

人
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The
ShanghaiAI
Lectures

上
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课



The ShanghAI Lectures

An experiment in global teaching

Fabio Bonsignorio

The BioRobotics Institute, SSSA and Heron Robots

Today from the BioRobotics Institute, Pontedera (PI)

欢迎您参与
“来自上海的人工智能系列讲座”

Lecture 1

**Intelligence – things can be seen
differently**

What it is and how it can be studied

27 October 2016



Goals

- **What is intelligence? Natural and artificial?**
- **conceptual and technical know-how in the field**
- **informed opinion on media reports**
- **things can always be seen differently**
- **new ways of thinking about ourselves and the world around us**



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Robots, artificial intelligence in the media

HAL, the “Hybrid Assistive Limb ®”
Cyberdyne Inc.

Sex and marriage with robots? “It could happen” (David Levy)



Engkey, the Korean English language Teacher

Beer-serving robot



Engkey: the English language teacher (2013!)

Korea to offer commercially viable English-speaking robots in 2013

By Kim Tae-gyu

A total of 29 English-language education robots will be placed in 21 elementary schools in Daegu next week for a four-month feasibility study to check the commercial viability of robotic teachers, to go on sale in 2013.

The state-run Korea Institute of Science and Technology (KIST) said Friday that the robotic assistants, dubbed "Engkey" combining "English" and "disc jockey," will help teachers during English classes.

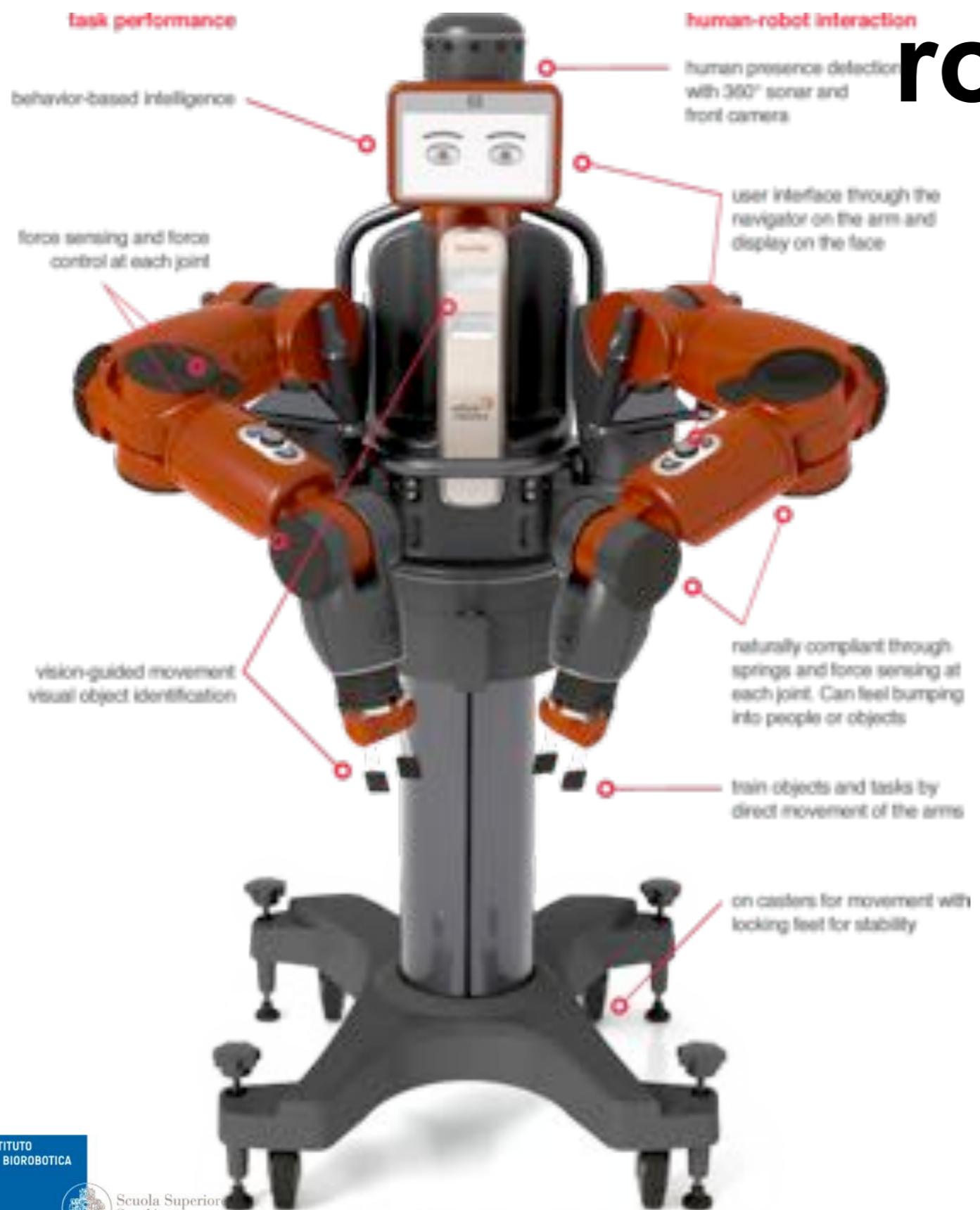
"We will carry out the second-phase pilot program with Engkey until next March after wrapping up the first project over the past year in Masan, South Gyeongsang Province," KIST spokesman Park Young-ho said.



