



Behavioral and Experimental Economics

SESSION 2: CONSUMER BEHAVIOR: RATIONALITY, BIASES & BEHAVIORAL
CHANGE

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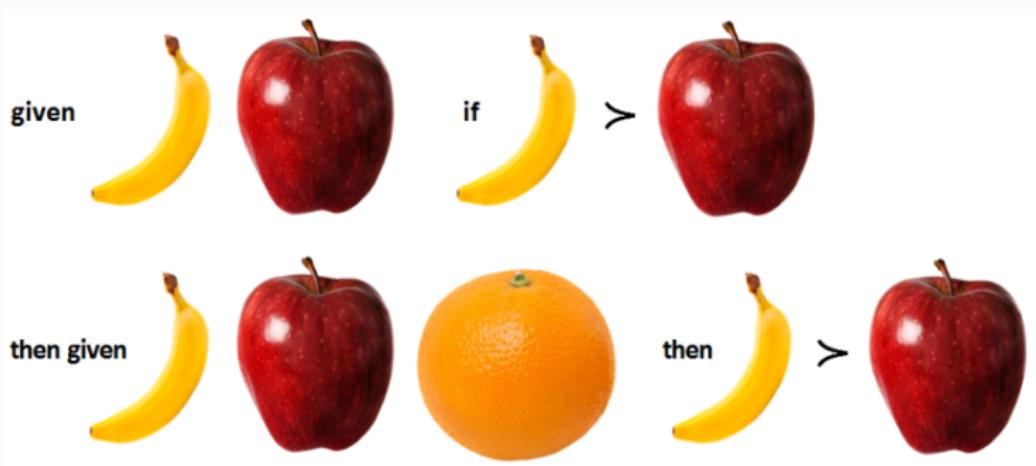
Failure of the *independence axiom*: the **Attraction Effect**



Independence

Independence assumes that if I give you an *irrelevant* alternative, you *shouldn't change* your order of preferences

- ▶ Do you prefer pasta to pizza?
- ▶ If I add kebab in the choice set, you should *still* prefer pasta to pizza.





Choosing pop-corn, 1

Please choose



\$7



\$3



Choosing pop-corn, 2

Please choose again



\$7



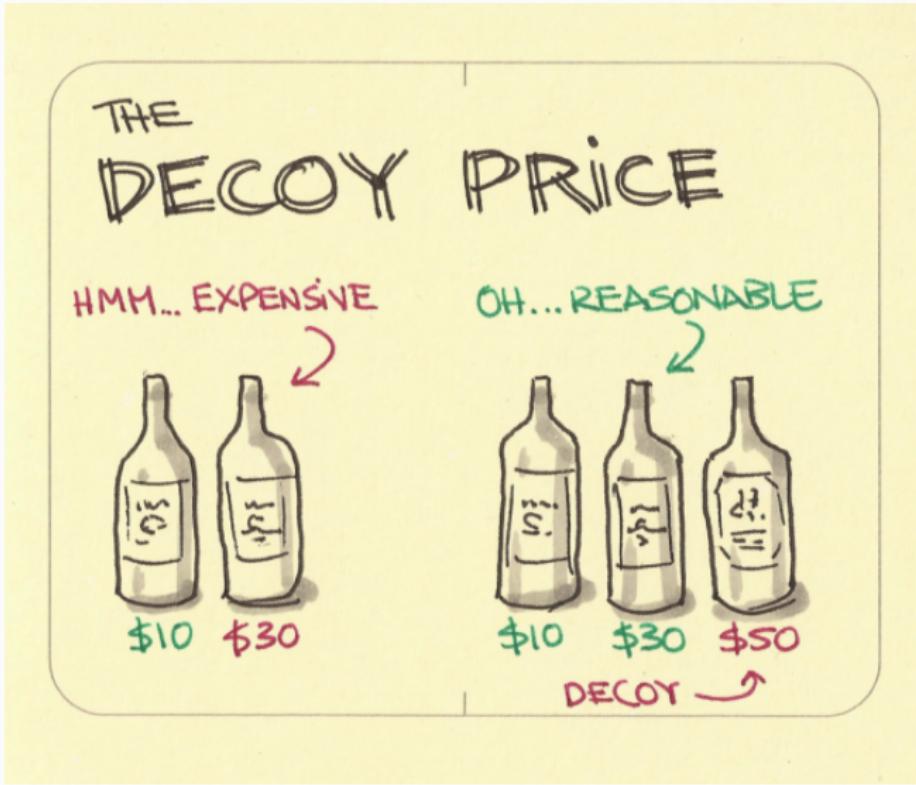
\$7



\$3



The decoy/attraction/asymmetric dominance effect





ADE

This is called the **Asymmetric Dominance Effect**.

