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Symmetry and symmetrical organization of forms in the composition of the cinematographic picture

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ABSTRACT

The study of asymmetry in the perception and cognitive representation of the cinematographic image as an ideal object (art object) and of the aesthetic experiences it produces is probably one of the most controversial and debated contemporary research directions in this field. Although this topic has animated for millennia artists, philosophers, art critics, creators of photographic or cinematographic picture, as well as prominent researchers in various fields of Neuroscience, no firm solution has been established yet. The association often used in fine arts, but also in Mathematics, Physics or Biology, of symmetry, with what we currently call "beautiful", has not been scientifically validated until now. Based solely on empirical observations, it inspired and spurred generations of creative artists that resorted to symmetry as a way of organizing compositional architectures.

KEYWORDS: symmetry, asymmetry, image composition, perception of symmetry, cinematographic image

Introduction

Symmetry, as a way of organizing a compositional architecture in the image, involves two directions of development: on one side and the other of the vertical axis of the frame (horizontal symmetry, more common) or on both sides of the horizontal axis (vertical symmetry).

Horizontal symmetry represents a particular case of materializing the proportion within the frame. It generates one of the rare situations in which the composition has an exceptional stability, determined a priori, due to the fact that its center is exactly in the middle of the frame, on the vertical axis of symmetry, and the subject, even if it is far from the vertical axis, towards the lateral extremities or the horizontal one, towards the upper or lower limit of the frame, is counterbalanced by mirroring (in the other half of the frame). Because it is a very important means of expression in image composition, we must do a brief analysis of how visual cognitive mechanisms deal with symmetry.

Perceptually, we define horizontal symmetry as a visual regularity in which one half of the image is identical to the other, but rotated horizontally by 180 degrees (it is seen "in a mirror"). The two halves of the image are separated by a vertical axis of symmetry. Vertical symmetry is defined in the same way, only we are dealing with a mirroring of the horizontal symmetry axis. Symmetries are found all around us, and the genetic patterns by which most beings are made up involve symmetrical architectures.

Why symmetrical? If we consider that, as is most likely, the first multicellular organisms appeared in the liquid environment (water), a development of a symmetrical form would have significantly improved the entire biomechanics of these beings. Including movement on land, which appeared later, would require superior biomechanics if the organization of the form was symmetrical. We can also propose another explanation: the living cell, in order to multiply, underwent a process of cell division, and DNA coding also implies a certain organizational symmetry of the basic components. The living cell is in the vast majority of cases a sphere, and the sphere is the perfect example of symmetry. Clearly, not all beings develop bilateral symmetry. Some, for example, certain species of starfish have developed five arms, not four. In this case, too, by placing the vertical axis along one arm we obtain, in fact, also a bilateral symmetry.

Obviously, we are talking only about the external organization of forms, not the inner one. In general, the bodies of living beings, although they are bilaterally symmetrically developed, the internal organization of the organs is completely asymmetric, a fact that would support the hypothesis that the development of shape symmetry is more related to the biomechanics of beings that evolve in different environments (increasing dynamics, speed of movement, the ability to respond to the environment, to the needs of security, feeding or reproduction). As such, biological symmetry is a necessary product of evolution, a response to the action of mechanical forces acting on bodies (Hollis, 2017).

Moreover, another essential factor that conditions the existence of any being is the ability to move and change its direction of travel-an extremely important element of any type of biological locomotion. This locomotion can be done by generating frictional, pushing surfaces. Bilateral symmetry is the only type of symmetry that can maximize these types of forces, obtaining, at the same time, a maximum maneuverability of the form (Holló & Novák, 2012).

