Abductive Philosophy and Error

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Project Information

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- Feldbacher-Escamilla, Christian J. (2018). "Knowledge First and Rational Action". In: *Teorema. International Journal of Philosophy* 37.2, pp. 31–54. URL: https://dialnet.unirioja.es/descarga/articulo/6414696.pdf.

Talk(s):

- Feldbacher-Escamilla, Christian J. (2017-10-07/2017-10-07). *Abductive Philosophy and Error*. Conference. Presentation (contributed). Williamson on Abductive Philosophy. University of Vienna: Vienna Forum for Analytic Philosophy.

Workshop(s):

- Feldbacher-Escamilla, Christian J. et al. (2018-12-06/2018-12-07). *Abduction and Modelling in Metaphysics*. Workshop. Organization. Facts: est. 35 participants; 7 invited: Helen Beebee, Stephen Biggs, Igor Douven, Tim Maudlin, Ilkka Niiniluoto, Meghan Sullivan, and Timothy Williamson. Conference report in The Reasoner. University of Duesseldorf: DCLPS. URL: http://dclps.phil.hhu.de/abdmet/.

Project(s):

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Abductive Philosophy: Some Problems

The core method of natural sciences is abductive reasoning.

The *status quo* methodology of (analytic) philosophy is deductivism.

Timothy Williamson suggests to switch also to abductivism in philosophy.

Problems:

- What's the epistemic rationale of abductive methodology in philosophy?
- In natural sciences the rationale is truth-conductiveness of abductivism. Is there an analogue rationale for philosophy?
- In particular: What's the role of likelihood, simplicity, and error in philosophy?

Contents

Abductive Philosophy

Three Types of Inferences

Main types of inference:

- Deduction: $\{\forall x R(x)\}$ $\vdash$ $R(c)$
- Induction: $\{R(c_1), \ldots, R(c_n)\}$ $\mid\!\sim$ $\forall x R(x)$
- Abduction: $\{\varphi[R, W]\}$ $\mid\!\approx$ $\psi[E, D, M]$

They are powerful, especially when they are combined. E.g.:

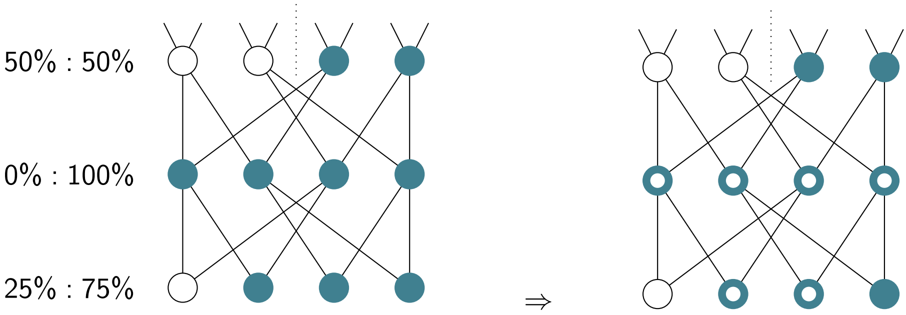
observation $\Rightarrow$ inductive generalisation $\Rightarrow$ abductive theory construction $\Rightarrow$ deductive explanation $\Rightarrow$ verification/falsification via observation

Depending on the choice of a key method, one might differentiate different methodologies: deductivism, inductivism, abductivism.

Example: Abductive Reasoning in the Natural Sciences

Gregor Mendel's famous laws of inheritance:

In 1850s and 60s, Mendel cultivated and tested about 5.000 pea plants and performed hybridisation experiments:



Mendel inferred from regularities about R, W (red, white colour), laws about E, D, M (recessive, dominant, mixed traits).

Characterisation of Abductive Reasoning

Here: *Abduction* = *Inference to the Best Explanation* (cf., e.g., Lipton 2004): Given $C_1, \ldots, C_n$ seperately explain P, then choose best C_i.

Two conditions for *best explanation*:

- Maximise the data's plausibility in the light of the inferred laws: $Pr(\textit{explanandum } P \mid C \textit{ explanans})$
- Maximise simplicity = minimise complexity: $c(C \textit{ explanans})$

A minimal constraint:

$$\begin{aligned} &\text{If there is a } i \in \{1, \ldots, n\} \text{ such that for all } j \in \{1, \ldots, n\} \setminus \{i\}: \\ &\qquad c(C_i) \leq c(C_j) \;\&\; Pr(P|C_i) > Pr(P|C_j) \\ &\qquad \text{or} \\ &\qquad c(C_i) < c(C_j) \;\&\; Pr(P|C_i) \geq Pr(P|C_j), \\ &\qquad \text{then infer from } P \text{ by abduction } C_i \end{aligned} \tag{Abd}$$

The Rationale of Maximising Likelihood (Pr)

Consider the deductive case as ideal case (aim of science): Then we aim at so-called *deductive nomological explanations*.

