An Outline of a Model of Situated Discourse Representation and Processing

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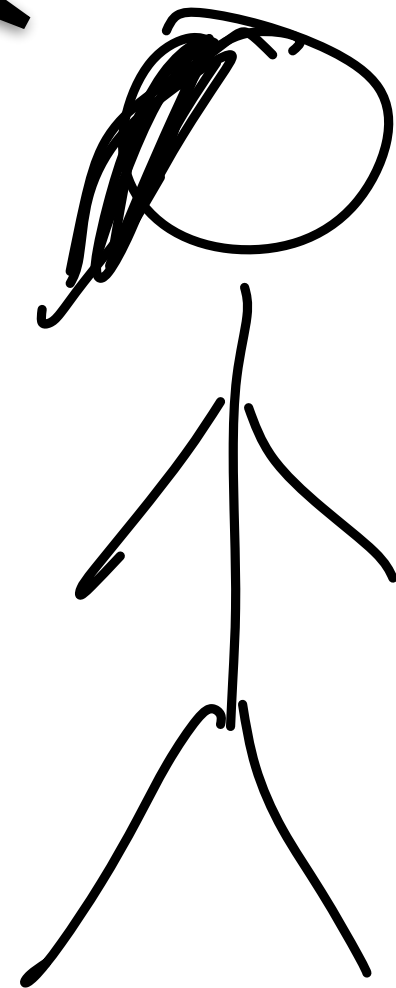# An Outline of a Model of Situated Discourse Representation and Processing

Outline of the talk

- A Story // The Explananda

- The Proposal in a Nutshell

- The Proposal in More Detail

  - *Context Representation Structures*

  - The Abstract Model of Concepts

  - *The Concrete Model of Concepts*

  - *The Concrete Model of Composition*
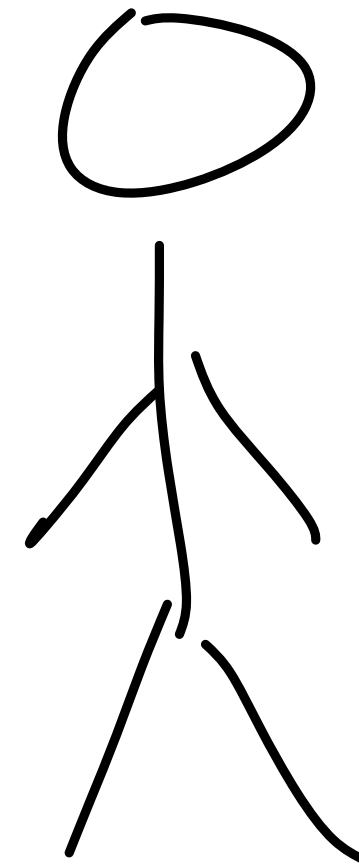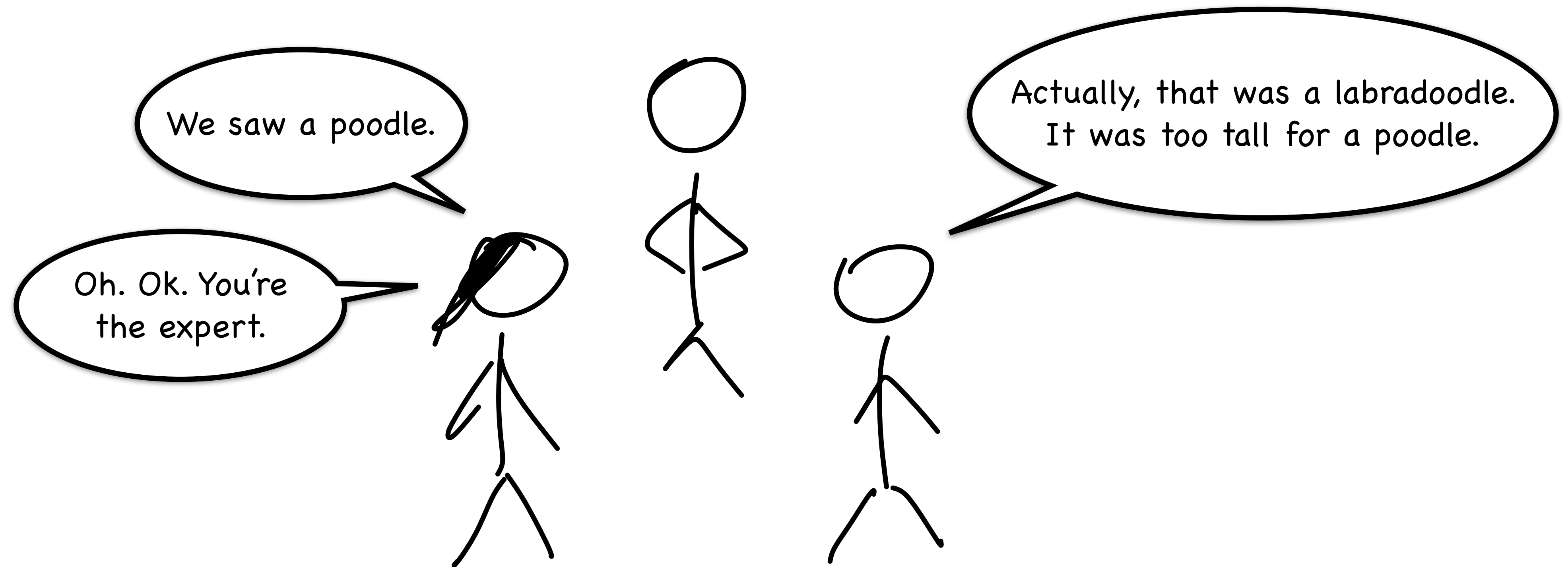
- Conclusions

