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South West Peninsula


*National Institute for
Health Research*

What is real about operational research?

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What is OR?

Google search results for "what is operational research". The search bar shows the query and a search icon. Below the search bar are navigation tabs for "All", "Videos", "News", "Images", "Shopping", "More", and "Search tools". The results section shows "About 9,500,000 results (0.57 seconds)". A knowledge panel for "operational research" is displayed, including a definition and a translation option. Below the knowledge panel are several search results, each with a red box highlighting a specific part of the text. Arrows point from these boxes to explanatory text on the right side of the slide.

noun
noun: operational research; noun: operations research
a method of mathematically based analysis for providing a quantitative basis for management decisions.

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a method of mathematically based analysis for providing a quantitative basis for management decisions.

Translate operational research to

Show less

Feedback

[What is Operational Research? | Lancaster University Management ...](#)
www.lancaster.ac.uk/lums/study/...operational-research.../what-is-operational-research...
Operational Research (OR) is the use of advanced analytical techniques to improve decision making. It is sometimes known as operations research, management science or industrial engineering.

[What is Operations Research? - INFORMS](#)
https://www.informs.org/About-INFORMS/What-is-Operations-Research
Operations Research (O.R.), or operational research in the U.K., is a discipline that deals with the application of advanced analytical methods to help make better ...

[Operations research - Wikipedia, the free encyclopedia](#)
https://en.wikipedia.org/wiki/Operations_research
Operations research, or operational research in British usage, is a discipline that deals with the application of advanced analytical methods to help make better decisions.
Category: Operations research · Management science · Institute for Operations ...

[What is Operations Research? - School of Operations Research and ...](#)
www.orie.cornell.edu › Home › About ORIE
Operations Research (OR) applies scientific method to the management of organized systems in business, industry, government and other enterprises. OR is ...

[What is operations research \(OR\)? - Definition from WhatIs.com](#)
whatistechtarget.com › Topics › Computer Science › Computing fundamentals

...is the use of advanced analytical techniques to improve decision making.

Employing techniques from other mathematical sciences...operations research arrives at optimal or near-optimal solutions to complex decision-making problems.

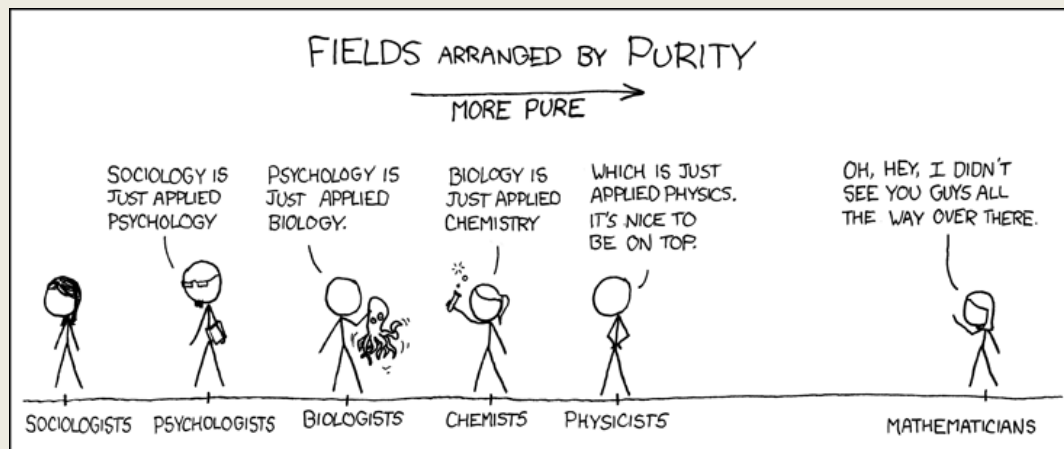
Why consider a philosophy of science for OR?

- **Is OR a science or a technology?**
 - OR has its origins in military application and aviation
 - Decision making
 - Evidence based decision making
 - Rigor
 - What is more rigorous than science?

Why consider a philosophy of science for OR?

- **Is OR a science or a technology?**

- Traditionally and today viewed as a science
- Hindrichs (1953) states that while the accuracy and approach of OR is closer to that of the social sciences it is still none the less a science



Why consider a philosophy of science for OR?

