Question Development and Search Strategies

PHYS 2070
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Sciences and Technology Library

http://libguides.lib.umanitoba.ca/astronomy
Goal

- Students will have a clear understanding of the steps of carrying out a literature search for their assignments and projects
Case

The National Radio Astronomy Observatory (NRAO) issued a press release on an upgrade to ALMA that will “supercharge” the Event Horizon Telescope.

How do you find the press release?

Where do you begin?

[Image of an observatory with star trails in the background]

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Pre-Test

- Let’s see where your knowledge about question development and search strategies is at
- The following is a brief self-assessment: https://www.surveymonkey.com/s/PHYS2070
- No marks are assessed
- Your answers are anonymous
- You can obtain a copy at the end of the test
What Are Research Questions?

http://www.cfht.hawaii.edu/HawaiianStarlight/HawaiianStarlight-AIOM.html
Objective 1

Analyze

http://www.astroml.org/_images/plot_moving_objects_2.png
Given a question formulated in preparation for a literature search, you will be able to *differentiate* background and foreground questions listing two characteristics specific to each type of question.
Ask the Right Question

“Paper or plastic?”

copyright The New Yorker
Types of Questions

- A two-model framework can be used to frame your question:
  - Background Questions
  - Foreground Questions

- This framework helps you to identify appropriate resources to better answer your question
Background Questions

- topics
- definitions
- facts

Background Questions

Examples:

Why is the sky blue?
What is gravitational lensing?
How is a CCD image calibrated?
Case

The National Radio Astronomy Observatory (NRAO) issued a press release on an upgrade to ALMA that will “supercharge” the Event Horizon Telescope.

Learning Activity

• Identify two background questions related to the case

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Foreground Questions

- Research based
- Specific – narrowly focused
- Data is collected and analyzed to answer the question

Foreground Questions

Examples:

In low mass close binary stars, what effects do magnetic stellar winds have on their evolution?

To what degree does dark matter affect gravitational lensing?
Questions

Undergraduate  Graduate  PhD/Researcher
Why is it Important to Match the Type of Question to Appropriate Information Resources?

www.idontsmoke.net
Objective 2

Comprehension
Given a background or foreground question, you will be able to select the appropriate information resource using the Information Retrieval Model to answer the question, listing one resource specific to each type of question.
Background Resources

Textbook

Monograph

Reference

Review Articles
Definition

Monograph:
A detailed written study of a single specialized topic (distinguished from general studies in which the topic is dealt with as part of a wider subject such as a textbook).

Oxford English Dictionary Online Edition
Definition

Review Article:
An article or book published after examination of published material on a subject. It may be comprehensive to various degrees and the time range of material scrutinized may be broad or narrow, but the reviews most often desired are reviews of the current literature.

Finding Background Resources

http://umanitoba.ca/libraries
Case

The National Radio Astronomy Observatory (NRAO) issued a press release on an upgrade to ALMA that will “supercharge” the Event Horizon Telescope.

Learning Activity

• Find a resource to answer your background questions

Background Resource Search

What type of resource did you find?

Which search resource did you use?

Did you encounter any difficulties searching?

Record your answers on the worksheet and write down any reflections you may have.
Are group- and cluster-scale dark matter haloes overconcentrated?

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ABSTRACT

We investigate the relationship between the halo mass, $M_{200}$, and concentration, $c$, for a sample of 26 group- and cluster-scale strong gravitational lenses. In contrast with previous results, we find that these systems are only $\sim 0.1$ dex more overconcentrated than similar-mass haloes from dark matter simulations; the concentration of a halo with $M_{200} = 10^{14}$ $M_\odot$ is $c = 0.78 \pm 0.05$, while simulations of haloes with this mass at similar redshifts ($z \sim 0.4$) predict log $c \sim 0.56 \pm 0.1$. We also find that we are unable to make informative inference on the slope of the $M_{200}-c$ relation in spite of our large sample; we note that the steep slopes found in previous studies tend to follow the slope in the covariance between $M_{200}$ and $c$, indicating that these results may be measuring the scatter in the data rather than the intrinsic signal. Furthermore, we conclude that our inability to constrain the $M_{200}-c$ slope is due to a limited range of halo masses, as determined by explicitly modelling our halo mass distribution, and we suggest that other studies may be producing biased results by using an incorrect distribution for their halo masses.

