Introduction

Animations are widely applied in presentation tools such as PowerPoint® (Badge, Dawson, Cann, & Scott, 2008). However, the use of animations can be a ‘two-edged sword’ (R. Lowe & Boucheix, 2011, p. 650). For instance, you have probably seen some presentations where you have been impressed and intrigued by the presentation animations, and they have helped you to understand the information. On the other hand, some presentations wildly overuse or misuse animations. In these situations, we have probably all noticed that the animations can be a distraction that reduces the effectiveness of the communication (1).

So is this perception backed up by the research?

There is plenty of research that backs up this ‘two-edged sword’ perception about animations. For instance, research shows that the good application of animation techniques can help to generate viewer attention (Schreij, Owens, & Theeuwes, 2008), interest (Berk, 2012; de Wet, 2006; Ruffini, 2009; Zongker, 2003), positive impressions (Treleven, Penlesky, Callarman, Watts, & Bragg, 2014), and enhanced learning outcomes (Berk, 2012; Li, Santhanam, & Carswell, 2009; Reinwein, 2012). However, when animations are misused, they can become distracting (R. K. Lowe, 2003; Zongker, 2003), disruptive (Bunzel, 2004; Mackiewicz, 2008; Treleven, Penlesky, Callarman, Watts, & Bragg, 2012), unpleasant (Kosslyn, Kievet, Russell, & Shepard, 2012), and they can degrade the quality of learning (Mahar, Yaylaciegi, & Janicki, 2009a, 2009b; Mayer, Hegarty, Mayer, & Campbell, 2005).

Consequently, the science agrees that animation can be either a benefit or a hindrance. To begin working out the optimised use of animations, the first step is to categorise animation objectives.

Animation Objectives

According to Berk (2012, p. 6) animations can be utilised to ‘grab or maintain attention’, ‘create an emotional connection’, and ‘improve learning’. These identified uses provide a helpful framework for understanding animation objectives. The first two of these objectives are explained below, and the third purpose is described in the following instalment within this series.

1. A practical demonstration of this problem is explained in the following paper: http://www.seahorses-consulting.com/DownloadableFiles/A_Useful_Exercise.pdf.
**Objective 1- Grab and Maintain Attention**

Object motion (Folk, Remington, & Wright, 1994), the appearance of an object (Chua, 2009; Hancock & Phillips, 2004), or significant change in the visual content (Rensink, 2002) can be highly salient\(^2\). Animation may even be more attracting than other types of salience (Libedinsky & Livingstone, 2011)\(^3\).

For this reason animation can ‘be used to direct the observer’s attention to important…aspects of a display’ (Schnozt & Rasch, 2005, p. 47). In other words, the salience effect created by animations can be utilised to cue viewers to key content, so they visually process the pertinent information at the right time (Murphy, 2004). As an example, animation can be applied to generate a focal point on a slide, and then shape the order of mental processing by animating-in following content in a specific order (Chang, Dooley, & Tuovinen, 2002; de Wet, 2006).

This type of visual cueing can help to minimise cognitive load, through the reduction of ‘extraneous processing, by guiding the learner’s attention to the key elements’ (Mayer, 2009, p. 109). The use of this type of attentional cueing can directly assist in generating enhanced communication and learning, by helping to ensure that the viewer is consistently focussed on the key content (de Koning, Tabbers, Rikers, & Paas, 2009; Mayer, 2009).

Alternately, ‘if the animations are designed in such a way that they distract the learner’s attention away from essential elements’ this can increase extraneous cognitive load, and this interferes with good communication (Ayres & Paas, 2007, p. 696). Additionally, if the animations make the screen objects transitory (e.g. they appear and then disappear), this can also increase extraneous cognitive load (Ayres & Paas, 2007; Hassanabadi, Robatjazi, & Savoji, 2011). This added cognitive load stems from the fact that viewers must store the visual content that has now disappeared in working memory, without recourse to utilising just-in-time saccades (e.g. fixating on key visual material) to use the screen information as a source of external memory (Schutz, Braun, & Gegenfurtner, 2011)\(^4\).

As these types of ‘attention grabbing’ animation can create both positive and negative outcomes, great care should be taken in applying them, and they should normally only be used to cue attention to the key visual material as it is required (R. K. Lowe, 2003; Zongker, 2003).

**Objective 2 – Create Emotional Connection**

Animations can also be intrinsically motivating (Betrancourt, 2005), and can generate positive impressions about the content (Halazonetis, 2000; Mackiewicz, 2008). Nonetheless, according to Musselman (2013) the presence of animation can only create positive emotional responses up to a point, and after reaching a crucial threshold, animations can then create negative impressions. Key aspects that appear to affect this threshold include:

- **Complexity.** Overly complex animations can generate negative impressions (Musselman, 2013). On the other hand, Wang, Yang, Liu, Cao, and Ma (2014) found that moderate levels of animation complexity generated greater attention than low or high

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2. The term salience refers to the ability of the visual elements to attract attention (Serences & Yantis, 2006).
4. This issue is discussed in more detail within Section 5 of the file at the URL in Footnote 3.
complexity animations. In other words, people will be less interested in visual aids where the animations are not helping to create moderate complexity (Wang et al., 2014).