A Story
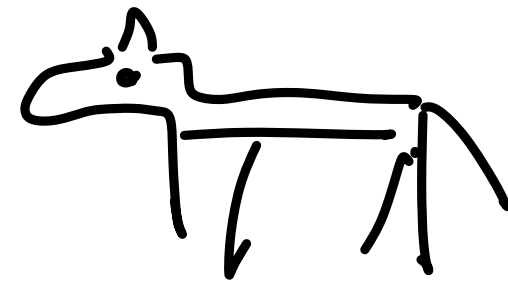
A Story
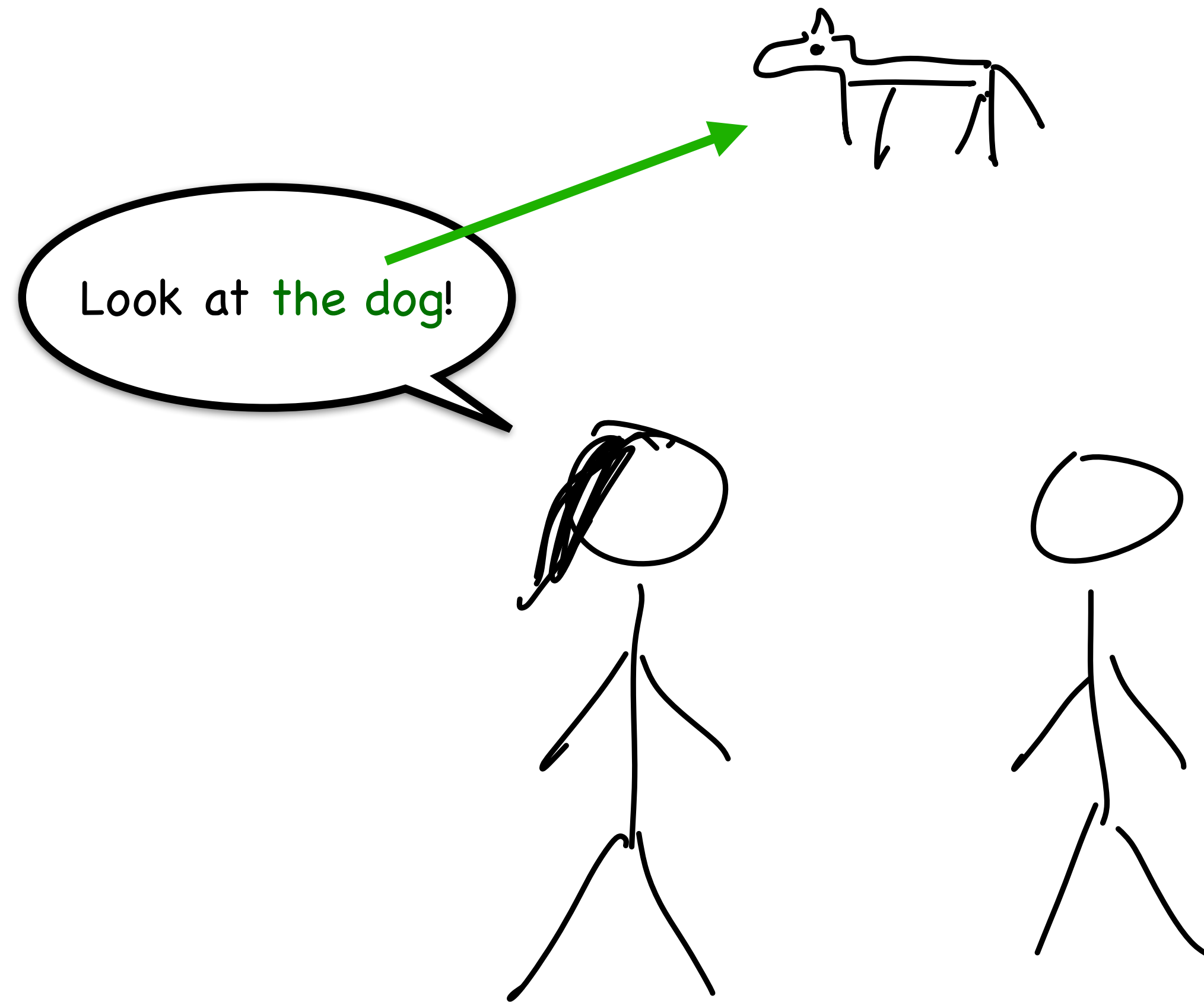
