

PowerPoint Slides as Speaking Notes: The Influence of Speaking Anxiety on the Use of Text on Slides

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Abstract

PowerPoint presentations are often criticized for the excessive use of text on the slides. In a study of 97 academic scholars, we found that presenters indeed used substantially more text than is advised. Speaking anxiety was found to be related to the time spent on preparing and rehearsing, and time spent on rehearsing is related to the number of words on the slides. Anxious presenters appear to use PowerPoint slides as speaking notes. Presenters should be trained to overcome their speaking anxiety by means other than the abundant use of words on their slides.

Keywords

speaking anxiety, PowerPoint, public speaking, speech preparation

In the past 15 years, PowerPoint has become by far the most popular presentation support in educational, academic, and business settings. Its use, however, has caused many authors to criticize the program in the video “Life after Death by PowerPoint” (McMillan, 2012), or articles such as “Powerful or Pointless?” (James, Burke, & Hutchins, 2006) and “PowerPoint Is Evil” (Tuft, 2003). Much of this criticism focuses on slide design: Too much text and too many bullet points, coupled with unintelligible

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texts and graphs, hinder rather than help the audience's ability to understand the presenter's central message (see also Cyphert, 2004; Keller, 2003; Tufte, 2006).

The heavy use of text on slides is problematic for two reasons. First, using slides as speaking notes might cause presenters to turn toward the projection to read the words. This is not necessary, since they can read the words from the computer screen. Rotating in the direction of the projection seems to be characteristic behavior of PowerPoint presenters (Cornelis & Tielens, 2004; Hanft, 2003; Shwom & Keller, 2003). Presenters thereby break eye contact with the audience, an important component of a presentation (see Kosslyn, 2007; Lucas, 2004; McCroskey, 2006). From a rhetorical point of view, looking away from the audience to point to or read a slide denotes poor presentation skills. While helpful for the presenter, the heavy use of text on slides might directly and indirectly impair the quality of the presentation.

Another reason that too much text on PowerPoint slides is problematic is that text on slides interferes with the spoken words of the presenter. Research by Mayer (2009) has shown that the use of words on a slide might hinder the information processing of the audience, whereas pictures combined with spoken words improve it. Mayer (2009) proposed two different channels for information processing: An auditive channel for spoken words and a visual channel for pictures and written words. Working memory connects the presented auditive information and the presented visual information. It is this active integration between pictures and spoken words—which he calls the “multi-media effect”—that causes better processing and comprehension of the material. Mayer (2009) found that words, projected on a slide as we see in PowerPoint presentations, impair the processing of information because they have to be processed in the visual channel and therefore must compete with pictures for limited processing space. He calls this the “modality effect.” When spoken words were presented simultaneously with text, Mayer found a second detrimental effect at work that impaired the processing of information; he suggested that this is due to the duplication of textual information, called the “verbal redundancy effect.”

Instruction books advocate limiting the number of words on PowerPoint slides but differ in their suggested numbers, which range from four lines with four words (maximum of 16 words) to six lines with six words (maximum number of 36 words; Atkinson, 2005; Knispel & Bemelmans, 2010; Kosslyn, 2007; Shephard, 2005). Studies have shown that many presenters far exceed the norms presented in instruction books (Hertz, 2011).

The central question of this research is how speaking anxiety and preparation practices contribute to presenters' nonconformance to guidelines regarding the use of text on slides. Cornelis and Tielens (2004) and Farkas (2005) have suggested that presenters use many words on a slide because they use the slides as speaking notes. Presenters who fear they will be lost for words, forget a topic, or present the topics in the wrong order know that PowerPoint slides containing the wording and structure of their speech could be helpful. These fears might be especially strong for presenters suffering from speaking anxiety. In the following sections, we will discuss the literature on speaking anxiety and how speaking anxiety might be related to the way presenters prepare for presentations and design their PowerPoint slides.

Speaking Anxiety

Speaking anxiety is a concept that has been well studied, indicating that it is a distinct subtype, qualitatively and quantitatively different from other subtypes of social phobia (Blöte, Kint, Miers, & Westenberg, 2009). We will use the term in the nonclinical way, referring to the feelings of anxiety many presenters experience when having to present in front of an audience. According to Behnke and Sawyer (2000), this anxiety manifests itself differently in three significant episodes of public-speaking performance: (a) preceding the presentation, just before speaking; (b) during the presentation; and (c) immediately following the presentation (as cited in Lucchetti, Phipps, & Behnke, 2003). The presence of an audience and the fear of negative evaluation are the most prominent causes of speaking anxiety (Rapee & Lim, 1992). For many speakers, the anticipation of giving a presentation produces more anxiety than actually giving the presentation (Behnke & Sawyer, 2000).

