The Rise and Fall of Asymmetric Dominance

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€: **INRA Jeune Chercheur**

$7

$3

$7

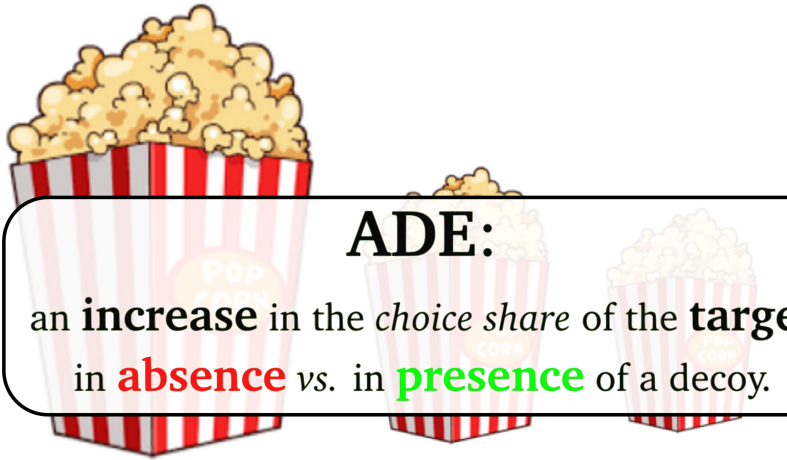
$7

$3

$7
Target

$7
decoy

$3
Competitor



ADE:

an **increase** in the *choice share* of the **target**
in **absence** *vs.* in **presence** of a decoy.

$7
Target

$7
decoy

$3
Competitor

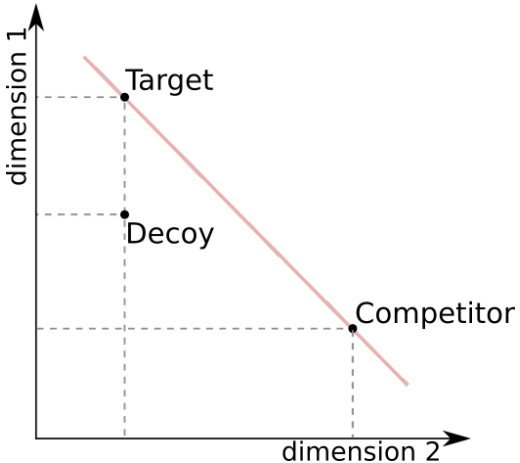
Why do we care?

- (for the money oriented):
  wide marketing implications

Why do we care?

- (for the money oriented):
  wide marketing implications
- (for ~~nerds~~ economists):
  violation of Independence from Irrelevant Alternatives

Standard ADE design



- Hypothetical
- 2-attribute choices
- Indifference
- Between-subjects
- Aggregate measure

difference in choice share of **target** in **absence** *vs* **presence** of **decoy**.

Evidence for ADE

Widely replicated (in marketing & social psychology mainly)

- In hypothetical **product** choices [dozens of papers]
- In **political** opinions in Finland [Herne]
- In **animals** honeybees, gray jays, slime mold [Shafir et al]

Yet, not very robust

- **Small** or **no** effect when:
  - products carry **brand name** [Ratneshwar et al., 1987]
  - product **description** is very **precise** [Mishra et al., 1993]
  - **visual** rather than numerical dimensions [Frederick et al., 2014]
  - **away** from **indifference** [Crosetto and Gaudeul 2016]
  - in **real-world** choices [Trendl et al., 2018]
- **Large(r)** effect when:
  - subjects asked to **justify** choices [Simonson, 1989]
  - **dominance** is made more **focal** [Mishra et al., 1993; Król and Król, 2019]

This paper: what?

Testing the **theoretical nature** of the ADE:

Bias? Heuristic? Artifact?

This paper: what?

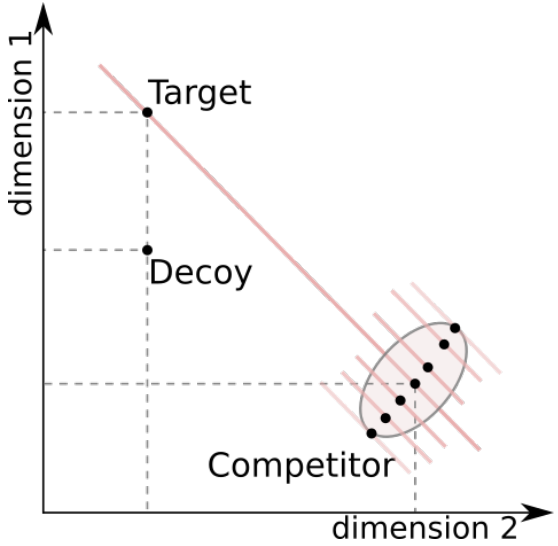
Testing the **theoretical nature** of the ADE:

Bias?	Heuristic?	Artifact?
Serious challenge to IIA	IIA mostly fine	No problem

Three main novelties:

1. **Within-subjects**: we can **measure** ADE and not just *show* it
2. **Induced** preferences allow us to **manipulate** indifference
3. **Time and choice process**: does ADE *survive* in the longer run?

