

From mechanisms to mechanistic explanatory texts

Matej Kohar
BSPS Annual Conference, Oxford
5th July 2018



META 

RTG Bochum · Osnabrück
Situating Cognition

Outline



1. The problem: Are more details better?
2. Craver and Kaplan: Contrastive phenomena
3. Ockhamian worries
4. Solution: Mechanistic explanatory texts

The problem



- Are more details in an explanation always better?
- Sketch -> Schema -> Mechanism
- Functional explanation?
- Relevance?

1. The problem



“[According to mechanists], not only does veridical representation of the causal mechanism make a model explanatory, the more accurate and detailed that representation is, the more explanatory the model will be [...] this view mistakenly implies that more accurate detail concerning mechanisms is always better.” (Batterman and Rice 2014: 352, cited in Craver and Kaplan 2018: 3)

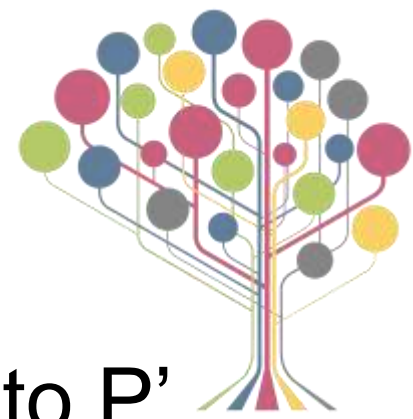
“[...] what seems to be missing from the mechanistic outlook is an analytical category: a notion that would cover cases in which a model is deliberately ‘sketchy’[...] In other words, the judgement that the [Hodgkin and Huxley] model [of the action potential] is a sketch stems, I think, from a gap in the mechanistic outlook itself, in which room has not been made for the explanatory fruits of abstracting away from structural detail.” (Levy 2014: 488, cited *ibid.*)”

2. Craver and Kaplan: contrastive phenomena



- Mechanists not committed to “more details are better” just “more relevant details”
- Salmon-Completeness (SC): The Salmon-complete constitutive mechanism for P versus P' is the set of all and only the factors constitutively relevant to P versus P' . (Craver and Kaplan 2018: 20)
- More Relevant Details Are Better (MDB_r): If model M contains more explanatorily relevant details than M^* about the SC mechanism for P versus P' , then M has more explanatory force than M^* for P versus P' , all things equal. (Craver and Kaplan 2018: 23)

2. Craver and Kaplan: contrastive phenomena



- Mechanisms are for P as opposed to P' ,
not for P *simpliciter*
- Constituents of the mechanism for P as
opposed to P' turn P into P' when wiggled
- A more complete model of the mechanism
for P as opposed to P' is still better

3. Ockhamian worries



- Craver (2014) is committed to a strong ontic conception of explanation
- In particular: mechanisms are real worldly objects/processes, whether we discover them or not
- The hierarchical nature of mechanistic explanation arguably commits Craver to the same view about phenomena

3. Ockhamian worries



- Too many mechanisms:
 - @P: car travels at 90km/h
 - P': car travels at 88km/h
 - P'': car travels at 80km/h
 - P*: car stands still
- 3 mechanisms, 2 likely coextensive
- But NB: the class of contrasts is unbounded so in fact there is an unbounded number of coextensive mechanisms here.

3. Ockhamian worries



- Too many models:
 - Trend towards acknowledging the need for multiple models (Hochstein 2015)
 - But not like this: in scientific practice, phenomena are not individuated by contrasts
 - One model still used to account for numerous contrasts

4. Solution



Craver and Kaplan

Kohar

Mechanism

Mechanism

(empty)

Mechanism description

Mechanistic model

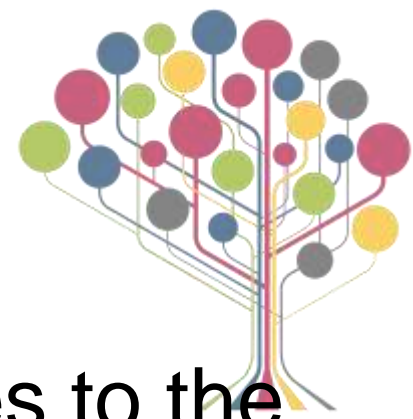
Mechanistic explanatory
text

4. Solution



- Mechanisms:
 - real objects/processes, one per phenomenon broadly individuated
- Mechanism descriptions:
 - texts which describe the operation of a mechanism
 - completeness norms apply here
- Mechanistic explanatory texts:
 - answers to why-questions
 - contrasts come in here

4. Solution



- Basic idea: identify a set of changes to the mechanism for the phenomenon, which, had they been actual, would change it into a phenomenon that belongs to the contrast class
- Affinity with mutual manipulability strategy for discovery – many explanations are found in top-down experiments

4. Solution



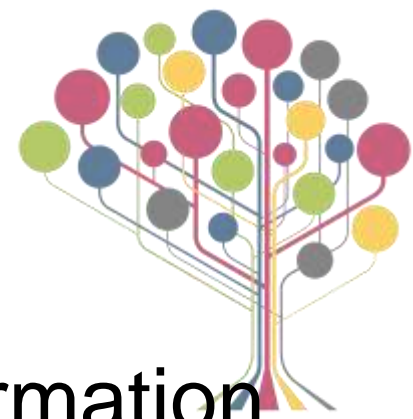
- Explanatory request: $\langle f, G \rangle$
 - f : a token phenomenon
 - G : a contrast class of phenomena defined by membership conditions
 - $f \notin G$
 - G can be empty
- Why did f occur rather than some $g \in G$?

4. Solution



- Answer: “Because C_f rather than C_G
 - C_f : a subset of components of mechanism M_f for phenomenon f
 - C_G : a set of counterfactual mechanism components
 - If C_f were replaced by C_G in M_f , the resulting mechanism would underlie a phenomenon $g \in G$

5. Problem solved



- Explanatory texts contain only information relevant to the contrast
- Explanatory texts describe the appropriate level of mechanism
- Explanatory texts can be constructed from incomplete mechanism descriptions

Thanks for attention.
Questions?

Bibliography



- Batterman, R. W., & Rice, C. C. (2014). Minimal Model Explanations. *Philosophy of Science*, 81(3), 349–376.
<https://doi.org/10.1086/676677>
- Craver, C. (2014). The Ontic Account of Scientific Explanation. In M. I. Kaiser, O. R. Scholz, D. Plenge, & A. Hüttemann (Eds.), *Explanation in the Special Sciences: The Case of Biology and History* (pp. 27–52). Dordrecht: Springer.
- Craver, C., & Kaplan, D. M. (2018). Are More Details Better? On the Norms of Completeness for Mechanistic Explanations. *The British Journal for the Philosophy of Science*.
<https://doi.org/10.1093/bjps/axy015>
- Hochstein, E. (2017). Why one model is never enough: a defense of explanatory holism. *Biology & Philosophy*, 32(6), 1105–1125.
<https://doi.org/10.1007/s10539-017-9595-x>
- Levy, A. (2014). What was Hodgkin and Huxley's Achievement? *The British Journal for the Philosophy of Science*, 65(3), 469–492.
<https://doi.org/10.1093/bjps/axs043>