Narrative Structuring of Experience for Extended Social Interactions in Humans and Robots

Peter Ford Dominey

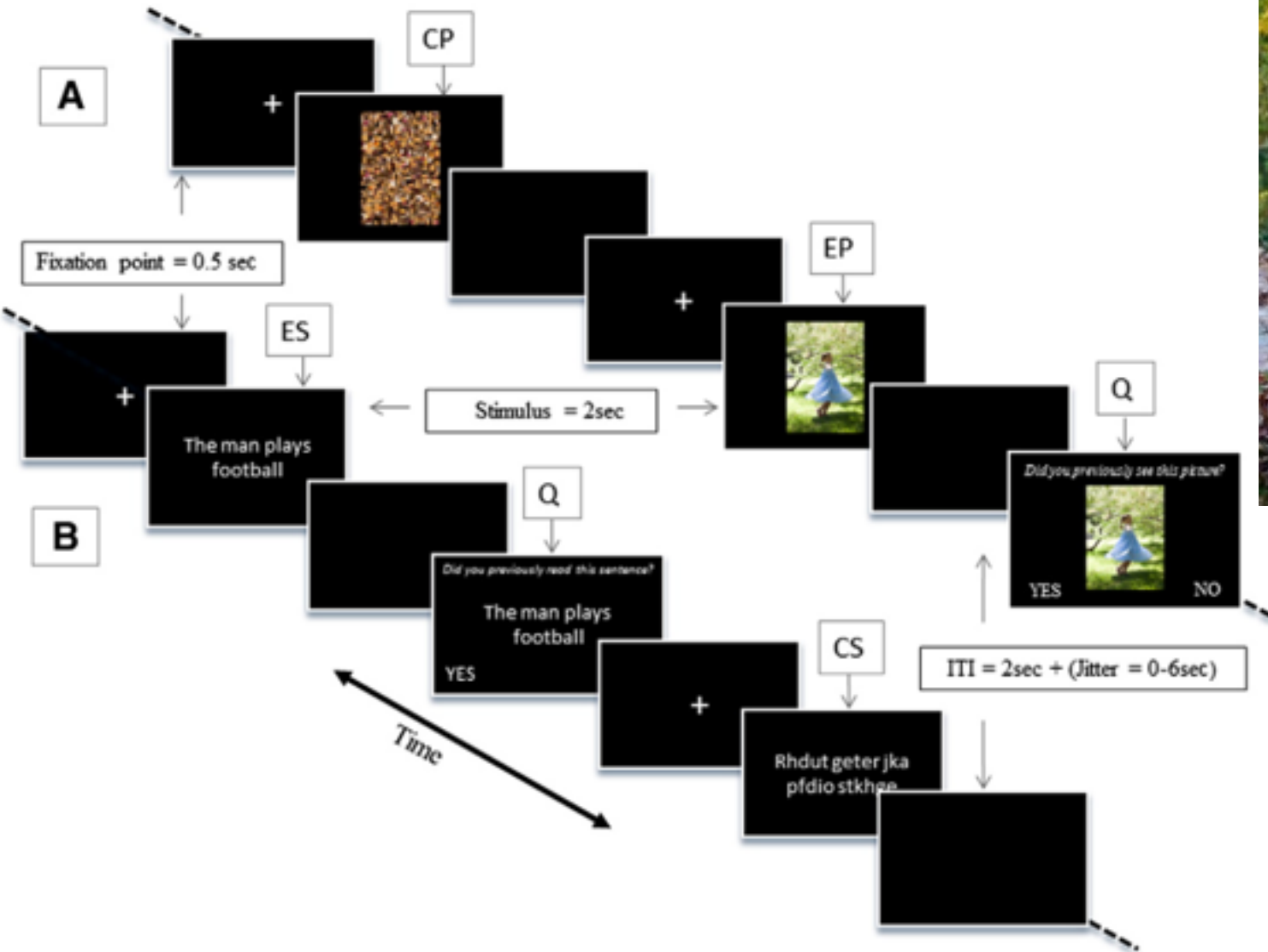Robot Cognition Laboratory

INSERM

France

Plan

- How do we represent meaning?
- How do we transmit meaning?
- How can we teach machines?

