HPSC 1001/1901/2101/2901

WHAT IS THIS THING CALLED SCIENCE?

Semester 2, 2020

Lecture 14: Frameworks

Main idea today: might there be paradigm-*like* things in science that do not have some of the controversial features Kuhn described?
Such as: dominance of a field (one para per field per time), and inspiring strong faith-like commitment.

Imre Lakatos and Larry Laudan, in 1970s, developed theories of scientific change and its organization that did this. Fairly similar views. I like Laudan's better for several reasons, even though Lakaktos' is more famous.

Imre Lakatos: Born in Hungary, member of the resistance to Nazi occupation during World War II. Included some

disturbing episodes -- see Stanford Ency. article about him. After the war he was jailed for years by the communists. Moved to England, allied with Popper.

Lakatos saw Kuhn's influence as *destructive*—destructive of reason and ultimately dangerous to society.
In contrast, I think K saw science as an remarkably well-structured machine for exploring the world, but in unobvious ways. Even the disorder of revolutions has a "function" in science.

Lakatos saw the disorder in Kuhn's picture as just dangerous chaos.

His project was to rescue the rationality of science from Kuhn. He admired Popper and sometimes presented his views as what Popper really meant (or should have said).

Main ideas: a *research program* is a unit of scientific work similar to a paradigm (broad sense). But usually more than one research program per field at any given time.

Competition between research programs is what we see in science, and it is also essential to rationality and progress. The only way to make sense of rationality and progress is to understand them at the level of research programs, not "theories."

Research program (RP): evolves over time. Contains a sequence of related theories. Later theories are developed in response to problems with the earlier ones.

Common and justifiable for a research program to live for a while despite empirical anomalies and other problems. Workers typically have some *commitment* to the program; do not reject the basic ideas of the program as soon as something goes wrong. Rather, they try to modify their theories to deal with the problem. They are *not* trying to show their own guiding ideas are false (as Popper wanted).

But research programs sometimes die.

Components of RP: a *hard core.* Basic ideas that are essential to the RP.

A *protective belt.* A set of less fundamental ideas used to apply the hard core to phenomena. The versions of a scientific theory that can be tested will contain ideas from the hard core combined with ideas from the protective belt.

Two different kinds of change: (1) change *within* individual research programs, and (2) change at the level of the *collection* of research programs within a scientific field. Lakatos *seems* to want to give *rules* for this -- rules that he advises scientists follow.

(1) First rule is that changes should only be made to the protective belt, never to the hard core. Second rule is that changes to the protective belt should be *progressive.*

Progressive change: expands the application of the RP (in breadth or precision).

A research program is ***degenerating*** if the changes being made only serve to cover existing problems and do not successfully extend the research program to new cases.
* This is a famous term. You may see it all over the place.

The RP is getting more complicated and full of *ad hoc* hedges, while little or nothing is being gained.

(2) Change at the level of the *collection* of research programs.
Should the rule be: "choose the most progressive research program"?

No, for Lakatos. It is OK to *protect* a research program for a while, even when it is degenerating. It might recover. There have been examples of this.

The decision to stay with a degenerating research program is a *high-risk* one, but can be rational. So you can stay with a degenerating research program if willing to tolerate a high-risk situation.

Critics pounced on this point. The attempt to be strict (unlike Kuhn) seems to have collapsed.

Larry Laudan, *Progress and Its Problems* (1977)
Also saw chaos and unreason in Kuhn - scientific decision-making as "basically a political and propagandistic affair."

Research traditions (Laudan) versus research programs (Lakatos).

For Lakatos, the hard core never changes.
For Laudan, there can be movement of ideas in and out of the hard core.
For Laudan, there is nothing unusual or bad about a later theory covering less territory than an earlier one; sometimes a retreat is necessary.

Distinction between *acceptance* and the *pursuit* of theories.