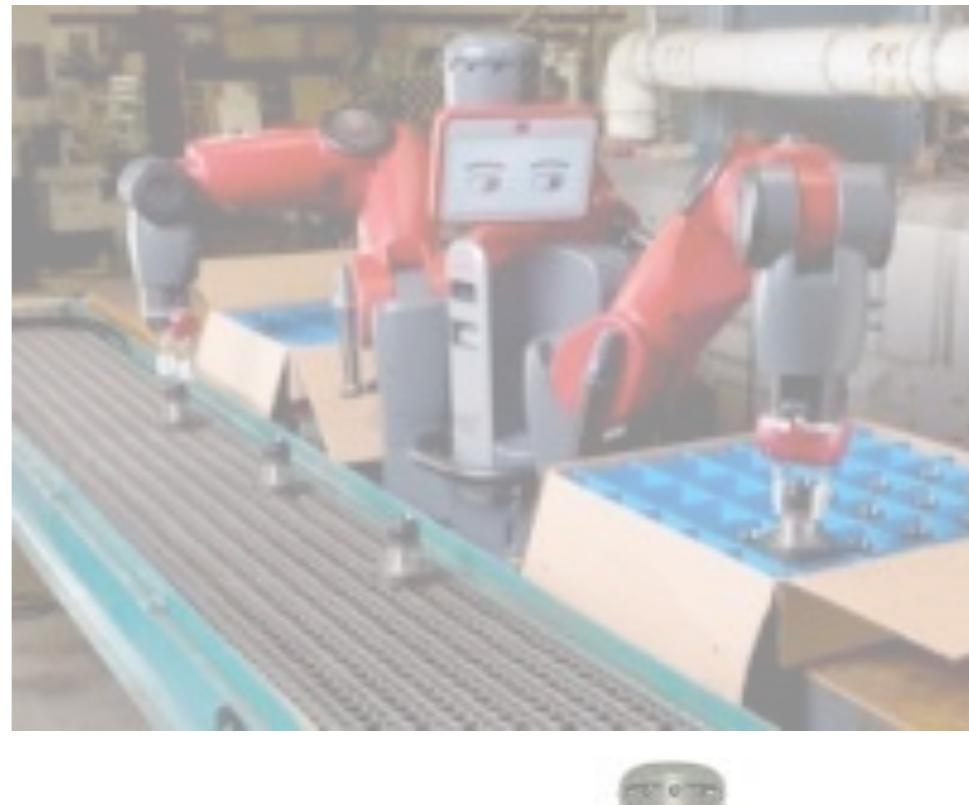
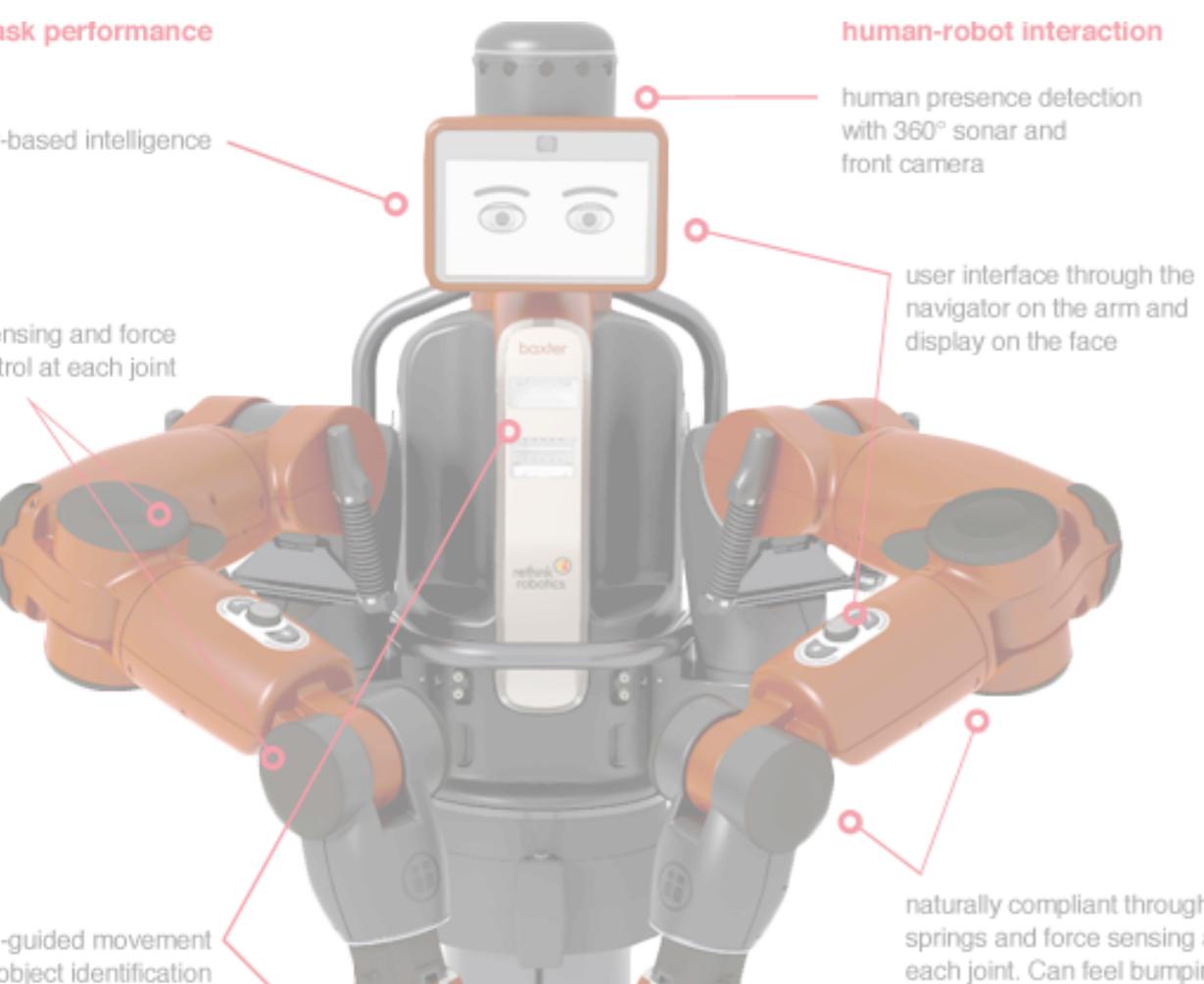
An English-language education robot named Engkey



The factory “humanoid” robot “Baxter”



The factory “humanoid” robot “Baxter”



<http://spectrum.ieee.org/robotics/industrial-robots/rethink-robotics-baxter-robot-factory-worker>

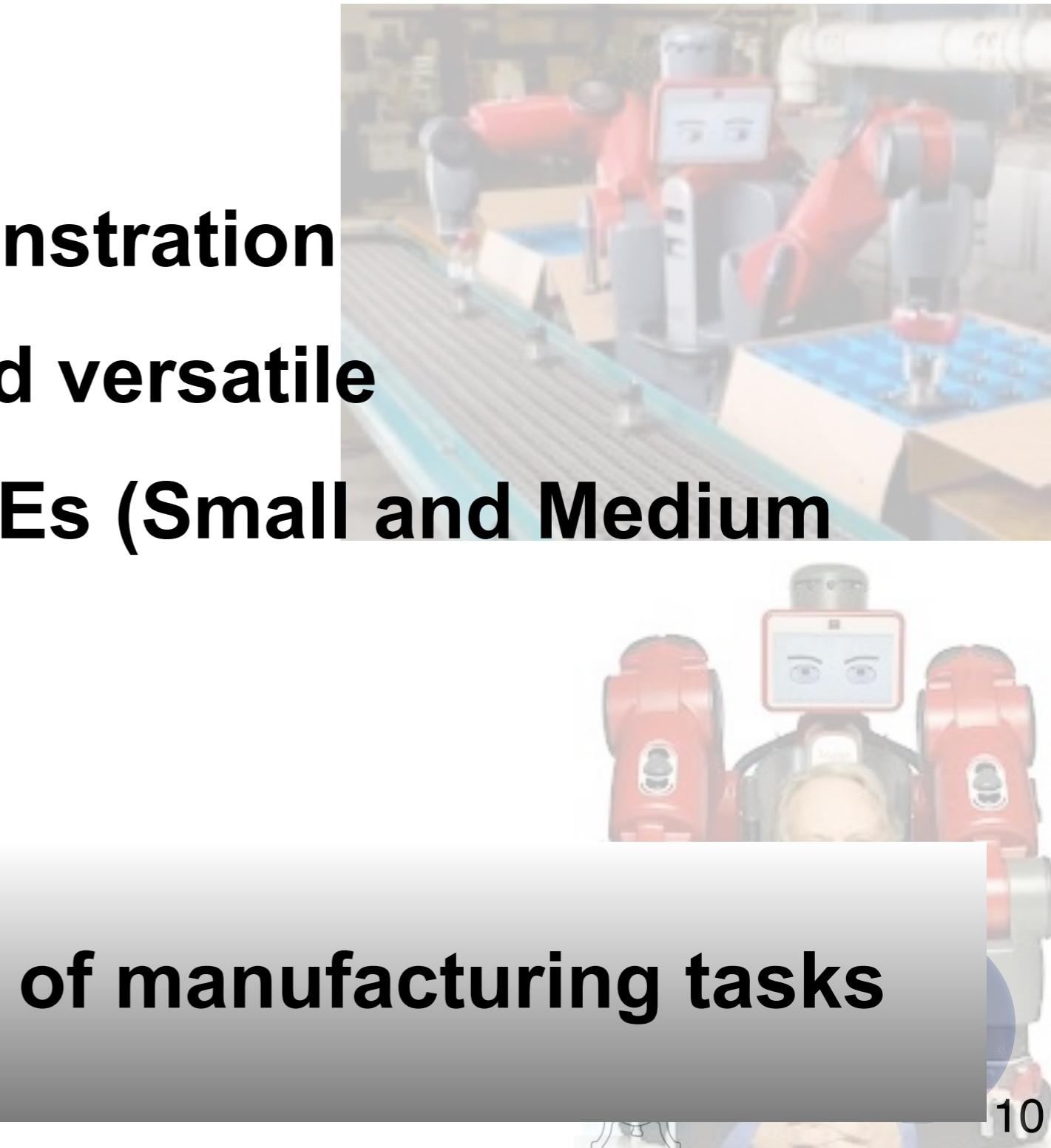
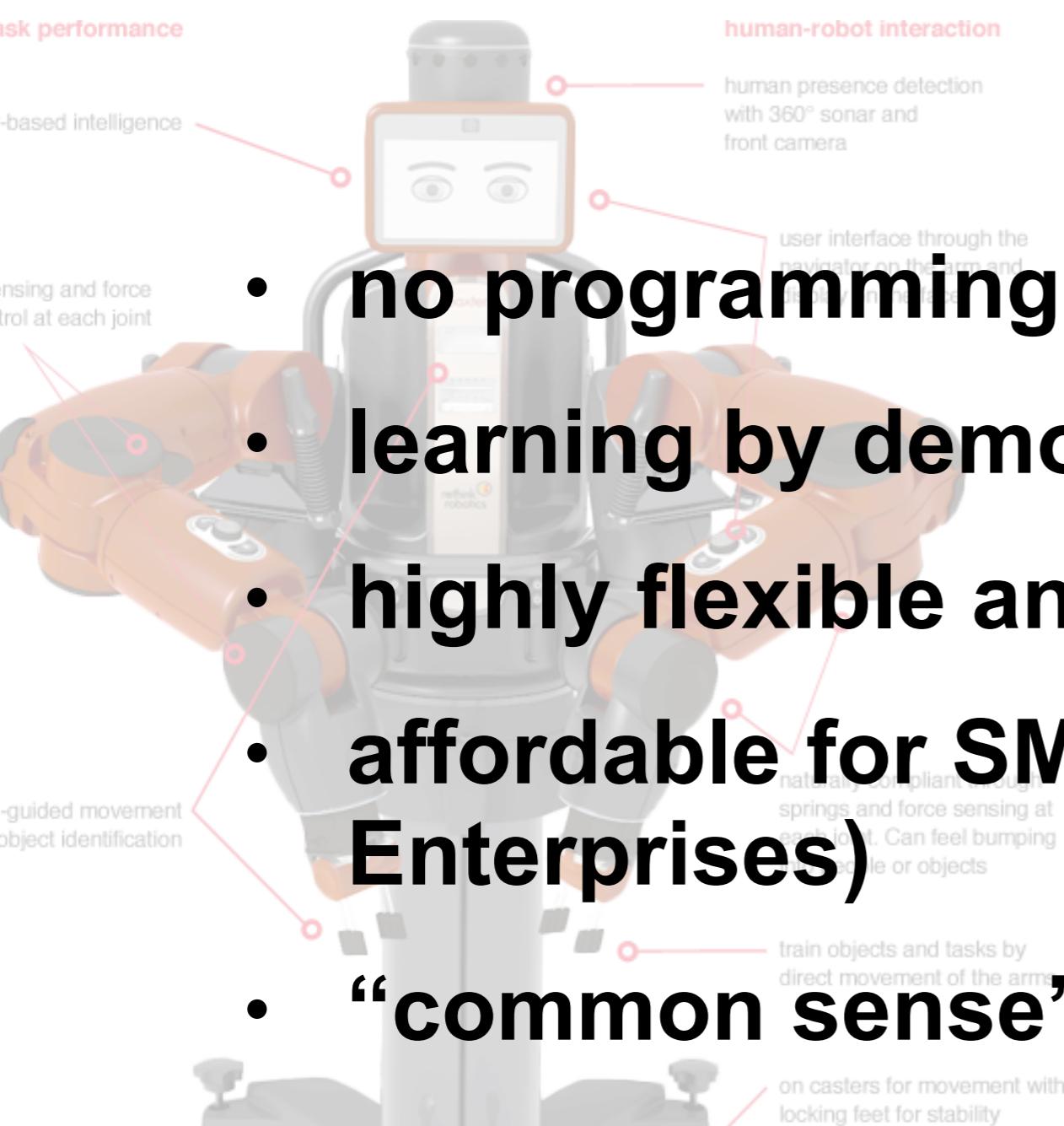
<http://www.xconomy.com/boston/2012/09/18/rod-brooks-and-rethink-reveal-an-industrial-robot-for-the-masses/>

