2. The decision to vote

when is it rational to cast a vote?

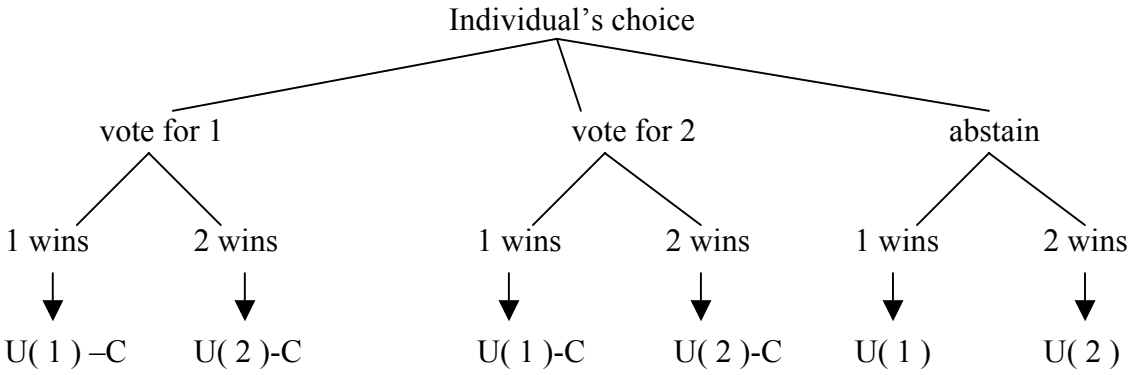
Benefits > Costs

motivation to cast a vote:

to affect policy outcome
to make a statement
…

Model:
Inspired on Downs 1957: *An Economic Theory of Democracy*.
Elaborated by Riker and Ordeshook 1968.

Consider an individual that has to decide whether to cast a vote. If he decides so he also has to decide which candidate to vote. Suppose there are two candidates: 1 and 2.
Thus, the individual has to choose among 3 actions: vote for 1 , vote for 2, abstain.
The set of possible outcomes are two: 1 wins, 2 wins.



U (i) denotes the expected utility for the voter if candidate i wins:

Indirect utility function: concavity over consumption
Single- peaked preferences
Definition of ideal point
Definition of ideology
Effect of campaigns and campaign spending
Effect of special interest groups

The act of voting implies some costs, C > 0, that include time and effort to cast a vote.

His casting a vote implies an effect on the probability of a candidate winning:

P (1 wins: votes for 1) > P (1 wins: abstains) > P (1 wins: votes for 2)

P (2 wins) = 1- P (1 wins)

These are subjective probabilities.
The expected utilities of each of the three actions are:

U(votes for 1) = P(1 wins: votes for 1) U(1 wins) + P(2 wins: votes for 1) U(2 wins) - C
U(votes for 2) = P(1 wins: votes for 2) U(1 wins) + P(2 wins: votes for 2) U(2 wins) - C
U(abstains) = P(1 wins: abstains) U(1 wins) + P(2 wins: abstains) U(2 wins)

Suppose that the candidate that the voter prefers is 1, and the net benefit he obtains if 1 wins is B (differential benefit):

$B = U(1 \text{ wins}) - U(2 \text{ wins}) > 0$

B may include: policies that the voter beliefs will be implemented if 1 wins, his evaluation of the candidates' competence and experience, material benefits that candidate 1 might have promised.

Since $U(1 \text{ wins}) - U(2 \text{ wins}) > 0$ then U(votes for 1) > U(votes for 2)

And we have that U(votes for 1) > U(abstains) iff
[P(1 wins: votes for 1) - P(1 wins: abstains)] B > C

P(1 wins: votes for 1) - P(1 wins: abstains) = marginal effect of casting a vote on the probability that candidate 1 wins = the probability that the voter is pivotal.
The magnitude of this effect depends on: the number of votes casted, the beliefs over other voters' intentions, … Normally this is very small.

In order to calculate it:
Suppose that there are n citizens.
Suppose that $v < n$ is the number of voters.
Suppose that v' is the voter i's expected number of voters, without him.
Suppose that m is the minimal number of votes that a candidate has to obtain in order to win the election.
Then, voter i is pivotal only if the expected number of votes for 1 is m-1.

For example with majority rule we have that
$m = (v/2) + 1$ if v is even
$m = (v+1)/2$ if v is odd.

Thus, in this case a voter i is pivotal only if the number of votes for 1 equals v'/2 and v' is even or if the number of votes for 1 equals (v-1)/2 and v' is odd.

