

Lecture 2 Outline:

1. Where are we now?
 - a. By now, you should have determined:
 - i. The context you are writing for (journal you are submitting to)
 - ii. Your storyline
 1. Narrative type your study takes
 2. Study type
 3. Questions, Hypotheses, Objectives
 - iii. Which figures and tables you will use to tell your story
 - b. What now?
 - i. Finishing planning
 - ii. How to write your methods and results
 - iii. Work on writing style
2. Making an Outline
 - a. You want to be as specific as possible
 - b. What to include
 - i. Introduction - ideally this will take up 3 paragraphs or sections
 1. You can add paragraphs as needed
 2. Paragraph 1 is your broad introduction.
 - a. Talk about the general context surrounding your story
 - b. Why might any scientist, not just one from your field, be interested in what you did?
 3. Paragraph 2 - specific problem
 - a. Introduce the specific problem that your study deals with
 4. Paragraph 3 - Your study
 - a. This section sets up the rest of your paper - it is very important
 - b. Introduce the specific question you are dealing with
 - c. Give your hypotheses as to what the answer might be
 - d. Give the specific objectives of your study
 - ii. Methods
 1. Start with the setting of your study
 - a. Where, when, who (study subject)
 2. Give a paragraph, more or less, to explanations of each experiment you performed in your study
 3. If you have statistics or other analyses in your study, give a paragraph to explain those as well
 - iii. Results
 1. Start with your general results
 - a. This is any broad patterns in your data

- i. This is both the easiest and most difficult section of your paper to write
 1. It already happened, it should be easy to tell people
 2. Explaining what you did clearly and succinctly is not so easy
- ii. It is both the least and most important part of your paper
 1. The details are important, since other scientists need to be able to replicate what you did
 2. Unless someone is interested specifically in the methods, few scientists actually read them
- iii. What to include
 1. You need to include descriptions of each experiment
 - a. New experiments need complete and detailed methods
 - b. Established methods need a citation, or if you modified it, a description of what you did and a citation.
 - c. Any important equations or calculations
 2. Descriptions of study subject(s)
 3. Locations
 - a. Where did the study take place (if this is important)
 - b. Locations of databases, GenBank accession numbers, *etc.*
- iv. Where to start
 1. Set up your methods section at the end of the introduction
 - a. Questions you addressed
 - b. Hypotheses
 - c. Objectives
 2. Examples
- v. Explaining your methods
 1. With text
 - a. Think in terms of paragraphs - provide a natural starting and end point for each experiment or sub-experiment
 - b. Tense
 - i. Experiments
 1. Most likely happened in the past, so use past tense.
 - ii. Locations, life history, other descriptions
 1. Should still be current information, use present tense to reflect this
 2. Present tense implies a degree of universality and an ongoing nature to whatever it is that you are talking about
 - a. Can be helpful
 - b. If the information is not established, can be too speculative
 - iii. Avoid switching tense unless necessary

1. Sometimes you need to, *e.g.* " Lobsters produce noise when grasped; therefore, we tested them with grasping predators." This sentence wouldn't make as much sense if the tenses in the two clauses were the same.

c. Transitions

- i. Very important in a methods section
 1. Establishes Chronological/Logical order within your methods section
- ii. Ways to use transitions
 1. Embedded List – First, second, third; First, next, next
 2. Dependant Clause – To verify the effectiveness of this new method, we examined. . .
 3. Transitional words within sentences –
"Lobsters were then . . .

2. Visuals in your methods

a. Diagrams

- i. Can be useful for any methods
- ii. Necessary for complicated methods

b. Tables

- i. When you have too much information for a paragraph - would be incomprehensible

c. Photos, drawings, or maps

- i. For information that is best seen as an image than read as words

d. Redundancy

- i. You may or may not want to repeat information from these visuals in the text, depending on what kind they are.

