

# **The Logical Form of Psychological Reports**

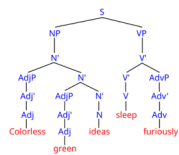
David Lindeman  
Georgetown University

$\Phi$

Philosophy

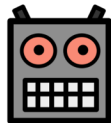
$\Psi$

Psychology



Linguistics

Artificial  
Intelligence



Anthropology



Neuroscience



‘The aim of philosophy, abstractly formulated, is to understand how things in the broadest possible sense of the term hang together in the broadest possible sense of the term.’  
(Sellars, ‘Philosophy and the Scientific Image of Man’)



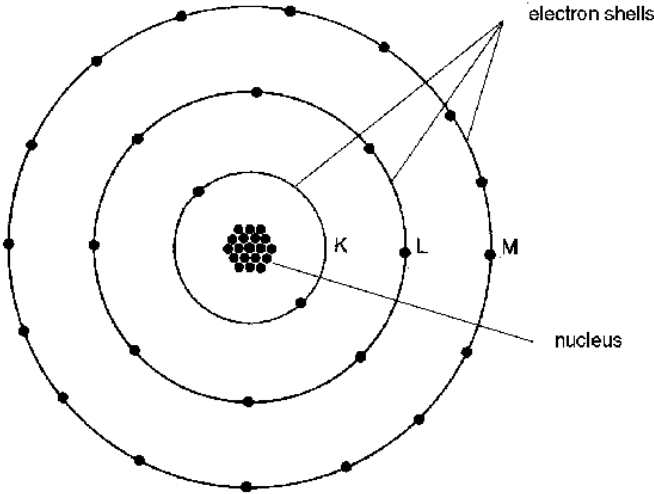




Fig. 30.

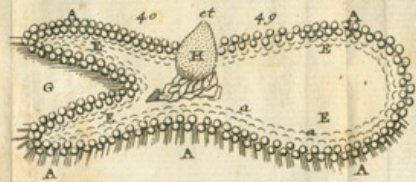


Fig. 32.

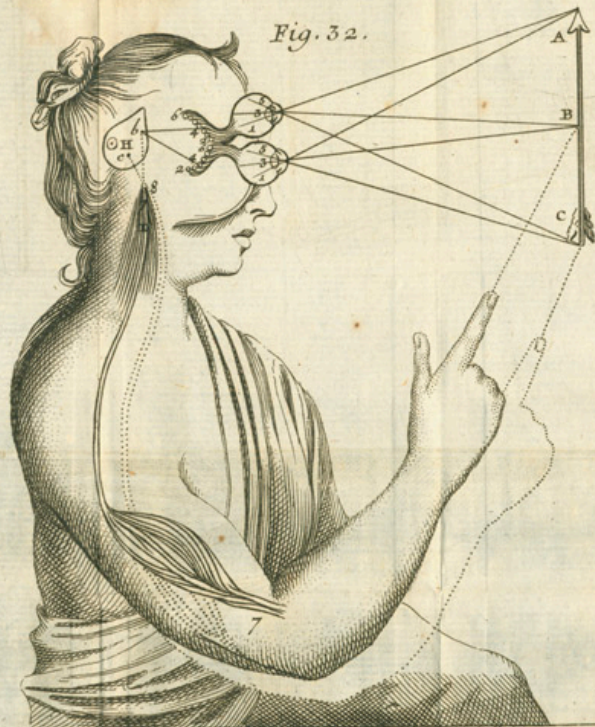
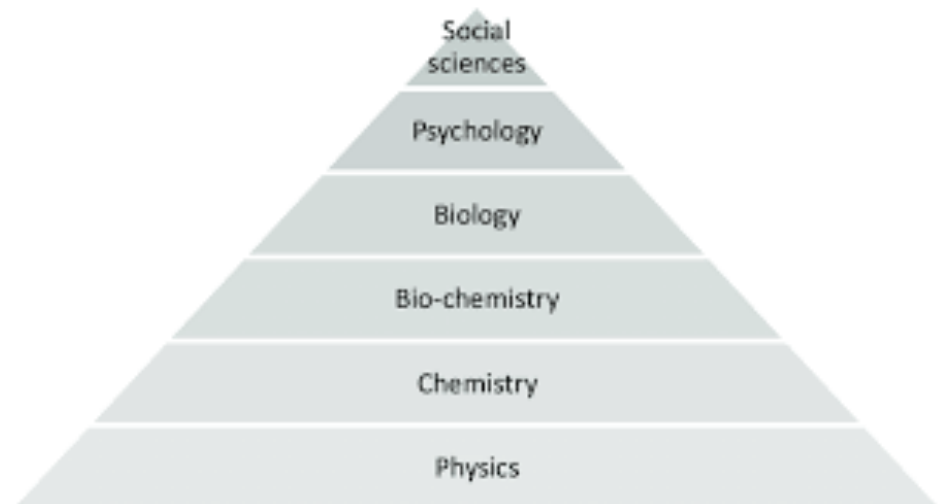
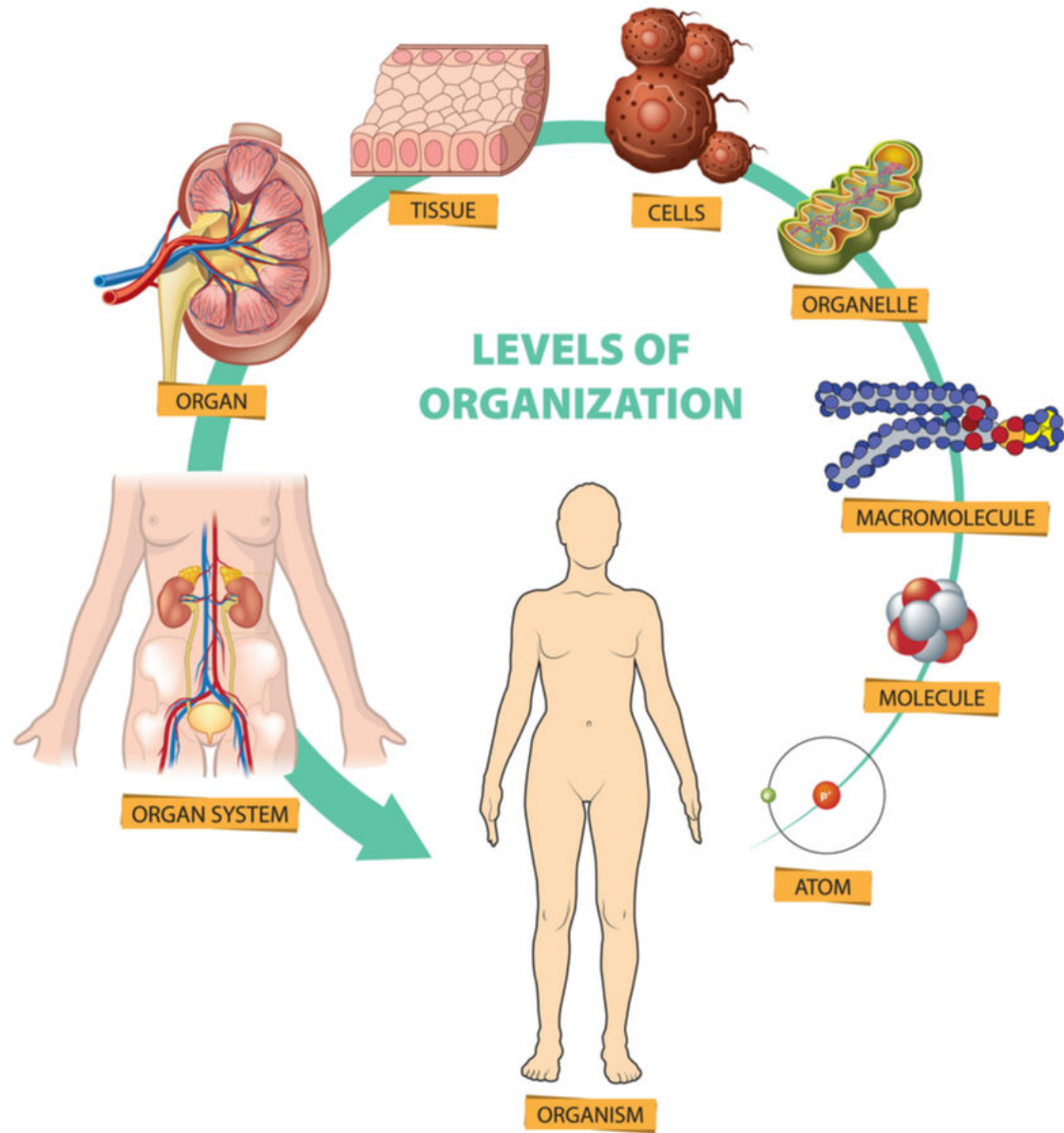