<http://www.nytimes.com/2012/09/18/science/a-robot-with-a-delicate-touch.html>

<http://www.technologyreview.com/news/429248/this-robot-could-transform-manufacturing/>

<http://www.businessweek.com/articles/2012-09-18/smarter-robots-with-no-pesky-uprisings>

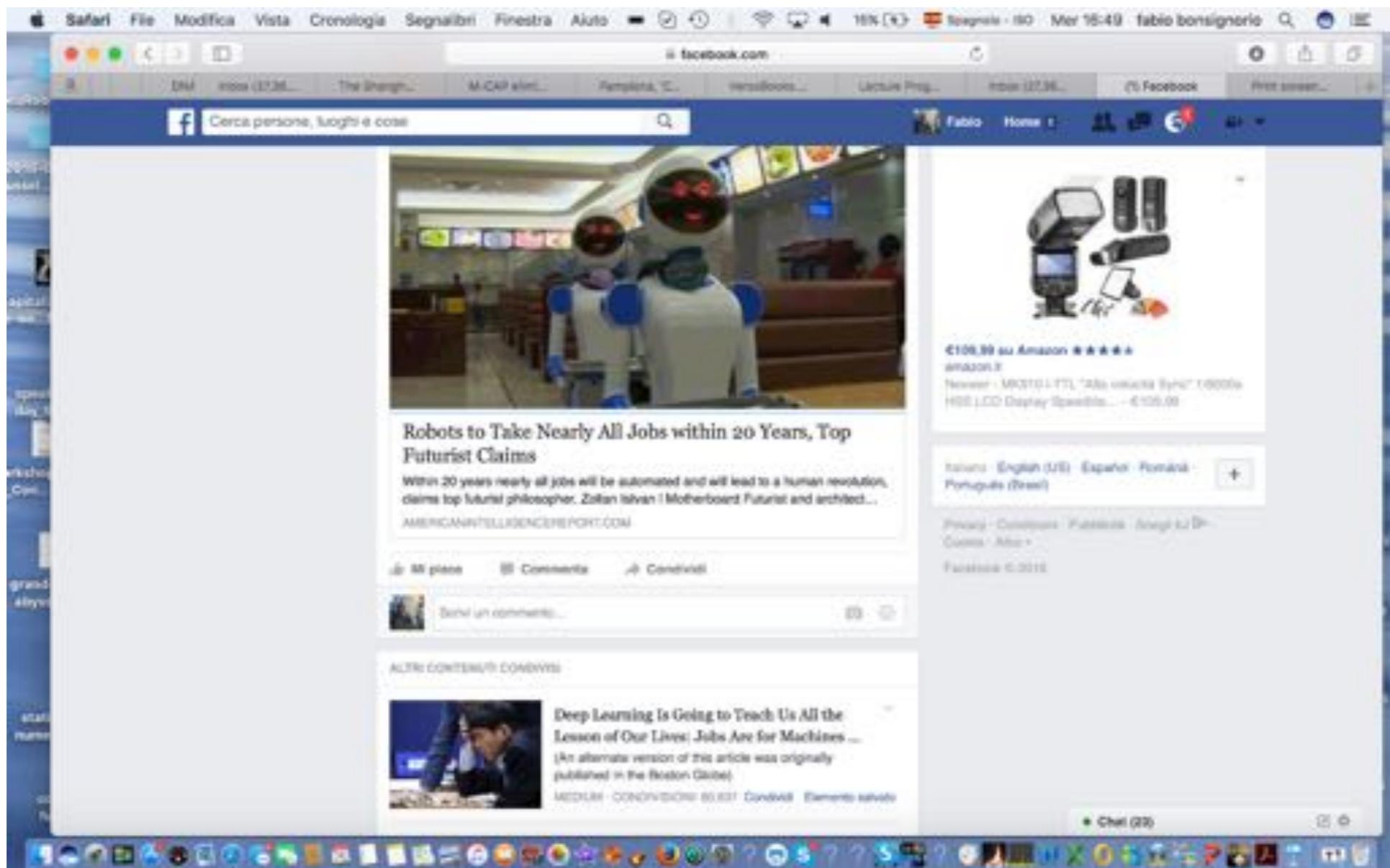
The factory “humanoid” robot “Baxter”



