

INTERACTIVE ROUGH GRANULAR COMPUTING

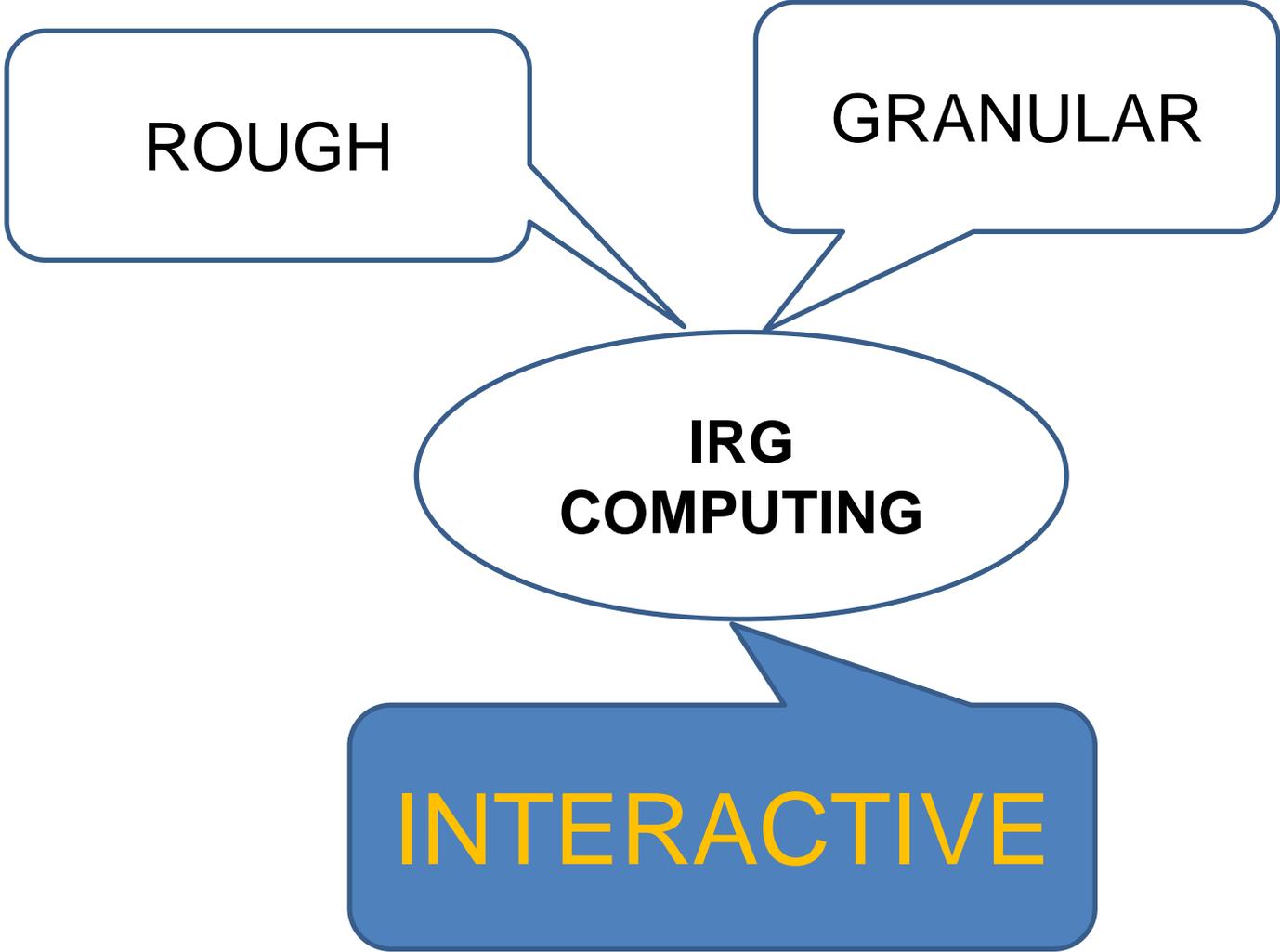
RSKT 2011 PANEL DISCUSSION

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MOTIVATION

- Making progress in constructing of the high quality intelligent systems
- Examples: approximation of complex vague concepts such as guards of actions or behavioral patterns



