

CS 4001: Computing, Society & Professionalism

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Week 6: Evidence
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Homework 3 and Term Paper Proposal



Writing Arguments

The argumentative essay is a genre of writing that requires you to:

1. investigate a topic;
2. collect, generate, and evaluate evidence;
and
3. establish a position on the topic in a concise manner.

What is Evidence?

- “Evidence”: all the verifiable information a writer might use as a support for their argument, such as facts, observations, examples, cases, testimony, experimental findings, survey data, statistics, etc.
- Evidence is part of the “grounds” and “backing” of an argument in support of reasons and warrant respectively

Use of Evidence

- Consider a target audience of educated, reasonable, and careful readers who approach an issue with healthy skepticism, open-minded but cautious. What demands would they make on a writer's use of evidence?
- Apply the STAR Criteria to Evidence (by Richard Fulkerson)
- *Ex: After-school jobs are bad for teenagers because they take away study time.*
- **Sufficiency:** Is there enough evidence?
- **Typicality:** Is the chosen evidence representative and typical?
- **Accuracy:** Is the evidence accurate and up-to-date?
- **Relevance:** Is the evidence relevant to the claim?

General principles for the use of evidence (example)

Claim: Testing computer software is very expensive and can consume enormous resources.

Evidence: It is estimated that the cost of developing the Boeing 777 is \$10B. 35% of this cost is for software and half of those costs were for testing (published reports and Boeing Senior Research Fellow). Thus, the estimated cost of testing software in the Boeing 777 was \$1.8B.

Sufficiency
Typicality
Accuracy
Relevance

Discuss with respect to general principles: STAR

General principles for the use of evidence (example)

Claim: Software maintenance is the most expensive activity of software development

Evidence: Software maintenance can account for as much as 2/3 of the overall cost of software production (Pressman 1992, Schach 1994).

Sufficiency
Typicality
Accuracy
Relevance

Discuss with respect to general principles: STAR

Discussion Point

Sufficiency
Typicality
Accuracy
Relevance

WARNING!



H1N1 FLU SHOT CONTAINS:

Beta-Propiolactone: Carcinogen
Neomycin Sulfate: Immunotoxin
Polymyxin B: Neurotoxin
Potassium Chloride: Neurotoxin

Sodium Taurodeoxycholate: Carcinogen/Immunotoxin
Thimerosal (Mercury Derivative) : Neurotoxin

VACCINES ARE LINKED TO:

Narcolepsy **Rheumatoid Arthritis**
Guillain-Barre Syndrome **Multiple Sclerosis**
Autism **Lupus**
Paralysis **Cancer**
Dystonia **Death**



THE H1N1 VACCINE IS NOW BANNED IN MULTIPLE COUNTRIES!
THE H1N1 VACCINE'S DEVELOPERS HAVE REFUSED TO TAKE IT!
PROTECT YOURSELVES WITH KNOWLEDGE!

Discuss with respect to general principles: STAR

Rhetorical Understanding of Evidence

- Kinds of evidence
 - Data from personal experience
 - Data from observations or field research
 - Data from interviews, questionnaires, surveys
 - Data from reading and research/library/internet
 - Testimony
 - Statistical data
 - Hypothetical examples, cases and scenarios
 - Reasoned sequence of ideas

Data from personal experience

- Despite the recent criticism that Ritalin is overprescribed for ADHD, it can often seem like a miracle drug. My little brother is a perfect example, Before he was given the drug, he was a terror in school... (tell the before and after story)
- Strengths?
- Limitations?

Data from observation or field research

- The intersection at Fifth and Montgomery is particularly dangerous because pedestrians almost never find a comfortable break in the heavy flow of cars. On April 29, I watched 57 pedestrians cross the street. Not once did cars stop in both directions before the pedestrian stepped off the sidewalk onto the street... (continue with observed data about danger)
- Strengths?
- Limitations?

Data from interviews, questionnaires

- Another reason to ban laptops from classroom is the extent to which laptop users disturb other students. In a questionnaire that I distributed to 50 students in my residence hall, a surprising 60% said that they were annoyed by fellow student' sending email, paying their bills or surfing the web, while pretending to take notes in class. Additionally, I interviewed 5 students who gave me specific examples of how these distractions interfere with learning... (report examples)
- Strengths?
- Limitations?

Data from testimony

- Although the Swedish economist Bjorn Lomborg claims that acid rain is not a significant problem, many environmentalists disagree. According to David Bellamany, president of the Conservation Foundation, “Acid rain does kill forests and people around the world, and it is still going so in the most polluted places, such as Russia” (qtd. In BBC News)
- Strengths?
- Limitations?

Data from Statistics

- Americans are delaying marriage at a surprising rate. In 1970, 85% of Americans between the ages of 25-29 years were married. In 2010, however, only 45% were married (a statistical source).
- Strengths?
- Limitations?

Understanding of Evidence 1a

Claim: Testing computer software is very expensive and can consume enormous resources.

