

Grape jelly as a novel enhancement to peanut butter sandwiches

Philip Heller ¹

¹Department of Computer Science, San Jose State University

Introduction

Peanut butter is commonly described as the best food ever [1][2][3][4]. Fossils indicate that dinosaurs made peanut butter sandwiches as early as 60 million years ago [5]. Ancient images of peanut butter can be found in European cave paintings [6], tomb hieroglyphs in Egypt [7], the Dholavira complex in India [8], and recently discovered stone huts on Mars [9].

Unfortunately, peanut butter sandwiches are sticky and dry. In a 1922 study, 98% of American elementary school children described peanut butter sandwiches as “somewhat sticky” or “very sticky” [10]; similar results were reported in 1990 [11]. Attempts at improvement have not been rewarding. Beginning in the 1940s, a series of experiments with various inorganic enhancements produced consistently low satisfaction; enhancement materials included gravel in 1946 [12], crayons in 1955 [13], and salt in 1976 [14]. The search for an inorganic enhancement was discontinued in 1980 for humanitarian reasons, after the infamous peanut-butter-and-styrofoam study at Stanford [15]. Beginning in the 1960s a separate line of inquiry, involving organic enhancements, produced moderately better results and fewer casualties. Enhancements included chutney in 1962 [9], mustard in 1977 [11], chewing gum in 2004 [12], and feathers in 2010 [13]. The most promising advancement came in 2012 with the jam experiments of Professor J. Ellie Bean [14]. Bean reported that 61% of American elementary school children described peanut butter sandwiches with strawberry jam as “somewhat sticky” or “very sticky”.

These results indicate that more research is required. I hypothesize that if jelly were to be added to traditional peanut butter sandwiches, satisfaction could be further improved. This appears to be a completely novel solution, with no previous mention in the literature. Here I report promising results of enhancing with grape jelly. The recipe for this enhancement, which I call “Peanut Butter and Jelly” or simply “PBJ”, is publicly available at <https://github.com/PBJ>.

Methods

Peanut butter was spread on one slice of bread and grape jelly was spread on another slice. The two slices were then pressed together and cut diagonally.

100 children from the Sesame Street Elementary School in San Jose were fed a PBJ. A control group of 100 children from the same school were fed peanut butter sandwiches without jelly. All participants were then asked to describe their sandwich as “Not Sticky”, “Somewhat Sticky”, or “Very Sticky”.

Results

Survey results are shown in Table 1.

	Not Sticky	Somewhat Sticky	Very Sticky
Contol Goup	1	73	26
PBJ Group	90	10	0

Table 1 – Survey Results

Discussion

99% of control group members and 10% of PBJ group members described their sandwiches as “Somewhat Sticky” or “Very Sticky”. These results demonstrate that compared to consumers of the proposed PBJ sandwich, consumers of a traditional peanut butter sandwich are 9.9 times more likely to experience their sandwich as sticky.

I conclude that jelly is an effective enhancement to the traditional peanut butter sandwich, and is a significant improvement over all other reported enhancements.

Further research may identify other jelly flavors that produce comparable or superior results.

References

...

Things to Notice

Peanut butter is commonly described as the best food ever [1][2][3][4].

I can't say "peanut butter is the best food ever". That's a personal/subjective statement. Scientific writing requires a fact, not an opinion. But if the opinion is broadly held, and the popularity of the opinion is documented (as in references 1-4), then *that's* a fact.

In Season 1 of "Game of Thrones", a servant tells Daenerys, "The last dragon died a thousand years ago, Khaleesi. It is known." This *it is known*, with the implication that it is not to be questioned, runs opposite to the scientific spirit where anything may be questioned using the scientific method.

Fossils indicate that dinosaurs made peanut butter sandwiches as early as 60 million years ago [5]. Ancient images of peanut butter can be found in European cave paintings [6], tomb hieroglyphs in Egypt [7], the Dholavira complex in India [8], and recently discovered stone huts on Mars [9].

The rest of the paragraph supports the opening sentence. The supporting evidence is presented in historical order; this part of the article tells the story of peanut butter.

Unfortunately, peanut butter sandwiches are sticky and dry.

The first paragraph showed that peanut butter by itself is great. This paragraph introduces a context (sandwiches) where the great thing isn't so great. The job of the paragraph is to make readers care about the solution represented by my research. But it's not time to talk about the solution yet. First I make readers want there to be a solution.

In a 1922 study, 98% of American elementary school children described peanut butter sandwiches as "somewhat sticky" or "very sticky" [10]; similar results were reported in 1990 [11]. Attempts at improvement have not been rewarding. Beginning in the 1940s, a series of experiments with various inorganic enhancements produced consistently low satisfaction; enhancement materials included gravel in 1946 [12], crayons in 1955 [13], and salt in 1976 [14]. The search for an inorganic enhancement was discontinued in 1980 for humanitarian reasons, after the infamous peanut-butter-and-cardboard study at Stanford [15]. Beginning in the 1960s a separate line of inquiry, involving organic enhancements, produced moderately better results and fewer casualties. Enhancements included chutney in 1962 [9], mustard in 1977 [11], chewing gum in 2004 [12], and feathers in 2010 [13].

