Between Philosophy of Science and Medicine:

Mechanism, Reduction and Homeostasis

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How can we talk about causation in an homeostatic mechanism?

- Reductive causal explanations
- Mechanistic causal explanations
- Statistical causal explanations
- Russo-Williamson thesis
  - Possible improvements?

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- Russo-Williamson thesis
  - **Possible improvements?**

Russo-Williamson thesis
Russo and Williamson, 2007.

- Epistemic causality supported by both mechanistic and statistical evidence

- But how do these two types of evidence interact to provide evidence for causation?

- Might we be able to strengthen this account by showing how this interaction happens?
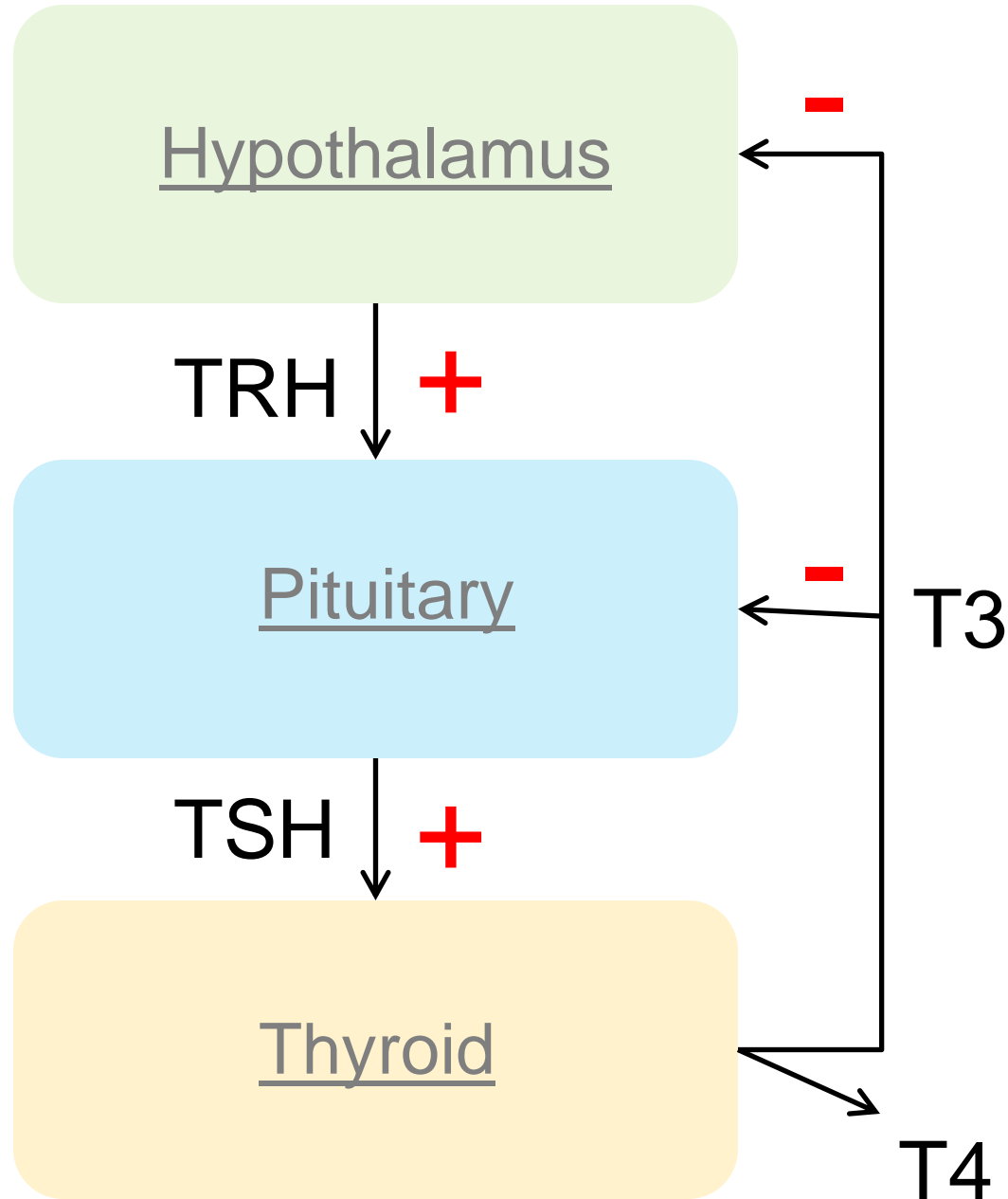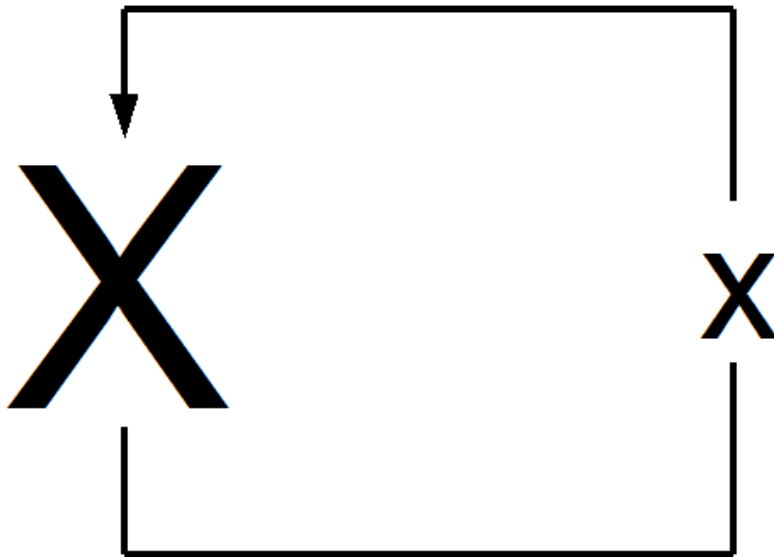
What is the cause of X's x-ing?
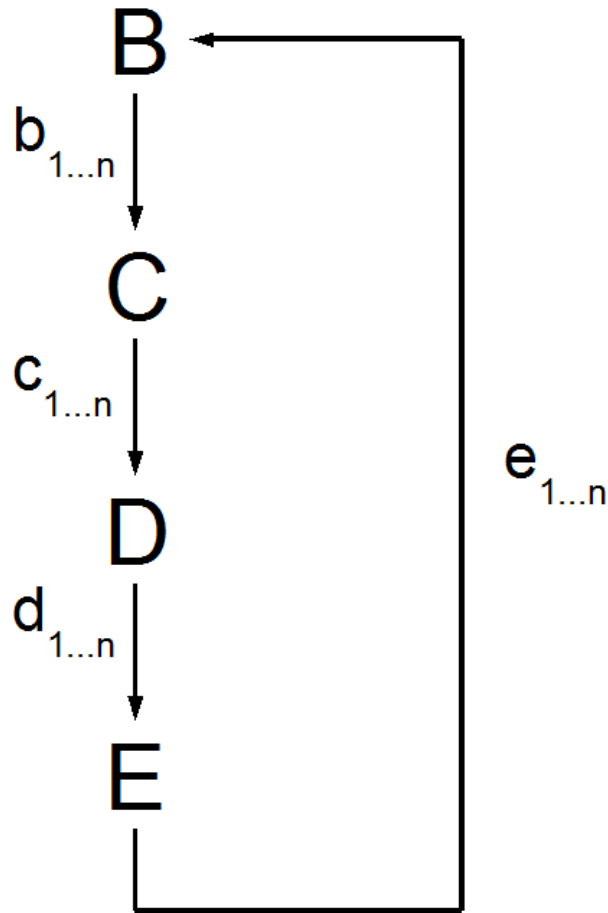
Machamer, Darden and Craver. 2000.
Craver, 2007.