Acceptance is close to belief; to accept something is to treat it as true.
Pursuit is deciding to *work with* an idea, and explore it, and this can happen for reasons other than confidence that the idea is likely to be true. Can be reasonable to *pursue* an idea that one does not *accept.*

Some better rules we can give with these concepts:

(i) It is always rational to *pursue* the research tradition that has the highest current *rate of progress* in problem-solving. Does not mean one should *accept* the basic ideas of that research tradition.

The acceptability of theories and ideas is measured by their present overall *level* of problem-solving power, not by the rate of change.

(ii) We should accept (perhaps cautiously) the theories that have the highest level of problem-solving power. (I think this

means: the ones have shown they can solve the most problems.)

So a scientist might accept the ideas in a mainstream research tradition but work on a more marginal research tradition that has a spectacular rate of progress. For Laudan that decision would be a rational one. And that looks right.

Conclusions about L&L, and some thoughts about cases.
I accept: (1) The idea of research programs.
(2) The distinction between acceptance and pursuit (Laudan).
(3) The idea that people make different decisions about moves *within* and *between* research programs.

(4) The idea that *growth* versus *degeneration* of a research program is important in trying to understand scientific progress.

* Some of this is easy to grasp via distinctions between distance covered, speed, and acceleration. (How many problems have you solved? How quickly are you solving them? Are you getting faster?) All of these are significant questions. How should they feed into decisions about what to believe? That is more complicated. But Laudan's suggestion is not bad.

Cases

There are fields where a RP-based view seems more accurate description of what goes on than Kuhn's paradigm-based view. Though nearly every case can be argued about.

Social sciences? Eg. linguistics now?

* Is it a good idea to try to get a dominating paradigm, or try to retain several approaches?

Possibility of *mixtures* of Kuhn-like and RP-based stories.

A very broad guiding paradigm plus competition between research programs at a slightly lower level.

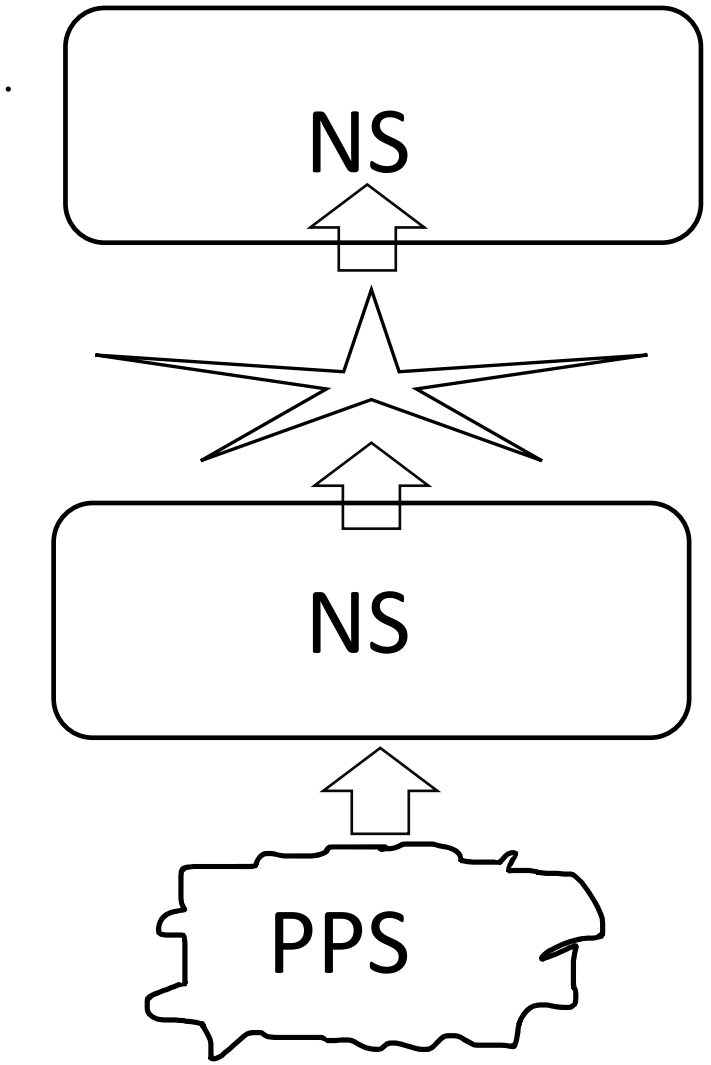
Evolutionary biology: the 'synthetic' theory as a high-level paradigm-like organizer (basically a blend of Darwinism and genetics and molecular biology), with various research programs at a level below it.