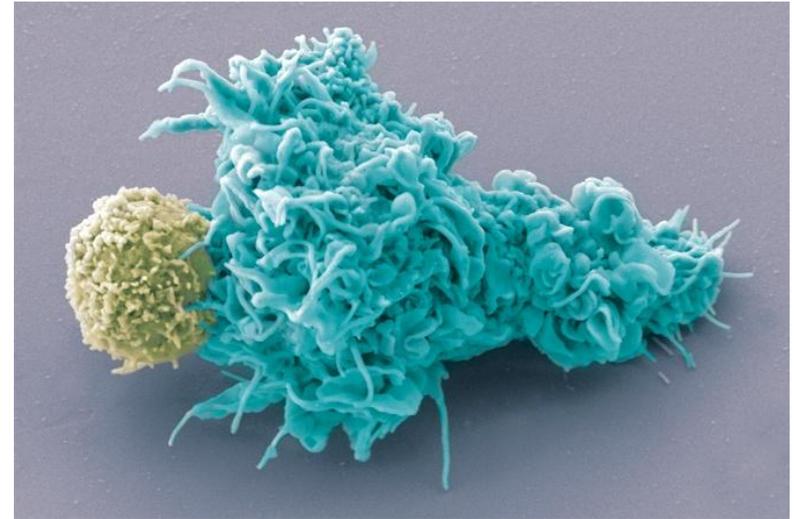
INTERACTIONS

[...] interaction is a critical issue in the understanding of complex systems of any sorts: as such, it has emerged in several well-established scientific areas other than computer science, like biology, physics, social and organizational sciences.

Andrea Omicini, Alessandro Ricci, and Mirko Viroli, The Multidisciplinary Patterns of Interaction from Sciences to Computer Science. In: D. Goldin, S. Smolka, P. Wagner (eds.): Interactive computation: The new paradigm, Springer 2006

INTERACTIONS

[...] One of the fascinating goals of natural computing is to understand, in terms of information processing, the functioning of a living cell. An important step in this direction is understanding of interactions between biochemical reactions. ... the functioning of a living cell is determined by interactions of a huge number of biochemical reactions that take place in living cells.



A human dendritic cell (blue pseudo-color) in close interaction with a lymphocyte (yellow pseudo-color). This contact may lead to the creation of an immunological synapse.

The Immune Synapse by Olivier Schwartz and the Electron Microscopy Core Facility, Institut Pasteur
http://www.cell.com/Cell_Picture_Show

ADAPTIVE JUDGMENT

- Searching for relevant approximation spaces
 - new features, feature selection
 - rule induction
 - measures of inclusion
 - strategies for conflict resolution
 - ...
- Adaptation of measures based on the minimal description length: quality of approximation vs description length
- Reasoning about changes
- Perception (action and sensory) attributes selection
- Adaptation of quality measures over computations relative to agents
- Adaptation of object structures
- Strategies for knowledge representation and interaction with knowledge bases
- Ontology acquisition and approximation
- Language for cooperation development and evolution
- ...