Speaking anxiety is a psychological state that presenters can experience in a direct, physiological way, with physical reactions like increased heart rate, heightened blood pressure, and cortisol responses (Pörhölä, 2002; Vogel, 1999; Westenberg et al., 2009). These reactions might influence the presenter in a negative way either directly—through a visible response like shaking—or indirectly, as the presenter's painful awareness of his or her speaking anxiety could set negative thoughts about failure into action. Beatty and Behnke (1991) and Pörhölä (2002) found that anxious communicators have a tendency to interpret their physiological arousal as fear or anxiety, whereas nonanxious individuals label a similar kind of arousal as enthusiasm or excitement. Anxious communicators tend to pay less attention to their environments and have more negative, self-focused feelings about their performances than low-anxiety speakers. This increase in attention to self is correlated with poorer speaking performance and lower self-evaluations (Daly, Vangelisti, & Lawrence, 1989).

One of the reasons behind the popularity of PowerPoint might be that presenters use it to reduce their speaking anxiety. Before the introduction of PowerPoint, Ayres (1991) found a relation between speaking anxiety and the use of visual aids. Presenters who used visual aids reported lower anxiety than those who did not. We have not found any more recent academic studies on this subject. There are various ways in which presenters use PowerPoint to reduce their speaking anxiety. The preparation of the slides, easy to accomplish, may give presenters a sense of mastery. Presenters also structure their presentations by putting slides in a certain order. Because of the fixed succession of slides during their presentation, presenters will be certain not to forget about subjects or present them in the wrong order. The default setting of PowerPoint with bullet point lists on a slide further adds to the creation of structure. In addition, by looking at words on the projected slides during the presentation, presenters are prevented from being "lost for words." The slide has become a projected speaking note. Being able to transfer the audience's attention from speaker to slides might also explain why anxious presenters like to work with PowerPoint. The use of PowerPoint thus offers assurance, not only during the presentation but also during the preparation phase in which speaking anxiety tends to be the highest (Behnke & Sawyer, 2000). The

words on the slides function as speaking notes for the presenter during the presentation, even while they may hinder the information processing by the audience.

Speaking anxiety may be related to the length of time presenters spend on preparing and rehearsing their presentations. Ayres (1996) found that presenters with more speaking anxiety (“communication apprehension” in his words) spend more time on their total preparation—mainly making speaking notes and employing visual aids (activities similar to making PowerPoint slides)—and that presenters with less speaking anxiety spend less total time on preparing and more time proportionally on analyzing the audience and rehearsing text. This form of rehearsing produces better speech delivery and content than not rehearsing the presentation (Menzel & Carrell, 1994). According to Ayres (1996), presenters with high speaking anxiety approach speech preparation with the same communication avoidance pattern they routinely use, namely to avoid communication-oriented preparation activities such as rehearsing out loud. These findings are probably applicable to presentations using PowerPoint; presenters with more speaking anxiety likely spend more time on preparing their presentations, for instance, on making slides. Anxious presenters can use these slides as speaking notes. Anxious presenters also likely spend proportionally less time on rehearsing their presentations. Presumably, more time spent preparing leads to more words on the slides, and more time spent rehearsing leads to fewer words, since well-rehearsed presenters do not need the words as speaking notes.

Study Overview

In this study, we tested our predictions that (a) speaking anxiety causes presenters to spend more time preparing the presentation than speakers with low speaking anxiety, (b) speakers with high speaking anxiety spend proportionally less time rehearsing than speakers with low speaking anxiety, and (c) speaking anxiety is related to more text added to slides during presenters’ preparation time. Furthermore, we studied the possible relation between time spent on preparing and rehearsing a presentation with PowerPoint and the use of words on a slide.

We tested the predictions among a sample of academic scholars completing their latest conference presentations. Given the characteristics of speaking anxiety described above, we expected scholars presenting their work at a conference (especially junior presenters) to have a high level of speaking anxiety. Conferences are sites for presenting research results and an open ground for confrontation, discussion, and the ratification of meaning, according to Shalom (2002). They play a central role in the network of scientific communication and in negotiating knowledge claims (Rowley-Jolivet, 2002) and are a challenge for presenters. Unlike publishing in journals, conference presentations offer a rare moment for scholars to have direct contact with colleagues and competitors who can directly evaluate their work by posing critical questions. Their work, and indirectly the scholars themselves, are tested here. Negative evaluation by the public, the main cause for speaking anxiety, is a realistic threat and might cause high anxiety levels.

