

## *Knowledge, Credibility and Research*

*There are known knowns; there are things we know that we know.*

*There are known unknowns; that is to say, there are things that we now know we don't know.*

*But there are also unknown unknowns - there are things we do not know we don't know.*

-Donald Rumsfeld



A Research Methods Crash Course:  
*Everything you didn't even know you needed to know*

## Today

- Don't panic
- Winnowing your  $p^3$  ideas
- Ways of knowing
- Credible Information
- Research
- Literature Review

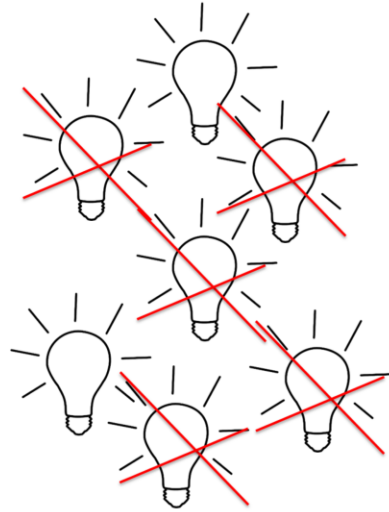


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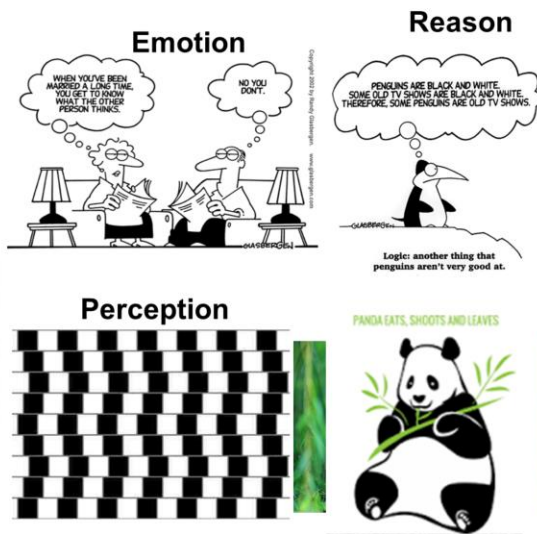
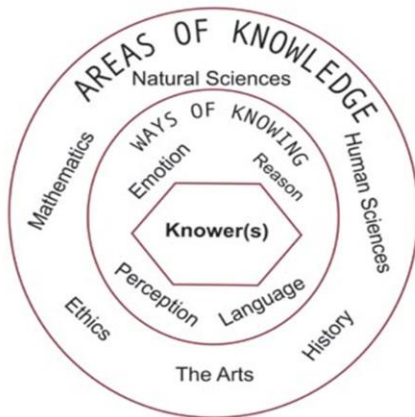


## Winnowing Ideas

- Generate Lots of Ideas
- Examine Each Idea as if You Had Completed your Project, Paper or Product
- Do you Care?
  - If you don't care, this is not a good idea to pursue
  - The ideas that are left over are viable but not "sized"



## Theory of Knowledge (ToK)



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Theory of knowledge (TOK) is a course in the International Baccalaureate (IB) Diploma Programme (DP). It is intended as an opportunity for students to reflect on the nature of knowledge, and on how we know what we think we know.

It is one of the components of the DP core and is mandatory for all students. The TOK requirement is central to the educational philosophy of the DP.

As a thoughtful and purposeful inquiry into different ways of knowing, and into different kinds of knowledge, TOK is composed almost entirely of questions.

The most central of these is "How do we know?", while other questions include:

What counts as evidence for X?

How do we judge which is the best model of Y?

What does theory Z mean in the real world?

Through discussions of these and other questions, students gain greater awareness of their personal and ideological assumptions, as well as developing an appreciation of the diversity and richness of cultural perspectives.

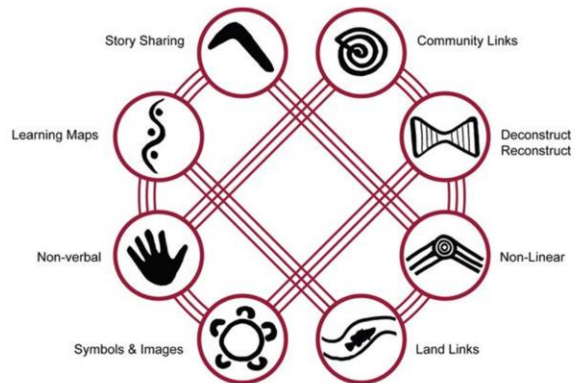
TOK aims to make students aware of the interpretative nature of knowledge, including personal ideological biases – whether these biases are retained, revised or

rejected.

