

Perception

From an AGI Perspective

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<http://opennars.org/>

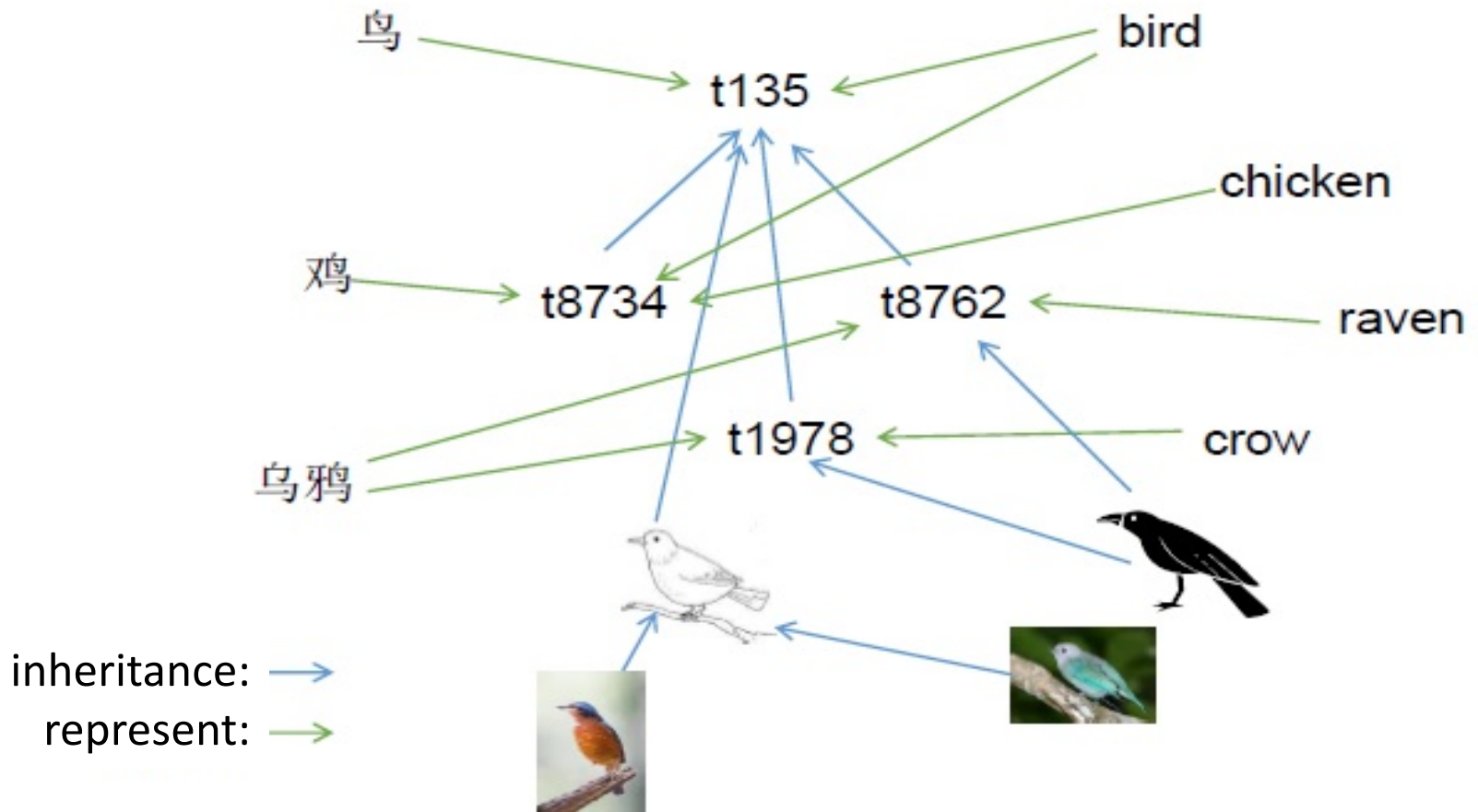
Perception in NARS

- **Subjective:** the results of perception depend on the system's sensors, percepts, concepts, beliefs, goals, attention, etc.
- **Active:** perception is a form of action, and perceptive patterns are represented with operational components in them
- **Unified:** perception is carried out by the same process responsible for reasoning, learning, and other cognitive functions