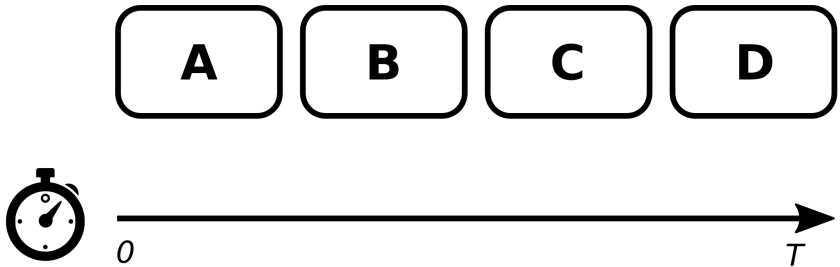
Within-subject design

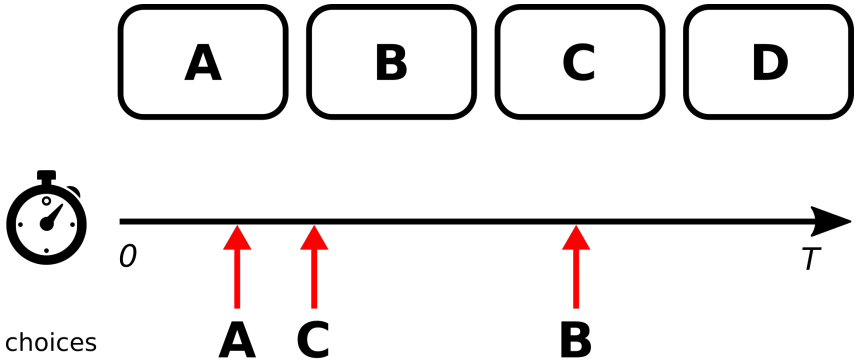


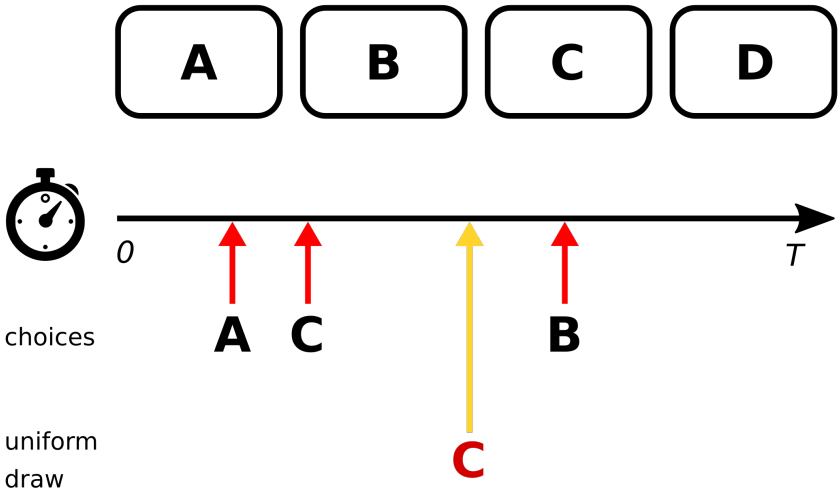
Time and choice process: exposing the *choice process*

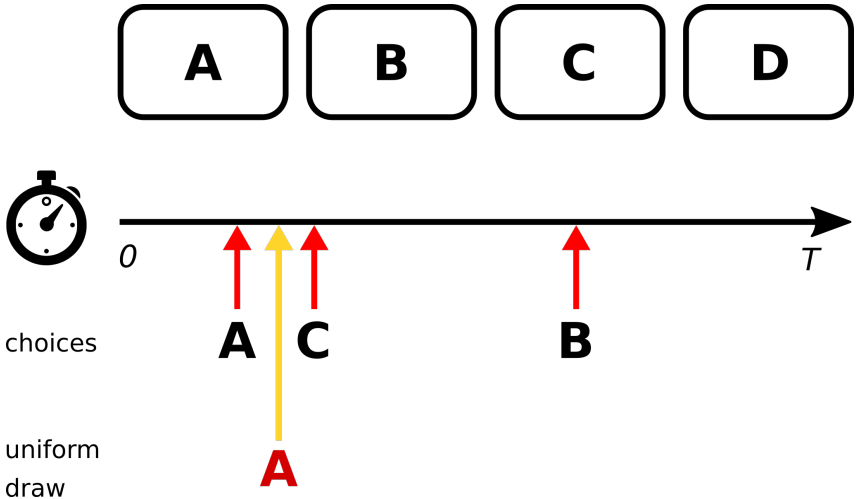
$\forall$ subject, $\forall$ choice, we want to capture

