representative” ballots, among only the three principal candidates, number of wins :

Statistical comparisons : (3) favoring the centrist

10,000 random samples of 201 from 501 "representative" ballots, among only the three principal candidates, number of wins :

	Left ⟵ Royal	Bayrou	⟶ *Right* Sarkozy	Tie	Cycle
First-past-the-post winner	656	0	9,261	83	–
Two-past-the-post winner	1,078	172	8,154	596	–
Approval $\succeq$ *Very Good*	472	651	7,919	958	–
Majority judgement-winner	587	4,402	5,008	3	–
Condorcet-winner	138	8,390	954	389	129
Approval $\succeq$ *Good*	36	9,436	30	498	–
Point-summing	132	9,444	260	164	–
Borda-winner	51	8,659	1,122	168	–

Statistical comparisons : (4) favoring the centrist

Statistical comparisons : (4) favoring the centrist

10,000 random samples of 201 from 501 “representative” ballots, among the all twelve principal candidates, number of wins :

Statistical comparisons : (4) favoring the centrist

10,000 random samples of 201 from 501 "representative" ballots, among the all twelve principal candidates, number of wins :

	Left ⟵ Royal	Bayrou	⟶ *Right* Sarkozy	Tie	Cycle
First-past-the-post winner	977	0	9,022	5	–
Two-past-the-post winner	1,146	98	8,197	559	–
Approval $\succeq$ *Very Good*	467	658	7,947	928	–
Majority judgement-winner	606	4,326	5,065	3	–
Condorcet-winner	142	8,329	974	441	114
Approval $\succeq$ *Good*	23	9,465	40	472	–
Point-summing	139	9,463	239	159	–
Borda-winner	12	9,976	0	12	–

Statistical comparisons : (4) favoring the centrist

10,000 random samples of 201 from 501 "representative" ballots, among the all twelve principal candidates, number of wins :

	Left ⟵ Royal	Bayrou	⟶ *Right* Sarkozy	Tie	Cycle
First-past-the-post winner	977	0	9,022	5	–
Two-past-the-post winner	1,146	98	8,197	559	–
Approval $\succeq$ *Very Good*	467	658	7,947	928	–
Majority judgement-winner	606	4,326	5,065	3	–
Condorcet-winner	142	8,329	974	441	114
Approval $\succeq$ *Good*	23	9,465	40	472	–
Point-summing	139	9,463	239	159	–
Borda-winner	12	9,976	0	12	–

First- and two-past-the-post (unduly) penalize the centrist, point-summing and Borda (unduly) favor the centrist.

Statistical comparisons : strategic manipulability

Manipulability of methods : 10,000 random samples of 101 from 501 "representative" ballots, given that there is a same unique winner A and same unique runner-up B for every method.

Statistical comparisons : strategic manipulability

Manipulability of methods : 10,000 random samples of 101 from 501 "representative" ballots, given that there is a same unique winner A and same unique runner-up B for every method.

Strategy 1 : all those voters who gave grade to B two levels above A change to give B highest and A lowest possible grades.

Statistical comparisons : strategic manipulability

Manipulability of methods : 10,000 random samples of 101 from 501 "representative" ballots, given that there is a same unique winner A and same unique runner-up B for every method.

Strategy 1 : all those voters who gave grade to B two levels above A change to give B highest and A lowest possible grades.

Strategy 2 : 30% of those voters who gave higher grade to B than A change to give B highest and A the lowest possible grades.

Statistical comparisons : strategic manipulability

Manipulability of methods : 10,000 random samples of 101 from 501 "representative" ballots, given that there is a same unique winner A and same unique runner-up B for every method.

Strategy 1 : all those voters who gave grade to B two levels above A change to give B highest and A lowest possible grades.

Strategy 2 : 30% of those voters who gave higher grade to B than A change to give B highest and A the lowest possible grades.

