



How understanding the factors of visual perception proposed by Bloomer can contribute to the representation of photographs

Gislene Rodrigues da Silva

Post-doctorate in Knowledge Management and Organization (PPG-GOC) ✉  Federal University of Minas Gerais

Célia da Consolação Dias

Professor in the Knowledge Management and Organization Program (PPG-GOC) ✉  Federal University of Minas Gerais

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ES Resumen: La percepción visual es un campo de conocimiento perteneciente a la Psicología Cognitiva. Se comprendió que dicho conocimiento puede contribuir a la indexación de fotografías basada en la comprensión de los procesos de cognición humana para identificar cómo el individuo interpreta y cuál es su percepción visual de una fotografía. Esta comprensión ayuda a establecer criterios para seleccionar palabras clave para indexar fotografías. Esta investigación presenta los factores de percepción visual de Bloomer (1990) y, tras la revisión de la literatura especializada, reflexiona sobre cómo dichos estudios pueden contribuir al proceso de indexación de fotografías. Como resultado, se destacan dos puntos: que la percepción visual puede contribuir a organizar catálogos de fotografías online más eficientes e intuitivos, proporcionando a los usuarios una mejor experiencia y facilidad en el proceso de recuperación de contenidos visuales; y que estos factores pueden ayudar a los profesionales de la información a seleccionar términos que sean relevantes para los usuarios.

Palabras clave: Indexación de fotografías; Percepción visual; Psicología cognitiva.

ES Cómo la comprensión de los factores de percepción visual propuestos por Bloomer puede contribuir a la representación de fotografías

Abstract: Visual perception is a field of knowledge belonging to Cognitive Psychology. It was realized that such knowledge could contribute to the indexing of photographs based on the understanding of human cognition processes to identify how the individual interprets and their visual perception of a photograph. This understanding helps to establish criteria for selecting keywords for indexing photographs. This research presents Bloomer's (1990) visual perception factors and reflects on the literature review of how such studies can contribute to indexing photographs. As a result, two points stand out: visual perception can contribute to organizing more efficient and intuitive online photography catalogues, providing users with a better experience and ease in retrieving visual content, and finally, it can help information professionals select terms relevant to users.

Keywords: Indexing photographs; Representation of images; Visual perception; Cognitive Psychology.

Sumario: 1. Introduction 2. Methodology and objectives 3. Literature review 4. Discussion about visual perception and indexing of photographs 5. Final considerations 7. References.

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1. Introduction

Cognitive Psychology is a branch of Psychology that studies the mental processes linked to understanding

the information received. Visual perception is a field of knowledge belonging to cognitive psychology. It was identified that such knowledge could contribute

to the indexing of photographs, as it is necessary to understand the processes of human cognition to identify how the individual interprets a photograph and their perceptions about it and, based on this, establish criteria for selecting keywords for indexing.

Information Science has repeatedly studied the representation and search for information. These interdisciplinary studies help to improve the understanding of human behavior during the documentary cycle and information retrieval. This is the ability to interpret the information received during the documentary cycle to analyze and establish terms that represent the thematic content of the information objects that users will later use. During the search and retrieval of information, interpretation helps to define the subject addressed so that the applicant can establish a term for setting up the search strategy. In this sense, the main objective of this study is to understand how the visual perception factors proposed by Bloomer (1990) can help represent photos. Therefore, a literature review was used as a methodology for this research.

2. Methodology and objectives

This research used a literature review as a methodology, focusing on Bloomer's (1990) study of visual perception factors and considering other studies identified in the literature that mention such factors. Thus, the objective of this research is to present the factors of visual perception proposed by Bloomer (1990) and how understanding such factors can contribute to representing photographs.

