Philosophy of Science

Chap.13 Naturalism in the Philosophy of Science

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主要线索

1. Quine and the Surrender of First Philosophy
2. Naturalism, Multiple Realizability, and Supervenience
3. Naturalism’s Problem of Justification

1. Quine and the Surrender of First Philosophy

在"Two Dogmas of Empiricism"中...

✤ **First Dogma**: 存在分析、综合判断之间的严格区分

- 这个区分首先被Kant引入。但是在Hume也采用了这个区分，体现在relations of ideas和matters of fact之间。Leibniz也持有类似的观点，比如truths of reason（在所有可能世界中都为真的命题） 和 truths of fact之间的分界。

- **分析命题**是根据定义而真的。

➡Kant: 谓词(predicate)是被主语(subject)包含在内的

- 康德的定义把分析判断距现在了主谓语句
- "It appeals to a notion of containment which is left at a metaphorical level"

➡Quine的原话：A statement is analytic when it is true by virtue of meanings and independently of fact.

- **综合命题**是根据世界事实而为真的。

➡Kant: 谓词是在主语概念之外的、连接主语所不包含的且无法从主语自身分解出来的概念

1. Quine and the Surrender of First Philosophy

在"Two Dogmas of Empiricism"中...

✤**Second Dogma**: 存在经验内容与逻辑形式之间的区分。

- Quine的原话：一种还原论，即，相信每一个有意义的陈述，都等值于某种以指称直接经验的语词为基础的逻辑结构。

- 两个教条带来的问题:

"Many of the epistemological and metaphysical problems that faced philosophers of science from Descartes to the present were the result of uncritically adopting these two 'dogmas.'" [Textbook, p.224]

1. Quine and the Surrender of First Philosophy

传统科哲的一些目标

- **The Explanatory Project**
  - 旨在找出所有科学学科所共有的独特方法，这些方法保证了科学产出的知识。
- **The Justificatory Project**
  - 旨在证明上面的这种独特方法是正确的，比如通过为它提供逻辑基础和认识论理论（无论是经验主义的、rationalism的，或是啥其他的）。

1. Quine and the Surrender of First Philosophy

传统科哲面临的问题

- **经验观察对于理论只有亚决定性 (underdetermination)**

➡**The explanatory project** 会变得更难以处理，因为它不再是一个纯粹的逻辑理论问题。心理学因素、历史因素以及社会学因素都会影响科学知识的产出。

➡**The justificatory project** 也会变得更难以处理。回忆一下，亚决定性意味着经验观察所裁决和检验的永远不是一个单独的假说，而是一个互相有链接、网络状的假说集合。因此，当承认被检验的最小单元从某个理论的单个假说变成该理论体系本身时，我们就必须要接受某种**整体论(holism)**。

1. Quine and the Surrender of First Philosophy

整体论

- 经验支持和裁决的是整个理论，包括直接处于检验的假说，该理论中那些支持被检验假说的其他部分，以及其他辅助性假说。
- 这和Lakatos在MSRP提到的理论非常相似。

Lakatos & Falsification

- Lakatos is a protégé of Popper.
- In Lakatos, the **hard core** is often unfasifiable in two senses:
  1. Scientists working within the programme are typically reluctant to give up on the claims that constitute the hard core;
  2. The hard core theses are usually, *by themselves,* devoid of empirical consequences.
     E.g. Newtonian mechanics *by itself* (three laws of motion + gravitational law) won't tell you what you will see in the night sky. To derive an empirical prediction, a whole set of auxiliary hypotheses (viz. **protective belt**) about **the positions, masses,** and **relative velocities of the heavenly body** are required.
- Point (2) is related to Quine-Duhem Thesis. Recall that this thesis says that:
  - (a) Our beliefs face the *tribunal of experience* not **singly**, but in a body (collectively).
  - (b) There are typically no *crucial experiments* to decide which of the competing theories is correct;
  - (c) The available data typically *underdetermine/does not pick out a unique theory* as being correct.
- Point (2) is concerned with (a)
  - In science, the following *modus tollens* argument is prevalent:

$$\frac{\begin{array}{l}\text{If } \{T \wedge A_1 \wedge A_2 \wedge \dots\}\text{, then } O.\\ \neg O.\end{array}}{\begin{array}{ll}\therefore & a(T \wedge A_1 \wedge A_2 \wedge \dots) = F\end{array}}$$

$$\therefore \quad \text{Either } T, A_1, A_2, \dots, \text{ is/are wrong}$$

1. Quine and the Surrender of First Philosophy

Explanations和Justifications的区分也受到了质疑

✤传统地，我们认为

- Explanations 主要是一种因果性主张，它通过给出原因/起因来完成解释。因此，explanation 是偶然而非必然的，因为世界可能是其他样子。
- Justifications 关注的则是事物间的逻辑关系。单纯观察到某现象的发生，只能让你产生关于这种现象的信念，但是除非你观察到的现象之间存在某种恰当的逻辑关系，否则该观察不会辩护你的信念。（作者似乎在这里持有的是知识的JTB观点？）

➡那么这些逻辑关系本身是有根据的吗？传统科哲的回答是，因为逻辑规则是分析的(viz. true by definition)，所以它们自然都是必然真的。见如下例子：

- 逻辑告诉你，If p then q, p, /q. 这个推理之所以是真的，是因为该推理反映了if, then, /的意义（meaning）。结论只不过是术语意义的后继罢了。

1. Quine and the Surrender of First Philosophy

Explanations和Justifications的区分也受到了质疑

✤挑战:

- **Gödel**: 任意一个蕴含皮亚诺算数定理的一阶系统都不可能是既完备又自洽的。因为我们一般比较看重自洽性，所以我们会牺牲完备性。

  ➡这样一来，经验主义的观点，即，所有必然真理都是定义或定义的后继，就是错误的。因为by Gödel，对于一个自洽的系统，一定存在为真但又不可推出的命题。

- **整体论**: 传统的经验主义认为，像“三角形的内角和为180°”这样的必然真理是不能被经验否定的；偶然真理则可以被经验否定。但是对于整体论来说，偶然真理，比如“光速在所有参考系中都一样”，也不能被经验证伪。因为当出现falsifying evidence时，并且科学家还不愿意放弃上面的偶然真理时，她总是可以通过修改理论体系中的其他部分来挽救上面的偶然真理。（这也和Lakatos的negative heuristics 想法非常相似！）

  ➡这样一来，当我们的态度是“不愿放弃”时，必然真理和偶然真理之间的差别就模糊了。

1. Quine and the Surrender of First Philosophy

Quinean Holism也挑战了形式科学与经验科学的界限

✤传统科哲中，形式科学和经验科学在认识论地位上有差别：

- 经验主义者: 数学知识是无内容的、凭借意义而真的(truths of meaning without content)，这也是为什么数学知识是必然真的.
- Rationalists: 数学知识并非无内容的或者仅仅是无聊的定义及其后继(are not empty or trivial disguised definitions and their consequences)； 数学知识是一种无法通过经验而得到辩护的知识。

➡但是Rationalists并没有给出关于如何获得这种知识的一个令人信服的解释.

1. Quine and the Surrender of First Philosophy

- 但是Rationalists并没有给出关于如何获得这种知识的一个令人信服的解释.

✤在Hume看来，有

- primary properties
  - ➡ideas resemble the world
  - ➡reflexive to what objects in the world are
  - ➡shape, weight, hardness, etc. resembles their causes
- secondary properties
  - ➡experience that does not resemble the world

✤Kant is **phenomenalist**: there are no primary properties, nothing reveal the world. Nothing in our experience reveals the true nature of the world. Notion of space and time, for Locke and Galileo, is primary properties; for Kant, our experience cannot be without spacial and temporal ingredients, they are subjective and inevitable, they do not reflect the world.

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✤7 + 5 = 12

A straight line is the shortest distance between two points.

