

## Not Waving but Drowning: A Review of Tufte's *The Cognitive Style of PowerPoint*

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*The Cognitive Style of PowerPoint: Pitching Out Corrupts Within* by Edward Tufte (2006) condemns the software for failing to help users achieve many of the goals of an effective presentation and instead offers a low resolution platform with a deeply hierarchical single-path structure capable of conveying a trivial amount of information even over extended periods of time. A summary of his main objections, paired with a Whorfian perspective of how linguistic structure can influence thought, highlights how this ubiquitous yet largely unexamined technology, deeply intertwined with our educational system especially at the collegiate level, must be empirically evaluated relative to potential alternatives and supplements.

Despite its ubiquity in the higher education classroom, one type of educational technology that has gone largely unexamined is Microsoft's PowerPoint® software. PowerPoint is a presentation program that is part of the Microsoft Office Suite usually bundled with Word® and Excel® and available for both Windows and Mac operating systems. The adoption of PowerPoint in the 1990s quickly replaced other presentation mediums, including overhead transparencies, slide projectors, and chalkboards. Perhaps due to the rapid adoption and seemingly indispensable nature of PowerPoint, the format has largely escaped criticism, with one notable exception – the writings of Edward Tufte. Tufte is Professor Emeritus at Yale in the Department of Graphic Design and maintains a research emphasis in political science and statistics. He is probably best known for his 1983 book, *The Visual Display of Quantitative Information*, which was written for the general researcher striving for new ways to present his or her data with increased accuracy, lucidity, and simplicity, and which, among other achievements, introduced possibly the golden rule of graph construction – maximizing the data-ink ratio.

More recently, in what is better described not as a book but a monograph (coming in at 32 pages), Tufte's (2006) *The Cognitive Style of PowerPoint: Pitching Out Corrupts Within* condemns the software for failing to help users achieve many of the goals of an effective presentation and instead offers a low resolution platform with a deeply hierarchical single-path structure capable of conveying a trivial amount of information even over extended periods of time. His treatise emphasizes that the outline style may serve to organize the thoughts of a nervous speaker, but it also promotes excessive abbreviation of complicated ideas and merely gives the illusion of an organized structure. In short, PowerPoint is presenter-oriented, but is neither content-oriented nor audience-oriented.

Complementary software packages accompanying textbooks of higher education including ready-made

PowerPoint presentations for each chapter are often used by publishers to entice instructors to choose their textbook over another. This is assuredly a powerful determinant of the widespread use of PowerPoint in the classroom, especially at the collegiate level, when classroom teaching may not always be the professor's top priority. Tufte's first complaint involves PowerPoint's extremely low spatial resolution. To illustrate that point, he offers a PowerPoint slide included with an Introduction to Statistics text which states the following in large bold type: "Correlation is not causation." Ever the responsible statistician, Tufte points out that "probably the shortest true statement that can be made about correlation and causality is, 'Empirically observed covariation is a necessary but not sufficient condition for causality'" (2006, p. 5). This, as he notes, is too many words to neatly fit on a PowerPoint slide, but the forced abbreviation of the fact is not a trivial matter: it is altogether unacceptable when the entire enterprise is undertaken to present the material to students, and this reckless abridgment of subtle arguments does little to benefit the development of nuanced repertoires in students. The lesson of the PowerPoint slide on correlation/causation is that there is no conceivable way a teacher can impart a full concept on a PowerPoint slide. Indeed, if one is using the so-called gold standard rule of slide text outlay – the 6 x 6 rule (i.e., maximum six lines of text, six words per line) promulgated by among others, the Harvard School of Public Health (Tufte, 2006) – several slides would be needed to present any serious concept. With such low resolution resulting in very little information per slide, many slides are needed.

This multi-slide requirement leads into Tufte's second criticism of PowerPoint – its reliance on a rigidly hierarchical single-path structure as a model for organization, regardless of actual content. As pointed out elsewhere (e.g., Shaw, Brown, & Bromiley, 1998), bulleted lists can only communicate three logical relationships – a sequence from first to last in time,

priority from least to most important or vice versa, and simple membership in a category. Most information teachers attempt to convey in the classroom, however, does not fit neatly within one of those relationships. The correlation/causation example, like many advanced ideas, requires a nuanced discussion of necessity and sufficiency to accurately and effectively relate the criteria to the concept. Furthermore, even in the few instances where information involves one of the three relationships amenable to bulleted lists, it is usually necessary to break up the narrative into several slides. This dissection is almost never as much related to the material as it is to the number of words that can fit on a PowerPoint slide, resulting in arbitrarily-forced minimal fragments comprising the presentation.

Tufte also offers quantitative evidence on PowerPoint structure to make his case. He points out that the average talk proceeds at about 100-160 spoken words per minute, and most people read at the rate of 300-1,000 printed words per minute. Bulleted PowerPoint slides, however, offer substantially less quantity and quality as a means of presenting information. In his analysis of 1,460 text-only slides in 189 PowerPoint presentations posted on the internet and top-ranked by Google, the median number of words per slide was 40 – about eight seconds of silent reading material! This poverty of information stems from the fact that only about 40-60% of slide space displays actual content. To make matters worse, the limited space displays a paucity of text because large fonts are needed so the audience can read it, requiring even more slides.