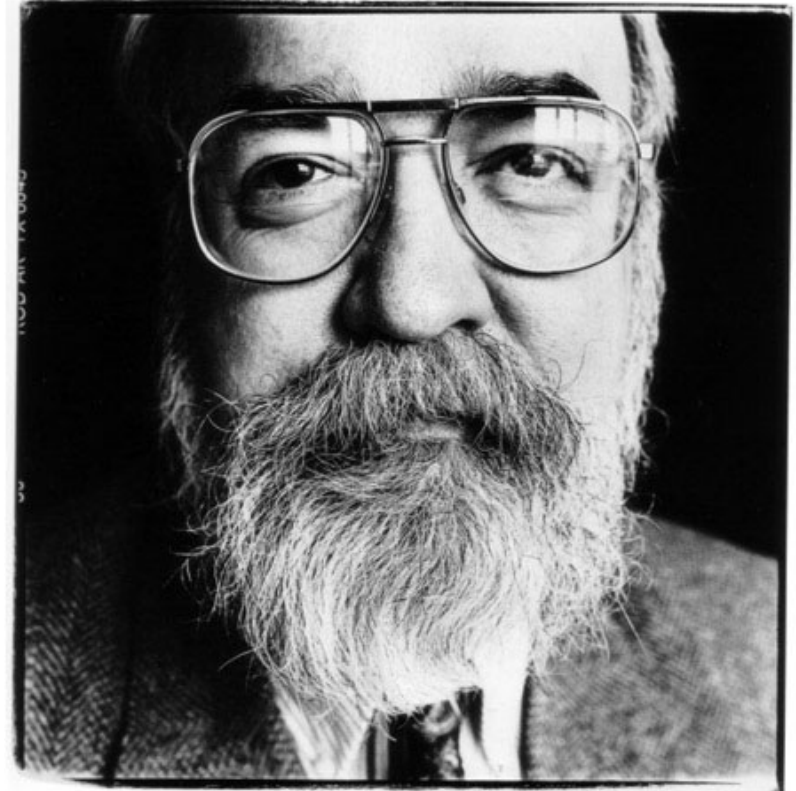
Fig. 33





Without the propositional attitudes and our capacity to recognize and ascribe them, ‘we could have no interpersonal projects or relations at all; human activity would be just so much Brownian motion; we would be baffling ciphers to each other and to ourselves—we could not even conceptualize our own flailings’.

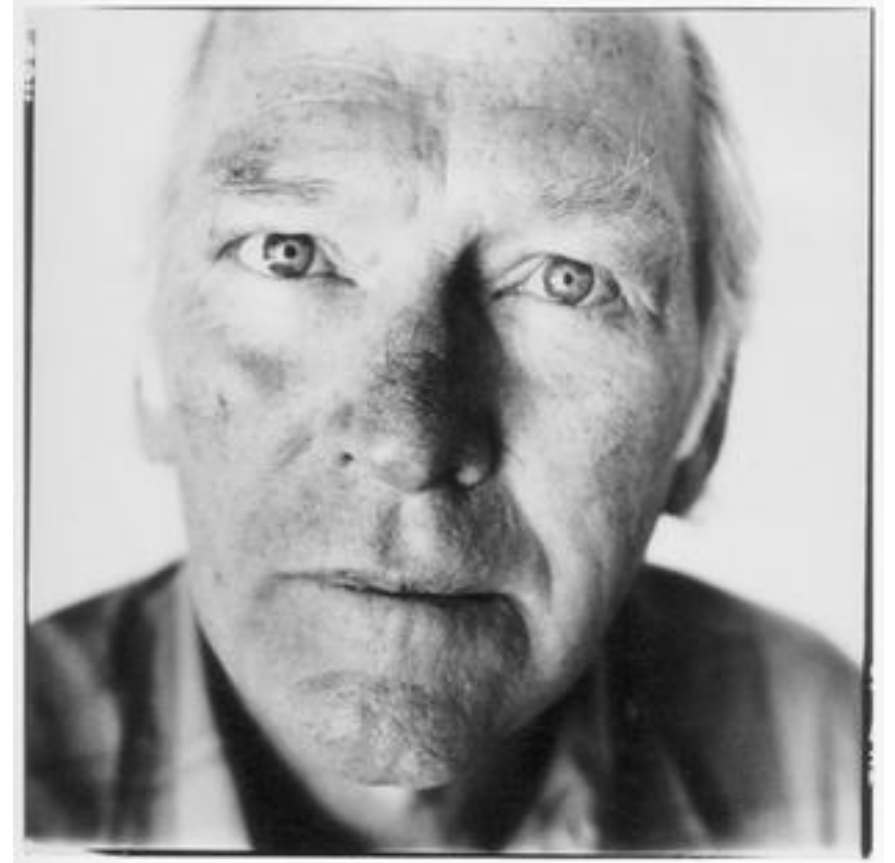
(Dennett, ‘Real Patterns’)





‘In sharing a language, in whatever sense this is required for communication, we share a picture of the world that must, in its large features, be true. It follows that in making manifest the large features of our language, we make manifest the large features of reality. One way of pursuing metaphysics is therefore to study the general structure of our language.’

(Davidson, ‘The Method of Truth in Metaphysics’)

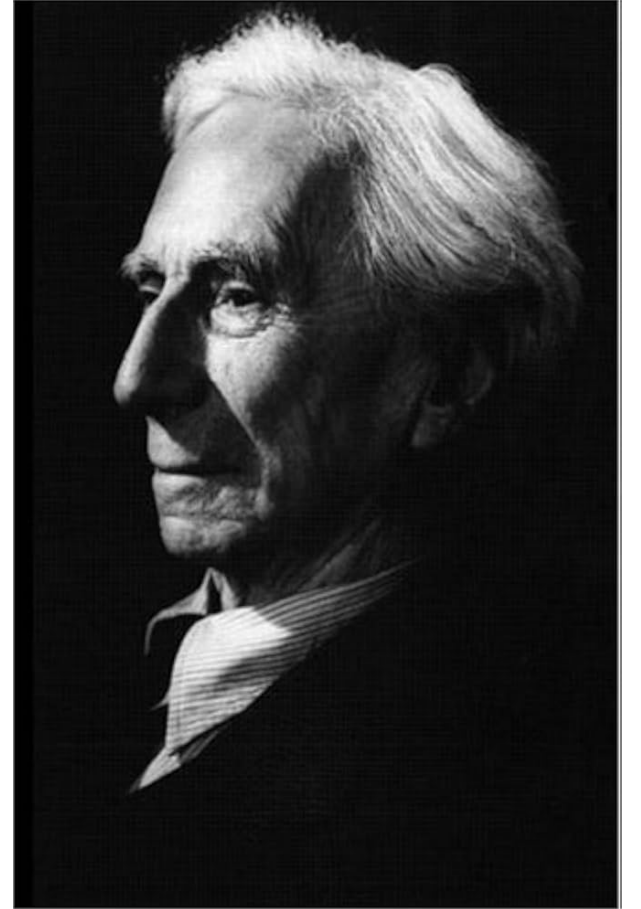


‘It is astonishing what language accomplishes. With a few syllables it expresses a countless number of thoughts, and even for a thought grasped for the first time by a human it provides a clothing in which it can be recognized by another to whom it is entirely new. This would not be possible if we could not distinguish parts in the thought that correspond to parts of the sentence, so that the construction of the sentence can be taken to mirror the construction of the thought.’  
(Frege, ‘Logical Investigations’)



‘I propose to consider whether anything, and if so, what can be inferred from the structure of language as to the structure of the world. There is, I think, a discoverable relation between the structure of sentences and the structure of the occurrences to which the sentences refer. I do not think the structure of non-verbal facts is wholly unknowable, and I believe that, with sufficient caution, the properties of language may help us to understand the structure of the world.’

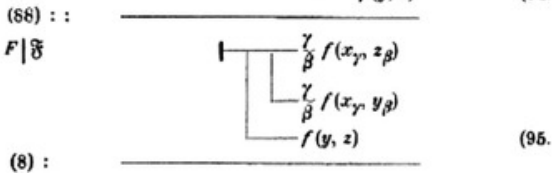
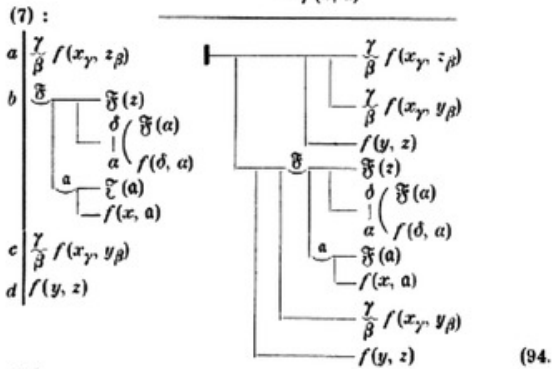
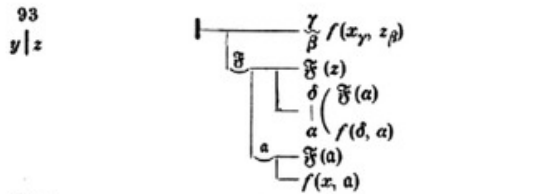
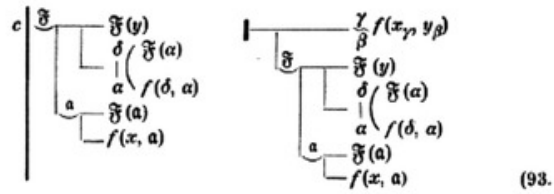
(Russell, *The Problems of Philosophy*)