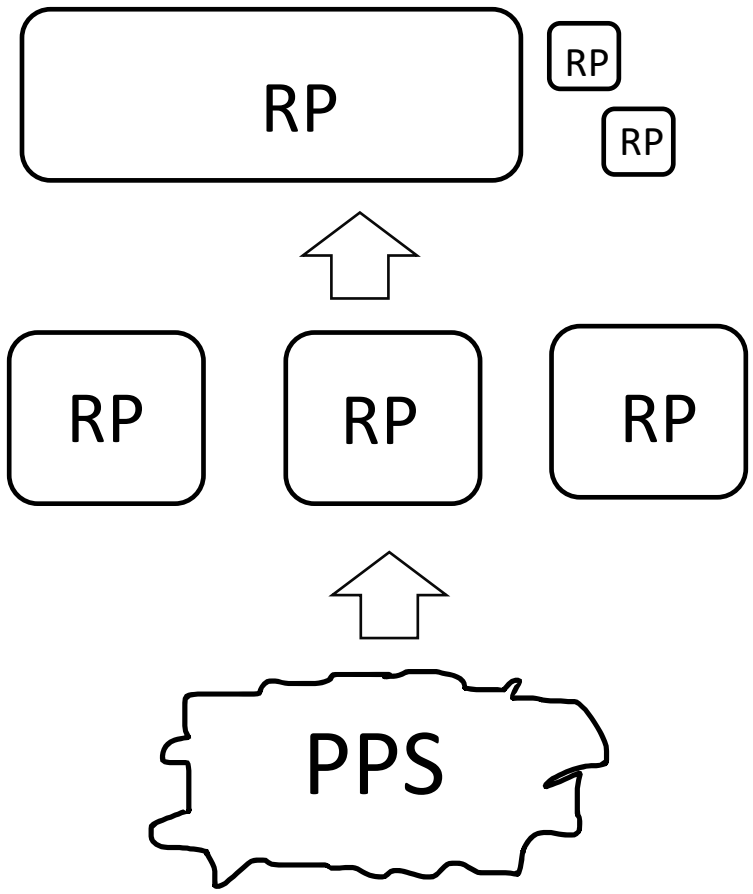
When I wrote T&R, the "neutral theory" in evolutionary biology looked like an example. Now many of its ideas have been folded into the central paradigm or paradigm-ish structure.

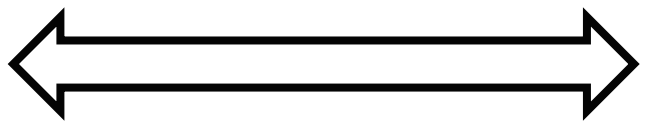
"Evo-devo" as a newer example: evolutionary biology needs much closer ties with 'developmental' biology, which describes the path from egg to adult. That looks like a