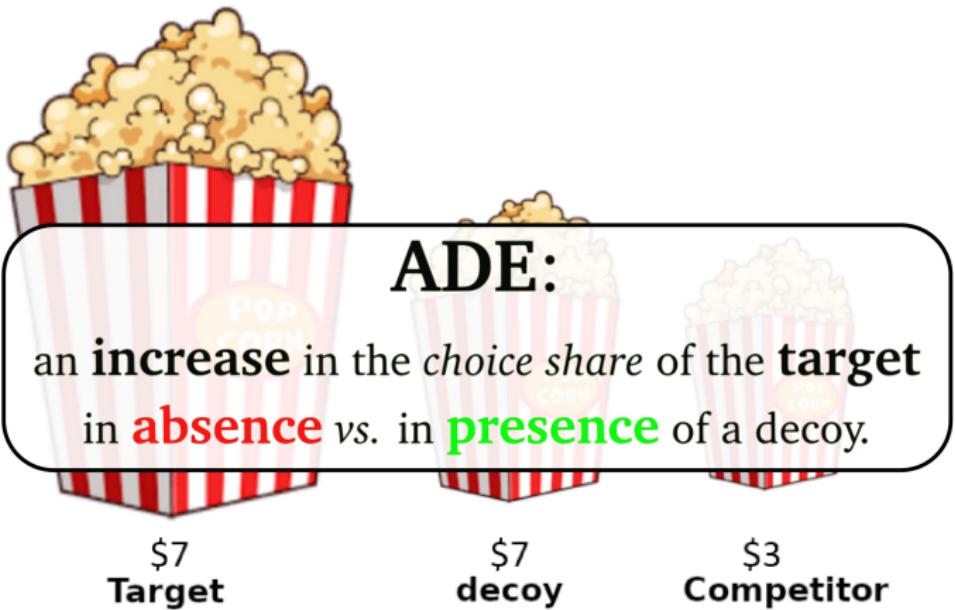
Adding to a choice set an asymmetrically dominated option – that is, an option that is dominated by some but not all the alternatives in the set – increases the choice share of the now-dominant option, at the expense of the others.

Some terms:

Target the asymmetrically dominant option

Decoy the asymmetrically dominated option

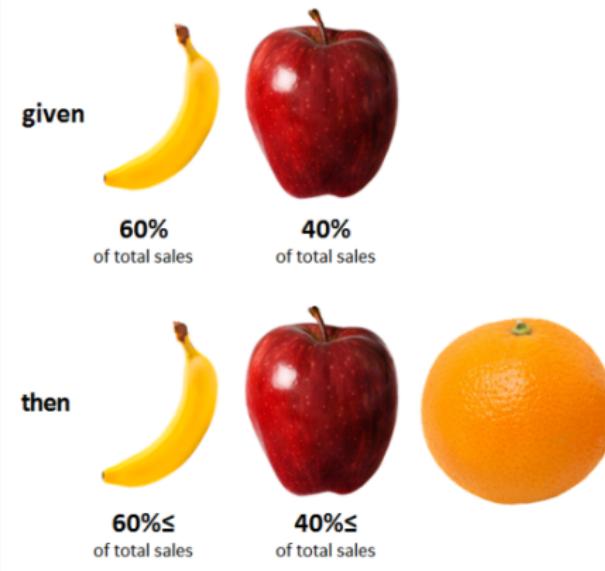
Competitor the other option





ADE as a violation of regularity

One consequence of the Independence axiom is that...



This is called *regularity* and it is an aggregate property of markets



Why is this a problem?

ADE is a **violation** of the Independence to Irrelevant Alternatives axiom of rational choice.

Under I.I.A, if in the set

$$\{\text{target}, \text{competitor}\} \Rightarrow \text{competitor} \succcurlyeq \text{target},$$

then in a set

$$\{\text{target}, \text{competitor}, \text{decoy}\} \Rightarrow \text{target} \succcurlyeq \text{competitor}.$$

At the aggregate level, this implies *regularity*

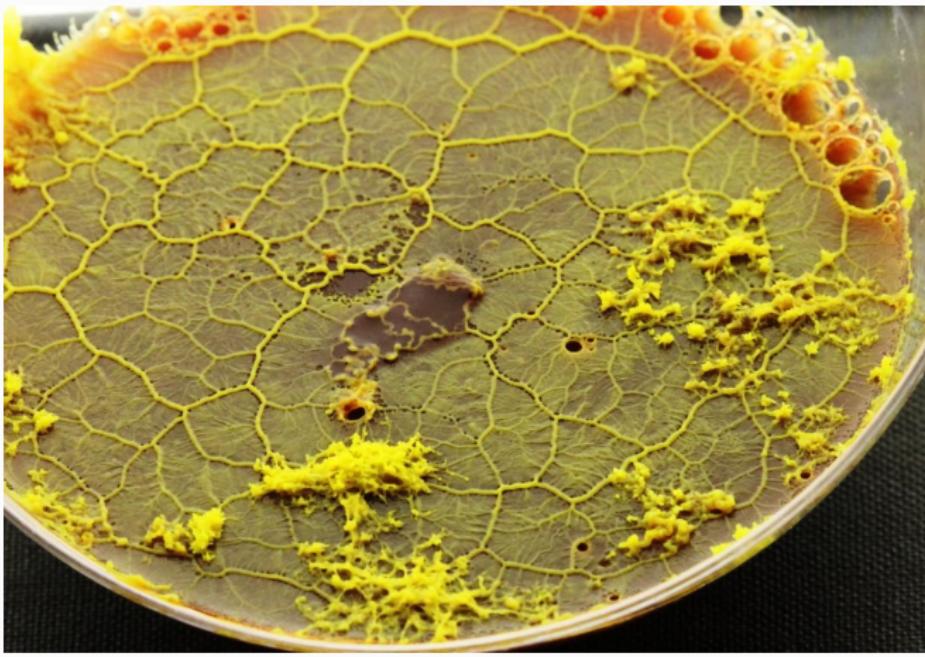
$$Pr(\text{target})\{\text{target}, \text{competitor}\} \leq Pr(\text{target})\{\text{target}, \text{competitor}, \text{decoy}\}$$

