

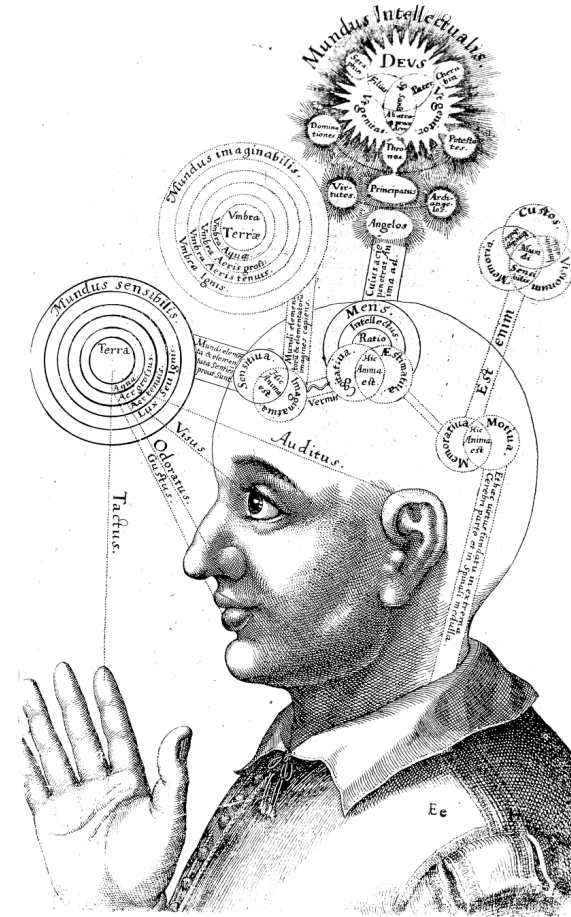
Tutorial 8 Poincare

What guides the scientist's mind?

GFN1000 In Dialogue with Nature

Content

- Simple Facts and Reductionism
- Intuition and Subliminal Ego
- Mathematical/Scientific Discovery
- Utility and Utilitarianism
- Beauty and Aesthetics



Simple Facts and Reductionism

- What are “simple facts” according to Poincaré? Use examples to illustrate them. ①
- What are Poincaré’s views on social science? Do you agree with him? ②③
- Give examples of simple facts in social sciences and important facts that are not so simple; explain how you understand the significance of not-so-simple facts. ④⑤

Intuition and Subliminal Ego

- How does Poincaré use his own experience to highlight the significance of the subliminal ego in mathematical or scientific discovery? Are there any other examples? ②
- Do you think intuition can be nurtured in human beings ③ and in AI ④?
- If mathematical discoveries rely on the subliminal ego as suggested by Poincaré, does this imply that AI, which is based on logical processes, cannot make new mathematical discoveries? ⑤①

Mathematical and Scientific Discovery

- How does Poincaré view the roles of conformity and exception in scientific or mathematical discovery? ③
- What is the process of discovery and why does Poincaré highlight the importance of the subliminal ego? ④
- Assuming Poincaré is correct, what do you think are the problems with our current STEM education and research institutions? ⑤
- Do you think (non-)Euclidean geometries ① and Newton's laws of motion ② are "discoveries" or "inventions"?

Utility and Utilitarianism

- Which activities do you consider useful that mainstream values might not, and which activities are valued by mainstream standards but not by you? What criteria do you think are applied in these assessments?
④⑤
- Do mainstream standards of usefulness vary across time and space? Use examples to illustrate your point. ①②
- Why does Poincaré argue that utility should not be the guiding principle for scientific discovery? ③

Beauty and Aesthetics

- What is Poincaré's view of beauty? ⑤
- Give examples that demonstrate the presence of beauty in mathematical or scientific discoveries. ①
- Do you think aesthetic value is subjective or objective? ②
- Do you agree with Poincaré that there exists a hierarchy of beauty (i.e., certain forms or styles of beauty are considered superior to others)? ③④