Does learning impact ambiguity aversion ?

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Bogazici Univerisity

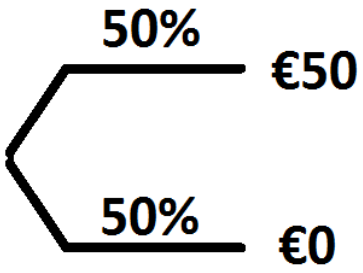
Outline

- Introduction
  - Motivation
  - Background
- The experiment
- The Results
- Discussion

Motivation

Decisions from experience

- Most of the empirical results in decision science deal with “described risk”



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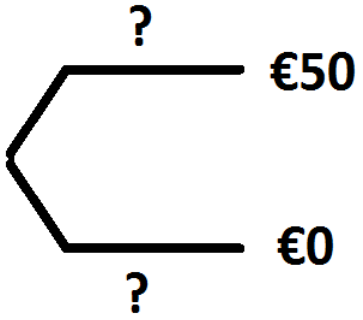

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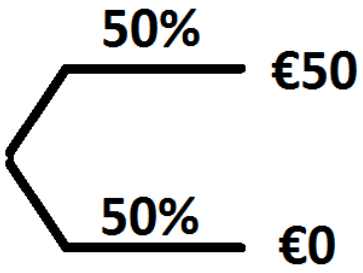

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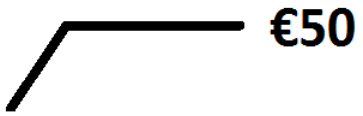

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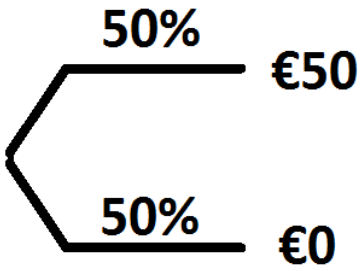

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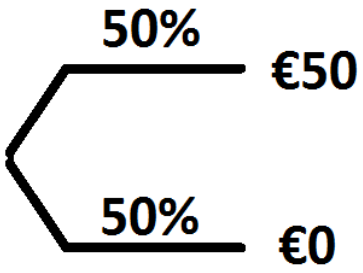

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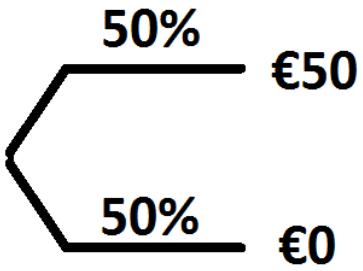

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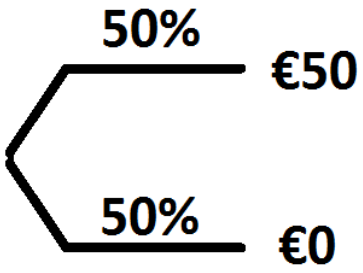

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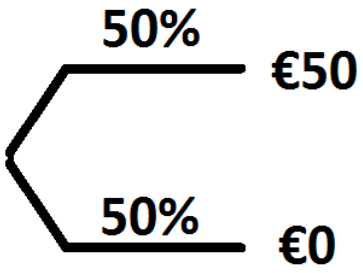

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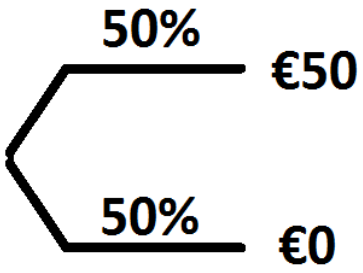

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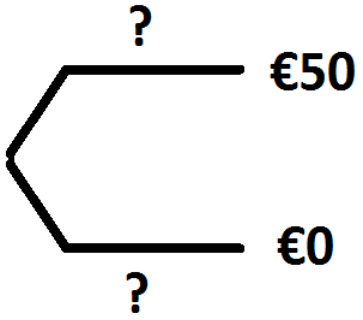

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- Time consuming and/or Costly

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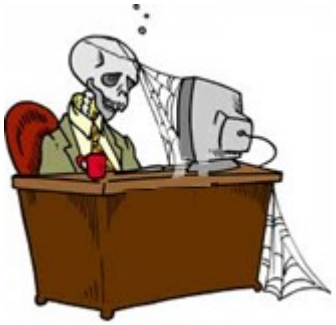

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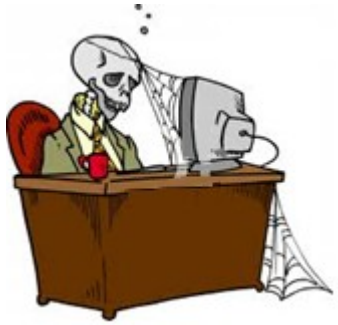

- Scarce
  - New products
  - New trends

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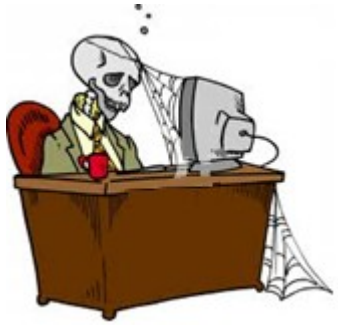

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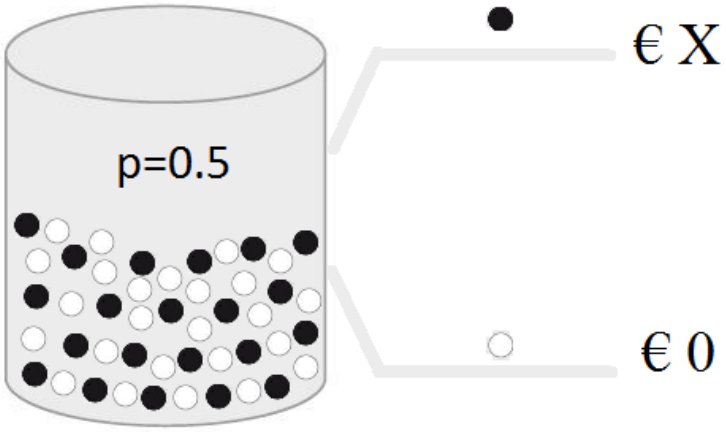
  - New trends

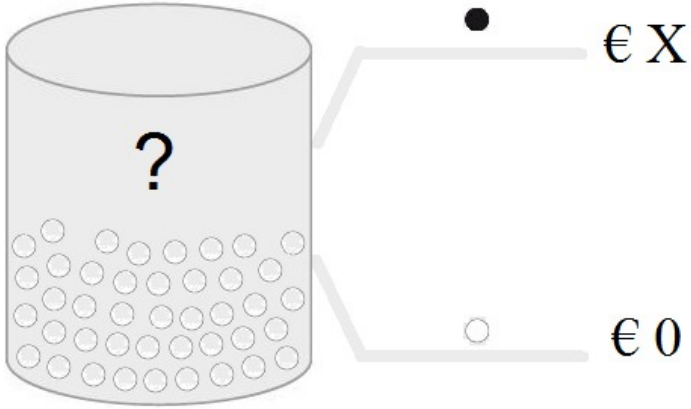
What about decisions from limited experience ?

Background

The Ellsberg's Paradox (1961)

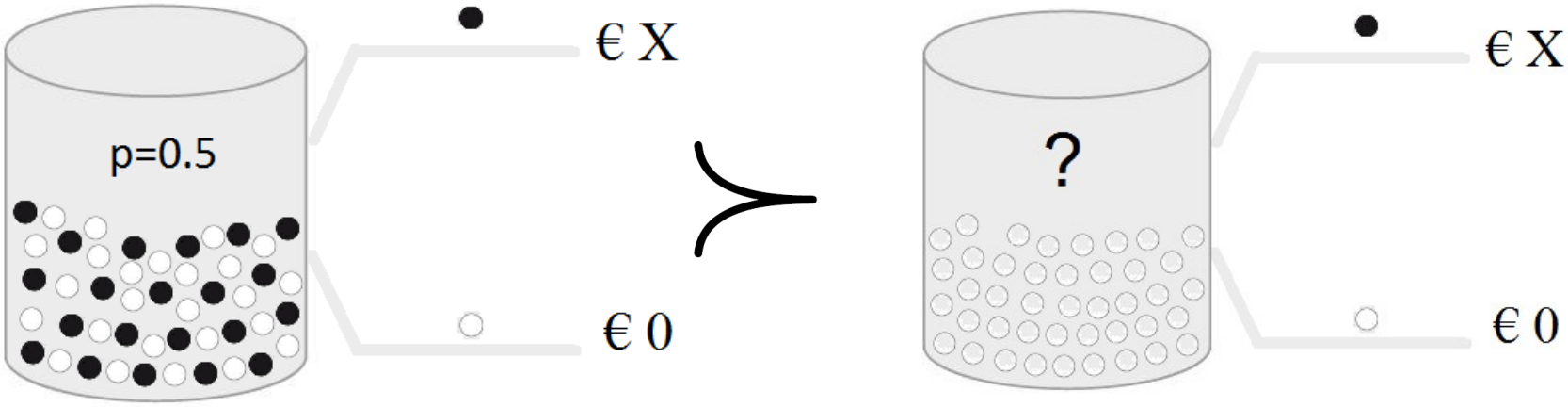


Risk



Ambiguity

The Ellsberg's Paradox (1961)



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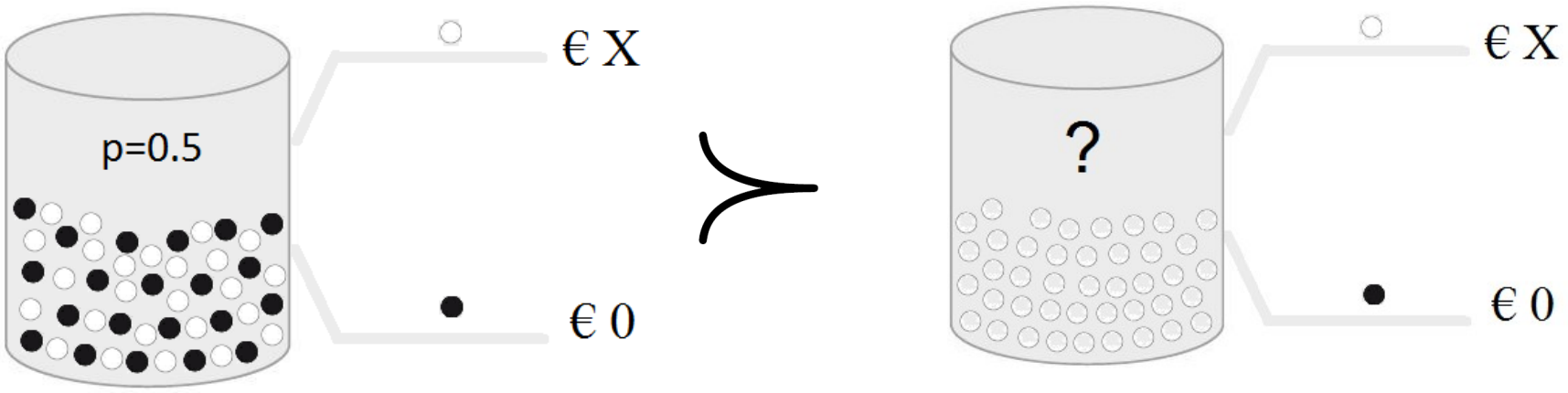

