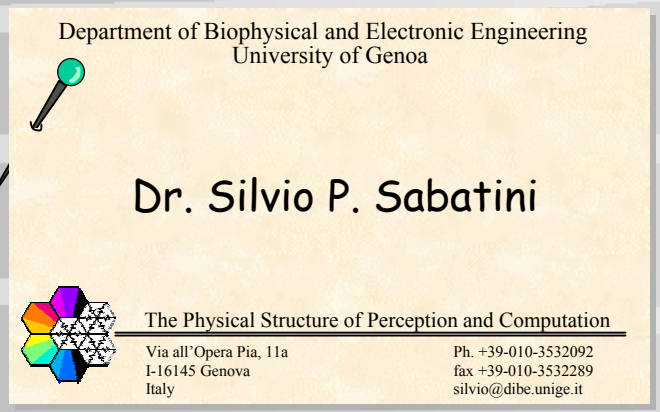

Department of Biophysical
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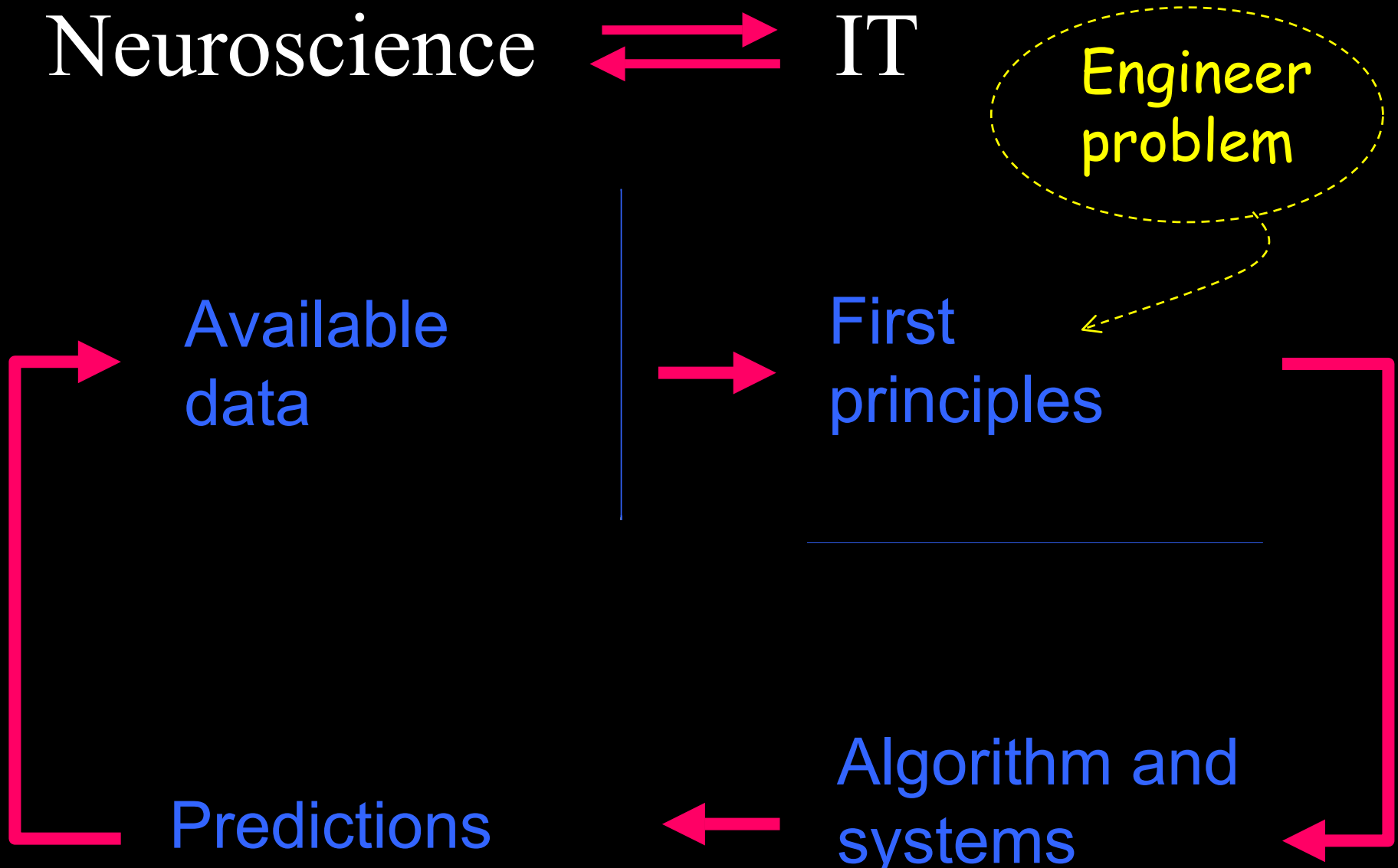
Efficient solutions to complex perceptual problems can be found by adopting novel forms of processing based on structural computational paradigms

Computation proceeds by constructing internal "model structures" of the observed dynamic environment


Neuroscience
IT
Engineer problem
Available data
First principles
Algorithm and systems
Predictions

What can IT do for Neuroscience?