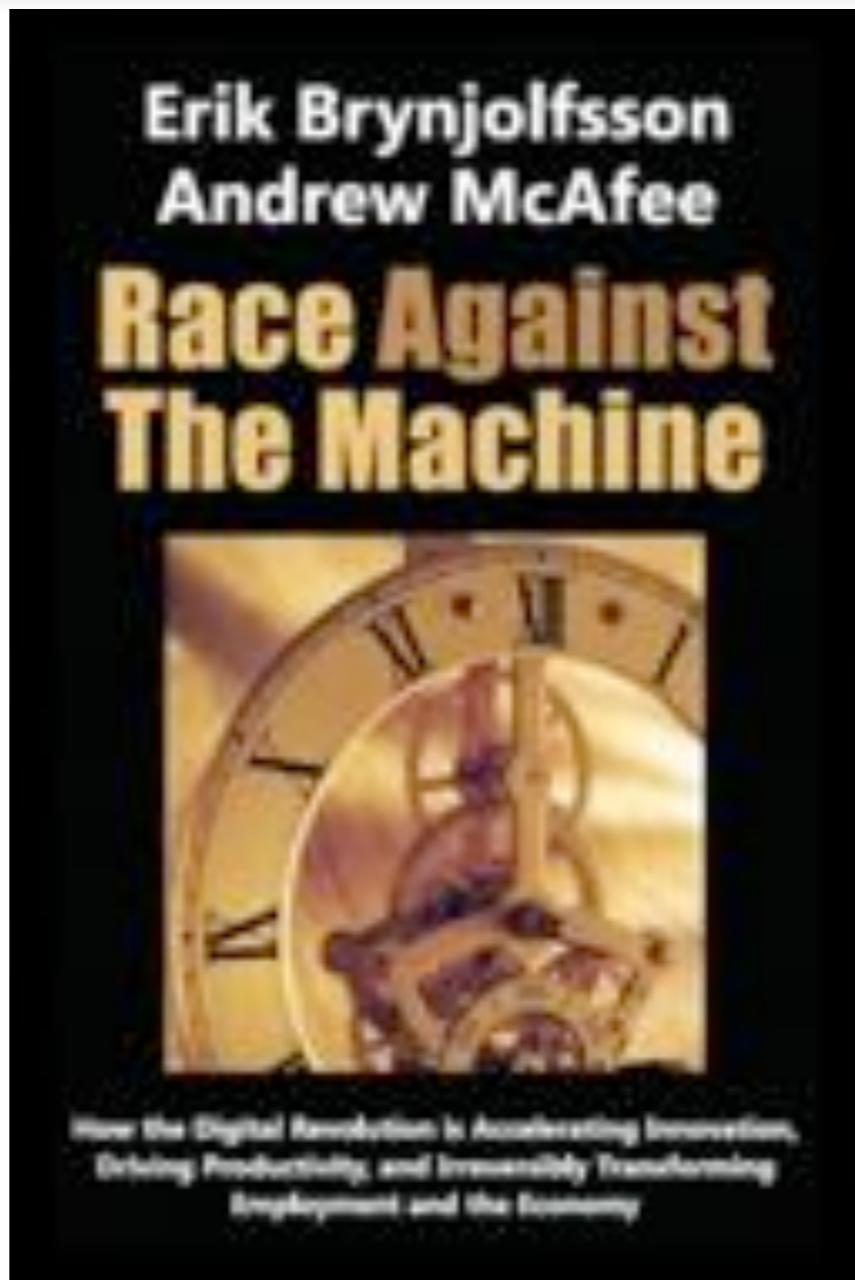
- no programming
- learning by demonstration
- highly flexible and versatile
- affordable for SMEs (Small and Medium Enterprises)
- “common sense”

—> re-insourcing of manufacturing tasks

Info in the media....



Someone is worried....



But maybe we should not be....

Erik Brynjolfsson (first author of the book above):

“The key to growth?
Race _with_ the machines”

(check his nice TED talk here:

<http://www.youtube.com/watch?v=sod-eJBf9Y0>)



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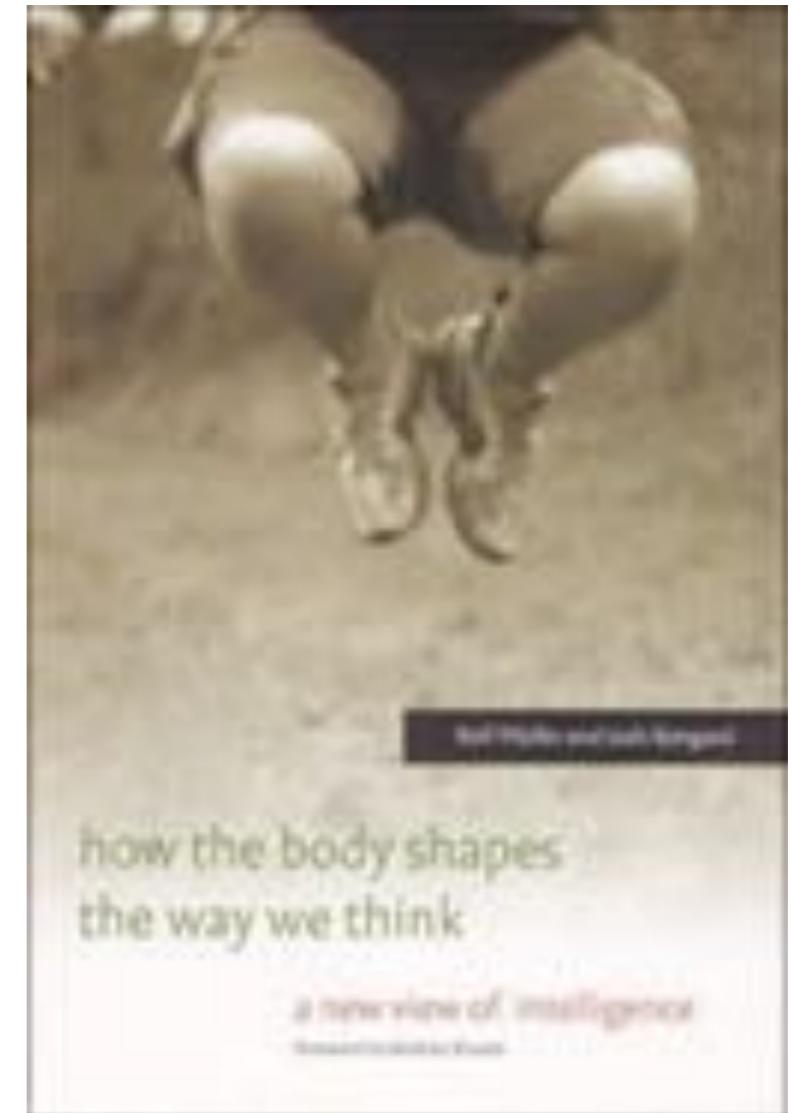
Book for class