Numbers of successful strategic manipulations :

	Point-sum	Borda	First-p-p	Approval $\succeq$ *Good*	Approval $\succeq$ *VGood*	Cond-orcet	Majority judge
Strat 1	9,965	9,313	8,699	8,569	8,407	7,042	6,142
Strat 2	9,769	7,864	4,411	8,849	8,557	4,641	5,313

Pool Opinion Way-Terra Nova, French presidential, April 12-16, 2012

Majority judgment	Majority-gauge	First-past-the-post score		AV-score	
1) Hollande	(45.1%, *Good*+, 43.3%)	1	28.6%	1	49.4%
2) Bayrou	(34.1%, *Good*−, 40.7%)	5	9.1%	3	39.20%
3) Sarkozy	(49.3%, *Accept*+, 39.6%)	2	27.3%	2	40.5%
4) Mélenchon	(42.5%, *Accept*+, 40.4%)	4	11.0%	4	39.1%
5) Dupont-Aignan	(40.6%, *Poor*+, 33.9%)	7	1.5%	8	10.7%
6) Joly	(36.8%, *Poor*−, 38.5%)	6	2.3%	6	26.7%
7) Poutou	(26.2%, *Poor*−, 45.7%)	8	1.2%	7	13.3%
8) Le Pen	(46.1%, *Poor*−, 47.6%)	3	17.9%	5	27.4%
9) Arthaud	(24.8%, *Poor*−, 49.9%)	9	0.7%	9	8.4%
10) Cheminade	(48.0%, *to Reject*, −)	10	0.4%	10	3.2%

Pool Opinion Way-Terra Nova, French presidential, April 12-16, 2012.

Only the five major candidates were tested.

Condorcet-ranking	Hollande	Bayrou	Sarkozy	Mélenchon	Le Pen	Borda-ranking
1) Hollande	–	51.6%	53.9%	68.5%	64.1%	1) 59.5%
2) Bayrou	48.4%	–	56.5%	59.4%	70.5%	2) 58.7%
3) Sarkozy	46.1%	43.5%	–	50.5%	65.7%	3) 51.4%
4) Mélenchon	31.5%	40.6%	49.5%	–	59.7%	4) 45.3%
5) Le Pen	35.9%	29.5%	34.3%	40.3%	–	5) 35.0%

Pool Opinion Way-Terra Nova, French presidential, April 12-16, 2012.

Only the five major candidates were tested.

Condorcet-ranking	Hollande	Bayrou	Sarkozy	Mélenchon	Le Pen	Borda-ranking
1) Hollande	–	51.6%	53.9%	68.5%	64.1%	1) 59.5%
2) Bayrou	48.4%	–	56.5%	59.4%	70.5%	2) 58.7%
3) Sarkozy	46.1%	43.5%	–	50.5%	65.7%	3) 51.4%
4) Mélenchon	31.5%	40.6%	49.5%	–	59.7%	4) 45.3%
5) Le Pen	35.9%	29.5%	34.3%	40.3%	–	5) 35.0%

- The MJ-, Condorcet- and Borda-rankings are identical (put Bayrou comfortably ahead of Sarkozy) but differ from first-past-the-post and AV (place Bayrou behind).

Pool Opinion Way-Terra Nova, French presidential, April 12-16, 2012.

Only the five major candidates were tested.

Condorcet-ranking	Hollande	Bayrou	Sarkozy	Mélenchon	Le Pen	Borda-ranking
1) Hollande	–	51.6%	53.9%	68.5%	64.1%	1) 59.5%
2) Bayrou	48.4%	–	56.5%	59.4%	70.5%	2) 58.7%
3) Sarkozy	46.1%	43.5%	–	50.5%	65.7%	3) 51.4%
4) Mélenchon	31.5%	40.6%	49.5%	–	59.7%	4) 45.3%
5) Le Pen	35.9%	29.5%	34.3%	40.3%	–	5) 35.0%

- The MJ-, Condorcet- and Borda-rankings are identical (put Bayrou comfortably ahead of Sarkozy) but differ from first-past-the-post and AV (place Bayrou behind).
- The margin of victory and ranking are much comfortable with MJ than all other methods. More information is better.

Pool Opinion Way-Terra Nova, French presidential, April 12-16, 2012.

Only the five major candidates were tested.