Uppercase – entity

Lowercase – activity

B – pituitary gland
C – TSH level
D – thyroid gland
E – T3 level

Each entity (B—E) has an associated set of potential activities $\{b_{1..n}\},\{c_{1...n}\}...\{e_{1...n}\}$.

So we have a range of potential activities within our mechanism.

But which activities actually happen?

B

$b_{1...n}$

C

$c_{1...n}$

$e_{1...n}$

D

$d_{1...n}$

E

Statistical causal explanations
Salmon, Jeffrey and Greeno. 1971 ; Salmon, 1984; Salmon, 1989

- *An* [SR] *explanation is an assembly of facts statistically relevant to the explanandum...* [Salmon, 1984: 45]

- We give conditional probability distributions for the chance of each activity occuring based upon its antecedants...

- $p(b_1 \mid e_1) > p(b_1 \mid \neg e_1)$ means that e_1 is SR to b_1, hence b_1 occurs because of e_1

Advantages of this approach

- Reflects interdependant nature of mechanistic and statistical evidence in making causal claims or supporting causal explanations

- SR already takes account of some difficult causal situations (screening off relations, partition inhomogeneity, confounding factors...)

- Hopefully tie to mechanism may ameliorate the need for *a priori* judgements of causal relevance

Suggested methodology

- Formulate mechanism
- Epistemically partition data using entity/activity pairs derived from the mechanism for both explanandum and explanans
- Determine associated probability relations
- (Potentially) reformulate mechanism
- Repeat

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