The Explananda
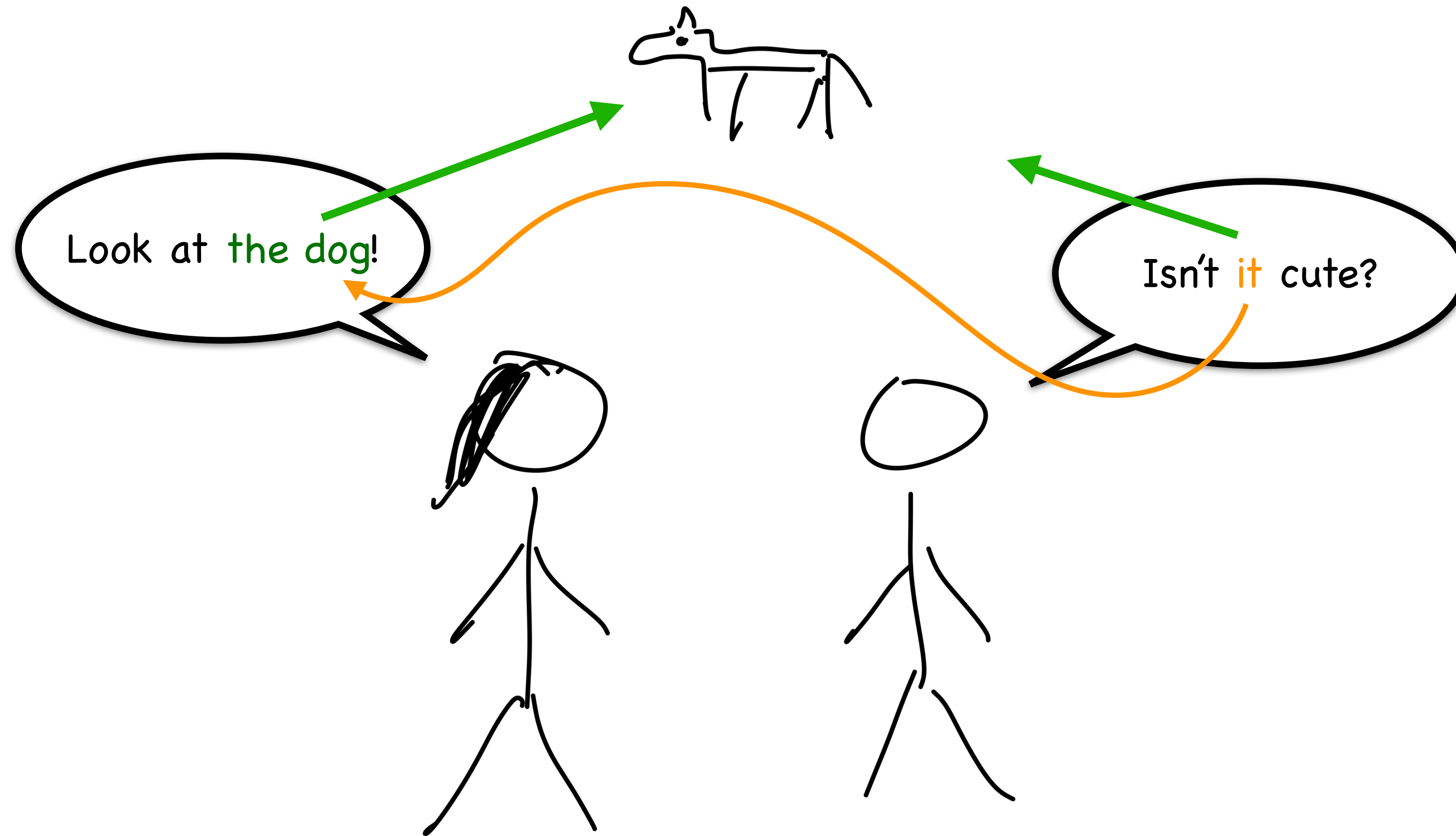
The Explananda