Rolf Pfeifer and Josh Bongard

How the body shapes the way we think – a new view of intelligence

MIT Press, 2007

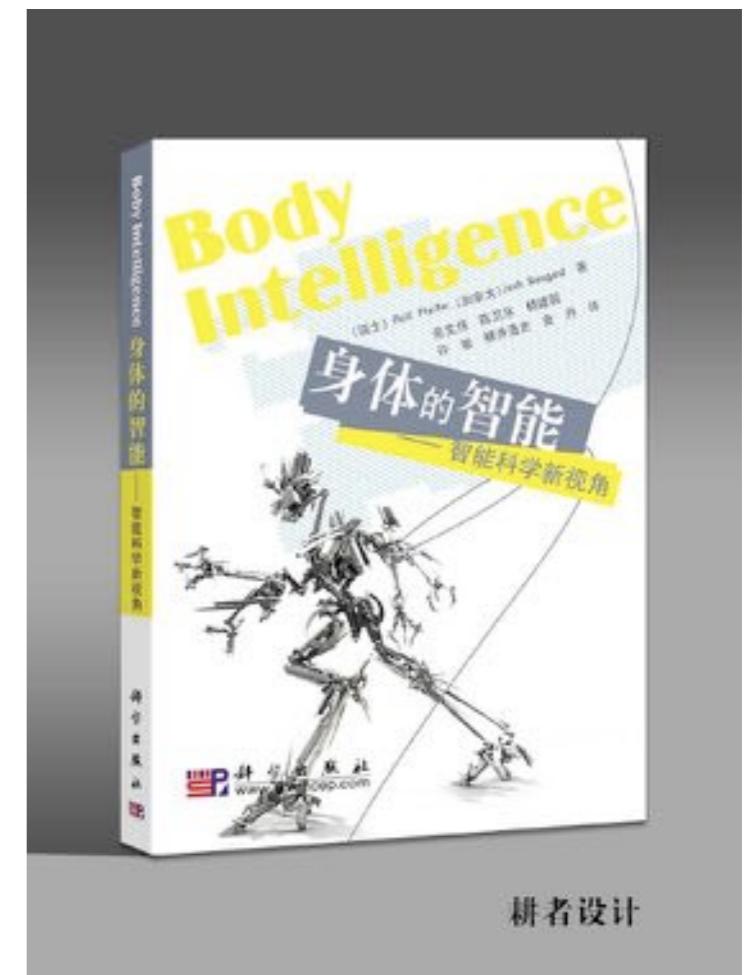
Illustrations by Shun Iwasawa



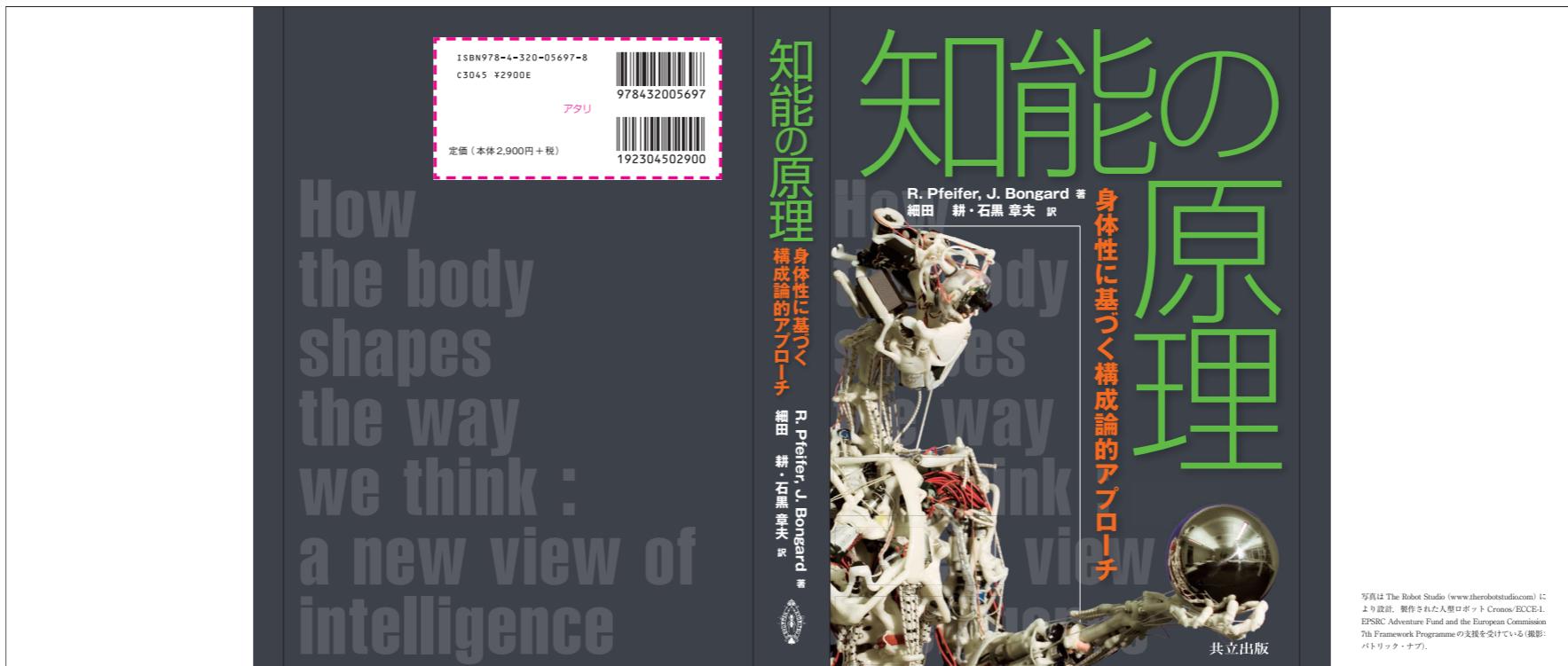
Chinese edition

Translated by
Weidong Chen
Shanghai Jiao Tong University
and
Wenwei Yu
Chiba University, Japan

Foreword by
Lin Chen
Chinese Academy of Science, Beijing



Japanese edition



translated by
Koh Hosoda, Osaka University
and
Akio Ishiguro, Tohoku University



Arabic edition

كيف يشكل الجسد. طريقة تفكيرنا.

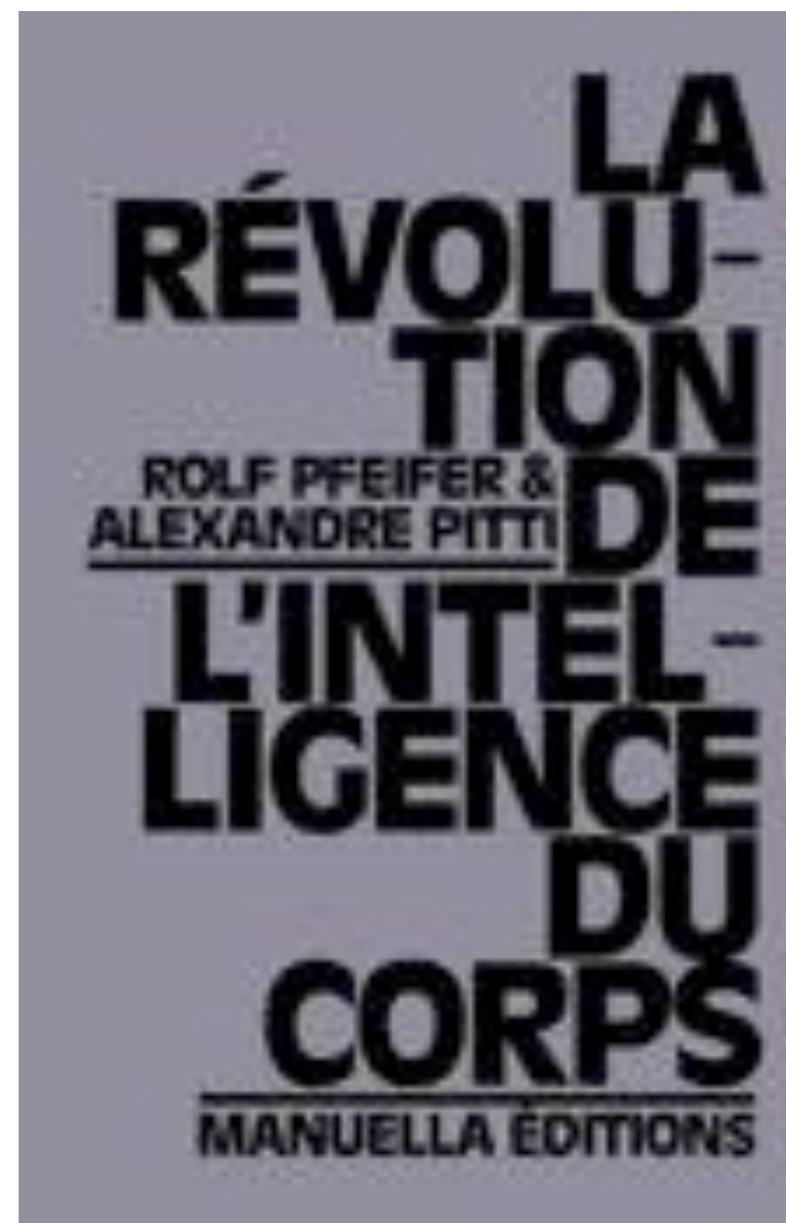
Arab Scientific Publishers,
(100 pages)



