Tenenbaum Tutorials, Spring 2024

Philosophy of psychiatry:

Natural kinds and the symptom network theory of psychopathology

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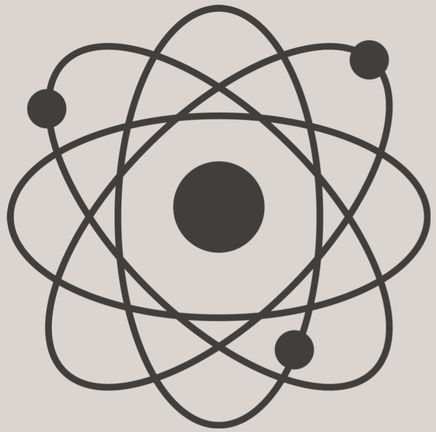
Introduction

What are natural kinds?

- Natural kinds: groups of objects which have some theoretically important property in common (REP)
- Useful for core practices of science like explanation, inference, and the creation of taxonomies

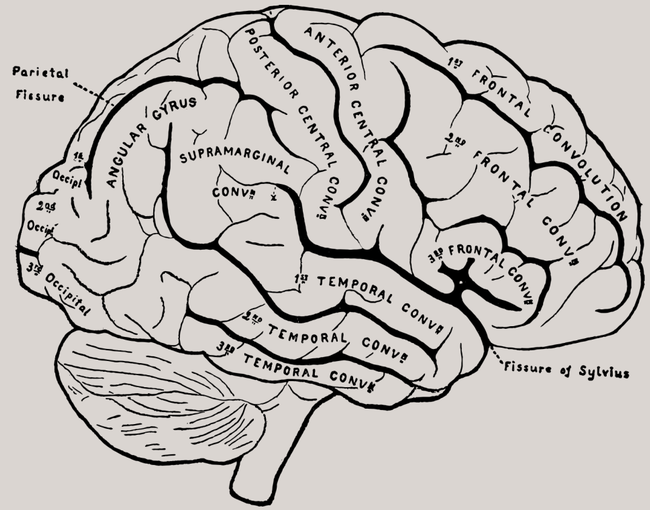


Introduction

The problem of psychiatric kinds

- Shift towards a biomedical paradigm starting with the publication of the DSM-III in 1980
  - Mental disorders = brain disorders
  - An essentialist view of psychopathology

- Challenges
  - No reliable biomarkers
  - Clinical heterogeneity
  - Multifactorality of disorders



The symptom network theory

Claim 1: Symptoms (and their relations) are constitutive of disorders

There is no common cause/pathophysiology for mental disorders. Deviation from a neurological norm does not constitute mental disorder — different clusters of symptoms do.

Claim 2: Symptoms are causally interrelated

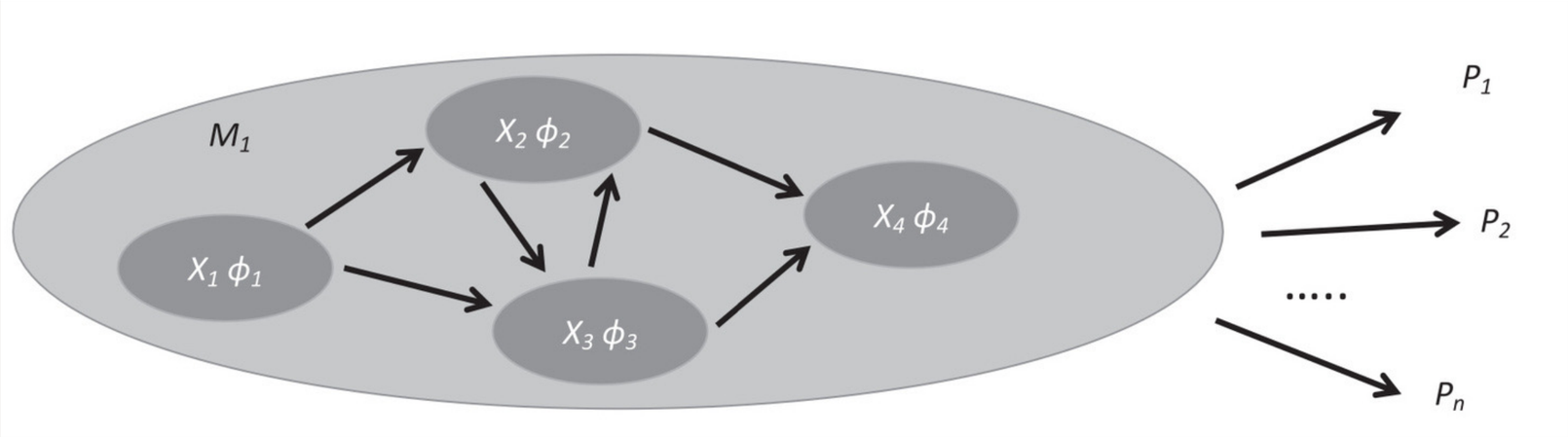
Symptoms emerge and persist because they are part of causal networks. While these connections may be underpinned by (neuro)biology, they are also sense-making.

