

# Mechanisms & Downward Causation

— an account by Max Kistler

Lena Kästner

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# What's the Agenda?

*“[S]how that partial downward determination of microphysical states of a complex system is conceivable and does not violate any plausible scientific or metaphysical principles.”*

– Kistler (forthcoming), p.12

# Outline

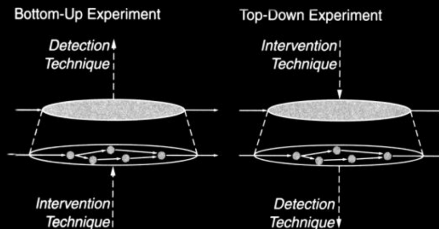
- 1 Introduction
- 2 Mechanistic Explanation
- 3 Interlevel Causation
- 4 Kistler
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# Bottom-Up & Top-Down Mechanisms

- mechanisms are organized collections of entities and activities

Kistler:

- make sense of causal processes cutting across levels
- however, causal explanation can't be reduced to mechanism



– Craver (2007)

## Glennan: 2 Kinds of Causation

- fundamental physics: particles' interactions
- all other sciences: cause and effect connected by a mechanism

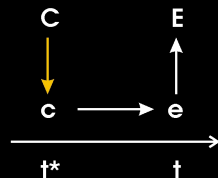
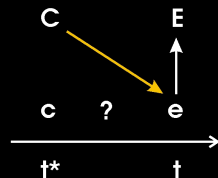
Kistler's Reply:

*"[E]ach step of analysis of a mechanism makes essential use of the notion of cause, and thus presupposes it."*

⇒ mechanisms can't be used to analyze causation

# The Car Example

- C = the driver realizes the exit
- c = nerve signals
- E = driving behavior  
(changing lanes)
- e = glucose metabolism



# Trouble with Downward-Causation

Kim's Argument:

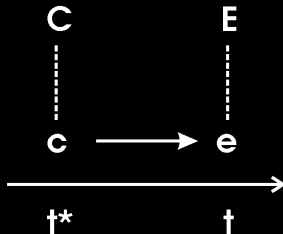
*(very sketchy version)*

- (1) causal closure of the physical
  - (2) no overdetermination
- ∴ all causes must be physical

⇒ no downward causation

# Craver & Bechtel

- interlevel causes are **mechanistically mediated effects**



*“[They] are **hybrids of constitutive and causal relations** in a mechanism, where the constitutive relations are interlevel and the causal relations are exclusively intralevel.”*

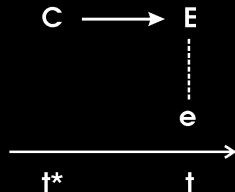
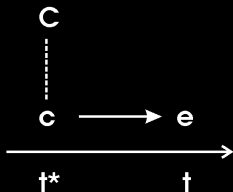
– Craver & Bechtel (2006), p.547

# Kistler's Interpretation

Constitution:

- object is constituted by the set of its parts but not identical to it
- logical/ metaphysical relation
- antisymmetric relation, bottom-up only
- 'multiple constitution' possible

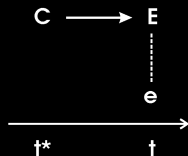
Two Scenarios:



## Scenario 2

### Modifications:

- it's not constitution – E constrains e
- partial constraint only
- constraints can exert both bottom-up and top-down influences



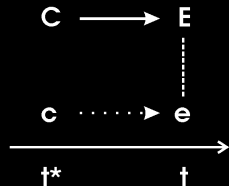
*“Constitution and constraint, which are both forms of non-causal determination, make causal relations crossing levels of composition conceivable.”*

– Kistler (forthcoming), p.9

# Kistler's Reply to Kim

## Argument from Chaos Theory:

- closure of the physical is debatable
- brain could exhibit **deterministic chaos**:  
e cannot be predicted from c at  $t^*$
- macro-level causal laws ( $C \rightarrow E$ ) may allow prediction of e at  $t^*$



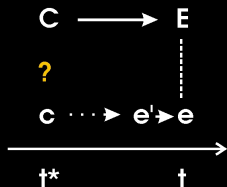
⇒ **mechanistic explanation helps us identify downward-causation**

# What Would Woodward Say?

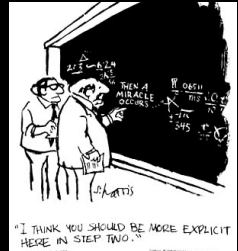
- no talk about levels
- this is token causation
- causation analyzed as manipulability
- But what intervention could test whether E causes e?
- If E *constrains* e, does it causally contribute?
- Can it be captured in Woodward's framework?
- incorporation into structural equations apparently raises difficulties ...

# Criticism

- Multiple constitution but not multiple realizability?
- Why can't constitution hold between both C and c, *and* E and e?
- Since a constraint is not causal, where is downward-causation?
- If this is downward causation, are there not two kinds of causes?
- Chaos is still deterministic.
- Doesn't Kim's argument apply at the very last moment?
- What's the relation between C and c?



# Thank You!



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