We chose to do research among presenters in the social sciences because their work often allows them the choice of using pictures (for instance, graphs for their numerical

data) or words on a slide (tables); however, they usually do not have an abundance of pictures from their data as medical researchers or physicists commonly have. Their topics, along with topics selected by researchers in the humanities, often deal with more abstract topics, which are more difficult to show. They also do not study texts themselves, such as linguists might do, which could lead to slides with examples of the texts they studied.

Method

We used the tool eXamine (Roelofsma, Bottema, & Smeets, 2005) to create a questionnaire with questions concerning speaking anxiety, time spent on preparation, and time spent on rehearsing. It was directly emailed to networks of social scientists at three Dutch universities (VU University Amsterdam, Rijksuniversiteit Groningen, and Wageningen University) and the secretaries of three academic departments at other universities with the request to forward the mail to their colleagues. Respondents were asked to upload their most recent conference presentation with PowerPoint. One hundred seventy-four respondents filled in the questionnaire (an estimated response of 30%) of which 97 sent in their PowerPoint presentations. Only data from those who sent PowerPoint presentations were used for the analysis.

Of the respondents, 59% were female and 41% were male. The distribution in academic functions was PhD student (42.3%), postdoctoral (6.2%), assistant professor (27.8%), associate professor (13.4%), full professor (6.2%), and other (4.1%). The respondents had 1 year of experience (8.3%), 2 to 5 years of experience (53.2%), or more than 5 years of experience (38.5%).

Measures

The number of words was taken from the word count function of PowerPoint. To control for the length of a presentation and for the fact that presenters can either put many words on one slide or fewer words on many slides, we included the length of the presentation (number of minutes) in our analyses.

To measure *speaking anxiety*, we selected five statements from the 35-item "Personal Report of Public Speaking Anxiety" of McCroskey (1970) that were applicable to a nonclinical setting and reflected worries of presenters of conference papers that were found in Hertz's (2011) study. We changed the word *speech* into *scientific presentation* and the present tense into the past. The five adapted statements included the following:

- During the preparation of my last scientific presentation, I felt tense and nervous.
- I was looking forward to giving/to preparing my last scientific presentation.
- During the preparation of my last scientific presentation, I was worried that I would forget to say what I had prepared.
- During the preparation of my last scientific presentation, I was worried that someone would ask me something regarding my topic that I don't know.

- During the preparation of my last scientific presentation, I faced my upcoming presentation with confidence.

Respondents could select their answer from a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The items were clustered in a mean index of speaking anxiety and showed sufficient internal consistency ($M = 2.10$, $SD = 1.02$, Cronbach's $\alpha = .71$).

Two questions measured the time respondents spent preparing and rehearsing: "How many hours have you spent on the preparation of your last scientific presentation (indication in minutes please)?" and "How many hours have you spent on rehearsing your last scientific presentation (indication in minutes please)?" The proportion of time spent rehearsing in relation to time spent preparing was computed.

Results

The mean length of the presentations was 20.51 minutes ($SD = 13.04$); 17.5% lasted less than 15 minutes, 29.9% lasted 15 minutes, 35.1% lasted 20 minutes, and 17.5% lasted longer than 20 minutes. The mean time preparing was 272.44 minutes (4 hours and 33 minutes; $SD = 204.68$). The mean time spent rehearsing was 37.24 minutes ($SD = 36.36$), which represented 13.7% of the total preparation. The mean number of slides per minute was 1.1 ($SD = 0.59$). The mean number of words per slide was 54.51 ($SD = 41.18$). The mean number of pictures per slide was 0.05 ($SD = 0.07$).

Table 1 shows the correlations between the variables. We found a significant negative correlation between years of experience in presenting scientific research and speaking anxiety, $r = -.56$, $p < .001$. Furthermore, we found significant positive correlations between speaking anxiety and the time to prepare, $r = .41$, $p < .001$ and speaking anxiety and the time to rehearse, $r = .32$, $p < .01$. There was a positive correlation between time spent preparing and time spent rehearsing, $r = .30$, $p < .01$. We also found a positive correlation between time to rehearse and the number of words, $r = .27$, $p < .01$, but no significant relation between time spent preparing and the number of words.

There were significant negative correlations between the number of years of academic experience and rehearsing, $r = -.29$, $p < .01$; and the number of years of academic experience and the number of words on the slides, $r = -.21$, $p < .05$.