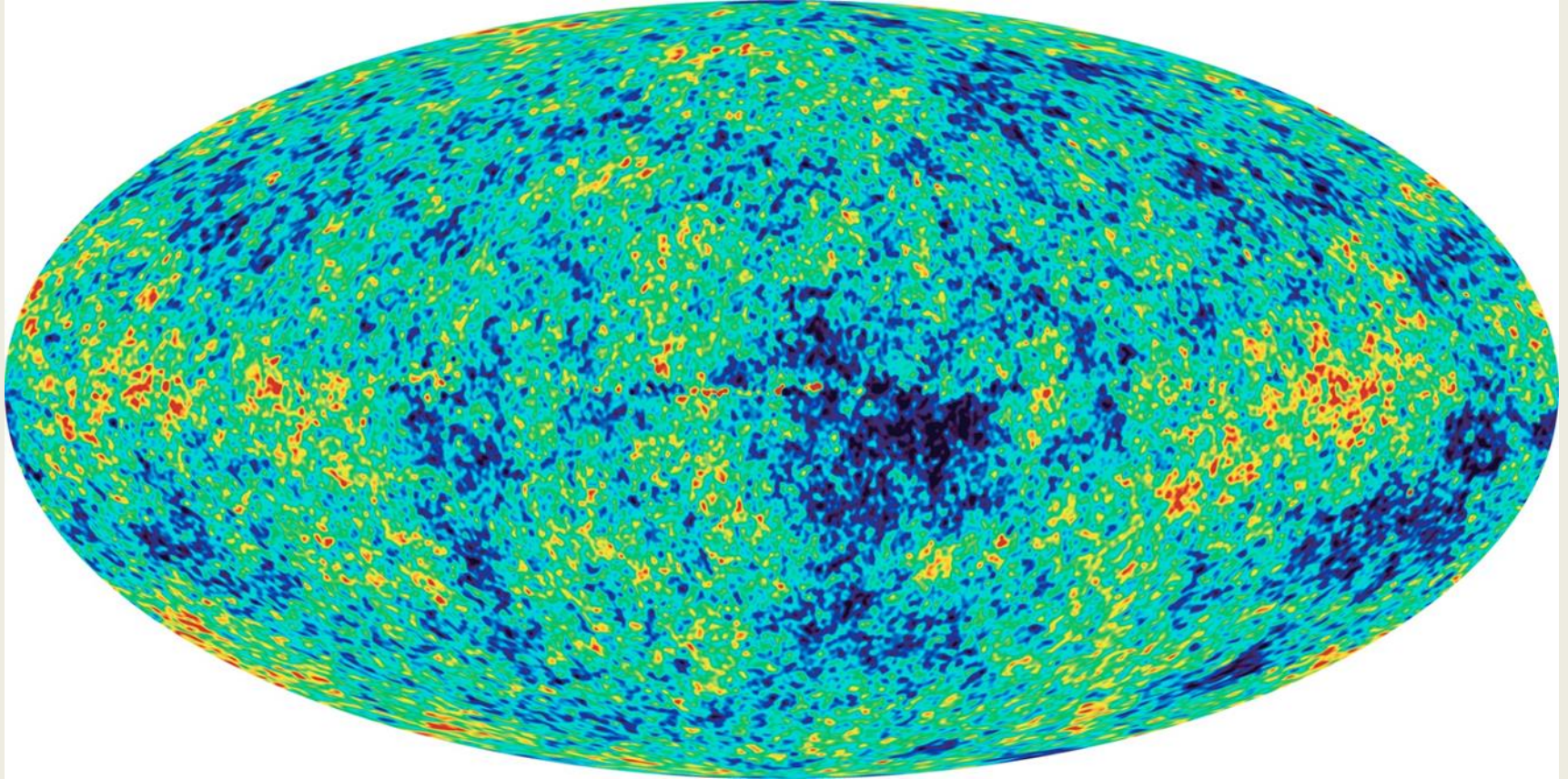
- **Is OR a science or a technology?**

Miser (1991) argues for OR as a science and says:

“In sum, OR is... an enterprise that has now built the foundations for a glorious future provided it finds itself guided and inspired by a realistic but visionary philosophy”

“The challenge to the OR community is to join in fleshing out a philosophy...”

What is the importance of a philosophy of science?



Do we really need philosophies of science?

Why

Why

How

How

What

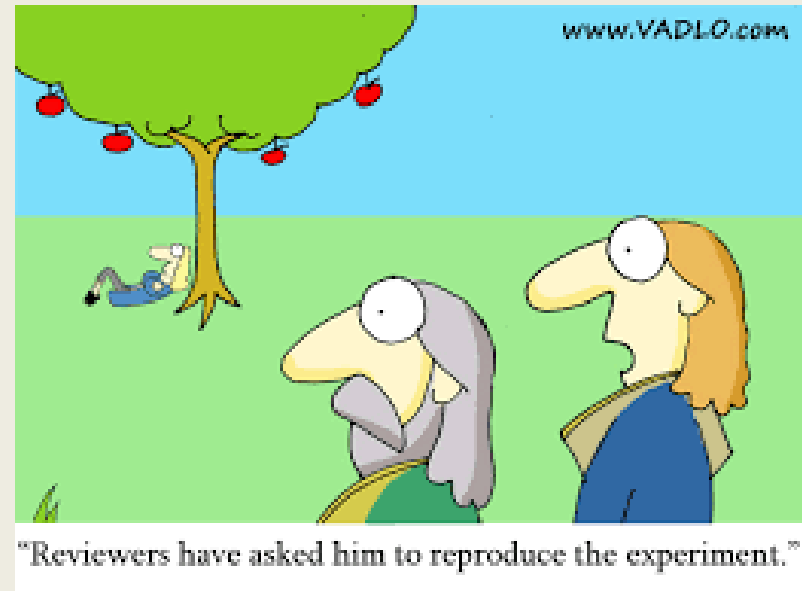
What



<http://www.hindustantimes.com/Images/popup/2014/3/traffic2.jpg>

How do you decide on a philosophy of science?