Cognitive symmetry processing

Regarding how symmetry is processed by cognitive mechanisms, it is assumed that its detection is an integral part of the perceptual organization process, since this allows cognitive representations of very effective patterns (der Helm, 2014). Despite the fact that symmetry is so often mentioned as one of the basic principles of the aesthetics of the products of visual arts, practically, at this moment, there is not much evidence to edify emotional responses to the analysis of images containing symmetries, regardless of the tests performed. However, it should be mentioned a study carried out in 2012 indicated that the aesthetic assessment of visual symmetry in an image can be a deliberate, intentional process and not a spontaneous, automatic one (Makin, Wilton &Pecchinenda, 2012).

Instead, there is some evidence demonstrating that there are automatic cortex evaluation responses in image analysis that contain symmetries. But this is not the same as affective response or aesthetic experience! The fact that certain structures of the cortex are "pre-programmed" to respond biologically to the sight of a symmetry, does not mean that these responses are highly cognitive, at the level of cognitive representation or consciousness (Makin, Pecchinenda & Bertamini, 2012). For example, a perfectly symmetrical human figure can denote excellent psycho-physical health and condition, while a facial asymmetry can indicate certain dysfunctions of the level of physical or mental health. Obviously, an observer's cognitive response will be conditioned by one of the evolutionary requirements implemented millions of years ago in any evolved biological complex: the preference for healthy biological exemplars for mating and reproduction.

In general, the temporal thresholds for detecting an axis of symmetry in an image are between 28 and 568 ms, a fairly wide range because this is where certain natural patterns are identified and recognized slower or faster (Cohen & Zaidi, 2013). The average detection is about 100ms (Wilson & Wilkinson, 2002), which indicates a very high processing speed, even in very complex images. Probably, and this is one reason why people show a special preference for images that contain symmetries.

Extensive research on this subject has also triggered gestalt researchers (Kolher, 1929, pp. 134-150). They discovered and documented for the first time the "preferences" of the cortex in the detection of mathematically organized forms (in the case of Arts, symmetry is a plastic concept, but it is defined mathematically), especially since the perception of symmetry occurs in childhood, around the age of 4 months (Pornstein & Krinsky, 1985). Other studies have also put forward the hypothesis that the mechanism of perception likes symmetry so much because it has a very important contribution in detecting the orientation of objects in space (Giannouli, 2013). Thus, a shape can have an axis more or less perpendicular to the plane of development of symmetry as the direction of normal movement.

Because cognitive mechanisms recognize the concept of symmetry very well and can operate with symmetrical forms even in cases where they do not appear entirely in the image, but turned even up to 90^{O}, the cortex can easily identify and recognize faces facing in profile with respect to the Observer or illuminated only half, because the missing information is filled in automatically, but returned to 180^{O}.

In the case of forms that do not have symmetries and have a profile orientation or poor illumination, only on one half of the form, perceptual systems cannot make an accurate recognition of the forms, since the information defining the visible half cannot be used to reconstruct the other half, not being identical. Therefore, the detection of visual regularities is one of the most important characteristics of the mechanism of perception, and this is also closely related to the evolution of the human being since the detection of these regularities is an attribute of great value in the survival process (for example, it was quite necessary for primitive man to visually detect the wild animals he fed on, all built based on symmetrical genetic models (as mentioned above, almost all beings of the animal kingdom belong to the class of these visual regularities).

Another vital attribute of the symmetry of form is that this way of organization allows faster and more efficient discrimination against irregular backgrounds with chaotic Constitution (Driver, 1992), as natural backgrounds are organized (grass, reeds, fringed forests, rocky walls, earth surfaces, surfaces with stones, etc.).

The conclusion is that the mechanism of perception can more easily discriminate a symmetrically constructed form against a non-symmetric one, since a symmetrical distribution of visual stimuli, with the same value, is perceived as a single object, while, in the case of non-symmetry, the values of stimuli can designate a background (Koffka, 1935; Machilsen, 2009). Thus, the stages of the perception mechanism are strongly supported by visual regularities such as symmetry, especially since they are highly consuming of energy and brain resources and any regularity in the organization of shapes in the visual field or inside a frame means a substantial reduction in visual processing time (Vetter & Poggio, 1994).