- Narrative Intelligence

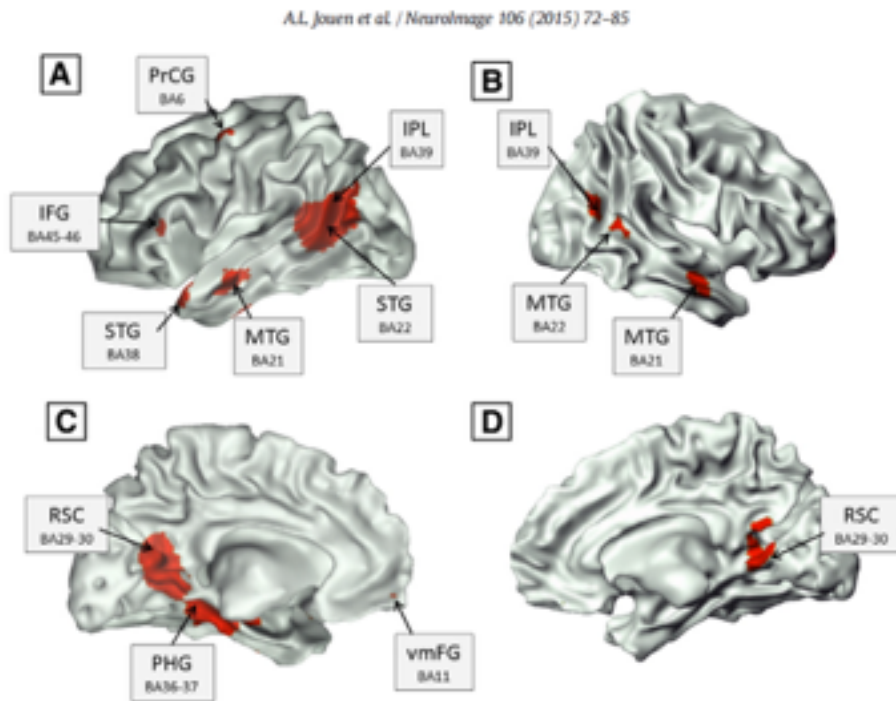# Narrative Intelligence: Based on a second kind of representation

- We organize our experience and our memory of human happenings mainly in the form of narrative-stories, excuses, myths ….

- Narrative as a form not only of representing but of **constituting** reality

Jerome Bruner (1991) The narrative construction of rea
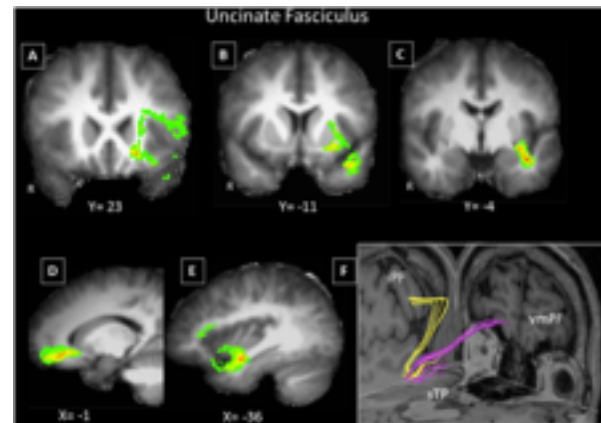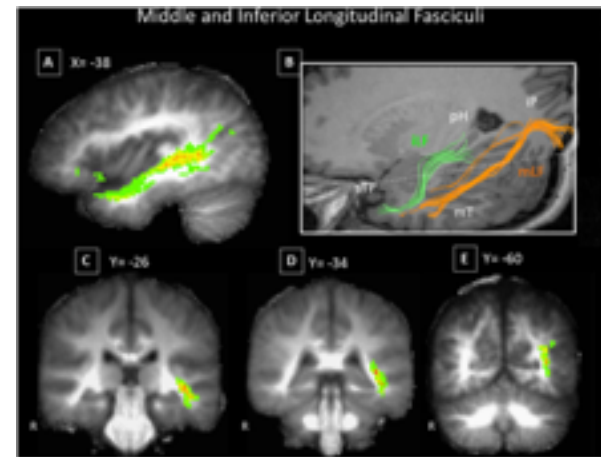
How does the brain process meaning?

