Influence des émotions sur la décision en incertitude : Premiers enseignements d'une enquête sur le risque d'inondation dans le Sud-Est de la France

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Outline

1) Decision with Emotion and Catastrophic Risk

2) Field Experiment on Flood Risk

3) Preliminary results

4) Conclusion and Future Research

1) Decision with Emotion and Catastrophic Risk

Catastrophic Risk

Catastrophic risks are low-probability events with widespread and possibly irreversible consequences.

Type of risks that challenge standard decision theory model (Expected Utility, Von Neumann and Morgestern, 1944)

Expected Utility (EU):

Let a lottery be defined by (x_1, p_1; x_2, p_2;… ; x_m, p_m), with p_i the probability ($p_1 + p_2 +…+ p_m = 1$) and $x \in X$ the outcomes. Suppose u(.) is a strictly increasing function over x.

The EU valuation of this lottery is: $V_{EU}(x_1, p_1; x_2, p_2; \dots ; x_m, p_m) = \sum_{i=1}^{m} p_i u(x_i)$

Catastrophic risks are not well taken into account by individuals

An example: "The Pill experiment" (Chanel and Chichilnisky, 2012)

Choose to swallow one pill among one billion with only one lethal pill for € 150.000.

Half of the 64 subjects answered "No", meaning that according to E.U they value their life to more than € 150 trillion ($150.000/10^{-9}$).

Standard valuation of life (monetary value to reduce probability of death) is around $1.5 - 6 million.

=> This instability of preferences facing such catastrophic risks could be due to emotional aspects of this kind of decision?

=> An axiomatic approach must allow for the emotions.
Chichilnisky (1996, 2000, 2009) developed an axiomatization with an E.U part (the cognitive one) and an emotional part.

Decision and Emotion

Emotions are outside the standard decision theory framework.

However, biological and behavioral evidence that emotions affect decision:
- Change the evaluation of outcomes
- Change the process of decision
- Provide energy to support decisions
- Help reminiscence of similar situations to make decision
- Memorize the events to update future decisions and actions

Sunstein (2003) or Sunstein and Zeckhauser (2008) provide evidence that individuals show unusually strong reactions to low-probability catastrophes especially when their emotions are intensely engaged.

=> How should we take into account these emotional aspects into decision-making?

=> Loewenstein et al. (2001); Loewenstein (2004): Risk as feelings.

Emotions are a consequence of decision.