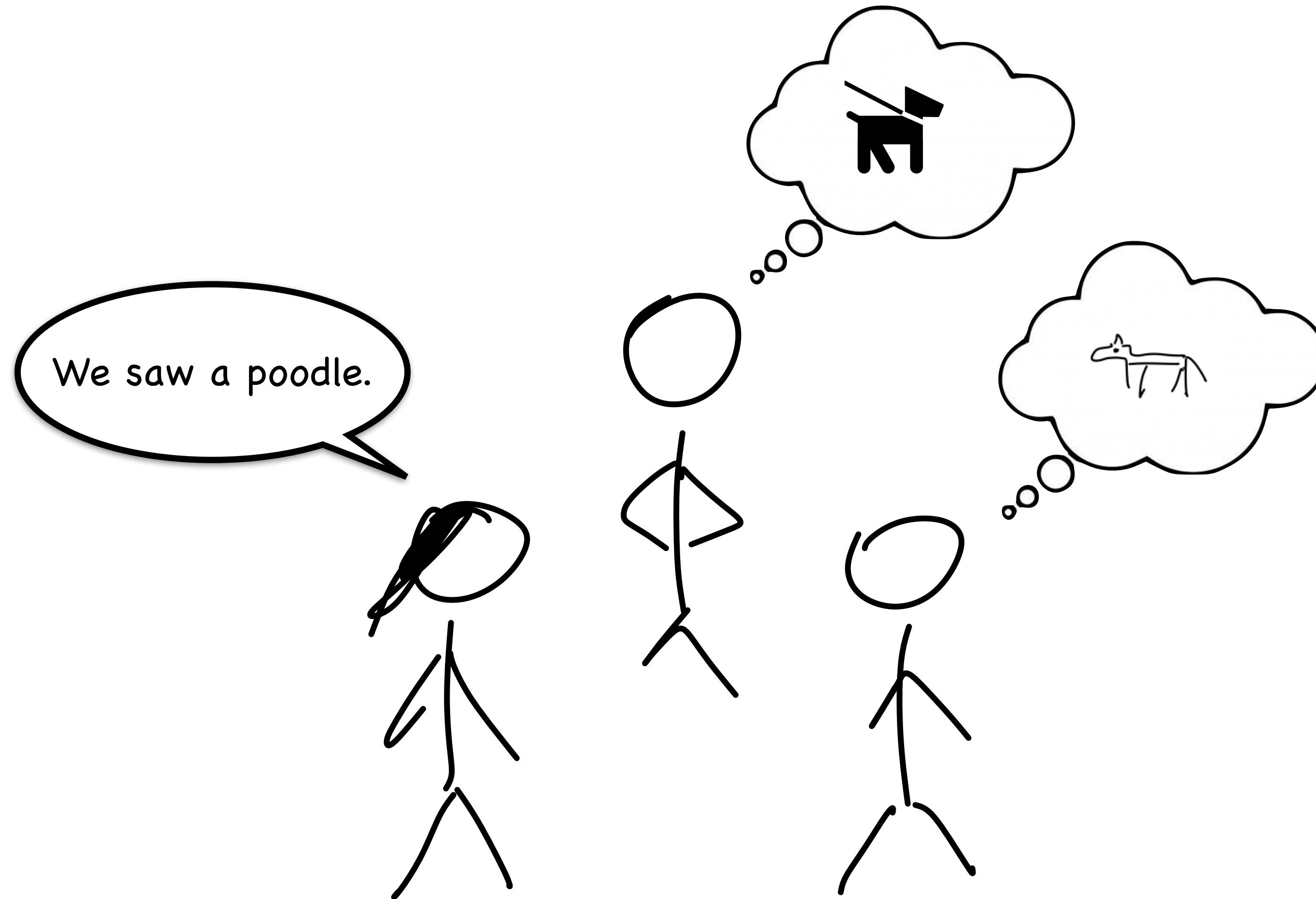
The Explananda
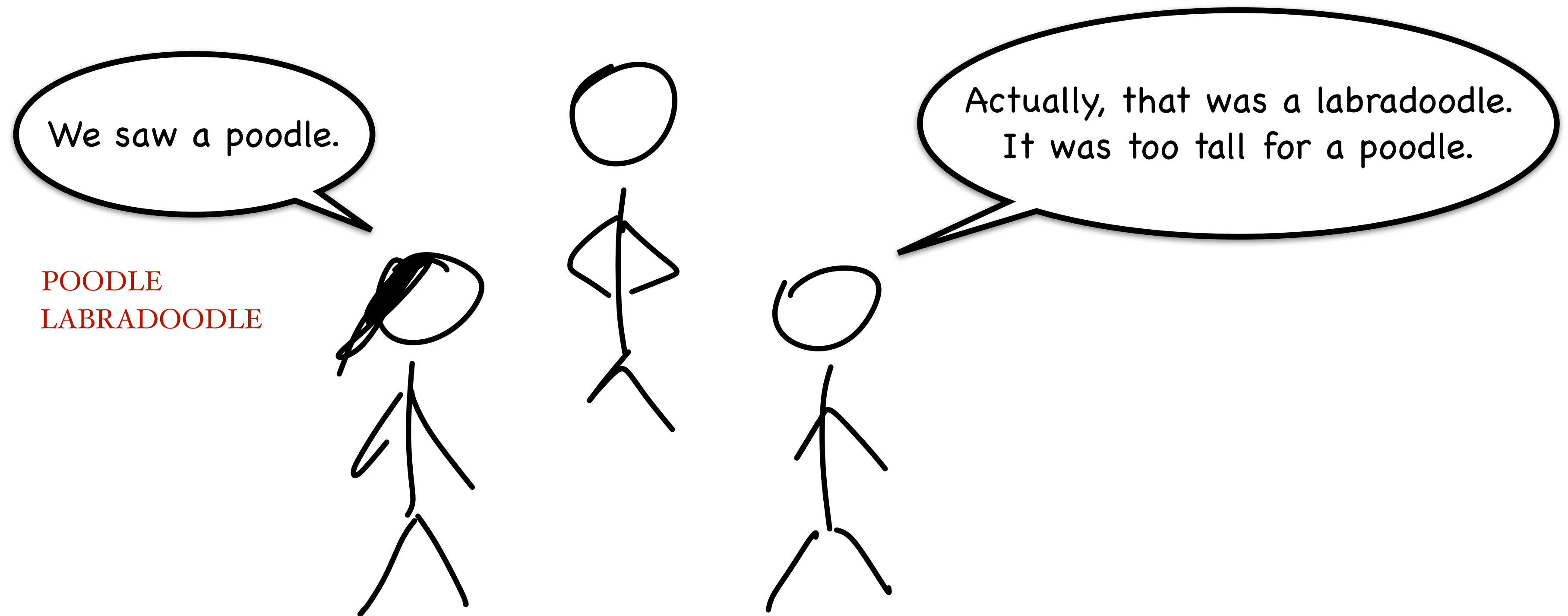
The Explananda

