(1). Effective scientific communication tells a story (see Lecture 4)

Your ***introduction*** sets the stage and introduces the "tension" in the story, i.e., the clearly defined open question

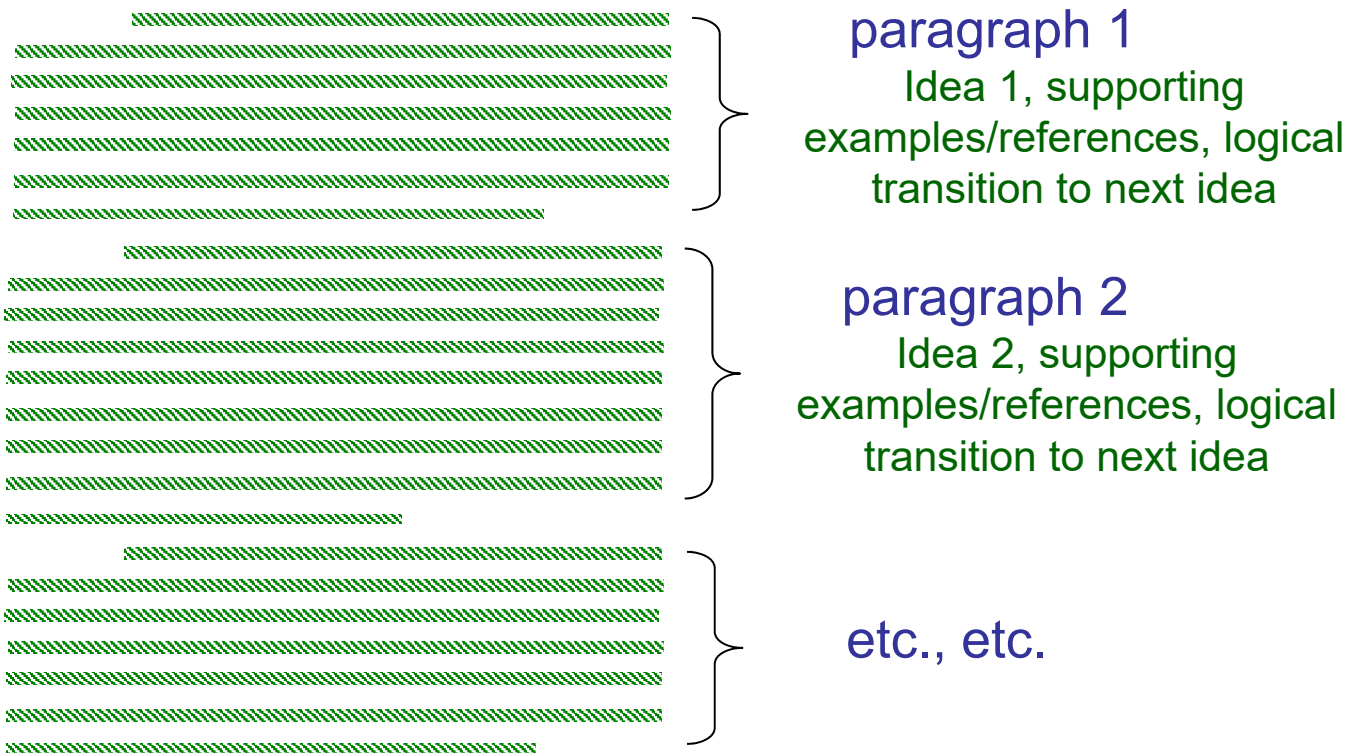
Your ***methods and results*** describe the tools used and results obtained in your efforts to answer the open question in the story

Your ***conclusions*** close the loop in the story by summarizing resolution of the open question in your story that was raised in the introduction

(2). Effective scientific communication is logically structured

Use paragraphs to maintain a logical structure (see WW #1)

Every paragraph should contain roughly one idea + supporting evidence for that idea, if possible, and ***this idea should be presented as concisely as possible***



(3). Effective science communication is concise

Avoid unnecessary background information: Ask yourself, "Do I really need this extra sentence, paragraph, or clause to explain my results or main point?"

Writing from a well-organized outline will help you avoid adding extraneous information

Keep sentences short: (see WW #2) Avoid lengthy and complex sentences (>25 words with long strings of modifiers). Ideally, each sentence contains one idea

To write concisely, it is easier to start by writing short sentences that convey single ideas than to start with complex prose that you have to trim!