Let R denote the reward from voting:

R = [P(1 wins: votes for 1) - P(1 wins: abstains)] B - C

Thus we have that a rational voter decides to cast a vote iff R > 0.
For this to hold we need B to be very large with respect to C.
Thus we should expect R < 0.

This implies that in general only voters that are indifferent abstain.

In the real world we observe that participation in elections is different in different countries and within a country it is different for different matters, for different groups of people: by regions, gender, income levels, education, …

Participation in elections:

COUNTRY	%	YEAR
Australia*	95	1984
	94	1987
Austria	91	1983
	90	1986
Canada	75	1984
	76	1988
Denmark	87	1987
	87	1988
Finland	75	1983
	72	1987
Ireland	72	1982
	73	1987
Italy	89	1983
	88	1987
Japan	71	1983
	71	1986
The Netherlands	81	1982
	86	1986
New Zealand	92	1984
	89	1987
Norway	79	1981
	83	1985
Sweden	90	1985
	86	1988
United Kingdom	73	1983
	75	1987
United States**	53	1984
	50	1988
Germany	89	1983
	84	1987

*** Australia: obligatory.**
**** USA presidential elections**

So, why do people vote ?

Riker and Ordeshook:

General effects on expected utility that depend on individuals' vote can be positive (B) and negative (A)

General effects on expected utility that do not depend on individuals' vote can also be positive (D) and negative (C)

$R = p\,B - p\,A - C + D$

where
candidate 1 is the most preferred candidate
p = U(1 wins: vote for 1)
B = U(1 wins) - U(2 wins) > 0
C = time and effort > 0
A = local revenge, election without secret ballots
D = partisan preference, ethics of voting, possibility of deciding, make democracy meaningful.

It is also observed that some people vote for causes that are known as lost, or for candidates who are certain to win. Why? Because of D.

VOTERS' RATIONALITY

The rational theory of choice is identified with the maximization of the expected utility. The theory of the expected utility was proposed by:

Von Neumann and Morgernstern 1947
Savage 1954

Defended as a good descriptive model of behavior:

Makes people effective
Axioms are compelling
Evolution and competition favor rational individuals over less rational ones.

Some objections:

Cognitive: human rationality is bounded by limitations of memory and computational capabilities.
Experiments show inconsistencies of human behavior with rationality.

Allais Paradox

First choose between:
L_1 = 500 with p = 1
L_2 = 2.500 with p = 0.1
500 with p = 0.89
0 with p = 0.01

Then choose between:
L_3 = 500 with p = 0.11
0 with p = 0.89
L_4 = 2.500 with p = 0.1
0 with p = 0.9

Choosing an even and an odd lottery is inconsistent with expected utility theory:

$u(L_1) = u(500)$
$u(L_2) = 0.1\ u(2.500) + 0.89\ u(500) + 0.01\ u(0)$
$u(L_3) = 0.11\ u(500) + 0.89\ u(0)$
$u(L_4) = 0.1\ u(2.500) + 0.9\ u(0)$

Therefore

$u(L_1) > u(L_2)$ iff $0.11\ u(500) > 0.1\ u(2.500) + 0.01\ u(0)$
$u(L_3) > u(L_4)$ iff $0.11\ u(500) > 0.1\ u(2.500) + 0.01\ u(0)$

In experiments we observe that people's choices violate expected utility theory: most people choose 1 and 4.
Normally people have a strong preference for sure prizes to uncertain lotteries.
This means that people probably overestimate small probabilities and underestimate large ones (as in Prospect theory described below).
If they overestimate their probability of being pivotal, then the chances for casting a vote increase.

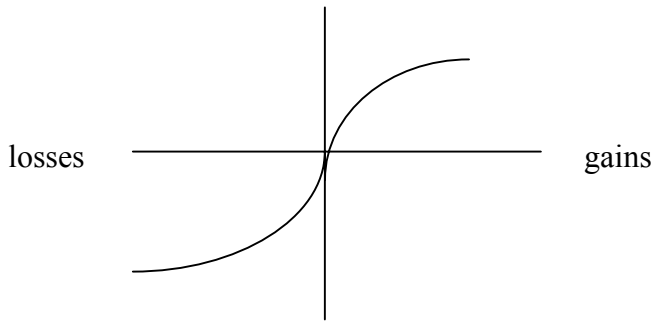
Prospect Theory

Proposed by Kahneman and Tversky 1979, 1984.
Main elements of the theory illustrated with experiments in Quattrone and Tversky, 1988:

Attitudes towards risk
Loss aversion
Framing effects
Weighting of chance events
Voters' illusion

Attitudes towards risk:

Expected utility theory predicts risk aversion (concavity)
Prospect theory predicts risk aversion on gain and risk seeking on losses (S-shaped)



A change of the reference point may imply a change from gains to losses, therefore a different attitude, and a different outcome: framing effects.
Experiments: 1, 2, 3, 4.