The Explananda

- Links to objects outside the discourse

- Links to objects inside the discourse

- Mutable (and discussable) concepts

The Proposal

- Links to objects outside the discourse

- Links to objects inside the discourse

- Mutable (and discussable) concepts

- *Mental files* as representations

- *Inference* and *Reference* as separate functions…

- … relying on separately represented knowledge

- … composed along parallel, but different paths

The Context Representation Structures

perception

object files

o_1 | o_2 | o_3

o_3

o_1

o_2

dog

the ← white ← dog

vQUD: „white dog?"
resolved by:

integration

x

$dog(x)$
$white(x)$

discourse repr.

memory

DOG

σ
$isa(mammal)$

biology, zoology, cynology, …

WHITE

σ
$isa(colour)$

physics, painting, arts, …

concept files

Fido

σ
dog
$owned\_by(P)$

e/e file

The Context Representation Structures

perception

object files

o_1 o_3

o_1 o_2 o_3

o_2

dog

vQUD: „white dog?"
resolved by:

x

the ← white ← dog

bottom up

top down
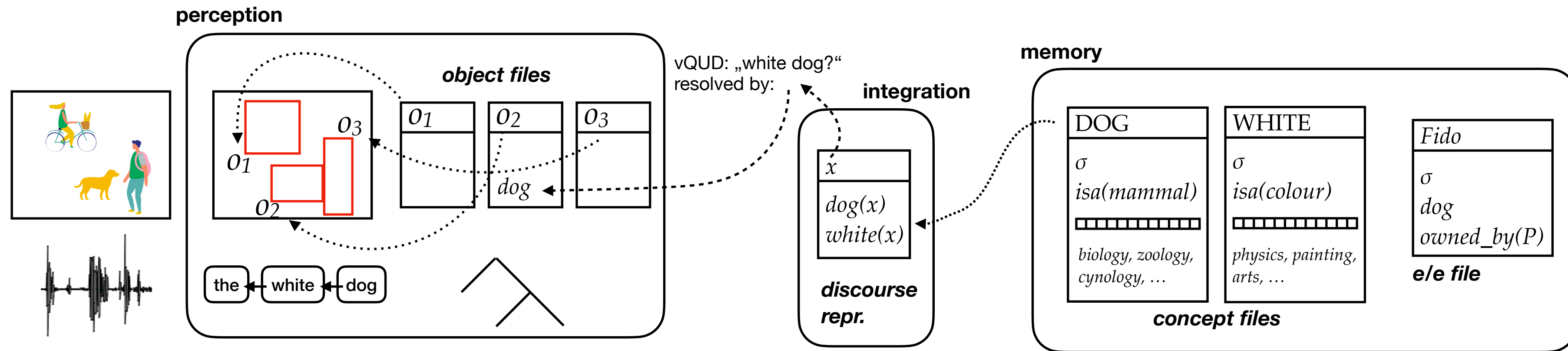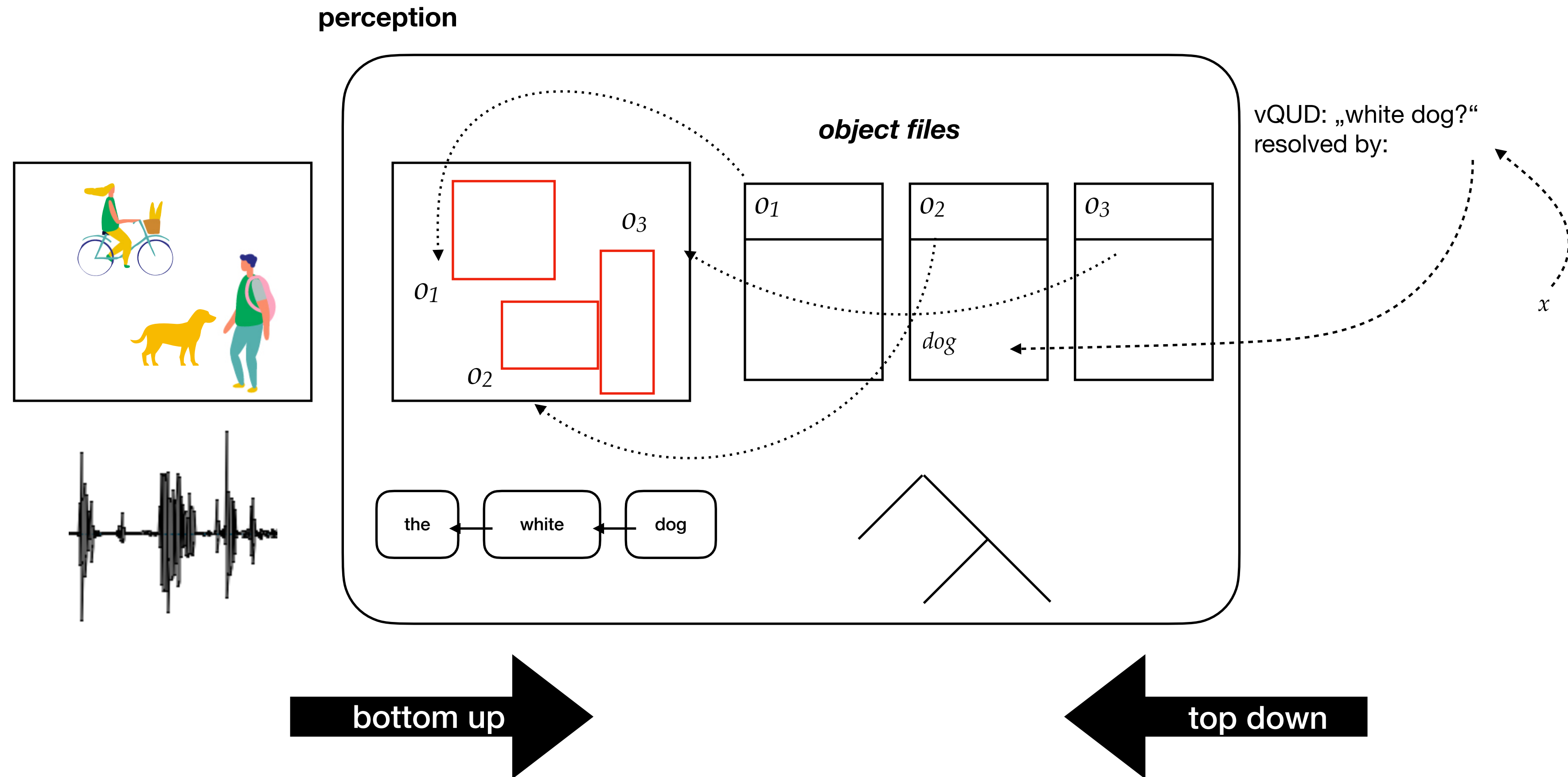
Pylyshyn (1989)

