

Anatomy of a Journal Article

Bill Knowlton^{1,2}

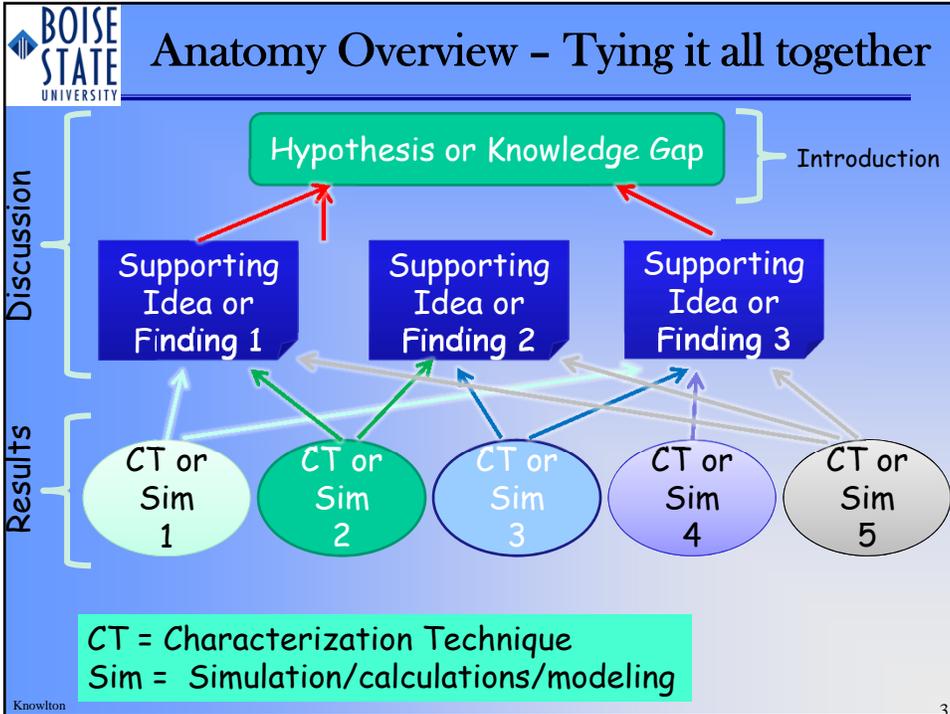
¹Department of Materials Science & Engineering

²Department of Electrical Engineering
Boise State University

MSE 478/578 - Scientific Communication in MSE

Anatomy Overview

- **Title**-Descriptive with minimal acronyms
 - **Author List**
 - **Affiliations** - Department, Organization, City, State, Country
- Abstract
- Introduction
- Experimental (Materials & Methods)
- Results
- Discussion
- Conclusion
- Acknowledgments



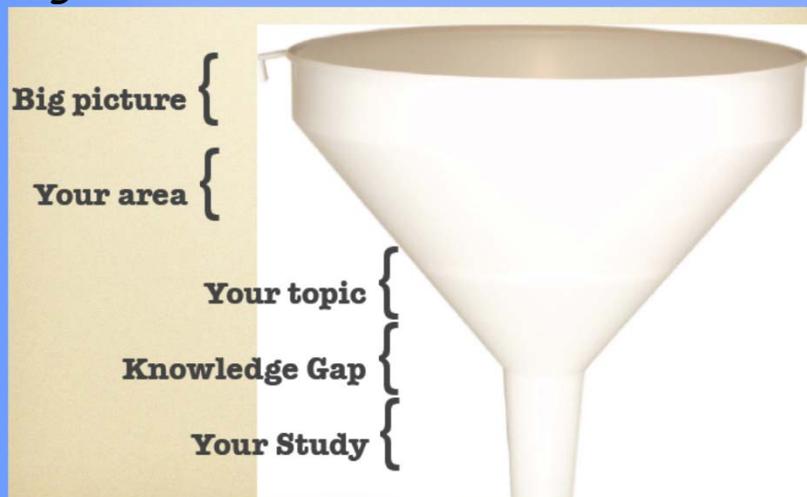
- BOISE STATE UNIVERSITY**
- ## Title, Author List & Affiliations
- **Title**-Descriptive with minimal acronyms
 - **Author List:**
 - First author is primary author,
 - Additional authors follow relative to amount of work contributed to manuscript
 - Last author is author who is supporting most of the work whether in funding, ideas and/or lab support;
 - Typically the last author is the corresponding author - provide email
 - **Affiliations** - Department, Organization, City, State, Country
- Knowlton 4