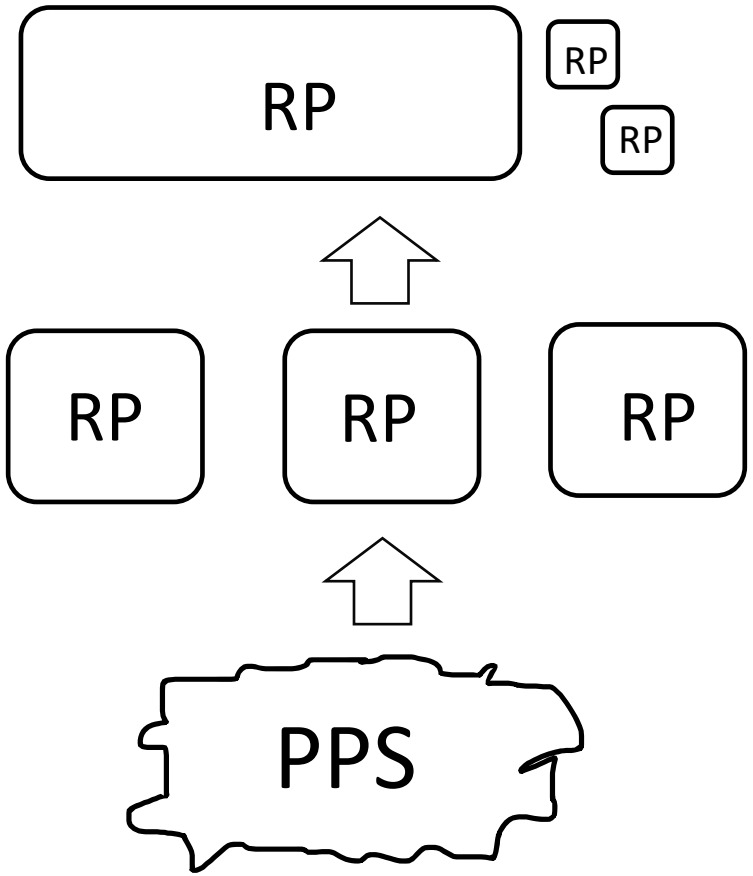
research program, competing with others.

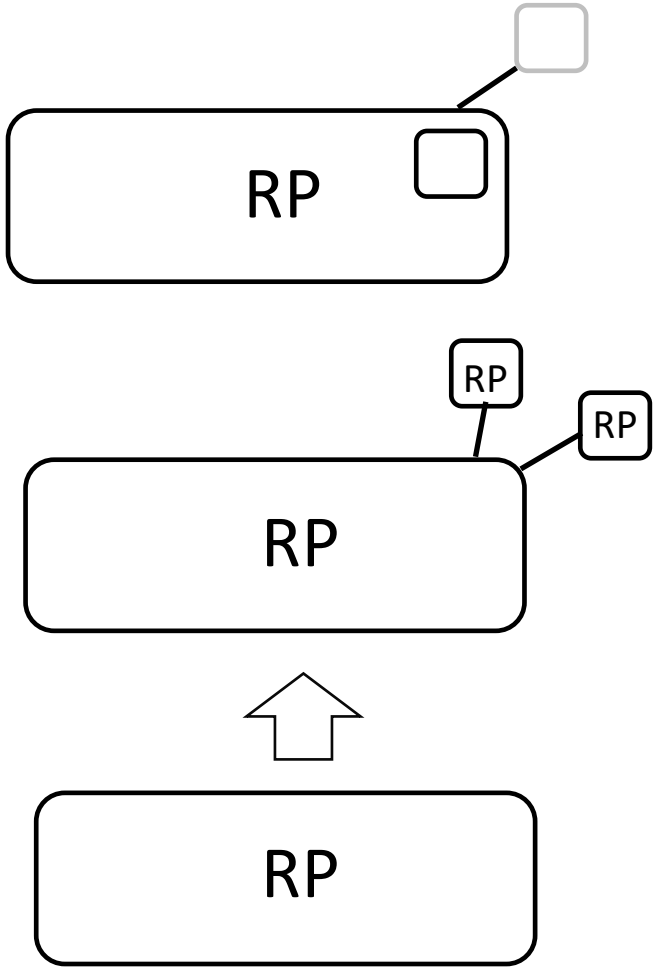
Think about cases from your other courses....


NS
NS
PPS


RP
RP
RP
RP
RP
RP
PPS

Paradigms  Research progams


RP
RP
RP
RP
RP
RP
PPS


RP
RP
RP
RP
RP