Structures of Social Proof

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LogiCIC Kick-Off Workshop: Belief Change in Social Context
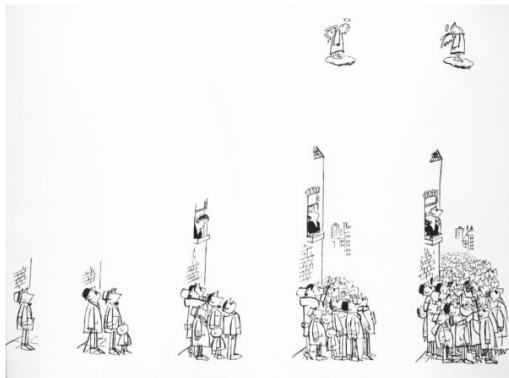Amsterdam, December 2012

Structures of Social Proof

"The task is to identify the conditions and procedures under which groups can find the information that their members have."

– Cass Sunstein

Forthcoming in *Socio-Epistemic Phenomena: 5 Questions*
Edited by Vincent F. Hendricks & Rasmus K. Rendsvig
Automatic Press / VIP, 2013

Structures of Social Proof

SOCIAL PROOF: Single agents assume beliefs / norms / actions of other agents in an attempt to reflect the correct view / stance / behavior for a given situation

Two Prominent Examples of Social Proof

Informational Cascades

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- Examples: Bubbles in stock and real estate markets (Hendricks & Lundorff-Rasmussen, 2013)

Bystander Effects

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- Examples: Smokey room (Darley & Latane 1968), corporate boards (Westphal & Bednar, 2005), intervention and regulation in financial market (Hendricks & Lundorff Rasmussen 2012).
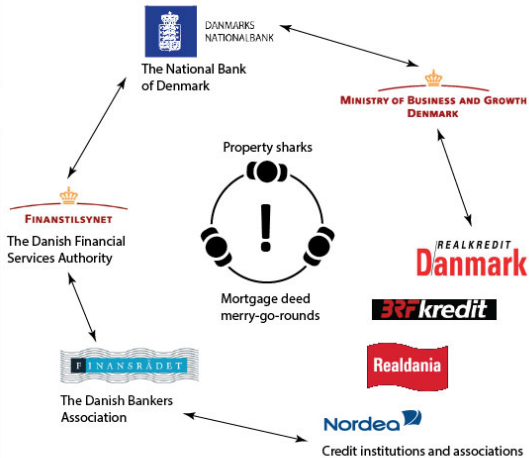
Bystander Effects for Real (Estate)
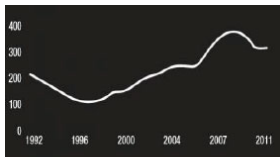
Price development on Danish corporate realty 1992-2011

REGULATORY INTERVENTION?

NEDTUR!
Finanskrisen forstået filosofisk

Vincent F. Hendricks & Jan Lundorff Rasmussen
København: Gyldendal, 2012

DOWNFALL!
Philosophy and the Financial Crisis
Forthcoming, 2013

Socio-Epistemic Phenomena

Subsequently socio-epistemic phenomena like:

Bandwagon effects
Boom thinking
Group thinking
Herd behavior
Gullibility
Conformity
Compliance
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The Diamond Conferences

Amsterdam / Copenhagen / Munich / Lund, 2014-16

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- Investors may start looking for social proof to facilitate a qualified decision.

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- what the investor expects about the market crash,
- what other investors are expected to do based on their expectations pertaining to the market crash,
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It also means that the collective behavior of investors become susceptible to the workings of socio-epistemic phenomena like informational cascades, pluralistic ignorance, bystander effects . . .

Socio-Epistemic Phenomena are Composites

- Agents
- Beliefs
- Private / public signals
- Preferences
- Expectations
- Modes of behavior
- ...

The Structure of Social Proof

Structural Ingredients

- ▶ Epistemic Logic
- ▶ Game Theory
- ▶ Judgment Aggregation
- ▶ ...

Parameters

- ▶ Uncertainty and Information
- ▶ Decision Rules and Actions
- ▶ Interpretation Rules and Social Proof
- ▶ Belief Merge Operations
- ▶ Social Network Structure
- ▶ ...

Modularity

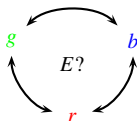- ▶ *Change module, plug module, press play*
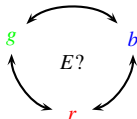
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- ▶ Formalization of pluralistic ignorance explanation put forth by social psychologists.
- ▶ Epistemic Plausibility Models and Action Models + some.
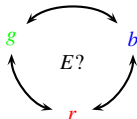
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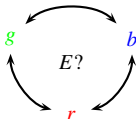
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  - Decisions are based on information from two sources:
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- Root of the Problem: Agents choose to observe in the first round, but misinterpret the same action by others.

