Review paper

Defining the parameters that determine the visual perception performance and the appearance of occupational health and safety pictograms

ABSTRACT

Originally developed as a means of transmitting information and warnings by eliminating language and cultural differences in public spaces such as airports, train stations, bus stations, hospitals, stadiums, pictograms have turned into visuals that we encounter in every aspect of our lives today. They are the visual heroes behind the harmonious movement of today's fast and complex pace of life. They deserve all kinds of praise in terms of the mission they have set out. Nowadays, which we call the digital age or the age of visual communication, visuals are produced very intensively in every field, but they are thrown into the visual landfill very quickly. However, it is necessary to keep the pictograms that will be used in a vital issue such as occupational health and safety out of this structure. For occupational health and safety, pictograms are symbols that allow employees and visitors to move safely. These pictograms are used in workplaces to indicate safety rules, instructions and warnings. These pictorams, which are of vital importance for human health and the prevention of occupational accidents, should be easily visible and quickly perception. Although pictograms for occupational health and safety have been standardized and made mandatory by legal regulations, they are produced in very different design options as a result of advanced graphic and printing capabilities. In addition, the new technologies that are being used in dynamic business life reveal the need to prepare informative, stimulating texts, signs and pictograms together with these technologies. In the field of occupational health and safety, whether it is designed for the first time or an old pictogram is revised, the form, size, composition, color and background elements that determine visual perception performance must be evaluated separately. Another important issue is that those responsible for the enterprise show the necessary sensitivity to the physical conditions that will make it easier to see the pictograms. Although it has been prepared at the highest level in terms of graphic design and printing techniques, it cannot have any function in unsuitable location and lighting conditions.

KEY WORDS
occupational health and safety, pictogram, vision, visual perception, graphic design

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Introduction

Occupational health and safety in many industrialized and industrializing countries of the world is one of the top priorities of country administrations. All kinds of legal regulations and practices have been implemented to minimize occupational diseases and occupational accidents and are being followed up with audits.

Informative and warning signs constitute the first stage of the applications related to occupational health and safety. Informative and stimulating messages related to occupational health and safety should be prepared with simple visuals instead of written messages in order to be perceived quickly and easily. Hesitation or a full-blown situation on a vital issue cannot be allowed. Pictograms have become the main visual language of crowded spaces today, especially due to their ability to communicate with the masses instantly (Tuğcan 2016).

Warning signs and signs that are of vital importance related to occupational health and safety have been standardized by laws and regulations. In order for pictograms or signs related to occupational health and safety to be easily seen and perceived, attention should be paid to two basic elements. Firstly, it should have a design structure that an optically healthy person can see with his visual sense organ, and secondly, it should have a content that a semantically normal person can perceive. From the design stage to the use stage, it is of great importance to put forward the study in the light of objective and analytical data instead of a personal approach in order to meet the desired expectations. Pictograms are largely composed of simplified geometric structures that do not carry artistic concerns. For this reason, it is prepared according to general vision and perception principles and concepts instead of personal initiatives.

It is of great importance to show the necessary care in all matters in terms of preventive measures in high-risk business lines in terms of occupational health and occupational accidents. One of the dimensions of preventive measures is the warning pictogram plates. It is necessary to show the required sensitivities at the highest level at every stage from the design of pictograms to their use. In the revision of new pictograms or existing pictograms designed for the needs of developing and changing business areas every day, separate evaluation, discussion of parameters affecting the dimensions of "visibility" and "visual perception" and correction of deficiencies and inaccuracies will be an indicator of the importance given to occupational health and safety.

The concept of Occupational Health and Safety

Occupational health and safety activities are scientific and systematic studies carried out in order to protect against causes that may harm health caused by various reasons during the execution of works in the field of business (Eraslan & Cansaran, 2020), as shown in Figure 1. The most important element that should be in business life is the comprehensive adoption of preventive measures for occupational accidents and occupational diseases. In order for the concept of occupational safety to make sense, it should be ensured that employees benefit from their health and safety rights within the scope of the declaration of human rights and that a certain level of knowledge is formed (Karaman, Çivici & Kale, 2011).

The most important detail that should be in business life is occupational safety information. Accidents and diseases will be inevitable unless sufficient information is given about the factors that will cause occupational accidents and diseases. Occupational accidents, occupational diseases cause serious losses both financially and spiritually for all developed and developing countries all over the world. The first stage of preventive measures for occupational accidents and diseases is to take the necessary measures. It is necessary to be a follower of the uninterrupted fulfillment of these received values. Warnings should be made with the necessary warning signs to ensure that necessary measures are taken continuously without leaving it to the personal initiative of employees. The plates prepared related to occupational health and safety have an important mission in this respect.

» **Figure 1:** *Occupational health and safety, taken from Vodafone, 2024 and occupational accidents, taken from Ateş, 2023*

Pictogram

Pictograms are defined as simple, pictorial and representative symbols. They are visual symbols that represent a specific object, verb, or place in a simplified (simplified) way, as shown in Figure 2. Pictograms simply contain graphic representations of objects, concepts or actions, the meaning of which is understandable for most people (Kovačević, Brozović & Bota, 2014).