Experiments 3 and 4

Suppose there is a continent that consist of five nations. They all have very similar systems of government and economics, they are members of a common market, …

Imagine you are a citizen of one of them, in which there is a presidential contest between candidates Frank and Carl.

Two economists studied the candidates' preferred policies and made a projection.

The forecasts concern the rate of inflation:

	Other 4 nations	Frank's	Carl's
Economist 1	24	16	4
Economist 2	26	14	26

Suppose that as a citizen you are asked to cast your vote for Frank or Carl. On the basis of the information provided, whom would you vote for?

N=76
Frank: 74%
Carl: 26%

A second group:

	Other 4 nations	Frank's	Carl's
Economist 1	4	16	4
Economist 2	6	14	26

N=75
Frank: 52%
Carl: 48%

Prediction:
The more risky candidate (Carl) obtains more votes in the second case (loses) than in the first case (gains).

Prospect theory:
People are risk-averse in the domain of gain and risk-seeking in the domain of losses, where gains and losses are defined relative to the outcomes projected for other countries.

Loss aversion:

Displeasure of losing an amount is larger than pleasure of winning the same.
Steeper slope for losses, flatter for gains.
The role of the reference point in the formation of public opinion.
The political significance of how issues are labelled: abortion opponents call themselves pro-life and not anti-choice.
Experiments: 5, 6, 7, 8.

Experiment 7

The Equal rights Amendment to the Constitution says:
"Equality of rights under law shall not be denied or abridged by the United States or by any state on account of sex."

Supporters of the amendment say that it will
(1) help eliminate discrimination against women
(2) improve the rights of women
in job opportunities, salary, and social security benefits.

Opponents of the amendment say that it will have a negative effect by denying women's protection offered by special laws.

Do you favor or oppose the Equal Rights Amendment?

(Two different groups: 1 and 2)

If losses loom larger than gains, then its support should be greater among those who are exposed to the frame that emphasizes the elimination of discrimination than among those exposed to the frame that emphasizes the improvement of women's rights.

N = 149
Favor: 74%

(1) Help eliminate discrimination against women
Favor: 78%

(2) Improve the rights of women
Favor: 69%

Invariance:

The preference order among prospects should not depend on how their outcomes and probabilities are described: framing effects.
Experiments: 9, 10, 11, 12.

Experiments 9 and 10

Political decision making often involves a considerable number of trade-offs. A program that benefits one segment of the population may work to the disadvantage of another segment.

Policies designed to lead to higher rates of employment frequently have an adverse effect on inflation.

Imagine you were faced with the decision of adopting one of two economic policies:

	unemployment	inflation
Program J	10	12
Program K	5	17

Which program would you select?

N=126
Program J: 36%
Program K: 64%

A second group:

	employment	inflation
Program J	90	12
Program K	95	17

N=133
Program J: 54%
Program K: 46%

Increasing illumination in a room by adding one candle has a much larger impact when the initial illumination is poor than when it is good.

The same psychophysical principle is applicable to the perception of numerical differences.

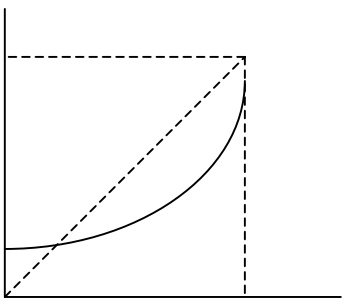
The change from an unemployment rate of 10% to 5% yielding a ration of 2 should have more impact than the objectively equal change from an employment rate of 90% to 95%, yielding a ratio very close to 1.

The prediction of Prospect theory: Program K would be more popular in the first case and program J in the second.

Weighting of chance events:

Zeckhauser's example: consider a game of Russian roulette where you are allowed to purchase the removal of a bullet. Would you be willing to pay the same amount to reduce the number of bullets from 4 to 3 as you would to reduce the number of bullets from 1 to 0?
Most people say that they would pay more to reduce the probability from 1/6 to 0 (eliminating risk) than to reduce it from 4/6 to 3/6.
This response is incompatible with expected utility theory.
Prospect theory applies a 'decision weight' to the expected value of each outcome that is a monotonic but non linear function of the probability.