Keywords: gravitational lensing; strong - galaxies: groups: general.

Review Article
Foreground Resources
Databases

- Subject Specific
  
- Multidisciplinary

- ads
- Inspec
- Engineering Village
- arXiv.org
- ISI Web of Science
- Scopus
- Google Scholar
Finding Foreground Resources

http://umanitoba.ca/libraries
Finding Foreground Resources

Within a **Subject Guide**, look for Articles or Databases by subject to access resources for foreground questions:

**Astronomy: Home**

- NASA Astrophysics Data System
- arXiv e-Print archive (Cornel University Library)
- INSPEC
- Web of Science
- Scopus
- Google Scholar
Case

The National Radio Astronomy Observatory (NRAO) issued a press release on an upgrade to ALMA that will “supercharge” the Event Horizon Telescope.

Learning Activity

• Would you use a multidisciplinary database for this case?
• Why? or Why not?
• Record your answers on your worksheet
Objective 3

Evaluation

http://4.bp.blogspot.com/-rQaFhd6NHJ0/TlJrXcsKavI/AAAAAAAAlU/urKiFcwF7Uk/s1600/evaluation.jpg
Given a foreground question, you will be able to *justify* the database(s) chosen to carry out the search using 3-5 database selection criteria.
Database Selection Criteria: Foreground Questions

- Journal Databases (also known as bibliographic databases)
- Subject
  - Specific (e.g. astronomy, physics, health sciences)
  - Multidisciplinary (e.g. material science comprises physics, chemistry and engineering)
- Publisher of Database (authoritative)
  - Government (e.g. NASA)
  - Academic/Industry organization (e.g. American Chemical Society)
Database Selection Criteria: Foreground Questions

- Time period coverage (current or older)
- Search tools
  - Boolean (logic) operators
  - Thesaurus (helps you find words/phrases for your search)
  - Limit options (time period, language, publication type, etc.)
  - Search set manipulation
  - Save search results to bibliographic management software
Case


Learning Activity

• Review a database other than ADS listed in Foreground Resources
• Use the database selection criteria to assess its appropriateness for this case
• List 3 database selection criteria this database meets

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Academic Journals

- Peer-reviewed periodicals
- Institution, corporation or a professional or scholarly society
- Researchers publish current news or reports in the form articles of their research work.
Definition

Peer-review:

“… a system… used by scientists to decide which research results should be published in a scientific journal. The peer review process subjects scientific research papers to independent scrutiny by other qualified scientific experts (peers) before they are made public.”

Sense About Science

http://www.senseaboutscience.org/pages/peer-review.html
(retrieved: Sept. 19, 2013)
Academic Journals

Types of articles:

- Letters/Communications
- Research Notes
- Articles
- Supplementary Articles
- Review Articles

Experiment-Recourses.com
Exercise

1. You plan to submit a research article to Annual Review of Astronomy and Astrophysics

2. Is this journal peer reviewed?

3. What process does this journal use to publish articles?
What is a Well-Formulated Search Statement?

xpaceculturalcentre.blogspot.com
Objective 4

Application
Given a question with two distinct concepts and associated synonyms within each concept, you will be able to apply appropriate Boolean operators to combine the concepts and synonyms into a well-formulated search statement.
Anatomy of a Question

**Key Concepts:** main topics or subjects in the question.

**Synonyms:** another word meaning the same thing
(e.g. synonym of dirt = earth, soil)

**NOTE:**

It’s important to think of all possible synonyms or related words to help achieve a comprehensive search retrieval.
Anatomy of a Question

Foreground Question:

Is physical therapy effective for treating lower back pain?

Key Concepts
### Example

<table>
<thead>
<tr>
<th>Concept A</th>
<th>Concept B</th>
<th>Concept C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Therapy</td>
<td>Lower Back Pain</td>
<td></td>
</tr>
<tr>
<td>Massage</td>
<td>Lower Back Ache</td>
<td></td>
</tr>
<tr>
<td>Hydrotherapy</td>
<td>Lumbar Pain</td>
<td></td>
</tr>
<tr>
<td>Acupressure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How Do We Combine?