That is, preferences are **context-independent**: changing the choice set should not affect choice



Evidence for ADE

- ▶ The ADE has been found in **product** choices among products:
 - ▶ beer 6-packs (quality vs. price) [Huber et al.]
 - ▶ cars (ride quality vs. gas mileage) [Huber et al.]
 - ▶ restaurants (distance vs. quality) [Huber et al.]
 - ▶ dates (good looking, bad looking twin, other) [Ariely et al.]
 - ▶ televisions (resolution vs. durability) [Pan and Lehman]
 - ▶ apartments (size vs. location) [Pan and Lehman]
 - ▶ Good vs Bad looking boys & girls [Ariely]
- ▶ **Herne** also found ADE in **political** opinions in Finland
- ▶ Curiously, the effect has been observed in **animals** (honeybees, gray jays: Shafir et al.)





Limits to ADE

- ▶ ADE has shown to be **less prevalent** or absent 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]
- ▶ It is instead **amplified** when
 - ▶ subjects asked to **justify** choices [Simonson, 1989]
 - ▶ **dominance** is made more **focal** [Mishra et al., 1993; Król and Król, 2019]



ADE: why?

- ▶ dominance gives *at least one* reason to choose when uncertain: you know that the *target* is *at least better than the decoy*
- ▶ the choice might be complex, and you have an easy way to simplify it: look for dominance
- ▶ cognitive: similar (but dominant) things are seen bigger than not-dominant ones (because they are easier to compare)
- ▶ loss aversion: reference point switches to target; competitor perceived as potential loss.



ADE: why?

- ▶ loss aversion (Simonson & Tversky 1993)
- ▶ statistical thinking: if i.i.d., target stochastically dominates competitor
- ▶ anchoring to avoid regret (Connolly & Reb, 2012)
- ▶ justifiable choice (Simonson 1989)
- ▶ cognitive: dominant things are *seen* as bigger (Trueblood et al 2015)
- ▶ dominance provides a heuristic (Gigerenzer et al. 1999)
- ▶ various theories of attention shift (Ariely, Decision Field Theory)



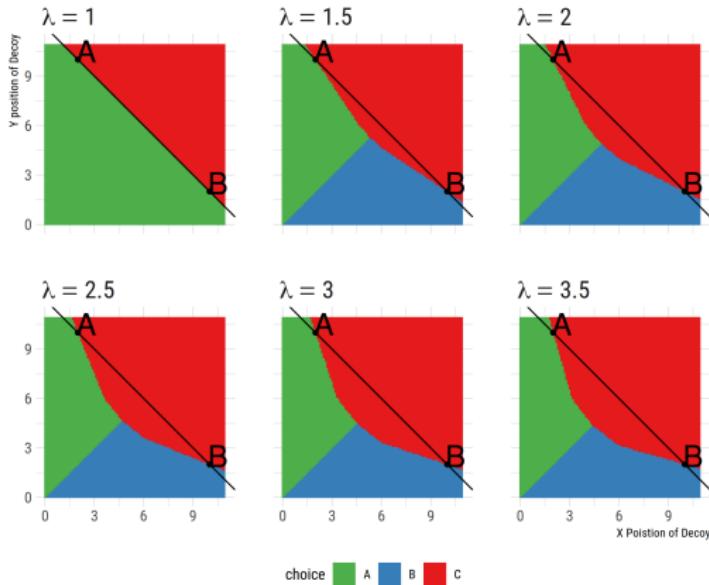
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Why the ADE? Loss aversion

- ▶ Utility piecewise linear, kink due to loss aversion (λ)
- ▶ Subject evaluates options w.r.t. reference point
- ▶ Reference point is centroid of options in utility space
- ▶ (for simplicity) dimensions are perfect substitutes