Term-oriented Representation

- A “term” names a concept, whose content can be an abstract notion, a perceptive pattern, a linguistic label, or an executable operation
- A term can has an internal structure consisting other terms
- The meaning of a term is its experienced relations with other terms in the system

Memory of NARS



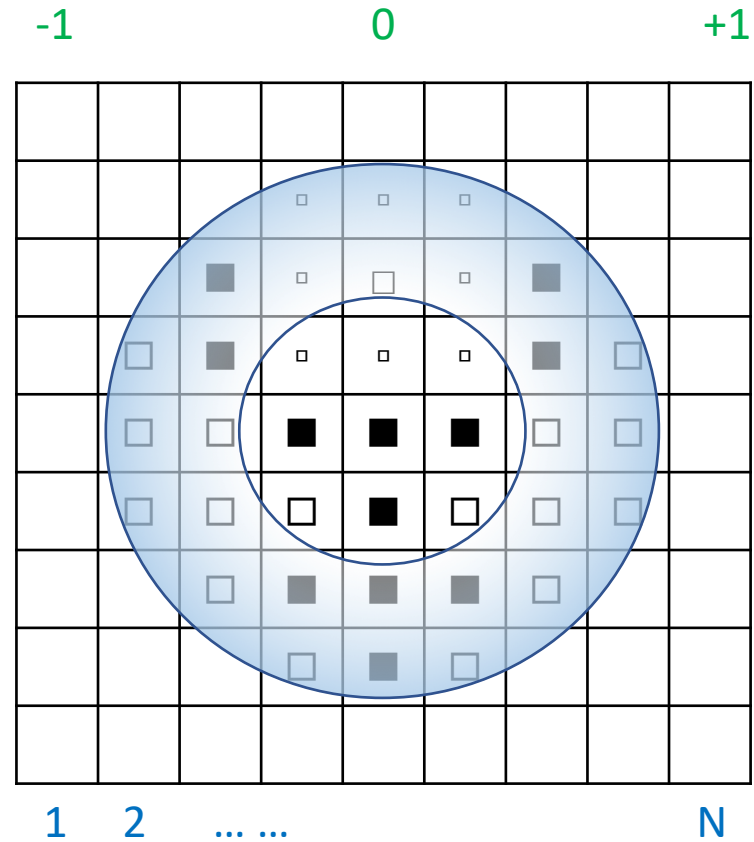
Sensory Term

- A sensory term is a array of 1-3 dimensions representing sensed signal of a certain type
- Each element of the array contains a NARS truth-value <frequency, confidence> as the strength and reliability of a sensed signal

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Perceptive Term

- A perceptive term is a sensory term with a focus
- Elements of the array outside the focus get “confidence penalty”
- Focus and boundary have default values
- Both “coordinate” and “index” are used



Mental Operations

- Reset the focus to a specific position
- Shift the focus with respect to the current position
- Zoom in/out to change the size of the center and boundary of the focus
- Rotate the pattern around its center
- Take the disjunction, conjunction, or difference of two arrays

Pattern Representation

- A mental image can be represented as a compound term consisting of perceptive terms and mental operations
- Perceptive terms and abstract terms can be related to each other at any level of abstraction
- A mental image can be represented by its construction process:

$\{M_4\} \rightarrow (\uparrow \textit{shift}(0, 0.5), M_{41}, \uparrow \textit{shift}(0, -0.8), \uparrow \textit{zoom}(0.4), M_{42})$

Perception as Reasoning

- Perception is not “world modeling”, but “sensorimotor coordination”
- Recognition is pattern categorization task
 $\{\text{pattern}\} \rightarrow ?\text{concept}$
- Imagination is concept visualization task
 $\{?\text{pattern}\} \rightarrow \text{concept}$
- All perception tasks are carried out by the inference rules of NARS