3. Literature review

3.1 Cognitive Psychology and Bloomer's Factors of Visual Perception

Cognitive Psychology is concerned with the internal processes that regulate human behavior. Among these processes, attention, perception, learning, memory, language, problem-solving, reasoning, and thinking stand out (Eysenck & Keane, 2007). According to the authors, most human cognition involves a combination of these internal processes, which can co-occur with some or all of the processes. Similarly, Brown (2007) also states that Cognitive Psychology is dedicated to perception, memory, attention, language, thinking, and decision-making.

The study of perception is located at a more cognitive level than that of sensation. In this way, perception is a set of structured information that acquires meaning from previous experiences, needs, environment, and intentions of the organism actively involved in a given situation (Lima, 2001). According to Stafford (2008), visual perception can be defined as a process that is more than the passive passage of light on the retina. It is seen as a dynamic process in which the brain, in most cases, filters, discards, and selects information and later compares it with a record already stored by the individual.

Bloomer (1990) recognizes that perception is commonly used in several situations: it can refer to the response to external stimuli of the nervous system, such as sensation or primitive consciousness, when, for example, a sudden movement is perceived in the corner of the eye. Another situation that the term can also refer to is complex thought processes

at a higher level than cognition. To understand this aspect, we can cite the ability to perceive deeper religious aspects in a painting as an example. According to Bloomer (1990), some perceptions seem automatic. However, they are culturally learned perceptions, such as optical illusions, depth perception in photos, and the perception of reality in photographs and electronic images. The author also states that in the context of everyday life, perception is also influenced by a variety of factors that are independent of the stimulus itself, such as cultural conventions (learning, experience, expectations, beliefs, and values), physiological factors (mood, temperament, age, and health), and environmental adaptation (ecological habitat). For these reasons, at all but the most basic levels, human perceptions can be variable and are not always predictable.

Furthermore, regarding visual cognitive theory, Bogen (1975) and Sperry (1973) state that this theory considers how the mind processes visual information and how human behavior is based on this information. According to the authors, cognition refers to the "mental process" of understanding the two central cognitive systems: rational, which uses logic and reason to form knowledge, and intuitive, which obtains knowledge directly or through experience.

Thinking about a connection between visual cognitive theory and images, Chauvin (2003) highlights that visual images are analyzed and understood by viewers who extract meaning from the ideas they expose; this interpretation also occurs in texts and words.

In this context of understanding images, Silveira (2005) highlighted the cognitive principle that integrates the communicative principle of relevance by stating that based on a basic property of human cognition, people normally pay attention only to relevant phenomena and stimuli at the moment they are observing such images. Following this cognitive aspect of images, Català Domènech (2011) highlights that the perceptual schemes formed by physical and psychological aspects affect the images and the visual perceptions of those observing them. Other elements that affect human perception and that can be applied to analyzing and representing photographic images were identified by Bloomer (1990) and called factors of visual perception. Lester (2013) names these factors proposed by anthropologist Bloomer as mental activities. The visual perception factors mentioned here are: memory, projection, expectation, selectivity, adaptation, dissonance, culture, words and were described below:

Memory: According to Bloomer (1990), people use techniques that improve memory by associating significant mental images with arbitrary series, such as telephone numbers, social security numbers, or zip codes. According to the author, the number four, for example, can be represented by a table with four legs; five for one hand, these associations usually have to do with parts of one's own body or a familiar path, such as a building, house, or garden. The author also states that memory associations (mnemonics) are common worldwide; they correspond to the multiple intelligence capabilities of the human mind, and they have persisted throughout history and human evolution. Costa (2005) also confirms that "our brain was developed to process visual information,

organizing it into models that internally reconstruct reality, giving it meaning” (Costa, 2005, p. 32).

In this sense, Lester (2013) highlights that memory is the human being’s link with all the images he has ever seen. Every image is affected by memory; that is, there is a connection between the image viewed at that moment and those that have already been seen at some point in life. Like this, people use images as memory aids to remember events or verbal passages.