A.L. Jouen et al. / NeuroImage 106 (2015) 72–85

By reactivating the high dimensional representations of experienced situation
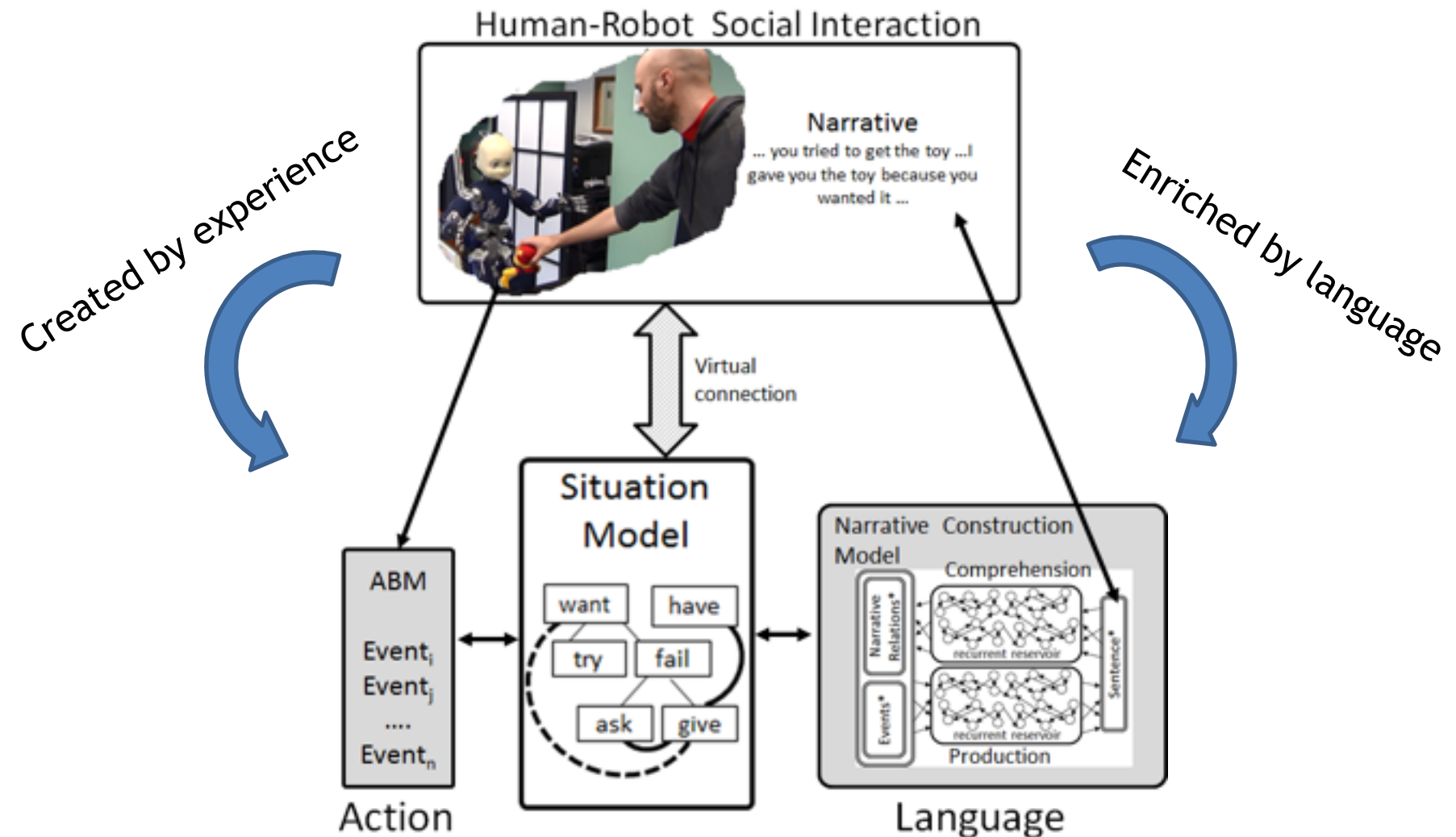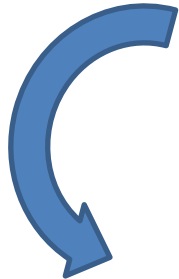