Because pictograms do not have any language, they appear as a visual language that people who speak different languages can easily understand. Pictogram; firstly, it is the name of visual images created instead of written language to describe certain contents to the general public without any language restrictions in public spaces such as airports, hospitals, stadiums, shopping malls, terminals, railway stations (Shiojiri, Nakatani & Yonezawa, 2013).

Pictograms are skeletal structures that, when examined, are either constructed in a sluet style close to reality or modularly. The main module is mainly triangle, square or circle. Other forms are created by adding to this main module. No matter what style they are produced in, pictograms are simplified abstract structures. The most important element to be considered in pictogram design is to ensure formal consistency. Computer-aided designs are used today in the adventure of pictogram design, which started by preparing with traditional methods. In computer aided design, great care is taken to ensure formal consistency starting from the first processes of pictogram construction. Formal synthesis, control of forms and dimensional coordination proceed in an analytically controlled manner with very precise values. In a visual sense, it is tried to reach the result that gives the most realistic picture of observable reality.

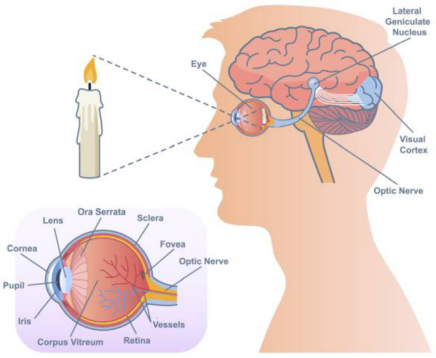
» **Figure 2:** *Examples of pictograms*

Defining the Physical Parameters that determine the Viewing Performance of Occupational Health and Safety Pictograms

In order for any object to be perceived by itself or its depiction, it is necessary to be able to see at a minimum level first. In order for the visual function to occur, the light must reach the retinal layer. The eye is a specialized organ for capturing these photons that are constantly coming from the environment, as shown in Figure 3. Light rays enter by passing through the pupil, which is the entrance area of the eye. The pupil has the function of growing and shrinking sensitively to light.

Because the light is intense in too bright environments, the pupil shrinks, while in dark environments the pupil grows so that as much light as possible enters the eye (Memetoğlu, 2022).

The light rays entering by passing through the pupil, then reaching the specialized nerve layer, their angle of arrival, intensity, etc. according to their physical properties, they are converted into electrochemical signals of various forms. These signals are transported to the brain on nerve cells and evaluated by other nerve cells specialized to read these signals in the brain. It is not our eyes that see anything; it is our brain. The only task of the eye is to provide information to the brain by converting light rays from the environment into electrochemical signals. They are transmitted and evaluated hierarchically to areas in the brain that are specialized for evaluating signals from the eye.



» **Figure 3:** *Eye and vision action stages*

For the action of vision to occur, a healthy visual organ and light are needed. Especially in order to see the pictograms in the indoor space of the workplace, the environment should be bright and within the visual angle. The perception stage cannot be passed before the act of seeing begins. Low light level or long distance are the most basic physical disadvantages that will make it difficult to see any kind of object, visual or writing. The main obstacles in front of the fact that pictograms for occupational health and safety are considered as a requirement of the responsibilities they bear must necessarily be solved.

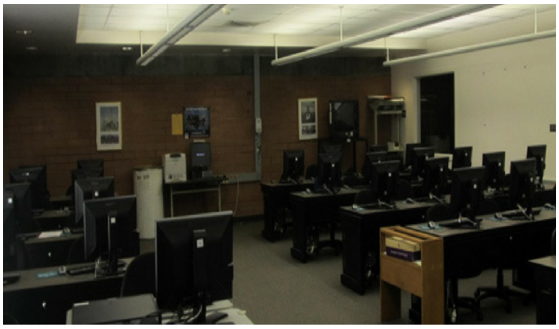
Pictograms for occupational health and safety are located in outdoor(outdoor) or indoor(indoor) spaces according to the activity structure of the workplace, as shown in Figure 4. The main parameters that affect the physical appearance of pictograms for occupational health and safety are the level of illumination and the choice of location. These two parameters interact with each other.

» **Figure 4:** *Workplace and occupational health and safety pictograms*

Level of illumination

The light stimuli that enable vision are transmitted by electromagnetic waves. The receptors located in the eye are stimulated by electromagnetic waves located within a spectrum of 400 – 700 millimicrons (Gürel, 2001). In the open air, the amount of light is more than enough for the eye to see except in very closed weather conditions during the daytime. But in order to see in a healthy way indoors, it is necessary to provide daylight with the help of windows or the level of illumination with the help of artificial lighting systems, as shown in Figure 5. Working in poorly lit environments poses risks in terms of occupational health and safety, as well as makes it difficult to see all kinds of warning signs and signs. Appropriate luminance level standards have been established by international lighting institutions for various functions and forms of activity. The purpose of these standards is to help ensure optimal conditions. A low level of illumination creates an important problem in seeing pictograms, while a high level of illumination causes negative situations such as dazzle and light reflections.

