College Writing Seminar (INTD100): Week 1 Notes

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Summary

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1. **Week 1**: *Concise writing I:* In Week 1, we will focus on creating concise writing that eliminates extraneous words and sentences from your writing.
    - Exercises: distilling complex scientific articles into shorter tracts of writing.
    - Exercises: reading popular scientific journal articles and discussing them in small groups
    - Exercises: Practice using analogies in communicating difficult or abstract scientific thoughts
    - Homeworks: Practice quotation and paraphrasing of experts in writing
    - Homeworks: practice descriptive detail by providing the reader with the correct details such that they understand something complex
    - Exploration topic: the demarcation problem for the scientific method

Concise Writing 1.1: Use the eraser

Concise Writing, 1.1

How do we create concise writing? Why is it important to be concise when writing for a scientific audience?

1. How...*Be alone.*
2. How...*Create an outline, mind-map or other plan*
3. How...**Use the eraser.** An eraser is a tool. So is the delete button.
4. Why...Concise writing means fewer opportunities to be misunderstood
5. Why...Concise writing is easier to read
6. Why...Concise writing communicates abstract ideas into concrete form

Concise Writing, 1.1

Google Docs, Week 1. *Distill the following paragraph into a more conscise one.*

In order to measure the coefficient of friction of the rubber eraser, we placed the eraser on top of the plastic cover of the textbook and began to tilt it. We continued to record the angle as we tilted the textbook. Eventually, the eraser began to slide down the textbook. We recorded that angle as well, and we calculated the tangent of that angle. This was our first result for the coefficient of friction. Next, we repeated the experiment many times and calculated an average coefficient of friction from the many trials.

Pre-recorded content: editing this down.

Concise Writing, 1.1

Google Docs, Week 1. *Distill the following paragraph into a more conscise one.*

We set out to measure the specific heat of water by passing a wire through a bucket of water. The water was 1000 milliliters and the water had a current of 2 amps. The Joule heating equation tells us how many Joules of heat are produced in the wire which is radiated into the water. We recorded the temperature of the water over time and recorded it next to the time in seconds. We calcuated according to the Joule heating equation how many Joules per second was put into the water by the wire. By comparing the rise in temperature of the water and the current we can calculate the conversion coefficient, which is the specific heat of water. Pre-recorded content: editing this down.