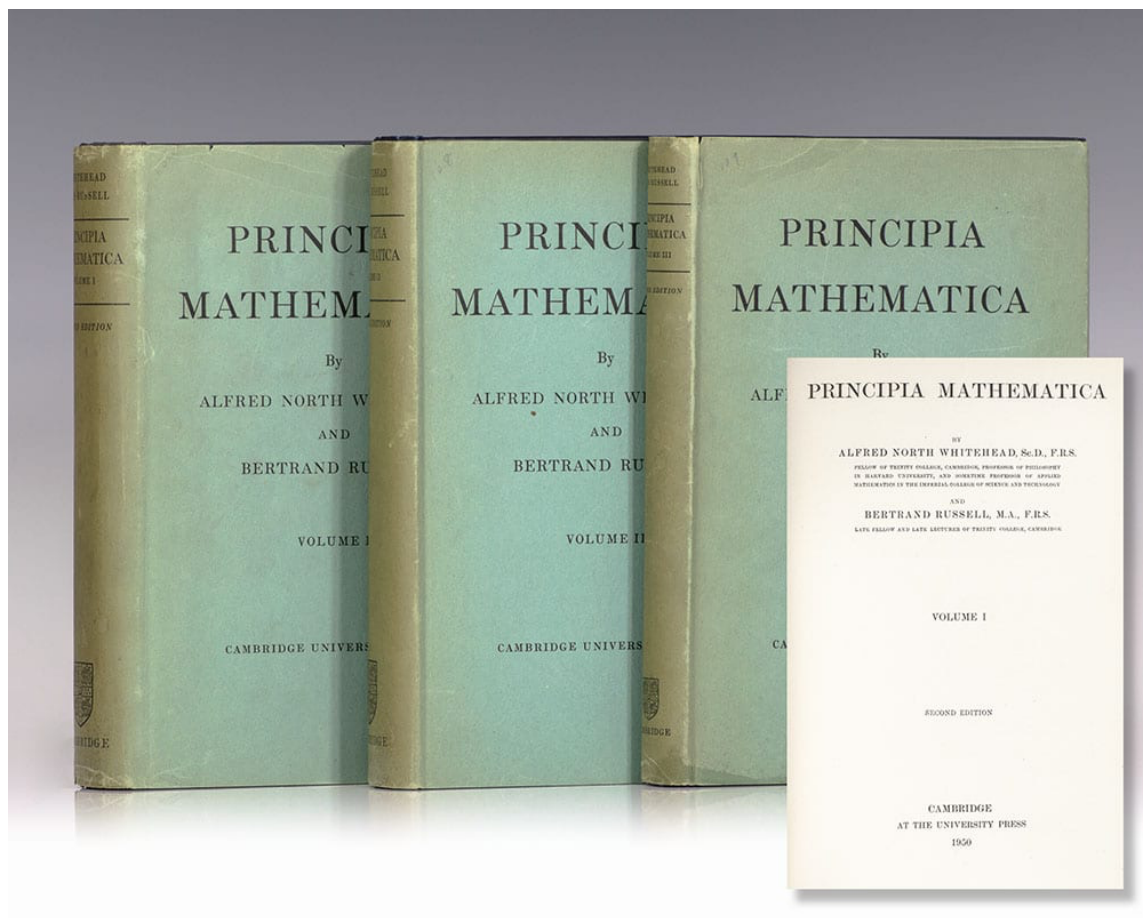


The Philosophy  
of Logical  
Atomism

Bertrand  
Russell

Open Court  
Classics





SECTION B] ARITHMETICAL SUM OF TWO CLASSES AND TWO CARDINALS 83

**\*110·643.**  $\vdash . 1 +_o 1 = 2$   
*Dem.*  $\vdash . *110·632 . *101·21·28 . \supset$   
 $\vdash . 1 +_o 1 = \hat{\xi} \{ (\forall y) . y \in \xi . \xi - \iota' y \in 1 \}$   
[\*54·3] = 2.  $\supset \vdash$ . Prop

The above proposition is occasionally useful. It is used at least three times, in \*113·66 and \*120·123·472.

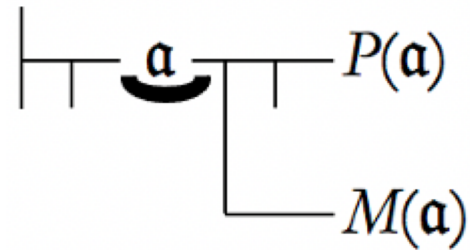
**\*110·643.**  $\vdash . 1 +_o 1 = 2$   
*Dem.*  $\vdash . *110·632 . *101·21·28 . \supset$   
 $\vdash . 1 +_o 1 = \hat{\xi} \{ (\forall y) . y \in \xi . \xi - \iota' y \in 1 \}$   
[\*54·3] = 2.  $\supset \vdash$ . Prop

The above proposition is occasionally useful. It is used at least three times, in \*113·66 and \*120·123·472.

$\vdash . *110·3 . \supset \vdash : Nc' \alpha = Nc' \beta +_o Nc' \gamma . \equiv . Nc' \alpha = Nc' (\beta + \gamma) .$   
[\*100·3·31]  $\supset . \alpha \text{ sm } (\beta + \gamma) .$   
[\*73·1]  $\supset . (\forall R) . R \in 1 \rightarrow 1 . D' R = \alpha . \text{C}' R = \downarrow \Lambda_{\gamma} \iota' \beta \cup \Lambda_{\beta} \downarrow \iota' \gamma .$   
[\*37·15]  $\supset . (\forall R) . R \in 1 \rightarrow 1 . \downarrow \Lambda_{\gamma} \iota' \beta \subset \text{C}' R . R' \downarrow \Lambda_{\beta} \iota' \alpha \subset \alpha .$   
[\*110·12 . \*73·22]  $\supset . (\forall \delta) . \delta \subset \alpha . \delta \text{ sm } \beta$  (2)  
 $\vdash . (1) . (2) . \supset \vdash$ . Prop

The above proof depends upon the fact that “ $Nc' \alpha$ ” and “ $Nc' \beta +_o \mu$ ” are typically ambiguous, and therefore, when they are asserted to be equal, this must hold in *any* type, and therefore, in particular, in that type for which we have  $\alpha \in Nc' \alpha$ , i.e. for  $Nc' \alpha$ . This is why the use of \*100·3 is legitimate.

**\*110·72.**  $\vdash : (\forall \delta) . \delta \text{ sm } \beta . \delta \subset \alpha . \equiv . (\forall \mu) . \mu \in NC . Nc' \alpha = Nc' \beta +_o \mu$   
*Dem.*  
 $\vdash . *100·321 . *110·7 . \supset$   
 $\vdash . \delta \text{ sm } \beta . \delta \subset \alpha . \supset : Nc' \delta = Nc' \beta : (\forall \mu) . \mu \in NC . Nc' \alpha = Nc' \delta +_o \mu :$   
[\*13·12]  $\supset : (\forall \mu) . \mu \in NC . Nc' \alpha = Nc' \beta +_o \mu$  (1)  
 $\vdash . (1) . *110·71 . \supset \vdash$ . Prop



$$\sim \forall x (Mx \supset \sim Px)$$

$$\exists x (Px \ \& \ Mx)$$

$$\exists x (\text{Planet}(x) \ \& \ \text{Moves}(x))$$

$$\sim \exists x (\text{Planet}(x) \ \& \ \text{Moves}(x))$$

‘A proposition must communicate a new sense with old words. The proposition communicates to us a state of affairs, therefore it must be *essentially* connected with the state of affairs. And the connexion is, in fact, that it is its logical picture.’

(Wittgenstein, *Tractatus Logico-Philosophicus*)





The Logical  
Syntax of  
Language

Rudolf  
Carnap

Translated by  
Amethe Smeaton

Open Court  
Classics



Rudolf Carnap

Meaning and Necessity

A Study in Semantics  
and Modal Logic

Second Edition

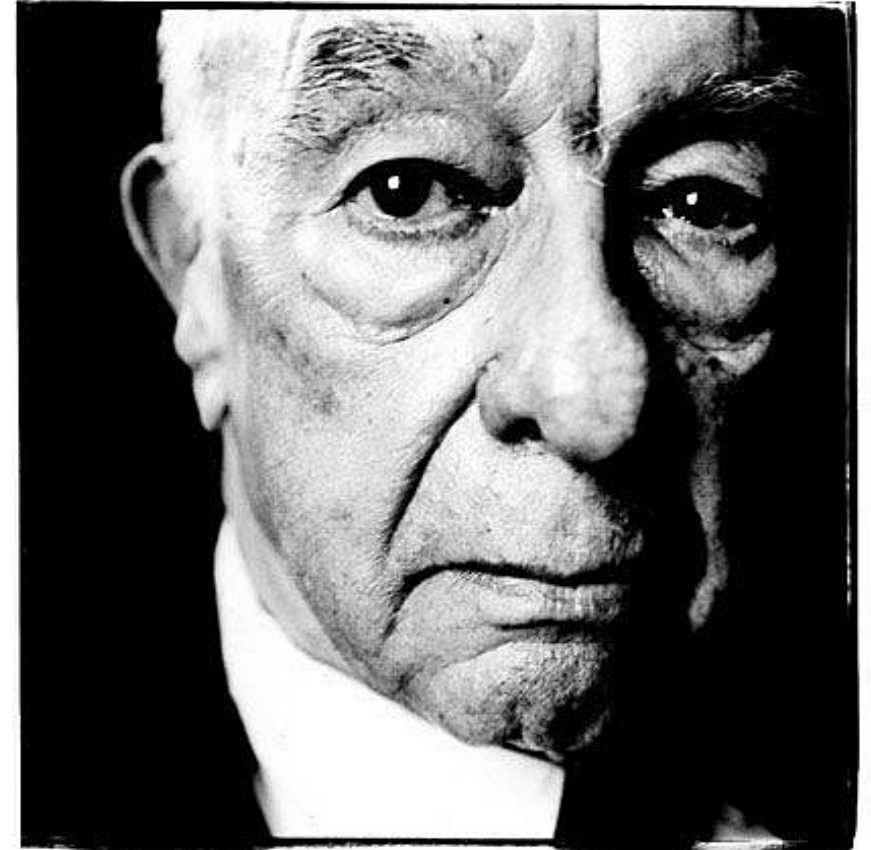


Midway Reprint

‘To be is to be the value of a variable.’