Risk ≻ Ambiguity

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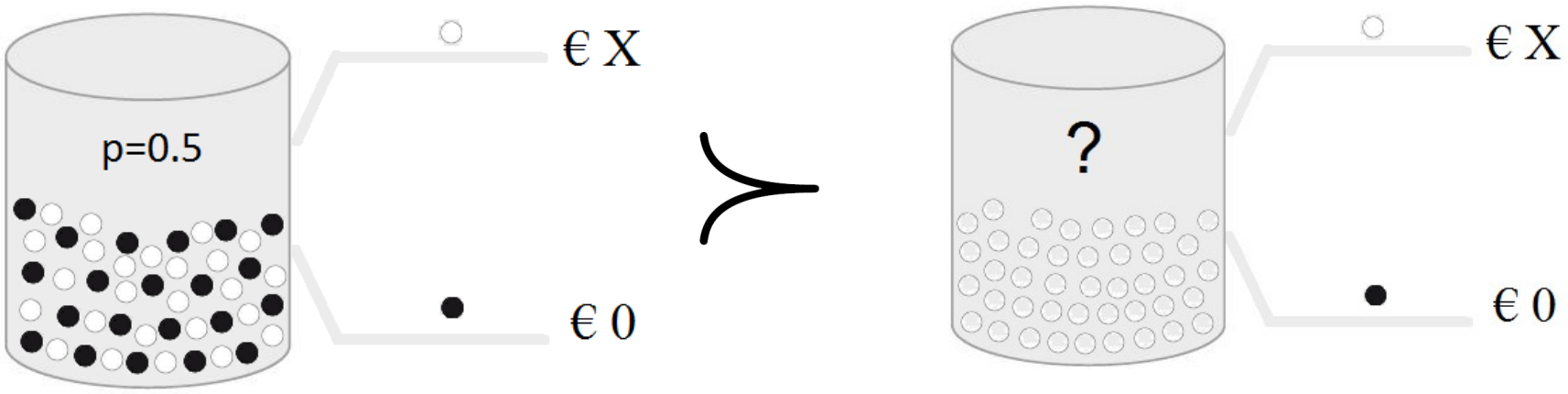


Risk ≻ Ambiguity

Ambiguity aversion: dislike for imprecision/vagueness

Ambiguity and finance

Ambiguity attitudes have been found to contribute to several puzzles in finance

Market anomalies (Barberis and Thaler, 2003)

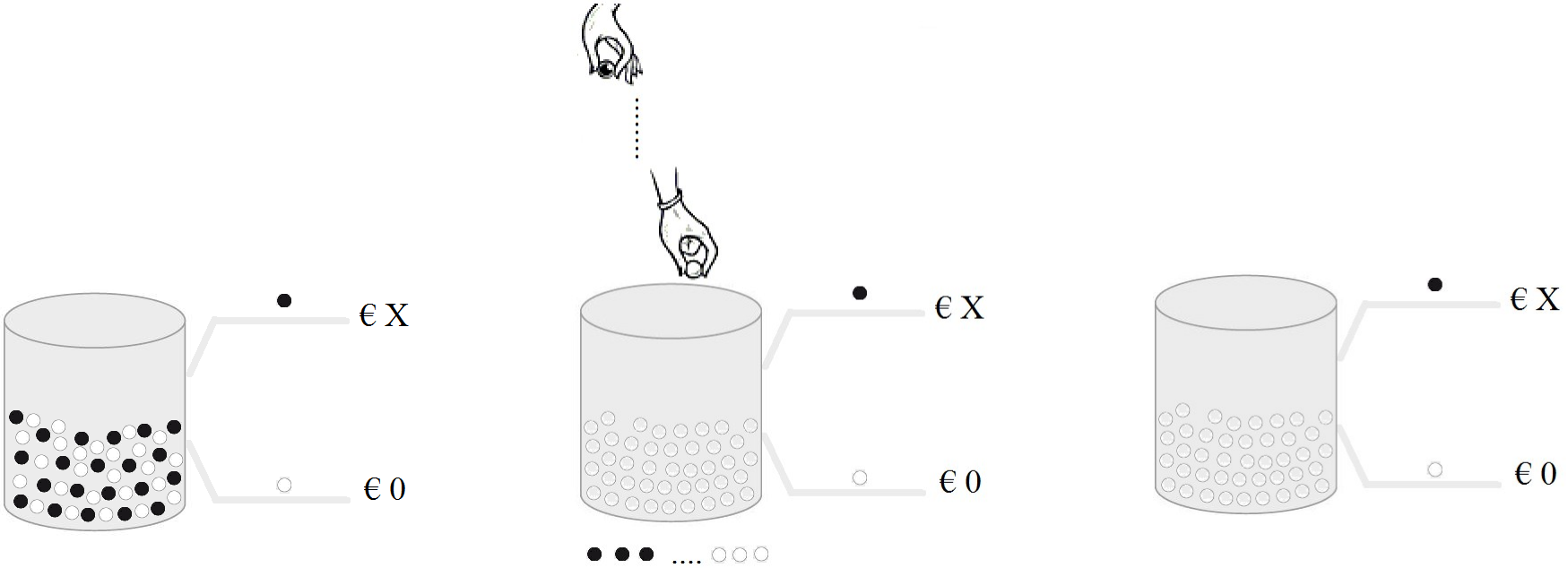
- Equity premium

Household behavior (Dimmock et al., 2015a, 2015b)

- Non participation
- Home bias
- Under diversification

A parallel between Described/Experienced decision making and Ellsberg (1961)

Abdellaoui et al. 2011



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Experienced risk as a source of ambiguity

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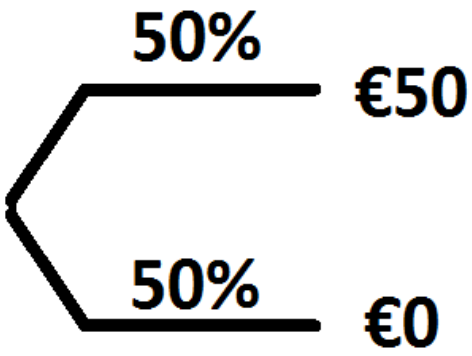

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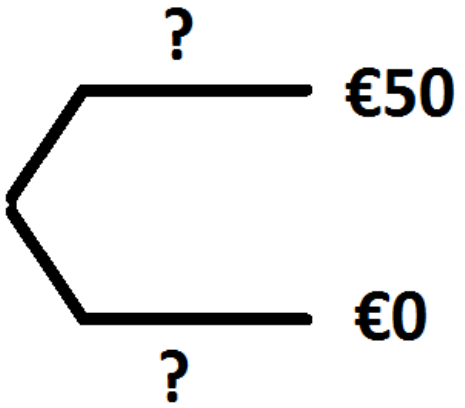

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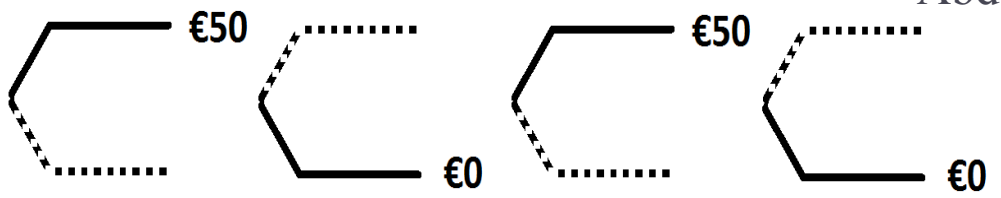

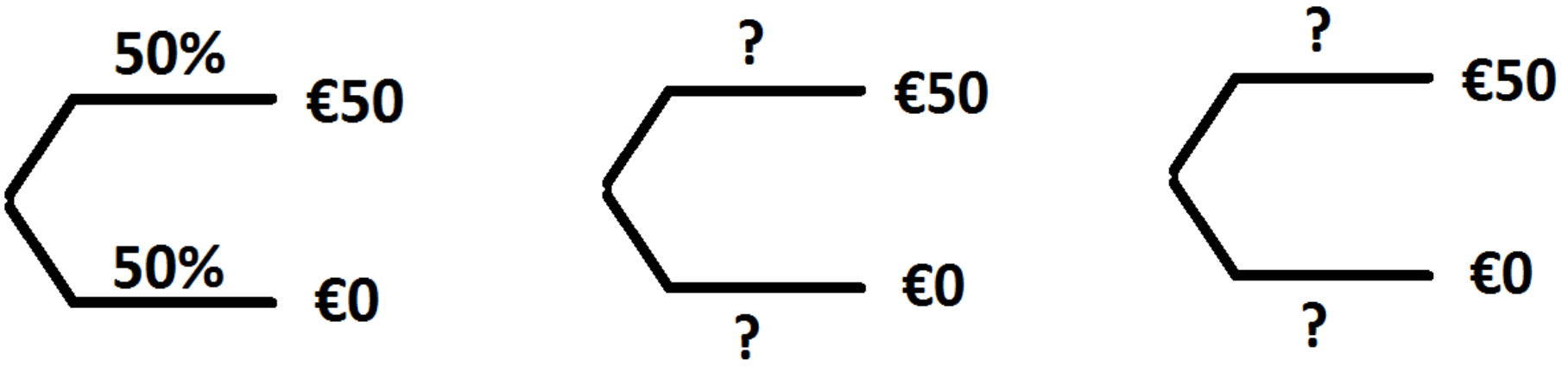

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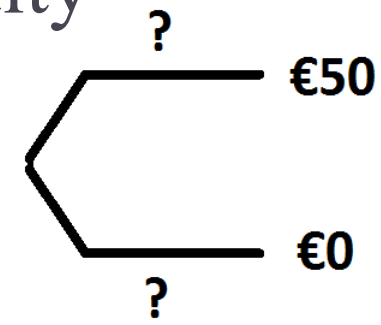
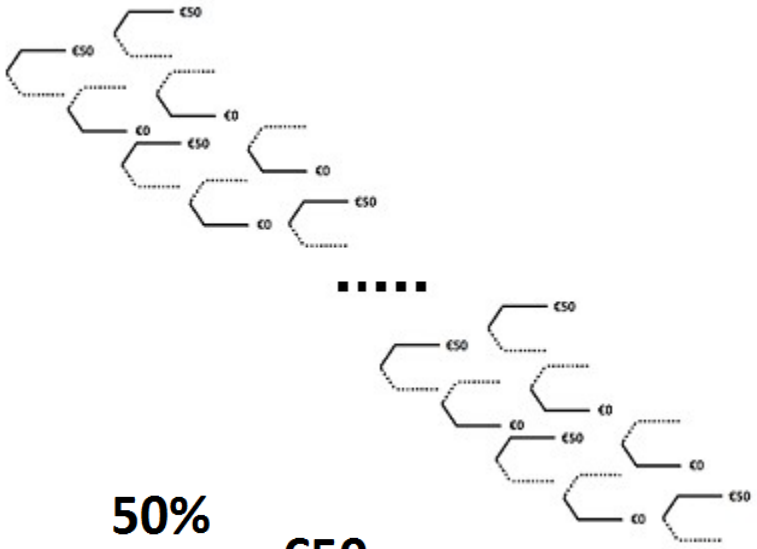
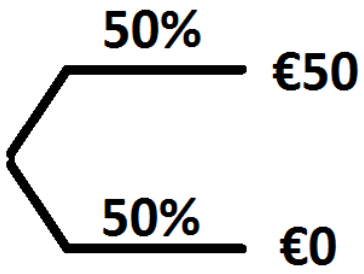