Abstract

- **Abstract**-(*past tense*) condensed version of topic, problem, approach to solving problem, how you solved problem (findings & conclusions), and implications
- *Topic* - 1 sentence
- *Question* (hypothesis or problem to be solved) - 1 sentence
- *Approach* - 1 sentence
- *Findings* - 1 to 2 sentences
- *Conclusions* - 1 sentence
- *Implications* (sometimes) - 1 sentence

I. Introduction:

- Use the funnel approach
- "*Big Picture*" & "*Your Area*"



I. Introduction:

- **I. Introduction:** (*present tense*) Funnel approach starting broad and funneling down
- Big picture: *1 to 2 sentences*
- Your area: *2-3 sentences*
- Your topic: *1-3 paragraphs*
 - Cover published work by others in the field
 - Cover your previous work in the field
- Knowledge gap: *1-2 paragraphs*
 - State 2-3 aspects of what is missing in the literature. State the questions that are unresolved by this knowledge gap.
- State how your current study addresses these questions: *1 paragraph*

II. Experimental (Materials & Methods):

- **II. Experimental (Materials & Methods):** (*past tense*) describe experiments, approach, methodology
- Devices
- Processing
- Characterization, Measurements
- Instrumentation used
- Simulations/Modeling
- How the data will be:
 - Analyzed
 - Trends tied together
- Rule: "Enough information must be given so that the experiment could be reproduced by a competent colleague"[1]

III. Results:

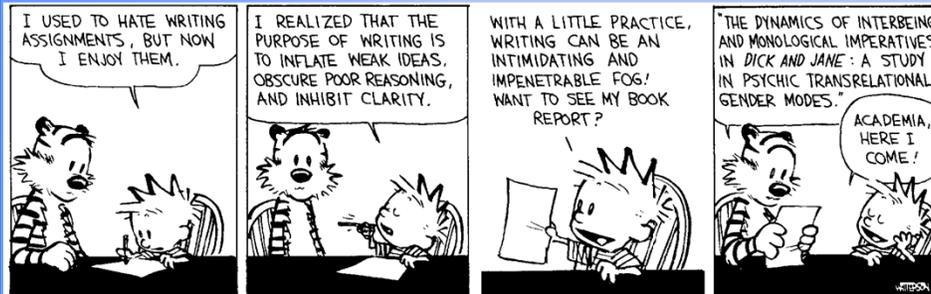
- **III. Results:** (*past tense*) statement of data, data analysis, what is observed in the data
- Provide a broad description of the experiments, providing the "big picture" without repeating the experimental details
- Should sequentially follow the *Experimental* section
- Select most pertinent data applicable to the study
- Describe figures and tables selectively. Do not regurgitate.
- Describe your observations of the results such as tendencies and trends in each figure and table
- Compare the tendencies and trends between figures and tables

IV. Discussion:

- **IV. Discussion:**
 - Decide before writing, what are the 3 most important aspects of the work that readers should know tomorrow.
 - Then write about each one separately.
 - Discuss the results relative to work of others and the meaning of the results, what are your findings.
- Answer the questions posed in the *Introduction*. Think of the *Discussion* and *Introduction* as a complimentary pair.
- Discuss, compare & contrast aspects of figures and tables with one another and what it might mean
- Discuss your data relative to its meaning
- Discuss what might be the meaning of the observed tendencies and trends described in the *Results*. Do so relative to:
 - Your own previous work
 - Other published data
 - Tie it back to the *Introduction* and previous work in the field you introduced

IV. Discussion: (cont.)

- Highlight areas in your study that are questionable
 - Be critical of your own work.
 - Do not hide any gaps in your study.
 - If you do not do this, the reviewers will find them.
 - Avoid the "Squid Technique"!



Knowlton

11

IV. Discussion: (cont.)

- In general:
 - Point out the behavior of the data (e.g., figures, tables, etc.)
 - Then suggest what the behavior might signify/mean/indicate.
 - Then support this stance with references if you can.
- Ways to do this include:
 - Use a model to describe/simulate the data.
 - The model may be based on physics or phenomenological/empirical.
 - Use work of others to substantiate your model (e.g., someone else has observed the same trends or used a similar model).
 - Use statistics to describe your data.
 - To show or demonstrate a certain behavior.
 - To disprove a certain behavior.
- Ramifications, implications, impact - state why the findings are significant

Knowlton

12

Conclusions; Acknowledgments; References

- **V. Conclusion:** similar to abstract, BUT:
 - Emphasize answering the questions listed in the *Introduction* that highlighted the *knowledge gap* you identified.
 - Ramifications - Implications - Impact!
 - ☀ State why the findings are significant!
- Do not leave any questions in the *Introduction* unanswered.
- **Acknowledgments:** acknowledge as many of the people and funding agencies that aided your work even if the aid is small. Acknowledge people and funding agencies - its free.
- **References:** Be complete and ensure that the references are correct and the format is correct.

