

How to stand on Giant Shoulders

Searching and Re-searching
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What is Science?

- Physics, Chemistry, Biology
- A system of organised knowledge
- Empirically verified knowledge about nature
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- Nouns
- Verb – science is what scientists do

What do scientists do?

- They ask questions
- They dig up available information
- They make hypothesis
- Design and conduct experiments
- They make detailed observations, look for patterns
- Construct theories and models
- Rigorous, skeptical, systematic
- They report their results

Science: Structure

- Naming
 - Classification
 - Hypothesis
 - Experiments
 - Observations
- Laws
 - Definitions
 - Axioms/Postulates
 - Theory
 - Models

Science

- Question, problem, doubt
- Literature search
- Hypothesis formulation
- Experiment design and execution
- Reporting results

Newton

- I see more because I stand on Giant Shoulders
- Copernicus
- Galileo
- Kepler
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Answering questions, clearing doubts

- Knowledgeable People
- Magazines – New Scientist, Scientific American
- Libraries – Books
 - Classification system
 - Contents, Index

Accessing content on the Net

- Browsers and Search Engines
- Google, Yahoo, and MetaSearch
- Searching “indexed” content
- Demonstration

Search

- Google, Google Scholar,
- Settings / preferences
- Advanced search
- Boolean operations
- Quote marks, - sign
- Keyword / phrase search
- Directories, Databases

Databases & Directories

- PubMed
- ScienceDirect
- Web of Science

- Yahoo Directory
- Specialised Directories

Searching and Re-searching

- Quick and efficient
- Right click or control click to open up tabs
- Scanning the page for **relevance**
- Bookmarking (favorites)
- Organising bookmarks / favorites

Searching and Re-searching

- Scanning pages for **importance**
- Use of EverNote or similar programmes to take notes
- Reading and organising notes
- Use of Mendeley for organising pdf files

Being Critical

- Scientific spirit/temper/attitude
- Stories - suspend disbelief
- Science - suspend belief
- Credulity and Skepticism
- Questioning spirit and humility
- Demonstration with an example:

Female Foeticide

- Census
- Sex Ratio in Punjab, Haryana
- Female Foetuses selectively aborted
- Ergo, ban amniocentesis.

Female Foeticide

- 25 million girl children missing!
- 75 million criminals roaming free
- 75 out of 1000 people!

Sex Ratio

- Amphibians – ambient temperature
- Deer Density
- X and Y chromosome
- Mother's health and sex of children

Sex Ratio

- Women in Haryana & Punjab
- Density of population
- Underpopulated tribal districts

Sex Ratio: Population Biology

- **A Thought Experiment:**
- One woman & 100 men
- One man & 100 women
 - In two islands

What do you expect to see after 50 years?

Sex Ratio: Population Biology

- Quantity
- Sexual and Social Selection
- Quality
- Evolution in Punjab and Haryana

Gender Issue

- Population & Gender Bias
- Fall in population
- Socio-Cultural Stabilisation
- Language and gender

**Don't believe all that
you read**

Don't be frightened to question
the "experts"

Now, to continue

Credibility, Authenticity

- Address bar
- .com, .org, .gov, .edu, ...
- Advertisements on the page
- About Us
- Contact Us
- Links on the page
- References
- Last updated

Credibility Authenticity

- Who
- Where
- When
- What
- Why
- How

Credibility and Authenticity Not the same as Reliability

No substitute for
critical spirit

Reliability and Truth

- Agreement between different webpages
- Science not a popularity contest – even if all scientists today agree on something, tomorrow it might turn out to be wrong
- Triangulation 1 – books, experts
- Triangulation 2 – different strategies, techniques, methods give the same results
- Reliability is not truth – suspend belief but be ready to use the results

Tasks

- Assess your reading speed
- Ask three questions
- Do three searches with key terms
- Search the topic through directories
- Search for databases

Stand on Giant Shoulders

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