Concise Writing 1.2: Outlines and Mind-Maps

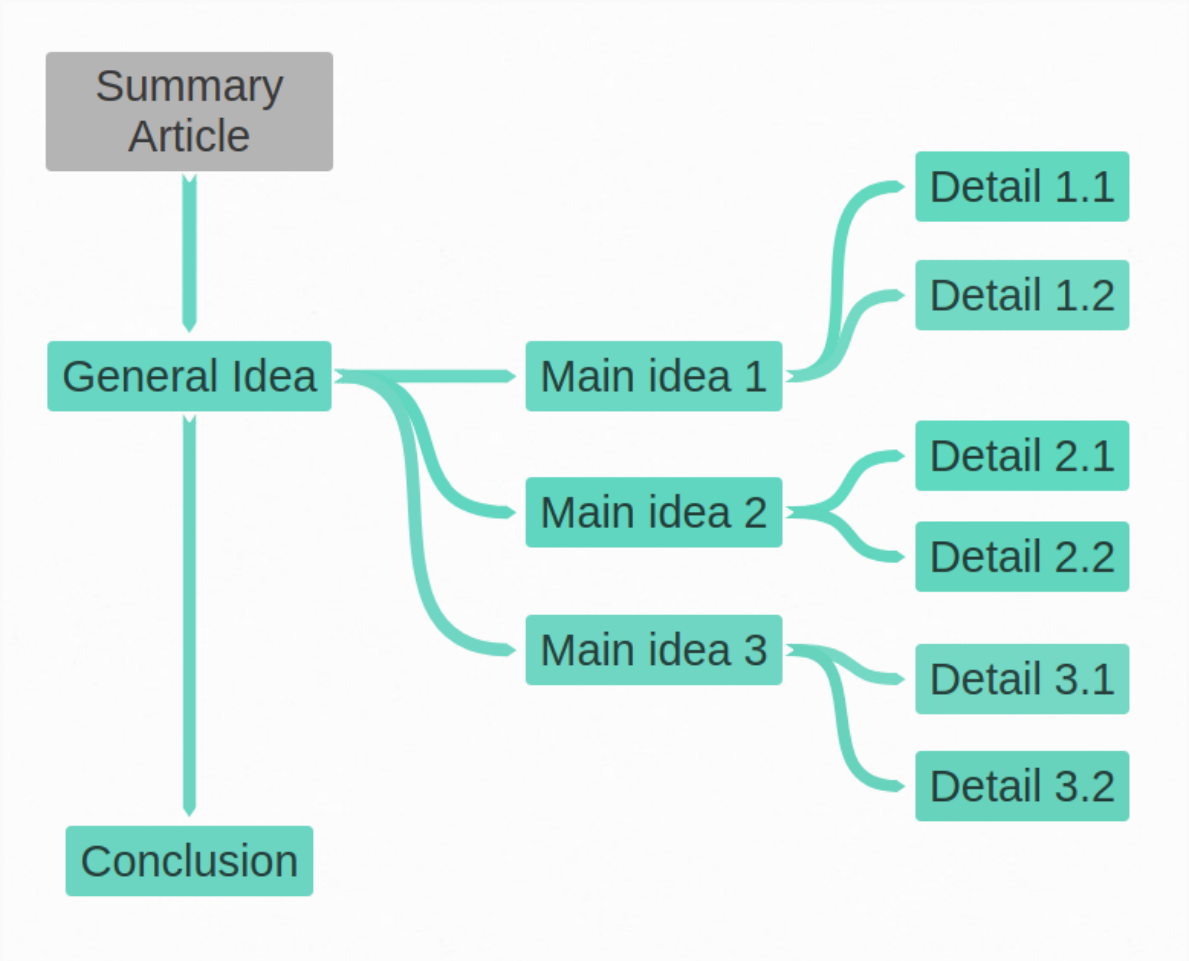

Figure 1: A typical outline or mind-map for a scientific article for a wider audience. For example, a summary of a field of research via Scientific American.

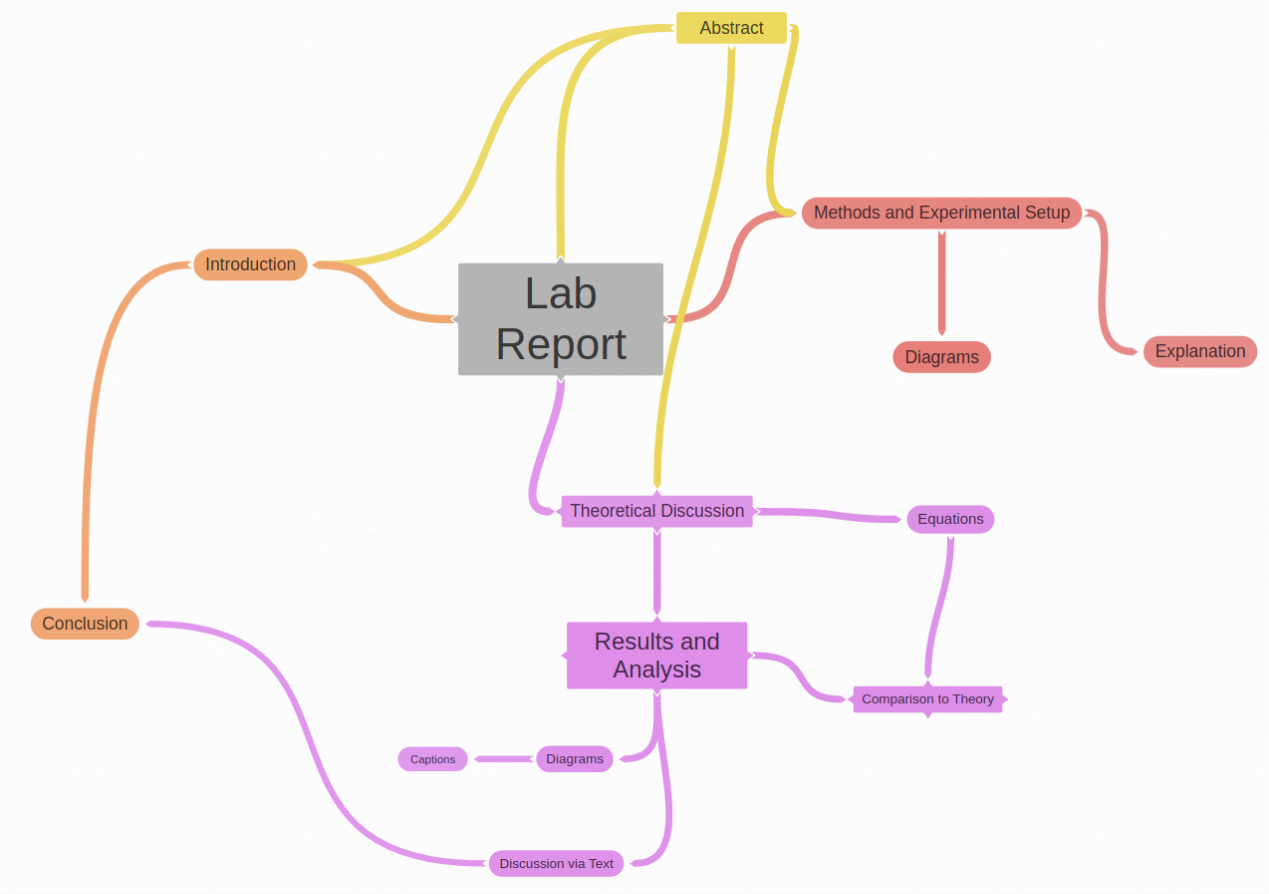

Figure 2: A typical outline or mind-map for a college lab report with an abstract.