‘We look to bound variables in connection with ontology not in order to know what there is, but in order to know what a given remark or doctrine, ours or someone else’s, says there is; and this much is quite properly a problem involving language.’

(Quine, ‘On What There Is’)



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HANS-JOHANN GLOCK

Quine and Davidson

on Language,  
Thought and  
Reality

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CAMBRIDGE

‘A theory of meaning (in my mildly perverse sense) is an empirical theory, and its ambition is to account for the workings of a natural language.’

‘The task of a theory of meaning as I conceive it is not to change, improve, or reform a language, but to describe and understand it.’

‘Empirical power in such a theory depends on success in recovering the structure of a very complicated ability—the ability to speak and understand a language.’

(Davidson, ‘Truth and Meaning’)

Our empirical theory will need to articulate the compositional structure of language.

The syntactic primitives of the language should correspond to semantic primitives.

This syntax, relevant to semantic interpretation, so semantically-relevant structure, should correspond to inferentially-relevant structure, i.e. logical structure.

**LF**

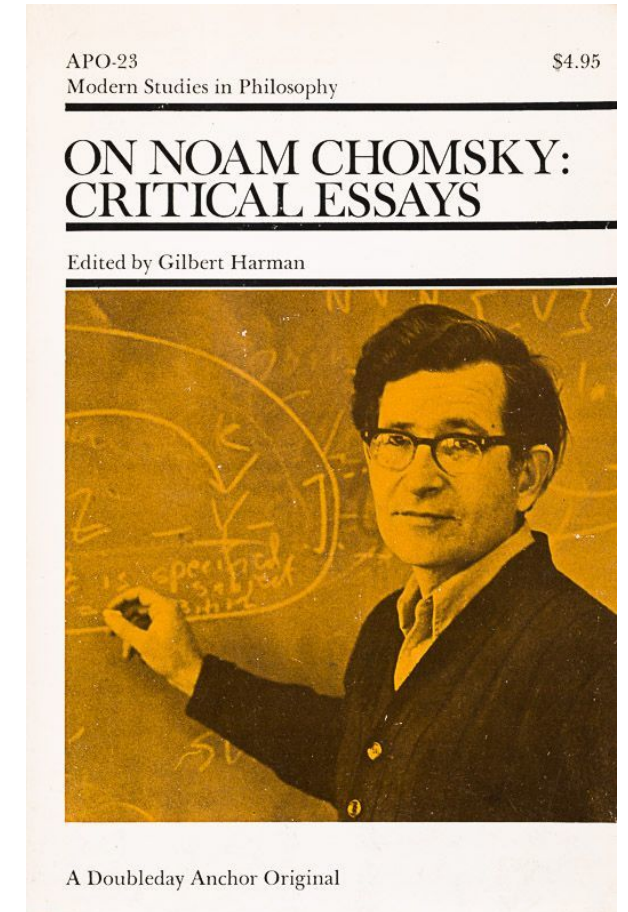
*viz.* that level of syntactic description relevant to semantic interpretation

**=**

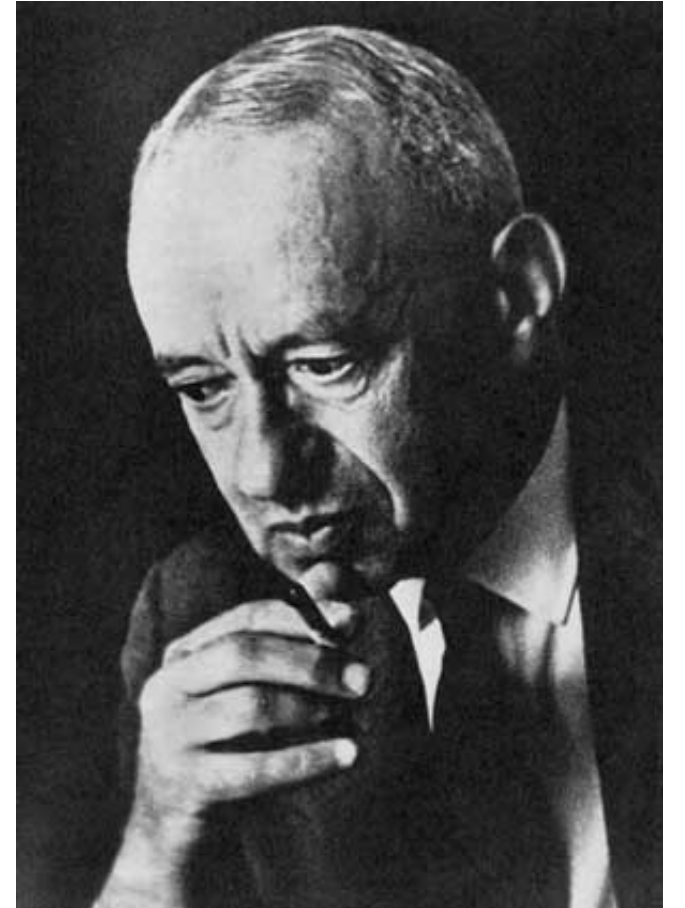
**Logical Form**

‘No arguments to show logical structure won’t serve [the purposes of syntax] seem conclusive; and it would be strange if the structure essential to an account of truth were not effectively tied to the patterns of sound we use to convey truth.’

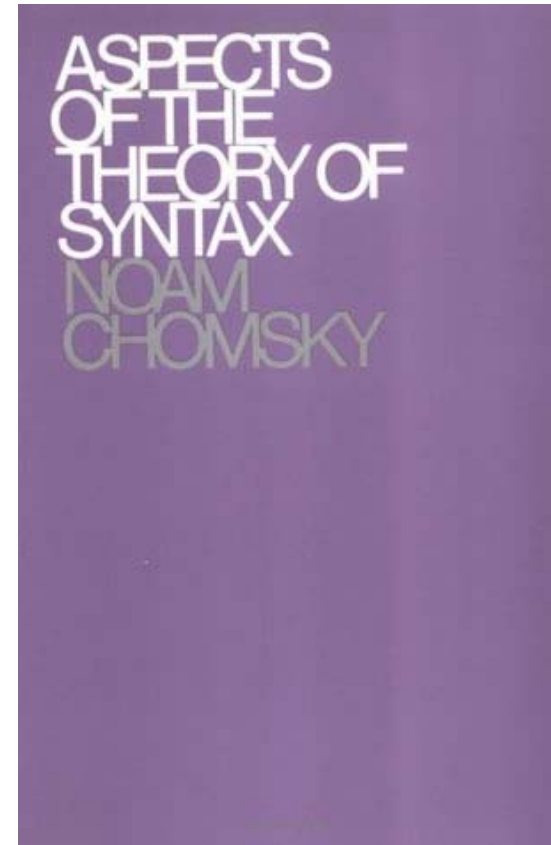
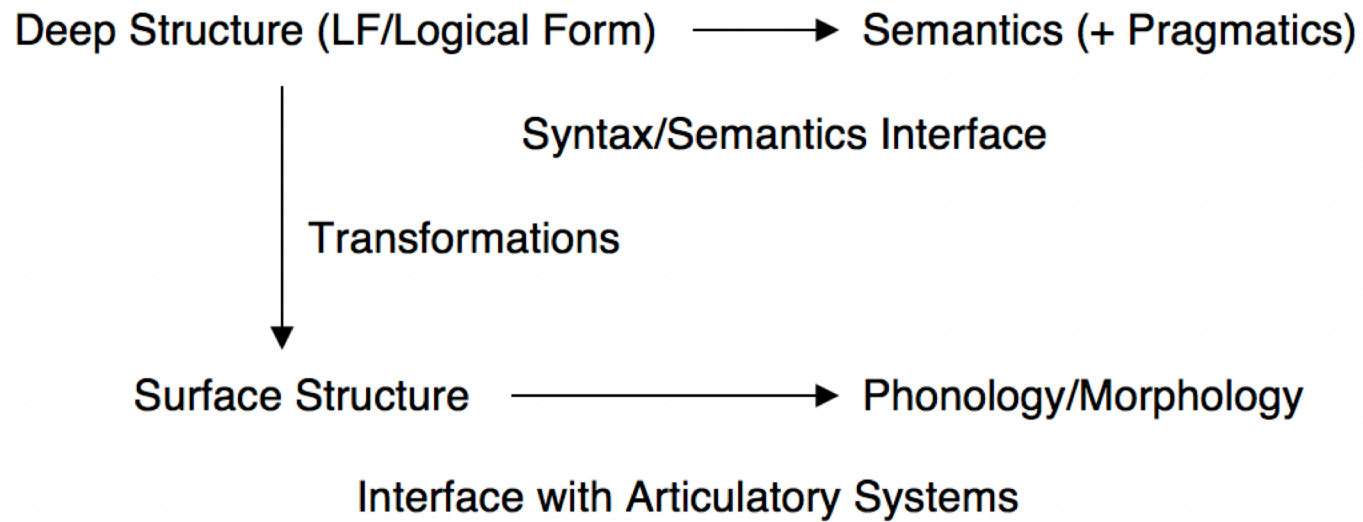
(Davidson, qtd. in May, *Logical Form: Its Structure and Derivation*)



$s$  is true-in- $L$  if and only if  $p$







Galileo believes {fears, hopes} that the earth moves.