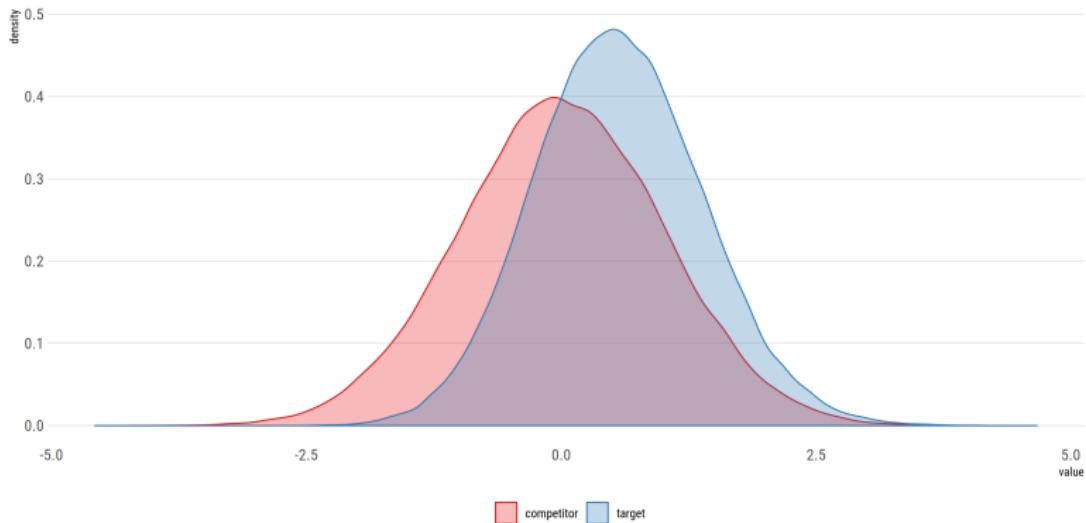


Why the ADE? Statistical thinking

- ▶ If value of A, B, C is i.i.d.
- ▶ Then $\text{prob}(\max\{A; B\} > C) = \frac{2}{3}$
- ▶ There is value to be gained in dominance
- ▶ (see the Monty Hall problem)

ADE as a rational strategy -- normally distributed values

Chance target has higher value than competitor: 0.6646





Why the ADE? Heuristic

- ▶ Heuristic: quick rule guiding choice in uncertain environments
- ▶ Selects a small, focal subset of information
- ▶ Leads to satisficing results
- ▶ Locally (ecologically) rational

This paper: what?

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

Bias?

Serious challenge to IIA

Heuristic?

IIA mostly fine

Artifact?

No problem



ADE: bias or heuristic? Long or short term?

Experiment: buying water in a strange world

A real experiment!

- ▶ Instructions as in the real experiment (2021)
- ▶ Same software used back then
- ▶ Same incentives

- ▶ ...but no money here

[Link to the instructions](#)



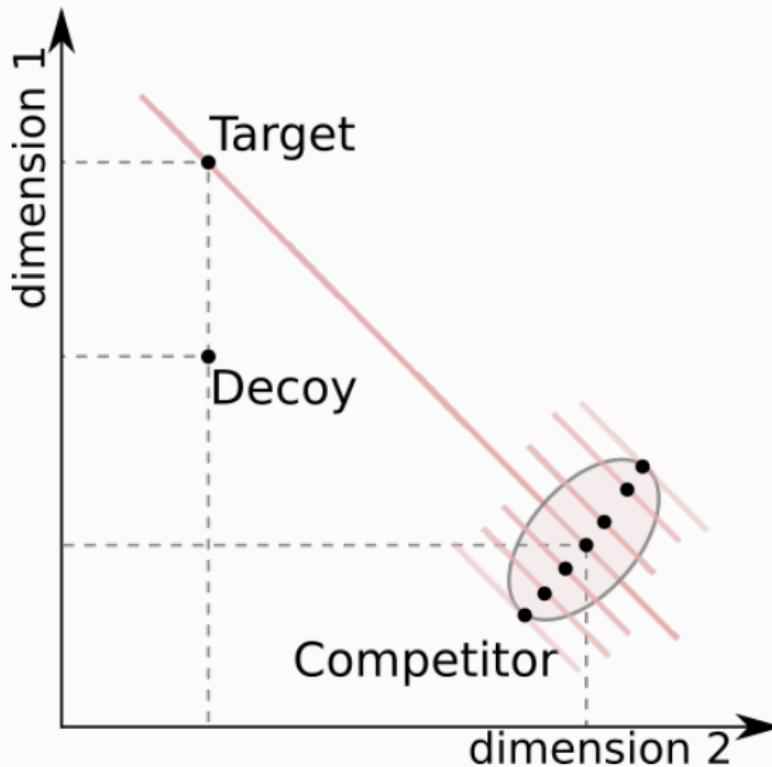
Let's play!