- the fast heuristics used (if any)
- *and* the slow reasoning applied (if any)
- *and* the moment the subject switched (if any)


A
B
C
D
0
T


A
B
C
D
0
T
choices
A
C
B


A
B
C
D
0
T
choices
A
C
B
uniform
draw
C


A
B
C
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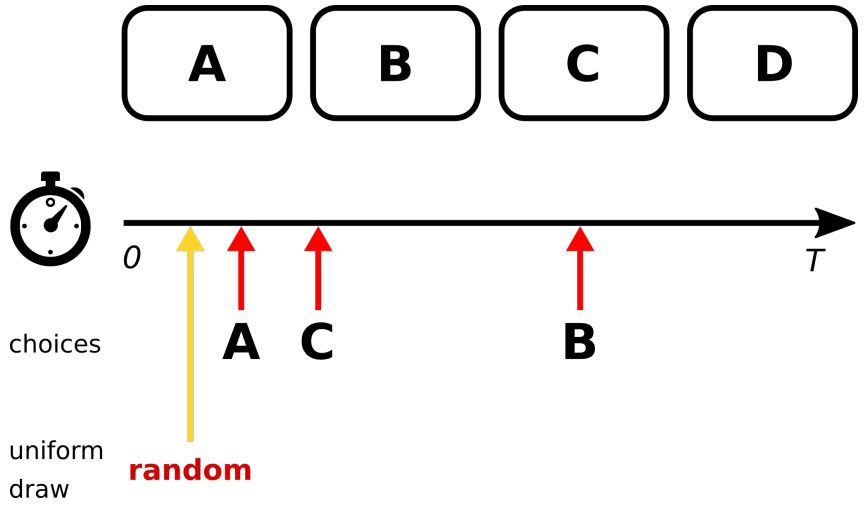
0
T
choices
A
C
B
uniform
draw
A



(adapted from **Caplin et al.**, *Search and Satisficing*, AER 2011; also applied to guessing games (Agranov et al., JESA 2015); social preferences (Dyrkacz Krawczyk JBEE 2017))

Expected behavior

- No choice $\Rightarrow$ random choice: incentive to *fast* reply
- Time is ticking: incentive to *change* first decision upon reflection

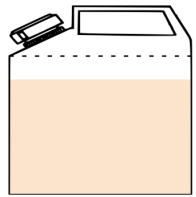
Notes:

- fast to slow *endogenous* (usually: exogenous)
- Data reveal choice *process* (usually: outcome)

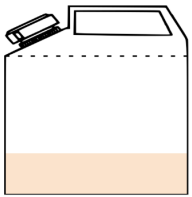
Induced preferences

Vous devez acheter 3 litres d'essence. Quelle est l'option la moins chère ?

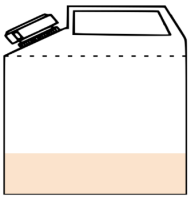
3 / 40



3.09€



1.17€



1.40€

Notes

- Problem is *spuriously* bidimensional (**size**, **price**)
- But actually *monodimensional* (**money**)
- (*unobservable*) utility weighting $\Rightarrow$ (**observable**) cognitive exercise

- *no* homegrown preferences
- The optimal choice is always **computable**
- (but somehow hidden to subjects)

Experimental details

- Each subject faces 40 screens
- random order of screens; random position of the decoy
- 111 consumers ["real people"]
- Grenoble area, south-eastern France
- 10€ show-up fee + earnings in the task (Average 10€)

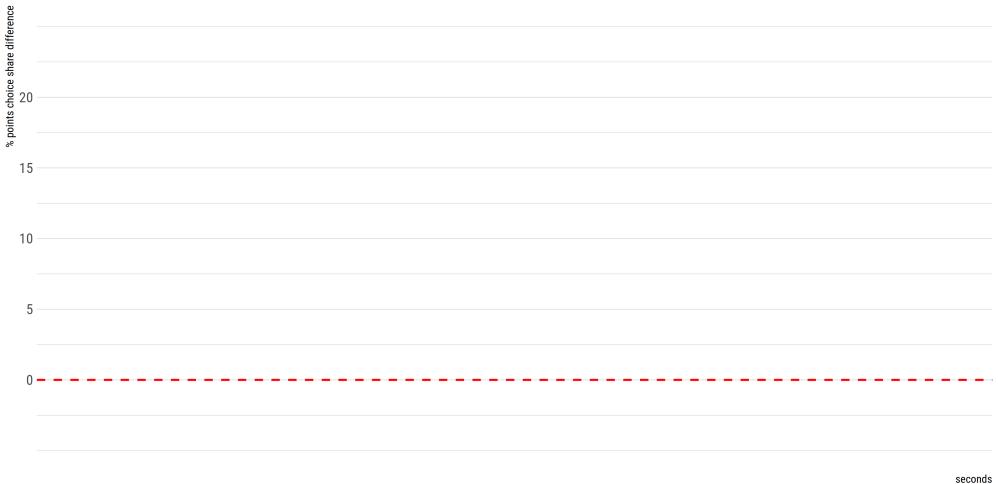
ADE:

the **difference** in the *choice share* of the **target**
in **absence** *vs.* in **presence** of a decoy.

