HPS200: LECTURE 1

- Science aims to reveal facts about the world
- A fact is a statement that expresses what is actually the case
    - Examples: DNA has a double helix structure; the earth is 4.5 billion years old
- Values are different from facts
- What is a value?
    - Ethical/moral values
    - People's opinions that may/may not be true
- Values are personal preferences of individuals
- Why do values have anything to do with science?
    - Science is done by people and people bring their own kind of context to the problems they come across
- Science is embedded in society; influences the kinds of questions we explore
- Ways in which science and society affect each other
- Many sources in values and science
- Science tells us what is likely or probable
- Sources…
    - Uncertainty
    - Ethics of discovery: discoveries may have positive or negative influences (nuclear technology); should we explore that field if it negatively impacts society
    - Funding: which kinds of experiments gets funded and how we prioritize experiments over others
    - Communicating results
- Examples…
    - Climate change
    - Nuclear technologies
    - Physics funding
    - Disease research funding
    - Mental illness and psychiatry
    - Big data
- Important:
    - http://miller.philosophy.utoronto.ca/courses/sv_f17/
    - U: sv_student / P: valuethis
- Format of Exam
    - Short answer format

HPS200: LECTURE 2

Today's Plan

- Philosophical background
- Climate Change I
- Introduction to Case One

Philosophical Background

- Philosophy of science?
  - Why is there such a thing?
  - Aspects of scientific practise which have consequences for ethical matters; so there might be a connection between science and philosophy here
  - End goal is not to develop a view of something; end goal of philosophy is gaining methods of confronting a problem, questions or situations in the world; knowing what argument is supported or not; conducting a method of coming at the problems of the world while being very attentive to the details of arguments
  - Philosophy can offer us a powerful method of coming at the world
  - Newton classified himself as a natural philosopher
  - There was a point in history where the distinction on being a scientist or philosopher wasn't really a valid distinction at all; you couldn't do both
  - Modern discipline now is philosophy of science
    - A movement made on logical positivism in the 20th century
  - Logical positivism?
    - Group in Europe called the Vienna circle, comprised of both scientists (mostly physicists) and philosophers; they discussed problems (conceptual problems arising on the foundation of physical inquiry)
    - Group was extremely influential
    - One of the views they came on about what the hard-line distinction between:
      - Context of discovery: what is going on in the lab, when a scientist is trying to figure out what is going on in the lab; this is the actual data from the experiment
      - Context of justification: comes after the experiment; figuring out the science; rigorous logical foundation to the knowledge that is generated by the scientific experiment; this is where we learn the truth or facts about the world that science reveals to us
  - Fact-value dichotomy
    - Fact: statements expressing that is actually the case (context of justification)
      - The real truth; comes from context of justification
    - Value: personal preferences of individuals (context of discovery)
      - Presence of scientists appealing to their preferences but it doesn't matter to the ultimate truth that science reveals to us
      - Positivists view: the goal that values play is not a pernicious role because the real truth that we get out of science will come about in the context of justification

- There was a fundamental change in philosophy of science (the positivist movement) which occurred in the middle of the 20th century
- Transition between science and society
    - Important relationship between the two
    - Historical, social context of which science is conducted in has an important role in understanding science
    - Philosophers argued against the positivists
    - If you want to know what the nature of the science generated by scientists really is, you can't ignore the context of discovery!
    - Can't ignore the conditions and pressures of the experimenter, etc.
    - Physicists abandoned their normal working conditions to work on a project
        - Transition in the way that people thought about the role that scientists played in society
    - In a writing piece, structure of scientific revolution:
        - Argument: historical context has an important role in understanding scientific content
    - So, how is science is embedded in society (historical, social and economic context) and how does it influence the content of scientific knowledge?
    - How do we communicate scientific knowledge to this society? How the development of new scientific knowledge impacts society?
- Reading by Richard Rudner:
    - Important role for values and science
    - Having science at all somehow involves a value judgement
    - In order to select among alternative problems, the scientist must make a value judgement!
    - How do we decide which disease to research in for drug development?
    - We need to make a decision on which disease to prioritize!
    - That is value judgement!
    - He said that: the scientist cannot escape his quite human self-he is a mass of predilections and the predilections must inevitably influence al his activities not escaping is scientific ones
        - Science is done by humans; it involve value judgement
    - These are all external to the scientific project in some sense
        - Not internal to science itself (does not play an importance)
    - "The perfect scientist - the scientist qua (a scientist as a scientist) scientist does not allow this kind of value judgment to influence his work. However much he may find doing so unavoidable qua father, qua lover, qua member of society, qua grouch, when he does so he is not behaving qua scientist."
        - Idea that if one allows values to influence their approach to their scientific inquiry then they are failing to be a proper scientist
    - Is there a role for values internal to the scientific enterprise?
    - Inductive/deductive distinction
        - Inductive support for a hypothesis
            - The truth of the premises if you can establish them makes the conclusion more likely