This means, we aim at explanantia C_i such that $C_i \vdash P$.

Now, probabilistically this means $Pr(P|C_i) = 1$; this is the maximum.

To maximise $Pr(P|C_i)$ is to approximate the deductive nomological ideal.

Hence, to maximise $Pr(P|C_i)$ is instrumental to the aim of science.

A Rationale of Maximising Simplicity (c)

How does simplicity serve the aim of science?

Just to rule out ad hoc-explanations is per se not sufficient: Why are ad hoc-explanations bad?

There is an argument put forward in the curve-fitting literature (for a philosophical application cf. Forster and Sober 1994):

complex/ad hoc explanantia C might overfit data P

So, complex C are more prone to result in error.

This provides an instrumental truth-conducive rationale of simplicity.

Abductive Philosophy: The Main Argument

1. Different branches of science and philosophy use different types of inference paradigmatically.
2. In philosophy the paradigm is a deductivist methodology.
3. Deductivism leads often to deadlocks, which can be easily overcome within an abductive approach.
4. Hence, also philosophy should switch to an abductive methodology.

If the argument is sound, this provides a higher level rationale for the abductive methodology:

If abductivism is more explanatory powerful than deductivism, then applying abductivism on a meta methodological level justifies abductivism on the methodological level.

However, can we also find a grounded rationale? I.e.: Can abductive philosophy be rationalised by grounding simplicity of philosophical theories?

The Value of Simplicity

The Tradition of Simplicity

For example:

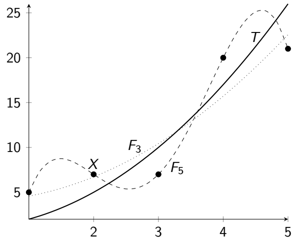
William of Ockham (1287–1347): Ockham's Razor: "*Numquam ponenda est pluralitas sine necessitate*": Plurality must never be posited without necessity.

Sir Isaac Newton (1643–1727): "*No more causes of natural things should be admitted than are both true and sufficient to explain their phenomena.*" (cf. Newton 1726(E3)/1999, pp.794–796)

Truth-Conduciveness of Simplicity: Argument

1. Data P might be noisy and involve *error*. *Error*
2. An accurate fit of an explanans C to the data P fits also error.
   Error $\Rightarrow$ (*Accuracy* $\Rightarrow$ *Falsehood*)
3. Whereas a less accurate fit of C to P may depart from error.
   Error $\Rightarrow$ (*Inaccuracy* $\Rightarrow$ *PosTruth*)
4. Fact: The more parameters, the more prone to overfit.
   Complexity $\Rightarrow$ *Accuracy* & *Simplicity* $\Rightarrow$ *Inaccuracy*
5. Hence: Simplicity (having less parameters) may account for inaccuracy w.r.t. data P in order to achieve accuracy w.r.t. the truth.
   Complexity $\Rightarrow$ *Falsehood* & *Simplicity* $\Rightarrow$ *PosTruth*

Truth-Conduciveness of Simplicity: Theory



Curve fitting with a polynomial of degree 4 with 5 parameters F_5 and a polynomial of degree 2 with 3 parameters F_3. F_5 perfectly fits data set X, whereas F_3 deviates from X. However, F_5 has more distance from the truth T, whereas F_3 approximates T.

The estimated predictive accuracy of the family of a model F given some data X (*Akaike information criterion* $AIC(F,X)$) is determined by (cf. Forster and Sober 1994, p.10):

$$AIC(F,X) \propto \log(Pr(X|F)) - c(F) \qquad \text{(AIC)}$$

$c(F)$: number of parameters of F; F: most accurately parametrised regarding X

Error in Philosophy

Philosophical Data

In natural science it is more or less clear what data X/P is.

But what counts as data in philosophy?

We suggest a pragmatic/conventional approach: Data is, what is accepted by a majority.