Galileo says {asserts, claims} that the earth moves.

Galileo says, 'the earth moves'.

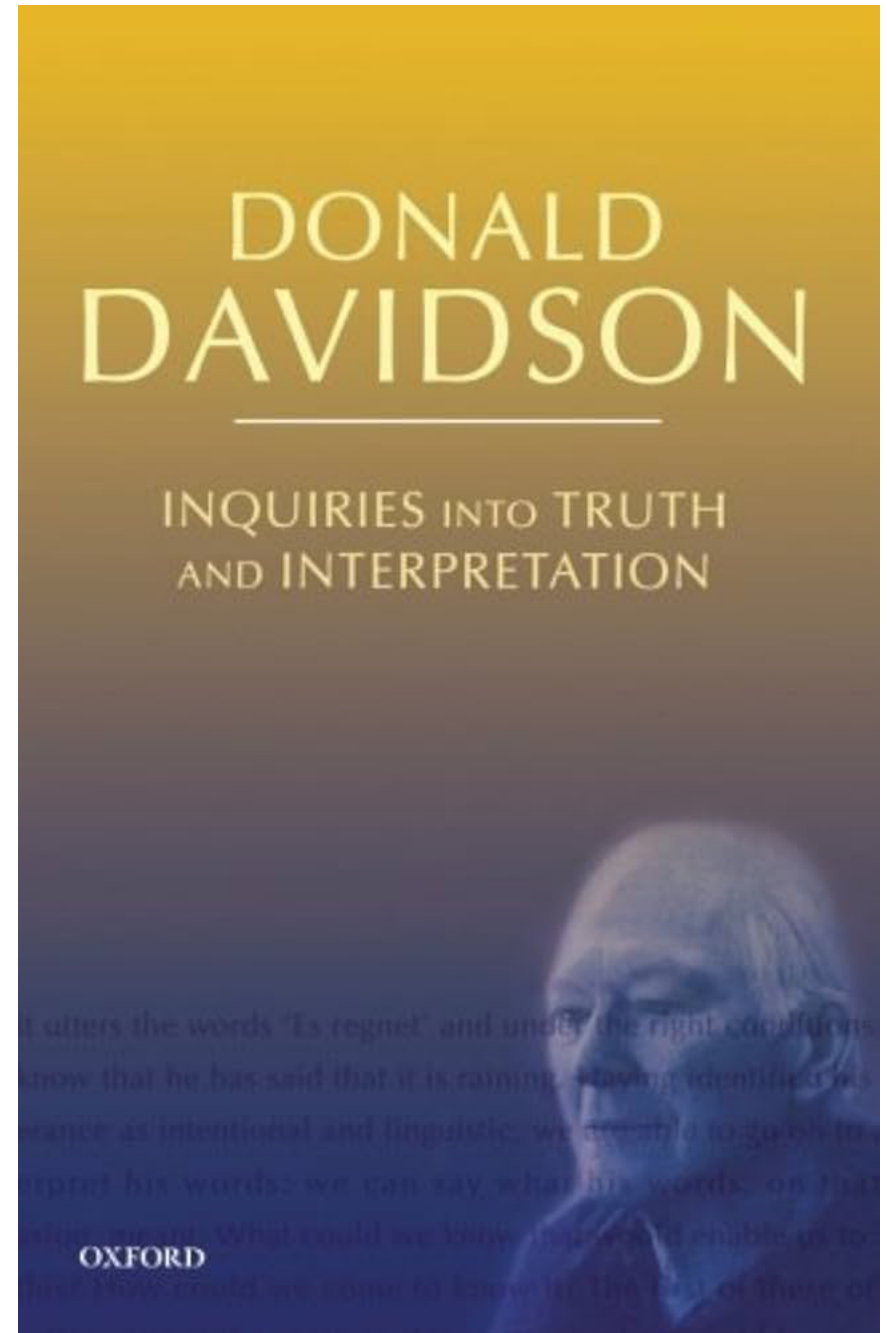
Galileo says that 'the earth moves'.

*Etc.*



‘...One trouble with such sentences is that we do not know their logical form. And to admit this is to admit that, whatever else we may know about them, we do not know the first thing.’

(Davidson, ‘On Saying That’)



Galileo believes that the earth moves.

That the earth moves is true.

∴ Galileo believes something true.

$B_{gp}$

$T_p$

∴  $\exists x(B_{gx} \ \& \ T_x)$

Galileo believes that the earth moves.

Pia believes that the earth moves.

∴ There is something they both believe.

Bgp

Bip

∴  $\exists x(Bgx \ \& \ Bix)$

A report like  
'Galileo believes that the earth moves'  
appears to be true  
just in case

Galileo stands in the belief-relation to the proposition that the  
earth moves,  
the subject and object being respectively the referents of 'Galileo'  
and 'that the earth moves'.

Instances of  $x V \textit{that } S$  are true

if and only if

$x$  bears the relation expressed by  $V$  (the V-relation) to the referent of  $\textit{that } S$ .

Galileo said, 'the earth moves'.

∴ Galileo said something.

Sgp

∴ ∃xSgx

*Etc.*



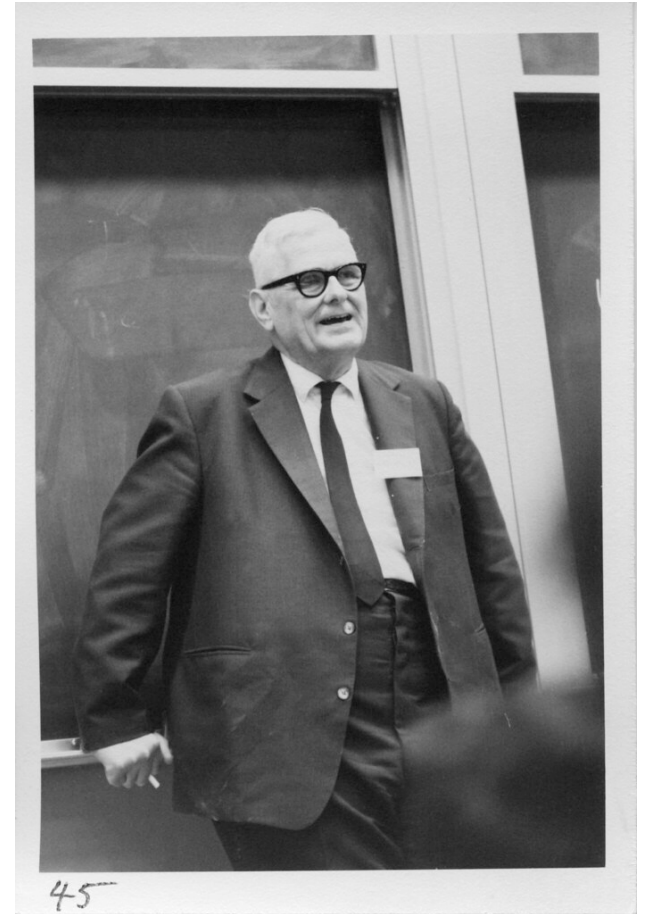
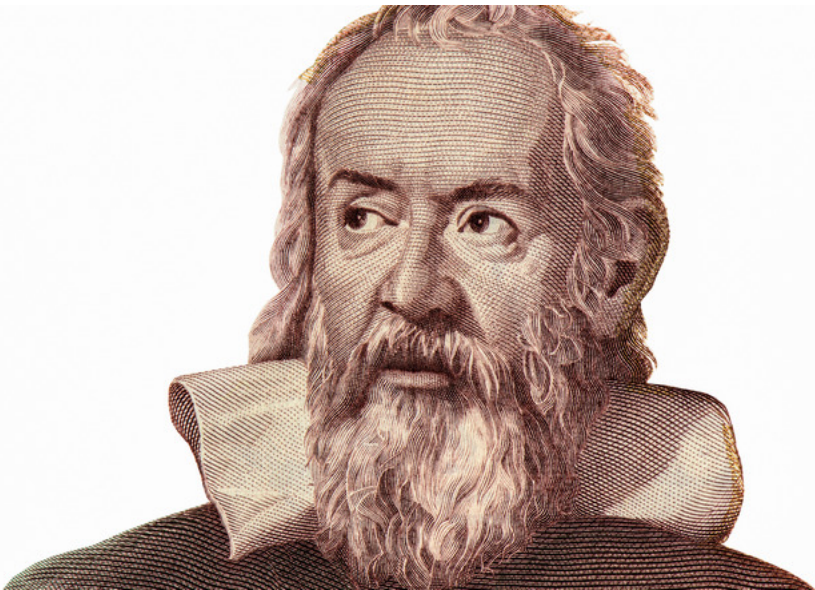
Bab believes that Hesperus shines in the evening.

Hesperus is Phosphorus.

∴ Bab believes that Phosphorus shines in the evening.



E pur si muove.