Condorcet-ranking	Hollande	Bayrou	Sarkozy	Mélenchon	Le Pen	Borda-ranking
1) Hollande	–	51.6%	53.9%	68.5%	64.1%	1) 59.5%
2) Bayrou	48.4%	–	56.5%	59.4%	70.5%	2) 58.7%
3) Sarkozy	46.1%	43.5%	–	50.5%	65.7%	3) 51.4%
4) Mélenchon	31.5%	40.6%	49.5%	–	59.7%	4) 45.3%
5) Le Pen	35.9%	29.5%	34.3%	40.3%	–	5) 35.0%

- The MJ-, Condorcet- and Borda-rankings are identical (put Bayrou comfortably ahead of Sarkozy) but differ from first-past-the-post and AV (place Bayrou behind).
- The margin of victory and ranking are much comfortable with MJ than all other methods. More information is better.

Pool Opinion Way-Terra Nova, French presidential, April 12-16, 2012.

Only the five major candidates were tested.

Condorcet-ranking	Hollande	Bayrou	Sarkozy	Mélenchon	Le Pen	Borda-ranking
1) Hollande	–	51.6%	53.9%	68.5%	64.1%	1) 59.5%
2) Bayrou	48.4%	–	56.5%	59.4%	70.5%	2) 58.7%
3) Sarkozy	46.1%	43.5%	–	50.5%	65.7%	3) 51.4%
4) Mélenchon	31.5%	40.6%	49.5%	–	59.7%	4) 45.3%
5) Le Pen	35.9%	29.5%	34.3%	40.3%	–	5) 35.0%

- The MJ-, Condorcet- and Borda-rankings are identical (put Bayrou comfortably ahead of Sarkozy) but differ from first-past-the-post and AV (place Bayrou behind).
- The margin of victory and ranking are much comfortable with MJ than all other methods. More information is better.
- Other experiments confirm all results (forthcoming OR paper).

Field experiment. French Socialist primaries, Fresnes, 2011

Majority judgment	Majority-gauge	First-past-the-post
1 Hollande	(18.2%, *Excellent*−, 49.7%)	35.7%
2 Aubry	(48.5%, *Very Good*+, 20.2%)	34.5%
3 Montebourg	(33.7%, *Very Good*−, 39.1%)	18.5%
4 Royal	(37.5%, *Good*−, 38.9%)	6.0%
5 Valls	(36.4%, *Good*−, 40.4%)	5.3%
6 Baylet	(27.2%, *Acceptable*−, 48.2%)	0.0%

Field experiment. French Socialist primaries, Fresnes, 2011

Majority judgment	Majority-gauge	First-past-the-post
1 Hollande	(18.2%, *Excellent*−, 49.7%)	35.7%
2 Aubry	(48.5%, *Very Good*+, 20.2%)	34.5%
3 Montebourg	(33.7%, *Very Good*−, 39.1%)	18.5%
4 Royal	(37.5%, *Good*−, 38.9%)	6.0%
5 Valls	(36.4%, *Good*−, 40.4%)	5.3%
6 Baylet	(27.2%, *Acceptable*−, 48.2%)	0.0%

Condorcet-ranking	Aubry	Hollande	Montebourg	Royal	Valls	Baylet	Borda-ranking
1 Aubry	–	50.2%	68.5%	85.0%	85.9%	95.5%	77.0%
2 Hollande	49.8%	–	65.3%	85.4%	87.1%	94.8%	76.5%
3 Montebourg	31.5%	34.7%	–	68.3%	69.0%	91.8%	59.1%
4 Royal	15.0%	14.6%	31.7%	–	54.7%	78.2%	38.1%
5 Valls	14.1%	12.9%	31.0%	45.3%	–	78.9%	36.4%
6 Baylet	4.5%	5.2%	8.2%	21.8%	21.1%	–	12.2%

Field experiment. French Socialist primaries, Fresnes, 2011

Majority judgment	Majority-gauge	First-past-the-post
1 Hollande	(18.2%, *Excellent*−, 49.7%)	35.7%
2 Aubry	(48.5%, *Very Good*+, 20.2%)	34.5%
3 Montebourg	(33.7%, *Very Good*−, 39.1%)	18.5%
4 Royal	(37.5%, *Good*−, 38.9%)	6.0%
5 Valls	(36.4%, *Good*−, 40.4%)	5.3%
6 Baylet	(27.2%, *Acceptable*−, 48.2%)	0.0%