- They have more in them than their subjects. For Kant is a priori truth, but they are synthetic! Because a straight line is qualitative, while shortest is quantitative, where is the extra information coming from? **Our subjectivity**!
- Frege's response
  - ➡with a rich enough logic, we can show that you can easily get those sort of things pulling out.
  - ➡They are not really ***synthetic***
- Alternative response by Kant:
  - ➡They reflect us and our cognition!
  - ➡Our cognition and the limitation of the possible sort of judgment we can make explains why we could have a priori synthetic truth
  - ➡Our very constituents and nature makes that judgment objectively true. By objectivity, Kant does not mean it reflects the actual world; it is instead, being true to every subjectivity like us. <- debatable

✤Question: what does it mean by subjectivity like us? Did Kant mean human?

- Human
  - ➡has passive sensibility
  - ➡we are impinged upon by the world
  - ➡we form the representation of the passively perceived world
- God?
  - ➡A productive intuition and an active sensibility
  - ➡Create the object of its own thought
  - ➡Conception is creation, thinking is making

1. Quine and the Surrender of First Philosophy

什么是意义(meaning)?

✤**在经验主义看来**: 一个语词的意义是由它的定义所给出的。这个定义只使用那些命名感官体验的基础词汇组成，比如描述颜色、气味、质地、形状啥的。（这和Locke的语言理论很相似，他们都认为语言指称的是一个mental image，当然对于Locke来说被指称的是一个更加私人的IDEA）

✤问题：单凭经验，我们能够区分“语词定义”和“报告世界事实的语句”吗?

- 考虑这个例子：定义“咸的(salty)”
  (1) 'Salty is the taste one gets under standard conditions from sea water.'
  (2) 'Salty is the taste one gets under standard conditions from dissolved potassium chloride.'

  ➡ 我们能通过说语句（1）是分析真（true by definition）来区分吗?

  - 不能，因为我们这里探究的就是meaning，诉诸分析性是一种乞题；

  ➡ 我们能通过说语句（2）中包含一个理论术语（即，potassium chloride）来区分两个句子吗?

  - 不能，因为 sea water 也不是一个可以通过简单的视觉感官来确认的液体。

➡ “***under standard conditions***” 虽然帮我们规避掉了诸如“因为磕了药，所以舌头尝不出味道”的反驳，但是也使得语句(1) & (2)在任何经验数据中都可以为真（因为我们可以修改理论的其他部分）。

➡ **Quine的结论**：要么语词的意义不是由我们与之联系的感觉数据所给出的，要么意义这个概念本身就是可疑的。

➡ 等等！我们能否从意义的规范性(normativity)特征上来建立区分呢？一个典型的Humeanist会同意，意义是关乎规范性的。语句（1）暗含了一个义务模态(obligatory modality)——应该(should)：that salty ***should be*** the taste one gets under standard conditions from sea water；语句（2）则不包含这样的模态。

✤如果意义这个概念本身是可疑的，那么我们对于亚决定性、不可通约性等概念的哲学说明也就荡然无存了。

1. Quine and the Surrender of First Philosophy

Quine on Scientific Change

✤我们仍然可以通过比较不同理论之间的 “all-around power [p.227]”(是否指empirical adequacy呢？) 来合理地选择理论 → 实用主义(pragmatism) (but not instrumentalism?)

1. Quine and the Surrender of First Philosophy

Quine's Conclusion

- "There is no grounded distinction between necessary truths and contingent ones." [textbook, p.227] For Quine, the criterion for theory choice in philosophy and in science is empirical adequacy.
- There is no first philosophy/body of knowledge that is more credible than science. "The difference between science and philosophy is one of degree of generality and abstractness, not a difference between necessary truths and factually contingent ones." [p.228]

2. Naturalism, Multiple Realizability, and Supervenience

Central Theses of Naturalism

- ✤ Thesis 1: The rejection of philosophy as the foundation for science
- ✤ Thesis 2: The relevance of science to the solution of philosophical problems
- ✤ Thesis 3: The special credibility of physics, as the most secure and well-founded portion of human knowledge.
- ✤ Thesis 4: The relevance of certain scientific theories (Darwinian theory of PNS) in advancing our philosophical understanding.

