

# Does the composition of landscape photographs affect visual preferences? The rule of the Golden Section and the position of the horizon



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## ABSTRACT

This study considers the effect of aspects of the composition of a photograph of a landscape scene on its overall perceived beauty. The study has confirmed that the composition of landscape photographs according to the Golden Section, or the Rule of Thirds, and the position of the horizon in the photograph significantly influence the perceived beauty of the depicted landscape scenes.

Moreover, we have found that placing positively perceived landscape elements at the intersection points of a grid based on the Rule of Thirds significantly increases positive evaluations of entire landscape scenes, while placing negatively perceived landscape elements according to the same rules makes negative evaluations more negative. Our finding about negative evaluations is innovative: this phenomenon has not been demonstrated by previous research. Our findings point to some possible pitfalls of photograph-based studies on visual preferences which do not consider the composition of individual pictures.

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## 1. Introduction

The sense of proportion is a basic human sense. It is essential for the analysis of visual information, facilitating orientation in the real world, and it is a part of the process of visual perception (Gowlett, 2011). Early humans already had a geometric sense of proportion and were able to make geometric transformations (Gowlett, 1984). However, the process of perception can be influenced by a number of internal and external factors. The choice of ideal proportions can therefore be highly individual and variable (see Fujita, 2001; Sevenant & Antrop, 2010). Why, then, is one particular proportion – the Golden Section – so relevant for the human eye?

The Golden Section is probably one of the most mysterious and controversial figures in aesthetics. As a concept and as a term, it has had a long history in the arts, in music and also in science (see e.g. Green, 1995; McWhinnie, 1987). The question whether human beings might have a preference for the Golden Section has been

studied by many researchers from a range of fields, but no definite answer has yet been found.

### 1.1. Golden Section

#### 1.1.1. History, principles and use of the Golden Section

The ancient Greeks believed that moderation is the key to health and beauty, both in life and in art. Euclid of Alexandria determined a ratio which Plato called the “section”, and which is now known as the Golden Section (Kent, 1995). Since the time of Euclid, and perhaps since much earlier, the Golden Section has been considered as the most aesthetically pleasing point at which to divide a line (Green, 1995).

There are a number of terms for the Golden Section. The concept is often referred to as Phi  $\Phi$  (e.g. Green, 1995), Tau  $\tau$  (e.g. Olsen, 2006), the golden number (e.g. Fischler, 1981), the golden ratio (e.g. Ajluni, Martin, & Yalamarthy, 2010) or the golden mean (e.g. Linn, 1974).

The first detailed studies on the Golden Section date back to the end of the 19th century, when the German physicist and psychologist Gustav Theodor Fechner started a systematic study of the aesthetic properties of the Golden Section (see Fechner, 1871, 1876). A number of scientists continued Fechner's research (e.g. Farnsworth, 1932; Schiffman, 1966; Witmer, 1894), but Fechner's

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work is considered as the theoretical basis for the concept of the Golden Section.

Benjafield and Davis (1978) presented the following mathematical expression of the Golden Section: “The ‘Golden Section’ is the proportion obtaining between two quantities  $a$  and  $b$  when  $a/b = b/(a + b)$ . This means that  $a$  must be approximately 61.8% of  $b$ ”. Every line can be divided by the Golden Section at two points (Kent, 1995) (Fig. 1).

The most frequently occurring geometric shapes that include the Golden Section are the golden triangle (Fig. 2a), the golden rectangle (Fig. 2b), the golden pentagon (Fig. 2c) and the golden spiral, known as the “Curve of Life” (Fig. 2d) (Huntley, 1970). These geometric shapes are often found in natural shapes, specifically in life forms. For example, rose petals, sunflower seeds and the shells of nautilus, abalone and triton are organized in Golden Section proportion (Benjafield & Davis, 1978; Falbo, 2005; Hargittai, 1992). The Golden Section concept is also often consciously used in architecture (e.g. the Pyramids in Giza, the Parthenon in Athens, and the United Nations building in New York City), and in art (e.g. Leonardo da Vinci’s *Mona Lisa*, Salvador Dali’s *William Tell*) (see Ajluni et al., 2010).

### 1.1.2. The Golden Section in photography, the Rule of Thirds, the position of the horizon

Apart from its use in architecture, painting and mathematics, the Golden Section is also widely used in photography (Kent, 1995; McManus et al., 2011; Pihan, 2008). The rule of the Golden Section simplifies the search for ideal proportions of objects and ideal geometry, in other words, how to divide and fill the picture in a way that is subjectively the most balanced.