Jouen et al (2015) Neuroimage

Jouen et al (2018) Neuroimage

The Common Representation:
The Situation Model

Human-Robot Social Interaction

Narrative
... you tried to get the toy ...I gave you the toy because you wanted it ...

Created by experience

Enriched by language

Virtual connection

Situation Model

want   have
try   fail
ask   give

ABM

Event$_i$
Event$_j$
....
Event$_n$

Action

Narrative Construction Model

Comprehension

Narrative Relations*

recurrent reservoir

Events*

recurrent reservoir

Sentence*

Production

Language

Mealier et al (2017) Frontiers Psychology
Hinaut & Dominey (2013) PloS One

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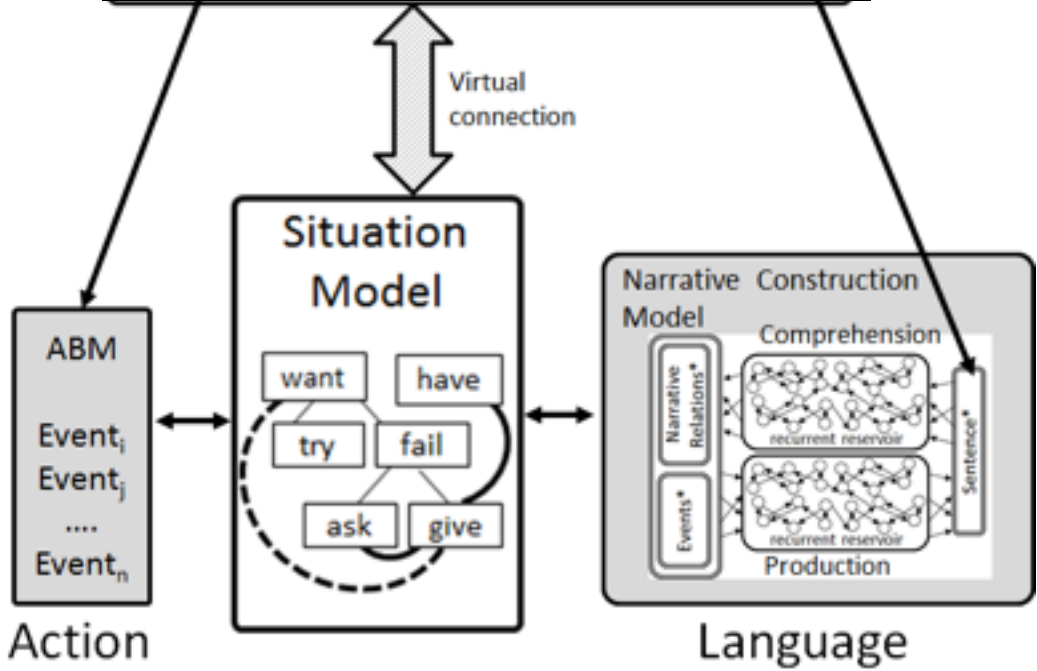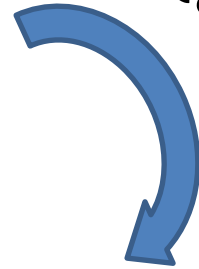
Language

Recalling From the Situation Model

Using learned narrative schemas in new situations

New experiences coded in ABM

Generating a new narrative using learned narrative template

"Do you remember when..."