Consequence of Thesis 3

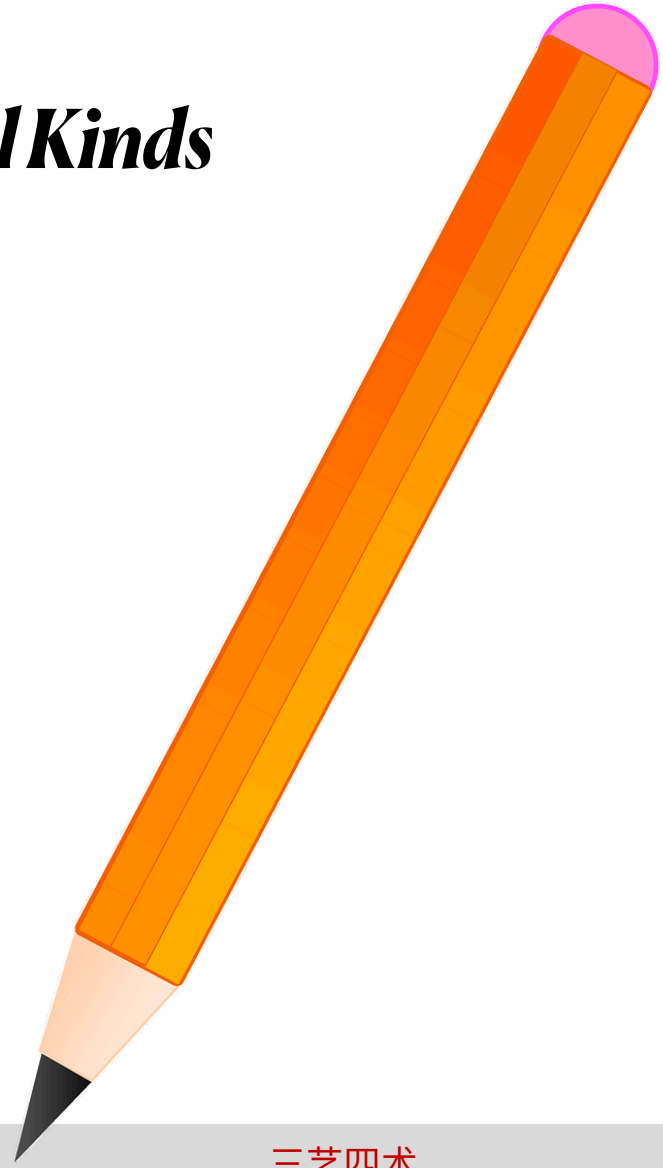
- Thesis 3: The special credibility of physics, as the most secure and well-founded portion of human knowledge.
- The view that there is only one sort of stuff in the universe, physical matter or physical fields.
- Commitment to some extent a minimal scientific realism (accepts the unobservable things and the relationships between them)
- Denial of Dualism
  - raises the problem: How could naturalists explain the inability to reduce or fully explain all non-physical facts in terms of physics? The laws and theories of biology, psychology, sociology, economics should be derivable from physics.

    ➡**The Problem**: **natural kinds** cannot be defined in terms of more fundamental, lower-level theories (Chap.8). There are few successes, e.g. temperature = mean kinetic energy. Mendelian gene cannot be defined in terms of the DNA double helix [textbook, p.229].

2. Naturalism, Multiple Realizability, and Supervenience

Naturalists's Solution Package 1: Distinction between *Functional Kinds* and *Structural Kinds*

- The name for the device at the top of a pencil that removes the marks of pencil graphite is called an 'eraser' in American English and a 'rubber' in British English. The former identifies the object in terms of its function, the latter in terms of its structure.
- Natural languages tend to identify object in terms of function; physics tend to identify objects in terms of structure: oxygen is the element whose atom has eight protons and eight electrons.