Theories of natural kinds

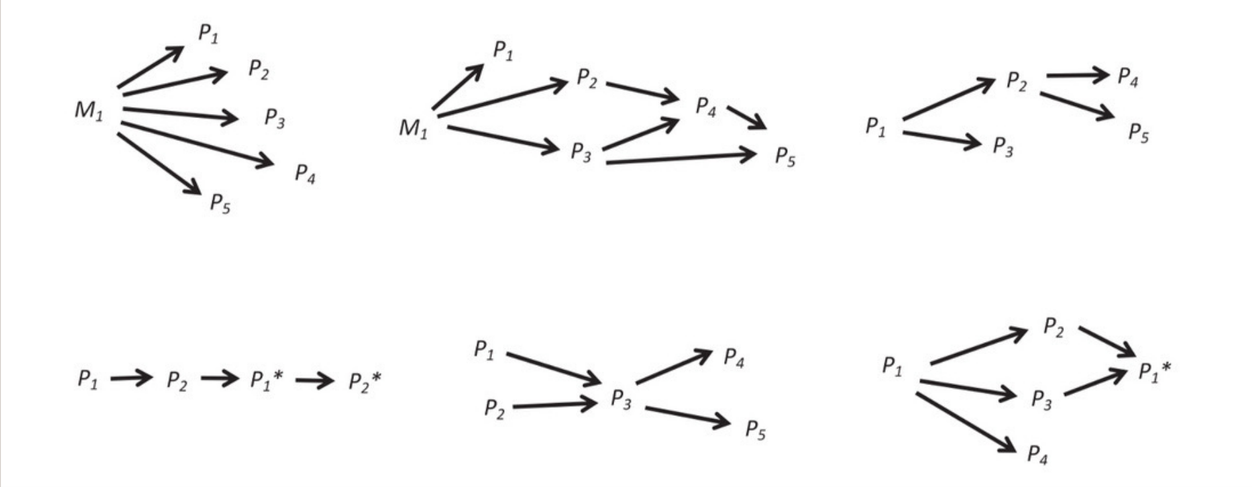
- Mechanistic property cluster kinds
  - Kendler et al. 2011
  - Inspired by Boyd's account of biological species
    - A "homeostatic" causal mechanism is responsible for producing and maintaining a cluster of properties
    - Properties (symptoms) may also cause each other

- Simple causal kinds
  - Craver 2009 (p. 579), Khalidi 2018
  - A more relaxed view of kinds → drops the mechanism requirement
  - Kinds are distinctive causal networks that recur in nature

MPC kind structure



SC kind structures



Objection to mechanisms

P1: The MPC view individuates psychiatric kinds by making reference to mechanisms underlying common sets of symptoms.

P2: Decomposed and localized neural structures are the components of the phenomenon to be explained, namely, the core cognitive features of disorders.

P3: The same neural structures are implicated in multiple disorders.

P4: The same cognitive features are implicated in multiple disorders.

C1: Therefore, the same mechanisms underly multiple disorders.

C2: Therefore, in making reference to mechanisms to individuate psychiatric kinds, the MPC view fails.

Objection to simple causality

- An objection to SC kinds must come from an objection to the causal claim or the recurring structure claim.

- Inter-symptom causality
  - Interventionist theory of causation
    - X is a cause of Y iff there is a possible intervention on X that changes Y
    - An intervention is a manipulation of the cause and only of the cause
    - The intervention is, in principle, possible.