No experience



Free draws



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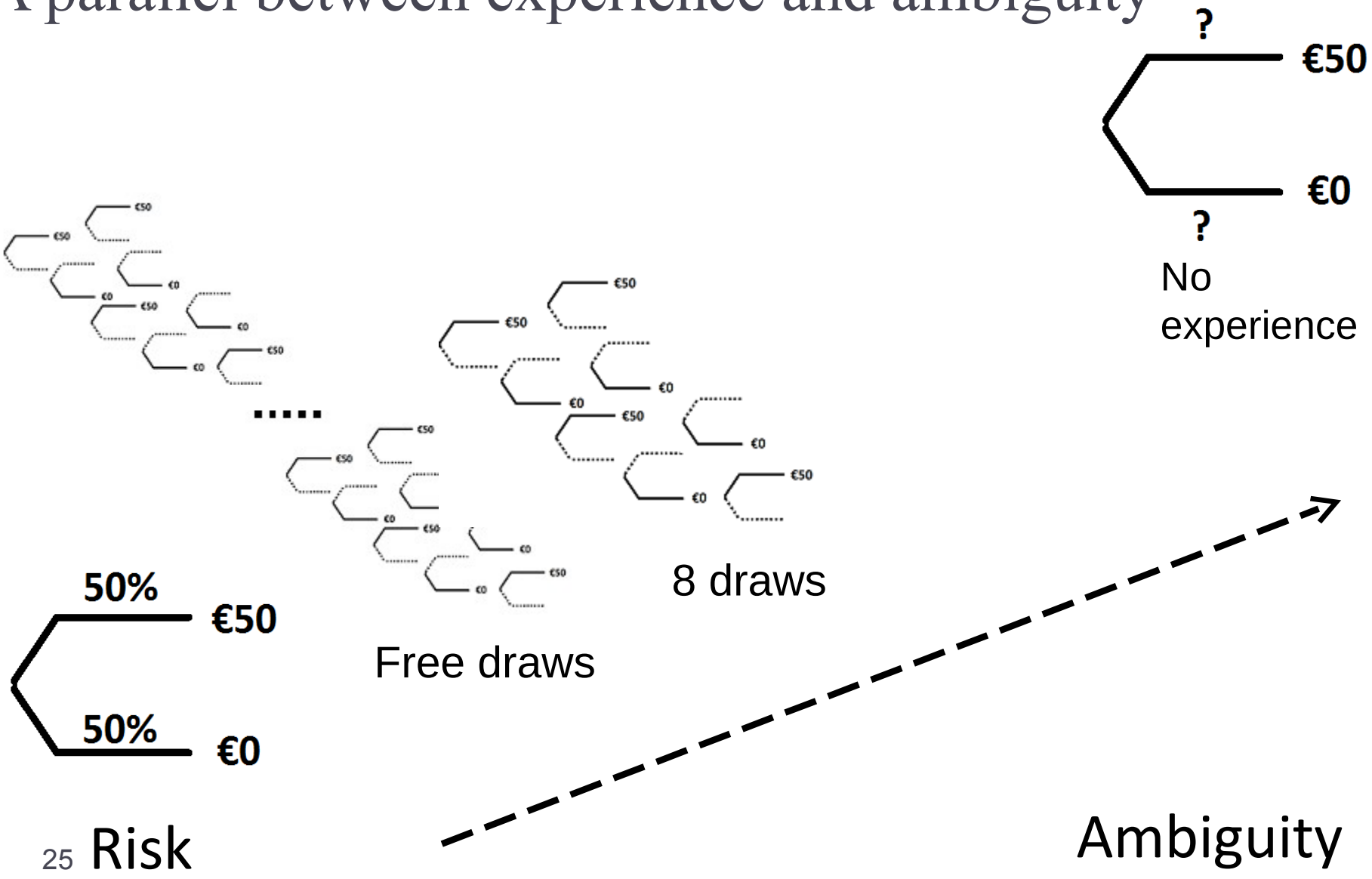

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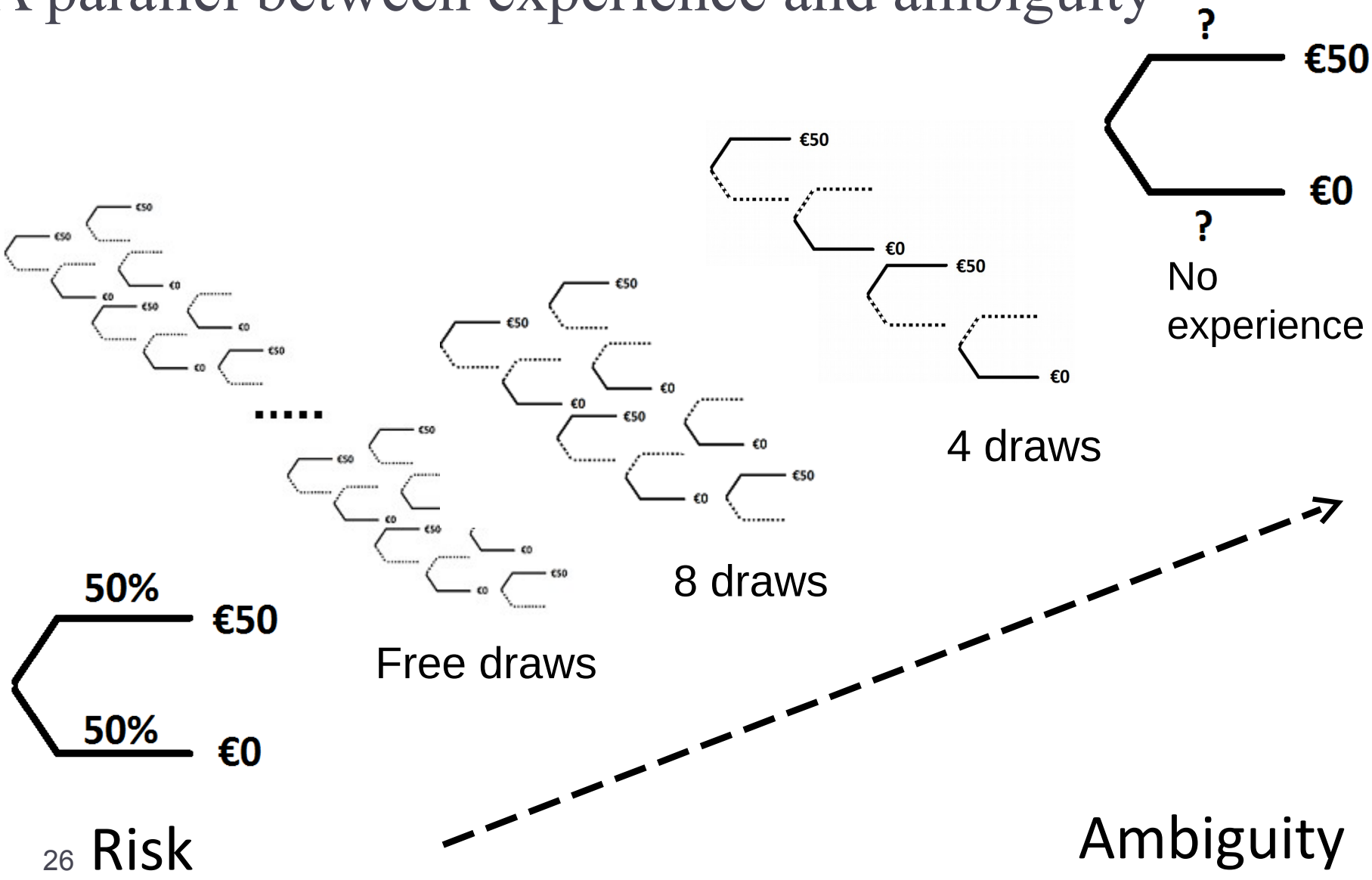

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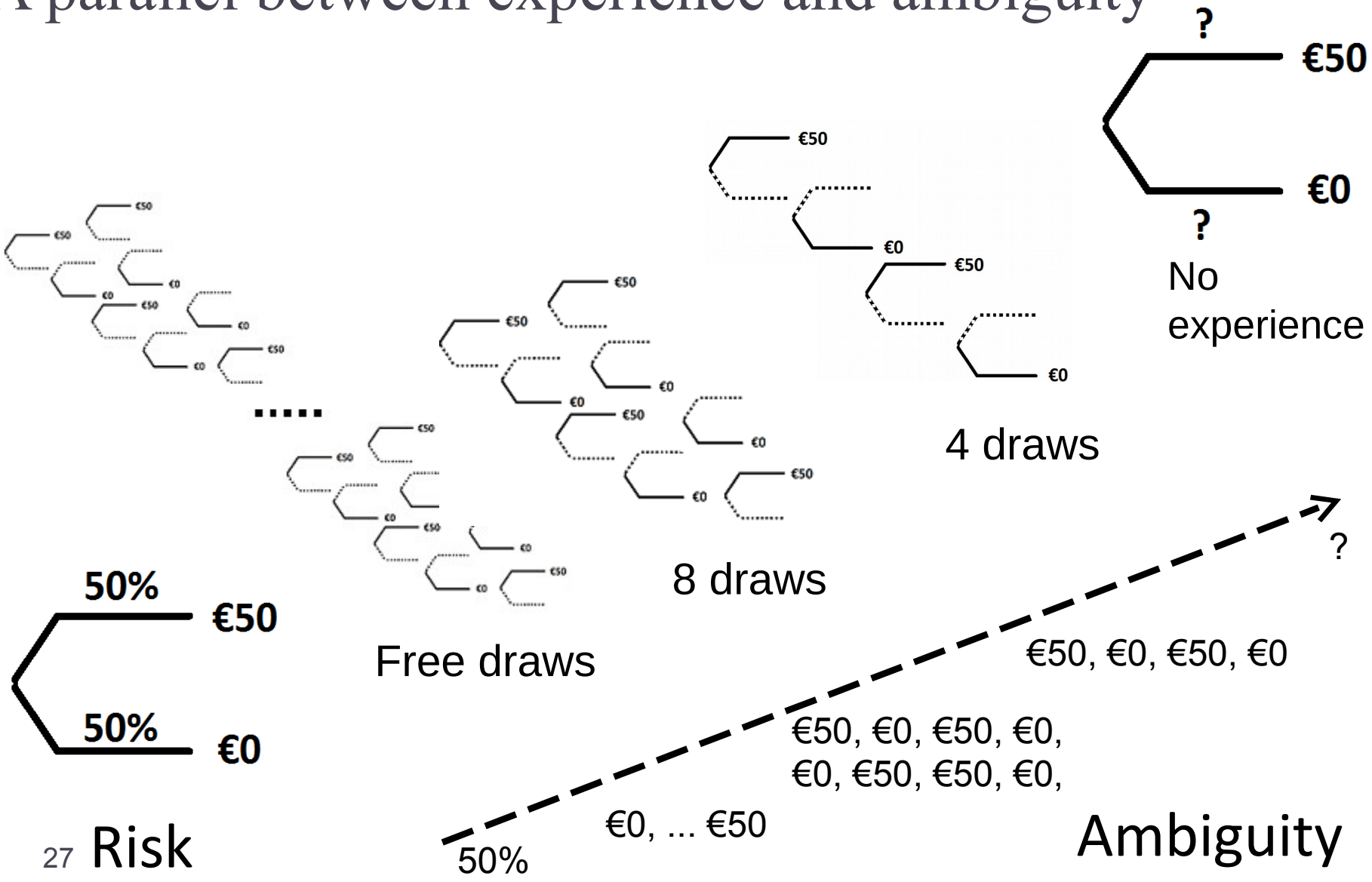