To exemplify the importance of memory for image recognition, Figure 1 can be seen. To understand it, it is necessary to recall a famous advertisement from the Brazilian company Bombril; this advertisement was broadcast in the 1990s and created from the famous painting by Leonardo Da Vinci – Mona Lisa, portrayed in this new photo as a masterpiece. Without knowing the referents of this image, which are possibly in memory, it is impossible to interpret it, that is, images can be affected by memory and the remnants of memories about the image.



Figure 1. Bombril commercial. Source: Pigmum (2024).

Projection: Bloomer (1990) points out that the human mind is very imaginative and that a person can make sense of random or accidental events as significant. Even when the mind is relaxing, it tends to make sense of things, for example, seeing identifiable images in clouds, rock formations, wood, and stains on the wall. These projections of meaning often say more about the mental processes than about the stimulus, so much so that they are used in psychological tests, such as the Rorschach Test, which is a test created by the Swiss psychiatrist Hermann Rorschach that consists of evaluating aspects of a person’s personality through inkblots.

According to Lester (2013), mental processes affect how humans interpret what they see in the world. When viewing an image, people project the internal meanings and emotional charge they are experiencing. Two people may attribute different meanings in interpreting inanimate objects; the difference may lie in the mental processes that affect what they see. Ideas can be projected in images. According to McWhirter and Hoffman-Goetz (2014), the mental activity of projection is identifying or imagining an

image of a given object in an image that represents another object, as in figure 2 in which one can imagine the image of a dragon in the clouds.



Figure 2. Landscape with clouds in the city of Moeda, MG – Brazil. Source: Authors’ archive.

Expectation: Bloomer (1990) states that expectations affect perception and behaviour in interpersonal contexts, and Lester (2013) also agrees with the same information; according to him, what you expect from a scene can change your perception of it, preconceived expectations about how something should appear most often leads to false or missed visual perceptions. Human beings tend to understand the visualization of the unexpected as unfavourable, and the opposite generates the expectation of visualizing the unexpected and being something expected. Through expectations, people conclude what they see, often incorrectly.

McWhirter and Hoffman-Goetz (2014) point out that prejudice about how something should appear in a scene can lead the viewer to poor visual perception. Due to the expectation caused by the image presented, the human being cannot quickly differentiate, as shown in Figure 3, which is a hand with makeup and not an eye.



Figure 3. Details of makeup. Source: Elayne Priscila Makeup (2024).

Selectivity: According to Bloomer (1990), conscious perception is selective; the mind pretends that some things do not exist. As a consequence, people do not experience everything in the world as equally meaningful. When a person tries to pay attention to too many meaningful perceptions at the same time, they end up experiencing information overload.

Lester (2013) states that most visual perception is unconscious. Due to the automatic act of the mind, most people focus on the significant details of a scene with many elements present. In this case, the brain's objective is to avoid information overload, that is, many elements in an image enter and leave the mind without being processed. In a football scene, for example, people focus their attention on the faces of well-known players. According to the author, in this case, when focusing on a particular scene, selective mental activity is being used. For example, in Figure 4, if the viewer is not careful, they may select the incorrect visual action. Generally, a person might focus on the three men photographing and ignore the masked Irish Republican Army (IRA) soldier in the lower right corner of the photo, which took place during Bobby Sandes' funeral after a 66-day hunger strike in Belfast, Northern Ireland in 1981.



Figure 4. Bobby Sandes' funeral in Northern Ireland in 1981. Source: Lester (2013, p. 66).

Adaptation: According to Bloomer (1990), human perceptual systems require variation and change; when exposed to steady-state conditions, their sensory receptors cease functioning. People generally become aware of familiar noises, such as household appliances and urban traffic, only when they stop.

The mind tends to ignore visual stimuli that are part of a person's daily life. When someone uses the same path daily, the brain fails to perceive details of the elements along the route. Habit occurs when you stop paying attention to something, you may have seen a specific scenario so often that some details go unnoticed. When getting your eyes used to observing specific images, some elements are less noticeable. According to Lester (2013), a person can become stressed if presented with an image that has many visual elements. According to the author, people are generally ambivalent about visual stimulation. On the one hand, human beings like new experiences; on the other hand, they do not enjoy most of them. One way to prevent the mind from habitual thinking is to constantly look for new ways of thinking about familiar objects or events.