3. Examples of visuals

vi. Finishing your results

1. Already finished: Figures and Tables

2. Next: Complete the story with text

- a. Don't just give a list of details
- b. Highlight the most important results – make sure you readers see what you want them to
 - i. Start with general statement, *e.g.* "Soils with the highest numbers of bacteria were also most diverse"
 - ii. Give examples, "For example, soil from . . ."
- c. Reference your figures and tables to point your readers to more detailed information

3. Examples from Rundle & Brönmark, 2001
- vii. Tips for writing your Methods and Results sections
 1. Style
 - a. Is reading your writing an enjoyable experience?
 - b. Voice: Active versus passive
 - i. Two different ways we have to describe an action
 - ii. Examples: Shark and Cheetah
 - c. Discussion of assigned paragraphs
 - d. Passive Voice
 - i. Subject of the sentence is acted upon
 - ii. Good for perceived objectivity
 1. The actor is not important in active voice
 2. Easier to use the 3rd person with passive voice
 - iii. The problem
 1. Harder to read, less direct, more words
 2. Disingenuous – often used to avoid responsibility for your actions
 3. Examples:
 - “Cigarette advertisements were designed to appeal especially to children” is passive - tries to place responsibility on some unnamed actor
 - “We designed cigarette advertisements to appeal especially to children” is active, the writer is accepting responsibility
 - e. Active Voice
 - i. Subject of the sentence does the acting
 - ii. Generally much easier and more enjoyable to read
 1. Sentences are direct and more exciting, with more “pop”
 2. Requires fewer words
 3. More accurate
 - iii. The problem
 1. May require 1st person perspective
 - f. Examples
 - i. Diagnostic predictive models have been constructed and optimised using multivariate analysis techniques. **Passive**
 - ii. Mating success correlated significantly with the intensity of color in the male’s display. **Active**
 - iii. Rats with the gene knockout consumed significantly more food and became obese. **Active**

- iv. The soils of the upper Vadose zone are impacted by Bioturbators. **Passive**
- g. Why Might you want to use passive voice
 - i. Traditionally, this is how papers were written
 - ii. Sounds more proper
 - 1. We have an innate bias that official or formal documents should be somewhat unreadable
 - iii. Can't use 1st person perspective
 - 1. Reviewers, editors, advisors prefer/require 3rd person perspective
 - 2. 3rd person often requires passive voice
- h. Better ways to write in 1st person perspective
 - i. Avoid starting a sentence with We or I
 - 1. This puts the attention on you and not the experiment
 - 2. *e.g.* We varied the pH of the samples in order to determine the acid tolerance of the bacteria.
 - ii. You can use a dependant clause to start the sentence in these cases,
 - 1. *e.g.* In order to determine the acid tolerance of the bacteria, we varied the pH of the samples.
 - iii. Avoid using "I" or "we" when making any sort of conjecture – Convey Inevitability
 - 1. Avoid “We believe,” “I Feel,” etc.
 - 2. Instead “This suggests that. . .” or “These data indicate. . .” or “Our results demonstrate. . .”
 - 3. You want to create the impression that any logically-thinking person would come to the same conclusions as you, given your data, *i.e.* your conclusions were inevitable.
- i. Joining Sentences together
 - i. Put short, related sentences together
 - 1. “Color change from black to brown indicated the presence of oxygen due to the oxidation of FeS to Fe(III)- oxyhydroxides. Transition of colors occurred mostly within a few mm.”
 - 2. “Color change from black to brown occurred within a few mm and indicated the presence of oxygen due to the oxidation of FeS to Fe(III)- oxyhydroxides.”

3. “The presence of oxygen drove the oxidation of FeS to Fe(III)-oxyhydroxides as indicated by a color change from black to brown within a few mm.”
- ii. Comparison sentences:
 1. “Water saturation levels in 2008 reached nearly 100%. The flooding did not affect microbial abundance.”
 2. “Water saturation levels in 2008 reached nearly 100%; however, the flooding did not affect microbial abundance.”
- iii. Joining comparisons allows for better understanding, even if it adds complexity to your writing.
- j. Comma Usage - Can be difficult for non-native speakers
 - i. In General
 1. If there is a pause a sentence when you read it out loud, there probably needs to be a comma.
 - ii. Specifics (examples from Rundle & Brönmark, 2001)
 1. In lists – use the Oxford Comma or serial comma
 2. You have probably been told you don't need to use it, but do anyway. Otherwise you run the risk of confusing your reader, which is the last think you want. It doesn't cost you to put it in there.
 3. Examples:
 - a. “We measured temperature, conductivity, pH and redox potential.”
 - b. “We measured temperature, conductivity, pH and redox potential, and oxygen saturation.”
 - c. “Different types of dependence or compensation relationships exist between these defense adaptations (DeWitt *et al.* 1999), including co-dependence (when traits are mechanically linked), complementation (when traits are mechanically independent but must be combined to be efficient), co-specialization (when traits are independent and used alone or in combination), and compensation (when there are negative correlations

between mechanically independent traits).”