(4). Effective science communication is precise

Avoid subjective statements:

"We felt that the diffractometer was misaligned, because we were unable to observe the Bragg peak,"

is more appropriately written,

"The Bragg peak was not observed, suggesting a problem with the sample or the diffractometer's alignment."

Avoid useless adjectives and quantify:

"We observed an incredibly large increase in scattering intensity when the temperature was lowered,"

is more appropriately written,

"There was a three-fold increase in resonance A's scattering intensity when the temperature was lowered below the transition,"

(4). Effective science communication is precise (cont.)

Don't use ambiguous pronouns: Avoid vague pronouns like "it", "this", "that", etc.

"Bob wanted to help John measure the resistance of the sample in the laboratory, but he couldn't find it."

What does "it" refer to in this sentence? Who is "he"?

Don't anthropomorphize: Most of the things you will probably study in your careers will not have either feelings or free will, so avoid statements like,

"The myosin wants to move along the actin protein strand…"

Be specific about the mechanisms causing the phenomena you describe: inanimate objects don't "want" or "need" anything

(5). Effective science communication is compelling

Minimize use of weak verb phrases: (see WW #3) These are dull and tend to unnecessarily lengthen sentences.

"The Acton 800 spectrometer is equipped with two stages, the first of which is known as the filter stage, and the second of which is known as the dispersive stage," (30 words)

is more succinctly written,

"The Acton 800 spectrometer has both filter and dispersive stages." (10 words)

Other Weak verb phrases	Strong verbs
"made a determination"	determined
"performed a measurement"	measured
"conducted an analysis"	analyzed

See Celia's lecture on verb usage:
http://people.physics.illinois.edu/Celia/Lectures/Verbs.pdf

(5). Effective science communication is compelling (cont.)

Place verbs early in sentences: (see WW #3) Let the reader know early what the action in the sentence is.

"*Scaling functions for both gauge-invariant and non-gauge invariant quantities across topological transitions of noninteracting fermions driven by the non-Abelian gauge potentials on an optical lattice have also been derived.*"

is better written,

"*Scaling functions were derived for both gauge-invariant and non-gauge invariant quantities across topological transitions of noninteracting fermions driven by the non-Abelian gauge potentials on an optical lattice.*"

See Celia's lecture on verb usage:
http://people.physics.illinois.edu/Celia/Lectures/Verbs.pdf

(6). Effective science communication is clear

Write simply and clearly! Avoid colloquial phrases, technical jargon, slang words and phrases, and complex words

Jargon terms confuse the reader and disrupt the logical flow of your paper

Employ "parallel structure" when listing things to help the reader navigate complex sentences…Think writing computer code!

"My goals in this class are to learn how to write more effectively, expressing myself better in presentations, and the scientific proposal review process"

(6). Effective science communication is clear (cont.)

Using the same verb form in a complex sentence helps the reader navigate a complex sentence with multiple elements:

"My goals in this class are to learn how to write more effectively, to express myself better in presentations, and to understand the scientific proposal review process"

OR

"By taking this class, I am interested in learning how to write more effectively, expressing myself better in presentations, and understanding the scientific proposal review process"

“Which” vs “That”

Use “that” to specify a specific class of something:

“The books that have a red cover are new”

Use “which” (followed by a comma) to provide additional information about something:

“The books, which have a red cover, are new”

"Due to" vs "Because of" vs "Caused by"

"Due to" is ***not*** interchangeable with "Because of"

"Due to" functions as an adjective and modifies nouns and pronouns. "Due to" is interchangeable with "Caused by"

"Because of" functions as an adverb and modifies verbs and adjectives. Equivalent to "on account of".

A trick you can use to see if "due to" is appropriate:
Replace "due to" with "caused by"…if the sentence still makes sense, you're probably OK

If the sentence doesn't make sense, "because of" is probably more appropriate

“Using” vs “by”

Be careful of interchanging “using” and “by”

“The transport properties of the device were measured by a standard voltmeter connected to a lock-in amplifer”

Is the inanimate voltmeter making the measurement?

“The transport properties of the device were measured using a standard voltmeter connected to a lock-in amplifer”