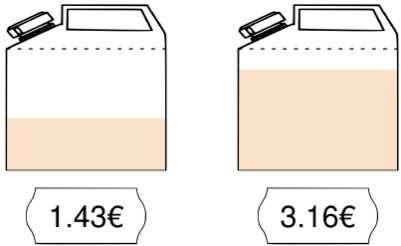
Aggregate results: choices

Extra choices of target in presence of a decoy

% points, treatment vs 2-option control, no choices counted in

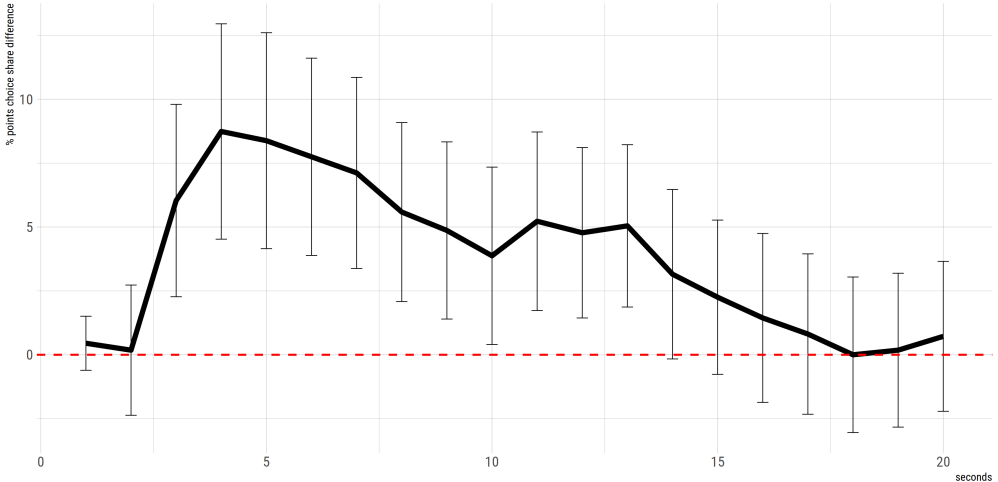


Classic comparison: 2vs3

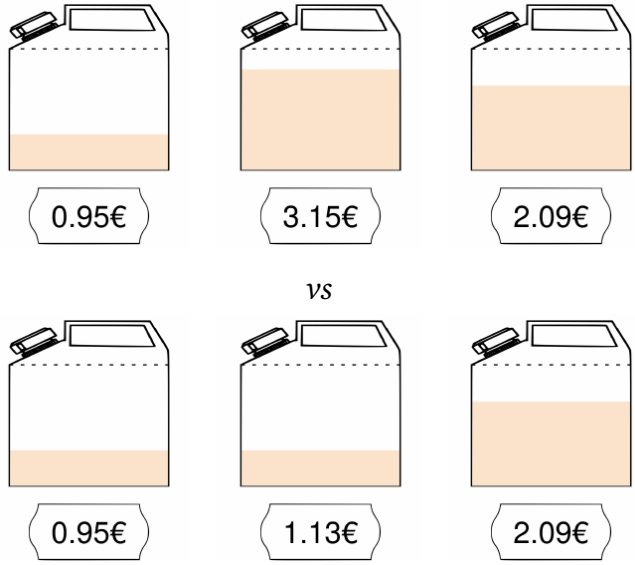


Extra choices of target in presence of a decoy

% points, treatment vs 2-option control, no choices counted in

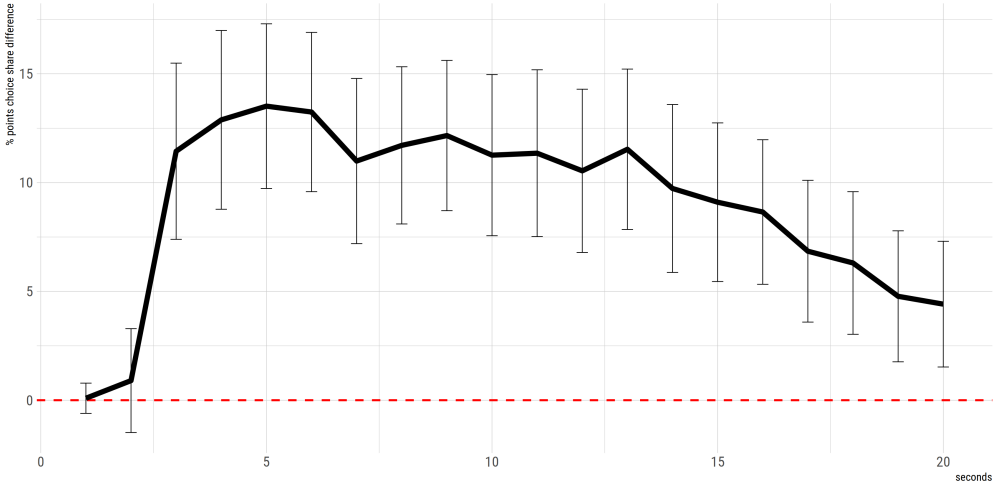


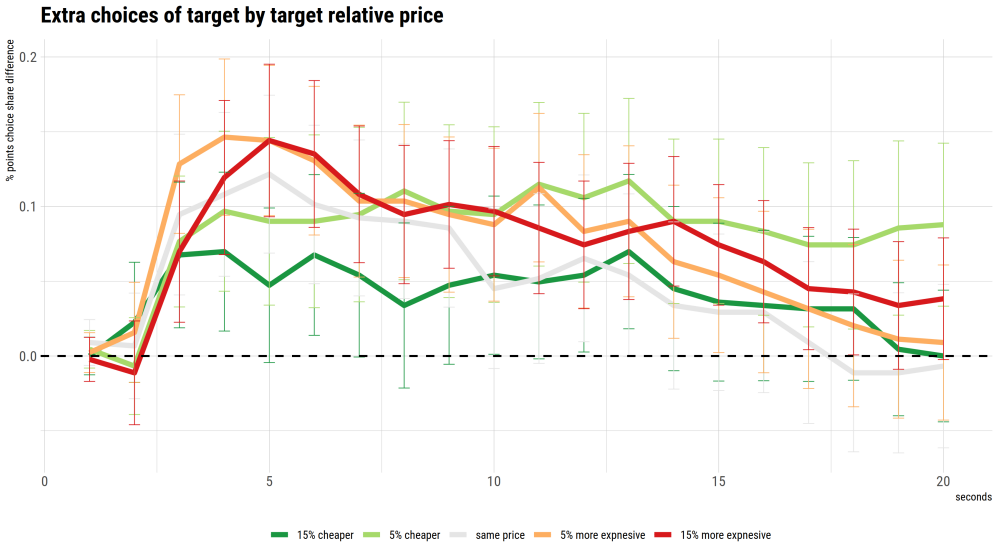
New comparison: 3vs3



Extra choices of target in presence of a decoy

% points, treatment vs 3-option control, no choices counted in

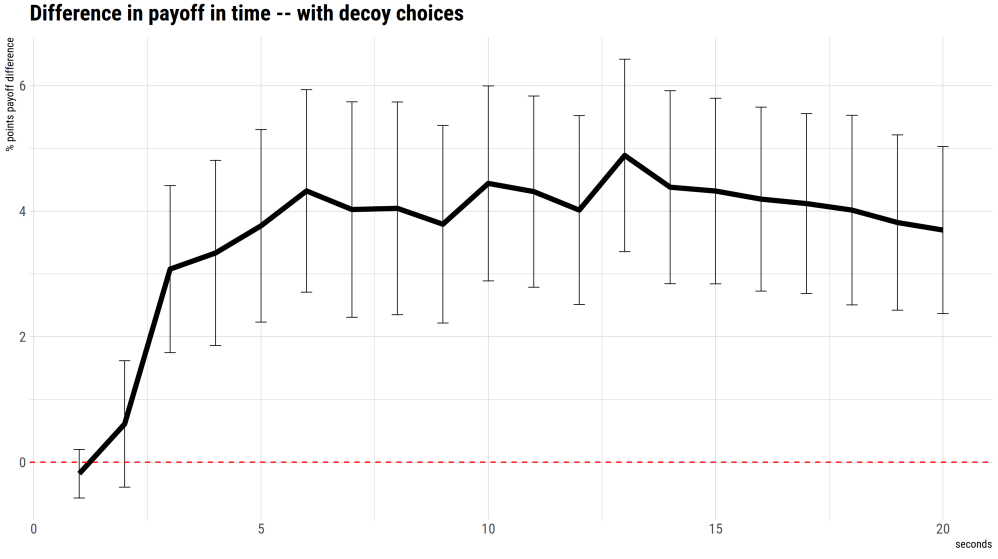


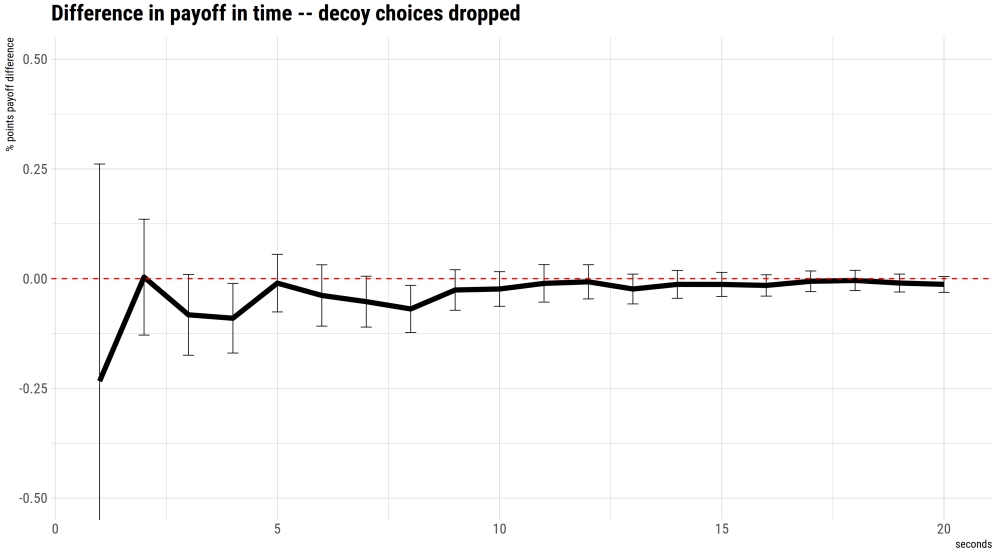

Extra choices of target by target relative price
% points choice share difference
0.2
0.1
0.0
0
5
10
