

What is research?

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What is R

In every area our knowledge is incomplete and
problems are waiting to be solved

What is R

We can address the holes in our knowledge and unresolved problems by asking relevant questions and then seeking answers through systematic research

The mystique of R

- activity that is exclusive and removed from everyday life
- individuals that seclude themselves in labs, libraries or ivory towers of the large universities
- what do they do on a day-to-day basis
- how their work contributes to people's quality of life or general welfare

What R is not

1. R is not information gathering

*“Mom, the teacher sent us to the library today to do research,
and I learned a lot about Columbus.”*

Information discovery/learning reference skills

What R is not

2. R is not transportation of facts from one location to another

“research paper” on the Dark Lady in the sonnets of William Shakespeare: collecting data, assembling a bibliography, referencing the statements

fact discovery/fact transportation/fact transcription

What R is not

3. R is not rummaging for information

“I’ll have to do some research to find out the fair market value of your car”

exercise in self-enlightenment

What R is not

4. R is not a catchword to get attention

“Years of Research Have Produced a New Car Wash”

clever use of a catchword

What R is – *Definition*

Systematic process of collecting and analyzing information (data) in order to increase our understanding of a phenomenon and communicate what we discover to the scientific community

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7. requires the collection and interpretation of data
8. is cyclical or, more exactly, helical

R originates with a question

Look around you.

What is such-and-such situation like?

Why does such-and-such phenomenon occur?

What does it all mean?

These are everyday questions, but with questions like these, research begins!

R originates with a question

Men love to wonder, and that is the
seed of science

Ralph Waldo Emerson, 1870

R requires a clear articulation of a goal

A clear, unambiguous statement, in a grammatically complete sentence must answer exactly the question:

“What problem do you intend to solve?”

R follows a specific plan of procedure

- we have identified the specific goal of your R
- identify how you propose to reach your goal
 - *where is the data?*
 - *do any existing data address to the existing problem?*
 - *if the data exist, have you access to them?*
 - *if you possess the data, what will do with them?*
 - ...
- R is not a blind excursion into the unknown, with the hope that the answer to the question will turn up

R divides the problem into more manageable subproblems

- Breaking down principal problems into small, easy solvable subproblems is an everyday strategy
- Close inspection of the principal problem – uncovering important subproblems – easy solving the main problem

R is guided by the specific problem, question or hypothesis

- we have stated the problem and its subproblems
- we form a hypothesis about what we may discover

Hypothesis = logical supposition

- is the natural working of the human mind: something happens, you attempt to explain the cause by constructing a series of reasonable guesses
- hypothesis are supported or not supported by the data
- data run contrary → rejection
- supported by a growing body of data → **theory**

R is guided by the specific problem, question or hypothesis

Theory = organized body of concepts and principles intended to explain a phenomenon

- theories are also tentative explanations supported or not supported by newer data

- data run contrary → modification or rejection

- testing of a theory: prediction (hypothesis) about what should occur if the theory is a viable explanation of the phenomenon

example:

R is guided by the specific problem, question or hypothesis

Albert Einstein's theory of relativity (1915)

Light passes through space as photons – minute masses of spectral energy. If light has mass – subjected to the pull of G field

Karl Schwarzschild – equation with respect to the gravitational field of the sun (1916): rays of light should be deflected 2x the amount that Isaac Newton predicted many years earlier

Group of London astronomers traveled to Brazil and North Africa (1919) to observe the light of a distant star distorted by the sun visible during an eclipse → data analyzed and interpreted: results support E-S hypothesis and thus Einstein's theory of relativity

R accepts certain critical assumptions

Assumption in R = Axiom in geometry

- self-evident truths, condition taken for granted
- vital that others that judge the quality of your R know what you assume with respect to your project, in accordance with their own assumptions

ex. astronomers were competent and their instruments were sensitive enough

R requires the collection and interpretation of data

- data, events, observations - nothing more!
- their significance - how the researcher extracts the meaning from them

DATA UNINTERPRETED BY THE
HUMAN MIND = WORTHLESS

R requires the collection and interpretation of data

- “Education” - notes traveling from the notebook of the instructor to the notebook of the student
- data that do not *pass through human* mind and is *processed* there - no help for answering the questions
- but, different minds see different meanings of the same facts
 - gastroduodenal ulcer
 - breast cancer

R requires the collection and interpretation of data

- Data demand interpretation, but
- no rule, no formula will lead to the correct interpretation, so

INTERPRETATION IS SUBJECTIVE

R requires the collection and interpretation of data

- Do you remember?
 - information gathering
 - transportation of facts
 - rummaging for information
 - catchword to get attention

None of these activities demands that the researcher draw any conclusion and make any interpretation

⑥ R interprets the data →
resolution of the problem →
confirmation/rejection of the
hypothesis and providing an
answer to the problem that started R
At this point one or more new
problems may emerge



① R begins with
a problem: an
unanswered question



② R defines the goal:
a clear statement
of the problem



③ R divides the problem into
appropriate subproblems



④ R proposes solutions
through reasonable
hypotheses - these direct
to appropriate data



⑤ R collects and
organize the data



R is helical

R is helical

- Dissatisfied?
 - R is rarely conclusive: additional problems that need to be solved arise
 - R asks for more R
 - every R yields as many problems as it solves = the true nature of discovery of knowledge

What is methodology?

Methodology (M) unifies and controls any R project

Functions of M:

1. controls and dictates the acquisition of data
2. gathers the data and extracts the meaning

Discover the discipline of research

Academic research is usually seen as being far away from everyday living.

This is not true!

1. conducting the R to produce a good thesis = one of the most valuable **educational experiences** a person can have

2. R adds to the knowledge about the world → **promote the welfare and comfort of us all**

Great discoveries are a commonplace in contemporary media



Thank you!