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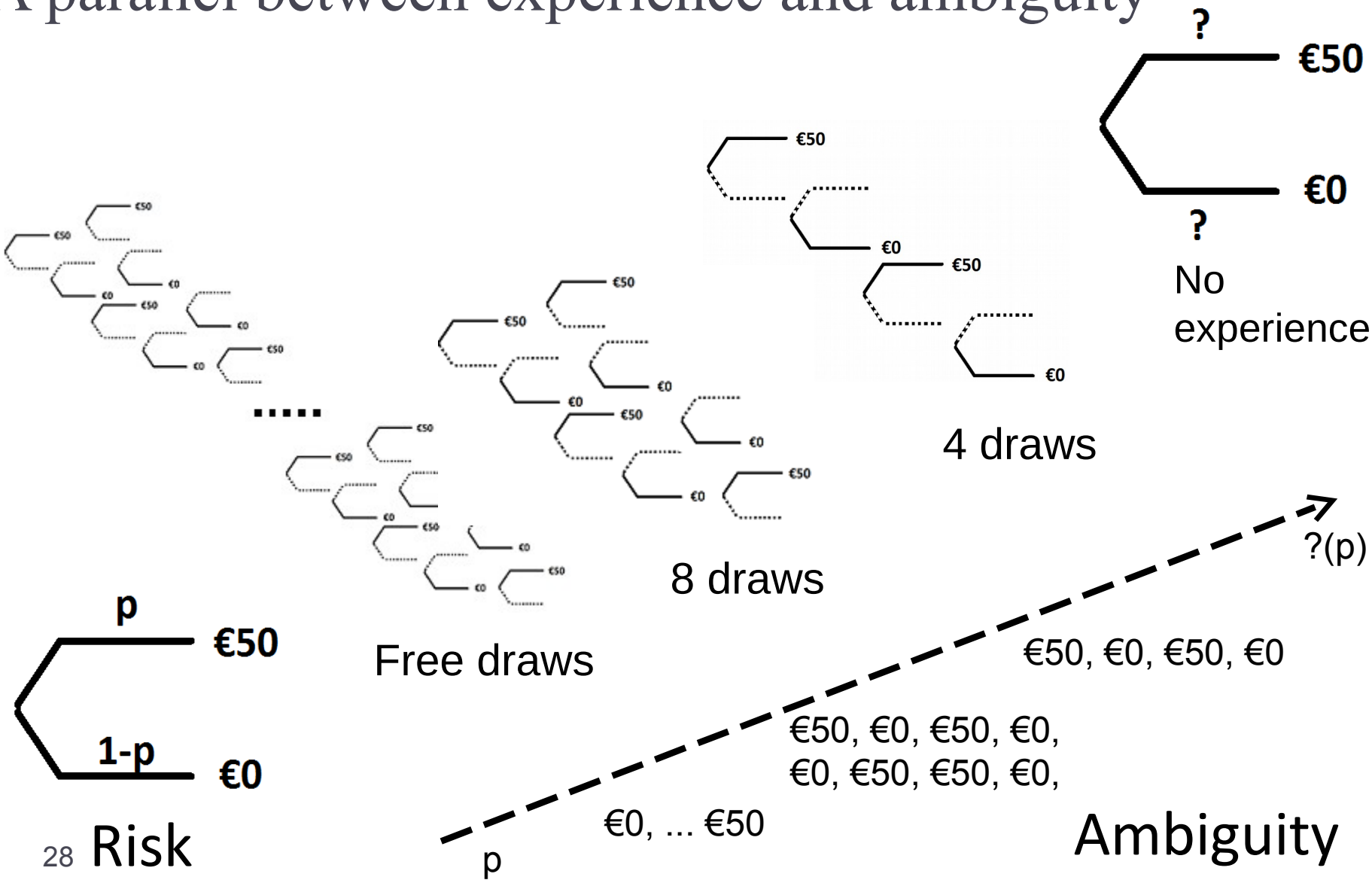

A parallel between experience and ambiguity

*"If all the information [...] were in the form of **sample distributions**,*

*then **ambiguity** may be closely related, inversely,*
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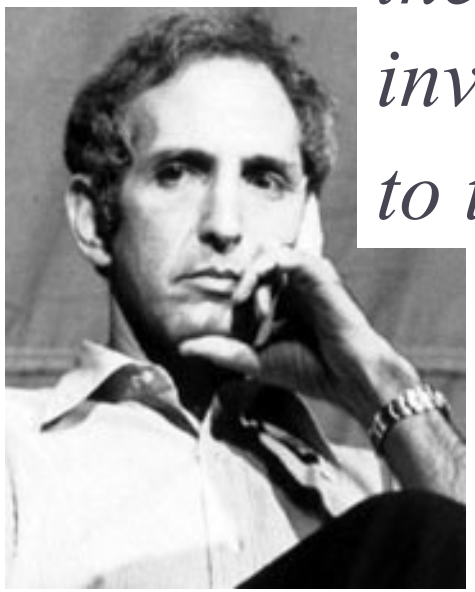

Ellsberg, 1961

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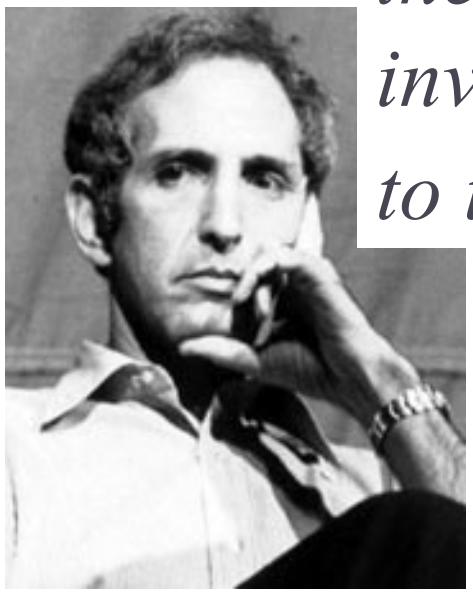


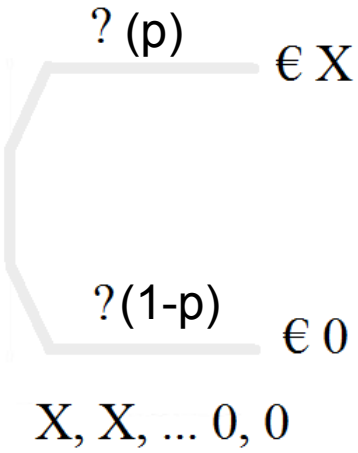
Ellsberg, 1961

 Objective: (How) does learning impact ambiguity aversion ?

The experiment

The choice task

- Matching probabilities



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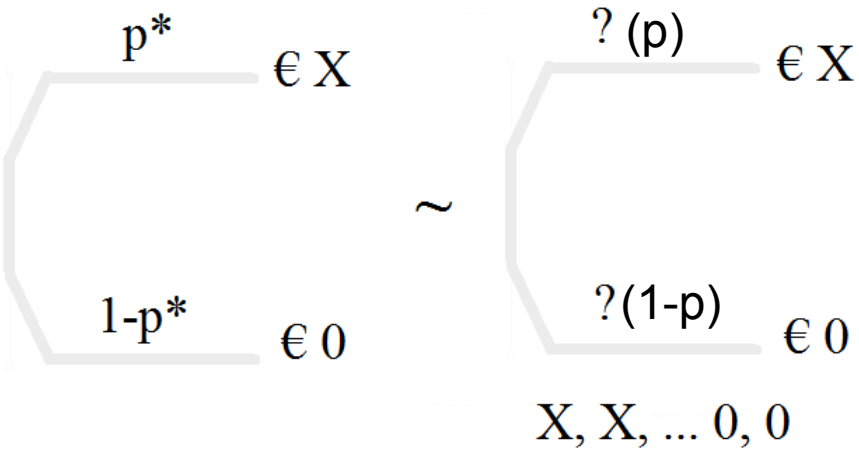
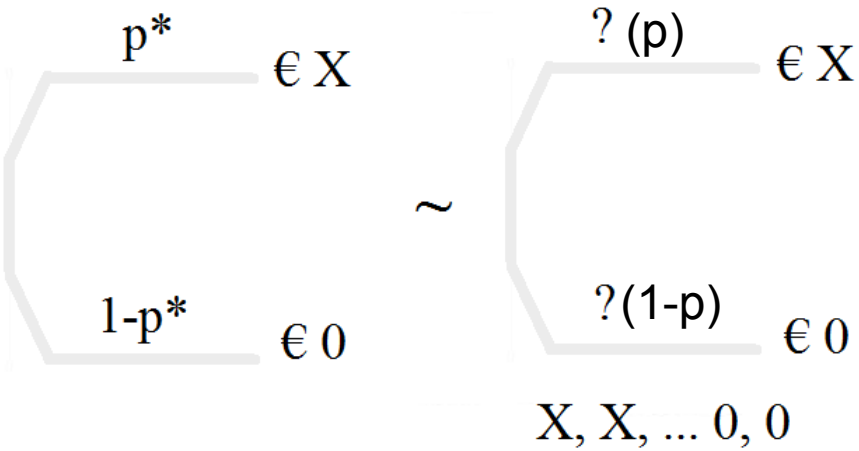


The choice task

- Matching probabilities
  - Direct comparison between risk and ambiguity
  - Direct observation of ambiguity attitudes



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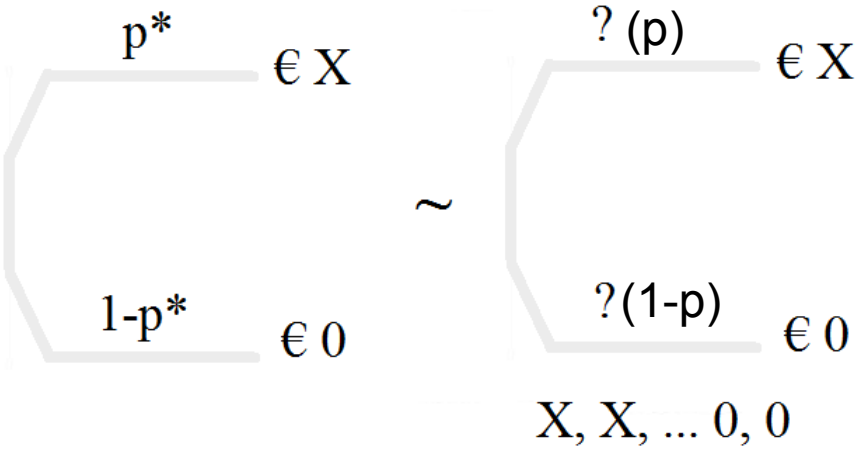
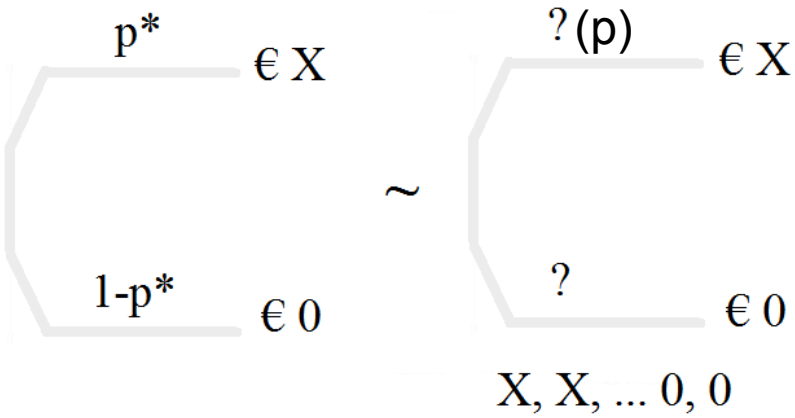


p*<p Ambiguity aversion

p*>p Ambiguity seeking

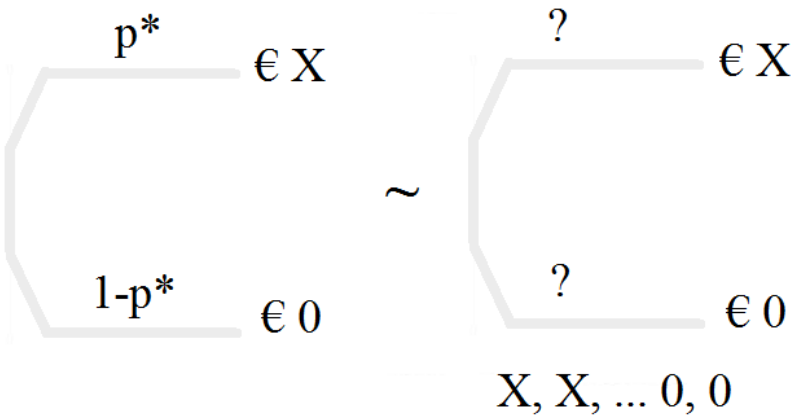
The model



- Under Prospect theory

$$w_{risk}(p^*)u(x) = W_{Source}(p)u(x)$$

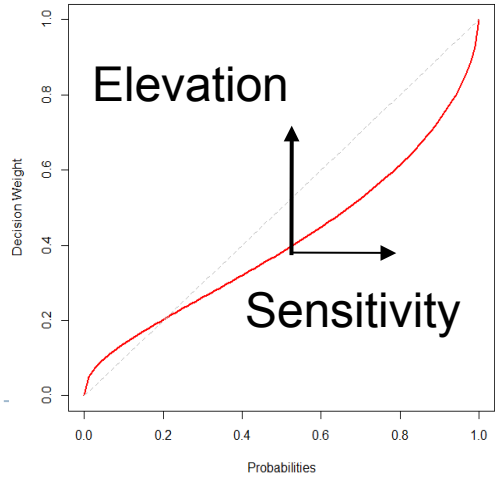
The model



- Under Prospect theory

$$w_{risk}(p^*)u(x) = W_{Source}(p)u(x)$$

- Estimations
  - Parametric specifications of
    - utility
    - Weighting function: elevation, sensitivity
  - Likelihood maximization



