REASONING WITH SOURCES

Evaluating, managing, integrating, and citing the work of others



Why Do We Use Sources?

- To gain access to information—facts, statistics, narratives, etc.
- To see what other people think about the topic
- To respond to other statements; to put ourselves in conversation with other scholars
- To build our work on the methods and theories that others have developed, so we don't have to reinvent them

Why Do We Cite Sources?

- To credit other scholars' work
- To show the sources of our information
- To show how our own ideas developed from thinking about the work of other scholars
- To identify which scholarly conversations we're entering
- To allow other scholars to find and use our sources
- To allow other scholars to judge the relevance, expertise, reliability, and accuracy of our sources
- To allow other scholars to trace our methods and lines of reasoning as a way of testing our ideas
- To allow the discipline as whole to trace the collective development of knowledge (and thus to know what needs correcting if theories are disproven, etc.)

How do we make use of sources?

Examine the following examples—

- How do the ideas and information from a source enter this text?
- How do we know what is from a source and what is from this author?
- How does the source material function? What is its purpose?
- How does the citation function? Why does it take the form it does?

From Marine Biology

Right whales produce sounds ("up calls" or "contact calls") that may function as a means of individual identification. These are the only calls known to be made by newborn calves, their acoustic properties are well-suited for long-range communication, and they appear to be under selection to minimize overlap with ambient noise (Clark, 1982; Parks et al., 2007). Thus, these contact calls represent the most likely means of mother-offspring recognition in right whales.

Frasier, Timothy R., Philip K. Hamilton, Moira W. Brown, et al. "Reciprocal Exchange and Subsequent Adoption of Calves by Two North Atlantic Right Whales (*Eubalaena glacialis*)." *Aquatic Mammals* 36, no. 2 (2010): 115–20. © MinuteMan Press. All rights reserved. This content is excluded from our Creative Commons license. For more information, see https://ocw.mit.edu/help/faq-fair-use/.

From Archeology

Definite evidence for whale hunting, including the presence of ethnographically documented whaling tools (reviewed below) and strike marks on whale remains in sites, appears as early as 3000 B.P. and has been entirely limited to the Nuu-chah-nulth and Makah area (Monks et al. 2001). Arguments also have been made for precontact whale hunting on the Queen Charlotte Islands based on ethnohistoric data and the relative abundance of whale bone in sites (Acheson and Wigen 2002). However, most researchers working beyond the region where whaling is ethnographically documented have been reluctant to use such information as evidence for precontact whale hunting.

Losey, Robert J., and Dongya Y. Lang. "Opportunistic Whale Hunting on the Southern Northwest Coast: Ancient DNA, Artifact, and Ethnographic Evidence." *American Antiquity* 72, no. 4 (2007): 659–76. © Cambridge University Press. All rights reserved. This content is excluded from our Creative Commons license. For more information, see https://ocw.mit.edu/help/faq-fair-use/.

From Environmental Science

OH-PCBs have been detected in the blood and tissues of humans (*17-20*) and several wildlife species (*21-28*), and those levels and patterns were shown to vary with species, possibly due to species-specific metabolic capacity by phase I CYP and/or phase II conjugation enzymes and binding affinity to TTR (*29, 30*). Such interesting observations suggest the need for studies on OH-PCB residue levels in biota. However, little is known on the patterns and levels of OH-PCBs in cetaceans, which accumulate some of the highest concentrations of PCBs (*26, 28, 31-36*).

Nomiyama, Kei, Satoko Murata, Tatsuya Kunisue, et al. "Polychlorinated Biphenyls and Their Hydroxylated Metabolites (OH-PCBs) in the Blood of Toothed and Baleen Whales Stranded along Japanese Coastal Waters." *Environmental Science & Technology* 44, no. 10 (2010): 3732–38. © American Chemical Society. All rights reserved. This content is excluded from our Creative Commons license. For more information, see https://ocw.mit.edu/help/faq-fair-use/.

From Literary Studies

To understand modernity, and in particular its insistent compartmentalization of knowledge, [Bruno] Latour invites analysis of what he calls "translation": the continuous process of exchange between nonhuman and human domains, recognition of which is foreclosed by the "modern constitution" (32). Melville's whales, I will argue, evince precisely this kind of transgressive translation. At certain moments they act as screens for the projection of models for human society; at others they are called upon to shape that society, or are shaped by it.