Condorcet-ranking	Aubry	Hollande	Montebourg	Royal	Valls	Baylet	Borda-ranking
1 Aubry	–	50.2%	68.5%	85.0%	85.9%	95.5%	77.0%
2 Hollande	49.8%	–	65.3%	85.4%	87.1%	94.8%	76.5%
3 Montebourg	31.5%	34.7%	–	68.3%	69.0%	91.8%	59.1%
4 Royal	15.0%	14.6%	31.7%	–	54.7%	78.2%	38.1%
5 Valls	14.1%	12.9%	31.0%	45.3%	–	78.9%	36.4%
6 Baylet	4.5%	5.2%	8.2%	21.8%	21.1%	–	12.2%

Practice shows what was illustrated in theory : majority voting can elect a candidate who is not judged to be the best according to the evaluations.

Contents

No to simple majority decision, even for 2 candidates

No to simple majority decision, even for 2 candidates

- The scientific community concurs that usual simple majority decision – first-past-the-post – is to be eschewed when there are at least three candidates.

No to simple majority decision, even for 2 candidates

- The scientific community concurs that usual simple majority decision – first-past-the-post – is to be eschewed when there are at least three candidates.

No to simple majority decision, even for 2 candidates

- The scientific community concurs that usual simple majority decision – first-past-the-post – is to be eschewed when there are at least three candidates.
- However, it concurs that simple majority decision should be the choice when there are but two candidates.

No to simple majority decision, even for 2 candidates

- The scientific community concurs that usual simple majority decision – first-past-the-post – is to be eschewed when there are at least three candidates.
- However, it concurs that simple majority decision should be the choice when there are but two candidates.
- We believe and argue, majority decision between two may fail, and has.

No to simple majority decision, even for 2 candidates

- The scientific community concurs that usual simple majority decision – first-past-the-post – is to be eschewed when there are at least three candidates.
- However, it concurs that simple majority decision should be the choice when there are but two candidates.
- We believe and argue, majority decision between two may fail, and has.
- Jacques Chirac defeated Jean-Marie Le Pen with a crushing 82% of the vote in the run-off of 2002, but that percentage in no way measured his support in the nation.

No to simple majority decision, even for 2 candidates

- The scientific community concurs that usual simple majority decision – first-past-the-post – is to be eschewed when there are at least three candidates.
- However, it concurs that simple majority decision should be the choice when there are but two candidates.
- We believe and argue, majority decision between two may fail, and has.
- Jacques Chirac defeated Jean-Marie Le Pen with a crushing 82% of the vote in the run-off of 2002, but that percentage in no way measured his support in the nation.
- Close scores between two candidates may mean little as well : voters may like both candidates, may like neither, or may like one and not the other.

No to simple majority decision, even for 2 candidates

- The scientific community concurs that usual simple majority decision – first-past-the-post – is to be eschewed when there are at least three candidates.
- However, it concurs that simple majority decision should be the choice when there are but two candidates.
- We believe and argue, majority decision between two may fail, and has.
- Jacques Chirac defeated Jean-Marie Le Pen with a crushing 82% of the vote in the run-off of 2002, but that percentage in no way measured his support in the nation.
- Close scores between two candidates may mean little as well : voters may like both candidates, may like neither, or may like one and not the other.
- These differences can be captured only with a finer measure of opinions.

No to simple majority decision, even for 2 candidates

- The scientific community concurs that usual simple majority decision – first-past-the-post – is to be eschewed when there are at least three candidates.
- However, it concurs that simple majority decision should be the choice when there are but two candidates.
- We believe and argue, majority decision between two may fail, and has.
- Jacques Chirac defeated Jean-Marie Le Pen with a crushing 82% of the vote in the run-off of 2002, but that percentage in no way measured his support in the nation.
- Close scores between two candidates may mean little as well : voters may like both candidates, may like neither, or may like one and not the other.
- These differences can be captured only with a finer measure of opinions.
- Close scores occur often to be important : the 2000 U.S. presidential race was decided by an official margin of 537 votes.