The Design

- Indifferences are captured with choice lists

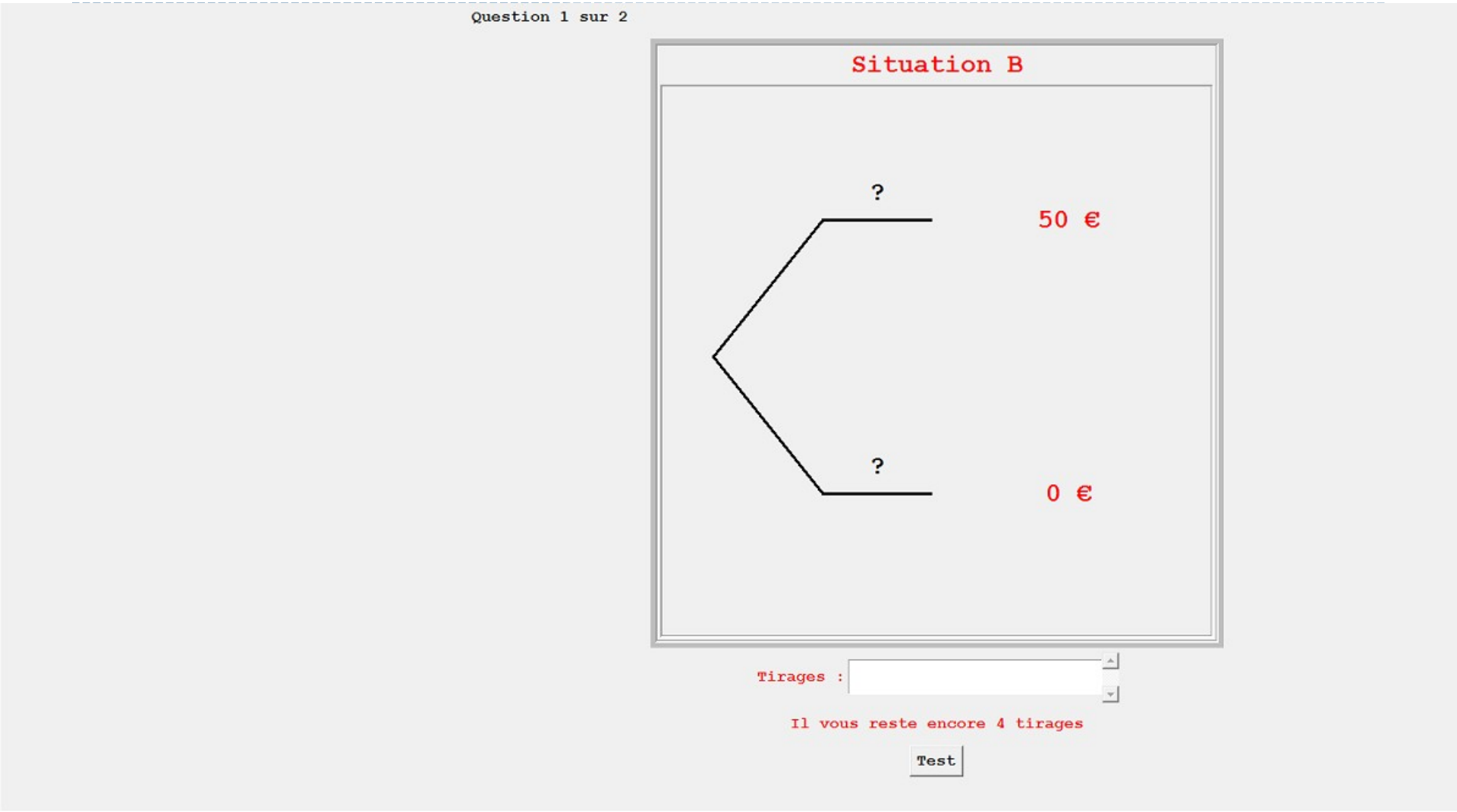
Treatment	Risk	Unconstrained	8 draws	4 draws
CE	9		5 for utility	5 for utility
MP		7	7	7
		0.05 0.13 0.25 0.5 0.75 0.87 0.95		

- Outcomes ranged from 0 to 50€
- Treatment blocks were randomized
- Choice lists were randomized within each block

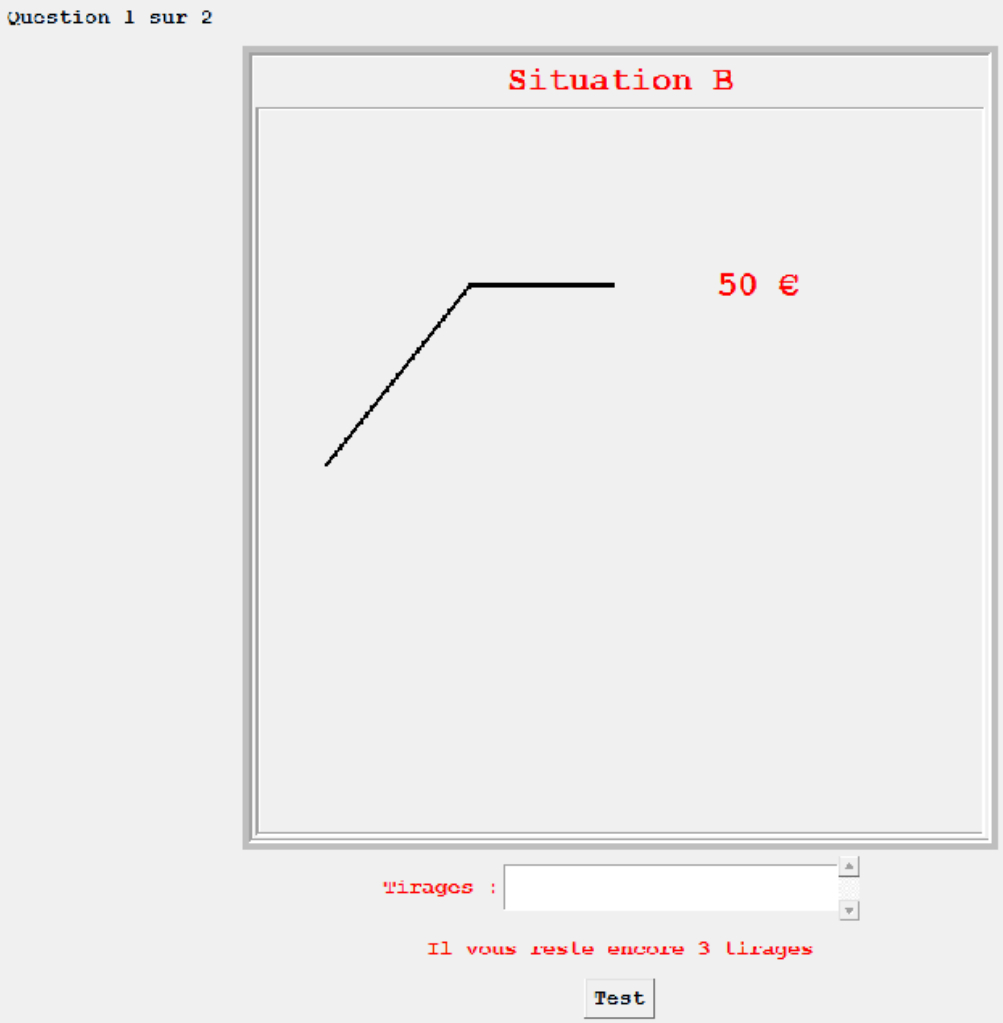
The Procedure

- 71 subjects from  L. E. E. P. Laboratoire d'Economie Expérimentale de Paris
- Sessions lasted 1h on average
- Individual interviews
- 10€ of show up fee + random incentive system

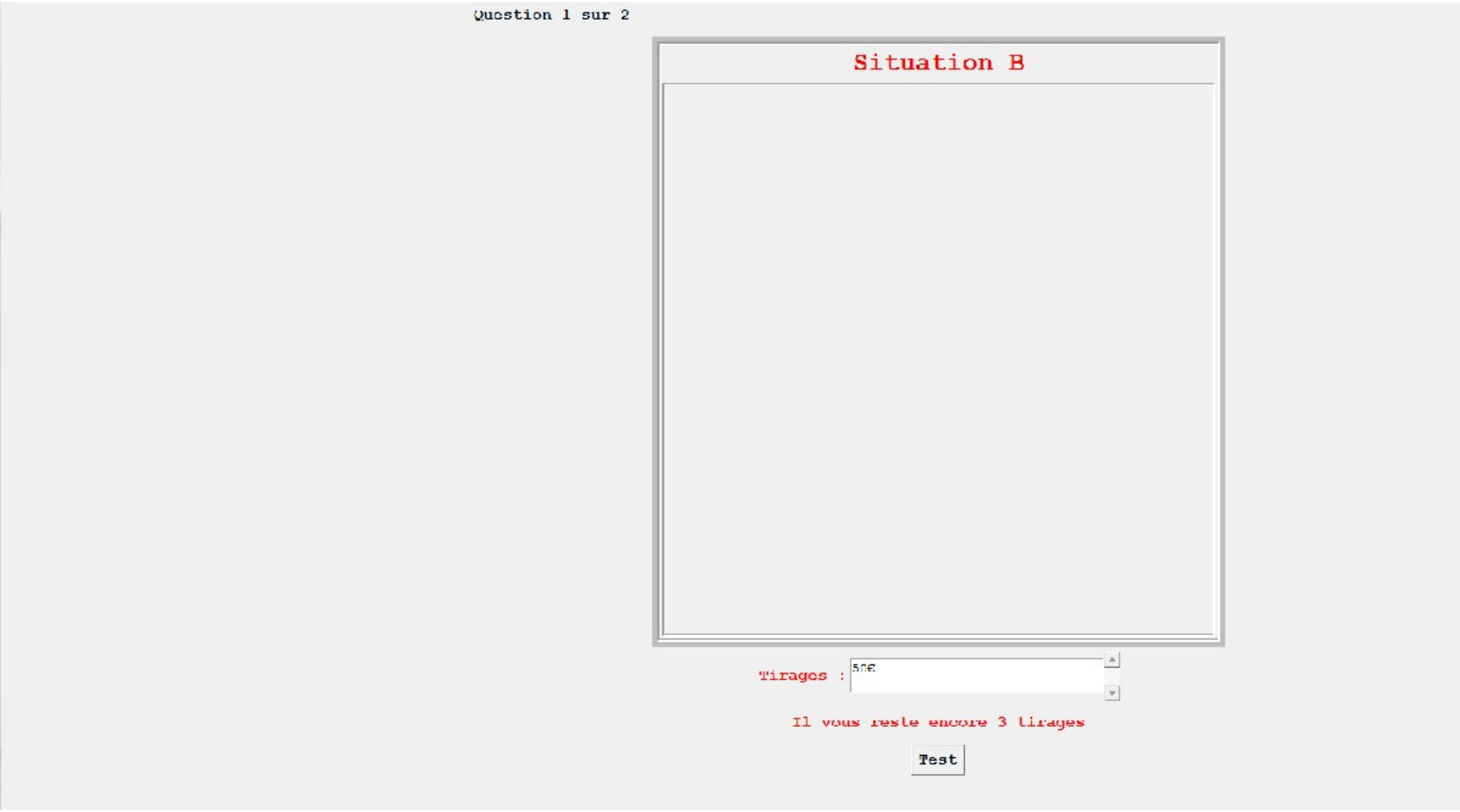
Displays


Question 1 sur 2
Situation B
?
50 €
?
0 €
Tirages :
Il vous reste encore 4 tirages
Test