Transition

- Can we use this technology
  - Autobiographical memory
  - Narrative enrichment
- To improve quality of life in real settings?

Improving Quality of Life with a Narrative Companion*

Peter Ford Dominey[1], Victor Paléologue[2], Amit Kumar Pandey[2], Jocelyne Ventre-Dominey[1]

1. INSERM U1208 Human and Robot Cognitive Systems Team
2. Softbank Robotics

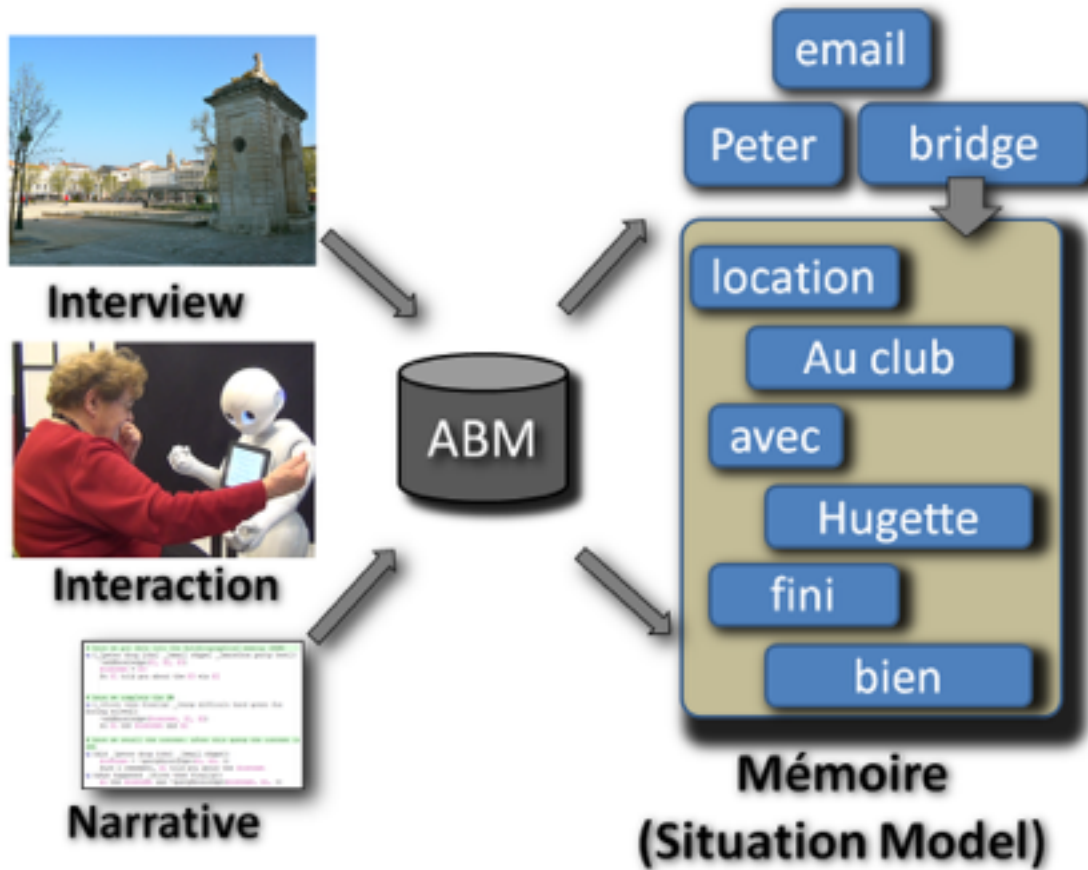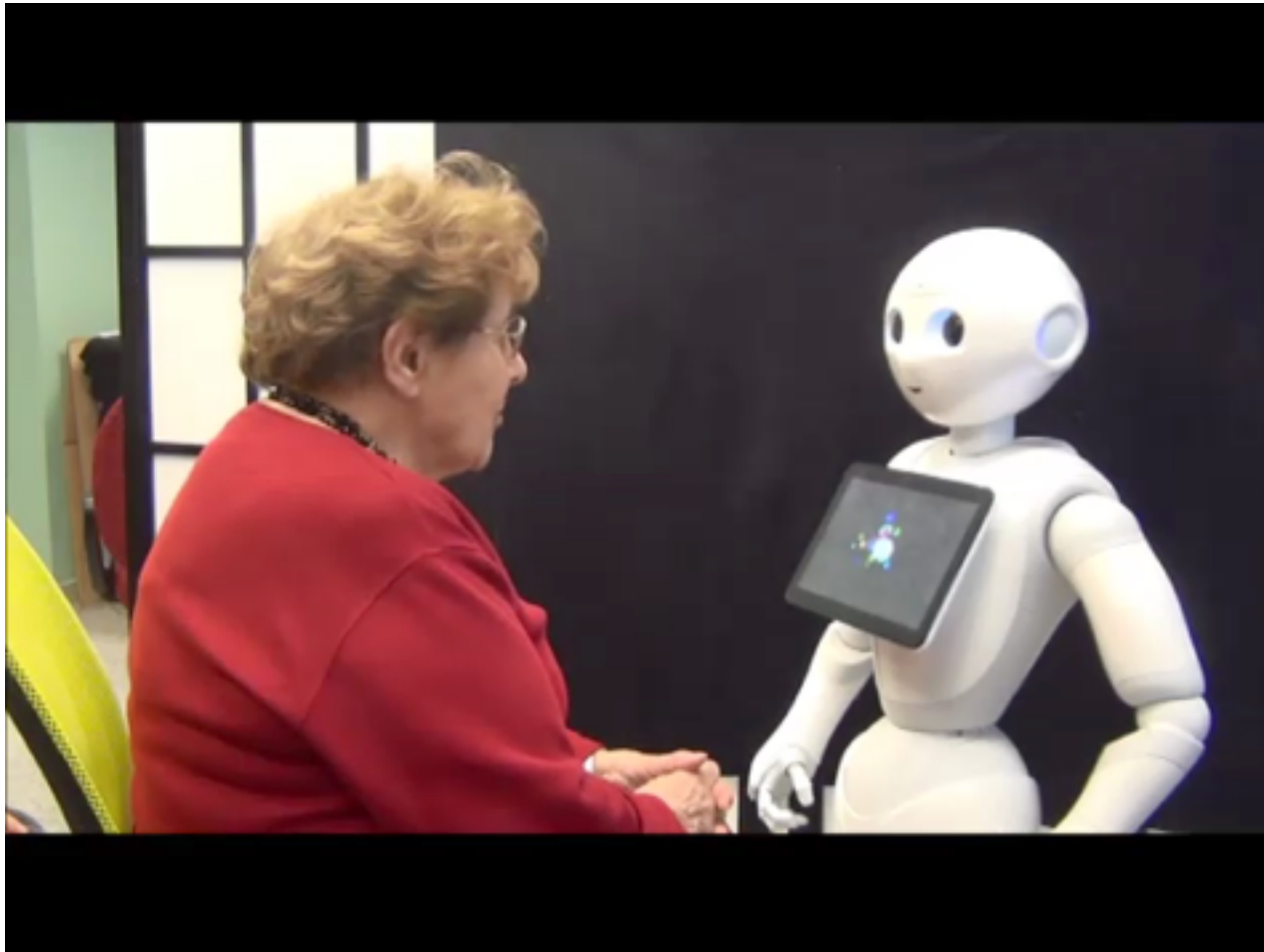# Motivation

- Self-identity relies on structured memory of experiences shared with others, embedded in narrative