French edition

La Révolution de l'intelligence du corps

Rolf Pfeifer
Alexandre Pitti



ISTITUTO
DI BIOROBOTICA



Scuola Superiore
Sant'Anna



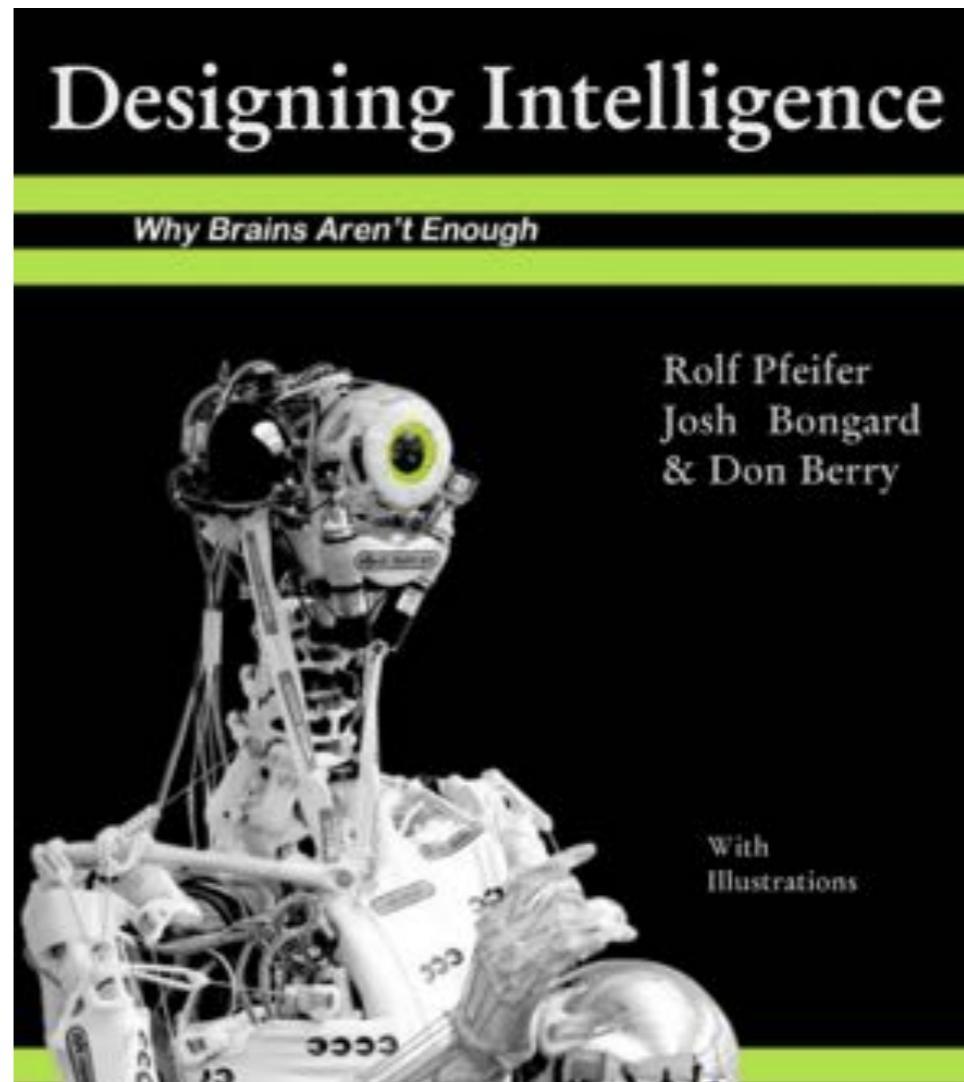
Short e-book version

<http://ailab.ifi.uzh.ch/>

Designing Intelligence

Why Brains Aren't Enough

Rolf Pfeifer
Josh Bongard
Don Berry



Can be downloaded from here:

<http://www.grin.com/e-book/165548/designing-intelligence#inside>

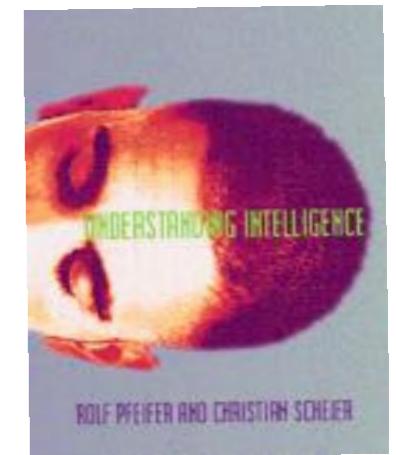


Can be complemented by

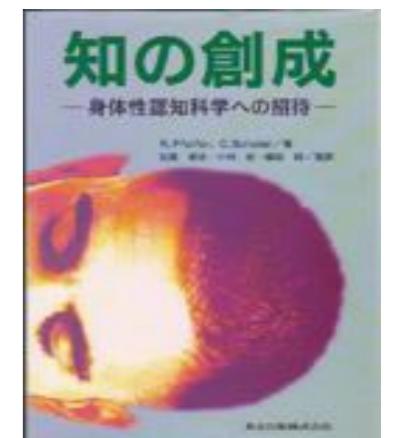
Rolf Pfeifer and Christian Scheier

Understanding Intelligence

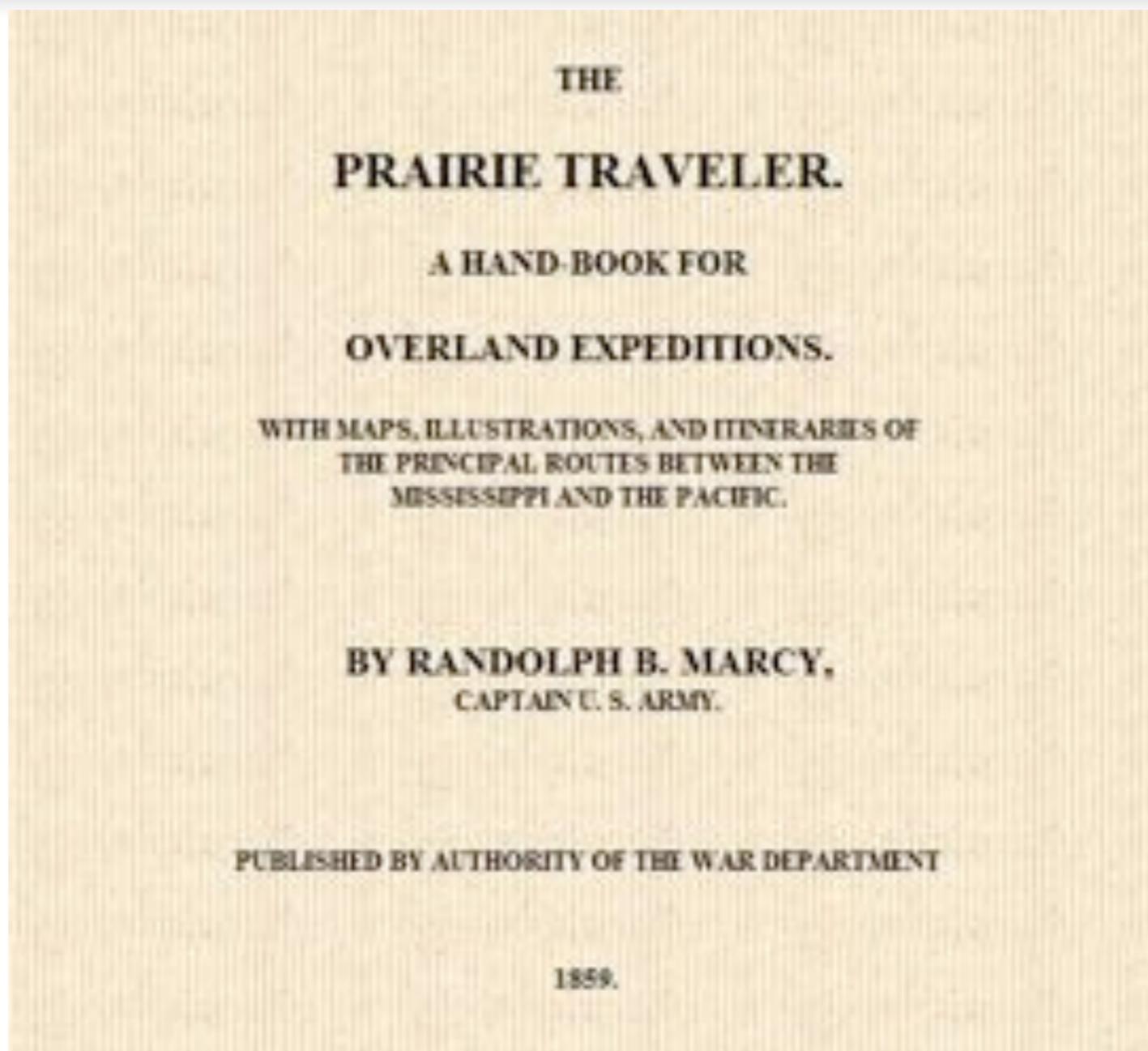
MIT Press, 1999 (paperback edition)



知の創成、共立出版、2001



'Caveat'



Today's topics

- **characterizing intelligence, thinking, and cognition**
- **“Turing Test” and “Chinese Room Experiment”**
- **intelligence testing – IQ**
- **artificial intelligence and its goals**
- **how to study intelligence: the “synthetic methodology”**

Today's topics

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Intelligence?



From the Penguin Dictionary of Psychology

“Few concepts in psychology have received more devoted attention and few have resisted clarification so thoroughly.”

(Reber, 1995, p. 379)



Some definitions (1927 psychology journal)

“The ability to carry on abstract thinking” (L. M. Terman)

“Having learned or ability to learn to adjust oneself to the environment” (S. S. Colvin)

“The ability to adapt oneself adequately to relatively new situations in life” (R. Pintner)

“A biological mechanism by which the effects of a complexity of stimuli are brought together and given a somewhat unified effect in behavior” (J. Peterson)

“The capacity to acquire capacity” (W. Woodrow)

“The capacity to learn or to profit by experience”
(W. F. Dearborn)



Definitions of intelligence

<http://www.vetta.org/definitions-of-intelligence/> – now
de

Robert Sternberg is an eminent psychologist who has been “fighting”
against a simplistic notion of IQ. One of his famous books is “Beyond IQ: A
triarchic theory of intelligence”, first published 1984

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1985)

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and Markus Hutter, IDSIA,



Definitions of intelligence

<http://www.vetta.org/definitions-of-intelligence/>

L Robert Sternberg is an eminent psychologist who has been “fighting” against a simplistic notion of IQ. One of his famous books is “Beyond IQ: A triarchic theory of intelligence”, first published 1984 published 1984

Agent has as it interacts with its environment.