Experimental software to be found on <https://gaeexperience.fr/>

Then click on the **LAST** green button "Turin_2025_MSci2 "



Within-subject design

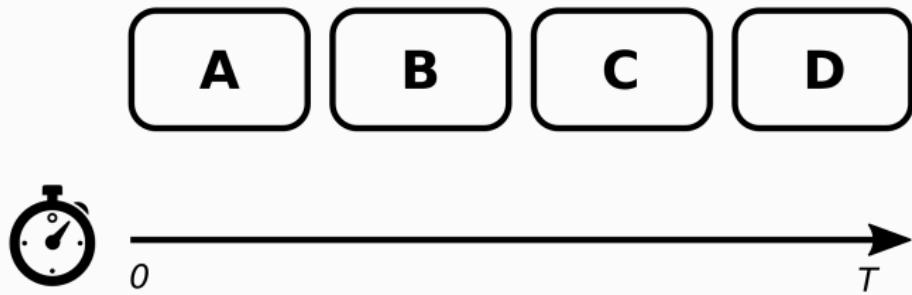


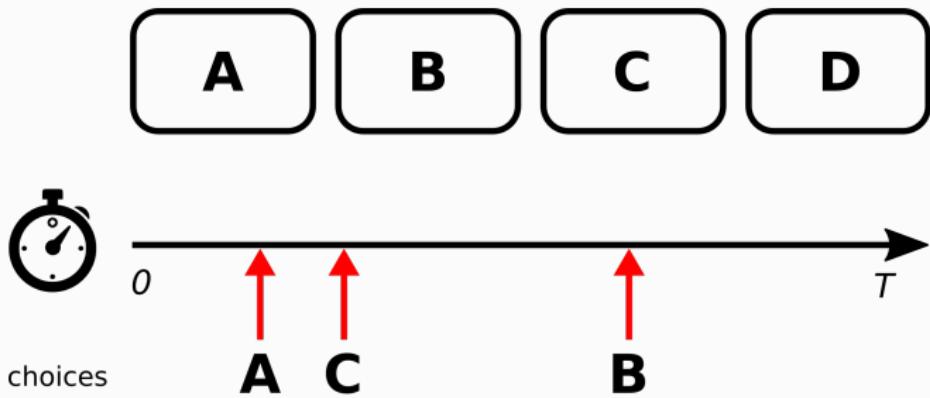


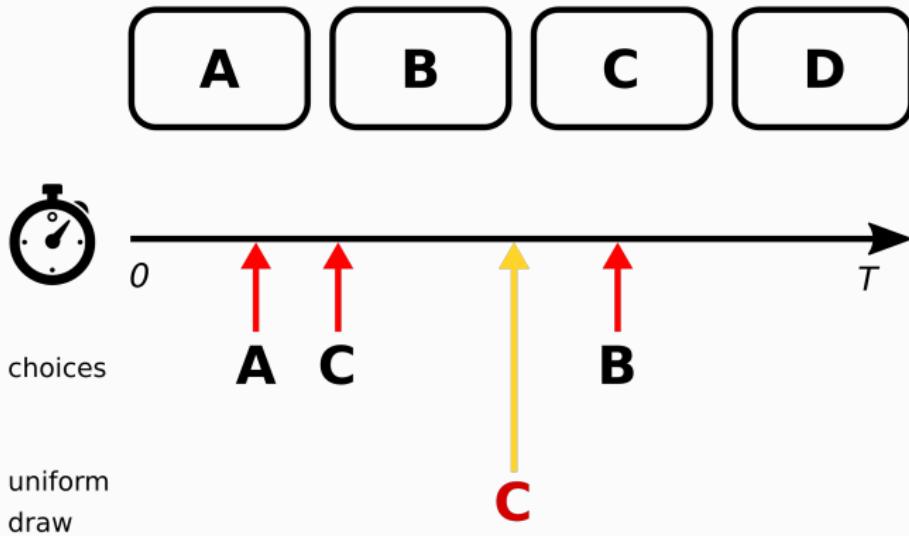
Time and choice process: exposing the choice process

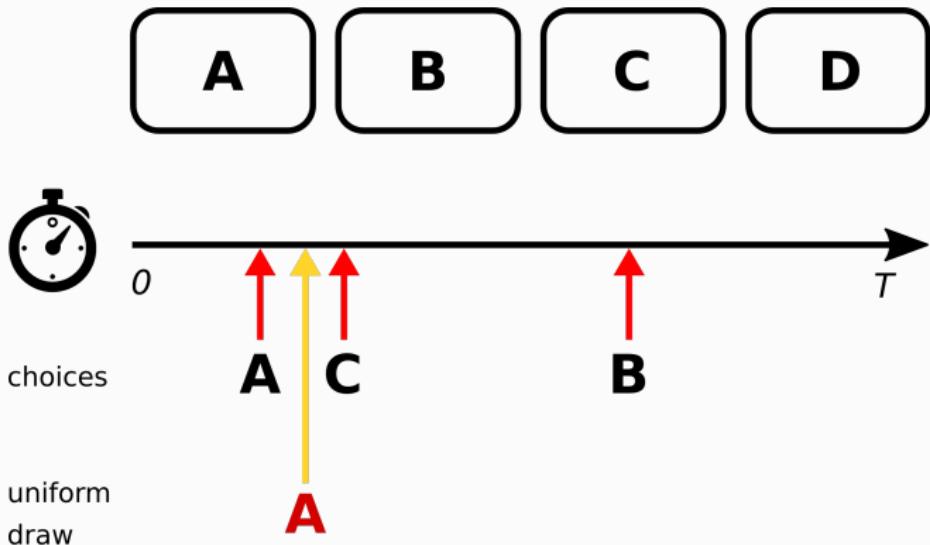
forall subject, forall choice, we want to capture