2. Naturalism, Multiple Realizability, and Supervenience

Naturalists's Solution Package 1: Functional kinds cannot be reduced to structural kinds

- ‘Chairs’ do not share any physical structure:
  - they can have four or three legs, or no legs (solid throne);
  - they can be made of plastic, metal, wood, ice, etc.
- To be a chair can’t be reduced to any set of facts about the structure of chairs.
  - ➡ No one would deny that chairs are wholly and completely physical things.
  - ➡No one would suppose for a moment that, just because we cannot define “chair” in terms drawn from physical science, chairs are “non-physical.”
  - ➡No one has gone in for dualism about chairs even though we cannot exhaustively break down the concept of chair-ness into more basic physical properties.

2. Naturalism, Multiple Realizability, and Supervenience

Naturalists's Solution Package 2: Supervenience

✤**Supervenience**: Higher-level entities (identified by function) ***supervene*** lower-level entities (identified by structure).

- Any particular higher-level entity will have a particular physical composition
  - ➡a particular chair will have a certain number of legs and arms, has a seat and back
  - ➡a mind will have a certain brain, with certain sets of neural connections
- Any object that has exactly the same structural properties must also be a chair with exactly the same functions or a mind with exactly the same thoughts feelings and sensations.

2. Naturalism, Multiple Realizability, and Supervenience

Naturalists's Solution Package 3: Multiple Realizability

✤**Multiple Realizability**: A higher-level entity that supervenes lower-level entity are often multiply realized.

- Chair can be made of almost any material, arranged in any way.
- If an entity is multiply realized, it cannot thereby be reducible to any finite list of structural components.

- **Darwinian PNS has shown that multiple realizability is commonplace in nature**
  - ✤If the function that is selected for is camouflage or mimicry, then there may be selection for skin color, or shape, or ability to remain motionless, or any of a dozen other ways to solve this "design problem."
  - ✤If the function selected for is to transport oxygen from the lungs to the capillaries, then any of a dozen different hemoglobin molecules may do the job just as well.
  - ✤Selection for function is blind to structure: Any two or more structures that accomplish the same or even roughly similar functions will be selected for in nature.
  - ✤The irreducibility of higher-level things will be consistent with physicalism if the kinds of events, processes, and things discovered in every science result from Darwinian processes, since these processes inevitably produce multiple realizability.
    - The terminologies/vocabulary in specific sciences are all functional.
    - The social and behavioral sciences are not concerned with behavior except insofar as it appears to be purposive, goal-directed, and to show the ends/means economy that we associate with rational agents.

2. Naturalism, Multiple Realizability, and Supervenience

Can we use Darwinism to provide a naturalistic account of scientific change?

✤van Fraassen:

- Scientific theories improve overtime in empirical adequacy (viz. predictive power) because they are selected for doing so by an environment that puts a premium on technological application, an environment created by Homo Sapiens.

✤Philip Kitcher:

- science shows cumulative progress in approximation to the truth at least in large measure because it is the product of a species whose cognitive equipment has been selected for discovering significant truths about their environment.

- Quine's naturalism pushed the problems of the philosophy of biology near the top of the agenda of the philosophy of science. This leads to a lot of problems discussed in chapter 9, e.g.

✤Is natural selection analytic and empty of empirical content? Will the definition of *fitness* in terms of reproduction make the theory true by definition?

✤Is Darwinism falsifiable?

3. Naturalism's Problem of Justification

- 逻辑原则或方法论本身是否是有根据的呢?

✤经验主义者的回答：因为推理规则和方法论都是分析真的，所以他们是必然真的。

- 这样的回答是有毛病的，因为它是基于有争议的概念，即，必然性和意义（necessity and meaning）。

✤那自然主义者们可以怎么回答呢?

- 诉诸于一种比科学更稳健牢固的认识论？Naturalism的thesis 1不允许这样的回答；并且，这样的回答会是一种循环论证，并且会让自然主义屈从于一种第一哲学，即实用主义（pragmatism）
- Quine似乎并没有对这个问题给出有效力的回应

➡Willian James, C. S. Peirce and John Dewey这几个人明确地拥抱了实用主义：科学的成功（有用）就是能够辩护它自己的用以导出这些成果的方法论，因为有用呀!

Thank you for your time!