15
20
seconds
15% cheaper
5% cheaper
same price
5% more expnesive
15% more expnesive

Take home message

- ADE is present in the first seconds of choice
- then it converges to $\sim$ zero
- true irrespective of target relative price

Aggregate results: payoffs


Difference in payoff in time -- with decoy choices
% points payoff difference
6
4
2
0
0
5
10
15
20
seconds


Difference in payoff in time -- decoy choices dropped
% points payoff difference
0.50
0.25
0.00
-0.25
-0.50
0
5
10
15
20
seconds

Take home message

- Dominance allows to spot and eliminate decoy
- Subjects pay a (*small*) price for ADE
- But only in the short run
- on top of this, no other effect on payoffs

Modeling choices

Modeling strategy

1. **Structural model of choice** to:
   - assess which strategy is followed
   - jointly estimate choice accuracy and heuristics
   - estimate value of *no choice*

2. **Mixture model** to:
   - allow subjects to be of different types
   - heuristic (fast) *or* maximizer (slow) *or* Fast *then* slow
   - estimate shares of types in population

Structural model

- Utility of options at time t depends on type and unit price

$$U(x_t) = f(type) \cdot (-up);$$

$$up = \frac{shownprice}{quantity}$$

$$f(type) = \begin{cases} competitor & 1 + malus_c(t) \\ decoy & 1 + malus_d(t) \\ nochoice & v_t \end{cases}$$

- Utility of options at time t depends on type and unit price

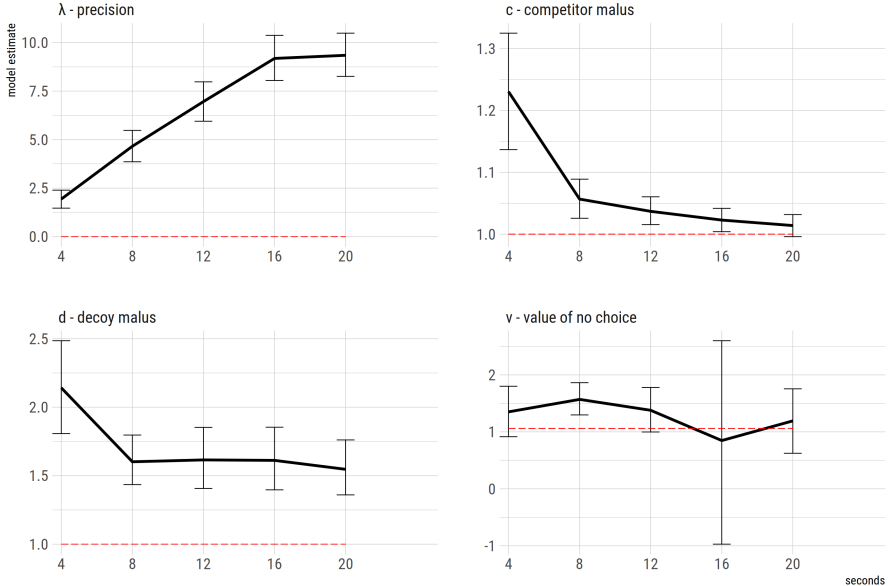
$$U(x_t) = f(type) \cdot (-up);$$

$$up = \frac{shownprice}{quantity} \qquad f(type) = \begin{cases} competitor & 1 + malus_c(t) \\ decoy & 1 + malus_d(t) \\ nochoice & v_t \end{cases}$$