More generally: Data comes in degrees: For any proposition (set of possible worlds, constituents of atomic formulæ):

$$P(p_i) = \frac{\#\text{ supporters of } p_i}{\#\text{ supporters of } p_i + \#\text{ opponents of } p_i}$$

Error in Philosophical Data

A tripartite point of view:

- There is the truth T, we in fact may say very little about.
- There is our data P, our basic theories we may consider as more or less true in virtue of conventionally accepting them.
- There are our overaraching theories C we are going to abduce from the data.

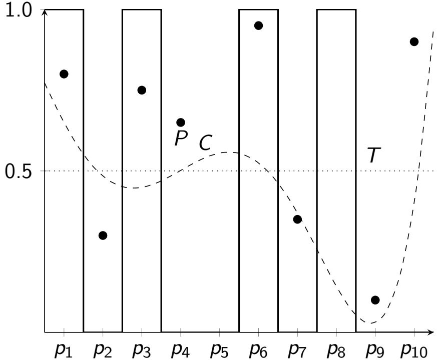
We do not know whether our data P matches the truth T.

So we should also not perfectly count on P by, e.g., inductive generalising P in order to achieve C.

Rather we take a possible mismatch between P and T into account.

So, not only $Pr(P|C)$ counts, but also $c(C)$.

A Rationale for Abductive Philosophy



Propositions are either true (T : 1) or false (T : 0). Data P is available by conventional standards in terms of acceptance. By help of abductive inferences, we fit C to our data P. In order to avoid overfitting P, we choose not arbitrarily high complex C. The mismatch between data P and the truth T represents *error* in the data.)

Example: *Knowledge First*

Knowledge first is a research programme that reverses the direction of explanatory priority in epistemology: It consists of a core and a periphery.

Instead of $K = JTB + X$, we have: $B = approx(K)$.

> *"Knowing is the most general truth-entailing mental attitude, the one you have to a proposition if and only if you have any truth-entailing mental attitude to it at all" (Williamson 2011, pp.215f)*

Core (schematically):

$$K\varphi \Rightarrow \varphi \ \ \& \ \ (X\varphi \Rightarrow \varphi) \Rightarrow K\varphi \tag{KFC}$$

Periphery: K *norm of* B, $Decision, \ldots$ (cf. McGlynn 2014, p.132):

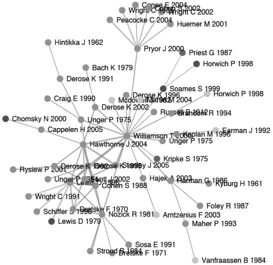
$$\begin{aligned} \text{One ought to achieve: } & B\varphi \Rightarrow K\varphi \\ \text{One ought to achieve: } & Decision(\varphi) \Rightarrow K\varphi \end{aligned} \tag{KFP}$$

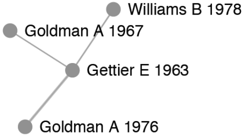
Example: *Knowledge First* Advantages

Knowledge first allows for resolving deadlocks in philosophy. E.g.: Approaches to K as response to (Gettier 1963): half a century of discussion; are they convincing? Can they be unified?

What about B as $approx(K)$ instead of K as $JTB + X_1$ or … or $JTB + X_n$?

Conventionally there seems to be already a turn going on (cf. Healy 2013): Most co-cited is (Williamson 2000):





Example: *Knowledge First* Disadvantages?

K norms allow for unification.

But sometimes they seem to need "artificial" rephrasing of *belief first* proposals.

E.g.: If one bases *Decision* on *K*, how can one describe decisions under uncertainty? One possibility: Distinguish epistemically proper *Decision* (based on *K*) from improper *Decision* (based on *B*).

Furthermore, e.g., regarding the *K* norm of *Decision*, Kaplan (2009) accuses Williamson of *casuality*:

Grounding *B* and *Decision* in *K* seems to not provide a proper basis for the laws of *B* (degrees of belief).

Whereas, e.g., grounding *K* in *B*, and *B* in turn in *Decision* (betting behaviour) does provide a rationale for the laws of *B* (and *K*).

Summary

- Abduction = Inference to the Best Explanation
- Best = Akaike Style Maximisation of Pr and Minimisation of c
- Rationale for Maximising Pr (Likelihood) = Approximation of DN-Ideal
- Rationale for Minimising c (Complexity) = Avoiding Error
- Error in Philosophy = Mismatch between Convention and Truth
- Application: Knowledge First "Turn" in Epistemology

Some questions:

1. Is (Abd) reasonable?
2. Is the conventional move regarding data P plausible?
3. What about applying bibliometrical methods? How to deal with problems: Co-citation $\neq$ Acceptance
4. How to interpret complexity c here?

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