The Context Representation Structures

perception

object files

o_1 o_2 o_3

o_3

o_1

o_2

dog

the ← white ← dog

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e/e file

concept files
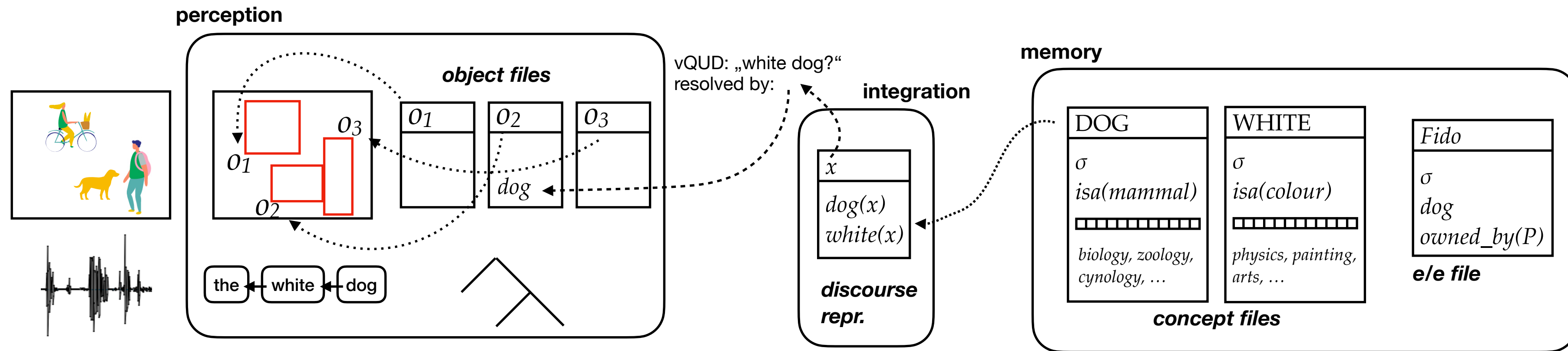
The Abstract Model of Concepts

- being able to make connections between sentences (inference) and being able to resolve references are separate competences

  - Marconi (1997): Referential and Inferential Lexical Competence

The Abstract Model of Concepts
and the case of the samovar

- Erk (p.c.), (McDonald & Ramscar 2001)

- „there was a samovar"

  - —> „there was a russian thing that has something to do with tea"