Concise Writing 1.2

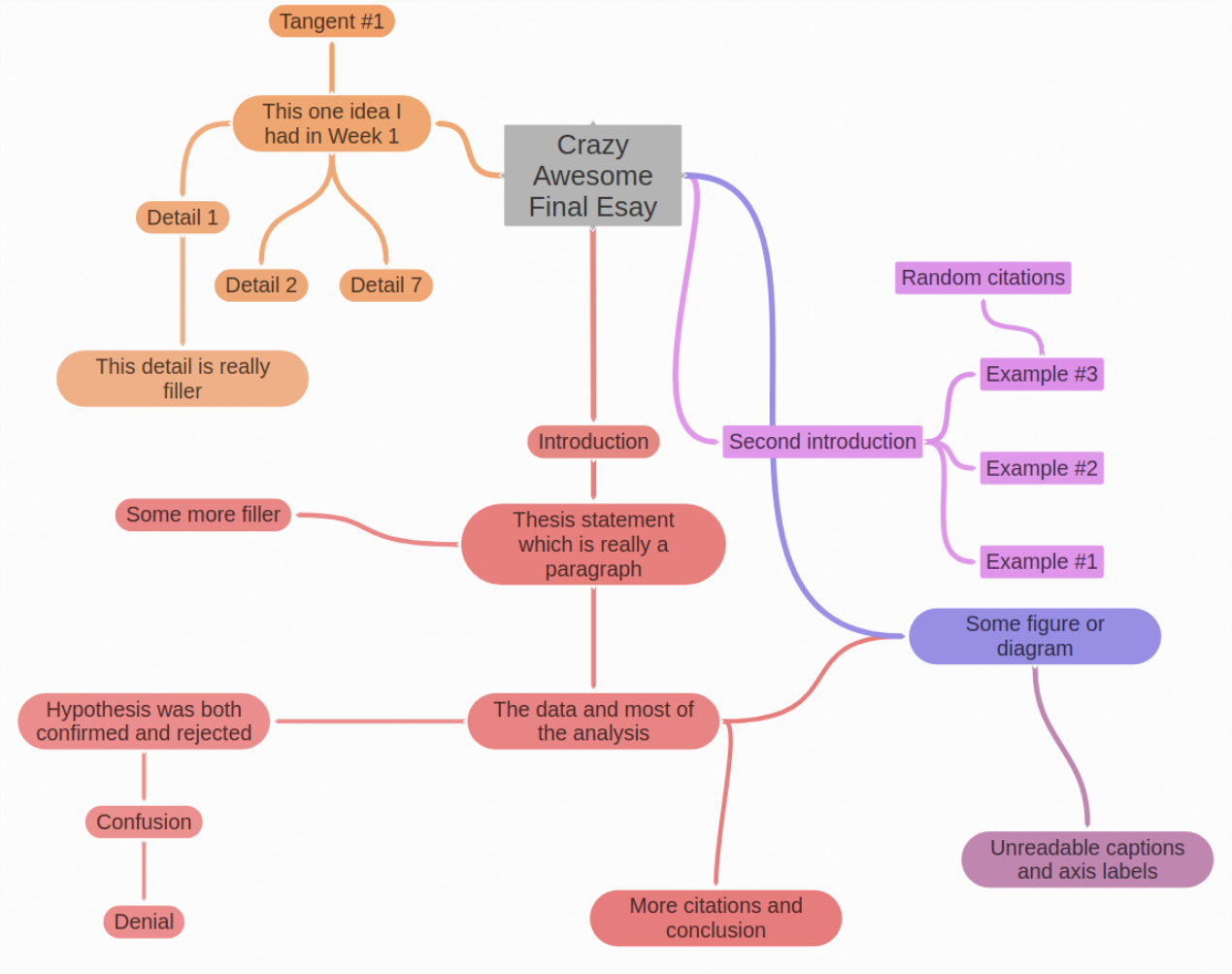

Figure 3: What I often find in first-year essays in my physics courses.

Concise Writing 1.2

Coggle.it, Week 1.

1. Write a ≈ 200 word summary of what you read in the chapter we are currently reading in the book.
2. Using Coggle.it, or the tool of your choice, create a mind-map or outline of the homework article regarding gravitational waves.
3. Think about your *nodes* and *connections*. Is there a way to simplify the outline?
4. Write a ≈ 200 word summary of what you read in the homework article, based on your outline or mind map.
5. Compare the two summaries.

Concise Writing 1.2

Be alone.