McWhirter and Hoffman-Goetz (2014) emphasize that through mental activity adaptation, human beings ignore the parts of the images to which the viewer is constantly exposed. This situation can be seen in Figure 5, which has elements that may go unnoticed. In this case, the extra "THE" in the sentence is not noticeable due to the adaptation factor.

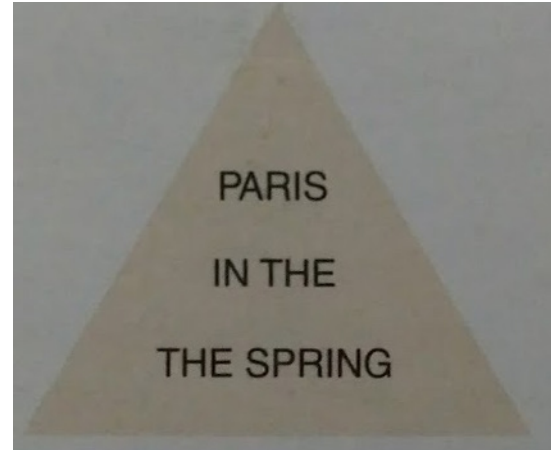


Figure 5. Paris in the Spring. Source: Eysenk & Keane (2007, p. 12).

Salience: As stated by Bloomer (1990), when something acquires personal meaning, it becomes salient in the individual's consciousness; that is, a stimulus with meaning for a person will be noticed more by that person. Therefore, what is relevant to someone stands out. For example, a hungry person in a city will look more at the local restaurants and cafes. In a photograph, it is no different; the human being also focuses on the visual perceptions present that are important to him; that is, the essential element stands out among the enormous volume of information received in an image. As an example, in a photo, a family member can be recognized in the middle of a crowd. According to McWhirter and Hoffman-Goetz (2014), visual stimuli are more likely to be noticed if they have significant meaning for the viewer.

In Figure 6, a chocoholic person will pay more attention to chocolate than to other sweets, and also, if the person is hungry, it will stimulate that hunger even more.



Figure 6. Details of sweets on a table. Source: Casamentos.com (2024).

Dissonance: Bloomer (1990) highlights that two or more perceptions conflict. According to Lester (2013), the human mind is limited to concentrating on one activity at a time, in this case, abstractions and noise can affect attention. An example of this situation is trying to read a text with a loud television or stereo in the same room, it is a difficult task to reconcile the two activities. Photographic images with excess elements in a scene can generate competition between such elements, generating a large amount of information and making it easier for those viewing the image to pay attention. Humans have difficulty reading complex images, as the brain has to go through the parts to understand their meaning. McWhirter and Hoffman-Goetz (2014) state that different scenes in an image compete for the viewer's attention. For example, Figure 7 has elements that can make it difficult for the viewer to identify the most relevant elements in the photo.



Figure 7. Details of several plates. Source: Lester (2013, p. 66).

Culture: According to Bloomer (1990), culture is the most prominent non-genetic influence on human perception. People learn culturally acceptable ways of attributing meaning to their personal experience (socialization). Human infants continuously acquire the language, perceptions, thought patterns, and behaviours appropriate to the culture in which they are raised, regardless of who or where their biological parents may be. Culture constitutes a set of collectively accepted parameters for evaluating the nature of things, a perceptually shared reality, and a worldview. Many factors linked to human beings affect how visual stimuli are received and interpreted, such as ethnicity, culture, nationality, gender, values and social class. What may be considered suitable in one culture may be deficient in another, affecting how a photograph is interpreted. Costa (2005) highlights that culture can be understood as the set of meanings shared by a group. According to the author, culture allows a deeper and more refined interpretation of the visual experience.