Tenses:

- **Tenses:[3]**
- **Present tense:**
 - For the general case and statements on what is currently known.
 - E.g., statements that are
 - ☀ General knowledge
 - ☀ Widely accepted,
 - ☀ That can be referenced in the present tense.
- **Past tense:**
 - Experimental results
 - Observations that were made during your study

References for this overview:

- [1] *Eschew Obfuscation: Advice on Writing Clearly*, Larry J. Forney, Dept. of Biological Sciences, Professor Trish Hartzell, PhD. Department of Microbiology, Molecular Biology, and Biochemistry, University of Idaho, Moscow, ID; presented at the 2008 INBRE Conference, Boise, ID
- [2] Day, R. "How to write and publish a scientific paper", 5th ed. (Orynx Press, 1998)
- [3] Michael Jay Katz, "From Research to Manuscript: A Guide to Scientific Writing" Springer; 2nd ed. edition (January 29, 2009) pp. 210.

How to Read a Journal Article

Bill Knowlton^{1,2}

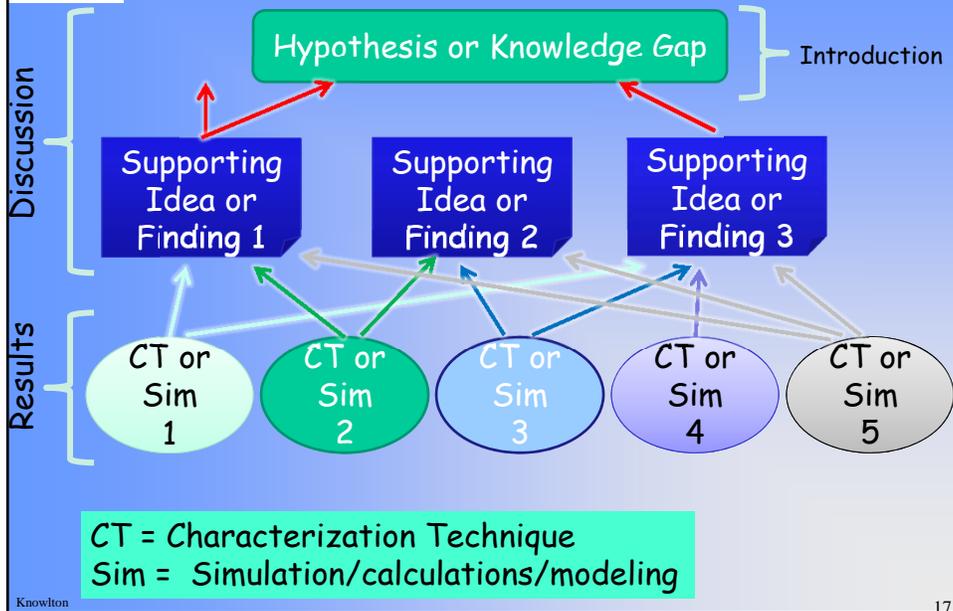
¹Department of Materials Science & Engineering

²Department of Electrical Engineering

Boise State University

MSE 478/578 - Scientific Communication in MSE

Anatomy Overview - Tying it all together



Where to Begin

- **Title** - examine the title to determine if there is a fit to your research. If so...
- **Abstract** - You know the structure of the abstract, so most of the information is here.
- **Figures/Tables** - Examine them for pertinent data.
 - Are they similar to your work? i.e., did they scoop you?
 - Figure captions should provide additional information
 - How do the data relate to your work?
 - Can you find a knowledge gap in their data?
 - Go to **RESULTS** to find more about the figures if the figure captions are lacking

Require More Depth From Paper

- **Conclusion** - similar to abstract BUT:
 - Provides a bit more information
 - Provides - Ramifications, Implications, Impact
- End of **Introduction** -
 - States the knowledge gap
 - Brief overview/conclusion of the project
- **Introduction** - provides a lit review for the study
- **Discussion** - the "guts" of the paper. It should provide the intricate details and how the data are tied/related together.