Decision weight



probability

So that:
P(0)=0

P(1)=1
Low probabilities are overweighted
High probabilities are underweighted, with a larger effect.
Experiments: 13, 14.

Experiments 13 and 14

The state of Epsilon is interested in developing clean and safe alternative sources of energy. Its department of Natural Resources is considering two programs for establishing solar energy.

	Savings in energy expenditures
Program X	20M with certainty
Program Y	30M w.p. 80% 0 w.p. 20%

N=88
Program X: 74%
Program Y: 26%

The state of Gamma is also interested in developing clean and safe alternative sources of energy. Its department of Natural Resources is considering two programs for establishing solar energy.

	Savings in energy expenditures
Program A	20M w. p. 25% 0 w.p. 75%
Program B	30M w.p. 20% 0 w.p. 80%

N=88
Program A: 39%
Program B: 61%

CHOICES OBTAINED:

	Program A	Program B
Program X	27	**38**
Program Y	7	16

Set U(0) = 0

Expected Utility theory:

Preference for X over Y implies
$U(20) > 0.8\ U(30)$

Preference for B over A implies
$0.25U(20) < 0.2U(30)$
or $U(20) < 0.8U(30)$

This implies that X > Y iff A > B

Prospect theory:

Preference for X over Y implies
P(1)U(20) > P(0.8)U(30)
or U(20)/ U(30) > P(0.8)/P(1)

Preference for B over A implies
P(0.25)U(20) < P(0.2)U(30)
or U(20)/U(30) < P(0.2)/P(0.25)

Thus:
P(0.8)/P(1) < U(20)/U(30) < P(0.2)/P(0.25)
and
P(0.8)/P(1) < P(0.2)/P(0.25) (close to 1)
Prospect theory only requires that:
- individuals who are indifferent between X and Y will prefer B to A and
- individuals who are indifferent between A and B will prefer X to Y.

The only pair of choices not consistent with prospect theory is Y and A.
For this pair P(0.8)/P(1) > P(0.2)/P(0.25).
This pair was in fact selected least often.

Rationality of voting: voters' illusion

Downs: it may not be rational to an individual to vote in large elections because of the very low probability that the individual will cast a decisive vote.
Riker and Ordeshook: an individual may derive other benefits from voting besides the possibility of casting a decisive ballot.

Quattrone and Tversky 1984 have shown that people fail to distinguish between causal contingencies (acts that produce an outcome) and diagnostic contingencies (acts that are correlated with an outcome).
There is a widespread belief that attitudes are correlated with actions. Therefore, some people may reason that if they decide to vote (abstain), it would imply that others with similar political attitudes would also decide to vote (abstain).
Each citizen may regard his vote as a diagnostic of millions of votes, which would substantially inflate the subjective probability of one's vote making a difference: the voters' illusion.

315 undergrads form Stanford.
Read about an imaginary country:
Two parties A and B.
They support party A
There are 4 million supporters of party A.
There are 4 million supporters of party B.
There are 4 million undecided.
Voting is costly (time and effort)

Some listen to party supporters' theory:
Non-aligned split equally
Participation of supporters is decisive.
Predicted margin of victory: between 200 and 400 thousand votes.

Some listen to non-aligned voters' theory:
Participation of supporters is equal for both parties.
Non-aligned are decisive.

Predicted margin of victory: over 200 thousand votes.

Both theories imply the same consequences of voting:
- Same net benefit (B)
- Same probability of being decisive
- Same cost of voting

party supporters' theory:: states a correlation between political orientation and participation.
non-aligned voters' theory: states that political orientation is independent from participation.

Results:

Only subjects presented with the party supporters' theory could infer that their decision would be a diagnostic of their like-minded peers' decision.
A large turnout should be found among subjects presented with the party supporters' theory.

How likely is that the supporters of party A would vote in greater numbers than the supporters of party B,
Given that you voted?
Given that you abstained?
People that listened to the party supporters' theory thought that the individual choice had a greater effect on what others decided than people that listened to the non-aligned voters' theory.

This analysis recalls the tragedy of the commons, and it applies to other phenomena: wars, charity, …
Exhortations to vote, to fight, to offer help are usually framed: if you don't vote/fight/contribute, think of what would happen if everyone felt the same way.
But how does an individual's private decision materially affect the decisions made by countless other persons?

References:

Riker, William and Peter Ordeshook. 1968. "The calculus of voting" APSR 62:25-42.
Quattrone, George and Amos Tversky. 1988. "Contrasting Rational and Psychological Analyses of Political Choice" APSR 82:719-36.