The essay on Moodle Solitude and Leadership by William Deresiewicz.

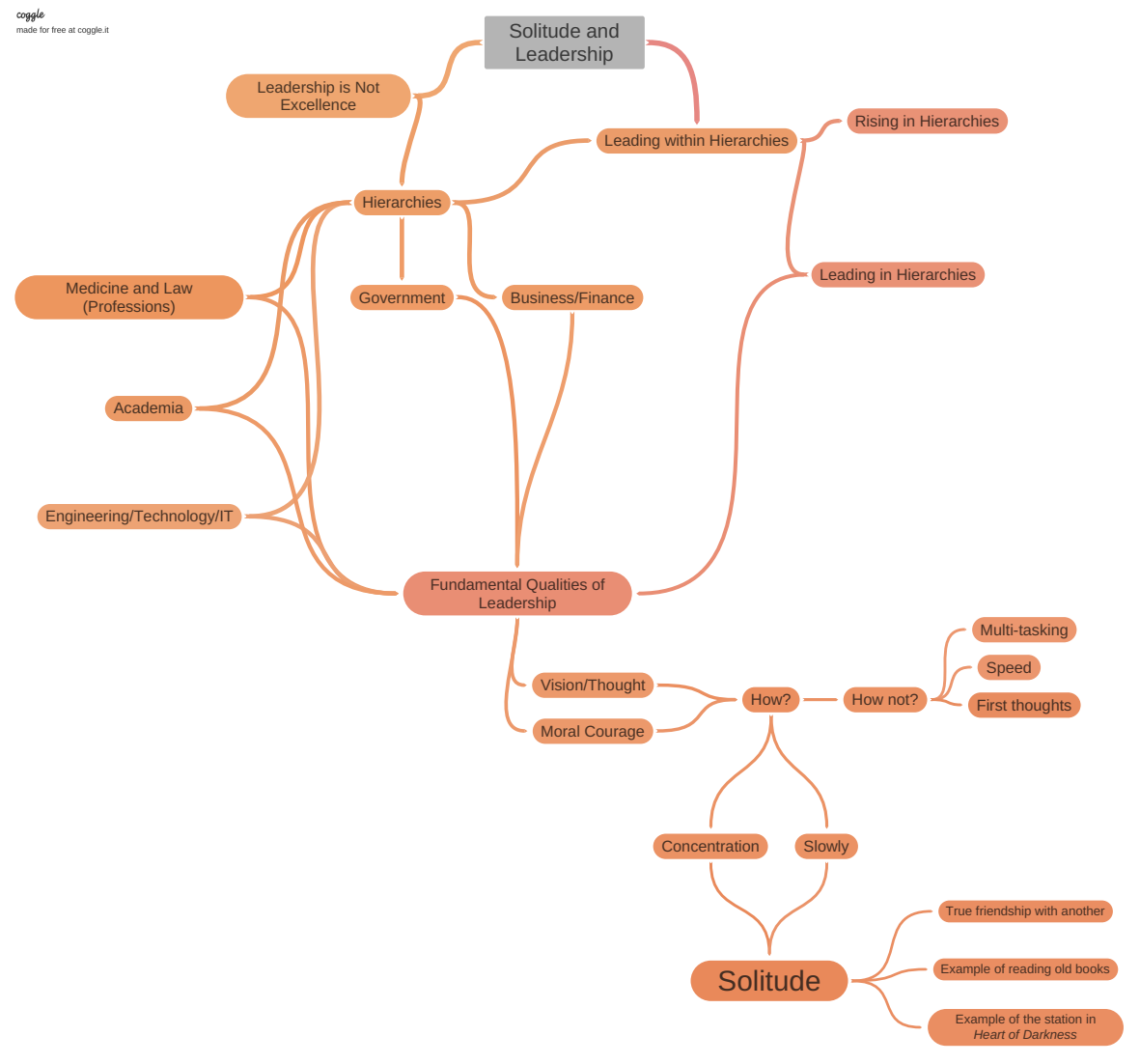

Figure 4: A map of the essay *Solitude and Leadership*.

Concise Writing 1.2

1. What is the central theme of the West Point article about leadership and solitude?
2. What does it mean to work alone in the context of leadership? Leaders, by definition, are around other people.
3. Reflect on your writing *process.* If you cannot identify what process or processes you undertake to complete your writing, that's normal. Write down a list of steps in your journal that constitute your writing process.

Concise Writing 1.2

An example process: my own for longer reports.

1. Make an outline, with enumeration and bullet points.
2. Walk away and think about something else
3. Re-do the outline, and ensure it has concrete goals and sub-goals.
4. *Identify any important graphics or tables, and work on those first.*
5. Begin writing:
    - Write the introduction first
    - Write the next section next, while cutting down the introduction
    - Write the third section next, while cutting down the second section...
    - Re-examine the whole structure periodically.

