

# Decisions from experience

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Mainstream decision research focuses on decisions from description: it examines people's reactions to descriptions of the incentive structure. We try to complement this research by studying decisions from experience.

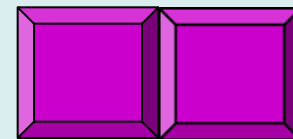
## Decisions from description

A 5 with certainty

B 5000 with  $p = 1/1000$ ; 0 otherwise

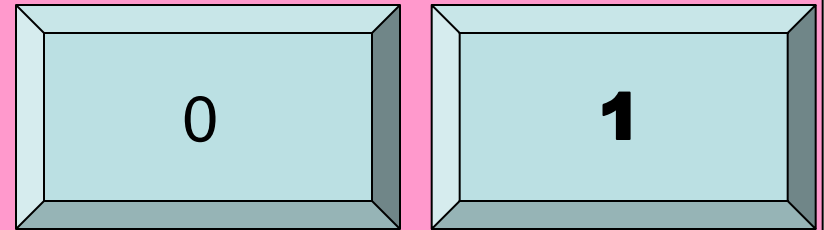
PD1	C	D
C	1,1	-10,10
D	10,-10	-1,-1

## Decisions from experience



# The clicking paradigm

The current experiment includes many trials. Your task, in each trial, is to click on one of the two keys presented on the screen. Each click will be followed by the presentation of the keys' payoffs. Your payoff for the trial is the payoff of the selected key.



You selected Right. Your payoff in this trial is **1**  
Had you selected Left, your payoff would be 0

Our investigation of decisions from experience highlights five main observations.

### **1. The limited value of the rationality assumption.**

Mainstream decisions research focuses on the predictions of rational decision theory. It shows clear violations, and tries to correct this model

Our analysis (and see Gigerenzer and Selten, 2001) questions the value of this approach. It shows that when people rely on experience, almost any behavior can be justified as rational (under certain priors).

Thus, the rational model is not even wrong.

## 2. Underweighting of rare events and the experience-description gap (Barron & Erev, 2003; Hertwig & Erev 2009)

Study of decisions from description reveals oversensitivity to rare events.

0	<b>+9 with <math>p= 0.1</math>; -1 otherwise</b>	Risk-rate = 70%
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Kahneman & Tversky (1979) use this tendency to explain the observation that many people buy both insurance and lotteries.

Study of decisions from experience reveals the opposite bias: experience leads people to behaves as if the believe that “it wont happen to me.”

0	+10 with $p= 0.1$ ; -1 otherwise	Risk-rate = 30%
0	<b>-10 with <math>p= 0.1</math>; +1 otherwise</b>	Risk-rate = 58%

This pattern is robust. It was observed in: one-shot decision based on free sampling (Hertwig et al., 2004); decisions with description & experience (Yechiam et al., 2005); animal behavior (Shafir et al., 2008); the stock market (Taleb, 2007, black swan effect)

### 3. Reliance on small samples.

The main properties of decisions from experience can be captured with the assertion that people rely on small samples of experiences.

<b>C</b>	<b>C-rate</b>	
<b>The alternative to the status quo</b>	Experimental results	Prediction of the sample of 6 model
<b>(11, .5; -9)</b>	57	64
<b>(9, .5; -11)</b>	40	36
<b>1 with certainty</b>	96	99
<b>(10, .1; -1)</b>	30	42
<b>(-10, .1; 1)</b>	58	58

The value of this assumption is supported by studies that examine free sampling (Hertwig et al., 2004), and in two open choice prediction competitions (Erev, Ert & Roth, 2010a; 2010b).

## 4. Under- and over-exploration (Teodorescu & Erev, 2013)

Study of multi-alternative choice tasks reveals under-exploration in **rare treasure** settings, and over-exploration **rare disasters** settings.

Problem **Rare treasures**:

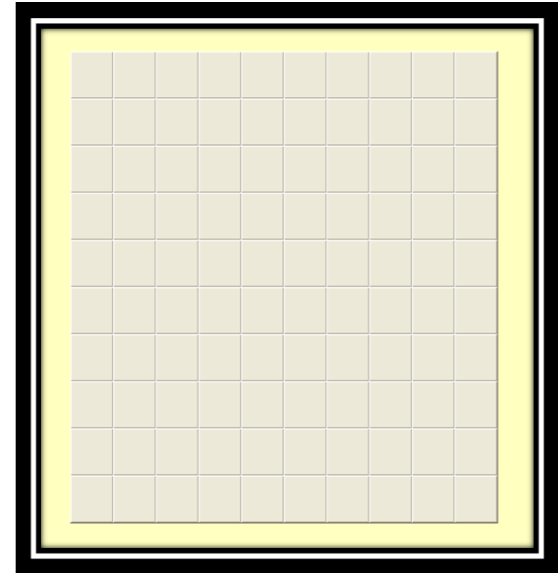
10% of the keys pay **+10**; 90% -1

Status quo gives 0

Problem **Rare disasters**:

10% of the keys lead to **-10**; 90% +1

Status quo gives 0



These results can be captured with a model that assumes an initial choice whether to use an exploration rule (Reiskamp & Otto, 2006) that reflect reliance on small sample.

It sheds light on the conditions under which **emphasis change training** (Yechiam, Erev, Gopher, 2001) is likely to be effective, and on the conditions that trigger **learned helplessness**.