# The Language of Thought

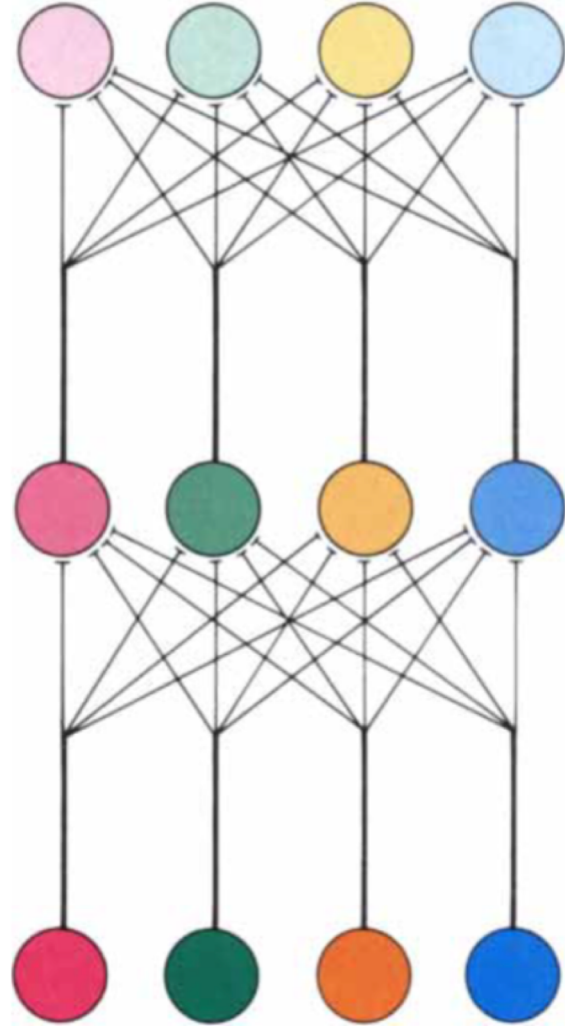
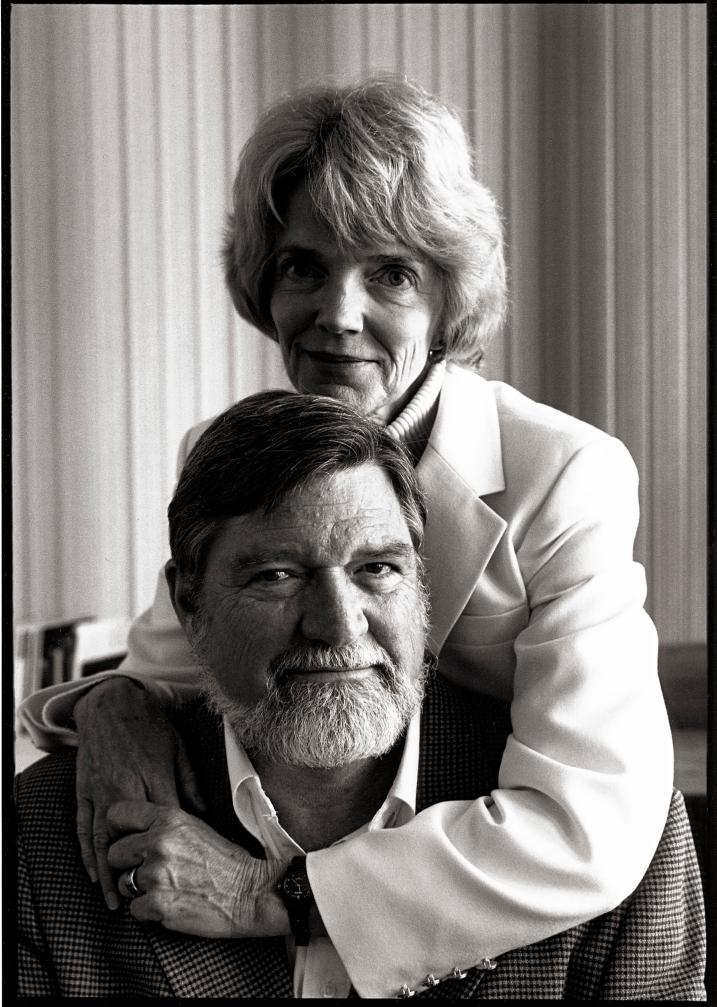
JERRY A. FODOR

*The Language and Thought Series*

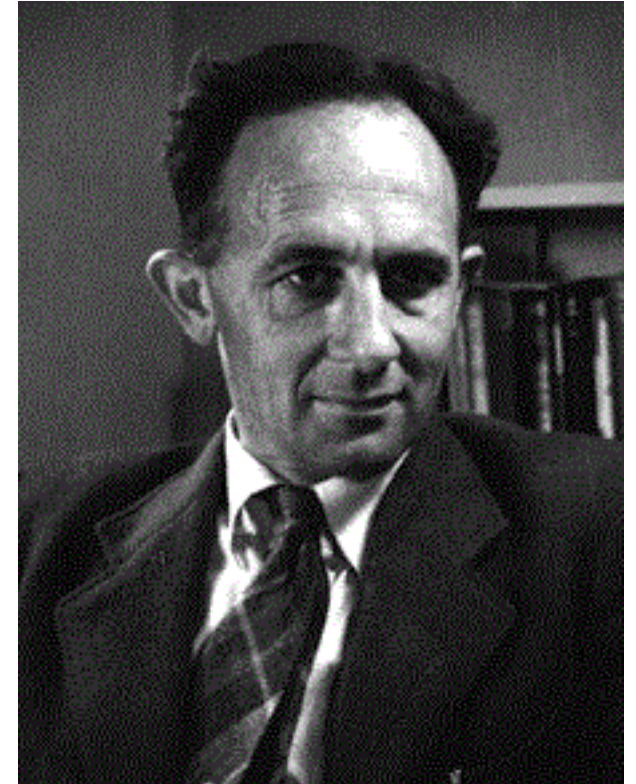
Jerrold J. Katz  
D. Terence Langendoen  
George A. Miller

SERIES EDITORS





‘We can say, if we like, that ‘X fears that there will be a nuclear war’ expresses X’s relation to *the proposition that* there will be a nuclear war, i.e. to the proposition which the sentence ‘There will be a nuclear war’ expresses (even if it doesn’t ‘designate’ it). But even if a philosophical theory might lead us to say this, it is in fact unusual for people to say ‘X fears the proposition that so-and-so’, or even ‘X thinks the proposition that so-and-so’. I am not sure what is the reason for this...’ (Prior, *Objects of Thought*)



Bellarmino fears that the earth moves.  
Bellarmino fears the proposition that  
the earth moves.

Pia hopes that Galileo will recant.  
\* Pia hopes the proposition that  
Galileo will recant.



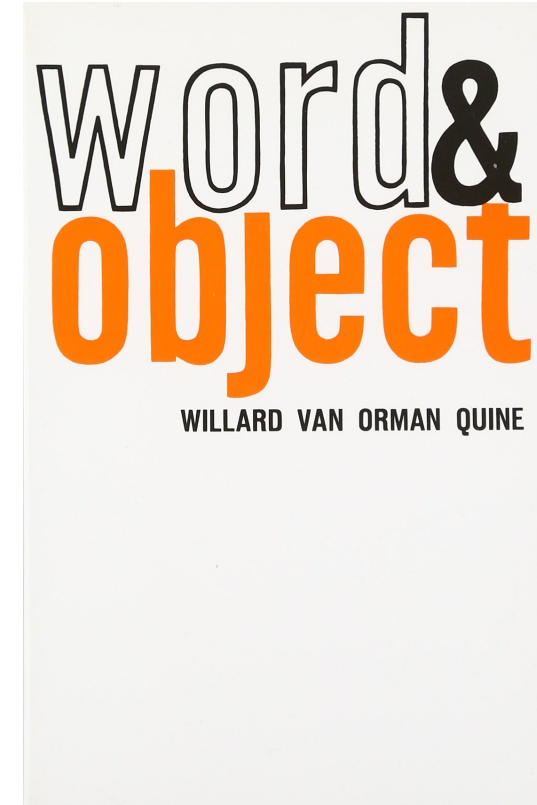
Galileo believes that the earth moves.

Galileo believes-that-the-earth-moves.

Believes-that-the-earth-moves(galileo)

Galileo believes that-the-earth-moves.

Believes(galileo, that-the-earth-moves)



Galileo believes that the earth moves.

A: The earth moves.

B: Galileo believes that.

Galileo believes that. The earth moves.

Believes(galileo, that<sub>i</sub>) : [Moves(the\_earth)]<sub>i</sub>



The truth-conditions are that

‘Galileo says that the earth moves’ is true  
if and only if

Galileo said something which *samesays* the reporter’s utterance  
of the content sentence.

The view is easily extended to attitude reports.

Galileo said, 'the earth moves'.

Galileo said 'T'-'h'-'e' '- 'e'-'a'-'r'-'t'-'h' '- 'm'-'o'-'v'-'e'-'s'

$\exists x$  Said(galileo, 'T'-'x'-'e' '- 'e'-'a'-'r'-'t'-'x' '- 'm'-'o'-'v'-'e'-'s')

'Galileo says, 'the earth moves'' is true

if and only if

Galileo said something which *sametokens* the reporter's utterance of the content sentence.