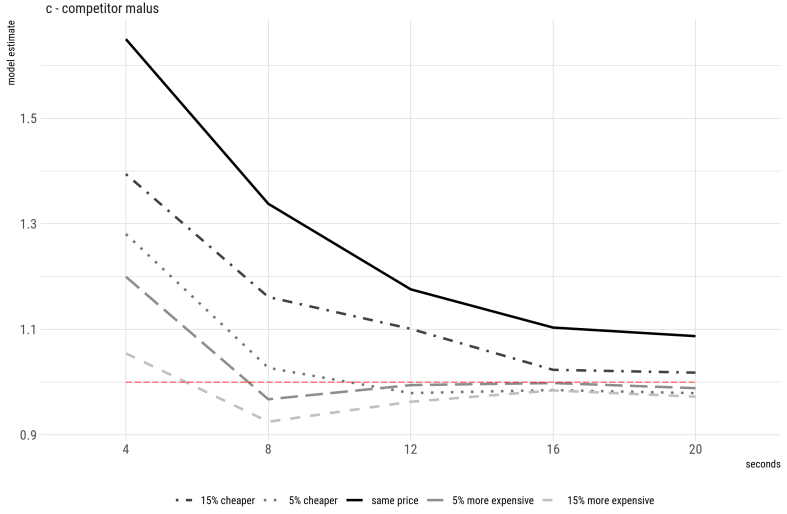
- We add an extreme-value distribution of error (accuracy parameter):

$$U(x) = \frac{\exp(\lambda_t U(x))}{\exp(\sum_i \lambda_t U_i)}$$

- We estimate the model for 5 4-second bins


λ - precision
model estimate
10.0
7.5
5.0
2.5
0.0
4
8
12
16
20
c - competitor malus
1.3
1.2
1.1
1.0
d - decoy malus
2.5
2.0
1.5
1.0
v - value of no choice
2
1
0
-1
seconds

Effect by markup

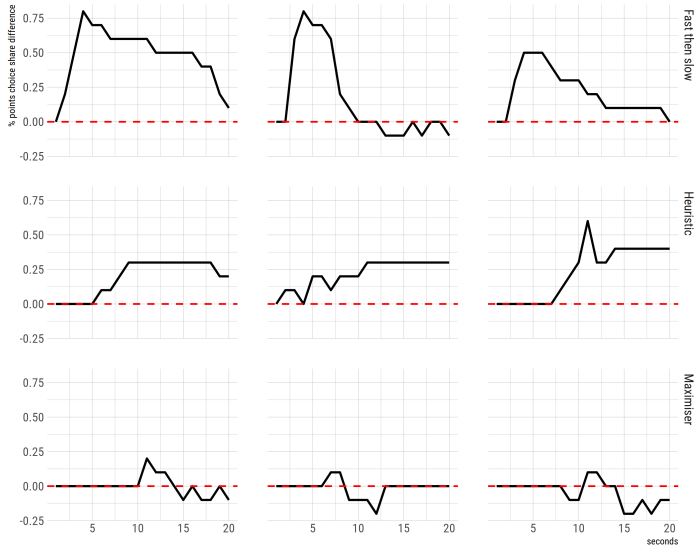


Take home message

- Precision increases over time.
- Elimination of dominated alternatives right at the beginning.
- "no choice" value goes to zero relatively late – subjects like to think
- Effect **disappears** away from indifference

Mixture model

ADE dynamics by type



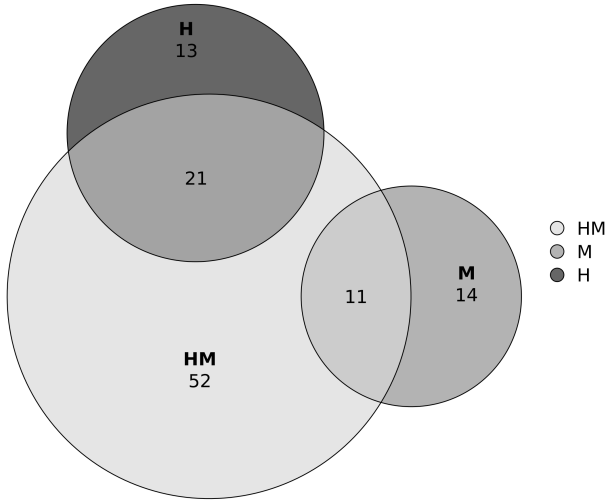
3 decision types

Heuristic only (**H**): estimate bonus, malus, precision, just for *one* period

Maximisers (**M**): have bonus = malus = 0, do not use dominance

Fast *then* Slow (**HM**): first H, then M

Type assignment



Who makes up the types?