No to Borda and Condorcet

No to Borda and Condorcet

- Condorcet's method may lead to no winner and suffers from the defects of simple majority decision.

No to Borda and Condorcet

- Condorcet's method may lead to no winner and suffers from the defects of simple majority decision.
- Borda's method is open to Arrow's paradox, highly manipulable, and unduly biased in favor of centrists.

No to Borda and Condorcet

- Condorcet's method may lead to no winner and suffers from the defects of simple majority decision.
- Borda's method is open to Arrow's paradox, highly manipulable, and unduly biased in favor of centrists.
- Dasgupta-Maskin's method is a hybrid of Condorcet's and Borda's – so in principle deficient for the reasons developed above –

No to Borda and Condorcet

- Condorcet's method may lead to no winner and suffers from the defects of simple majority decision.
- Borda's method is open to Arrow's paradox, highly manipulable, and unduly biased in favor of centrists.
- Dasgupta-Maskin's method is a hybrid of Condorcet's and Borda's – so in principle deficient for the reasons developed above –
- It seeks to satisfy the four minimal requirements and to resist manipulation.

No to Borda and Condorcet

- Condorcet's method may lead to no winner and suffers from the defects of simple majority decision.
- Borda's method is open to Arrow's paradox, highly manipulable, and unduly biased in favor of centrists.
- Dasgupta-Maskin's method is a hybrid of Condorcet's and Borda's – so in principle deficient for the reasons developed above –
- It seeks to satisfy the four minimal requirements and to resist manipulation.
- To prove it satisfies these requirements, instead of enlarging voters' possible expressions of opinion, it must restrain them (implicitly assuming that voters' rank-order inputs are naturally expressible along a clear-cut ideological ordering of the candidates).

No to Borda and Condorcet

- Condorcet's method may lead to no winner and suffers from the defects of simple majority decision.
- Borda's method is open to Arrow's paradox, highly manipulable, and unduly biased in favor of centrists.
- Dasgupta-Maskin's method is a hybrid of Condorcet's and Borda's – so in principle deficient for the reasons developed above –
- It seeks to satisfy the four minimal requirements and to resist manipulation.
- To prove it satisfies these requirements, instead of enlarging voters' possible expressions of opinion, it must restrain them (implicitly assuming that voters' rank-order inputs are naturally expressible along a clear-cut ideological ordering of the candidates).
- It cannot be the case in most competitions (wine, skating) and there is ample experimental evidence that shows voters do not behave in accord with this restriction.

No to Approval Voting

- The yes/no or two levels of approval voting are insufficient to judge candidates.

No to Approval Voting

- The yes/no or two levels of approval voting are insufficient to judge candidates.
- Unthinkable system in skating, with 9 judges and so many competitors ! ! !.

No to Approval Voting

- The yes/no or two levels of approval voting are insufficient to judge candidates.
- Unthinkable system in skating, with 9 judges and so many competitors!!!.
- In polarized elections pitting different ideologies and policies against each other such as a presidential race, often no candidate receives a majority of "approvals" and the results are not sufficiently different to impart legitimacy to the winner.

No to Approval Voting

- The yes/no or two levels of approval voting are insufficient to judge candidates.
- Unthinkable system in skating, with 9 judges and so many competitors!!!.
- In polarized elections pitting different ideologies and policies against each other such as a presidential race, often no candidate receives a majority of "approvals" and the results are not sufficiently different to impart legitimacy to the winner.
- On the other hand, in a non-polarized election such as a primary, often many candidates end with strong "majorities," so again none has a really clear and distinctive mandate.

No to Approval Voting

- The yes/no or two levels of approval voting are insufficient to judge candidates.
- Unthinkable system in skating, with 9 judges and so many competitors!!!.
- In polarized elections pitting different ideologies and policies against each other such as a presidential race, often no candidate receives a majority of "approvals" and the results are not sufficiently different to impart legitimacy to the winner.
- On the other hand, in a non-polarized election such as a primary, often many candidates end with strong "majorities," so again none has a really clear and distinctive mandate.
- In both cases experience shows that scores may be close, so the results are all the more manipulable.

