The Issue

In many classes, students are asked to summarize research articles. Students often find this task challenging because the format and language of science articles can be unfamiliar and a bit confusing. The instructions teachers give are also not very helpful for many students because teachers assume students already know how to write a “good” summary.

How this tutorial will help

In this tutorial, we will present the key questions to address to make sure your summary includes the most important information that needs to be included and avoids unnecessary details.
Why should students be concerned with writing summaries?

- It will help you get a **better grade** on assignments.

- It will help you **learn** what the researchers did, why they did it, and what they found.

- Without a good understanding of the theories and results, you cannot **develop and support new ideas** of your own.

- You may have noticed that the introductions to articles contain citations to past studies. In the same way, the summaries you write of each research paper will eventually be used when you write **your research paper**. To state what is currently known and to justify your study.
What is a research article summary?

A summary of anything is a brief description of the main point of larger piece of information (e.g., a book, a research article, a play). It must highlight what is important.

For a summary of a research article, what is important is guided by the hypothesis and the design used to test the hypothesis.

Although much of the other information in an article is very important for conducting or evaluating the study, it is not so important when summarizing the study.
So how do we decide what is important enough to include in a summary?

4 questions to guide your summary content:

(1) What is the **hypothesis** proposed by the researchers?  
*(see Introduction)*

(2) How does the study’s **design** and **procedure** allow the researchers to **test** this hypothesis?  
*(see Methods)*

(3) What did the researchers **find** in their study (stick to the predictions)?  
*(see Results)*

(4) What does this all mean for the hypothesis?  
*(see Discussion)*
Before you begin...

As part of the process of familiarizing yourself with research articles, it’s a good idea to get in the habit of reading articles more than once. We all do it. The **first read** through should be devoted to understanding the **details** of the design and results of a study.

Once you have the details down, **re-reading** the article is useful for understanding the researcher’s hypothesis, how it was tested, and why the conclusions were made. This second piece of information is really important for a summary.
You should have a copy of a very brief research article titled *The long road of pain: Chronic pain increases perceived distance* (Witt, Linkenauger, Bakdash, Augustyn, Cook & Proffitt, 2008) in front of you.

This article is based on research on the effects of chronic pain on distance perception.

Please skim the article right now to figure out what they did in general. It is most important to notice what they manipulated (Independent Variable) and what changes they measured (Dependent Variable). Some students find it helpful to draw out the design. Use the paper in front of you for notes.

When done, advance to the next slide.
Now that you have some familiarity with what was done in this study, use the sheet in front of you to try answering the following question:

What is the hypothesis being proposed by the researchers?

Advance to the next slide for the answer.
Hypothesis:

*It was hypothesized that because pain affects the amount of effort needed to complete a task, people who experience chronic pain will perceive targets to be farther away than people who are not in pain.*

You should note that although the above hypothesis is what the researchers were testing, it’s hard to find this in the introduction of the paper. **Not all papers are written ideally.** You will need to be a sharp reader to get all the key information from a paper.

Click to see where the content for the hypothesis was found.
From the Introduction:

An energetic cost represents a reduction in the organism’s potential to perform adaptive actions. However, if one interprets the concept of costs of behavior more broadly, it becomes apparent that there may be other influences on spatial perception beyond the energetic variety. The motivation for the current study was to extend the notion of behavioral costs by examining a group of individuals who suffer from chronic pain in the lower back and legs. Not surprisingly, patients with such pain are often reluctant to perform actions that produce uncomfortable and often excruciating sensations (Kori et al. 1990; Picavet et al. 2002). Thus, they experience physical and emotional costs associated with movement that might impact perception of spatial layout in a similar fashion to the energetic costs documented in earlier studies. To anticipate the key result, we found that patients suffering from chronic low back or leg pain did perceive visually presented targets to be farther away compared with a group of pain-free controls.

Also, note that the concept of effort cost is mentioned but wasn’t included in the hypothesis. This is because this wasn’t directly tested.
Now answer the following question on the sheet of paper in front of you:

*How did the researchers test the effects of pain on perception?*

This question requires you to pay very close attention to the **independent and dependent variables**.

Advance to next slide AFTER really trying. This one is important to try on your own.
How they tested their hypothesis:

The researchers conducted a study in which 10 chronic pain patients and 8 clinic employees (the control group) were asked to participate in a distance judgment study. They walked to a hallway and then stood in a spot where they had to judge the distances from where they were to 3 different cones. Then they had to indicate how many times they would be able to walk to and from a cone before they would experience pain.

This is the independent variable. They didn’t manipulate it but tried to see if this variable mattered.

This helps the researchers be certain that the pain group did perceive greater effort with tasks.