Concise Writing 1.3

Concise Writing 1.3

1. Exercises: Practice using analogies in communicating difficult or abstract scientific thoughts
2. Exercises: Practice quotation and paraphrasing of experts in writing
3. Exercises: hierarchy of detail

Concise Writing 1.3: Analogies

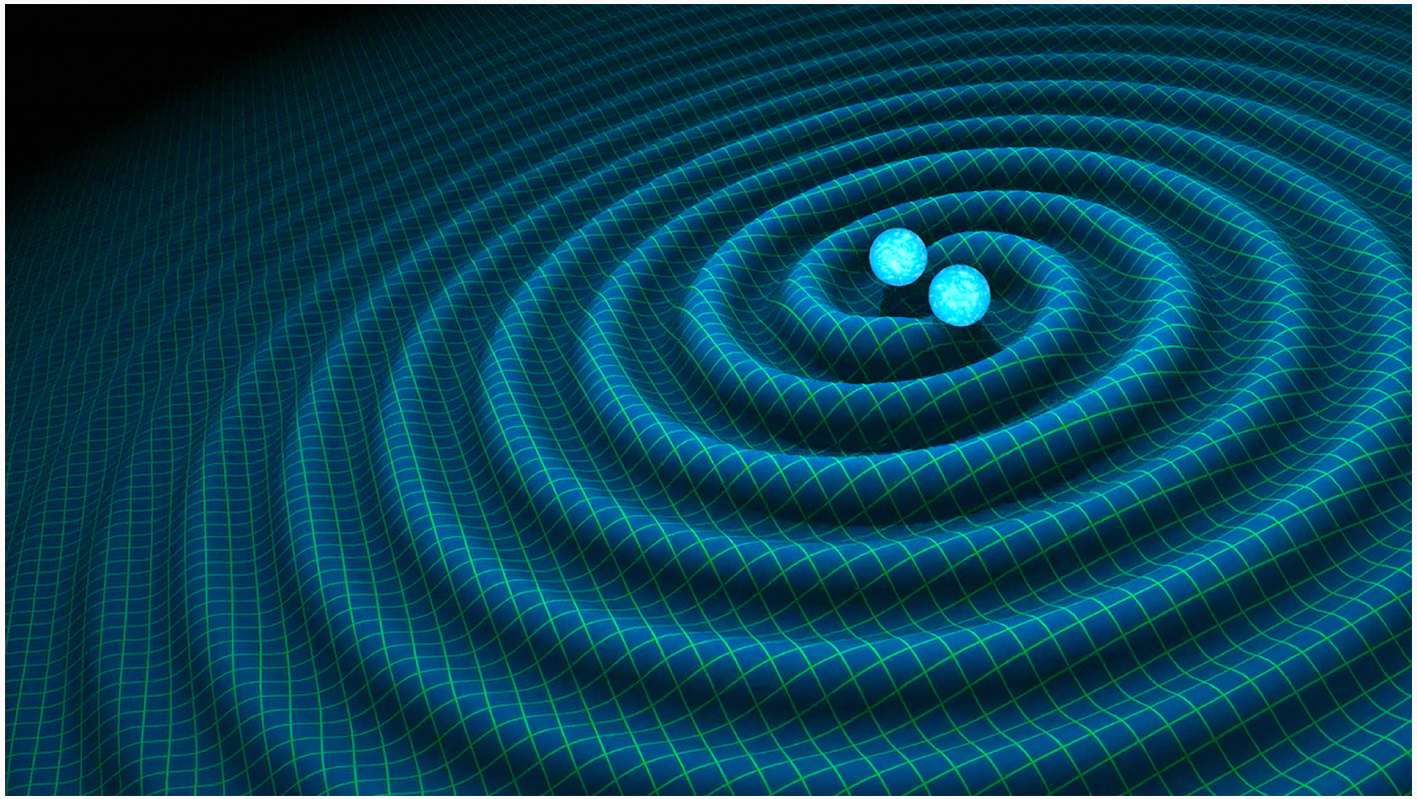

Figure 5: A graphic of spacetime in 2D when two black holes orbit.

Concise Writing 1.3: Analogies

1. Exercise 1: Write three to four sentences describing the gravity waves that flow outward from the black hole pair, then *edit it down.*
2. Exercise 2: Write three to four sentences describing the gravity waves that flow outward from the black hole pair, **using an analogy or metaphor**, then *edit it down.* Potential analogies:
    - Water waves due to a pebble dropped into a still pool
    - Marble spiraling down a funnel
    - One of your own choosing...

Concise Writing 1.3: Citations

Citations: Citing experts and technical references must be kept to a consistent style. Below are some examples of citations in scientific journals.

"Recently, the LIGO and Virgo collaborations published demonstrated the existence of black holes ≈ 100 times the mass of the sun [2]."

"The authors of [1] concluded that black holes larger than just a few times the mass of the sun do exist."