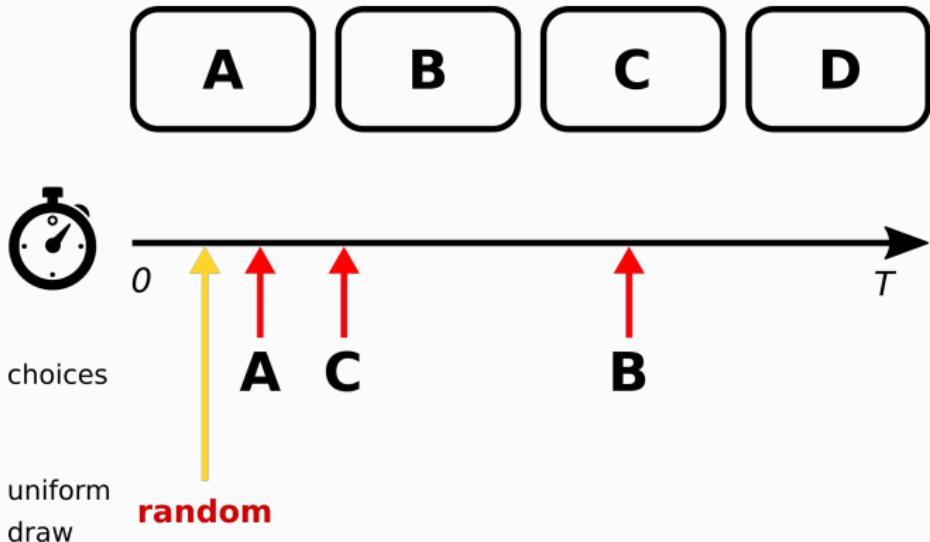
- ▶ the fast heuristics used (if any)
- ▶ and the slow reasoning applied (if any)
- ▶ and the moment the subject switched (if any)











(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

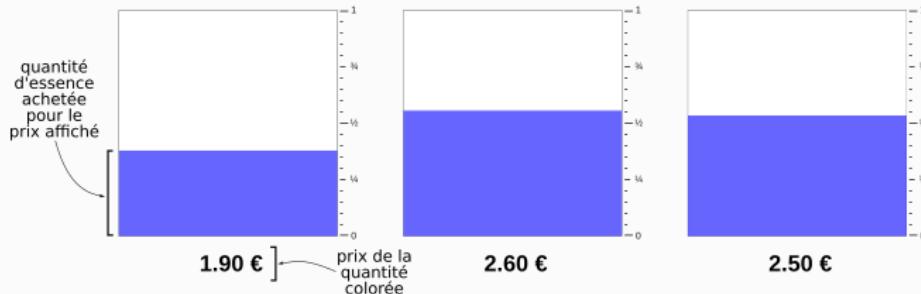
- ▶ No choice \Rightarrow random choice: incentive to *fast* reply
- ▶ Time is ticking: incentive to *change* first decision upon reflection

Notes:

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



Induced preferences





Notes

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

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



A dynamic dataset

So far we have seen only very limited or no dynamics, but here...

- ▶ Timing of decision is endogenous (milliseconds)
- ▶ Choice is inherently dynamic
- ▶ timing of choices *does* matter
- ▶ we are interested in the choice shares *in time*



Original data vs discretized data

For every subject, trial, we have

- ▶ the timing of each click (in milliseconds)
- ▶ the chosen item at each click
- ▶ chosen item characteristics
- ▶ subject characteristics
- ▶ treatment and screen characteristics (decoy, not decoy, relative price...)

But how to compare across people and screens? we need to discretize



The discretized dataset

We discretize on an interval of a tenth of a second

1. it contains the same data as before
2. but now *one observation per 1/10 second*