- **Speed.** Faster animations can generate positive impressions, but if they are too fast (for rate and velocity\(^5\)), they are likely to create negative feelings in the viewer (Bartram & Nakatani, 2010; Sundar & Kalyanaraman, 2004). Optimal speed relates to:

  - **Rate.** As long as the visual perception systems are still able to process the content effectively, faster animation rates generate higher levels of arousal and a commensurate increase in attention and learning (Sundar & Kalyanaraman, 2004). Conversely, slower rates of animation may enhance the general appeal of the content (Sundar & Kalyanaraman, 2004). They therefore recommend utilising a mixture of fast and slow rate animation sequences. To put this context, Sundar and Kalyanaraman (2004) define rates of animations as fast (up to about 55 visual changes per minute), and slow (around 21.5 or less per minute). Please note that one animation sequence can equate to numerous changes (e.g. 10 or more) within this model, because it refers to the perception of incremental variations.

  - **Velocity.** For velocity, Blascheck et al. (2014) recommend that a maximum velocity limit of 30° of visual arc per second (p/sec) should be utilised if the intent is for the viewer to track the motion. On a 17-inch screen this equates to the horizontal motion of an object from side to side in about 1.75 seconds.

- **Visual appeal from motion.** The animation should also be visually appealing (Musselman, 2013). In other words, it should not be clumsy or too jerky. Additionally, Bartram and Nakatani (2010) identified key features of motion animations that affect impressions, and these are listed in Table 1.

<table>
<thead>
<tr>
<th>Table 1: Emotional responses to different types of motion paths</th>
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<td><strong>Emotion Generated</strong></td>
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5. Velocity refers to the tracking speed required to follow moving objects within the field of view. Rate refers to the number of movements or changes (animations) visible on the screen during a given period (e.g. per minute).
• *Tone.* Gabriel (2008) also identified that the type of animation applied within the PowerPoint® slides can help to set the tone of the presentation. For example, the application of animations that are perceived as sophisticated or imaginative can generate feelings of modernity or innovativeness (Gabriel, 2008).

• *Relevance.* Most importantly, if the animations are considered irrelevant (even if they are ‘cute’) they are likely to generate negative impressions and frustration within the viewer (Fritschi, 2008, p. 120).

Consequently, designers can utilise appropriate animation sequences to generate positive impressions. However, to achieve this objective, the designer should conform to the guidance provided above.

**Summary and Looking Ahead**

As illustrated in the preceding sections, the use of animations can be beneficial. However, animations should be applied with care, and should not be utilised just because they are available (Murphy, 2004; Smaldino, Lowther, & Russell, 2008).

The following parts in this series build on this first instalment as follows:

• **Part 2: Animation to optimise learning.** The next part explains how animations used to ‘grab and maintain attention’ and ‘create emotional connection’ should be used together to improve communication and learning. When we talk about learning, this is not just applicable in the sense of the classroom. Learning in this context refers to any situation in which the presenter wishes their audience to properly understand and remember the content being provided. This second instalment is provided at the following URL: [http://www.seahorses-consulting.com/DownloadableFiles/UsingAnimations_Pt2.pdf](http://www.seahorses-consulting.com/DownloadableFiles/UsingAnimations_Pt2.pdf).

• **Part 3: Strategies and Techniques.** The first two parts provide a framework for understanding animation objectives. Part 3 explains which animation strategies and specific techniques will work best to allow presenters to achieve their objectives. The third part is provided at the following URL: [http://www.seahorses-consulting.com/DownloadableFiles/UsingAnimations_Pt3.pdf](http://www.seahorses-consulting.com/DownloadableFiles/UsingAnimations_Pt3.pdf).

• **Part 4: Text Animation.** The final part in this series looks at a special case for using animation. This relates to the use of animated text. Although animated text is widely used in presentations, the research shows that many common techniques are actually counter-productive. Consequently, this last paper in the series is designed to explain how you can get the best results from showing text in presentations. This is found at: [http://www.seahorses-consulting.com/DownloadableFiles/UsingAnimations_Pt4.pdf](http://www.seahorses-consulting.com/DownloadableFiles/UsingAnimations_Pt4.pdf).

**A General Note**

This is one in a series of quarterly newsletters. Should you or another person wish to receive future newsletters, or links to previous newsletters, please email the following information to info@seahorses-consulting.com:

- your full name; and
- the email address to which you want the information forwarded.
REFERENCES


Fritschi, J. (2008). Examining pre-service instructor's use of PowerPoint based on pre-service students' perceptions: A mixed methods study. (Doctor of Philosophy), The University of Alabama at Birmingham, Birmingham, Alabama, USA.