## 5. The value of gentle rule enforcement (Erev et al., 2010)

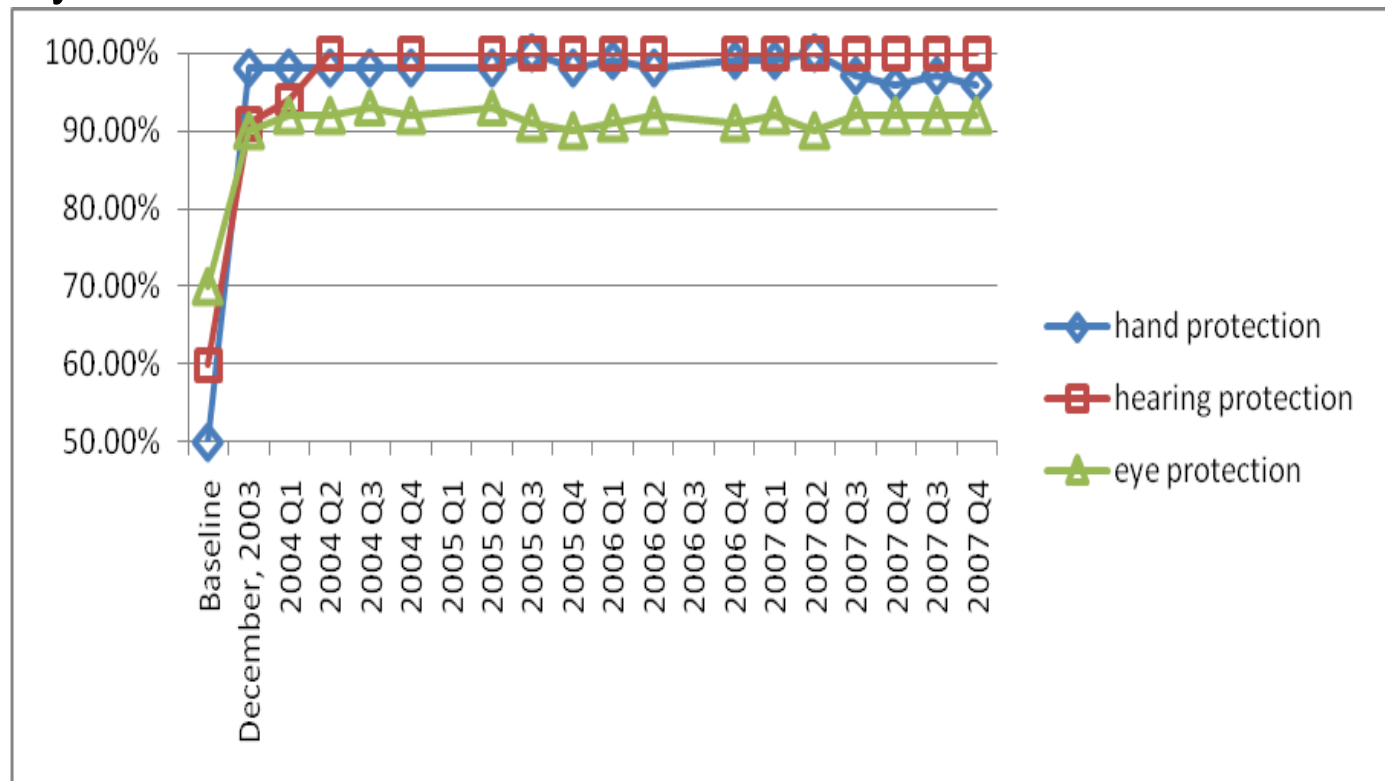
Enforcement is necessary

Workers like enforcement programs

Probability is more important than magnitude

Large punishments are too costly, therefore, gentle enforcement can be optimal

Intervention study in 12 factories:

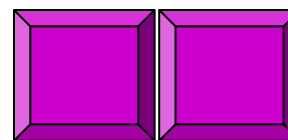


## Two lines of future research

a. Applied: Law and decisions (I-Core)

b. Basic: (with Ori Plonsky, Ralph Hertwig & AI Roth)

Previous research suggests that the tendency to rely on small samples reflects cognitive limitations. We try to highlight another contributor to this tendency. Our analysis starts with an attempt to generalize the study of decisions from experience to address dynamic tasks.



S: 0 with certainty

R:  $V_{\text{gain}}$  if the state of nature is G1 or G2;  $V_{\text{loss}}$  otherwise

And the state of nature is determined by the following Markov chain:

		State at trial t+1			
		G1	L1	G2	L2
State at trial t	G1	$P_{1,1}$	$P_{1,2}$	$P_{1,3}$	$P_{1,4}$
	L1	$P_{2,1}$	$P_{2,2}$	$P_{2,3}$	$P_{2,4}$
	G2	$P_{3,1}$	$P_{3,2}$	$P_{3,3}$	$P_{3,4}$
	L2	$P_{4,1}$	$P_{4,2}$	$P_{4,3}$	$P_{4,4}$



When the payoff rule is unknown, the computation of the optimal strategy is impossible. Nevertheless, it is easy to approximate this strategy with simple similarity-based (SB) rules.

Rule SB-k implies that after observing a certain outcome sequence of size k (e.g., when k=4: GLLG), the subject selects the action that have performed best in similar situations in the past.

**These strategies lead to maximization when the environment is dynamic, but imply reliance on small samples and underweighting of rare events when the environment is static.**

The assertion that people use SB rules is a sufficient condition for the main properties of decisions from experience.

We plan to extend this investigation, and feel that it can shed light on many open questions.

Pilot results suggest that a simple model of choice among the similarity-based strategies can shed light on:

- The partial reinforcement extinction effect (Hochman & Erev, 2013)
- Spontaneous recovery and other violations of Rescorla-Wagner model
- Skinner's concept of contingencies of reinforcements.
- The co-existence of positive and negative recency (the wavy recency pattern, Erev & Teodorescu, 2013)
- The discoveries-inventions paradox and the value of Al Roth's engineering approach to economics.
- The experience-description gap in social interactions