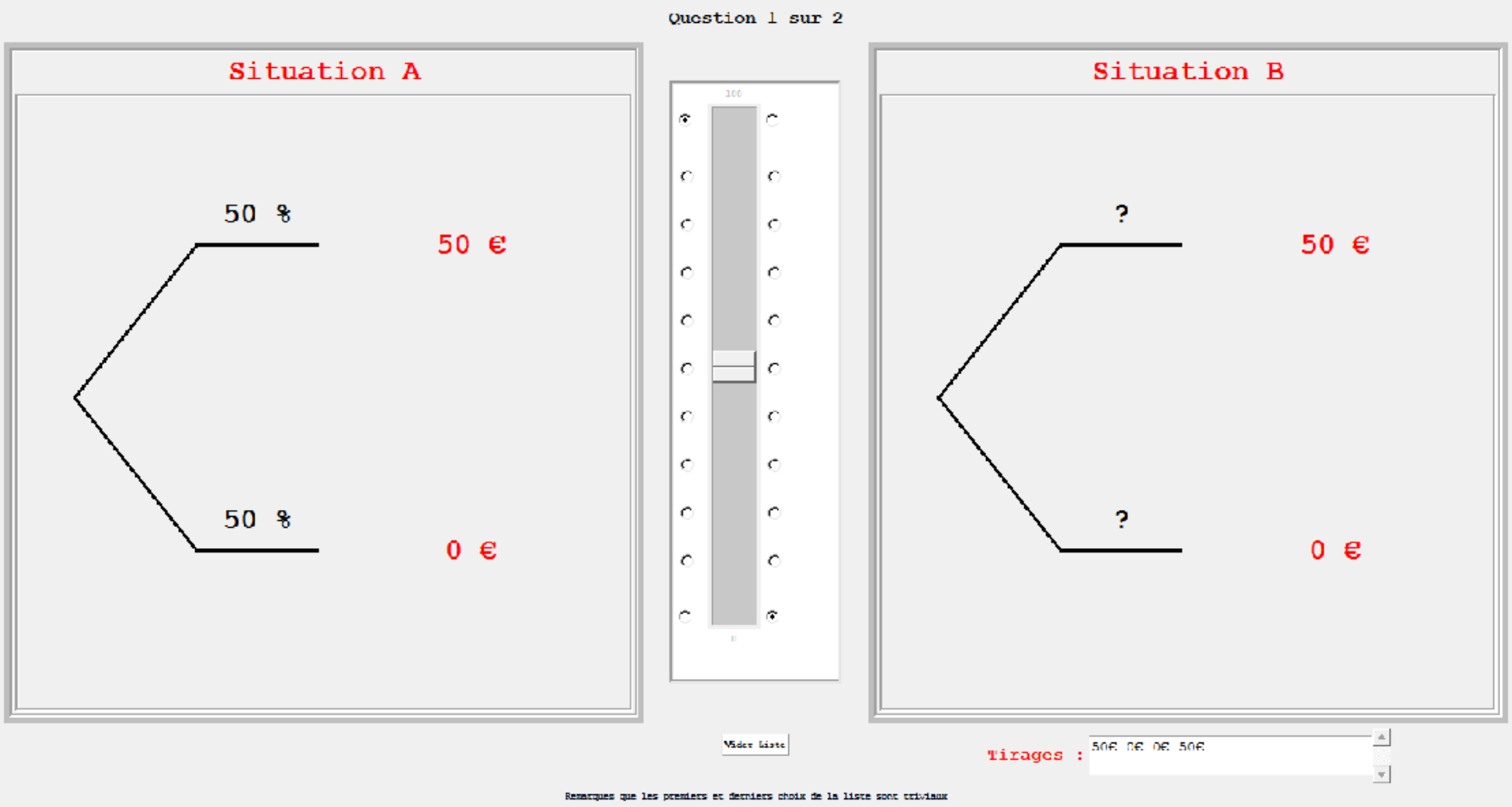
Displays


Question 1 sur 2
Situation B
50 €
Tirages :
Il vous reste encore 3 tirages
Test

Displays


Question 1 sur 2
Situation B
Tirages :
506
Il vous reste encore 3 tirages
Test

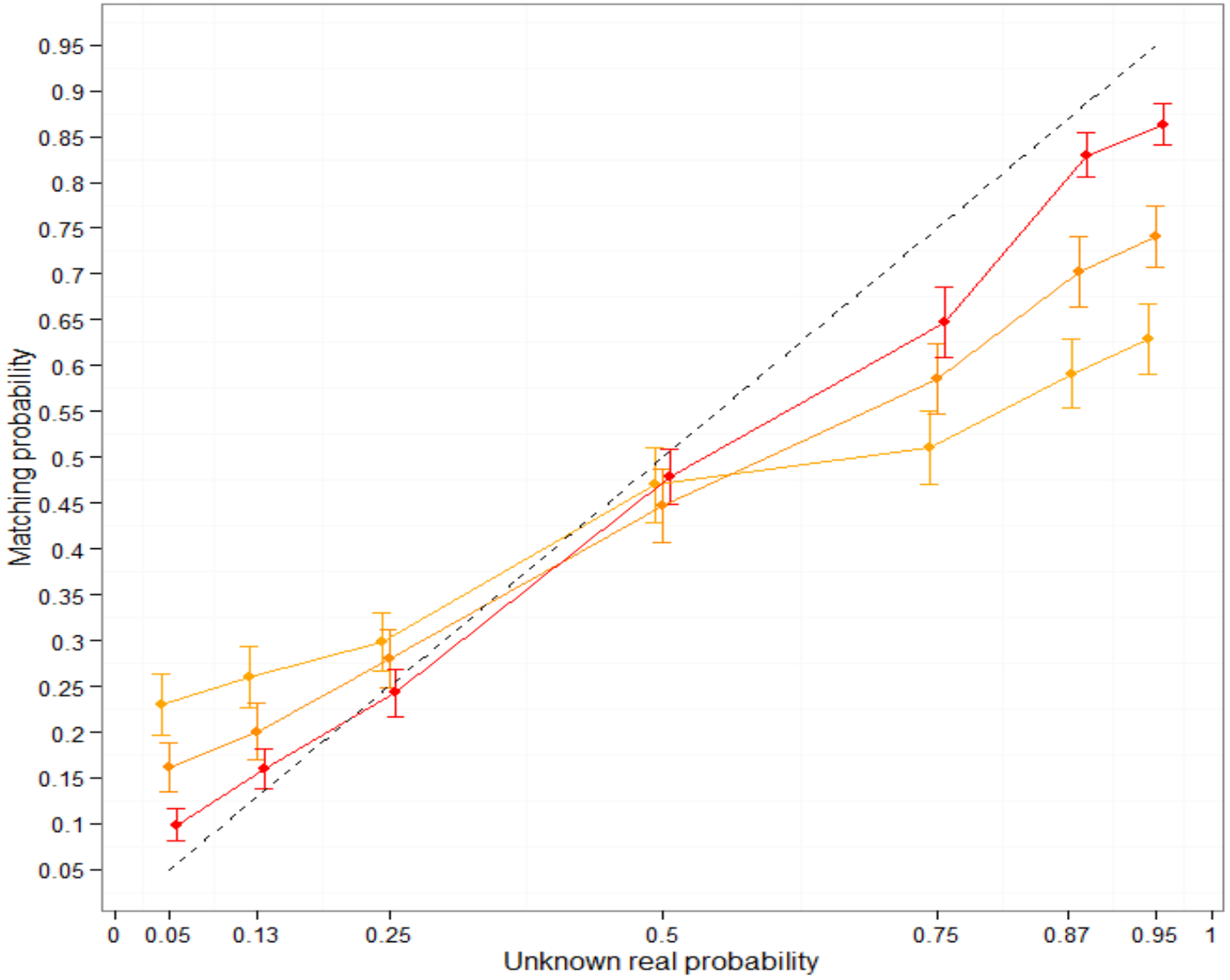
Displays


Question 1 sur 2
Situation A
50 %
50 €
50 %
0 €
Situation B
?
50 €
?
0 €
Vider liste
Tirages :
Remarques que les premiers et derniers choix de la liste sont triviaux