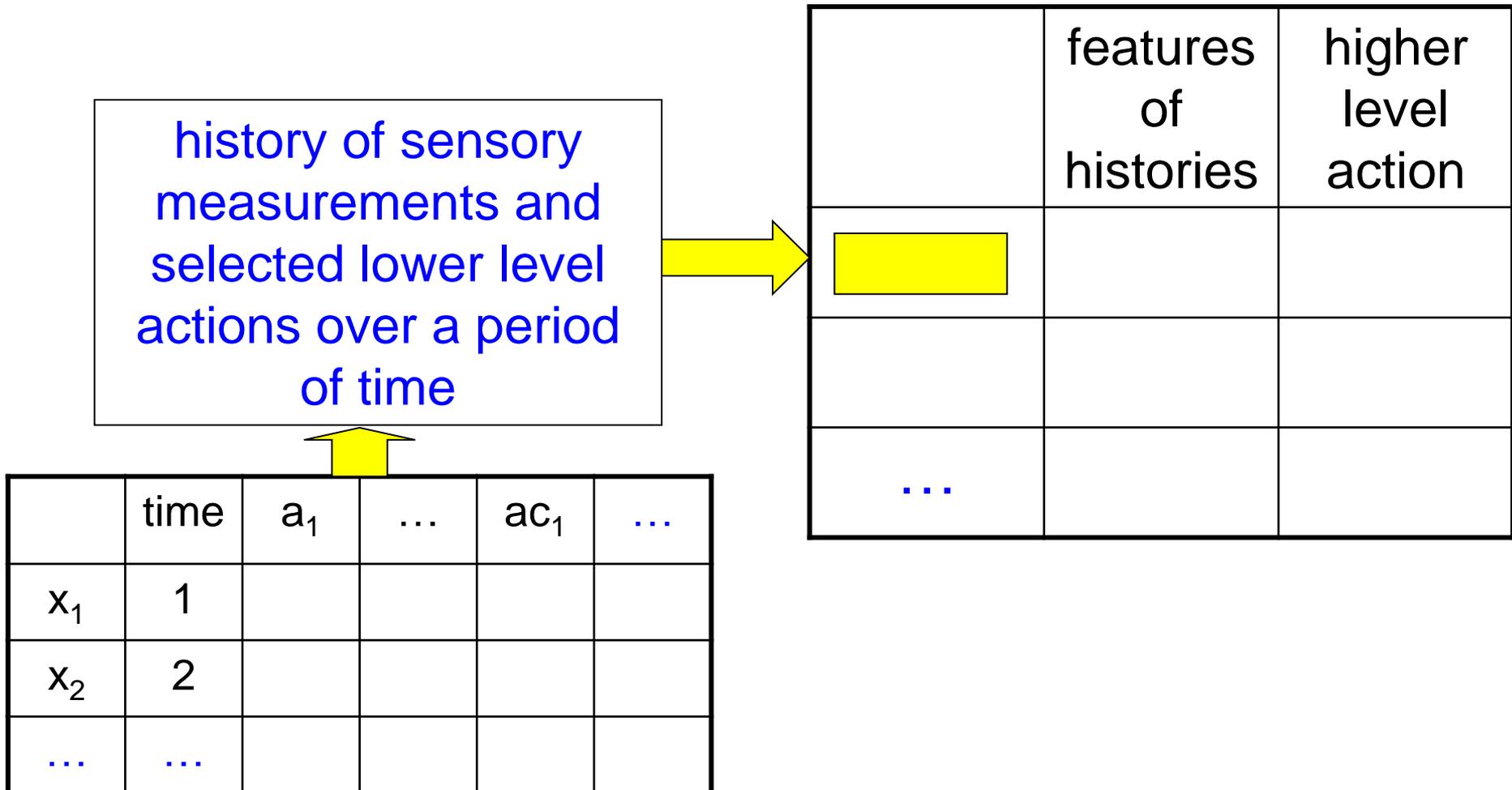
PERCEPTION BASED COMPUTING

**PERCEPTION
=
UNDERSTANDING
OF
SENSORY INFORMATION**

The main idea of this book is that perceiving is a way of acting. It is something we do. Think of a blind person tap-tapping his or her way around a cluttered space, perceiving that space by touch, not all at once, but through time, by skillful probing and movement. This is or ought to be, our paradigm of what perceiving is.

Alva Noë: Action in Perception, MIT Press 2004

interaction: agent \rightarrow sensory and action attributes - only activated by agent attributes $A(t)$ at time t are performing measurements and actions



WHY Wistech?

March 10, 2011:

Leslie Valiant, of Harvard University, has been named the winner of the 2010 Turing Award for his efforts to develop computational learning theory.

<http://www.techeye.net/software/leslie-valiant-gets-turing-award#ixzz1HVBeZWQL>

Current research of Professor Valiant

<http://people.seas.harvard.edu/~valiant/researchinterests.htm>

A fundamental question for artificial intelligence is to characterize the computational building blocks that are necessary for cognition.

A specific challenge is to build on the success of machine learning so as to cover broader issues in intelligence.

This requires, in particular a reconciliation between two contradictory characteristics -- the apparent logical nature of reasoning and the statistical nature of learning.

Professor Valiant has developed a formal system, called robust logics, that aims to achieve such a reconciliation.

WHY Wistech?

Aristotle's man of practical wisdom, the *phronimos*, ... is observant of principles and, at the same time, open to their modification. He begins with *nomoi* – established law - and employs **practical wisdom** to determine how it should be applied in particular situations and when departures are warranted. Rules provide the guideposts for inquiry and critical reflection.

L. P. Thiele. The Heart of Judgment: Practical Wisdom, Neuroscience, and Narrative. Cambridge Univ. Press, 2006. p.5.

THANK YOU !