Morry went like this {vocal noise}

She went like this {gesture}



Mary sang this {a singing by me of Pop Goes the Weasel}

His face turned this color {holds up a color chip}

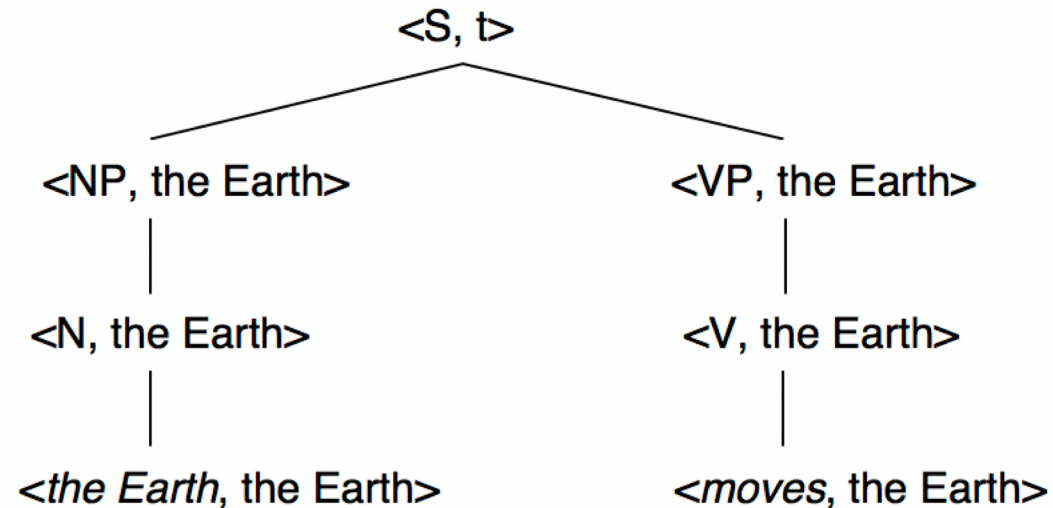
McEnroe serves like this {demonstration of the serve}



- F Jason believes that JFK went to /harverd/.
- T Jason believes that JFK went to /hahvahd/.

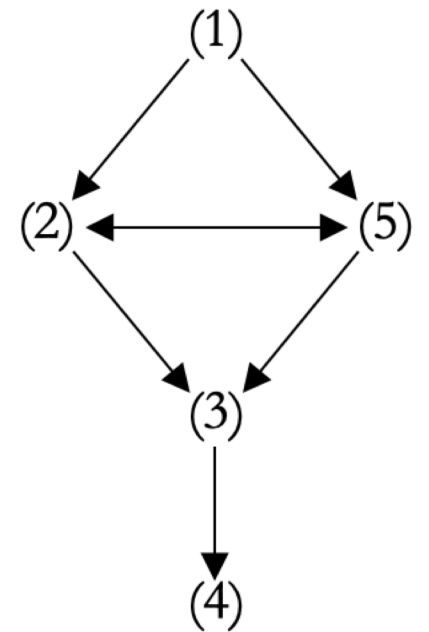
- T Kathrin thinks this door is [un[lockable]]
- F Kathrin thinks this door is [unlock[able]]

‘Galileo believes that the earth moves’ is true  
if and only if  
Galileo believes (something relevantly similar to)



- (1) Jones buttered the toast in the bathroom with a knife at midnight.
- (2) Jones buttered the toast with a knife at midnight.
- (3) Jones buttered the toast with a knife.
- (4) Jones buttered the toast.
- (5) Jones buttered the toast at midnight with a knife.

$\exists e[\text{butter}(\text{jones}, \text{the toast}, e) \ \& \ \text{in}(e, \text{the bathroom}) \ \& \ \text{with}(e, \text{a knife}) \ \& \ \text{at}(e, \text{midnight})]$



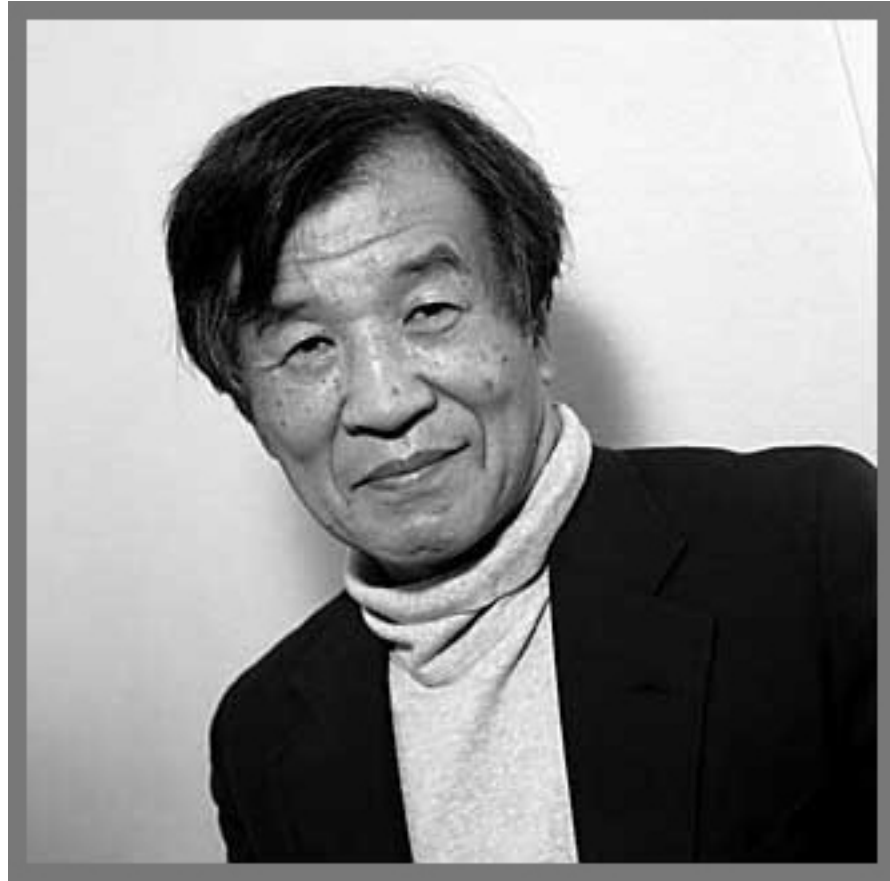
- ∴ There was a buttering.
- ∴ There was a buttering of something.
- ∴ There was a buttering of something by someone.
- ∴ Jones buttered something.
- ∴ Jones did something to something.
- ∴ Jones did something.
- ∴ Someone did something.
- ∴ Someone did something to something.

$\exists e[\text{agent}(e, \text{Jones}) \ \& \ \text{past-buttering}(e) \ \& \ \text{theme}(e, \text{the-toast}) \ \& \ \text{with-a-knife}(e)]$

$\exists e[\Phi(e)]$

$\exists e[\text{agent}(e, \text{Galileo}) \ \& \ \text{believing}(e) \ \& \ \text{type}(e, \text{that \{the earth moves\}})(e)]$



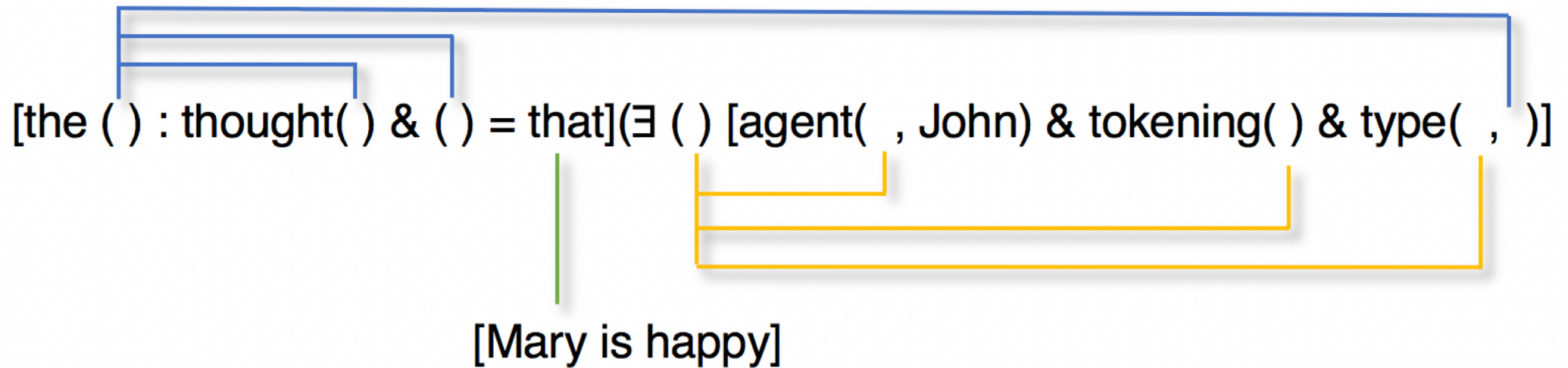
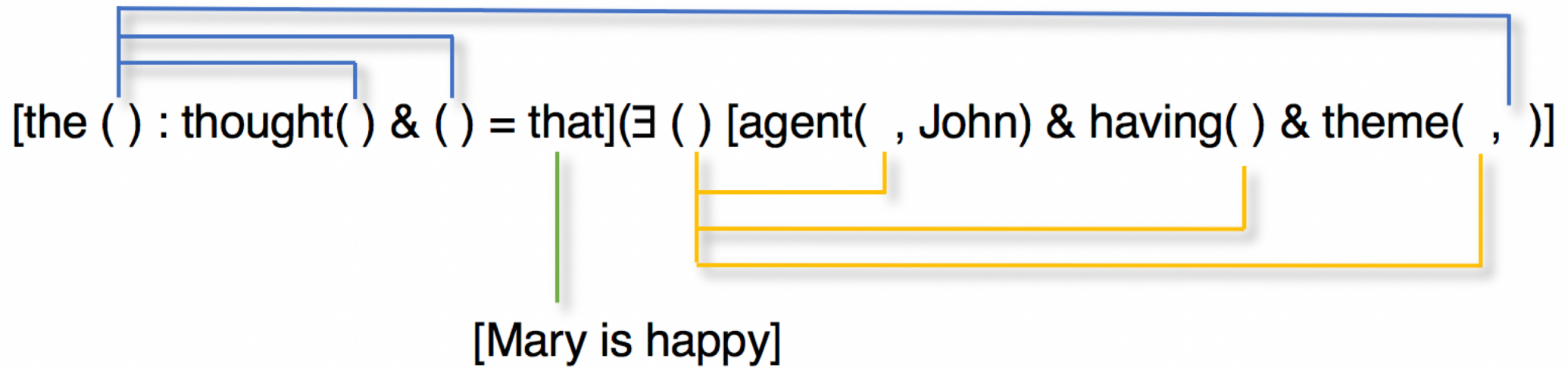


Galileo believes that the earth moves.