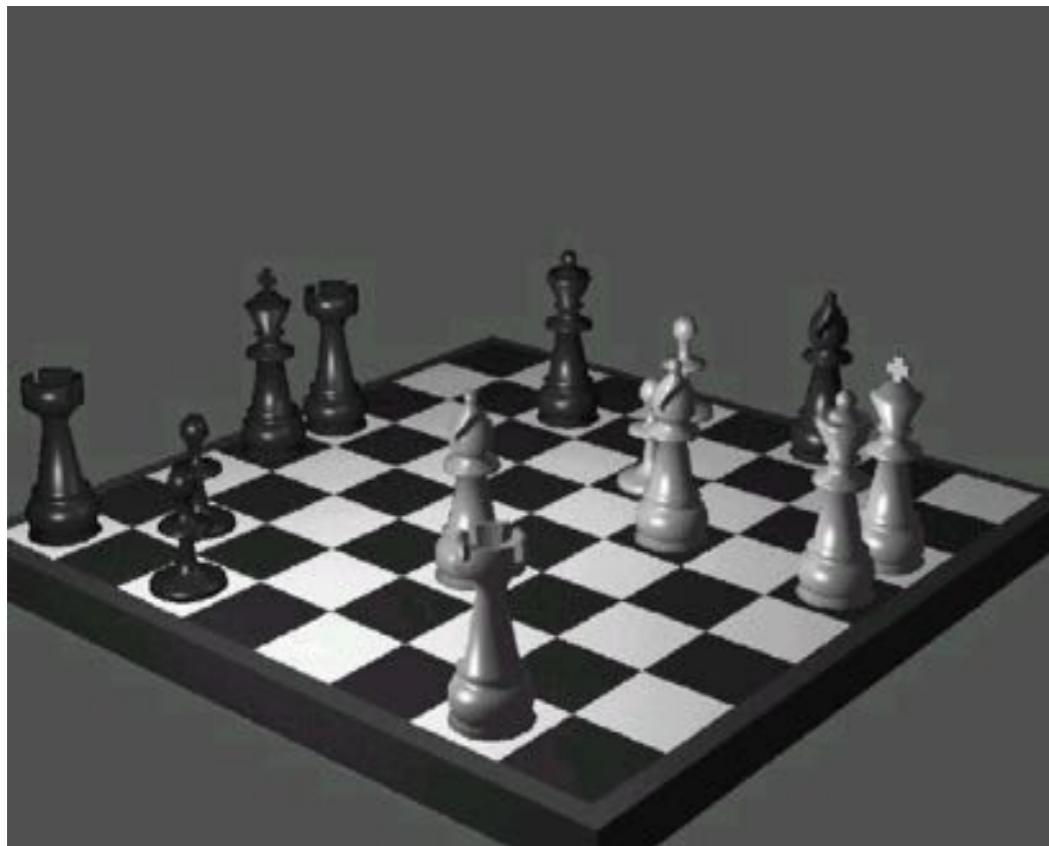
Is the ability to succeed or profit with respect to one's goals.

Definition of intelligence is to adapt to different environments.

Intelligence is the agent's ability to achieve goals in a wide range of environments.”

Subjectivity, expectations

Playing chess



Rolf playing chess

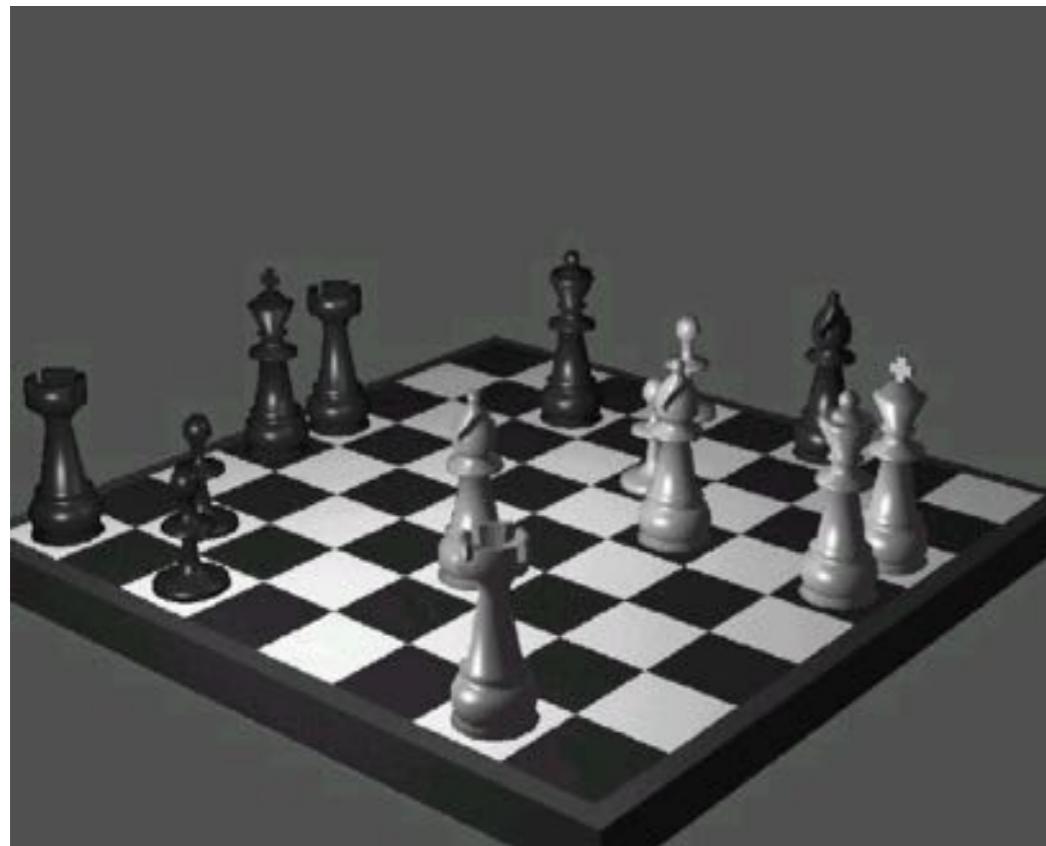


Note: Fabio is obviously much better :-)



Subjectivity, expectations

Playing chess

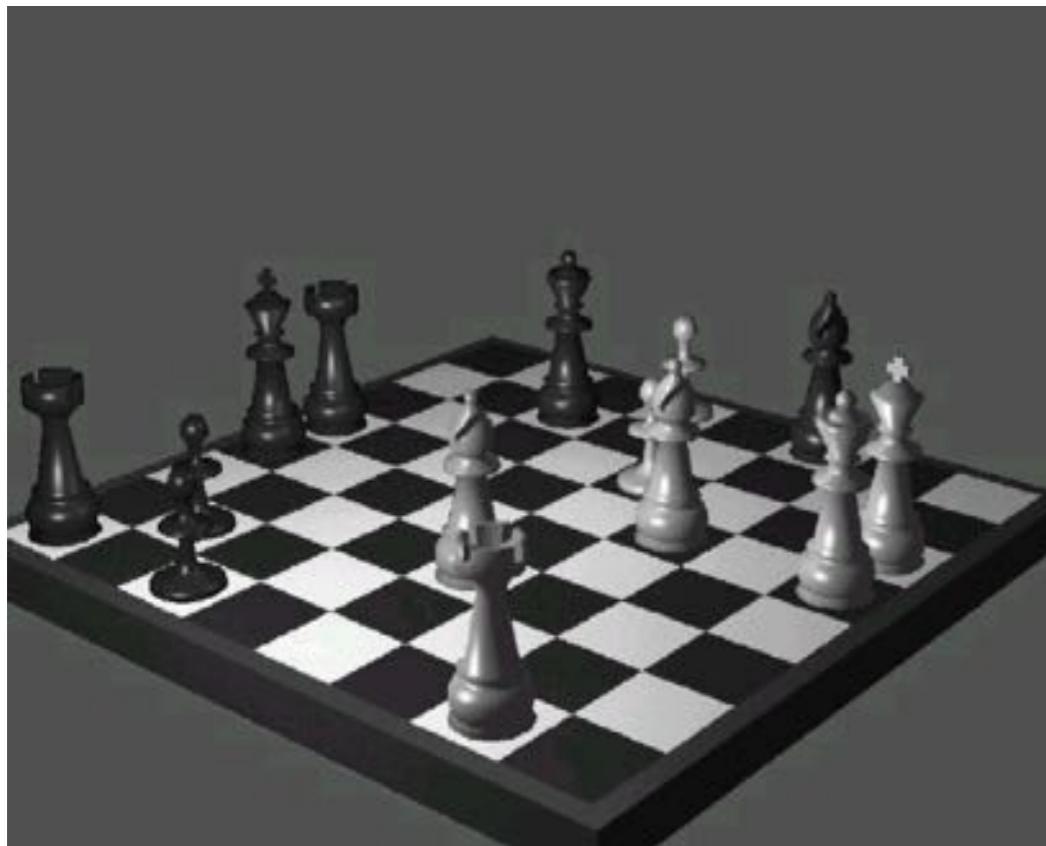


baby girl playing chess



Subjectivity, expectations

Playing chess



dog playing chess



Definitions, arguments

- hard to agree on
- necessary and sufficient conditions?
- are robots, ants, humans intelligent?
- more productive question:
“Given a behavior of interest, how does it come about?”