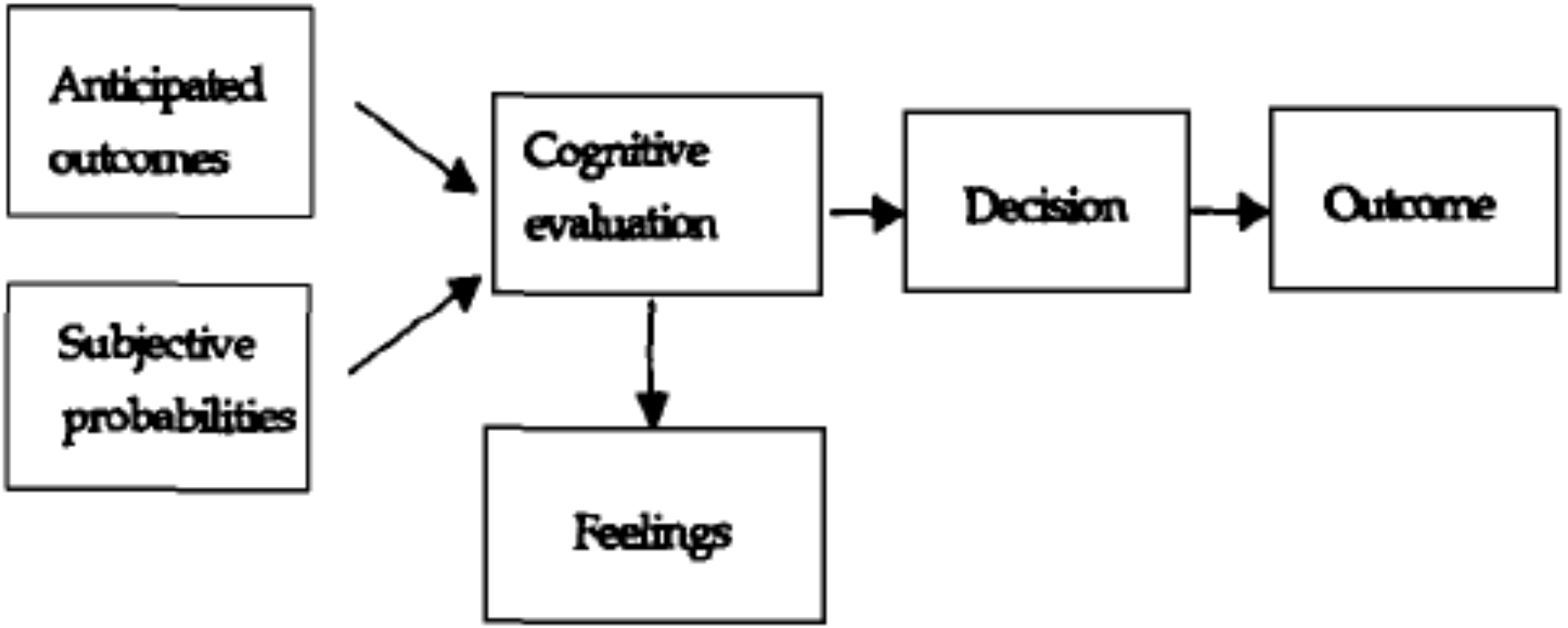


Figure 1. Consequentialist perspective.

Source: Loewenstein et al. (2001)

Anticipated emotions affect decision.

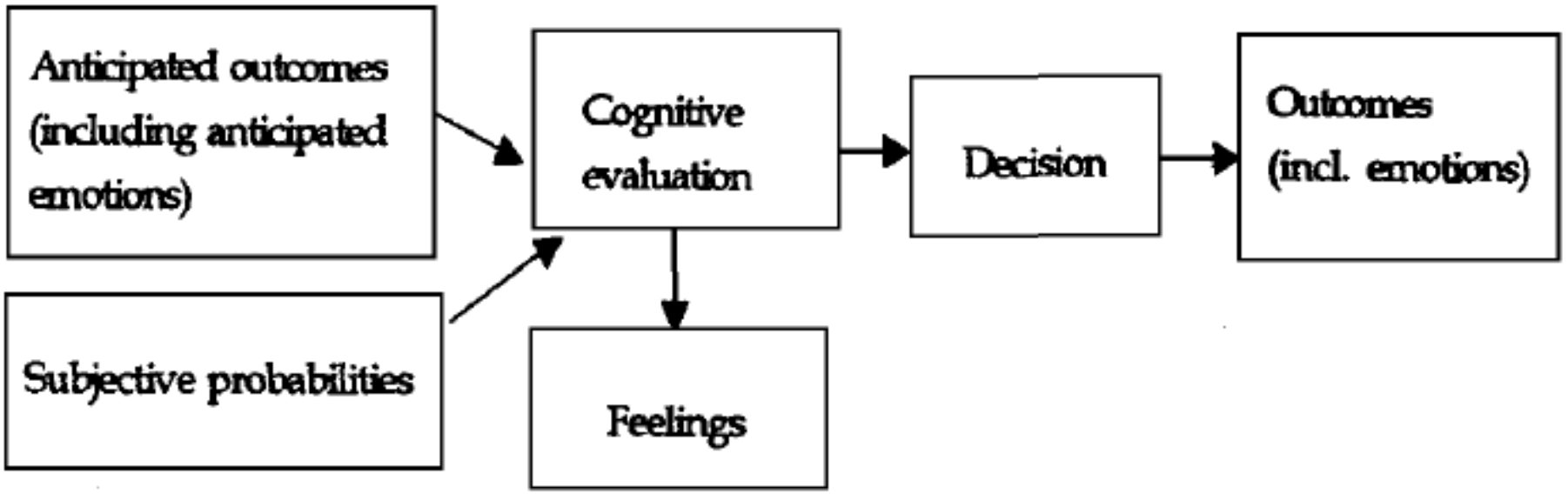


Figure 2. Consequentialist perspective with anticipated emotions.