We need to think about how we know because we can be fooled.

## Other ways of knowing

- An Indigenous Model
  - Tell a story.
  - Make a plan.
  - Think and do.
  - Draw it.
  - Take it outside.
  - Try a new way.
  - Watch, then do.
  - Share it with others



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From: ABORIGINAL PEDAGOGY BOOK - 8 WAYS by Dr Tyson Yunkaporta

### Australian Aboriginal Model

Story Sharing: *Approaching learning through narrative.*

Learning Maps: *Explicitly mapping/visualising processes.*

Non-verbal: *Applying intra-personal and kinaesthetic skills to thinking and learning.*

Symbols and Images: *Using images and metaphors to understand concepts and content.*

Land Links: *Place-based learning, linking content to local land and place.*

Non-linear: *Producing innovations and understanding by thinking laterally or combining systems.*

Deconstruct/Reconstruct: *Modelling and scaffolding, working from wholes to parts (watch then do).*

Community Links: *Centring local viewpoints, applying learning for community benefit.*

## Language and Reason as ways of knowing

- Basis for
  - Academia (Academic Literature)
  - Law (Rhetoric)
  - Business (Rules, Contracts, Regulation)
- Not necessarily for
  - The arts
  - Social interaction
  - New Ideas



What is this?



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Reason and Language tend to be the means by which we “know”

They are used heavily in some knowledge areas but not necessarily in others.

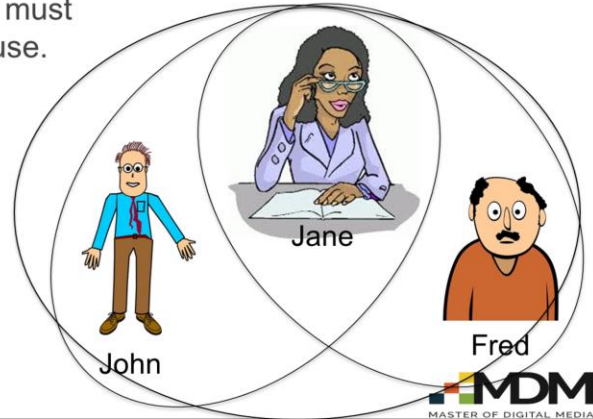
Language and reason can fool us in subtle ways. For example, the original name for a bicycle seat was a “saddle” because there was no language for it when the bicycle was invented so they used an identical word for a similar concept. Thus started the aching of millions of bums over hundreds of years. Once one stops thinking of a saddle, one is freed to think of more comfortable ways of sitting on a bike.



## language and reason for persuasion

- In order to use language and reason to make persuasive arguments, we must have trust in the information we use.
- Trust
  - A belief in reliability
- Why believe?
  - Evidence
    - Logic
    - Credibility

If John lives with Jane and Jane lives with Fred then Fred lives with John



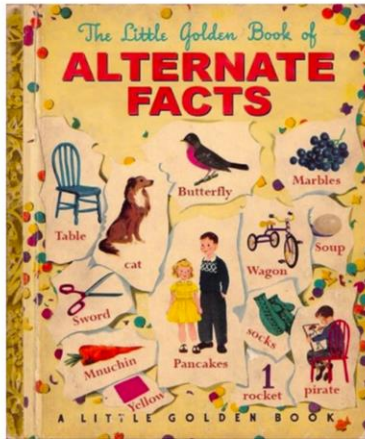
## What is a Credible Information?