Here I present the trouble. Earlier I told the story of the topic (peanut butter). Here I tell the story of the problem. Notice that there are 2 lines of investigation (inorganics and organics), and their timelines overlap. If I present the studies in chronological order, I'll have to describe a couple of inorganic experiments, then some organic ones, then another inorganic, back and forth from 1946 to 2010. My story will be historically accurate, but confusing. 8 experiments is a lot, and I should try to impose some simplifying organization if I can. The distinction between inorganic and organic enhancements is natural.

Think about the outline of this text as it is:

- Enhancements
 - Inorganic
 - Gravel
 - Crayons
 - Salt
 - Cardboard
 - Organic
 - Chutney
 - Mustard
 - Chewing gum
 - Feathers

Compare to the outline of a purely historical order:

- Enhancements
 - Gravel
 - Crayons
 - Chutney
 - Salt
 - Mustard
 - Cardboard
 - Chewing gum
 - Feathers

The first outline shows how its story is better organized. Sometimes historical order isn't the best order – you have to think about the organization that best instructs your readers.

The most promising advancement came in 2012 with the jam experiments of Professor J. A. Emerson [14]. Emerson reported that only 61% of American elementary school children described peanut butter sandwiches with strawberry jam as “somewhat sticky” or “very sticky”.

This experiment is the state-of-the-art. My work has to be significantly better. But the shortcomings of Emerson's work need to be presented respectfully.

Here ends the literature review. Hopefully my readers are interested in the sub-sub-field of peanut butter, and care about the important problem of sandwiches. They have spent their valuable time reading up to this point. Now I owe them a significant solution to the problem.

These results indicate that more research is required.

After the literature review I put all that prior work in the context of the research I am about to present. This sentence obeys Rule 2c: it logically follows from what came just before.

I hypothesize that if jelly were to be added to traditional peanut butter sandwiches, satisfaction could be further improved.

If the research is hypothesis-based, this is a good place to put the hypothesis. The general form of this sentence is "I hypothesize that a certain solution (to the problem I just presented and made you care about) will be effective.

In a real article, you would give more extensive information about your idea. But remember that this isn't the place to go into full detail. Too much detail will lose your audience. Give them the big idea; they know that details will follow in the Methods section.

This appears to be a completely novel solution, with no previous mention in the literature.

Research has to be novel and significant. Here I claim that it's completely novel. In this case by definition I can't cite anything to support the claim. If my solution were partly novel (maybe an extension of someone else's idea), that's fine. I just have to mention whose work I am extending; that work would already have been presented in the literature review.

Here I report promising results of enhancing with grape jelly. The recipe for this enhancement, which I call "Peanut Butter and Jelly" or simply "PBj", is publicly available at <https://github.com/PBJ>.

The remainder of the paragraph sets up the remainder of the article. Traditionally this is also where you state where your open-source material can be found.

Notice what isn't said. You might have been told that all sections should end with connecting material: something like, "This section has described peanut butter in

the context of sandwiches, and has listed various attempts to make peanut butter sandwiches less sticky. In the following sections I present my methodology, results, and discussion". This wastes your readers' time. They just read the Introduction, and they can see what sections are to follow. Telling them the obvious serves no purpose and violates Rule 4b. ("My writing instructor told me I always need connecting material" is not an explanation. It's like "It is known.")

Connecting material should be about ideas, not about the order of your sections. The big idea of the Introduction is, "Peanut butter sandwiches need something more." The big idea of the rest of the article is, "Jelly!". In terms of ideas, all the necessary connecting material is in the sentence "*Here I report promising results of enhancing with grape jelly.*"

Methods

The point of science is to report reproducible results. The Methods section is where you tell readers how to reproduce your results. It's a recipe. Anything not directly about what you did belongs somewhere else.

Results

Now your readers know what you did. Here you tell them what you observed when you did that. Anything other than your direct observations belongs somewhere else.

Discussion

Here you tell your readers how you interpret the data.

99% of control group members and 10% of PBJ group members described their sandwiches as "Somewhat Sticky" or "Very Sticky".

Notice that I don't just write sentences that present the raw numbers in the table. Those numbers have already been presented. The sentence above organizes the raw numbers in a way that leads to an interpretation. It obeys Rule 2c, as it is a logical outcome of the table.

These results demonstrate that compared to consumers of the proposed PBJ sandwich, consumers of a traditional peanut butter sandwich are 9.9 times more likely to experience their sandwich as sticky.

This sentence follows logically from the previous one.

I conclude that jelly is an effective enhancement to the traditional peanut butter sandwich, and is a significant improvement over all other reported enhancements.

Again, this sentence follows logically from the previous one. From the table (containing only numbers) to this sentence, there is a progression from raw data to progressively higher level interpretation. The sentence above has no numbers at all.

Further research may identify other jelly flavors that produce comparable or superior results.

This sentence is connecting material, not to subsequent parts of this article but to future work. As with all connecting material, don't put it in just because it is known that you should. The Discussion section ends cleanly if the last sentence is omitted.