To test whether speaking anxiety affects the number of words used in a PowerPoint presentation through time spent on rehearsing and/or preparing, we used the PROCESS macro for SPSS (Hayes, 2012). PROCESS is a tool for path analysis that estimates direct and indirect effects and constructs bootstrap confidence intervals for these effects (see also Preacher & Hayes, 2004). PROCESS allows for multiple mediators and makes no assumptions about the normality of data, which is important given the nonnormal distribution of most of our data.

In the model we tested, we controlled for academic experience and the length of the presentation. Table 2 shows the results of the analyses. In the first step, speaking anxiety, length of presentation, and academic experience all predict time spent on

Table 1. Pearson Correlations Between Speaking Anxiety, Time Spent on Preparing and Rehearsing, Number of Words, Length of Presentation, and Academic Experience.

	1	2	3	4	5	6
1. Speaking anxiety	—					
2. Preparing	.41***	—				
3. Rehearsing	.32**	.30**	—			
4. Number of words	.07	.07	.27**	—		
5. Length of presentation	-.19†	.11	.08	.37***	—	
6. Academic experience (years)	-.56***	-.05	-.29**	-.21*	.07	—

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2. Analysis of Direct and Indirect Effects (Unstandardized Regression Coefficients and Standard Errors).

	Time for preparing	Time for rehearsal	Number of words
Constant	-236.23 (115.48)*	11.53 (23.95)	855.96 (502.12)†
Academic experience	25.40 (12.69)*	-3.39 (2.63)	-86.18 (55.78)
Length of presentation	2.42 (1.37)†	0.42 (0.28)	20.70 (5.92)***
Speaking anxiety	163.43 (32.45)***	15.50 (6.73)*	-9.05 (157.10)
Time for preparing			-0.11 (0.47)
Time for rehearsal			3.82 (2.25)†
R^2	.24	.16	.22
F	8.98***	5.27**	4.59***
df	3, 86	3, 86	5, 84
Indirect effect (time for practice)	40.78 (82.83)	95% CI [-199.40, 126.03]	
Indirect effect (time for rehearsal)	59.14 (42.04)	95% CI [3.59, 193.05]	

Note. df = degrees of freedom; CI = confidence interval.

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

preparing (be it only marginally significant for length of the presentation). The time spent preparing was higher for longer presentations, experienced academics, and presenters with high speaking anxiety. Together, these variables accounted for 24% of the variance in the time spent preparing. Time spent on rehearsing was predicted only by speaking anxiety: High speaking anxiety was positively related to more time for rehearsal. The model explained 16% of the variance in the time spent rehearsing.

The results show that the model explains 22% of the number of words in the PowerPoint presentations. The main predictor is the length of the presentation: Lengthy presentations lead to more words on the PowerPoint slides. Only the time spent rehearsing was positively (be it marginally, $p < .10$) significantly related to the number of words used on the slides. Speaking anxiety is not directly related to the number of words used on the PowerPoint slides, but the results show that there is an indirect relation between speaking anxiety and the number of words through time spent on

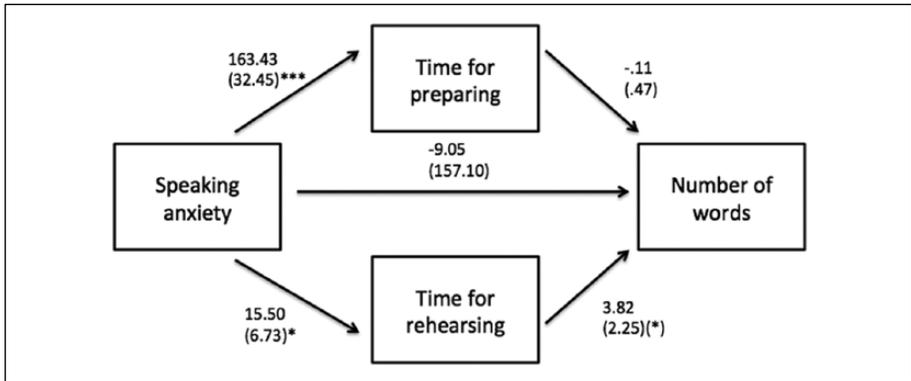


Figure 1. Direct and indirect effects of speaking anxiety on number of words. Controlled for academic experience and length of presentation. (*) $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

rehearsal. The higher the speaking anxiety, the more time is spent on rehearsing, and the more time is spent on rehearsing, the more words are used on the slides (see Figure 1 for a graphical representation of the relations between the main variables).