Source: Loewenstein et al. (2001)

Emotions are a second process of decision.

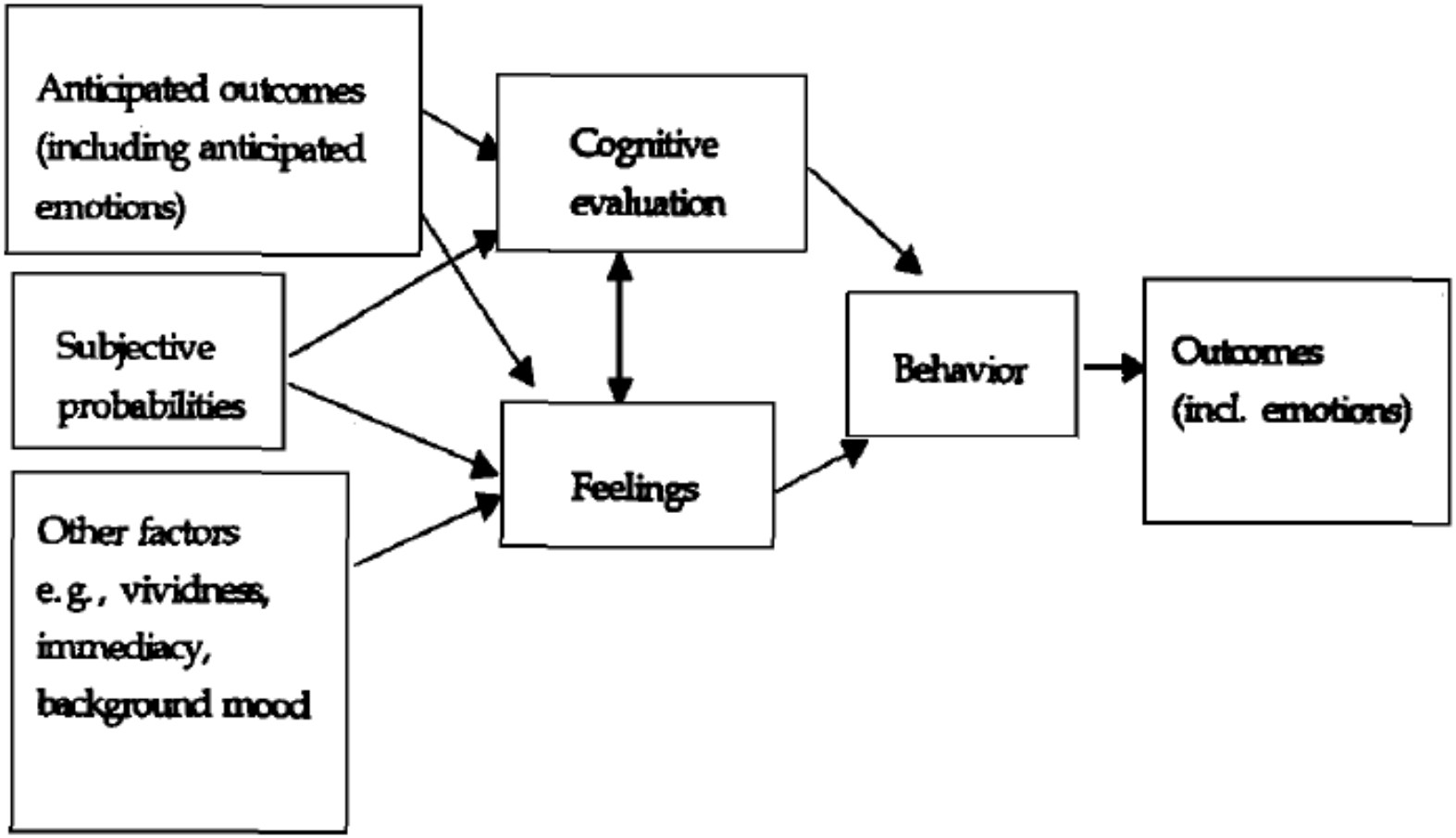


Figure 3. Risk-as-feelings perspective.