- Authority
  - Produced by an expert in the subject area citing other experts
- Accuracy
  - Edited and fact-checked by multiple other experts
- Objectivity
  - Free from bias
- Currency
  - Latest information
- Coverage
  - comprehensive research

There are not “Alternate Facts”

Boing Boing  
13 hrs · 48

Art: Tim O'Brien #alternatefacts



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## Research and its Methods

Exists

Does not exist

- What is research?
  - A systematic search *of* or *for* knowledge about a specific topic
  - A practical form of “scholarship”
- What method do I use to do research?
  - We have to thank Psychology for helping us with this.
  - Research methods are generally categorized as either
    - *Quantitative, or*
    - *Qualitative*



## Qualitative Research

- Concentrates on collecting and analyzing subjective data
- Usually the perceptions of the people involved
- Intention is to illuminate perceptions and, thus, gain
  - greater insight (explain why) and
  - Knowledge (reproduce or recognize).





## Subjectivity Problem

- What this monkey doing?



## Quantitative Research

- Concentrates on what can be measured.
- Involves collecting and analyzing objective data
- Usually involves some form of math
  - Statistical





## Causality Problem

- Data taken from 20 year study of 2438 middle-aged Welsh men's shaving habits discovered that the unshaven are;
  - Less likely to be married
  - More likely to be blue-collar
  - Had a 45% higher death rate
  - Had a 70% higher risk of stroke
  - Were shorter
  - More likely to suffer from Angina
- Conclusion: Not shaving causes these problems?



## Quantity vs. Quality

	<b>Qualitative Research</b>	<b>Quantitative Research</b>
<b>Type of reasoning</b>	<i>Inductive (infer general from specific)</i>	<i>Deductive (infer specific from general)</i>
<b>Link with concepts</b>	<i>identifies concepts from situation</i>	<i>Has predetermined concepts and investigates relationships</i>
<b>Action</b>	<i>Usually only describes the action in a situation</i>	<i>tests relationships between concepts on performing an action</i>
<b>Outcome</b>	<i>illuminates the situation by adding examples</i>	<i>accepts or rejects proposed theory</i>
<b>Approach to validity</b>	<i>truth seen as context bound (socially constructed)</i>	<i>truth seen as objective and universal</i>

## Quantity vs Quality



- **Quantitative**
  - We have an hypothesis that monkeys will put bananas to their ears
  - We gave bananas to monkeys
  - If we say banana to ear == "Monkeycide"
  - We counted xx instances of Monkeycide over yy trials
  - Our hypothesis is accepted if  $xx > 0$
- **Qualitative**
  - We saw monkeys pick up bananas
  - We observed the monkeys placing bananas to their ears
  - From observation we have the concept: "Monkeycide"
  - Monkeys Jenny, Irene and Blake exhibited Monkeycide

## Forms of Research

- Research can be...
  - Descriptive (*find facts*)
  - Exploratory (*identify patterns*)
  - Analytical (*explain why or how*)
  - Predictive (*forecast the likelihood of particular events*)
  - Problem Solving (*improve current practice*)

## What is a Literature Review?

- a literature review ...
  - uses as its input reports of primary or original scholarship,
  - does not report anything new
  - Seeks to describe, summarize, evaluate, clarify and/or integrate the content of primary scholarship

Cooper, H. (1998), synthesizing Research: A Guide for Literature Reviews

## Why do a Review?

- Know what to do (before starting a  $p^3$ ):
  - to identify gaps in what is known
- Know where to start (starting):
  - to carry on from where others have already reached, or position your work relative to previous work
  - to identify information, methods and ideas that may be relevant to your work (i.e. avoid reinventing the wheel)
- Know what you have done (finishing):
  - to increase your breadth of knowledge of your subject area
  - to put your work into perspective
- Other:
  - to identify opposing views
  - to identify other people working in the same fields

## 5 Stages

1. Specifying
  - formulating the problem
2. Searching
  - collecting the data
3. Collating
  - evaluating the data
4. Analyzing
  - interpretation of the data
5. Writing
  - presentation of results