Interaction and observation

Video “Robovie”

Video “iCub attention”



Interaction and observation

videos:

intelligent?

- > highly subjective
- > Turing suggests empirical test



Fabio Bonsignorio

Prof, the BioRobotics Institute, SSSA
CEO and Founder Heron Robots
Santander - UC3M Chair of Excellence 2010



Research interests

- embodied intelligence, cognition/AI and robotics
- experimental methods in Robotics and AI
- Advanced approaches to Industry 4.0
- synthetic modeling of life and cognition
- novel technologically enabled approaches to higher education and lifelong learning



The ShanghAI Lectures
2013-2016



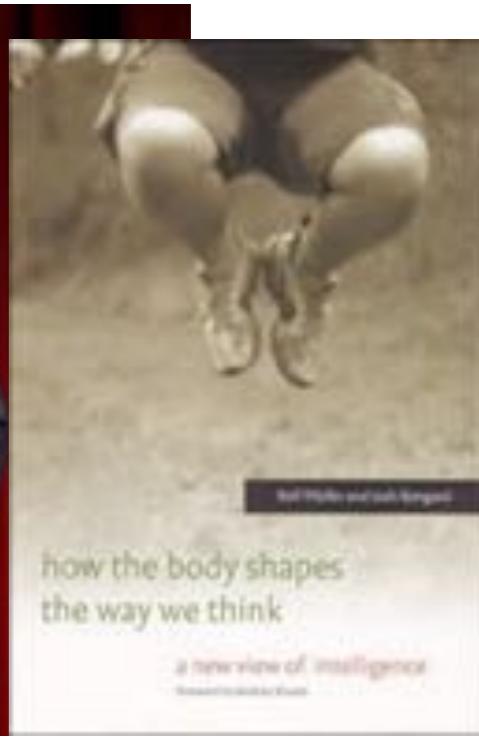
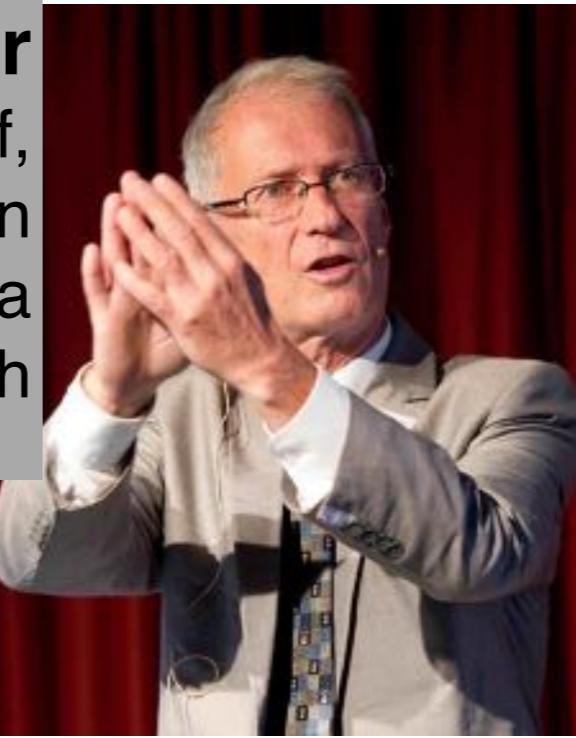
Rolf Pfeifer

Prof,

Institute for Academic Initiatives, Osaka University, Japan

Dept. of Automation, Shanghai Jiao Tong University, China

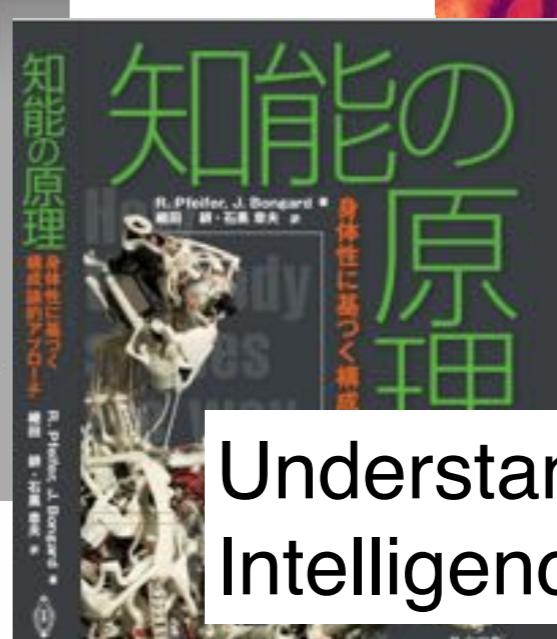
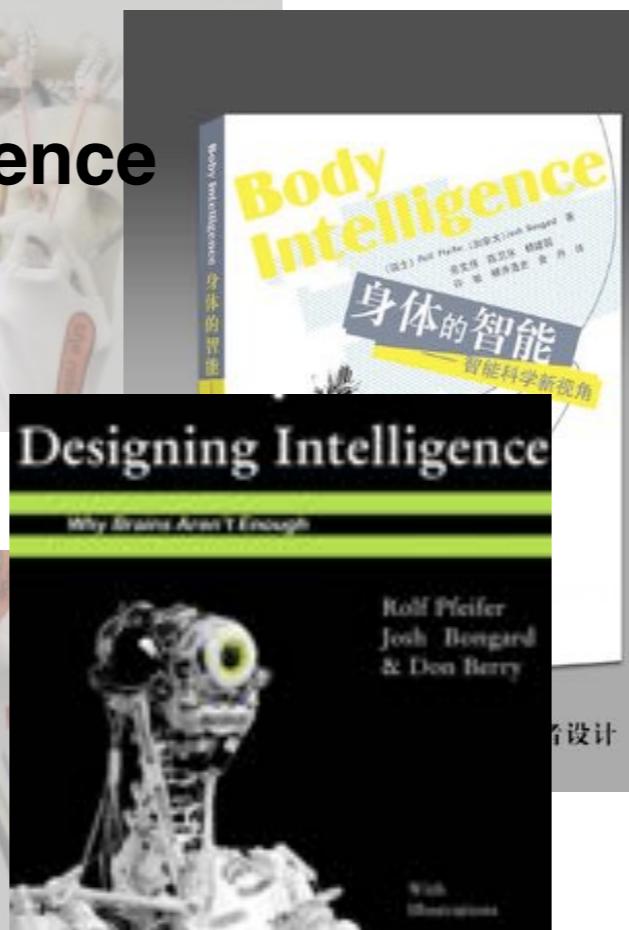
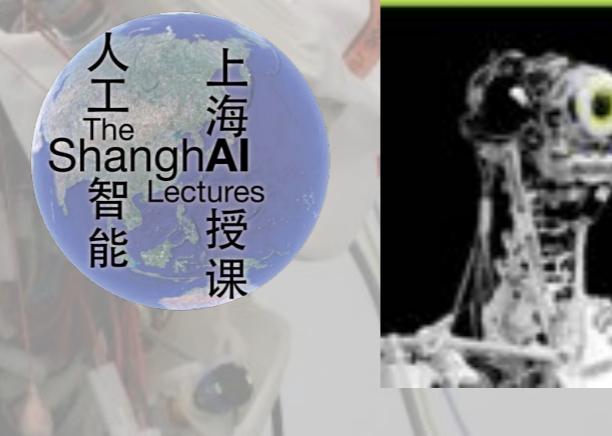
Prof Em., Former Director AI Lab, Univ. of Zurich



Research interests

- embodied intelligence
- bio-inspired robotics
- self-organization and emergence
- educational technologies

The ShanghAI Lectures



How the body shapes
the way we think

MIT Press

Understanding
Intelligence