The Results

Raw data analysis

Matching probabilities vs Unknown real probabilities

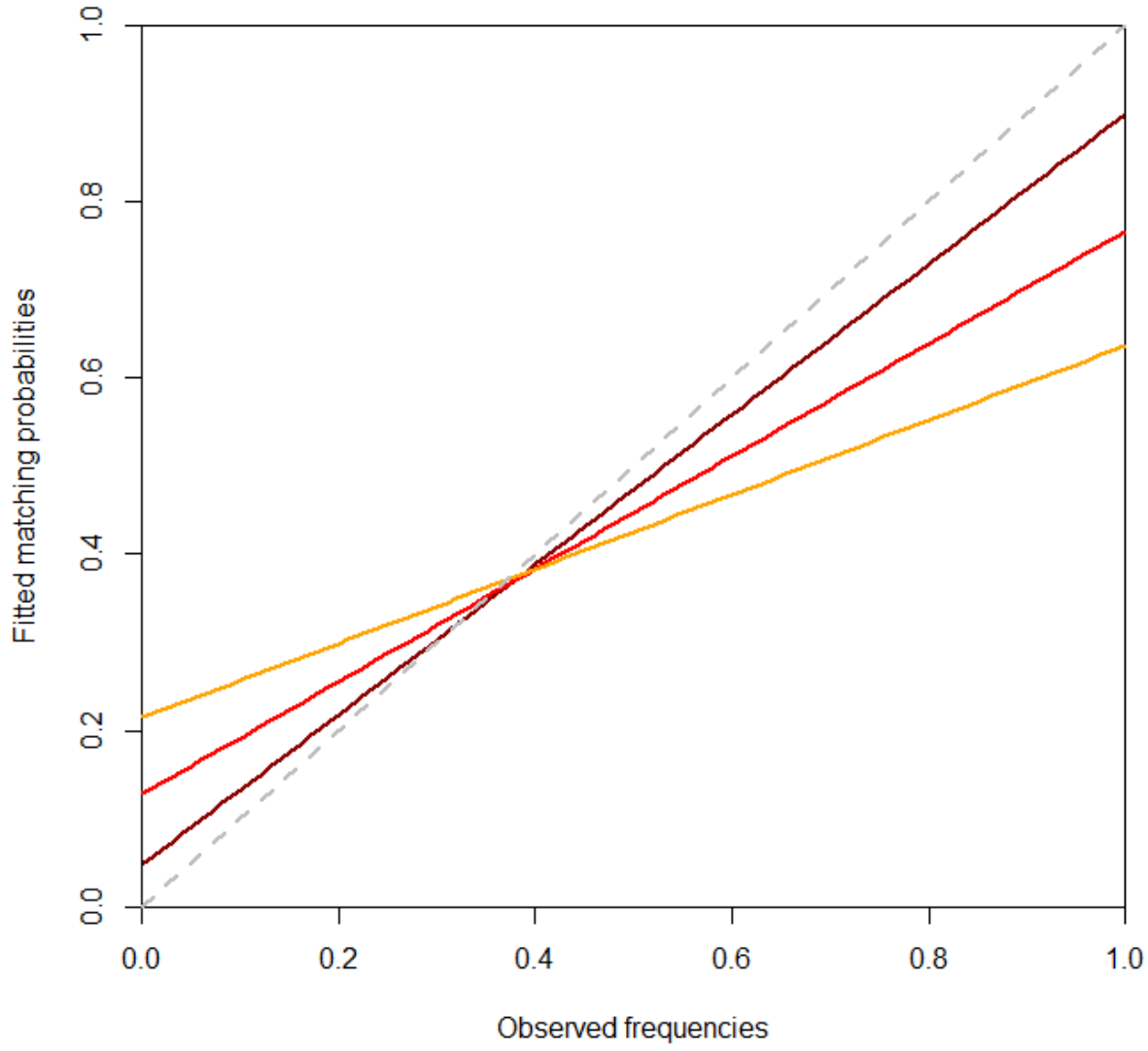


Free sampling

8 draws

4 draws

Matching probabilities vs Experienced frequencies



free sampling

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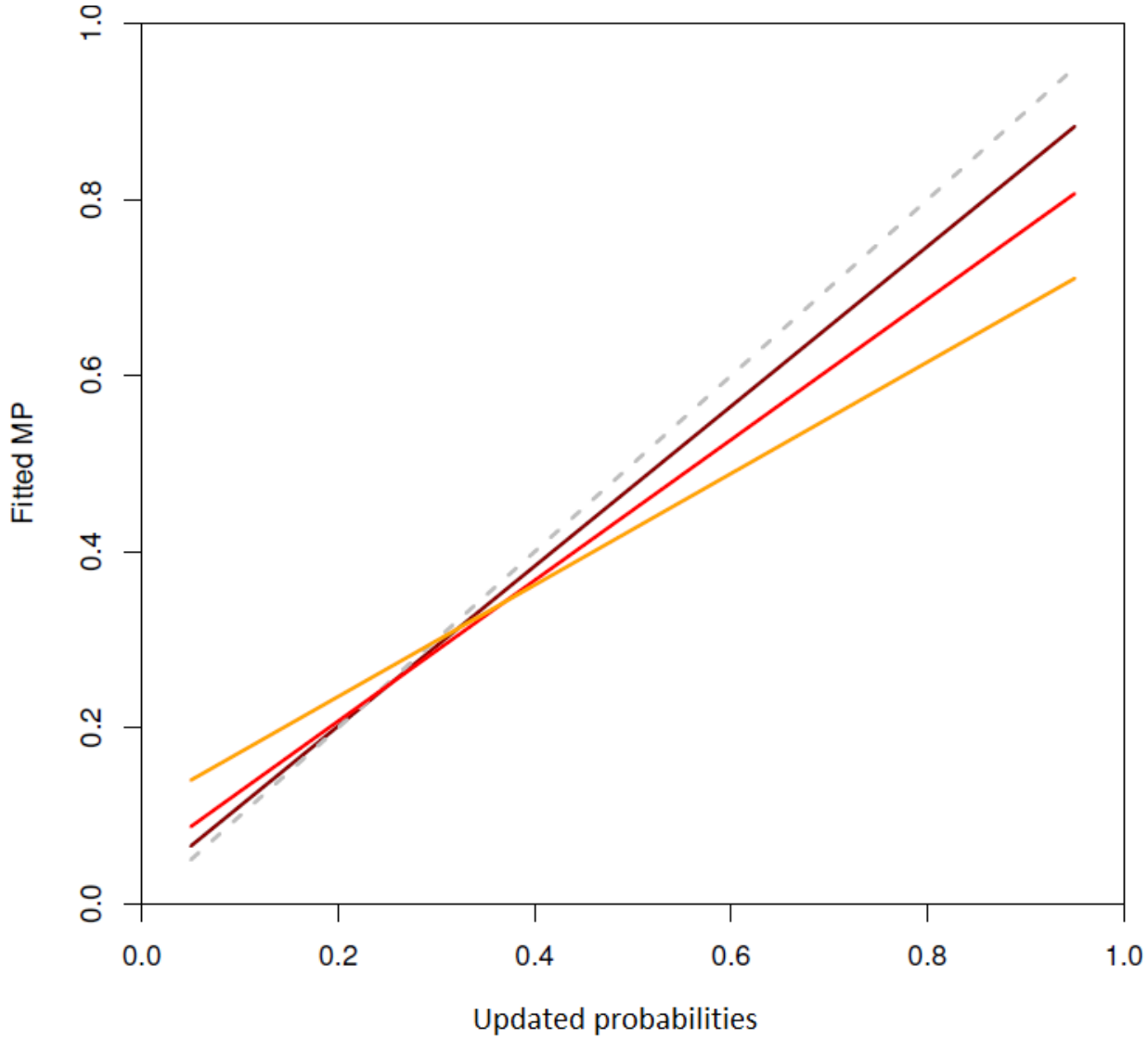
Matching probabilities vs Bayesian probabilities



free sampling

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The Results

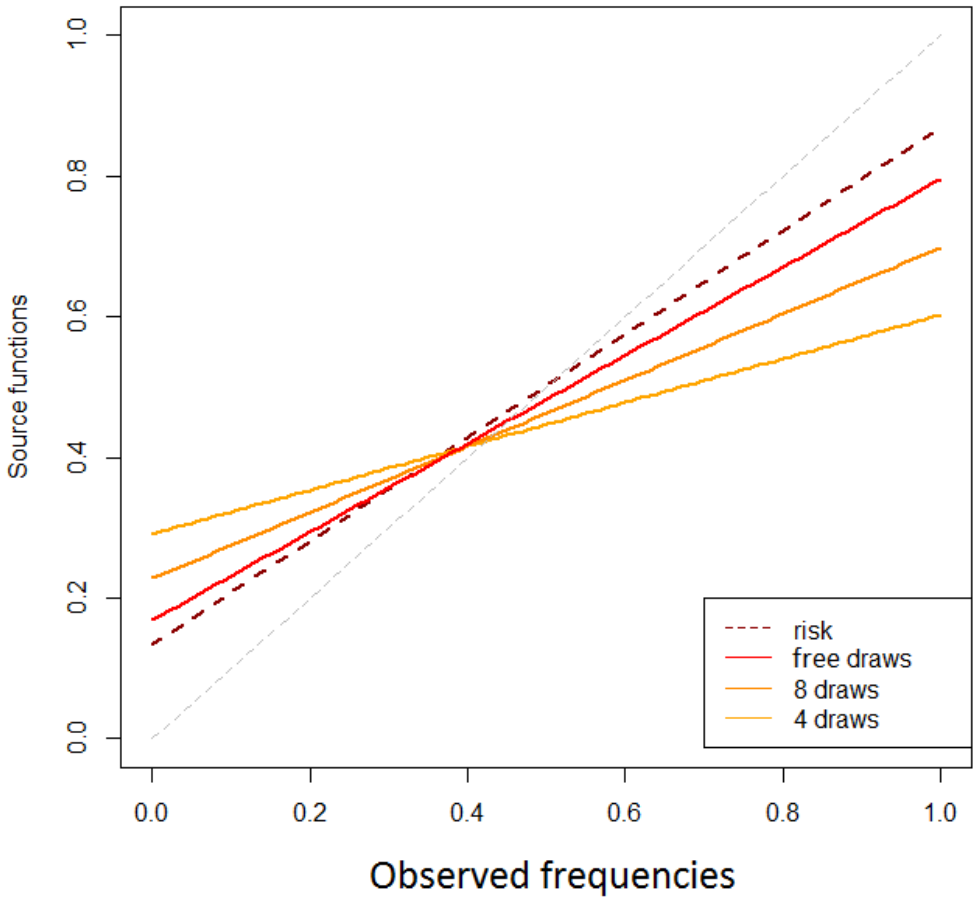
Analysis under Prospect Theory

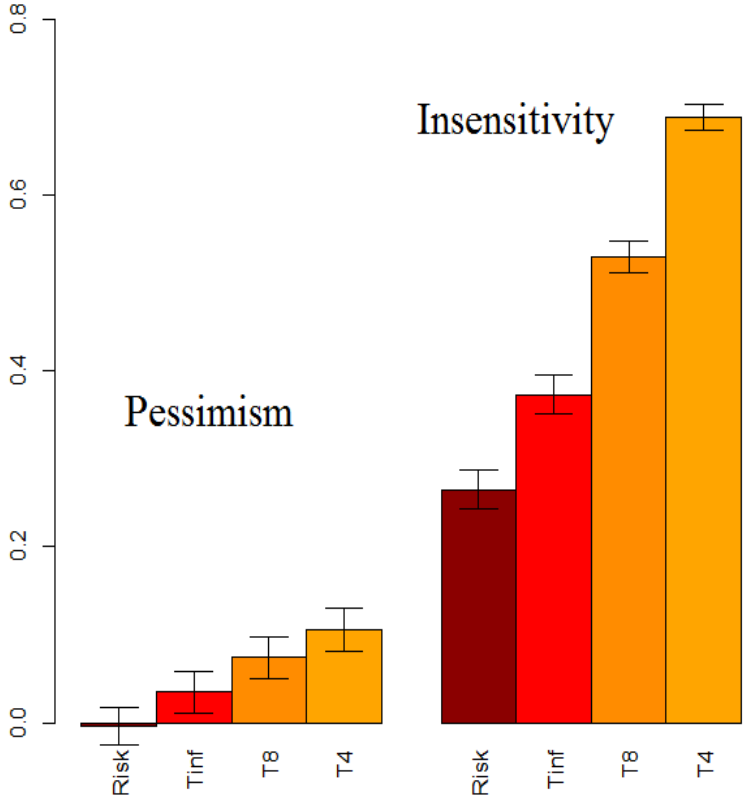
Decision weights and ambiguity levels

- Which probabilities are weighted ?
  - observed frequencies
  - bayesian probabilities

- Which decision weighting function offers the best fit ?
  - Prelec
  - Goldstein-Einhorn
  - Constant relative sensitivity
  - Linear function (insensitivity and pessimism indexes)

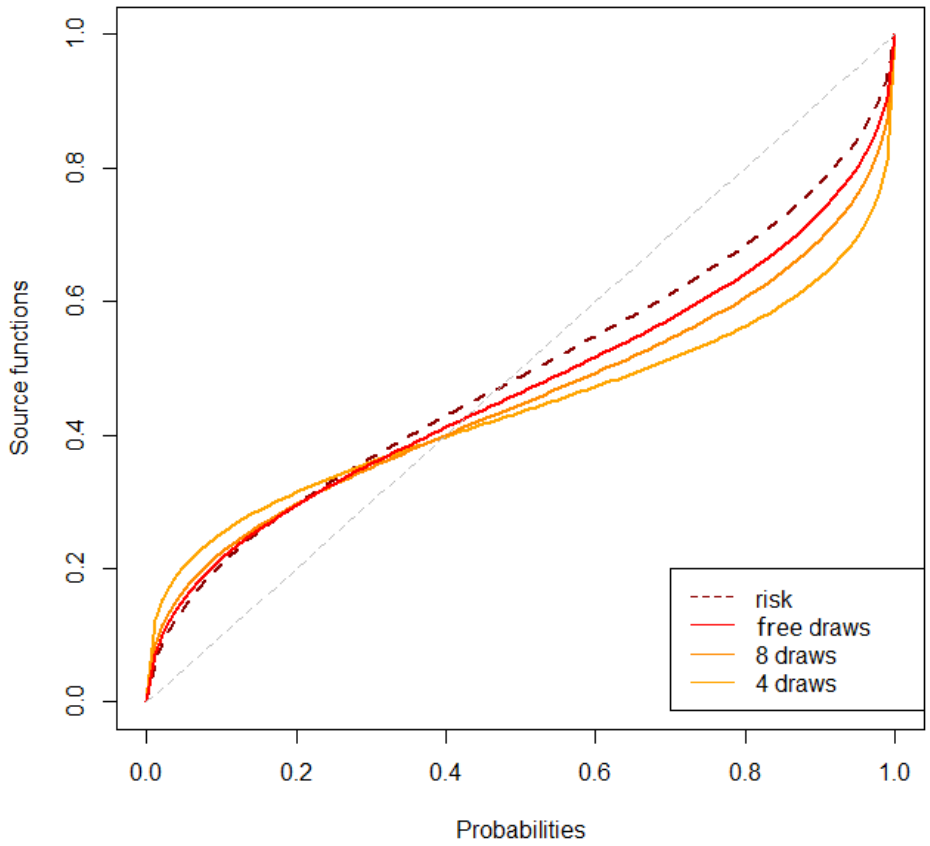
Estimations based on Observed frequencies