Source: Loewenstein et al. (2001)

2) Field Experiment on Flood Risk

Datasets used in the overall research

Objective: try to identify the impacts of emotions in the decision process facing catastrophic risk.

Three datasets on different catastrophic risk:
- Survey on flood risk
=> Estimate the impact of an emotional past-experience on WTP to reduce the risk in populations differently exposed.

- Survey on military risk
=> Estimate the impact of an emotional experience on decision under uncertainty before and after the experience (mission on Afghanistan).

- Psychophysic experiment on catastrophic risk (with real money)
=> Introduce an emotion in a well-controlled experiment in lab.
=> Identify the importance of the low probability and the high event in a LPHE setting.

Design of the survey on flood risk

Survey on four populations in Southeast France:
- Recent flood (Draguignan, June 2010, 10 deaths)
- Past flood (Vaison la Romaine, September 1992, 33 deaths)
- Potential flood risk (Berre l'Etang)
- No flood risk (Miramas)

Different blocs of questions:
- Socio-demographic questions
- Psychological questions (BFI, control, risky behaviors...)
- Preferences under risk and intertemporal choices
- Past emotional experience and PTSD
- In a standardized hypothetical framework, individual WTP for protection and insurance against flood risk and storm risk
- Individual WTP for protection and insurance against flood risk

Predictions

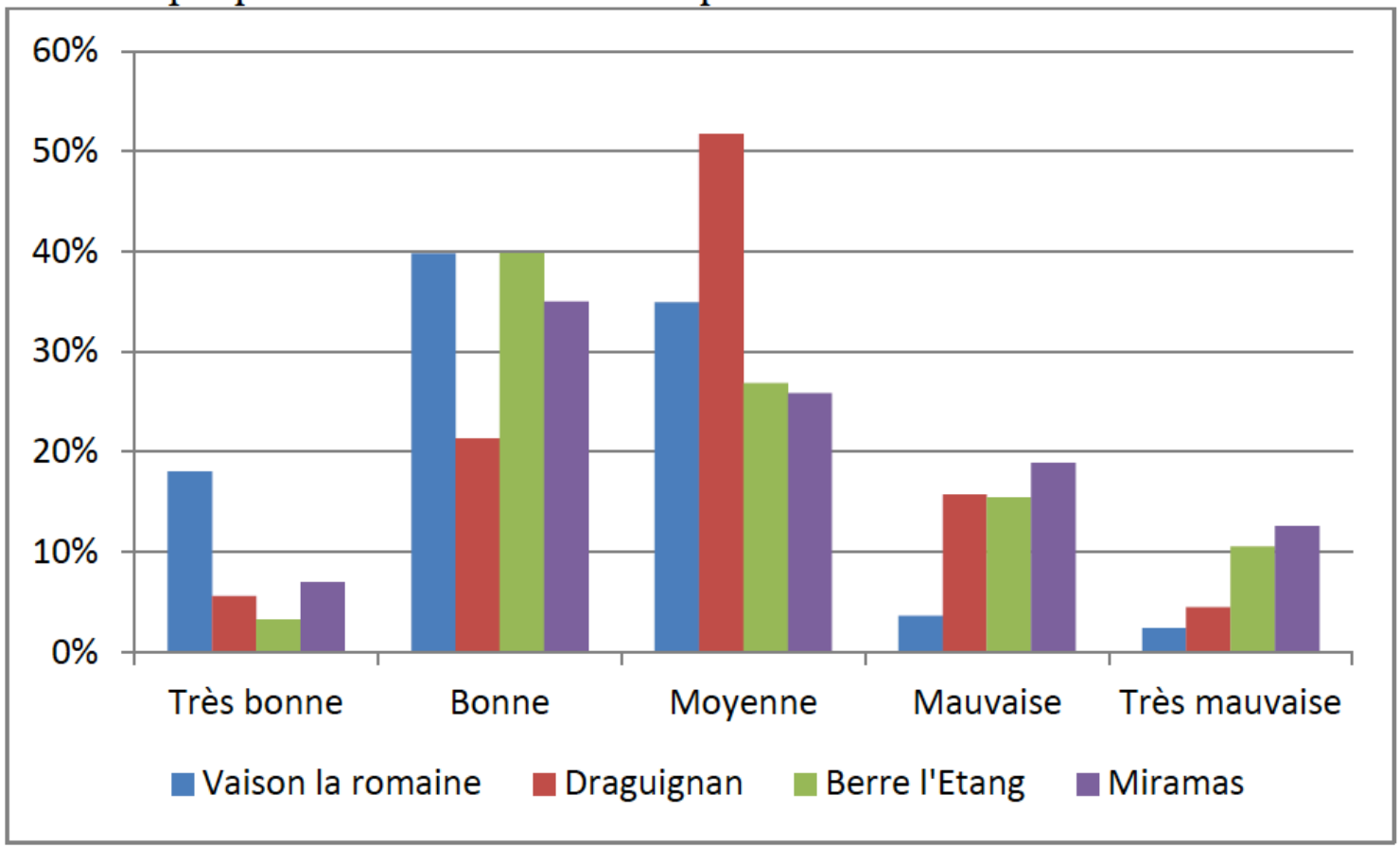
- Past experience affects subjective beliefs, insurance choices and preferences.

