

Research in Science & Technology:

Basic Research, Applied Research, and Development

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Bacaan :

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Definition: *Science*

1. a branch of knowledge or study dealing with a body of facts or truths systematically arranged and showing the operation of general laws.
2. systematic knowledge of the physical or material world gained through observation and experimentation.
3. any of the branches of natural or physical science.
4. systematized knowledge in general.
5. knowledge, as of facts or principles; knowledge gained by systematic study.
6. a particular branch of knowledge.
7. any skill or technique that reflects a precise application of facts or principles.

[Websters College Dictionary]

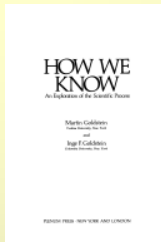
Definition: *Science*

Scientific theories are derived in some rigorous way from the facts of experience acquired by observation and experiment.

Definition: *Research*

1. diligent and systematic inquiry into a subject in order to discover or revise facts, theories, etc.
2. a particular instance or piece of research.
3. to make researches; investigate carefully.
4. to make an extensive investigation into.

[Websters College Dictionary]



Three (3) Characteristics of Science Activity

[**How We Know:** An exploration of the scientific process; Martin Goldstein, Inge F. Goldstein Plenum Press, 1978)

1. Search for understanding: finding a satisfying explanation of some aspects of reality.
2. The understanding is achieved by means of statements of general laws and principles—laws applicable to the widest possible variety of phenomena.
3. The laws or principles can be tested experimentally.

Empirical Science

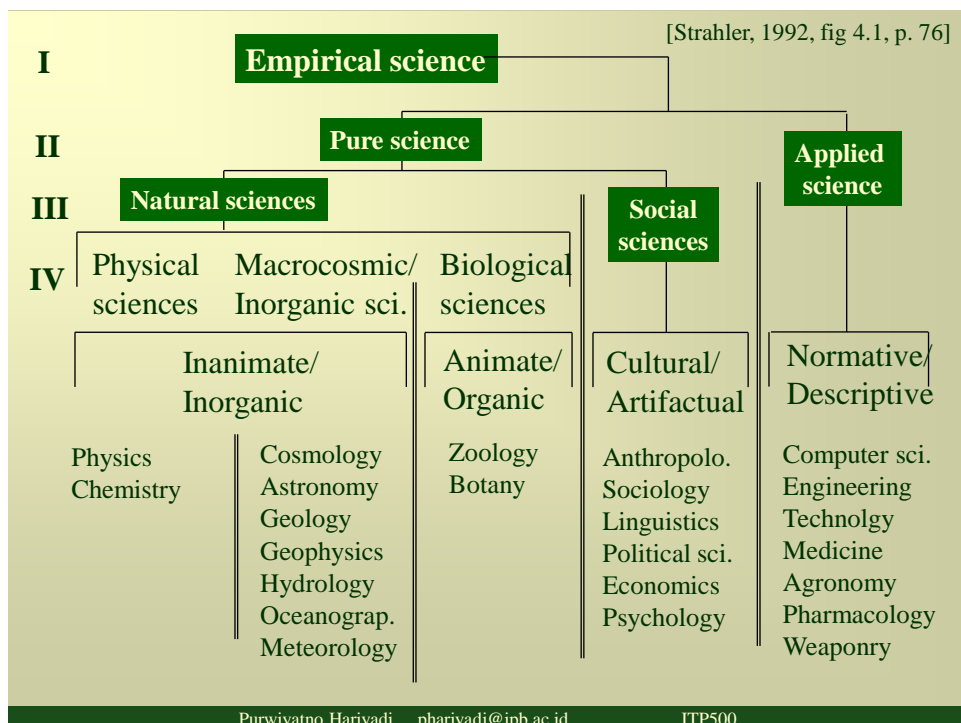
Classifying the fields of science and arranging them in some sort of hierarchy of generality and specificity is an exercise in frustration.

Potential groups:

- Empirical science (based on external observations): natural sciences, social sciences, applied science
- Transempirical science (ideational realm): mathematics and logic

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Basic and applied research

- **Basic researchs**

- have limited direct application
- researcher has careful control of the conditions

- **Applied researchs**

- have direct value to practitioners
- researcher has limited control of the conditions

→ **The interaction of basic and applied research**

- Basic research provides the theory that produces the concepts for solving problems
- Applied research provides the data to help support, guide, and revise the development/application

Basic and applied research

Basic research

In **basic research** the objective of the sponsoring agency is to gain fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward process or products in mind.