All these concepts can extend to the level of the entire compositional architecture of a cinematic plane, in which a number of forms are presented by symmetry. The preference shown by the vast majority of people for symmetrical images or containing symmetries has been known for a very long time, and even Aristotle mentions this fact in his book "Metaphysics", describing symmetry as one of the greatest aesthetic norms.

A means of cinematic expression often used in the film image is rhythm through symmetry (fig. 1A, B), which is carried out by repeating identical, similar or of the same category elements on either side of one of the axes of the frame. Perfect symmetry can be built by reflecting one half of the frame in a reflective surface (mirror, glass, water). In this case, symmetry becomes a variant of repetition, in which the elements are repeated, but turned to 180^{O}.

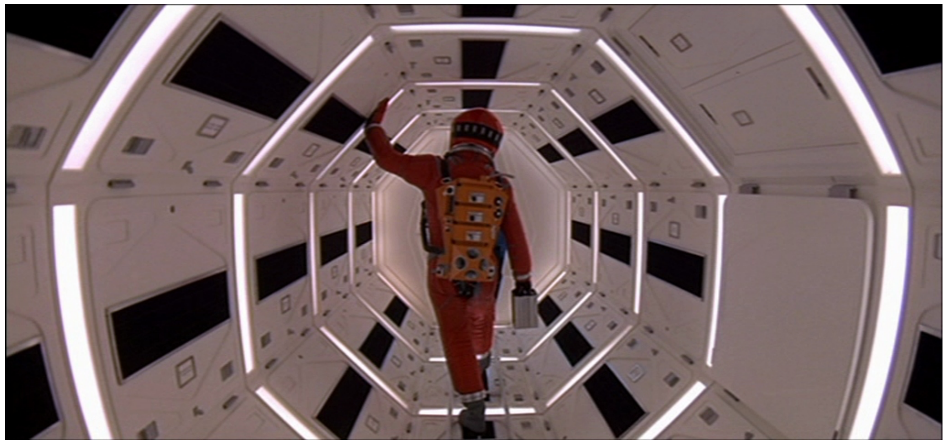
A

B

Fig. 1A, B. Rhythm through horizontal symmetry (sources: A: *The Grand Budapest Hotel* Directed by Wes Anderson, 2014; Fox Searchlight Pictures. USA, Germany; B: *The Fall* Directed by Tarsem Singh, 2006; Googly Films. USA)

Perceptually, rhythm through symmetry represents a configuration that, for processing, consumes less brain resources because the processing of the visual elements that compose it, once done for the elements that belong to one half of the symmetry, is also applied to the elements in the mirror, these being identical to the first ones, but reversed. Moreover, another obvious advantage is that the attention mechanism is no longer primed and executed for mirrored objects, which greatly reduces the overall processing time of an image (Giannouli, 2013). At the same time, we must also mention the fact that in the processing of compositions containing rhythms through symmetry, it is very well facilitated to discriminate objects from the environment (versus backgrounds) because symmetrical forms tend to be perceived as a group, as a single object, in time which non-symmetric shapes are considered to be background, as shown by the results of another study (Machilsen, Maarten & Wagemans, 2009).

The use of symmetry in the film image has been taken to the art level by many prominent directors, including Paul Thomas Anderson, Wes Anderson and Stanley Kubrick. They use it mainly to obtain closed compositions, in which the subject is strongly isolated from the outside world or actions (fig. 2, fig. 3) because the perspectives are frontal, at a Vanishing Point, located right in the centre of the dial.



A

B

Fig. 2A, B. Symmetry in composition (sources A, B: *2001: A Space Odyssey*. Directed By Stanley Kubrick, 1968; Metro-Goldwyn-Mayer. United Kingdom, USA)

A

B 

Fig. 2A, B. Symmetry in composition (sources A, B: *The Grand Budapest Hotel* (original title: *The Grand Budapest Hotel*). Directed by Wes Anderson, 2014; Fox Searchlight Pictures. USA, Germany)

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