(More rare) "Figure 7 of [3] displays a mm-wave 16-element phased-array antenna system..." Notice the following:

- Structure and placement
- When is a citation required

Concise Writing 1.3: Citations

1. Exercise A: Go to `arXiv.org` and browse for a scientific paper that you think looks interesting. You can find mostly physics, math, computer science and engineering papers, but also things like quantitative biology. Once you find one, search for it on Google Scholar.
2. Exercise B: Once you find the webpage for your paper, determine the following:
   - The journal title, volume, and number (or year)
   - The lead authors or collaboration
   - The article title

   Determine whether it is a *conference proceeding* or a *peer-reviewed article.*

Concise Writing 1.3: Hierarchy of Detail

Hierarchy of details: the organization of writing can make it more concise with *better clarity.*

1. Good concise writing contains *details*, but not *too many* details.
2. The same is true for presentations.
3. Details form a hierarchy, just like the outline or map of a piece of writing.

Concise Writing 1.3: Hierarchy of Detail

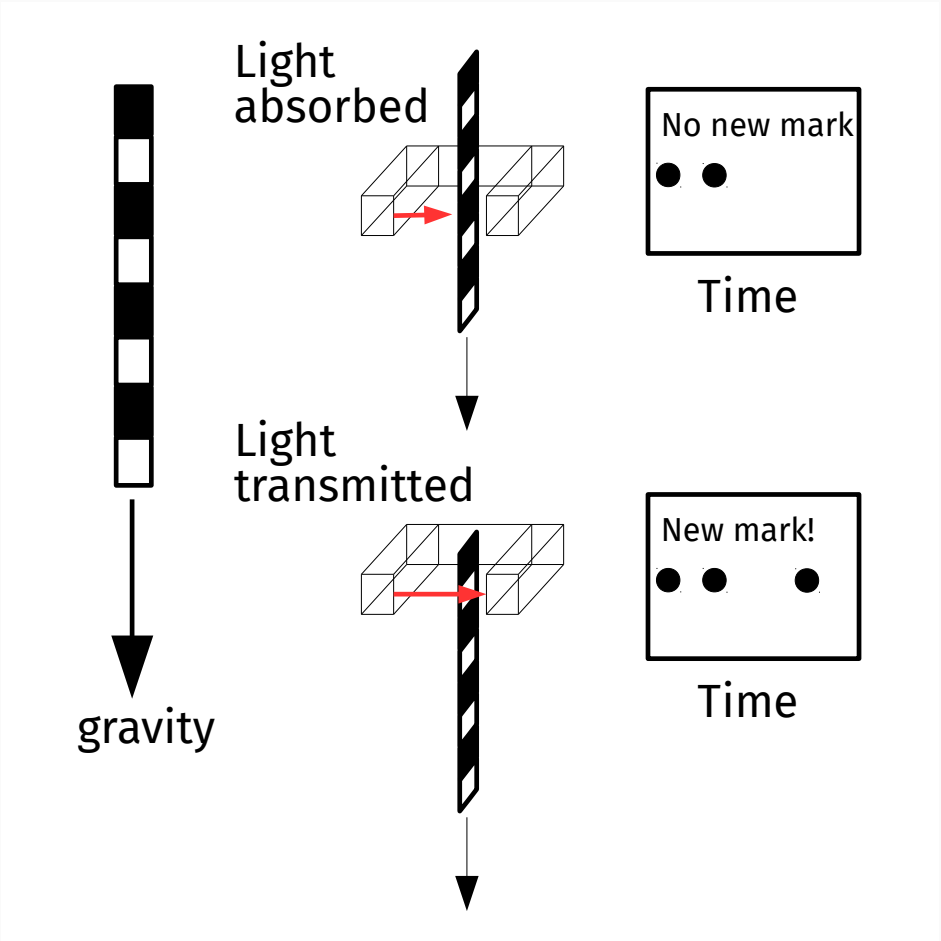

Figure 6: The classic setup for measurement og g, the acceleration due to gravity.

Concise Writing 1.3: Hierarchy of Detail

Acceleration due to gravity, well-constructed with appropriate detail.

The acceleration due to gravity was measured with the following technique. A plastic slat with alternating black and transparent sections was dropped in front of an optical sensor. The black and transparent sections were the same length. When the optical sensor was blocked by the black sections, the time was recorded. The difference in subsequent times decreases as the plastic slat accelerates. The acceleration due to gravity was deduced from the increasingly short time-differences and the length of the black sections. The acceleration was 10.0 ± 0.4 m/s^2.

Concise Writing 1.3: Hierarchy of Detail

Acceleration due to gravity, hierarchy of detail out of balance.