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Modularity and Bystander Effects: Decision

To incorporate a notion of **choice** in DEL models, we use **decision rules**. E.g.:

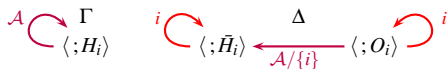| **First Responder:**	$B_i E \to [X]H_i \wedge B_i \bar{E} \to [X]\bar{H}_i$ [1]

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[1] X ranges over a set of a set of **doxastic programs** $\{\Gamma, \Delta, ..., \Omega\}$ from an action model with **postconditions** – $[X]$ is a **dynamic modality** : $[X]\varphi$ reads "after execution of program $X := \Gamma$, φ holds everywhere".

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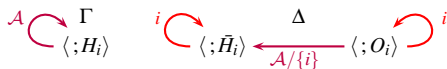| **City-Dwellers:**	$B_i E \to [X]\bar{H}_i \wedge B_i \bar{E} \to [X]\bar{H}_i$

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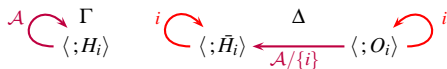| **City-Dwellers:**	$B_i E \to [X]\bar{H}_i \wedge B_i \bar{E} \to [X]\bar{H}_i$
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- **"Social beliefs"** constructed in accordance with the perceived beliefs of agents from group G.
- Based on **majority voting** on φ: If most of G believes φ, then let social beliefs be one's own beliefs radically upgraded with φ.
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Informational Cascades

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▶ Rigorous reconstruction of the informal elements from IC models from behavioral economics.

▶ Epistemic Plausibility Models and Action Models + some.

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  2. Receives a private signal believed to be positively correlated with the truth

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Four Combinations

Decision Rules:

1. Individualist:	$(B_i L \rightarrow [X]L_i) \wedge (B_i R \rightarrow [X]R_i)$
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SkipGambleQuit

SkipGambleQuit

▶ How social proof may be extracted from the actions of others, how it may be used to influence expectations and actions in extensive games.

▶ Game Theory coupled with Doxastic-Epistemic Temporal Logic with Expectations + change.

From DEL to Temporal Forests: SkipGambleQuit
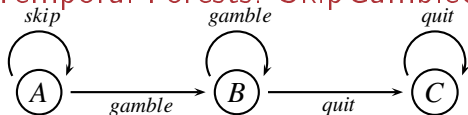
Pay-offs: $+0$ for any *skip*, $+1$ for any *gamble* before *crash*, -1 for any *gamble* after *crash*, $+0$ for any *quit*.

From DEL to Temporal Forests: SkipGambleQuit
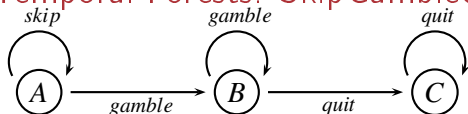
Pay-offs: +0 for any *skip*, +1 for any *gamble* before *crash*, -1 for any *gamble* after *crash*, +0 for any *quit*.
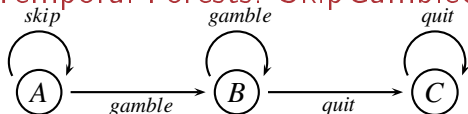
Agent types: Aggressive (going for highest possible), Conservative (worst-case scenario maximizers), and Social-Conservative (cons. based on social proof).

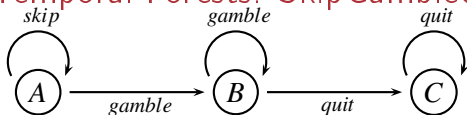# From DEL to Temporal Forests: SkipGambleQuit

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Example 1: If a set of social-conservative agents end up in a state where they *Gamble* and seek information from each other, *then they will play Gamble till the end of the game*.

SkipGambleQuit: Example 2

Adoption: If a social-conservative agent i receives social proof from group G of which she believes that each agent is conservative, then if the majority of G played the same move in the previous round, i will play this move in the next round.

Example 2: If groups of social-conservative agents herd each other in following some set of well-informed aggressive agents, a *delayed informational cascade* may occur, which results in *negative payoffs for agents with too "old" information.*
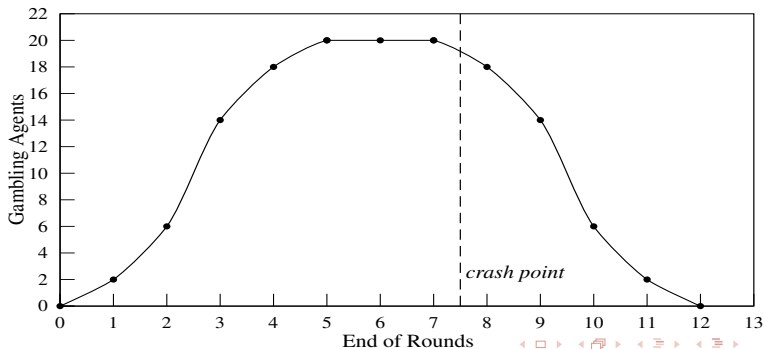
Wrapping it up

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- Socio-Epistemic Phenomena

Wrapping it up

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The New Game in Town