- **Infrastructure**

Databases

Interoperability across different disciplines

- **Tools**

Recording techniques

Descriptive models

Interpretative models

Interpretative *vs* descriptive models

Descriptive models:

- Character: data-driven
- Primary purpose: to describe phenomena
  NOT explaining them

Interpretative models:

- Character: problem-driven
- Primary purpose: testable hypotheses on why the nervous system operates as it does

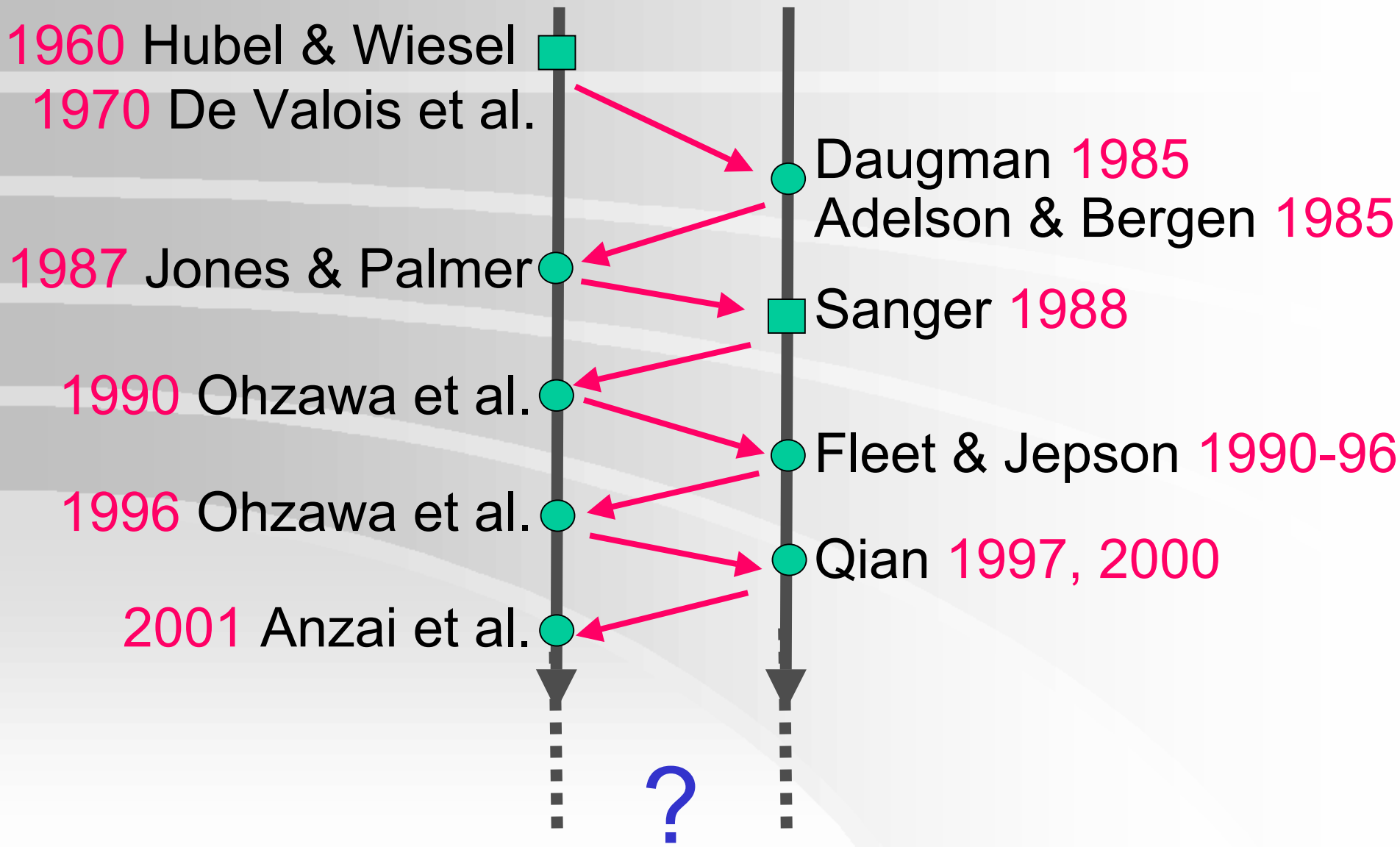
New interpretative models at supraneural scale of observation

traditional *inductive* analysis of the exp. data

+ *deductive* analysis, which starts from the task

- A solution to the problem is formulated through computational resources we expect to be available in the brain
- The "dynamics" of processing of such models would be more directly comparable with the neural observables of the "brain-in-action"

Example: binocular stereopsis



Concluding remarks

Focus on concrete instances of a more general problem
(e.g., understanding/emulating cognitive functions)

1. start from a concrete problem
2. define reachable objectives
3. avoid mere methodological research for which it is difficult to define criteria to measure the success in achieving the goals