## 1. Specifying the Review

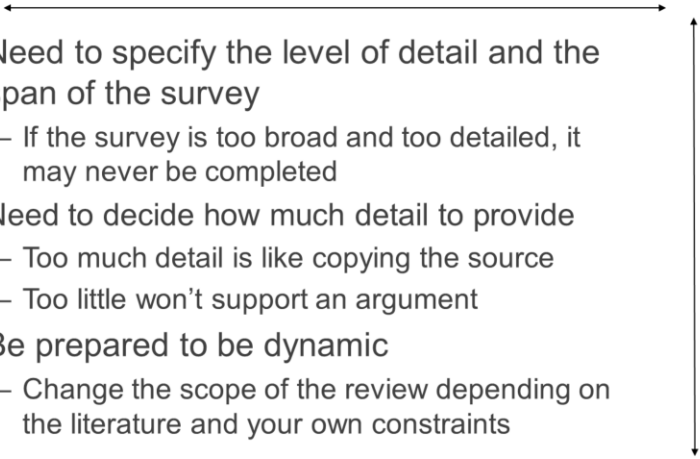
- Topic
  - What subject will the review cover
- Type of Review
  - Integrative, Theoretical, Methodological
- Breadth of Review
  - The range of subjects that are covered
- Depth of Review
  - The amount of detail that it goes into



## Types of Review

- **Integrative**
  - Drawing conclusions from many separate studies
    - ...study A, B, C and D concluded that product X is horrible
- **Theoretical**
  - Present different theories to explain a certain phenomenon
    - ...why people use this app is partially explained by the “A” theory which is summarized as...
- **Methodological**
  - Examine methods that have been applied to a problem.
    - ...the A, B and C methods have been applied to this problem...

## Breadth and depth

- 
- Need to specify the level of detail and the span of the survey
    - If the survey is too broad and too detailed, it may never be completed
  - Need to decide how much detail to provide
    - Too much detail is like copying the source
    - Too little won't support an argument
  - Be prepared to be dynamic
    - Change the scope of the review depending on the literature and your own constraints

## 2. Searching

- Primary Sources
  - Peer-reviewed sources
- Secondary sources
  - Bibliographies, abstract archives
- Less credible sources
  - Google, Wikipedia, popular publications, web sites, your friends

## Scholarly Peer-Review

- Process of subjecting an author's scholarly work, research, or ideas to the scrutiny of others who are experts in the same field, before a paper describing this work is published in a journal or other forum.
- Peer review methods are employed to
  - maintain standards,
  - improve performance, and
  - provide credibility.



## Where to Start

- Ryerson Library
- Articles and Indexes
  - <http://www.ryerson.ca/library/indexes.html>
- Digital Media Librarian
  - Jay Wolofsky
    - LIB176
    - 416-979-5000x:7377
    - [jwolofsk@ryerson.ca](mailto:jwolofsk@ryerson.ca)



## Search Process

1. Start with some relevant source
2. Find all its references
3. Screen those references to find new sources,
  - select only those papers which are relevant and of high quality
4. Repeat steps 1-3 multiple times using the new sources
  - You are building up a bibliographic source list
  - Remember to change the scope/detail of review, depending on literature that appears during search

## A Heuristic That Often Works

- Find any paper in the area you are interested in.
- Go to its reference section and find the first 10 references
- Look up those papers and go to their reference sections and find each of their first 10 references
- The papers that are referenced most are probably the “real literature”.
- Use the “real literature” to identify secondary literature.

### 3. Collating: What to Keep

- Critical analysis and organization of available literature:
  - Practical (Is it going to be useful?)
    - Is it in a language I can read?
    - Is it from the area I am reviewing?
    - It is from a peer-reviewed Journal I respect?
  - Quality (Is it any good?)
    - Did the authors sample the population fairly?
    - Did they treat the errors consistently and well?



## 4. Analyzing

- What does the data actually tell us?
- How does it apply to the topic of the review?
- What conclusions can we draw?
- Are there any major disagreements between different sources/studies?

## 5. Writing

- Introduction
  - Define topic, & also parameters/terms
- Body, where the review proceeds
  - Chronologically
  - Thematically
  - Methodologically
- Conclusions
  - Include future questions to be answered

## Conclusions

- The purpose of a review is not just to find what is in the literature, but also to draw conclusions from it. Have this in mind from the beginning.
- Be as thorough as you can, bearing your constraints in mind
- Be flexible, changing the scope of your review, or the amount of detail that you cover, as the review proceeds

## Bibliography

- “Conducting Research Literature Reviews”, Arlene Fink, 1998, Sage Publications
- “The Integrative Research Review - a systematic approach”, Harris M. Cooper, 1984, Sage Publications
- David Parkinson, Research Fellow, Dept of Physics, Queensland University