



# Psychiatric classification: an a-reductionist perspective

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# ① Disease classification

Classification schemes for mental illness serve a variety of goals.

- > Medical doctors: to design and apply treatments.
- > Researchers: to design studies and carry them out.
- > Patients and their families and friends: for explanation and understanding.
- > Philosophers: to furnish a metaphysics?

Whether a classification scheme is “good” depends on what we value in it.

# This talk

A general goal of classification is that it allows us to predict and intervene.

- > The problem of classification is a version of the so-called *reference class problem*.
- > This points us to particular statistical methods, namely *model selection* and *causal modeling*, in particular causal variable selection.
- > The resulting outlook is empiricist, pragmatic, eclectic, and thereby *a-reductionist*. Furthermore it supports a mild form of realism about disorders.

## ② Conventions

Much of this paper is set against the background of work with Hanna van Loo.



We proposed a form of *conventionalism* about mental disorders. The disorders are real but perspectival.

# How to facilitate psychiatry?

We steer a course between two opposing views on disease classification: realism and constructivism.



Conventionalism invites us to ask: what set of disease definitions will facilitate psychiatry best?

### ③ Psychiatric reference classes

A good classification allocates patients to the right *reference classes* or groupings.



Several talks were concerned with this task of finding the “right” characteristics or structure.

# The right control panel

A good “control panel” includes the right set of patient characteristics for the purpose of prediction and intervention.

- > We want to select characteristics, and thus identify groups, that determine *stable chances*.
- > Such characteristics determine a classification that allows for *reliable predictions*.
- > And it helps to identify *effective interventions*, ones that give stable chances of success.

Perhaps this contributes to an *understanding* of disorders.

# Reference class problems

So can we find the appropriate reference classes of psychiatric patients?

- > What is the salient group for chance ascriptions to a particular individual? Chances must be stable within the group.
- > Is that idea even coherent? It seems to clash with the reduction of psychiatric phenomena to a single deterministic level of description.
- > And if we manage to define salient patient groups, what guarantees that they will align across all prediction and intervention tasks?



# Emergent chances

Some ideas from the philosophy of science help us to ground the requisite notion of chance conceptually.



Key concepts are emergentism and multiple realizability: the idea of irreducible chances for high-level descriptions is coherent.

## ④ Model selection

If the goal is prediction, the problem of classification becomes to some extent statistical.

- › Searching salient characteristics comes down to choosing statistical variables, or a statistical model.
- › This choice is regulated by expected predictive performance, and therefore by-and-large data-driven.
- › Coherence across prediction task can be imposed as a modeling requirement.

Model selection offers a particular grip on *multi-level* disease classification.

# Overfitting

Model selection tools systematically guard against so-called overfitting.



Refining the classification may improve the fit to data, but it will generally make predictions less reliable.

## ⑤ Causal modeling

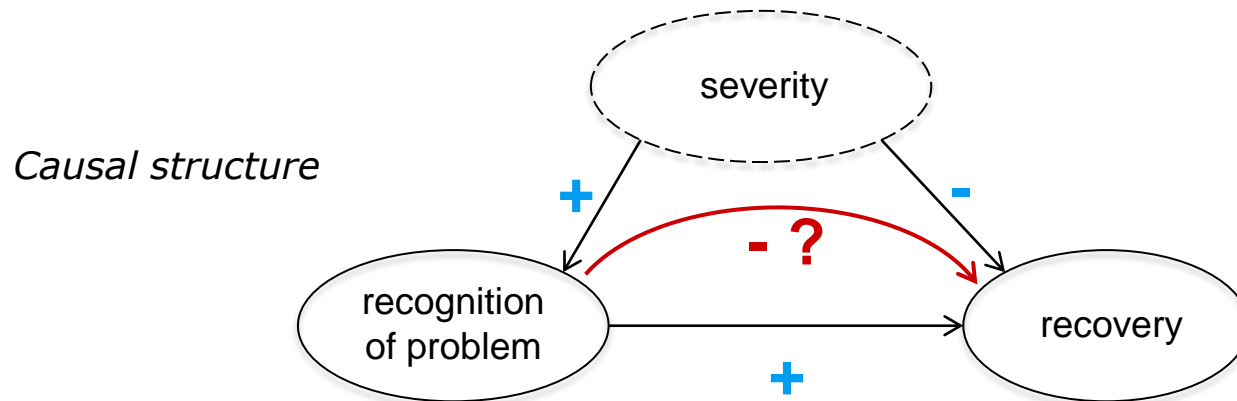
Classification is used in designing treatment programs and allocating individuals to them.

- › We want to define disorders in order to facilitate maximally effective clinical interventions.
- › Such interventions have to be based on the causal structure among patient characteristics.
- › And they are mostly stochastic, i.e., they merely raise the chance of some desired outcome.