Evidence: It is estimated that the cost of developing the Boeing 777 is \$10B. 35% of this cost is for software and half of those costs were for testing (published reports and Boeing Senior Research Fellow). Thus, the estimated cost of testing software in the Boeing 777 was \$1.8B.

Discuss the kinds of evidence provided to support the claim.

Understanding of Evidence 1b

Claim: Software maintenance is the most expensive activity of software development

Evidence: Software maintenance can account for as much as 2/3 of the overall cost of software production (Pressman 1992, Schach 1994).

Discuss the kinds of evidence provided to support the claim.



Class Activity 1

Gathering Evidence

- Create a plan for gathering evidence.
 - What personal experiences have you had with this issue?
 - Relevant observational studies
 - What people could you interview?
 - What questions could be addressed through a survey or a questionnaire?
 - What useful information on this issue might be gathered from reference sources (e.g., journal)?
 - What useful information on this issue might be gathered from the library?
 - Can a search engine help?
 - Could any reliable statistical source provide you relevant information (e.g., Census Bureau, CDC)?

Your angle of vision will help determine how you frame evidence



- It's like looking through a peep hole or camera lens.
- As a writer, “you maximize the reader’s focus on some data, minimize the reader’s focus on other data, and otherwise [guide] the reader’s vision and response” (pg. 96).
- What influences are angle of vision?
 - Who we are, our belief systems, perspectives, biases

What is going on in this picture?



- Where is this happening?
- When is this happening?
- Why is this happening?
- What information do we still need?
- Is this a good trip or a bad trip?

Do you think the sailors are having a bad day?

Frames determine what is seen and unseen.



Framing Determines What Audience Perceives

- As you watch this video, note which statistics are used:
- <http://www.youtube.com/watch?v=Y7GGwg1949A> (AutismSpeaks ad)
- Why say 1 in 166?
- The odds of your child being diagnosed with autism? **.06 %**

Framing Statistical Evidence


- Raw numbers versus percentages
 - Small percentages may also be big numbers in absolute terms
 - People affected by mental illness and supporting funding for research and awareness
- Median versus mean
 - Distributional effects
- Unadjusted numbers versus adjusted numbers
 - Minimum wage increase versus subject to inflation
- Base point for statistical comparisons
 - E.g., change in stock price in 2008




Case Study – Academic Urban Legends

“Spinach is a good source of iron”

- Some messages presented in respectable scientific publications can be based on various forms of rumors.
- Sometimes authors can lazily, sloppily, or fraudulently employ sources
- Peer reviewers and editors may not have discovered these weaknesses in the manuscripts during evaluation
- A decimal point error appears to have misled millions into believing that spinach is a good nutritional source of iron
- Internet allows quick sharing of both accurate and false scientific information



Case Study – Anti-Vax Arguments



Andrew Wakefield's
discredited study, wrongly
linking vaccines and autism

Argument on Anti-vaccination

- It is claimed that specific vaccines such as MMR (mumps, measles and rubella), or specific ingredients like thiomersal are causative factors leading to diseases like autism.
- Vaccines are "unnatural," that they are somehow "useless," or that the diseases they prevent "aren't that bad anyway."
- Vaccination programs are seen as excessive government interference, or as an implementation of socialized medicine
- Ideological position of "choice"

Argument on Anti-vaccination

- A major cause of confusion among anti-vaxxers is the utter lack of understanding the difference between actual research and woo that someone wrote on their blog.
- Having little to no understanding of science or the scientific process, a parent is all-too-often more likely to trust something that entertains them even while it scares them.
- Attention grabbing pictures of children

Argument on Anti-vaccination: Role of the Internet

- Arguments proffered on anti-vaccination websites (Kata 2010)
 - safety and effectiveness
 - alternative medicine
 - civil liberties
 - conspiracy theories
 - morality



Class Activity 2

How to use evidence

- The idea that spinach is a good source of iron is a myth that was born in the 1930s, due to a misplaced decimal point, causing the concentration to appear ten times higher than its real value.

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How to use evidence

- The idea that spinach is a good source of iron is a myth that was born in the 1930s, due to a misplaced decimal point, causing the concentration to appear ten times higher than its real value (Hamblin, 1981).

How to use evidence

- The discovery that spinach was as valuable a source of iron as red meat was made in the 1890s ... German chemists reinvestigating the iron content of spinach had shown in the 1930s that the original workers had put the decimal point in the wrong place and made a tenfold overestimate of its value. ... For a source of iron Popeye would have been better off chewing the cans. (p. 1671)

How to use evidence

- The myth that spinach is a good source of iron has its origin in a decimal point error in the 1890s. German scientists discovered the error about 40 years later (Hamblin, 1981: 1671).

How to use evidence

- Typographical errors, for example, do occur. It has been suggested that [emphasis added] spinach got its reputation as a dietary supplement because of a misplaced decimal point in which the iron value was given as ten times higher than it was. (Kronick, 1985: 75)