Objection to simple causality

P1: SC kinds and symptom networks can both plausibly be interpreted using an interventionist theory of causality.

P2: Surgical intervention on one node/symptom in a symptom network (holding the values of all other's constant) is highly unlikely.

P3: The independence of an intervention X from a variable Z that may also cause Y is highly unlikely in mental disorders.

P4: There is a significant degree of conceptual overlap among symptoms, making successful targeted interventions unlikely.

C1: Interventionism likely fails to support the causal claims of the symptom network theory.

C2: SC kinds fails as an account for symptom networks.

An alternative: topological explanation

Graph theory

The structure of networks is describable in terms of certain mathematical properties:

- Centrality
- Degree
- Modularity
- Clustering
- Efficiency
- Characteristic path length

Topological explanation

- Describes a counterfactual dependency between a system's topological properties and its network dynamics (Kostic, 2020)
  - If the topological property would not have been there (e.g. small-worldness), the network dynamics would have been different

Advantages of topological explanation

1.

Can be applied to non-decomposable systems. Abstracts from lower-level causal detail.

2.

Potential for causal claims at the systems level.

3.

No single variable in a graph is causally responsible. Focus is on connections, not factors.

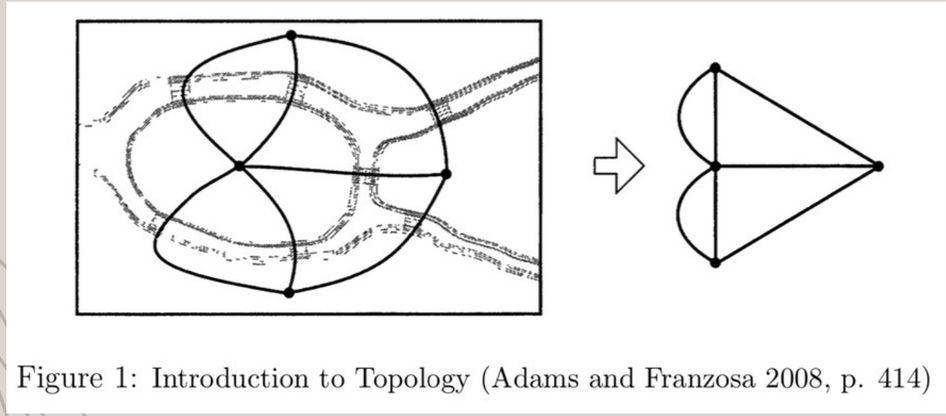
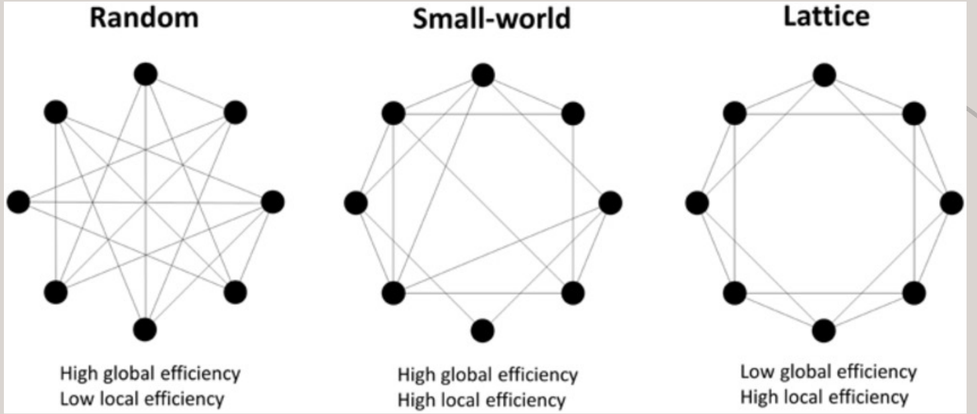


Figure 1: Introduction to Topology (Adams and Franzosa 2008, p. 414)



Conclusion

While MPC and SC views of natural kinds may appear to correspond to the symptom network theory of mental disorders, it is challenging to account for their causal-mechanical claims. A topological explanatory strategy may ultimately be more fruitful in understanding symptom networks.

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Thank You

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