The data

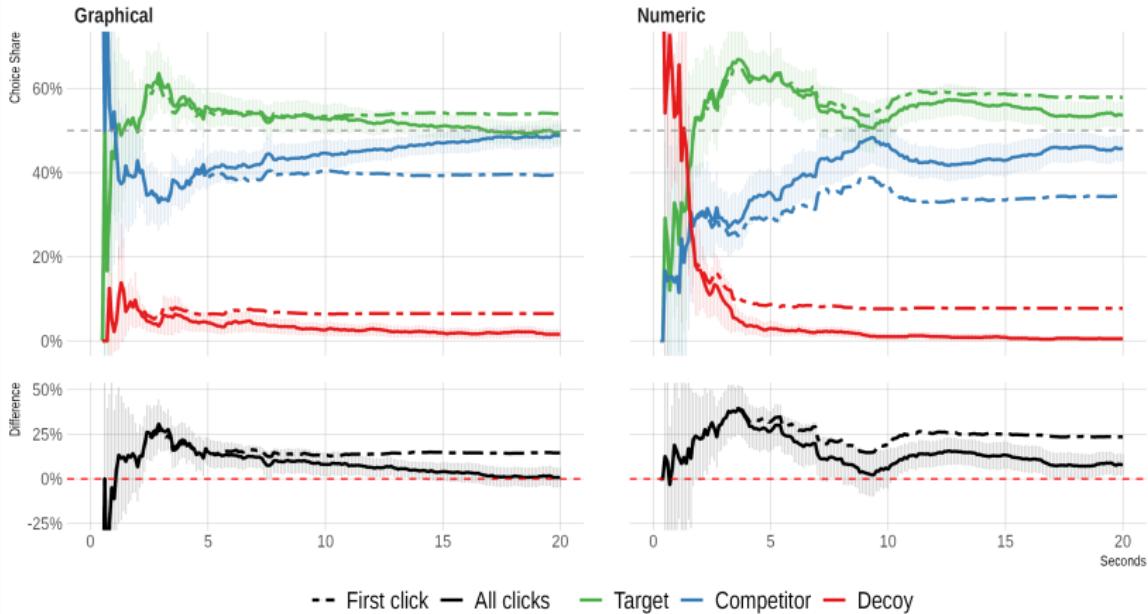
All data and scripts

All data and analysis scripts are hosted here

[paper data on github](#)



Results, 1: choice share dynamics



ADE is short-term, shoots up in the first seconds, dwindles to zero



Results, 2: there are 3 decision types

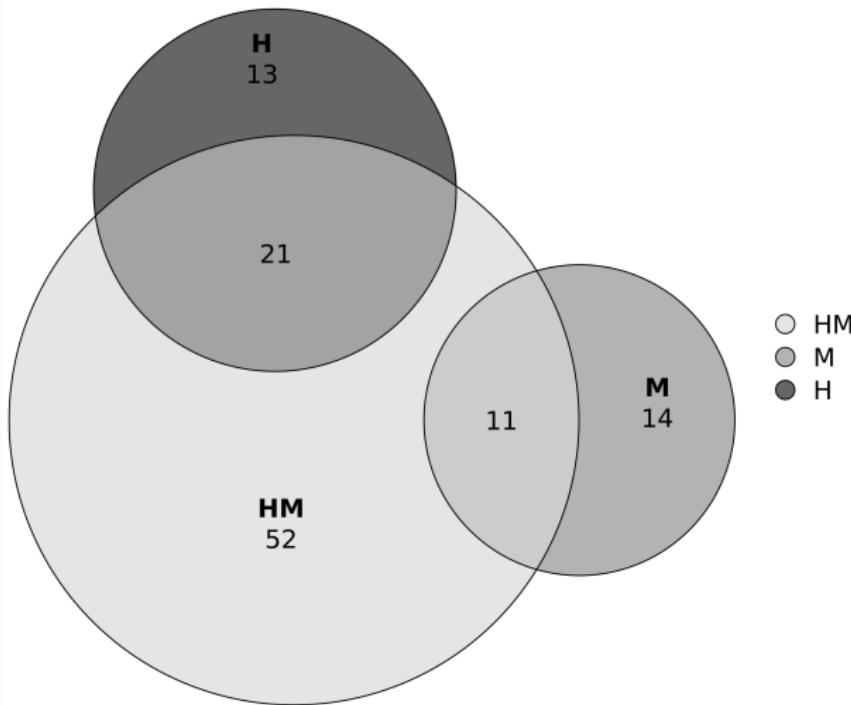
Heuristic only spot dominance, go for it, never revise

Maximisers do not use dominance, estimate value of each offer, choose best estimate

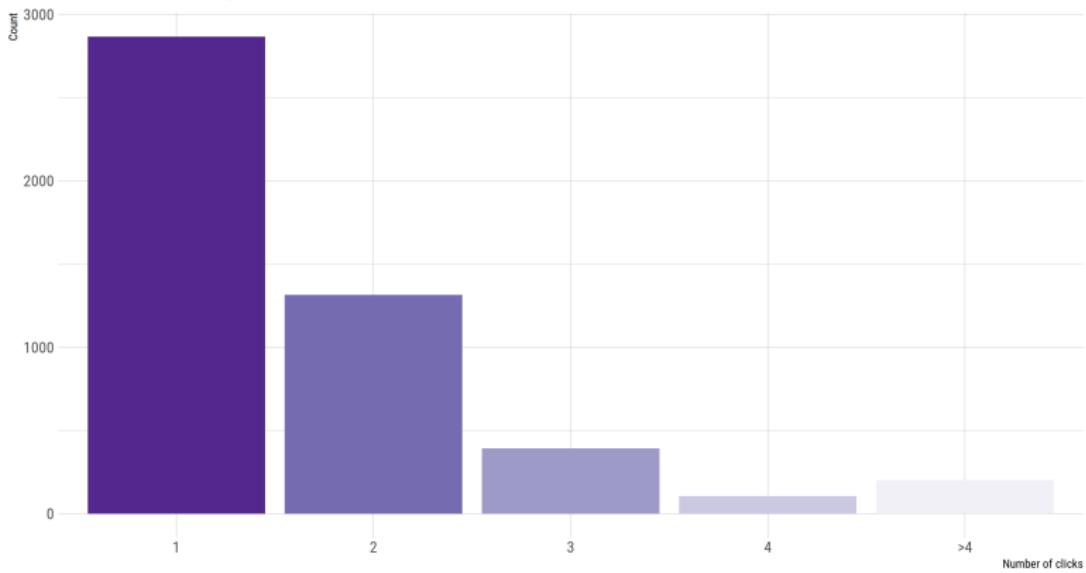
Fast *then* Slow (**HM**): first H, then M