McWhirter and Hoffman-Goetz (2014) state that culture affects how signs are interpreted and the importance attributed to them by the viewer.

An example of how this factor alters perception can be seen in Figure 8, which shows a chocolate packaging from the 1980s. This image shows a child with a chocolate cigarette between his fingers, alluding to cigarette consumption. At that time, an image

like this was considered normal, as smoking was a glamorous act. Currently, this type of image is abominable and is considered an apology for cigarette consumption by children.



Figure 8. Detail of a chocolate advertisement. Source: Cultura Mix website.

Words: According to Bloomer (1990), words play a significant role in people's perception of the meaning of visual information. Naming identification is the basis of countless activities, such as education, hobbies, medical diagnosis, and astronomy.

According to Lester (2013), most people also think with words, consequently, words, like memory and culture, profoundly affect our understanding. Text can change the meaning of an image and can magnify or reduce the meaning of what is being seen. One of the most efficient forms of communication is when words and images are combined equally harmoniously. Magazines and TV use these two combinations to transmit information.

McWhirter and Hoffman-Goetz (2014) state that words shape conscious thought and, therefore, affect the understanding and recall of images. An example is figure 9 in which the plate helps in interpreting the image.



Figure 9. Plate detail Ski-free. Source: Lester (2013, p. 71).

This section presented the concept of Cognitive Psychology, as well as the factors of visual perception proposed by Bloomer (1990). Such factors make it possible to identify the processes that are important to human beings when viewing an image. The next section will address how these visual perception factors can contribute to the photograph indexing process.

4. Discussion about visual perception and indexing of photographs

Indexing refers to the process of assigning terms to represent the content of an informational resource. This becomes more complex in the case of photographs, as images have many attributes that are fundamental to their representation. Lima (1988) has already identified that to understand, there is a need to speak the language of the image. Furthermore, due to the complexity of photographs, their interpretation becomes very subjective, allowing different interpretations, which vary according to various aspects. Following the cognitive process, which is the focus of this study, Lester (2006) reiterates that according to visual cognitive theory, a person who sees an image is not simply a witness to it but draws conclusions about what is being perceived in that image through mental activities. It is known that other factors can contribute to the indexing of photographs, such as cultural, social, and the photographic techniques used. However, based on what was exposed by the authors throughout this research, investigations carried out in the field of visual perception can contribute to the Information Science in the photo indexing process with the following knowledge. Below, we present how each factor Bloomer (1990) presents can contribute to indexing photographs:

Memory: as presented by Bloomer (1990), to interpret a photograph, individuals need to consider the elements present in the image and make associations, comparing them with past experiences. This allows for the identification of objects, patterns, and familiar scenes. In this sense, in the indexing process, the information professional needs to consider and express the signals through keywords. As in the case of Figure 10, the indexer and the user need to use memory to associate the symbol with Freemasonry when considering the image.



Figure 10. Freemasonry symbol. Source: Pixabay (2024).

Projection: This factor can help identifying how people perceive and identify the elements in photographs: understanding how colours and patterns are

presented in a photo can help select the most relevant terms.

Through mental projection, users can be motivated to attribute meanings or elements not explicitly represented in the image. In this context, the indexer must consider whether these elements are relevant enough to be represented by keywords in the indexing system, considering the context and users' needs. Figure 11 depicts a leaf on the sand. Users can project different meanings and associations onto the image depending on the context in which it is inserted. For example, the heart-shaped leaf could be associated with the keywords "heart" and "saudade," interpreted in a romantic context or as a representation of someone's absence. In this sense, users' mental projection can directly influence how images are indexed and interpreted in a photograph organization system.



Figure 11. Detail of a leaf on the sand. Source: Pixabay (2024).