Kent (1995) postulates that a grid based on the Golden Section determines the position of key subjects in the picture, which leads to a likeable picture. Although some experts postulate that the key elements should be placed in the centre of the picture (Alexander, 2002; Gardner, Fowlkes, Nothelfer, & Palmer, 2008), most of the available empirical research shows that the main theme should be driven out from the centre towards the corners (e.g. Friedenber, 2012; Korkmaz, 2009; McManus & Weatherby, 1997). A study by Clifton (1973) showed that this distribution of the elements of the picture provides a much more dynamic perception of the design. Other empirical studies by Wölfflin (1928), Levy (1976) and Nachson (1999) provide even more detailed guidelines, stating that the key element in the picture should be located distinctly to the right of the centre of the picture.

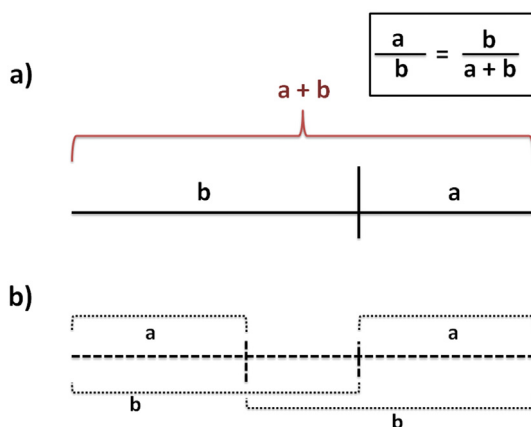


Fig. 1. a) A graphic expression of the mathematic definition of the Golden Section using lines, after Benjafield and Davis (1978); b) dual use of the Golden Section in one line.

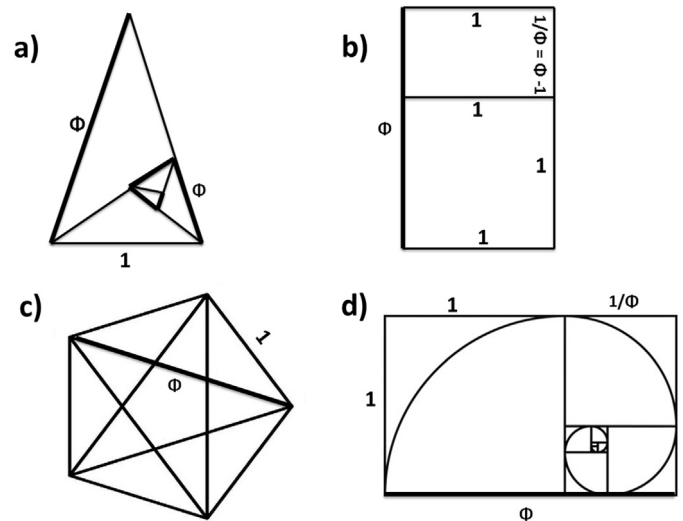


Fig. 2. Basic geometric shapes that include the Golden Section ( $\phi$ ), which can be found both in man-made and in natural forms (a) the golden triangle; b) the golden rectangle; c) the golden pentagon; d) the golden spiral). The depicted geometric shapes always include values 1 and  $\phi$  ( $=1.618$ ) in different positions.

Although there is an exact mathematical expression for the Golden Section, in photography this is often substituted by the so-called Rule of Thirds, which is an approximation to the Golden Section in a rectangle (Bertamini, Bennet, & Bode, 2011; Datta, Joshi, Li, & Wang, 2006). Pihan (2008) explains the simplification of the Golden Section in photography in the following way: in practical photography, the exact expression of the Golden Section does not make sense, with regard to the proportion of the sides of the rectangle, which do not exactly follow the Golden Rectangle. For this reason, the approximation of the Golden Section by the Rule of Thirds is considered to be sufficient in photographic practice (Fig. 3).

The Rule of Thirds means that the image is divided into three horizontal sections and three vertical sections. Where the horizontal and vertical lines intersect, four points of interest are created (see Fig. 3a). According to Korkmaz (2009), the idea behind the Rule of Thirds is that if a visually dominant feature is placed on the points of interest or along the lines formed by these points, this will result in a more balanced design, which will provide a much more pleasant perception. The points of interest can then be defined as the areas where viewers primarily perceive the visual stimuli and where they generally most like to see the visual accent (Greenzweig, 2001).

The Rule of Thirds is closely connected to another rule of composition that is commonly used by experts in photography and painting: the placement of the horizon in a photograph (picture). This rule is important mainly in landscape photographs.

The horizon is the line where sky and land appear to meet (Bell, 2004). According to Hagerhall, Purcell, and Taylor (2004), the horizon is the most dominant edge in a typical landscape image. Kent (1995) states that artists usually place the horizon in the centre of the depicted scene. Raising, lowering or slanting the horizon then leads to a change in the expression of the depicted scene. The role of the Rule of Thirds in placement of the horizon is simple – horizontal lines drawn according to the Rule of Thirds create benchmarks for placing the horizon (Fig. 4). In this context, Pihan (2008) notes that where the horizon is placed in the lower third of a photograph (Fig. 4a), the emphasis is on the sky and on events happening on it. The human eye is therefore drawn to the sky, and the landscape plays only a complementary part in the picture.

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