A Popular Approach

- cross-modal mapping

image feature space

learned mapping

hut

house

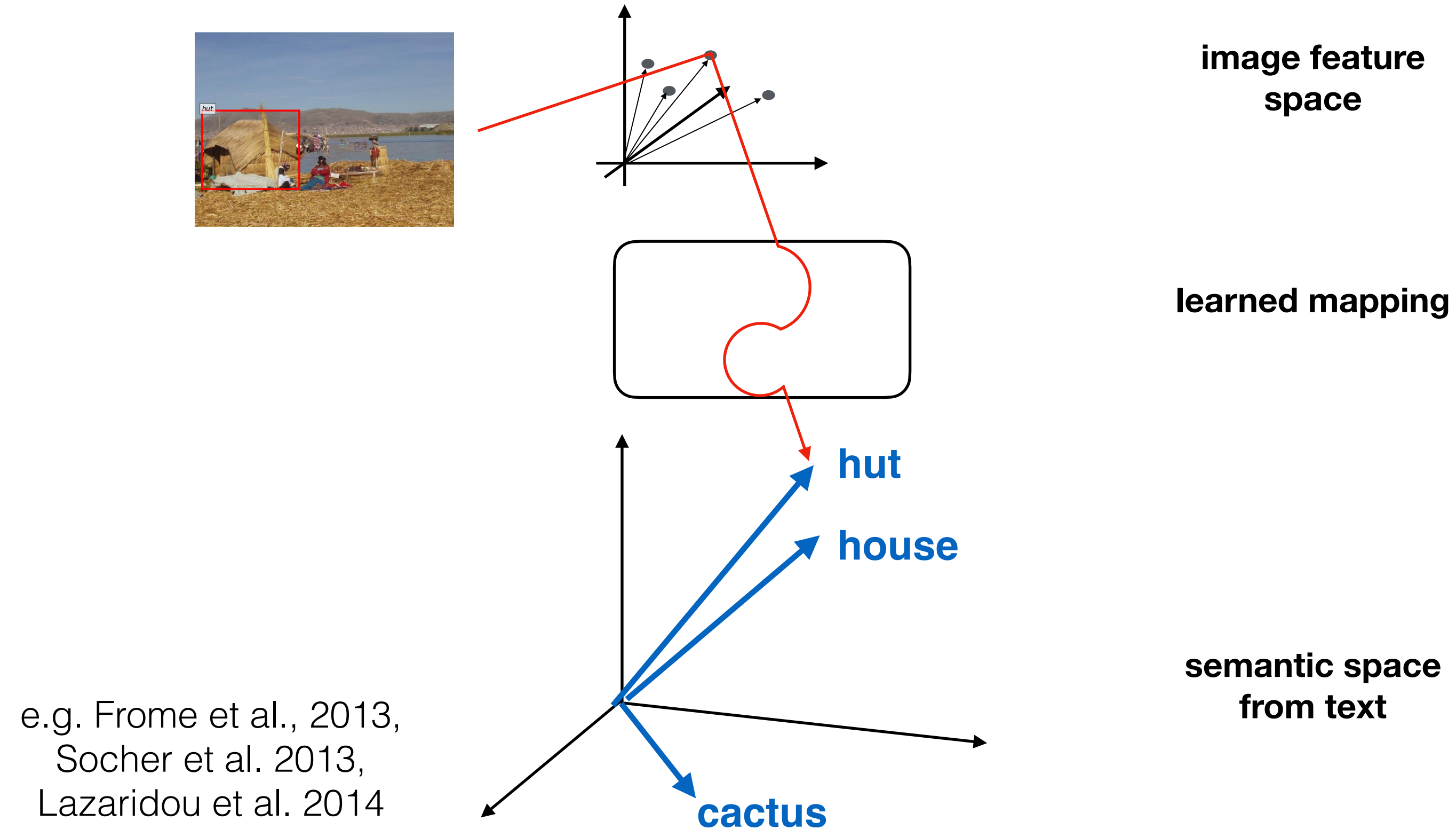semantic space from text

e.g. Frome et al., 2013,
Socher et al. 2013,
Lazaridou et al. 2014

cactus

The Concrete Model of Concepts

WACs

vecs   WKs   whats
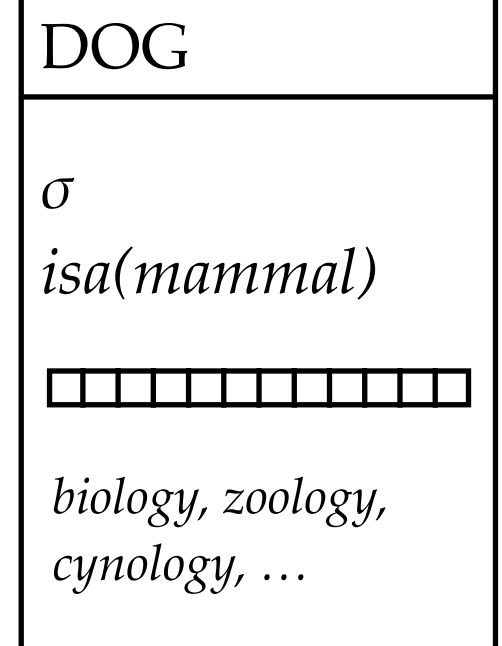
words-as-classifiers

(Kennington & Schlangen 2015; Schlangen,
Zarrieß, Kennington 2016; Zarrieß & Schlangen
2017)

perceptual / referential knowledge
expressed as binary classifier over
perceptual input

(Larsson 2011; Siebert & Schlangen 2008; Roy
2002; Harnad 1990)

DOG

σ
isa(mammal)

biology, zoology,
cynology, …

concept file

The Concrete Model of Concepts

WACs

vecs   WKs

whats

words-as-classifiers   distr. vectors   knowledge graphs

DOG

σ

isa(mammal)

*biology, zoology,
cynology, …*

concept file

„what a cute doggy.. yes, that's a dog. a dog"

„a dog is carnivorous mammal."

… Mary has a new poodle that is very cute. …
… The poodle was barking as if its life depended …
…. There he is, America's poodle, Tony Blair …

The Concrete Model of Concepts

WACs		vecs	WKs		whats

words-as-classifiers   distr. vectors   knowledge graphs

DOG

σ
isa(mammal)

biology, zoology, cynology, …

concept file

Zero-Shot Learning

(Zarrieß & Schlangen 2017)

„a poodle is a mid-sized dog, often with black fur."

poodle: dog, black, fur, cat, background, …

ongoing research area

The Concrete Model of Concepts

WACs

vecs   WKs

whats

words-as-classifiers   distr. vectors   knowledge graphs   who has last word?

DOG

σ

isa(mammal)

*biology, zoology,
cynology, …*

concept file

The Concrete Model of Composition

WACs

vecs　　　　WKs

whats

words-as-classifiers　　distr. vectors　　knowledge graphs　　who has last word?

DOG

σ
isa(mammal)