The acceleration due to gravity was measured, and the result was 10.0 ± 0.4 m/s^2. A plastic slat with alternating black and transparent sections was dropped in front of an optical sensor. The acceleration due to gravity was deduced from the increasingly short time-differences and the length of the black sections. When the optical sensor was blocked by the black sections, the time was recorded. The black and transparent sections were the same length. The difference in subsequent times decreases as the plastic slat accelerates[1].

[1] Note: these are the *exact same sentences* as in the prior paragraph. Is the experiment as easily understood as before?

Concise Writing 1.3: Hierarchy of Detail

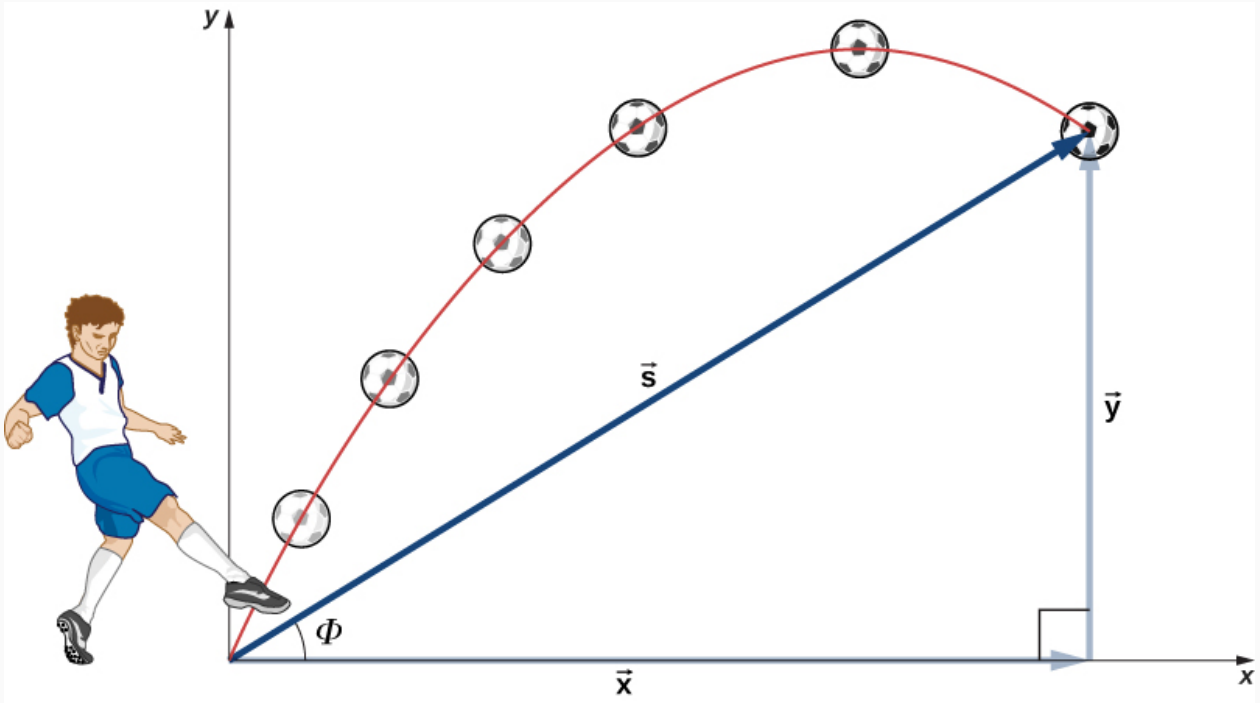

Figure 7: *Projectile motion* refers to the arch or quadratic curve objects make when moving through the Earth's gravity with some initial velocity.

Concise Writing 1.3: Hierarchy of Detail

Projectile motion, well-constructed with appropriate detail.

According to Newton's Laws, the distance an object should travel horizontally is the initial velocity squared, divided by the acceleration due to gravity, if the object is launched initially at a 45 degree angle with respect to horizontal. A slingshot was tested on a pebble, and pulled back to a consistent length before releasing the pebble. With an optical sensor, the velocity of the pebble was measured to be 10 meters per second. When launched at a 45 degree angle, the pebble should travel 10.2 meters according to the prediction. When launched, the pebble traveled 9.1 meters, for a fractional error of 10 percent.

Concise Writing 1.3: Hierarchy of Detail

Projectile motion, hierarchy of detail out of balance.

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Concise Writing 1.3: Hierarchy of Detail

Several things to notice:

- The details flow from *general* to *specific*. When possible, measurments or variables are quoted later. The setup or general idea occurs in the first sentence.
- If a key variable is referenced, it is defined *before* used.
- Explaination of detail is still concise, so the rules regarding concise writing still apply.