- Concerned with trying to gain knowledge in its own right
- Aim is to gain greater understanding of a phenomenon
- Collection and analysis of data to develop or enhance theory

Basic and applied research

Applied research

In **applied research** the objective of the sponsoring agency is to gain knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

- Concerned with using current understanding of a phenomenon in order to solve a real-world problem
- Collection and analysis of data to examine the usefulness of theory in solving practical educational problems

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Basic and applied research

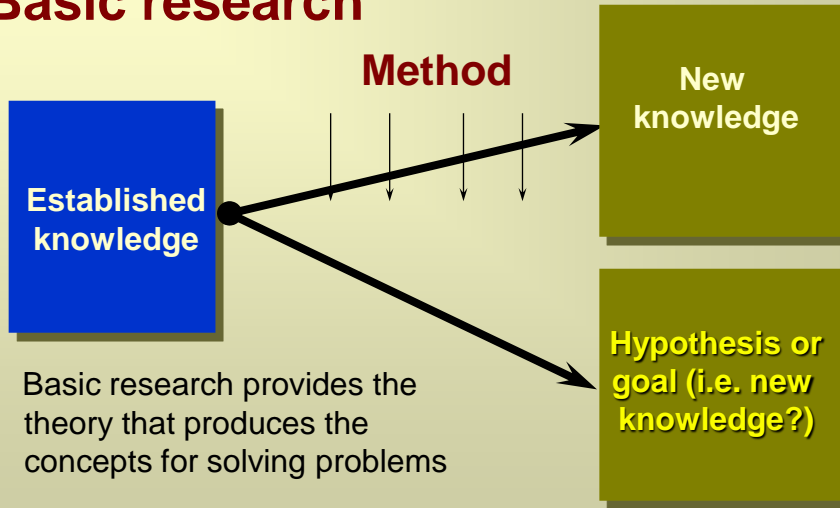
Development?

Development is systematic use of the knowledge or understanding gained from research, directed toward the production of useful material, devices, systems, or methods.

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Basic and applied research

Basic research

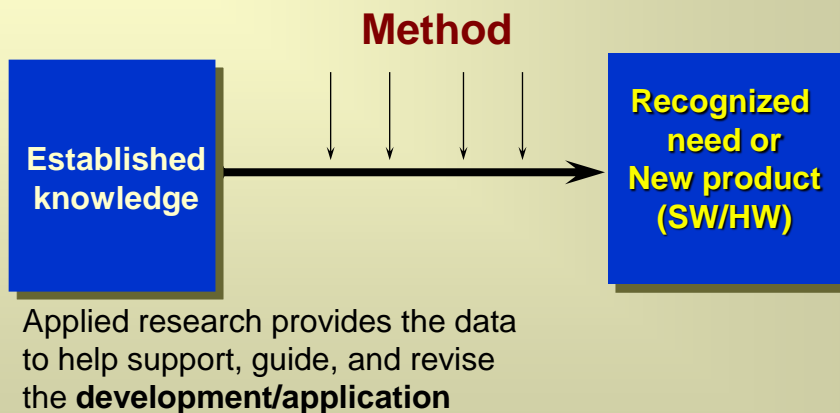


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Basic and applied research

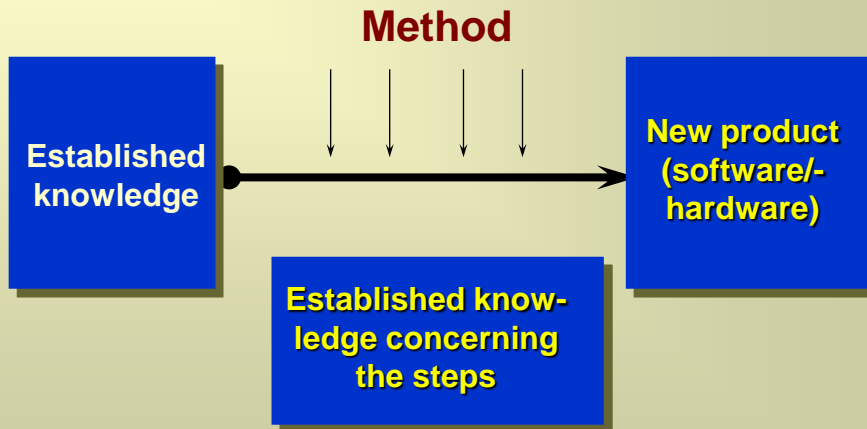
Applied research



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Basic and applied research Development?