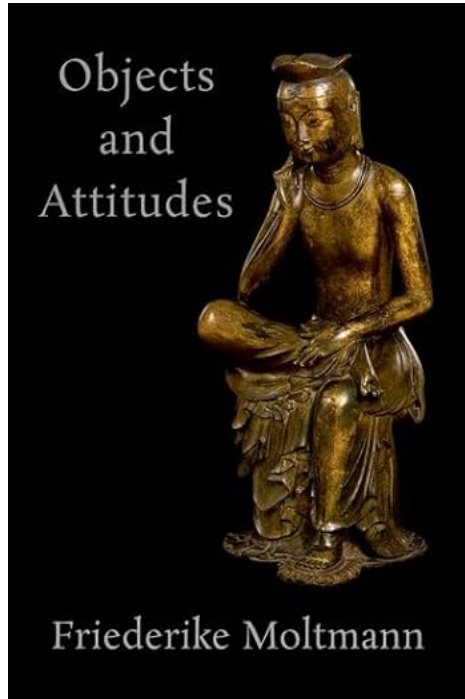
Galileo has the belief that the earth moves.

[the p : belief(p) & (p) = that {the earth moves}]( $\exists e$ [Agent(e, Galileo) & having(e) & theme(e, p)])

[the p : belief(p) & (p) = that {the earth moves}]( $\exists e$ [Agent(e, Galileo) & tokening(e) & type(e, p)])



Read: John participates as agent in a token event of the type  
 THINKING THAT: {Mary is happy}.



Reports of what  
we say, know, or  
believe

Angelika Kratzer

John Locke Lectures 2022

Lecture 1: Sorting the puzzles



Moltmann:

$\exists e[\text{believing}(e, \text{Galileo}) \ \& \ [\text{that the earth moves}](\text{product}(e))]$

(Read: There was a believing by Galileo and its product was of the that the earth moves type.)

Kratzer:

$\exists e[\text{believing}(e, \text{galileo}) \ \& \ \text{content}(e) = [[\text{'the earth moves'}]]]$

(Read: There was a believing by Galileo the content of which is the meaning of 'the earth moves', viz.  $\lambda w.\text{moves}_w(\text{the earth})$ , a function from possible worlds to truth values.)

He dreamed that he was a frog. He jumped around a bit and then was eaten by a stork.

Sue stared at the calendar. Oh no, she had to hand in that damn paper today!

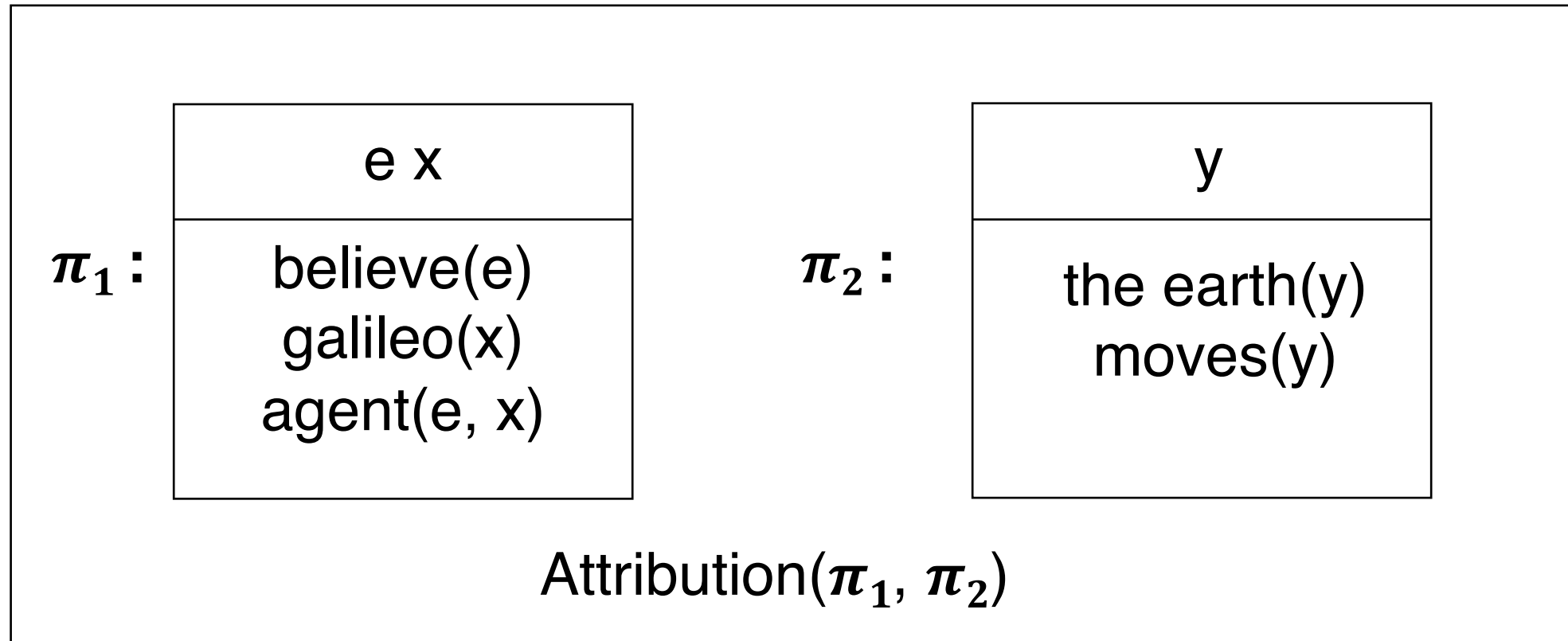
John fears this. A witch is trying to kill him.

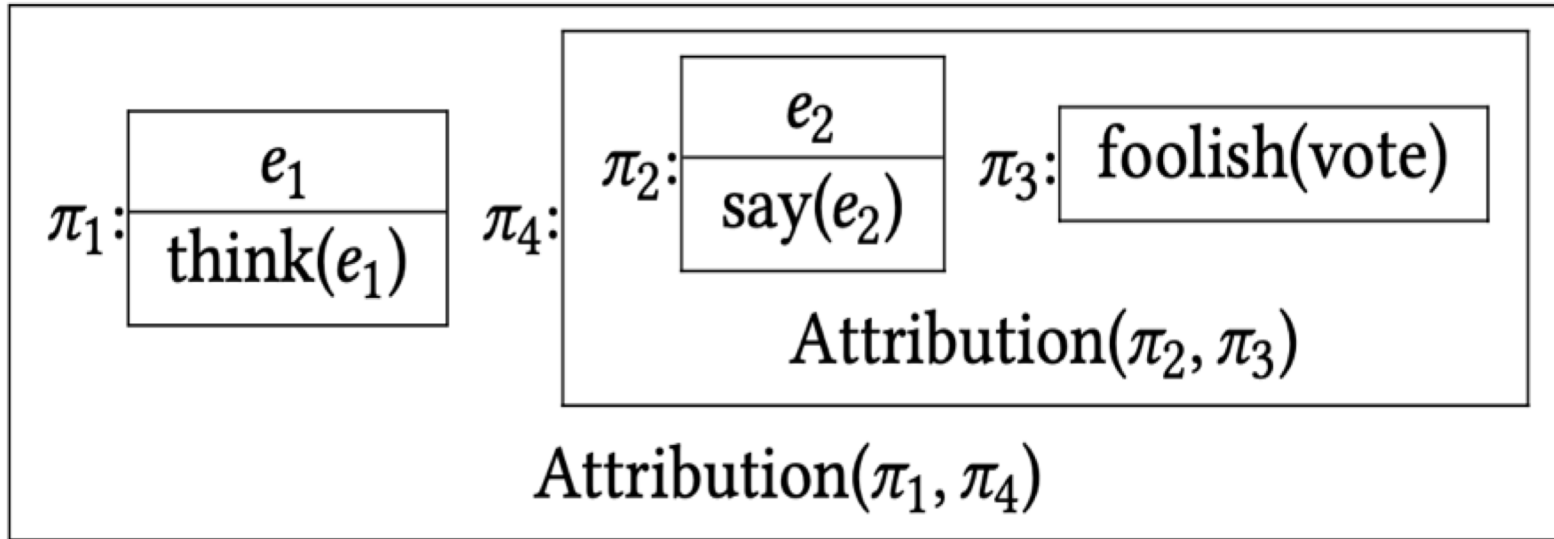
John had a dream. A witch was trying to kill him.

Galileo believes that the earth moves.

$\pi_1$  : Galileo believes

$\pi_2$  : The earth moves









Thank you