Field experiment. French Socialist primaries, Alfortville, 2011.

Majority judgment	Majority-gauge	Approval voting	Approval judgment	Reported votes	Actual votes
1 Hollande	(40.1%, *Good*+, 25.4%)	87.3%	87.0%	37.7%	39.7%
2 Aubry	(33.1%, *Good*+, 30.6%)	85.2%	82.0%	29.2%	28.9%
3 Montebourg	(39.8%, *Accept.*+, 36.3%)	64.1%	63.7%	12.5%	12.3%
4 Valls	(28.5%, *Accept.*−, 44.7%)	53.2%	55.3%	10.0%	8.6%
5 Royal	(27.1%, *Accept.*−, 47.2%)	53.5%	52.8%	10.3%	9.7%
6 Baylet	(41.7%, *Poor*+, 28.9%)	25.7%	20.4%	0.4%	0.7%

Step by step

Step by step

- The practice in judging competitions has taken an important first step : instead of comparing it evaluates.

Step by step

- The practice in judging competitions has taken an important first step : instead of comparing it evaluates.
- A second step needs to be taken too : to change the procedures for amalgamating the different evaluations.

Step by step

- The practice in judging competitions has taken an important first step : instead of comparing it evaluates.
- A second step needs to be taken too : to change the procedures for amalgamating the different evaluations.
- Many have taken a small step in this direction by eliminating the top and bottom grades or the top two and bottom two grades.

Step by step

- The practice in judging competitions has taken an important first step : instead of comparing it evaluates.
- A second step needs to be taken too : to change the procedures for amalgamating the different evaluations.
- Many have taken a small step in this direction by eliminating the top and bottom grades or the top two and bottom two grades.
- Terra Nova – "an independent progressive think tank whose goal is to produce and diffuse innovative political solutions in France and Europe" – has taken both steps in voting.

Step by step

- The practice in judging competitions has taken an important first step : instead of comparing it evaluates.
- A second step needs to be taken too : to change the procedures for amalgamating the different evaluations.
- Many have taken a small step in this direction by eliminating the top and bottom grades or the top two and bottom two grades.
- Terra Nova – "an independent progressive think tank whose goal is to produce and diffuse innovative political solutions in France and Europe" – has taken both steps in voting.
- Terra Nova has included in 2011 majority judgment in its recommendations for reforming the presidential election system of France.

Step by step

- The practice in judging competitions has taken an important first step : instead of comparing it evaluates.
- A second step needs to be taken too : to change the procedures for amalgamating the different evaluations.
- Many have taken a small step in this direction by eliminating the top and bottom grades or the top two and bottom two grades.
- Terra Nova – "an independent progressive think tank whose goal is to produce and diffuse innovative political solutions in France and Europe" – has taken both steps in voting.
- Terra Nova has included in 2011 majority judgment in its recommendations for reforming the presidential election system of France.

Darwin would conclude : for a better democracy, natural selection will lead, in the long term, to majority judgment.

References

♦ Michel Balinski and Rida Laraki. 2010. *Majority Judgment : Measuring, Ranking, and Electing.* MIT Press.

♦ — and — 2007 'A theory of measuring, electing and ranking, *PNAS*, USA, vol 104, 8720-8725.

♦ — and — 2013 How Best to Rank Wines : Majority Judgement. Chapter in the book : Wine Economics : Quantitative Studies and empirical Observations, Palgrave-MacMillan.
♦ — and —. 2014. Judge : Don't Vote.. Operations Research. In press.

♦ — and —. 2014. What Should "Majority Decision" Mean ?. Chapter in the book : Majority Decisions, Cambridge University Press, by J. Elster and S. Novak.
♦ Terra Nova [2011]. Rendre les éctions aux électeurs : le jugement majoritaire. April 21.
http ://www.tnova.fr/note/rendre-les-lections-aux-lecteurs-le-jugement-majoritaire