- Boolean operators are a system of symbolic logic used to express the relationship between individual terms.

- We use these logical relationships all of the time, even in non-academic related topics.

- Even a search as simple as “Cats and Dogs”
Boolean Operators

- Use **OR** to connect synonymous or related terms.
- For example if searching “Cats” consider

Persians  OR  Calicos  OR  Kittens
Boolean Operators

- Use **AND** to connect all terms that must occur in the information.

Retrieves only information that talks about both Cats **AND** Dogs.
Boolean Tutorials

Boolean:
http://lib.colostate.edu/tutorials/boolean_info.html

Advanced Boolean:
http://lib.colostate.edu/tutorials/booleanadv_info.html

Note: you will need Macromedia Flash v.5 installed on your computer
Search Principles

Good Search Technique:

- Search for one concept at a time
- Group synonymous/related terms into one set using OR operator
- Use AND operator to combine set numbers representing distinct concepts that must occur in same search
Search Principles

Well-Formulated Search Statement:
(physical therapy OR massage OR hydrotherapy OR acupressure) AND (lower back pain OR lower back ache OR lumbar pain)
Search Principles

Well-Formulated Search Statement Entered into a Database:

#1 physical therapy OR massage OR hydrotherapy OR acupressure

#2 lower back pain OR lower back ache OR lumbar pain

#3 #1 AND #2
Exercise
Well-Formulated Search Statement

• Identify key concepts in the question below
• Combine the case key concepts and their synonyms with their appropriate Boolean operators to create a well-formulated search statement

*What factors affect stellar motion of the Andromeda galaxy (also known as M31, NGC 224)?*

Enter the search statement into your worksheet.
Case


Learning Activity

• Use NASA/ADS to answer the case question
• Use another database listed under foreground resources to find articles
• Compare the two databases using the database selection criteria

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Citing and Referencing

Citation: A (Very) Brief Introduction
https://www.lib.ncsu.edu/tutorials/citation/

Citing Sources Overview (MIT)
http://libguides.mit.edu/c.php?g=176032&p=1159439
Citing and Referencing

This is a more detailed tutorial for you to review on your own.
http://monash.edu/library/skills/resources/tutorials/citing/index.html

Another tutorial using the Harvard style system:
https://ilrb.cf.ac.uk/citingreferences/tutorial/index.html

(Note Annual Reviews uses the Harvard Style with some minor changes)
Citing and Referencing

Go to: Annual Reviews Instructions for the Preparation of Manuscripts

Citing and Referencing info: Pages: 18-21

Examples in Appendix A. Pages: 28-30
Citing and Referencing

In-text citation:

- Use name-and-year system
  
  Holmgren & Johnson (1958) discovered...
  
  Jones, Smith & West (1988) observed...
  
  More than 3 authors: Harvey et al. (1999) determined that...

- Multiple in-text citations
  
  - Chose either alphabetical or chronological order
  
  - Be consistent once you decide
Citing and Referencing

Reference List

- Separate Page
- Heading: Literature Cited
- Do not list as footnotes
- Set line space to 2 throughout literature cited section
- Do not indent the first line of each entry
- For each author, use last name first, then initials, no periods
- List references in alphabetical order by last name of first author, then last name of coauthors, and finally by year.
- See example on page 19 of Annual Reviews Instructions to Authors
Citing and Referencing

Bibliographic Style

Refer to Appendix A of *Annual Reviews Instructions for the Preparations of Manuscripts* for examples

Some things to pay attention to:

- Italicize book titles and journal names
- Do not include journal article title
- Abbreviate journal names
- For abbreviation lists go to: 
  [Astronomy Subject Guide Citations and Journal Abbreviations](#)
Citing and Referencing Exercise

For the following sources:

1. Write out the in-text citation, each, on a separate line.
2. Literature Cited list
3. Go to Astronomy Subject Guide to access exercise
Contact

Should you have any questions, I can be reached at:

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