How can we tailor classification to the goal of facilitating interventions with good stochastic properties?

# Causal networks

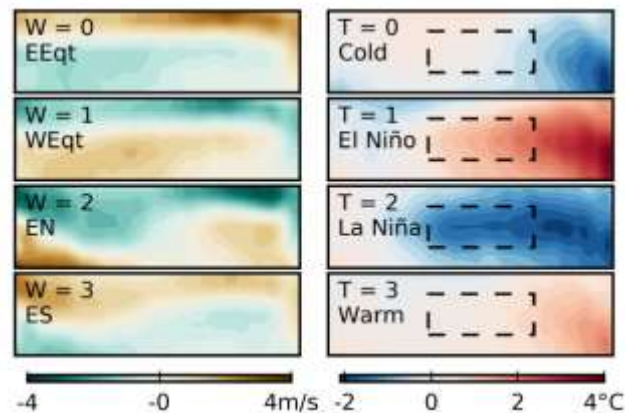
Causal networks help to determine classifications that support better predictions and interventions.



This criterion for classification seems applicable *across all levels of description*.

# Defining causal macro-variables

Next to identifying causal factors, we want to construct global characteristics that are causally salient.



Recent work by Chalupka, Eberhardt and others on causal feature learning may serve as an inspiration.

# Conventional causal powers?

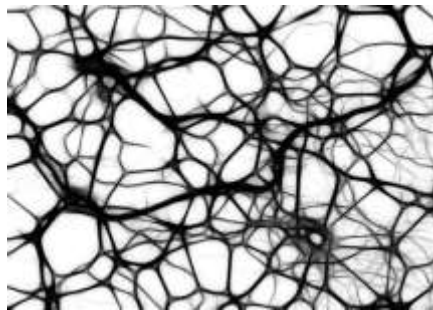
If the causal factors are decided on through mere convention, how can they be carriers of causal power?



We should deflate the notion of cause. Causal efficacy of the factors derives from robust or empirical patterns, independently of the level of description.

## ⑥ A-reductionism

In this view, a classification may employ characteristics from several different levels of description.



This offers an alternative to classifications that are based on an assumed metaphysics, e.g., strictly neuro-scientific.



# Smallism, physics envy, etc.

We need not suppose that our statistical classification efforts will pick characteristics from a single level.

- › The range of eligible properties includes bio-markers, socio-economic factors, and everything in between.
- › Psychiatry's desire may be to resemble the natural sciences, and so resort to a smallest level of description.
- › But the search for adequate concepts is ultimately an empirical matter.
- › From the empiricist point of view, characteristics from different levels are on a par.

# Data-driven classification

Big data and machine learning methods hold a promise for systematically searching salient characteristics and concepts.

CHRIS ANDERSON: FUTURE DELUGE 12:00 PM  
**THE END OF THEORY: THE DATA  
DELUGE MAKES THE SCIENTIFIC  
METHOD OBSOLETE**



But they also present problems for the intelligibility and communicability of disease classification.

## ⑦ Conclusions

I hope that the above insights can be of use in the hunt for improvements in disease classification.

- > A *conventionalist* view clears the way for trying out revisions to disease classification.
- > Viewing disease classification as a reference class problem invites an *a-reductionist* view on the task of finding good classifications.
- > It directs us to the use of *model selection* and *causal modeling*, and suggests that we search for *robust chance* ascriptions.

# Some topics for discussion

Clearly statistical tools alone will not deliver all the answers to the classification question.

- > Classification serves many different goals. I have focused on prediction and intervention but this presents a substantive choice.
- > The above statistical methods are too generic and abstract. They need to be tailored to the case at hand.
- > For the purpose of long-term improvements it may be beneficial to adhere to a metaphysics, or a specific disciplinary matrix, when designing a classification.

# Thanks for your attention

## Some references to papers:

- > "Measuring and defining: the double role of the DSM-criteria for psychiatric disorders", with H. van Loo, *Psychological Medicine*, 2017.
- > "Psychiatric comorbidity does not only depend on diagnostic thresholds: an illustration with major depressive disorder and generalized anxiety disorder", with H. van Loo, P. de Jonge, K.S. Kendler, and R.S. Schoevers, *Depression and Anxiety*, DOI 10.1002/da.22453, 2015.
- > "Comorbidity: fact or artefact?", with H. van Loo, *Theoretical Medicine and Bioethics* 36(1), pp. 41-60, 2015.
- > "Psychiatric comorbidity and causal disease models", with H.M. van Loo, P. de Jonge, R.A. Schoevers, *Preventive Medicine*, 57(6), pp. 748-752, 2013.
- > "Data-driven subtypes of major depressive disorder: a systematic review", with H.M. van Loo, P. de Jonge, R.C. Kessler, and R.A. Schoevers, *BMC medicine* 10: 156, 2012.