        - Blending the credence to the truth of the conclusion but may not entail directly
        - You need to make up a case for the conclusion
            - Plug some data, make some observations, those observations bring us towards arguments that tells us that some conclusion is likely or probable…
        - Most of the science that we do is inductive
    - Deductive support for a hypothesis
        - The truth of the premises/statement entails
        - If the premises/statements are true, then the conclusion must be true…
        - Going back to positivists:
            - They thought that science was casted in a deductive argument fashion
        - Not the nature of scientific experiments though
        - We never get deductively valid arguments
- Observations:
    - Scientists accept/reject hypotheses that are supported *inductively* rather than deductively
    - Only inductive support for our hypotheses
    - We only have reason to think they are more probable because of the science we have done, we don't have a deductively valid argument for it
- Rudner thinks that this alone is sufficient to establish an internal role for values in science
- "For, since no scientific hypothesis is ever completely verified, in accepting a hypothesis the scientist must make the decision that the evidence is sufficiently strong or that the probability is sufficiently high to warrant the acceptance of the hypothesis."
    - Inductive support only
    - So, need to decide on accepting or rejecting a hypothesis
    - How probable something is (high sufficiency) in order to accept it?
    - So, this establishes an internal role for the values in science
- Example in class…
    - Hypothesis: a toxic ingredient in a drug is not present in lethal quantity
    - In this case, a relatively high degree of certainty in the correctness of the hypothesis would be required because of the seriousness of the consequences of error.
    - Level of confidence that you need to have in the hypothesis would be different where the stakes are higher when you are at risk of killing a patient… this lead to the concept of…
- Inductive risk
    - How sure we need to be before accepting a hypothesis will depend on how serious the stakes are… or in other words
    - How sure we need to be before we need to accept a hypothesis will depend on how serious a mistake would be

- "...we are confronted with a first order crisis in science and methodology. The positive horror which most scientists and philosophers of science have of the intrusion of values considerations into science is wholly understandable."
- "What seems called for ... is nothing less than a radical reworking of the ideal of scientific objectivity."
    - The presence of this role in values in science is one is which calls for a reworking of the very idea for what it means for science to give us a subjective view of the world
    - Is that the case? Can we recover from it?

- Rudner thinks we have a crisis
    - The value neutrality thesis/the value free ideal
        - Proper scientists should not incorporate value judgement
        - Seems to fail (intrinsic to generating scientific knowledge however)
        - Accepting/rejecting hypotheses – we need to incorporate value because we need to know how much indicative risk we can take

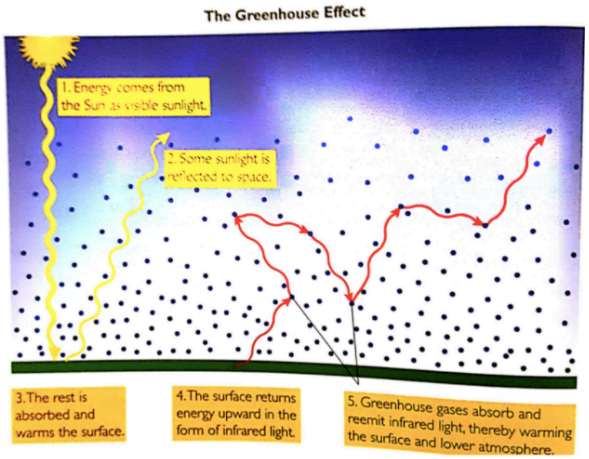
- Reading by Karl (Levi paper)
    - Is there such a crisis?
    - In light of Rudner's argument, is there any way the value free ideal can be upheld?
    - Rudner says in accepting/rejecting a hypothesis, there is value judgment
    - Levi wants to know if we can take that away because it is a problem
- Levi's characterization of Rudner's argument
    - The scientist qua scientist accepts or rejects hypotheses.
    - No amount of evidence ever completely confirms or disconfirms any empirical hypothesis.
        - In science, we have inductive rather than deductive grounds
    - As a consequence of 1 and 2 the scientist must decide how high the probability of a hypothesis relative to the evidence must be before he is warranted in accepting it.
    - The decision required in 3 is a function of how important it will be if a mistake is made in accepting or rejecting a hypothesis.
      4 does not follow from 3 without further argument. There are two additional tacit assumptions (that the author is making without explicitly declaring)
    - To choose to accept a hypothesis H as true (or to believe that H is true) is equivalent to choosing to act on the basis of H relative to some specific objective.
        - If you accept it, you choose to take an action in the world
    - The degree of confirmation that a hypothesis H must have before one is warranted in choosing to act on the basis of H relative to an objective P is a function of the seriousness of the error relative to P resulting from basing the action on the wrong hypothesis.
        - The risk of the assumption