Armstrong, Philip. "'Leviathan is a Skein of Networks': Translations of Nature and Culture in Moby-Dick." *ELH* 71, no. 4 (2004): 1039–63. © John Hopkins University Press. All rights reserved. This content is excluded from our Creative Commons license. For more information, see https://ocw.mit.edu/help/faq-fair-use/.

Citation styles differ

BECAUSE different fields care about:

specific wording and its location in a text (author-page number styles)

currency (author-date styles)

using unpublished sources (footnotes)

data from many sources more than authorship (citationsequence styles)

Citation Styles Differ, BUT:

All styles share two main features:

--an in-text marker

--a complete bibliographic reference

Evaluating arguments



How do we know what to use from a source? How do we indicate our stance / assessment?

Stasis Theory is a useful frame for

evaluating and connecting arguments

Fact—does a thing exist? how much? what happened?

Examples: is the ivory-billed woodpecker extinct? What nutrients do carrots provide? What is the intermediary in this chemical reaction?

Definition—what kind of thing is this? (links the concrete to the conceptual, or places a thing in a classification system)

Examples: what exactly is entropy? Does this defendant's action fit the definition of murder? Should this area be classified as a wetlands?

Causation—What are the causes, effects, or consequences of this?

Examples: what caused this outbreak of bird flu? What is the influence of environment on psychology? How will the intensity of cyclones change with increases in sea surface temperature?

Value—How should we evaluate or judge it?

Examples: Would person X make a good advisor? How significant ? What's the best process for refining uranium?

Policy or Action—what should we do because of this?

Examples: Should we ? Should we approve the Keystone XL pipeline project? ?

Adapted from "The Stases in Literary and Scientific Argument," by Jeanne Fahnestock and Marie Secor in *Written Communication*, 1988.

Claims in lower stases can form warrants for claims in higher stases

Data		Qualifier	Claim
1 million animals are killed each year in cosmetics testing		So, except for treatments of diseases,	Animals should not be used to test skin treatments
	Warrant	Rebuttal: human lives matter more than animal lives should matter more than profits	
	Backing Studies have s to reduce the c	hown that compani ost of tests	ies use animals

Adapted from Toulmin, Stephen, "The Layout of Arguments" in *Professing the New Rhetorics: A Sourcebook*, 1994. Ed. Theresa Enos and Stuart Brown.

Claims in different stases create chains of reasoning



Arguments of fact: Is or is not?

Claims of fact can be true or false if they can be measured absolutely and verified.

If they are measured by proxy or estimated, they are in the realm of the probable, and thus we can argue about the existence or amount.

The stasis of definition lets us navigate the ladder of abstraction, and reason by analogy



And categorize, include and exclude, reason by example, and generalize Categories: Class, kind, family, type, group, cluster, camp, genre, genus

Inclusion: Is, counts as, meets the qualifications, can be considered, belongs in, typifies, is defined as

Exclusion: is not, is distinct from, unlike, differs from, is a separate case

Cases: Instance, case, member, item, candidate, representative

Typicality: classic, (un)common, (a)typical, central, (un)representative, borderline

Elements of causation need to work together

Correlation (correlation implies but is not sufficient for causation)

Sequence (sequence helps us understand directionality in causation, but it is also not sufficient, and alone results in a post hoc ergo propter hoc fallacy)

Agent and mechanism

Types of values claims

Comparisons

Ratings on a scale; hierarchies

Trade offs between values

Hedging, (phrases of probability) indicate whether the stasis is "open" or "closed"



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As you read, ask and record:

- What assumptions does the source make?
- What claims does it make?

- How does it use evidence?
- How is the source structured?

How does the source use its own sources?

- Do you share those assumptions?
- Are the claims convincing? To what extent does the source close any open stases?
- Is the evidence relevant and sufficient?
- What does the structure tell you about the logic of the argument?
- Will you agree with, counter, complicate, extend, or qualify the ideas of the source?

Managing Information from Sources

- How do you manage information as a researcher?
- Can you describe your process of capturing useful facts, theories, methods, mechanisms, results, etc. from your sources?
- Are there particular tools or procedures you use?

