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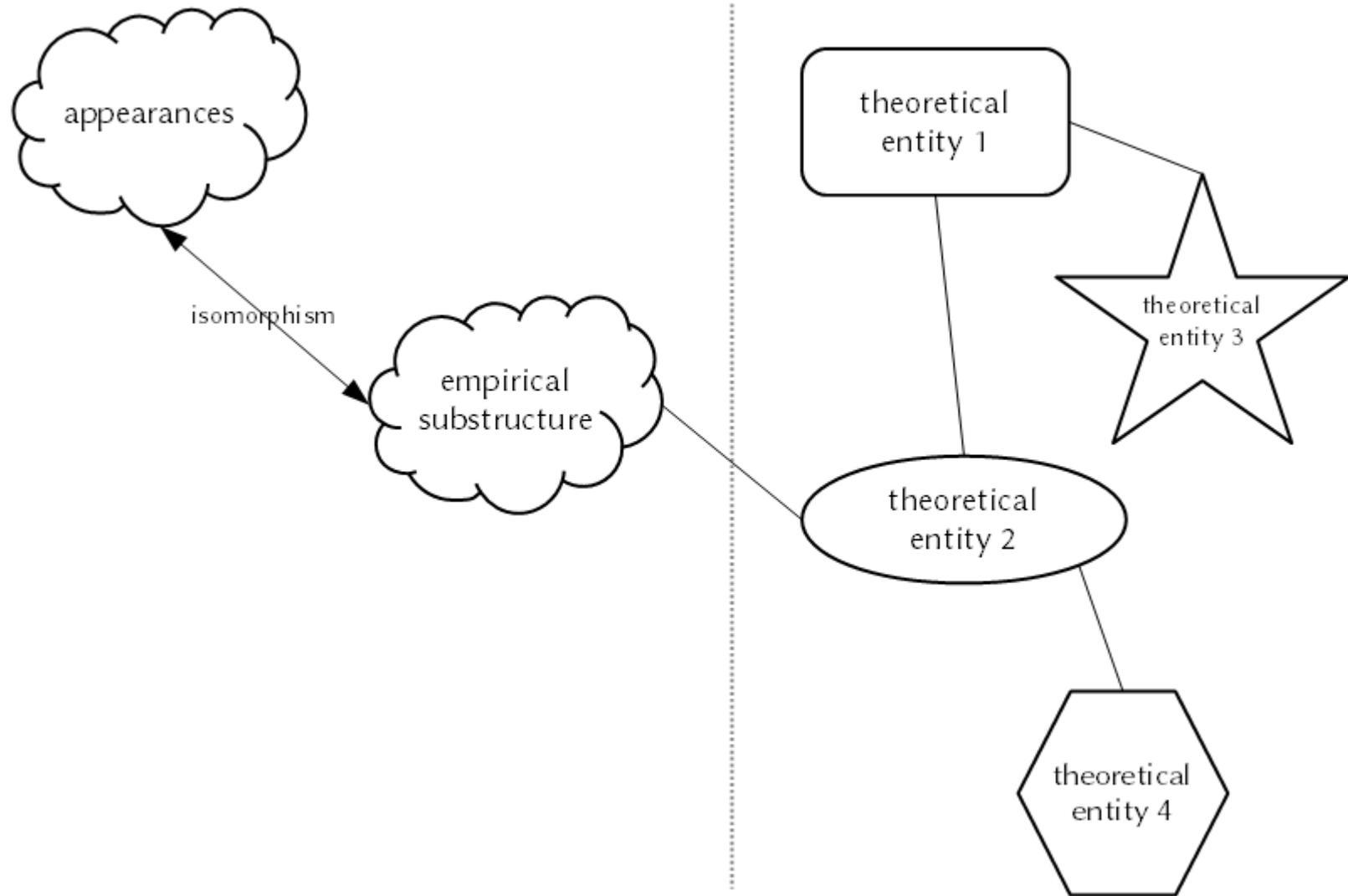
# Explaining (with) the unobservable

On Bas van Fraassen's *The Scientific Image*  
and potential applications in linguistics

# Outline

- Constructive empiricism
  - Theory as a model
  - The status of unobservable phenomena
- Causal explanations
  - Causation vs. co-occurrence
  - Salience and context dependence
  - Science as answering why-questions

# A scientific model



# Constructive empiricism

	Acceptance based on	Status of unobservable phenomena
<b>Realism</b>	truth (about observable and unobservable elements of the model)	literal (can be true or false)
<b>Instrumentalism</b>	empirical adequacy (about observable phenomena)	non-literal (can't be true or false)
<b>Constructive empiricism</b>	empirical adequacy (about observable phenomena)	literal (can be true or false)

# Causation or co-occurrence?

(1) 10% of people touch a cat and get rash. ( $C \wedge R$ )

(2) 90% of people touch a cat and don't get rash. ( $C \wedge \sim R$ )

Why admit causation in (1), but not in (2)?