- Difficulty to anticipate emotional aspects of a disaster without past experience.

=> In a catastrophic risk framework, emotions impact decisions but this kind of emotions is hardly anticipated without past experience.

3) Preliminary results

Graphique 3 : Connaissance du risque d'inondation selon la commune



Source: Ilardi (2012)

31) WTP for protection and insurance against flood and storm risks (hypo. framework)

Effects of recent or past experience and being at risk

	Subjective probability of flood	Level of anticipated negative emotion in case of flood	WTP			
			Flood		Storm	
			Insurance	Protection	Insurance	Protection
Recent exp. (Draguignan, n=89)	>0**	>0***	>0**	>0***	>0*	>0**
Past exp. (Vaison, n=83)	=	<0***	=	=	=	=
At risk, no exp. (Berre, n=123)	=	=	=	=	=	=

Reference: No risk (Miramas, n=143)

- Effect of recent experience but no effect of past experience on WTP and subj. proba.
- No effect of living in a potential risky zone.
- Contrasted effect of experience on level of anticipated negative emotion.

The effect of post-trauma disorder (PTSD) and severity in flood experience (score)

Scoring a PTSD index for each individual and an index of negative experience for flood victims.

	Subjective probability of flood	Level of anticipated negative emotion in case of flood	WTP			
			Flood		Storm	
			Insurance	Protection	Insurance	Protection
PSTD	>0**	>0*	=	=	=	=
Flood severity	=	=	=	=	=	=

- PTSD affects anticipations but not WTP.
- Flood severity has no significant effect.

The effect of anticipated emotion

Scoring anticipated negative emotions that will be felt in case of disaster.

	Subjective probability of flood	WTP			
		Flood		Storm	
		Insurance	Protection	Insurance	Protection
Anticipated emotion	=	=	=	=	=

Anticipated emotions have no significant impact.

32) Explaining individual WTP for protection and insurance against flood risk

Explained variable	**WTP for protection**	**WTP for insurance**
Explanatory variables	- Living in Berre (+) - Having an average (rather than a poor) knowledge of flood risk (+) - Below 65(-) - Income (+) - PTSD (+) - no risky behaviour in everyday life (+) - risk aversion in gamble with money loss (-)	 - Owner (+) - Having a knowledge of flood risk different from poor (+) - Income (+) - risk aversion in gamble with money loss (-)
Mean WTP	€ 126.86 per year	€ 145.35 per year

Source: d'après Ilardi (2012)