Expectation: as pointed out by Bloomer (1990), the representation of the visual world is directly linked to the expectations that the person has about the image, for this reason, at the time of indexing, the information professional must be attentive to all the details of the photograph, in order to interpret it correctly for users. It is as in the following figure 12, where the expectation is that there is ice cream in the container, but it has beans. Viewing without paying attention to this detail may misinterpret the image.



Figure 12. Detail of the beans in the ice cream packaging. Source: Family around (2024).

Selectivity: Selectivity is a crucial aspect when representing a photograph, not all elements present in a photograph must be represented through terms in an image. The information professional needs to select those that may be relevant to users, such as in the example in the following figure 13, where the trees present may not be relevant to be indexed.



Figure 13. People in a tunnel. Source: Pixabay (2024).

Adaptation: visual adaptation is a phenomenon described by Bloomer (1990) in which people become accustomed to specific visual characteristics of an object or environment, making them less consciously perceptible. This has important implications for image indexers, who must know these characteristics when performing descriptions. A notable example is the photograph of the dress that went viral on the internet, figure 14, where the perception of the dress's colour varied between observers. In this context, the information professional must consider the possibility of visual adaptation when describing the colour of an object, thus ensuring an accurate representation of the image.



Figure 14. White or blue dress. Source: Uol (2024).

Saliency: When indexing, the professional must always choose the keywords that are of interest to users. Therefore, in an image, it is important to select those that are most relevant to users. For example, in Figure 15, there is a photo of some football players, in which for Argentines and Neapolitans (Italy), Maradona represents an iconic figure, despite not being highlighted in the photograph.

Dissonance: occurs when an image contains significant visual information, making it difficult to represent it accurately and concisely. In these cases, information professionals should focus on representing



Figure 15. Careca and Maradona football players. Source: O Tempo (2024).

the general elements of the scene instead of detailing all the elements present. An example of this can be seen in Figure 16, where it is more effective to index the photograph based on the general context of the city of Delhi rather than trying to describe all the individual elements present in the image.



Figure 16. Deli in India. Source: Pixabay (2024).

Culture: the culture plays a fundamental role in the interpretation of photography, as highlighted by Bloomer (1990). The cultural and social context is considered the most relevant external factor influencing the perception of images since their understanding is not universal but somewhat shaped by culture and individual experience. Therefore, when representing a photograph, the indexer must consider the users' cultural context to provide a more accurate and meaningful description of the image. The figure 17 illustrates this cultural influence by showing a beer advertisement in which a pregnant woman is portrayed. Currently, this representation is considered unacceptable due to changes in cultural and social norms regarding the representation of pregnant women in advertising contexts.

Words: the words in an image's text can directly influence its interpretation. Therefore, the indexer must take into account all textual elements present in the image when carrying out the indexing process. Figure 18 illustrates this importance, where the presence of a specific plate can significantly change the way the photograph is interpreted.



Figure 17. Beer advertising. Source: Cogita Mundo (2024).

In summary, the visual insights proposed by Bloomer (1990) can help select the best keywords according to the characteristics of the photographs, the users' needs and the way they see and interpret an image.

5. Final considerations

From this research, it can be seen that understanding cognitive psychology and visual perception can contribute to the process of indexing photographs, as this comprises a complex informational resource, and to carry out its representation, there is a need for a holistic understanding from the understanding

5. References

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Figure 18. Sign in the grass. Source: Reddit (2024).

of its multidimensionality. Visual perception studies can contribute to making the organization of online photography catalogues more efficient and intuitive, providing users with a better experience and ease in retrieving visual content. Furthermore, cognitive psychology helps in understanding how human beings perceive, process and retrieve information visually, which helps to create more efficient and personalized systems for users. It also aimed to understand the different types of images and how to select the best terms for their representation.

Therefore, this study is a provocation and an invitation for new studies to be carried out that seek to understand the relationship between cognitive psychology, visual perception and the process of organizing images, specifically in specialized catalogues of this type of resource, as understanding how users search for and interpret information is essential for retrieval to be more efficient.

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