- iii. To join independent clauses. If two clauses have subjects and verbs and can "stand on their own," they can be connected with a comma along with a coordinating conjunction or a semi-colon.
 1. With a coordinating conjunction
 - a. “A single collection was made for each species, but each species came from a different site in the region.”
 - b. “Seven replicate tanks were used for each treatment, and treatments were allocated randomly across tanks.”
 2. With a semi-colon
 - a. “Both shell construction and a behavioral avoidance response should incur a cost to the individual; hence, we predicted a negative correlation between the expressions of these two traits (*i.e.* trait compensation) across taxa.”
- iv. After Introductory Elements - dependant clauses or even single words at the beginning of a sentence.
 1. “Prior to experiments, snails were kept in aerated water in 20 L Plexiglas tanks for 24-48 h and fed on rabbit chow.”
 2. “For example, prey that have a well-developed morphological defense adaptation should not need to allocate resources to behavioral defense.”
- v. Setting off parenthetical elements - these are elements/clauses that, were they removed, would not change the basic meaning of a sentence
 1. “A position anywhere else in the tank, or floating on the water surface, was classified as a non-avoidance response.”
 2. “Shell-crushing predators, such as fishes and crayfishes, have been shown to prefer small and thin- shelled snails.”
 3. “There has, however, been no investigation of how interspecific variation in shell morphology is reflected in behavioral differences between taxa.”

- vi. Separate Coordinate Adjectives - when you have more than one adjective, you may or may not need to put a comma between them.
- vii. Rule of thumb: if you could change the sentence and put an "and" where the comma would go, then there should be a comma. So "Tall, handsome man" (tall and handsome man works) needs one, "Little old lady" (little and old lady sounds funny) does not.
 - 1. "They also demonstrated size-related trait compensation, with smaller, more vulnerable physids being more prone to exhibiting avoidance behaviors."
 - 2. "Vulnerability to predation in freshwater snails is associated with their size and shell thickness, with smaller and thinner-shelled individuals being preferred by molluscivorous predators"
 - 3. "Several studies in freshwater systems have shown that molluscivorous predators may have strong indirect effects on periphytic algae through a reduced grazing pressure by snails."
- viii. Typographical Reasons
 - 1. "All of these taxa are widespread and locally abundant in Skåne, southern Sweden."
 - 2. Dates and Numbers – Check your journal for examples.
- ix. Set off contrasting phrases
 - 1. "It was the snail, not the lobster, which got the most attention in class today."
- x. Quoted elements - we don't have a lot of these in scientific papers.
- k. Other style and grammar stuff - these are things that I have noticed when editing papers here in Germany
 - i. Possessives
 - 1. the hat of Karen → Karen's hat
 - 2. The mean temperature of the soil → the mean soil temperature
 - ii. Names
 - 1. the stream "Gessenbach" → Gessen creek or Gessenbach creek
 - 2. During the manipulation experiment of 2007 → During the 2007 manipulation experiment
 - iii. Approximately not Approximated

1. "Mean annual precipitation of this area between 1971-2000 approximated 1163 mm. . ."
2. "Mean annual precipitation of this area between 1971-2000 was approximately 1163 mm. . ."

iv. Respectively

1. "Mean temperatures were 10.2 and 11.9°C for the 2006 and 2007 manipulations, respectively."
 2. "Mean temperatures during the manipulations were 10.2°C in 2006 and 11.9°C in 2007."
4. For next week you should continue working on your papers
 - a. Finish your planning and produce a really nice, detailed outline
 - b. Start writing some methods and results if you have time