- This memory allows one to continue to share experiences with others

- Loss of memory creates loss of shared experience, and loss of self

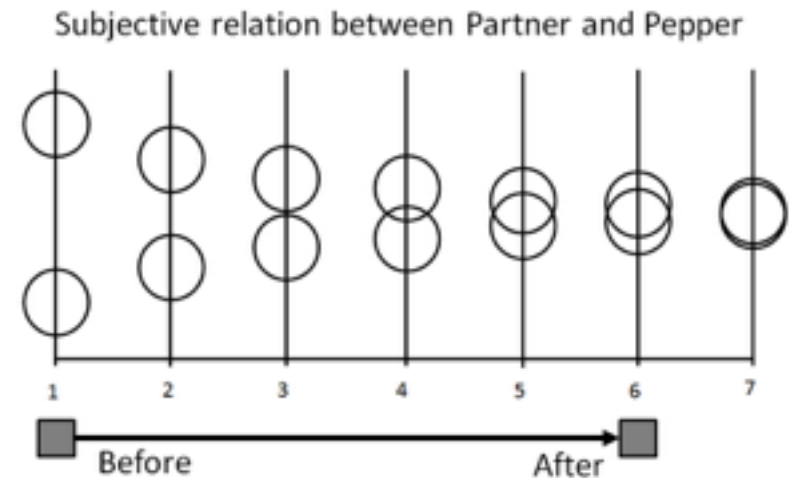- A robot that makes autobiographical memory available in simple narrative can serve as « social bridge »
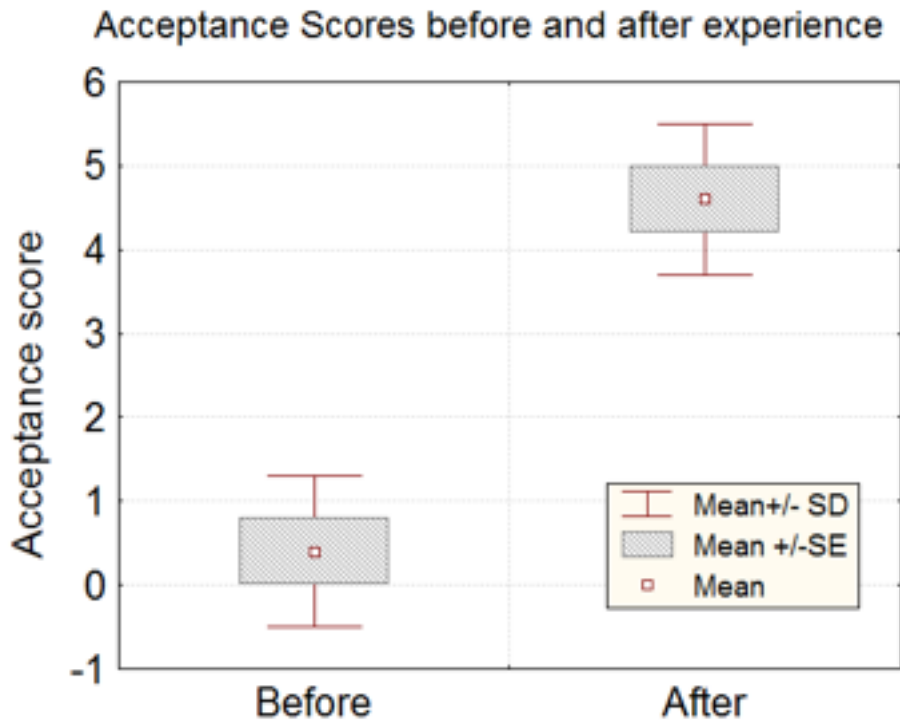
System Requirements

Interview

Interaction

Narrative

ABM

email

Peter   bridge

location

Au club

avec

Hugette

fini

bien

Mémoire
(Situation Model)

Case study: Naive Elderly Subject

Subjective Measures of Acceptance

Acceptance Scores before and after experience

Subjective relation between Partner and Pepper

Conclusions

- The self is narrative
- Human psychology and neuroscience provide the blueprint for the autobiographical and narrative memory system
- We can use this blueprint to build cognitive systems that can:
  - enable state of the art robots, and
  - Help people