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Research in Science & Technology

- Exploratory (investigative)
 - looking for answers to questions
 - finding solutions to problems
- Show evidence of independent inquiry
- Show originality in the methods used and/or conclusions drawn
- Make an appreciable new contribution to knowledge in the field of study

(Source: University Calendar, Trinity College, Dublin)

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Continuum of Scientific Consensus (i)

Process of convergence to a consensus :

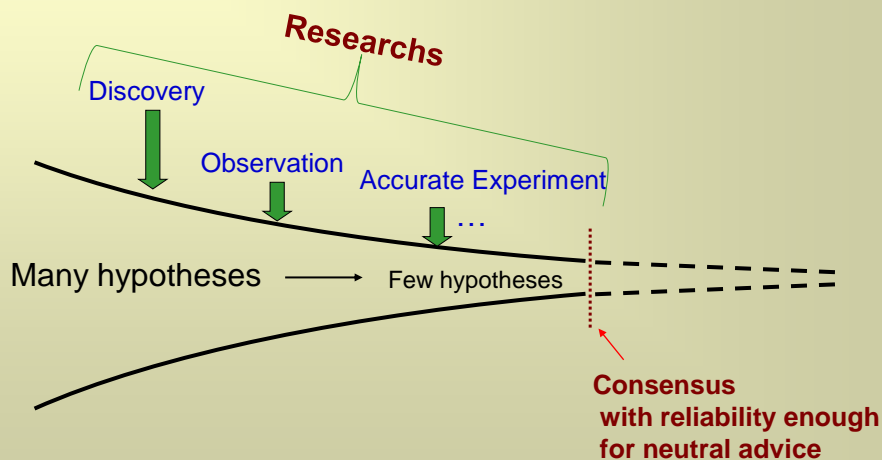
- Process of convergence to a consensus is **evidence-based**
- Process of convergence to a consensus is **NOT based on compromise**
- Compromise and “fairness” are not part of Science
 - Case : $2 + 2 = 4$ vs. $2 + 2 = 6$
does not mean that
 $2 + 2 = 5$
 - *One does not “teach both sides” if one side is supported by overwhelming **evidence***

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Continuum of Scientific Consensus (ii)

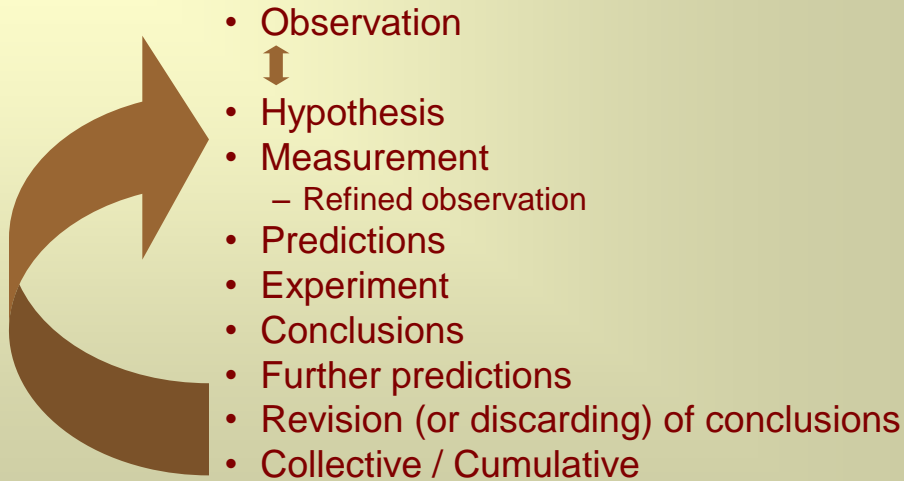
Process of convergence to a consensus :



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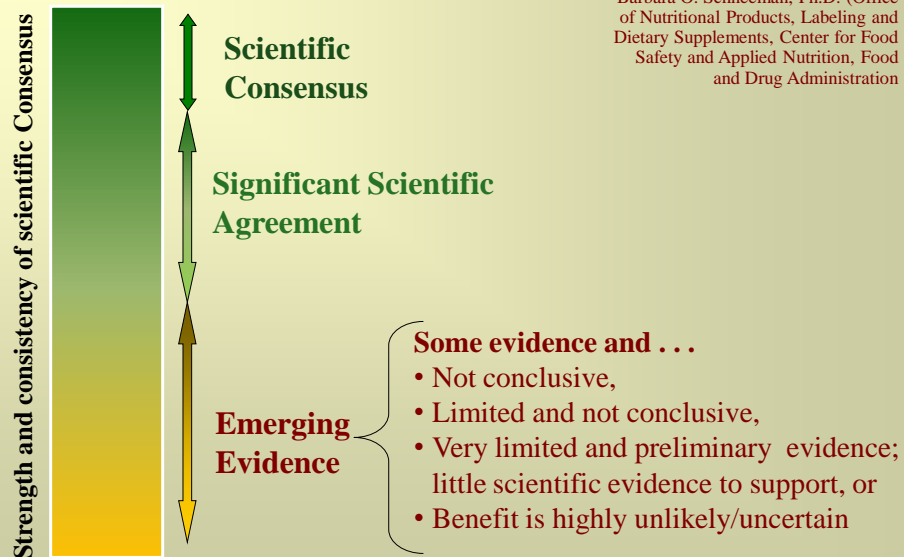
Continuum of Scientific Consensus (iii)



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Continuum of Scientific Consensus (iv)



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Terimakasih ...