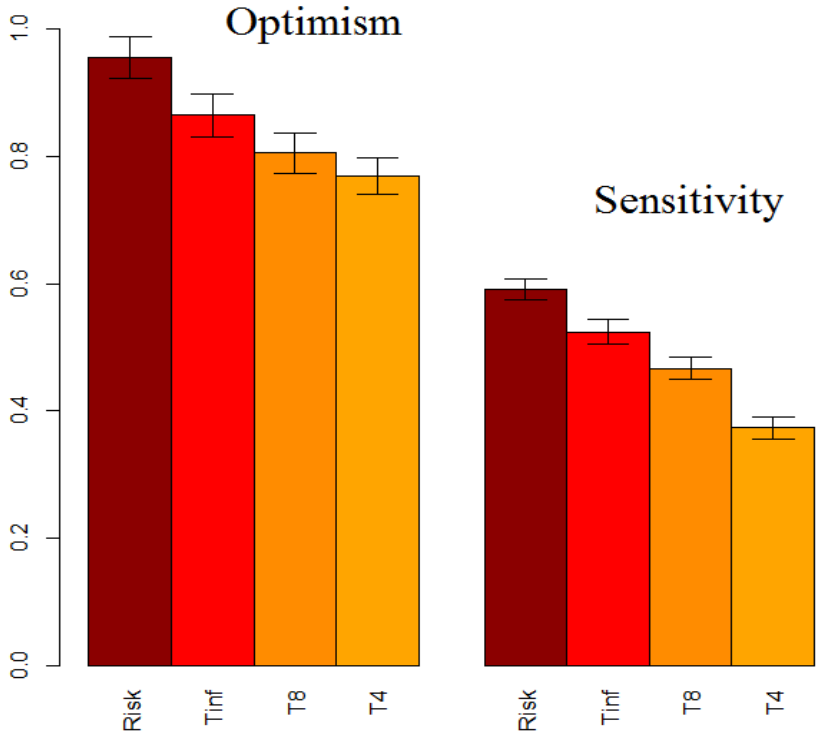




	GE	Prelec	CRS	Linear
LL	-8516.6	-8516.3	-8516.5	-7838.6

- Estimations based on Bayesian probabilities (uniform priors, updated from the observed sample)

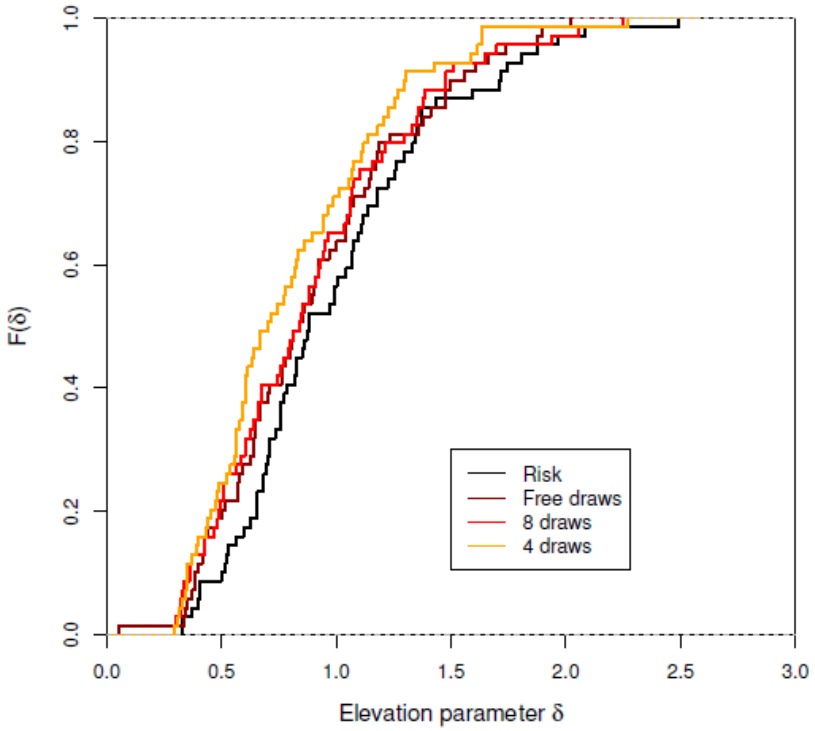


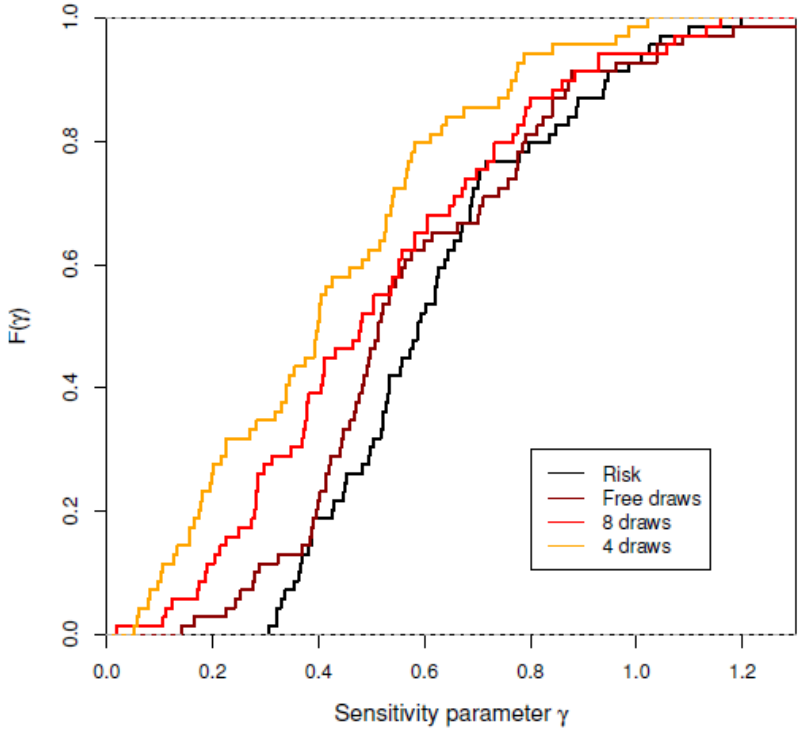


	GE	Prelec	CRS	Linear
LL	-7722.6	-7726.8	-7730.1	-7838.4

- Estimations based on Bayesian probabilities (uniform priors, updated from the observed sample)

Individual level estimations





Discussion

Main findings

About Ambiguity and Sampling:

- A **continuum of ambiguity degrees** between the known and the unknown urn

  Sample size allows to manipulate ambiguity within a source

- For Ellsbergian ambiguity,

  A relationship between **information and ambiguity**

- Ambiguity seeking towards rare events

- Decisions from unconstrained sampling remain ambiguous

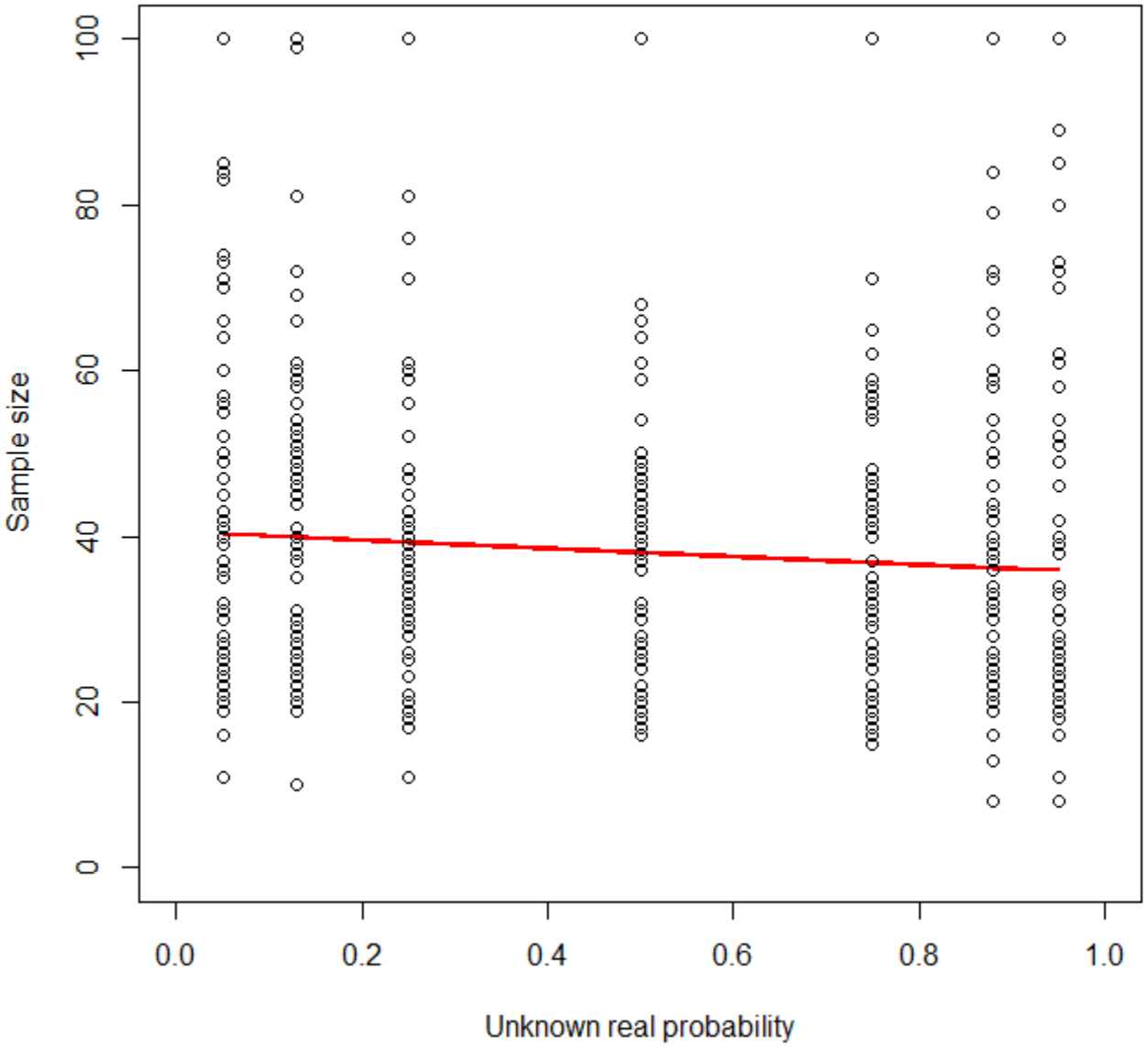
Other findings

About Prospect Theory:

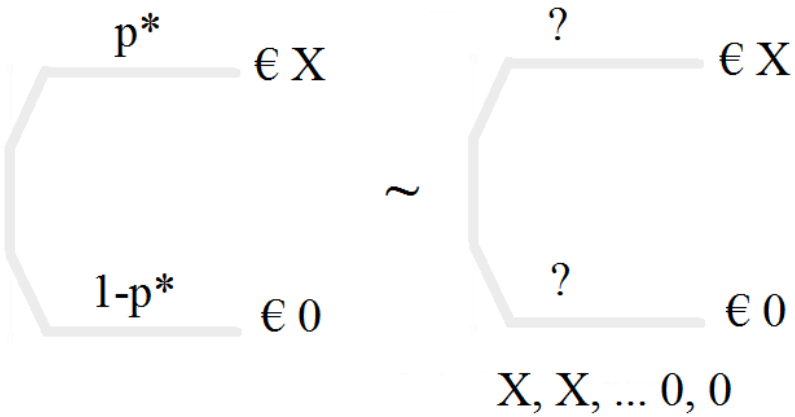
- Weighting functions capture attitudes in decisions from limited experience
- Regarding the estimation method
  - The different decision weighting specifications offer similar results and goodness of fit
- Sensitivity is the dimension that is the most impacted by ambiguity

Thank you for your attention.

Sampling Behaviors



The models



- Prospect theory (Wakker, 2010)

$$w_{risk}(p^*)u(x) = W_{Source}(p)u(x)$$

- Smooth model of ambiguity attitudes (KMM, 2005)

$$\Phi(p^*u(x)) = \int_M \Phi(pu(x))dp$$

Experimenting on experienced risk

	Psychology *HBWE, 2004, 2006; Erev et al. 2010*	Decision theory Fox and Hadar, 2006; Abdellaoui et al, 2011
Findings	*Rare events are under weighted*	*Rare events may be under estimated, but are over weighted*
Paradigm	*Dynamic learning of probabilities and consequences*	*"Savagian" framework: Known state space*
Method	*- Small stakes* *- Binary choices*	*- Larger stakes* *- Indifferences*