Highlighting and margin notes

try cooperative

try all

demonstrate leadership, and be continually drawn into social situations. They new social fearly easily and even obligingly ormonstrate leadership, and be continually drawn into social situations. They may acquire friends easily and even obligingly alter their necessarias with each to math they will usually.

alter their personae with each. In math they will usually respond to ressoner personae with each. In name to some sources of the second secon inspond to cooperative tearing and cooperative reasons in the matching the history and mandatative to the later of the second se anecdotes behind the material they are studying.

Spatial Intelligence - Localized in the right brain, this intelligence often works in concert with vision, but blind persons exhibit it, too. Spatial intelligence is a fantastic aid to problem-solving in many areas: navigation, costumingsculpture, engineering, room decoration, and computer (syberspace) information management. A minority of people are "spatially challenged" - they get disoriented trying to unthread a map, turn the letter F upside down and backwards in space, or put together a machine they just took apart. But even they often benefit from simple use of spatial cues in the information they're studying (e.g. outlines, layouts, arrows).

Addressing students' spatial intelligence is perhaps one of the strongest aids in mathematics education. Diagrams, pictures, manipulatives, and games make mathematics clear to many.

Intrapersonal Intelligence - Also localized in the frontal lobes of the brain, this intelligence shows itself in the ability to create and use an accurate, undistorted model of oneself knowing one's own "feeling life," thought dynamics, values, and personal traits. Someone strong in intrapersonal intelligence might be considered "thoughtful" or "sensitive," perhaps introspective. She might have much more than a perfunctory answer to the question "How are you today?" but may or may not have a great deal of interpersonal or linguistic skill for conveying the answer. A student strong in this intelligence would happily examine his own thought process in successfully arriving at an answer and would also meaningfully discuss his fears about math.

Linguistic Intelligence - Residing in Broca's and Wernicke's areas of the brain, linguistic intelligence is exemplified in poets and other authors, but it is a strength of many people who are comfortable in the universe of words, reading, or writing. These individuals are often articulate, having a sense of humor. Deaf children who invent their own signs are likely showing this intelligence at work. A linguistically-strong child with average math skills may do fairly well on an IQ test.

Math teaching can draw heavily on linguistic intelligence by encouraging children to put into words what they see as patterns and procedures. A careful choice of a few accurate

"Somebody asked me to explain the achievements of the great biologists, the ones ... who could recognize patterns in nature and classify objects. So I began to think about whether the capacity to classify nature might be a separate intelligence. The naturalist ability passed with flving colors." Howard

> "There are certain parts of the brain particularly dedicated to the recognition and the naming of what are called 'natural' things." Howard Gardner

> > 5

Gardner (9/97)

key words (instead of a stream of technical teacherese) t explain an idea can capitalize on the verbal capacity for clarifying concepts, and it can prevent the predictable misunderstandings that later need correction. Also, the origins and definitions of math terms can enrich a presentation for students who possess a strong linguistic intelligence.

Naturalist Intelligence - This intelligence has to do with observing, understanding and organizing patterns in the natural environment (plants, animals, rocks, and natural features) an ancient key to survival. Tom Brown, known as "The Tracker" can distinguish minute indicators in any footprint that indicate even the emotional state of the walker, whether animal or human! Even identifying brands and models of cars, analyzing fingerprint variations, or spotting pathologies in x-rays uses the naturalist parts of the brain. In the math "environment," attributes of fractals, unique features of graphs, and visual patterns created by numbers and geometrical designs all tap this brain capacity. The Fibonacci Number patterns even give us deep insight into natural forms. (For instructing this see the Resource Bibliography: Wahl.)

A major premise shared by Gardner, and this book, is that a teacher A should more often attempt to tap processes that are strong and natural in the tearner than consistently demand production from a weaker intelligence mode. Without understanding this fundamental dictum,

schools and educators find themselves in classic no-win situations, as evidenced by the child who's constantly tipping out of his chair and throwing spitwads, using his strong kinesthetic intelligence for trivial ends, while the teacher is trying to verbally bang things into his weaker logical-mathematical intelligence, to no avail.

The times tables, for example, can be taught more effectively through several intelligences rather than relying on the tradition flash cards, printed square table, and timed tests that appeal to some linguistically- and spatially-intelligent students. For a variety of Multiple-Intelligence options that rapidly teach the math facts, see Chapter 10, "Sharpening the Math Facts."