	Base category: Fast *then* Slow	
	Heuristic	**Maximiser**
CRT score	-1.0^{**} [−1.7, −0.2]	−0.1 [−0.6, 0.5]
Risk tolerance	0.3^{**} [0.005, 0.6]	0.2 [−0.1, 0.4]
Student	0.2 [−2.2, 2.7]	-2.7^{**} [−5.0, −0.4]
Worker	1.8 [−0.6, 4.2]	−1.2 [−3.6, 1.2]
Education level	0.2 [−0.3, 0.7]	1.1^{***} [0.3, 1.9]
Econ student	1.8^{**} [0.4, 3.1]	−0.6 [−2.0, 0.8]
Age	0.1^{**} [0.003, 0.2]	−0.2 [−0.4, 0.1]
Revenue	−0.9 [−2.7, 1.0]	-2.5^{**} [−4.7, −0.3]
Constant	-6.4^{***} [−11.2, −1.6]	1.9 [−4.4, 8.1]
Akaike Inf. Crit.	190.0	190.0

Note: 95% CI in parenthesis. *p<0.1; **p<0.05; ***p<0.01

Take home message

- Subjects are different.
- Most subjects show ADE as a short-term strategy, then change.
- We have some (sensible) predictors of types

What did we learn?

Two *alternative* interpretations

For ~~nerds~~ economists

ADE is a **heuristic** and IIA is saved (in the long run)

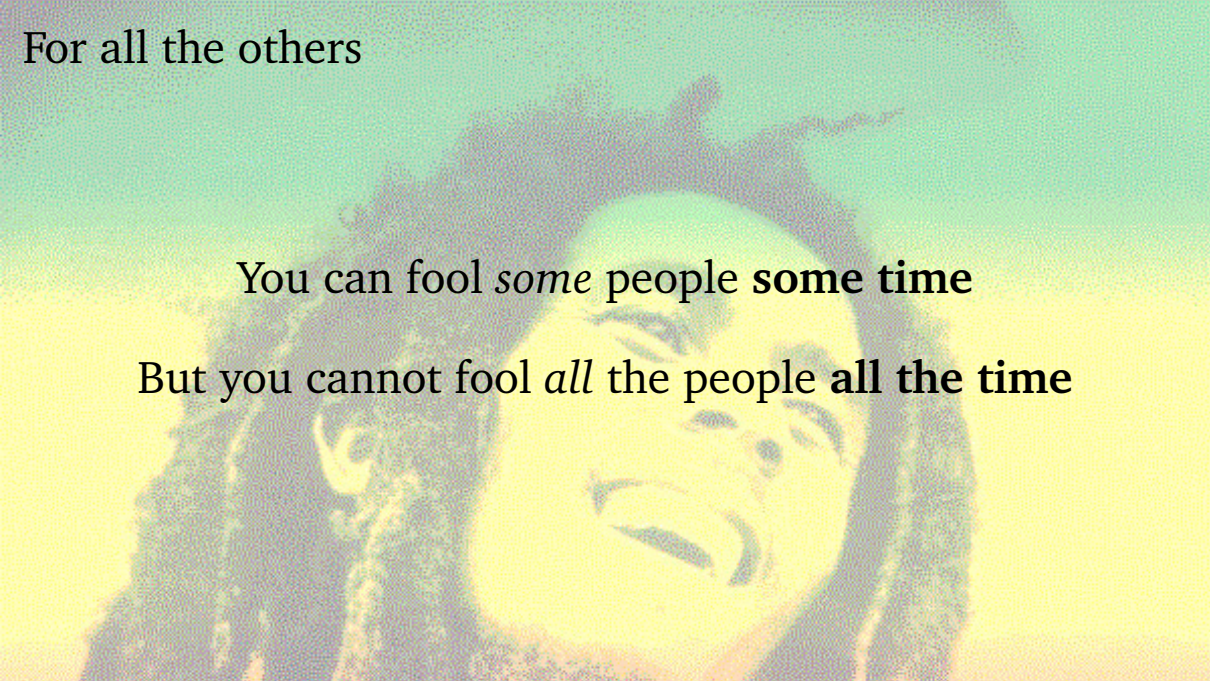
- used in the early stages of the decision process
- disappears upon reflection
- majority of subjects fast *then* slow
- $\sim \frac{1}{4}$ of subjects use ADE only

For ~~nerds~~ psychologists

ADE is still present in a **hostile** environment

- there exist clear and unique best option
- there is no actual utility trade-off
- in the real world *a fortiori* reliance on heuristic
- a full $\sim \frac{1}{4}$ use ADE only!

For all the others



You can fool *some* people **some time**

But you cannot fool *all* the people **all the time**

THANKS