**Counterfactuality test:** what would happen if the cause is “removed”?

(1a) 10% of people wouldn't have rash. ( $\sim C \rightarrow \sim R$ )

(2a) 90% of people wouldn't have rash. ( $\sim C \wedge \sim R$ )

- In genuine causation, a change on the side of causes changes something in the side of the consequences. In co-occurrence, the change on the side of causes changes nothing on the side of consequences.

# Causal explanations – salience

Suppose David's alarm clock goes off at seven a.m. and he wakes up. Now, we cite the alarm as the cause of the awakening, and may grant, if only for the sake of argument, that if the alarm had not sounded, he would not (then) have woken up. But it is also true that if he had not gone to sleep the night before, he would not have woken in the morning. This does not seem sufficient reason to say that he woke up because he had gone to sleep.

The response to this and similar examples is that the counterfactuals single out all the nodes in the causal net on lines leading to the event (the awakening), whereas 'because' points to specific factors that, for one reason or other, seem especially relevant (salient) in the context of our discussion.

(van Fraassen 1980, 115)

# Causal explanations – context dependence

Consider how the cause of death might have been set out by a physician as ‘multiple haemorrhage’, by the barrister as ‘negligence on the part of the driver’, by a carriage-builder as ‘a defect in the brakeblock construction’, by a civic planner as ‘the presence of tall shrubbery at that turning’.

(Hanson 1972 [1958], 54)

[The] salient feature picked out as ‘the cause’ in that complex process, is salient to a given person because of his orientation, his interests, and various other peculiarities in the way he approaches or comes to know the problem – contextual factors.

(van Fraassen 1980, 125)

# Why-questions

Science is not about formulating covering laws, but about answering why-questions.

A proper why-question has:

- **topic**
- **relevance**
- **contrast-class** – “Why does X have property A (rather than B, C, or D)?”

# A good causal explanation

- “saves the phenomena” (refers to observable facts),
- points out the cause that passes a counterfactuality test,
- is relevant within a proper context,
- selects only one member of the contrast-class.

# Pragmatics of explanation

The description of some account as an explanation of a given fact or event, is incomplete. It can only be an explanation with respect to a certain relevance relation and a certain contrast-class. These are contextual factors, in that they are determined neither by the totality of accepted scientific theories, nor by the event or fact for which an explanation is requested. It is sometimes said that an Omniscient Being would have a complete explanation, whereas these contextual factors only bespeak our limitations due to which we can only grasp one part or aspect of the complete explanation at any given time. But this is a mistake. If the Omniscient Being has no specific interests (legal, medical, economic; or just an interest in optics or thermodynamics rather than chemistry) and does not abstract (so that he never thinks of Caesar's death qua multiple stabbing, or qua assassination), then no why-questions ever arise for him in any way at all—and he does not have any explanation in the sense that we have explanations.

(van Fraassen 1980, 130)

# Case study – arbitrariness

- **Why-question:** Why do fricatives predominate in *sizzle*?
- **Contrast-class:** ...rather than plosives, affricates, laterals, etc.?
- **The answer(s):**
  - a) Because *sizzle* is motivated by iconicity.
  - b) Because *sizzle* is arbitrary and conventional.
    - Both answers are valid: they “save the phenomenon”, are relevant, and select only one member of the contrast-class.

# Case study – Conceptual Blending Theory (CBT)

- **Why-question:** *Why This surgeon is a butcher?* (cf. Grady, Oakley, & Coulson 2007)
- **Contrast-class:** ...rather than *a lumberjack, a cook, a stonecutter, etc.?*
- **The answer:** Because BUTCHER creates a more optimal blend (more similarities between SURGEON and BUTCHER than between SURGEON and LUMBERJACK, COOK, or STONECUTTER). Thus, CBT's optimality principles explain the selection of the source concept in the metaphor inder analysis.

# Case study – CBT

- **Why-question:** Why is the body of the Grim Reaper a skeleton? (cf. Fauconnier & Turner 2007)
- **Contrast-class:** ...rather than a partially decomposed body?
- **Answer:** ???
  - Optimality principles do not select one member of the contrast-class; a partially decomposed body seems to be a good choice too. Thus, this explanation fails (to some extent).

# References

## Constructive empiricism

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