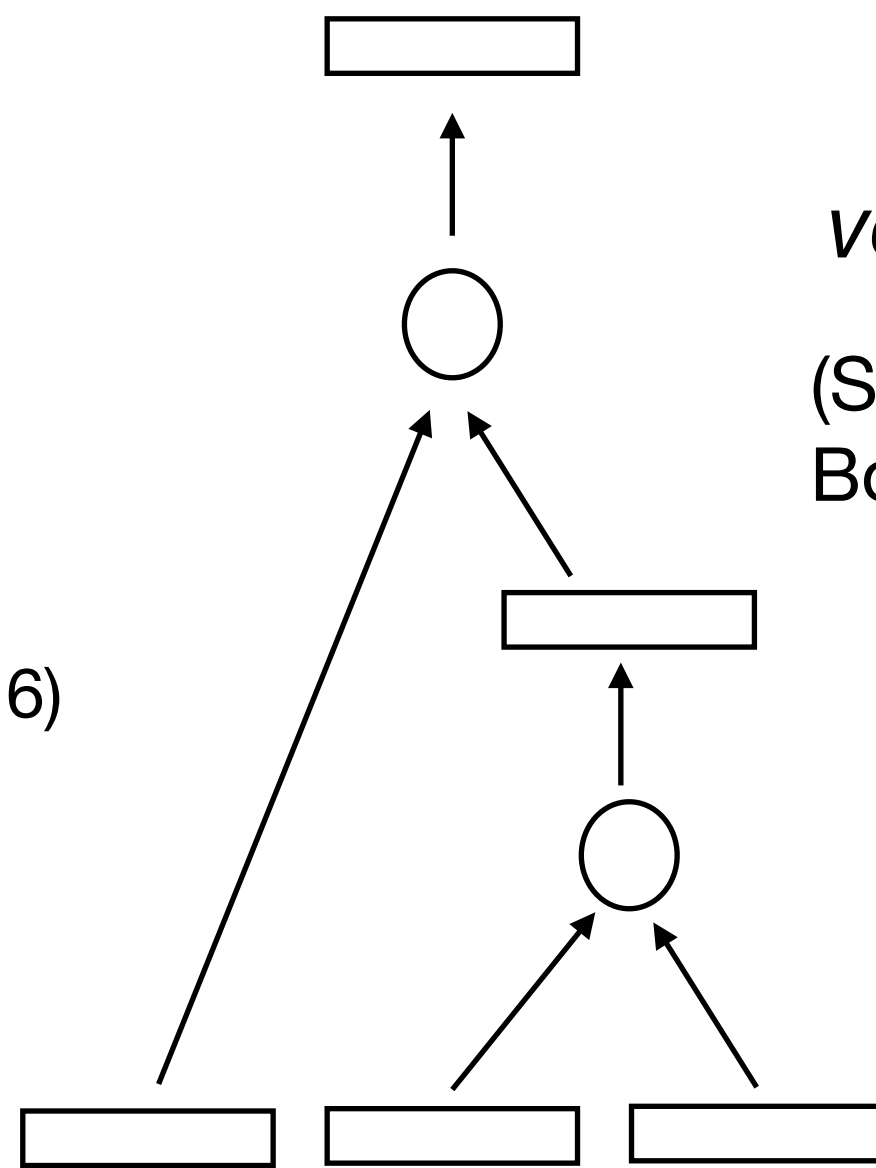*biology, zoology,
cynology, …*

concept file

LFs

vectors

(Socher *et al.* 2011;
Bowman *et al.* 2016)

*numerical
scores*

(Schlangen et al. 2016)

The Proposal

- Links to objects outside the discourse

- Links to objects inside the discourse

- Mutable (and discussable) concepts

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The Explananda, Explained?
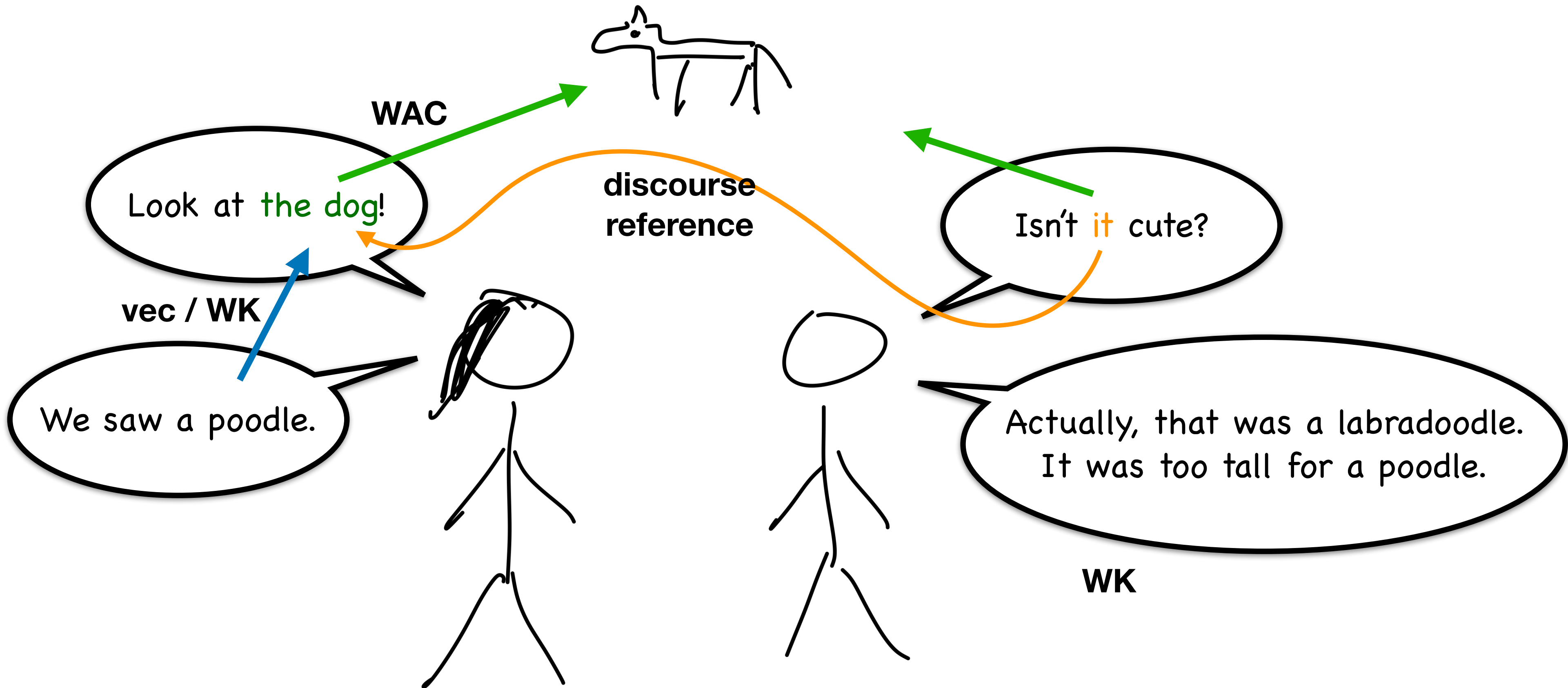
Conclusions

- Related Work:

  - Idea of mental files is old, in CogSci, Phil., CS (see paper); emphasis on learning is not?

- Can this even be wrong?

  - Predictions: Keep track of familiarity-via-modality. Accept judgement by experts about kind-membership. Dissociable?

- Where are the details?

  - Many supporting experiments have been already done, are waiting to be written up.

- Shouldn't this be…

  - end-to-end? Maybe. Could be inspiration to provide inductive biases to learning algorithm. Also for how to set up task & data collection.

  - formalized? Maybe. But testing on large datasets more immediately important (to me).

The End.