Concise Writing 1.3: Hierarchy of Detail

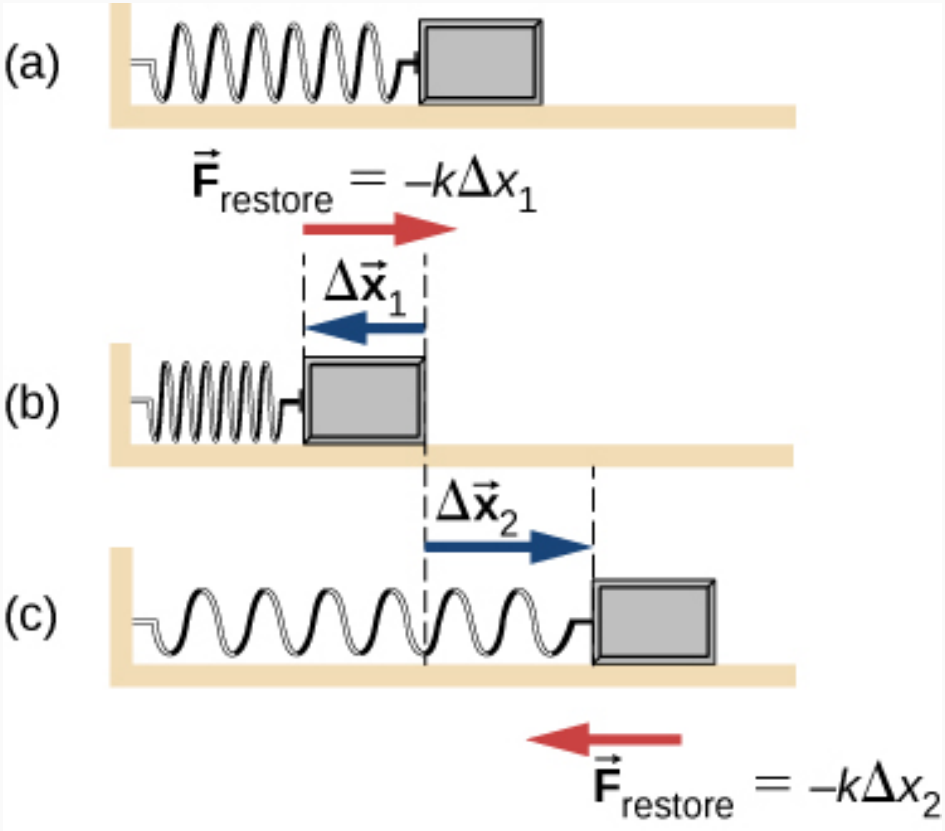

Figure 8: The force a spring exerts is proportional to the distance from its equilibrium point. Create a paragraph describing how you would measure the force exerted by the spring, with the details in the correct order.

Concise Writing 1.3: Hierarchy of Detail

Equations. Equations can be particularly troubling when attempting to keep details in the proper hierarchy. Consider the following equation describing projectile motion:

$$y(t) = -\frac{1}{2}gt^2 + v_{i,y}t + y_i \tag{1}$$

Used in a piece of scientific writing, the equation would be introduced by defining each variable in words, and then presented in mathematical form.

Concise Writing 1.3: Hierarchy of Detail

Good example:

Let $y(t)$ represent the height of an object above a given surface. Let g represent the acceleration due to gravity. Let t be the time, assuming that the beginning of the motion corresponds to $t = 0$. The height of the object at $t = 0$ is y_i, and $v_{i,y}$ is the vertical velocity at $t = 0$. According to Newton's Laws, $y(t)$ is

$$y(t) = -\frac{1}{2}gt^2 + v_{i,y}t + y_i \tag{2}$$

Concise Writing 1.3: Hierarchy of Detail

Average example:

Let $y(t)$ represent the height of an object above a given surface. According to Newton's Laws, $y(t)$ is

$$y(t) = -\frac{1}{2}gt^2 + v_{i,y}t + y_i \tag{3}$$

The variable g represents the acceleration due to gravity. The variable t is the time. It is assumed that the beginning of the motion corresponds to $t = 0$. The height of the object at $t = 0$ is y_i, and $v_{i,y}$ is the vertical velocity at $t = 0$.

The reader is left wondering what all these symbols mean. They know what you want to say, but they can't see the purpose of all the letters in the formula unless you prepare them to understand.

Concise Writing 1.3: Hierarchy of Detail

Bad example:

According to Newton's Laws, $y(t)$ for projectile motion is

$$y(t) = -\frac{1}{2}gt^2 + v_{i,y}t + y_i \tag{4}$$

Technically, this is true. However, no detail is provided, and so the reader either accepts it or moves on, not necessarily knowing what you mean.

It is challenging to avoid this in a longer work. It's super easy to just stick in the formula you need and move forward.

Concise Writing 1.3: Hierarchy of Detail

Figure 9: This is what it sounds like without this lesson.

Conclusion

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1. **Week 1**: *Concise writing I:* In Week 1, we will focus on creating concise writing that eliminates extraneous words and sentences from your writing.
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    - Homeworks: practice descriptive detail, placing it into a hierachy that makes sense
    - Exploration topic: gravitational waves

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