It is this monotony of “one damn slide after another” (Tufte, 2006, p. 4) that likely induces PowerPoint users to introduce conspicuous decoration to fill out the remaining area of slide space with PowerPoint’s infamous and often obnoxious graphic background templates and distracting animation which Tufte terms *PowerPointPhluff*. According to Tufte, “A vicious circle results. Thin content leads to boring presentations. To make them unboring, PowerPointPhluff is added, damaging the content, making the presentation even more boring, requiring more Phluff . . .” (Tufte, 2006, p. 15). Although Tufte’s treatise doesn’t stray far from his two primary PowerPoint criticisms, they are supported by a litany of examples ranging from the comical – what a PowerPoint presentation of the Gettysburg Address would have looked like, to the serious – how NASA PowerPoint presentations on the engineering analysis of debris impact may have played a role in the 2003 Space Shuttle Columbia catastrophe.

It may be useful, however, to view Tufte’s general argument in a larger context, specifically within the framework of the theory developed by Benjamin Whorf. Most learn only a caricature of the Whorfian

hypothesis – usually the fact that the Eskimo language has several expressions for the word “snow.” This example bears only a superficial relationship to Whorf’s profound theory. As Himeline (1980) pointed out,

While it is indeed one of Whorf’s own observations, the “Eskimos and snow” example and its attendant interpretation are trivial and misleading representatives of a Whorfian perspective. Whorf’s position is much more subtle, holding that the important linguistic differences consist in the *ways* in which distinctions are made, rather than in *which* distinctions are made. (p. 79)

The Whorfian hypothesis, or as termed more descriptively by Whorf (1956), the *linguistic relativity principle* contends that

users of markedly different grammars are pointed by their grammars toward different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers but must arrive at somewhat different views of the world.” (p. 221).

Or, put another way, “all observers are not led by the same physical evidence to the same picture of the universe, unless their linguistic backgrounds are similar” (Whorf, 1956, p. 214).

The structure of Western languages including English, for example, necessitates segmenting the world around us into categories of verbs that are required to be organized around nouns. These arbitrary segmentations emphasize discrete, unidirectional actions across time, instead of ongoing, multiply determined processes that, for example, obfuscate (or perhaps create) the counterintuitive nature of the dynamics of the universe at the subatomic level in physics. Aware of these types of problems, Whorf (1956) stated, “Modern thinkers have long since pointed out that the so-called mechanistic way of thinking has come to an impasse before the great frontier problems of science” (p. 238).

As Tufte argued, the noted PowerPoint preoccupation with structure over content puts unnecessary and arbitrary forced limits on the methods of information transmission. Perhaps a more dangerous consequence of PowerPoint in higher education, however, only implicit in Tufte’s lamentation, is how PowerPoint may exacerbate these mechanistic perspectives of nature. Because the bulleted list is only amenable to the three relationships described above, it circumscribes enormously the limited potential inherent in the already constrained nature of English and other Western languages to describe scientific relationships.

Because PowerPoint relies on, and interacts with, our already constrained English language, the mechanistic consequences Whorf cautioned against may be synergistically greater in communicating information with PowerPoint than with any Western language alone. Therefore, PowerPoint may have serious implications not only for what material we choose to teach, but also the ways in which both student and teacher are forced to think about the material because of the presentation's organized structure. Although Tufte (2006) does not draw the connection between PowerPoint and the Whorfian perspective, he comes awfully close when reminding the reader of a passage from George Orwell's (1946) classic essay, *Politics and the English Language*: "The English language becomes ugly and inaccurate because our thoughts are foolish, but the slovenliness of our language makes it easier for us to have foolish thoughts" (p. 252). When considering that this circumscribing technology is deeply intertwined with our higher educational system, a dismal vision emerges.

So what are we to do about this state of affairs? Unlike his previous books, when it comes to offering solutions, Tufte's treatise falls short. He promotes replacing PowerPoint slides with paper handouts showing text, figures, tables, and pictures together. And while simple paper handouts can provide a high level of information resolution that is free from mandatory bounds of linear organization, he provides no data on the relative effectiveness of this tactic in teaching. Moreover, paper handouts seem to be a great leap backwards, technologically speaking. The solutions seem more likely to be discovered in controlled empirical investigations which would almost certainly serve as an exciting realm for those already investigating the relative effectiveness of various strategies and tactics of teaching in higher education. One can easily imagine PowerPoint control sessions or units alternating with various alternatives. In addition, recognizing the shortcomings and pitfalls of

PowerPoint does not necessarily have to lead to a complete abandonment of the technology as Tufte suggests. The projection component of the software still offers a useful means for presenting images, tables, and figures (with a high data-ink ratio, of course). The insidious feature is its heavy reliance on the bulleted list.

As Tufte concedes, PowerPoint's forced organizational structure may benefit the bottom 10% of all presenters, and it probably does not cause much damage to the top 10% of all presenters. Readers of this journal should agree that empirical examination of PowerPoint relative to various alternatives would be a worthwhile activity, especially given PowerPoint's unchecked ubiquity in higher education.

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