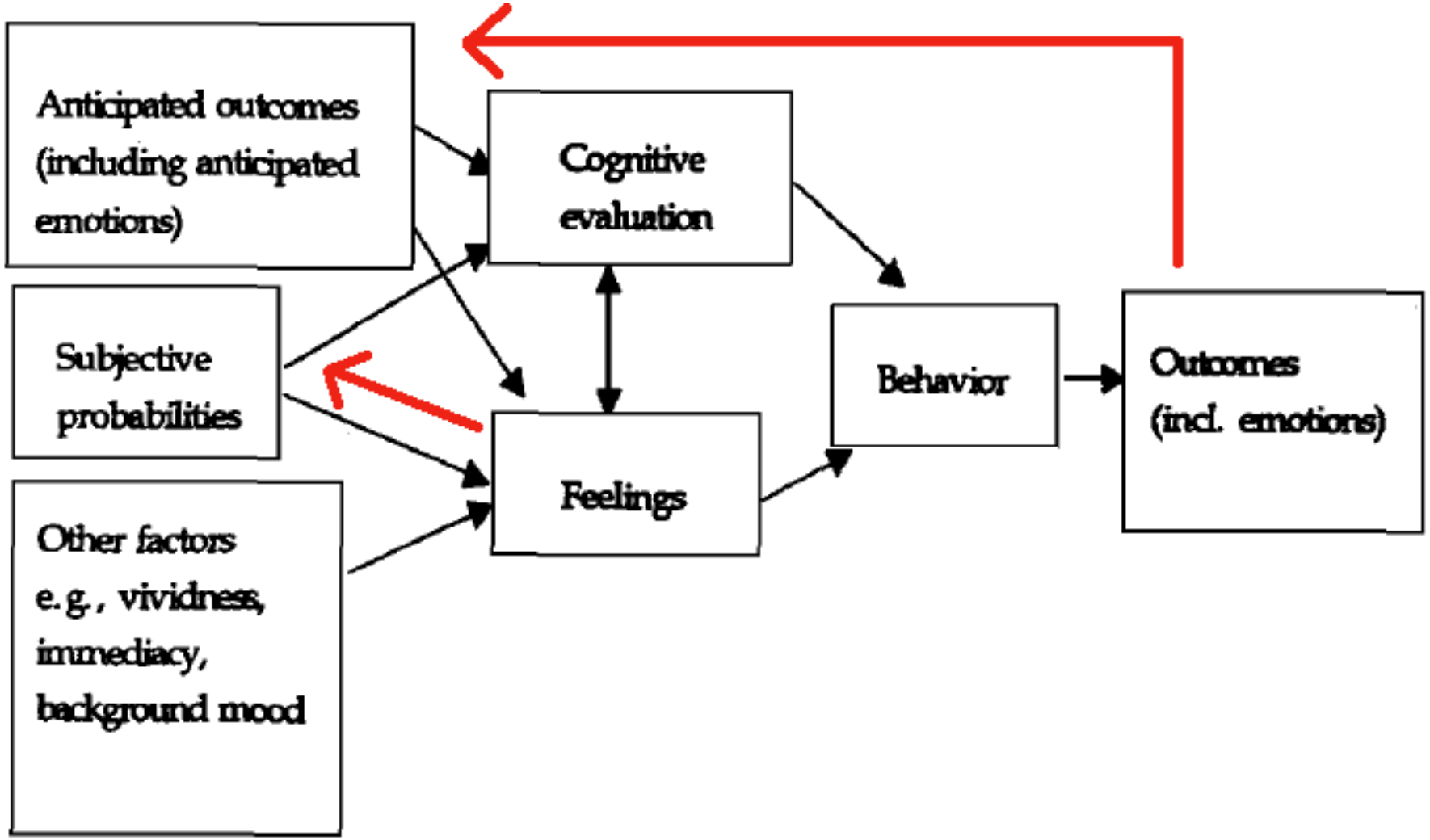
4) Conclusion and Future Research

Preliminary findings

- Positive effect of recent experience on WTP.

- At this stage, no clear evidence on the role of affects and emotions.

Feelings as a second process



Future research

- work on the whole dataset (600 individuals),

- scrutinize further the relations between demographic variables, psychological questions (BFI, control, risky behaviors...), preferences under risk and intertemporal choices, past emotional experience, PTSD and the various WTP (6 questions),

- explicitly introduce emotions in models of decision,

- estimate these models,

- jointly explore the richness of the three database (flood and soldier surveys, lab experiment).