Building on this fundamental structure, the Teacher Chapters and Activities in Math for Humans direct the teaching of mathematics toward consciously utilizing each of the intelligences as much as possible. This also means truly including the logicalmathematical intelligence that too often gets underplayed durin instruction in favor of secretarial copying and rote imitation.

I hope you have been stimulated by reading this summary look further into the eye-opening theory of Multiple Intelligen Consult the Resource Bibliography in the Appendix to locate fascinating references for its further study.

photo of Math for Humans by Mark Wahl. 2011. Photograph. Karmamatopoeia: Reading. Reading, Reading! Web. 19 Jan 2012. < http://karmamatopoeia.blogspot.com/2011/06/>.



Conceptual Note-taking

1898 Urban planning conference's 1^{st} PROBLEM: Horse manure. No solution Horse manure=pollution=transportation byproduct \rightarrow public health, sanitation problems

Factors affecting the problem:		Urban density $\uparrow \rightarrow$ transportation \uparrow			
Causal relationships:		living standards↑ → trade↑ →transportation ↑ - byproducts↑	→		
New technology amplifies the pr	roblem:	Railroad $\uparrow \rightarrow$ horse $\uparrow \rightarrow$ manure \uparrow			
Innovation extends use:	omnibus -	→ personal transportation \uparrow →horse \uparrow → manur	e ↑		
General principle:		as efficiency $\uparrow \rightarrow$ prices $\downarrow \rightarrow$ usage $\uparrow \rightarrow$ byprod	ucts ↑		
Potential uses for byproducts:	manure=f	ertilizer, BUT manure \uparrow (glut) \rightarrow fertilizer price \downarrow			
Byproducts have byproducts (2 nd order problems): manure $\uparrow \rightarrow$ flies $\uparrow \rightarrow$ disease \uparrow					
More direct byproducts:	noise, acc	cidents, traffic congestion, horse disease and de	ath		
Final claims: Cars are the solution! The example of the horse pollution problem can be generalized as an indicator of how technology and ingenuity will solve our problems 25					
These notes are based on the article "From Horse Power to Horsepower" by Eric Morris in Access Magazine, 2007.					

Literature Review Chart

Table 6. Comparison of studies identified by a systematic literature review that reported stage distribution in relation to quantified smoking status .

Study (Year) Ref No	No of cases, country, time period	% Smokers, Quantified smoking based groups	NSCLC stage profile, Group differences ^ in NSCLC stage	Other baseline group differences ^ (Gender, Age, Histology)	
Holli K, et al. (1999) (15)	290; Finland 1983-87	100%; Lifetime Cig : L (<500), M (500-800), H (>800)	Stages I-IV No diff in T or N or M status Stage groups N.A.	Males max (99%) in H, min (72%) in L. No diff in mean age. SqCC (63%) & SCLC (26%) max in H, ADC (17%) max in L.	
Maeshima AM, et al. (2008) (16)	236; Japan 1984-90	58.9%; BI: NS, Sm 1-500, Sm >500	Stages I-IV No diff in T or N status No diff in stage I vs. II-IV distribution	Gender distribution N.A., Age distribution N.A., Series consisted of surgically resected adenocarcinoma.	
Guo NL, et al. (2009) (17)	327; USA N.A.	100%; Sm <61 PYI, Sm >61 PYI	Stages I-III TNM status N.A. Stage I more in Sm <61 PYI (76.4% vs. 64.7%); Stage II more in Sm>61 PYI (20.6% vs. 8.4%).	Age ≥60 years more in Sm >61 PYI (77.9% vs. 64.4%) Males more in Sm >61 PYI (68.4% vs. 42.9%). SqCC (61.0%) more in Sm >61 PYI, ADC (83.2%) more in Sm <61 PYI.	
Janjigian YY, et al. (2010) (18)	2010; USA 2003-06	83.5%; NS, Sm <15 PY, Sm >15 PY	Stages IIIB-IV TNM status N.A. No diff in stage group	Males max (55.6%) in Sm >15 PY, min (34.4%) in NS. Median age max (65 yrs) in Sm >15 PY, min (59 yrs) in NS. SqCC (12%) max in Sm >15 PY, ADC (69%) max in NS.	
Current study	520; India 2008-11	74.0%, NS, L/M (SI I-300), H (SI>300)	Stages I-IV No diff in T or N status MI min (39.1%) in H, max (67.4%) in NS. IIIB max (42.1%) in H, min (24.4%) in NS. ETD min (16.6%) in H, max (41.5%) in NS.	Males max 97.9% in H, min (48.1%) in NS. Mean age max (61.0 yrs) in H, min (54.5 yrs) in NS. SqCC (57.9%) max in H, ADC (59.3%) max in NS.	
ETD=Extrathoracic disease, BI=Brinkman index, SI=Smoking index, NSCLC=Non-small cell lung cancer, Cig=Cigarettes, Sm=Current/Ex-Smoker, NS=Never-Smokers, PY=Pack Years, PYI=Pack Years Index, H=Heavy, M=Medium, L=Light, max=maximum, min=minimum, resp=respectively,					