This is the dependent variable.
Ten patients diagnosed with benign chronic musculoskeletal and/or neuropathic pain of the low back and/or lower extremities were recruited at the pain management center (PMC) at the University of Virginia Health System (2 males, 8 females, mean age = 42.80). The clinical profile of this group is reported in Table 1. Eight employees (2 males, 6 females, mean age = 38.44) of the PMC and adjoining clinics served as control participants. All participants volunteered for the study and gave

Participants were approached by an experimenter after their medical appointments, during which they had been assessed on a variety of measures (see Table 1). They were asked if they would participate in an experiment on distance perception. Once consent was obtained, an experimenter walked them out of the PMC and along a hallway heading toward the building’s main exit. The experimenter stopped the participants at a pre-marked point and explained that they would view a series of cones placed in the hallway at various distances from where they stood, and that they were to estimate the distance to each cone in feet and inches. We offered an 18” ruler to use as a reference. Participants estimated the distance to cones placed at 4, 5, 7, and 9 m. Participants estimated the distance to targets at all four distances, and the order of distances randomized across participants. After participants estimated all four distances, they were shown a sample distance of either 6 or 8 m (chosen at random) and asked how many times they could walk back and forth over that distance before experiencing pain.
Use your sheet of paper to answer this question about the findings:

What did the researchers find in their study?

Advance to the next slide for an answer.
The results:

*It was found that the chronic pain participants perceived the cones to be farther away than what was perceived by the control participants.*

Advance to the next slide to see the original document.
Distance estimates from one patient and one member of the control group were deemed outliers (patient outlier mean = 91.44 m, control outlier mean = 28.96 m, both were over 3 times the interquartile range of their respective groups) and excluded from analysis. The remaining data (N = 8 patients, mean age = 40.63; 7 controls, mean age = 38.79) were entered into a repeated-measures ANOVA with distance (4, 5, 7, and 9 m) as a within-subjects factor and group (controls vs. pain patients) as a between-subjects factor. There was a main effect of distance, F(3, 39) = 36.16, P < 0.001, \eta^2 = 0.73. Critically, there was also a significant main effect of group, F(1, 13) = 9.25, P < 0.01, \eta^2 = 0.42. As shown in Fig. 1, participants who experienced pain when walking perceived targets as farther away compared with pain-free controls. The interaction between distance and group was not significant, F(3, 39) = 1.87, P = 0.15.
When these answers are combined, they reflect what is often provided in students’ summaries when asked to summarize a research study. Consider the following prompt and answer:

**PROMPT:**

It was hypothesized that because pain affects the amount of effort needed to complete a task, people who experience chronic pain will perceive targets to be farther away than people who are not in pain. The researchers conducted a study in which 10 chronic pain patients and 8 clinic employees (the control group) were asked to participate in a distance judgment study. They walked to a hallway and then stood in a spot where they had to judge the distances from where they were to 3 different cones. Then they had to indicate how many times they would be able to walk to and from a cone before they would experience pain. It was found that the chronic pain participants perceived the cones to be farther away than what was perceived by the control participants.

(This is simply the combined answers previously presented.)
Although the above response is fairly good, it doesn’t tie the results in very well with the hypothesis as it relates to effort cost.

An article summary really needs to state the purpose of the study and how the findings relate to the predictions. Consider the modified summary on the next page. Notice the additions in red:
Much like carrying something heavy or engaging in a great deal of physical activity, it is believed that chronic pain can alter perceptions of the amount of effort needed to complete an activity. With this in mind, it was hypothesized that people who experience chronic pain will perceive targets to be farther away than people who are not in pain due to the amount of effort that would be needed to reach the target. The researchers conducted a study in which 10 chronic pain patients and 8 clinic employees (the control group) were asked to participate in a distance judgment study. They walked to a hallway and then stood in a spot where they had to judge the distances from where they were to 3 different cones. Then they had to indicate how many times they would be able to walk to and from a cone before they would experience pain. It was found that the chronic pain participants perceived the cones to be farther away than what was perceived by the control participants. *This difference in judgments is believed to be due to the energy cost of attempting to reach the target.*
It doesn’t help if you don’t remember...

This information will not really be helpful if you don’t remember the 4 questions to guide your summary. Try now to recall them.

(1) *Hint: usually in the* Introduction

(2) *Hint: usually in the* Methods

(3) *Hint: usually in the* Results

(4) *Hint: usually in the* Discussion

Advance to the next slide to check.
4 questions to guide your summary

(1) *What is the hypothesis being proposed by the researchers?* (see Introduction)

(2) *How does the design and procedure allow the researchers to test this hypothesis?* (see Methods)

(3) *What did the researchers find in their study (stick to the predictions)?* (see Results)

(4) *What does this all mean for the hypothesis?* (see Discussion)
Additional things to consider:

Because the goal of writing summaries is often to use them for integration of ideas, it is worth your time to consider these few key problems that professors notice in students’ integrated writing assignments:

1. Failing to make **explicit connections** between content within and among research articles.
   - Know how the studies are similar and/or different
2. Writing more **details** about a study than are necessary.
   - The details are rarely as critical as understanding the predictions and theories
3. Failing to use **one’s own words** when writing about past studies.
   - Try stepping away from the articles and writing your thoughts on them
Good luck with your summaries!!!