- More about understanding why you have chosen it
- Logical argument
- Consensus
- Belief



Do we neglect our philosophy?

- Have you ever decided which methods or research design you will use to study something before determining the research question?
- Do you consider whether a research question is within the bounds of your underpinning philosophy of science at the start of a project?

Has philosophy of science been neglected in OR?

- Limited literature
- Some consideration
- No consensus

What would be a suitable philosophy for OR?

- Temperate rationalism?? (Miser, 1991)
 - A philosophy constructed by Newton-Smith (1981)
 - In 1988 Newton-Smith argues for a new kind of realism – modest realism
 - The rationale for temperate rationalism is that it accounts for subjective reality

What would be a suitable philosophy for OR?

- Realism

“...operations research provides a golden opportunity for philosophy to gear itself to the day-to-day decision making process...”

“more humanly significant results than is possible on the basis of a limited concept of efficiency” (Hindrichs, 1953)

- The impact of context on the action of mechanism and the resulting outcome in human contrived systems

What is Realism?

- Embraces two different yet inter-related types of knowledge.
- That which would exist without the presence of a human observer - Intransitive knowledge
- That which can only exist with the presence of a human observer - Transitive Knowledge
- Allows for the development of generalisable theory based on both types of knowledge.
- Imitates aspects of preconscious free will

What other philosophies could we use?

- There are hundreds of philosophical schools and 'sub-schools' of thought.

Antireductionism

Existentialism

Deism

Critical realism

Positivism

Confucianism

Empiricism

Idealism

Pragmatism

Social constructivism

Pythagoreanism

Post-positivism

Realism

Limitations of realism and other approaches

- Realism
 - Not seen as a sufficiently rigorous approach by some sciences.
 - Lacks generalisability with too much focus on context
- Pragmatism
 - Provides a basis for the investigation of both the objective and subjective aspects of human behaviour and experience.
 - Does not allow for the development of theory that is generalisable beyond the space and time in which it takes place.

Limitations of realism and other approaches

- Post-positivism
 - A rigorous method by which to investigate social phenomena
 - Potential dilution of the human experience it is trying to capture.
- Social constructivism
 - Provides a detailed insight into the experience of the individual
 - Does not allow for the robust testing of the similarities between individuals

How a realist OR can work in practice

- Human contrived systems not naturally occurring systems
- The properties of the system are the result of the initial conditions
- Enabling the understanding of 'why'
- Integration of objective measurement and subjective experience to answer these questions

Is this not what we are already doing?

- Perhaps without realising it
- Minimal discussion or consensus
- A more pragmatic approach seems to be used in the most applied fields
- A post-positivist approach in the more scientific areas
- Realism as a middle ground? A truly scientific approach to studying applied problems to support decision making



i^2

Keep it real

Thank you for listening and joining the discussion

Any questions or further discussion points are welcome

References and related reading

- Philosophy of science: Contemporary Readings (2002). Eds Balashov, Y. and Rosenberg, A. Routledge, London.
- Scientific Pluralism (2006). Eds Kellert, S. H., Longino, H. E. and Waters, C. K. University of Minnesota Press, London.
- Phillips, D. C. (1987). Philosophy, Science, and Social Inquiry: Contemporary methodological controversies in social science and related applied fields of research. Pergamon Press, London.
- Delanty, G. (1997). Social science: Beyond constructivism and realism. Open University Press, Buckingham.
- Constructing the social (1994). Eds Sarbin, T. R. and Kitsuse, J. I. Sage publications, London.
- Psillos, S. (1999). Scientific Realism: How science tracks truth. Routledge, London.
- Bhaskar, R. (1975). A Realist theory of Science. Leeds Books Ltd, Leeds.
- Olsen, W. (2010). Realist methodology. Sage publications, London.
- Olsen, W. (2004). Triangulation in social research: qualitative and quantitative methods can really be mixed. *Developments in sociology*, 20, 103-118.
- Tashakkori, A. and Teddlie, C. (1998). Mixed methodology: Combining qualitative and quantitative approaches. Sage Publications, London.
- Hindrichs, G. (1953). Toward a Philosophy of Operations Research. *Philosophy of Science*, 20(1), 59-66.
- Miser, H. J. (1991). FORUM: TOWARD A PHILOSOPHY OF OPERATIONAL RESEARCH. *INFOR*, 29(1), 4-13.
- Newton-Smith, W. (1981). The Rationality of Science. International Library of Philosophy, editor: Ted Honderich: Routledge & Kegan Paul, Boston, London and Henley.
- Archer, M. S. (1995). *Realist social theory: The morphogenetic approach*: Cambridge university press.
- *Also see the reference list for the paper titled 'Opening the black box: Combining agent based simulation and realism in intervention development'*