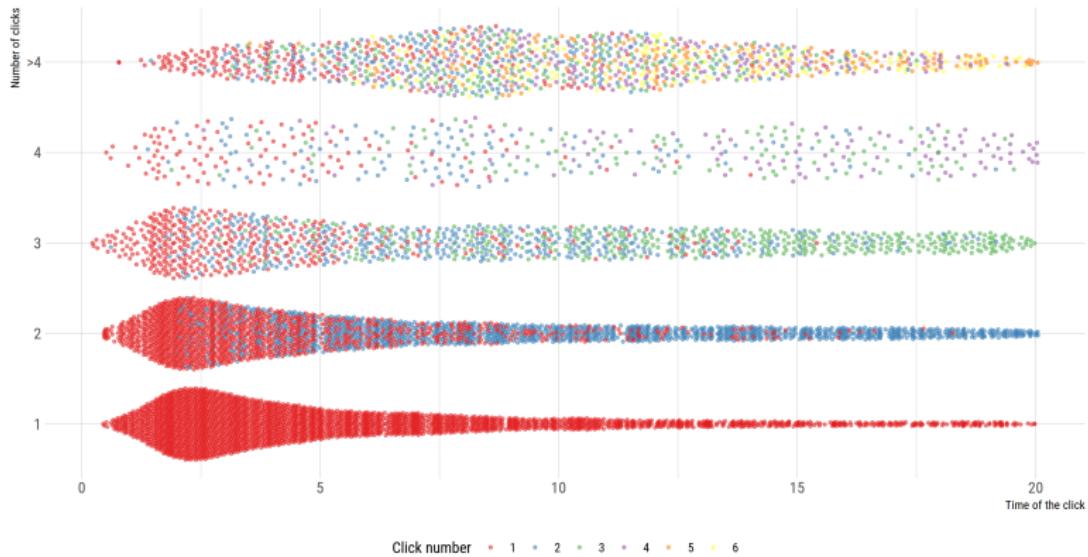
Results, 2: there are 3 decision types



Number of clicks per decision screen



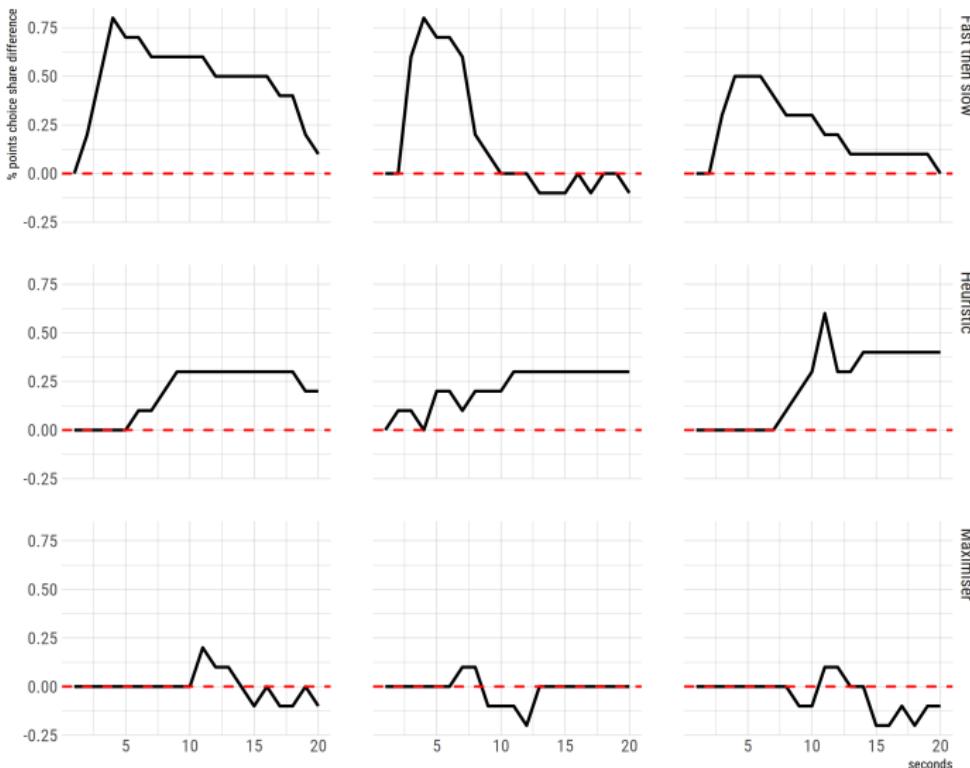
Types of clickers





The data

ADE dynamics by type





Results, in a nutshell

A close-up photograph of a woman with dark, curly hair, smiling broadly. The background is a warm, blurred gradient of yellow and pink.

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

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