5 requires further support. Some decisions about accepting/rejecting hypotheses are made before the scientist is aware of any of the practical consequences of that decision

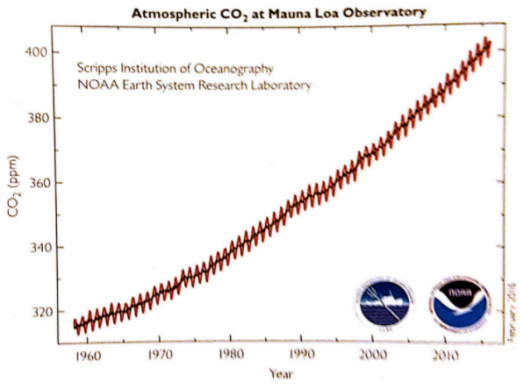
- Not an inevitable truth of the world
- Need more support

- What are some cases where you accept a hypothesis but does not entail action?
  - Examples in class
  - There is a gap between believing that something is true and acting on it
  - In these cases, at least, it seems that we may be able to maintain a value free ideal
  - A classmate argued that believing a hypothesis to be true is still a value judgement (independent of any action pursued)
  - Levi's argument shows if you accept the hypothesis, the argument from inductive risk is at spotlight because there is a gap between believing the hypothesis is true and acting upon it
  - If there is a gap, then we may be able to maintain the value-free ideal
- TAKE AWAY
  - We haven't established any conclusion; we tried to take a problem and got away to being precise in what instances that values are playing a role in science

Climate Change



- Jeffrey Bennett: a global warming primer
  - What causes climate change? Earth is the same size as Venus
  - Earth surface temp: 15 C; forms of life; Earth has enough CO2 to maintain life
  - Venus surface temp: 470 C; no form of life; Venus has 200,000 times the amount of earth's CO2
- Facts:
  1. CO2 is a greenhouse gas (traps heat and makes earth warmer)
  2. Human activity and especially the use of fossil fuel is adding CO2 to the atmosphere
- Consequence:
  - The surface temp of the earth rises as a result of our use of fossil fuels and become more severe as we use them more
- How do we know that fact 1 is true?
  - Inductive support; greenhouse effect; empirically well-confirmed
  - Some atoms reflect off or absorb light
  - CO2 disproportionately gets absorbed more so than reflected



- How do we know that fact 2 is true?
  - Measure our use of fossil fuel vs. CO2 in atmosphere over time
  - Rise of industrial activity, more CO2
  - Inductive support of the claim that we are causing climate change
- How does climate change example relate to the Rudner or Levi debate?
  - When we are accepting/rejecting the hypothesis we need to consider the consequences (risks) of accepting or rejecting it
  - The hypothesis that humans are causing climate change is serious
  - We are going to be impelled to act on the aftermath of accepting/rejecting a hypothesis
  - In this case, it seems likely that if we accept the hypothesis, we will want to act towards it (for example: changing the sources of energy)

Introduction to Case One

- Bret Stephens, Climate of complete Certainly
  - New York Times, April 28, 2017
- Role of analytics in assessing polls, how the data led them to be certain that they will win presidency
- How people report climate change data and how it leads to motivations
- Detrimental because:
  - People who aren't aware of climate change and it's scientific evidence
  - Report the kinds of sources that are important background to scientific knowledge?