Discussion

Although PowerPoint is a very popular presentation tool, there is much criticism concerning the excessive use of words on the slides. Instruction books advocate limiting the number of words and, more important, research by Mayer (2009) has shown that the use of words on a slide might hinder the information processing by the audience, whereas pictures combined with spoken words improve this information processing.

Our study among social scientists shows that presenters do indeed use more words per slide than is typically advised in instruction books. We found a mean of 55 words per slide. Compared with the different proposed maximum numbers in instruction books, this average exceeds the highest proposed maximum number of 36 by 50%.

The goal of this study was to establish the relation between speaking anxiety and the number of words on PowerPoint slides. The results show that presenters with fewer years of academic experience suffered more from speaking anxiety than those with more experience. We expected, in line with the findings of Ayres (1996), that speaking anxiety would cause presenters to spend more time on preparing the presentation than speakers with low speaking anxiety. Speaking anxiety in our study indeed proved to be a reliable predictor of the time presenters spent on preparation. We also found that presenters with higher speaking anxiety spent more time rehearsing and that more experienced presenters spent less time rehearsing. This did not conform to our expectations or agree with the research of Ayres (1996), who found that presenters with more speaking anxiety spend proportionally less time rehearsing text. Perhaps the difference in both studies' subjects can explain this disparity. The

students in Ayres's study might have given into their speaking anxiety by avoiding communication-oriented preparation activities, as Ayres supposed, while the scholars in our study might have had a more "professional" attitude and rehearsed regardless of their speaking anxiety.

We found no relation between the time spent preparing and the number of words. This could be attributed to the relatively short time it takes to type words on the slides, compared with other activities during preparation (e.g., thinking about the structure or preparing a graph). We did find that the more time presenters spent rehearsing the presentation, the more words they used on the slides. We also found an indirect relation between speaking anxiety and the number of words through the length of time spent on rehearsal and a positive relation between years of academic experience and the number of words. More experienced presenters have less speaking anxiety and use fewer words on their slides. This is consistent with the findings of Hertz, Kerkhof, and van Woerkum (2015). We assume that anxious presenters use the PowerPoint slides as speaking notes while rehearsing, using the words as prompts, and that they keep the words on their slides as speaking notes during their presentations.

Limitations and Further Research

A limitation of our study was that we tested our predictions among a sample of social scientists. Is our group representative of all scientists? Although Hertz (2011) found that professionals in the hard and medical sciences tend to use more pictures and fewer words than social scientists, there is no indication that they differ with regard to issues of speaking anxiety. Thus, future studies should add other academic disciplines to test for possible deviations from our findings.

In this study, we only focused on the time spent preparing and rehearsing. We did not study the specific activities presenters undertake while preparing and rehearsing their presentations. Furthermore, we do not know if presenters intend to use PowerPoint slides as speaking notes or if they do it unconsciously. We suggest to further study the activities of presenters and interview them about their motives for using PowerPoint in general and the use of words in particular.

Another interesting line of inquiry would be the possible use of pictures on slides to help presenters memorize their presentations and thereby overcome speaking anxiety. In ancient Greece, speakers used to picture important subjects of their speech along a familiar route in order to remember them in the right order (a specific imagery mnemonics technique called the method of loci). Using pictures instead of text on the slides would improve the audience members' information processing.

Conclusion

The problem we addressed in our study is that many presenters seem to use PowerPoint slides with too many words. It appears that this is also the case for scholars presenting at conferences. Based on our findings, we would like to propose some possible solutions to help improve these presentations. First, the findings of Mayer (2009), which

suggested using PowerPoint slides to project pictures instead of words (see also Atkinson, 2005), deserve a more prominent place in instruction books and should be explained in presentation trainings for students and professionals. The practice of using words on the slides might be difficult to change, however, if presenters believe that the words help them reduce their speaking anxiety. This is especially true for presenters with fewer years of academic experience. We advocate a three-step method for teaching how to present with PowerPoint (Hertz et al., 2015). First, students should be taught rhetorical skills while presenting without the use of the program. To help students overcome their speaking anxiety, instructors can provide them with a series of small exercises, giving positive feedback and emphasizing success as students complete them. The importance of rehearsing should be stressed, not only for the quality of the presentation but also to diminish speaking anxiety. Second, they should be taught how to design slides. Special attention can be given to finding appropriate pictures to support the story. The pictures can serve as a memory aid for the students as well. Only after completing the first and second steps should students be taught how to present with PowerPoint. The third step thus builds on the first two, with specific instruction in how to present effectively with PowerPoint slides.

Authors' Note

This study was conducted according to generally accepted ethical standards for human subjects; participant comments are reproduced by permission.

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