N.A.=Data Not Available, SqCC=Squamous cell carcinoma, SCLC=Small cell lung cancer, ADC=Adenocarcinoma; ^ Statistically significant.

Singh, Navneet, Ashutosh N. Aggarwal, Dheeraj Gupta, et al. "Quantified smoking status and non-small cell lung cancer stage at presentation: Analysis of a North Indian cohort and a systematic review of literature." *Journal of Thoracic Disease* 4, no. 5 (2012):474–84. © Pioneer Bioscience Publishing Company. All rights reserved. This content is excluded from our Creative Commons license. For more information, see https://ocw.mit.edu/help/faq-fair-use/.

Useful note-taking systems must:

- Track the texts' main claims, purpose, and logical structure
- Record your own responses to the ideas
- Differentiate between your words and ideas and those of the sources
- Make information and ideas malleable, so they can be restructured and used to construct new ideas

How do we incorporate others' ideas?

- Direct Quotation
- Paraphrase
- Summary
- Images

All paraphrases, quotations, summaries, images, ideas, and facts from a source must be cited.

Write a 2-sentence summary of Emanuel 2005

A Paraphrase Must:

Accurately reflect the meaning of the source

BUT

• Substantially change the source's wording and structure

What cognitive and textual operations do we employ when we paraphrase?

How to Paraphrase

First, identify the central concepts and their logical relationship. Then, keeping that logical relationship intact, invert the structure of the central concepts

Next, look for ways to change syntax and diction e.g. changing from first to third person;

reordering phrases and clauses and using different subordinating conjunctions to keep the logical relationship intact;

"translating" phrases into more formal or less formal diction;

breaking long sentences into smaller parts, or linking similar smaller parts into one unit;

"translating" concepts from more concrete to more abstract, or vice versa

Check for accuracy and completeness—has the language sufficiently changed? Has the sentence structure sufficiently changed? Has the meaning *not* changed?

Paraphrase this passage from The Structure of Scientific Revolutions

"Normal science does and must continually strive to bring theory and fact into closer agreement, and that activity can easily be seen as testing or as a search for confirmation or falsification. But science students accept theories on the authority of teacher and text, not because of evidence." (80)

Kuhn, Thomas. S. *The Structure of Scientific Revolutions*. University of Chicago Press, 2012. © University of Chicago Press. All rights reserved. This content is excluded from our Creative Commons license. For more information, see https://ocw.mit.edu/help/faq-fair-use/.

Is this an acceptable paraphrase?

"Normal science always tries to make theory and fact agree; for example, scientists test theories and try to confirm or deny them. Students of science, though, don't test the evidence but just take the theories as true based on the authority of their teachers (80)."

Is this an acceptable paraphrase?

"Because he's interested in how scientific revolutions occur, Kuhn compares how normal scientists and students learn. Normal scientists, he claims, constantly work to make their theories fit the evidence, testing, confirming, and falsifying their ideas, but students don't work like normal scientists; instead, they ignore the evidence due to their concern for their teachers' authority (80)."

Is this an acceptable paraphrase?

"Thomas Kuhn identifies an incongruity between how "normal science" works and how students learn to become scientists. Students learn scientific theories by listening to their professors and reading their textbooks, he points out, rather than by actively questioning and assessing the fit between theory and reality themselves (80)."

Questions?

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