Lux (lx), which is the unit of luminous intensity, refers to the degree of luminosity that light from a candle-sized light source gives to a vertical surface at a distance of one meter (Gürel, 2001). The luminance level was characterized as 500 lx lower and 1500 lx higher than the alternatives. The most preferred lighting level. 1250 lx is the option where light is provided (Erkoç Kaplan & Dokuzer Öztürk, 2022).



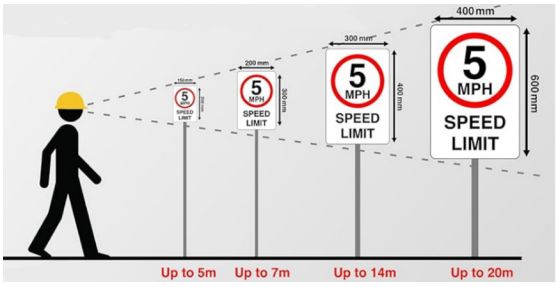
» **Figure 5:** *Adequate and insufficient lighting in the workplace*

In the lighting of indoor spaces, there are lighting options with a very wide range according to the activity characteristics of the space and personal preferences. As important as it is to make the most appropriate choice among these options that will not harm the visual health of employees in the environment, it is also important to adequately illuminate the areas where there are warning signs and pictograms related to occupational health and safety. If the surface structures of pictograms and warning signs are bright, a suitable lighting system should be preferred, taking into account the unwanted light reflections of light rays coming from the lighting system. In addition, the choice of location should be made to minimize reflection. An important obstacle in front of the healthy viewing of pictograms in indoor spaces is the shadow falling on the visual, as shown in Figure 6. It is the lighting factor that significantly reduces the appearance of shadow, whether in an environment where the sun's rays illuminate the interior or in an environment with artificial light. For this reason, it is necessary to take care that the pictograms, which are of vital importance for occupational health and safety, are not located in the shadow areas caused by the structure and interior design of the space.

» **Figure 6:** *Lighting and shade in the workplace (Akay, 2015)*

Location (Location selection)

Placing the pictogram in the appropriate place is of great importance in fulfilling the expected purpose. It should be deployed according to the distance that people can easily see and the most appropriate visual angle, as shown in Figure 7. Location selection elements that make it difficult to be seen too far or too high or too low or angled positions that prevent it from being seen or make it difficult to see are those that make it difficult to be seen and visual perception along with it. The choice of a place that can be seen continuously should be made by taking into account the cases of periodic closure due to the shipment of raw materials or products or vehicle-machine mobility. Whether it is traffic or a pictogram for occupational health and safety, the necessary sensitivity should be shown when for any reason (a physical obstacle in front of it, dust, snow or mud or any substance covering it causes that pictogram to be disabled. Especially in workplaces with dust and sawdust environments, pictograms quickly become invisible due to the layer formed by particles. In such enterprises, the surface of the pictogram boards should be cleaned frequently. Due to the operating conditions of the workplace, environmental conditions such as high temperature, steam, chemical gases cause the printed parts that make up the pictogram to undergo deformation over time. Care should be taken to renew the pictogram plates in such establishments.



» **Figure 7:** *Ideal visual distances according to the visual size*

There may be a large number of pictograms in a workplace, the important thing is that it is positioned taking into account the closest and best visual point to the relevant place, as shown in Figure 8. The closest points should be selected against positions that may create a contradiction (confusion) with another pictogram or other device. For example, if there is an opening floor just below the crane and a rotating system next to it, it is not correct to position a group of collective pictograms in one place. Instead, positioning each of them separately so that they come to their own area will minimize the occurrence of confusion. If there are changes in the internal design of the enterprise or the stowage and shipment system due to new requirements that have arisen in the past time, their locations should be revised to ensure that they are visible on their pictograms.

» **Figure 8:** *Workplace and pictogram location selection application (hayalkare, 2019)*

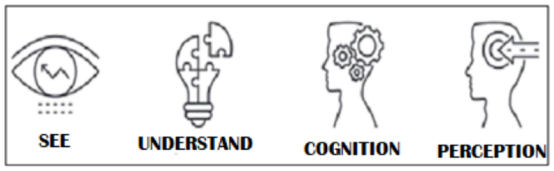
Defining the Graphic Design Parameters that determine the Visual Perception Performance of Pictograms related to Occupational Health and Safety

A person acquires an important part of the information he has about the outside world through sight. For this reason, visual perceptions are more effective on an individual's behavior than other sensory organs. "According to Carlson, perception takes place in an unconscious way (Timur & Keş 2016). A person does not become aware of the process during the perception process, he only receives the result of the perception" (Çağlayan, Korkmaz & Öktem, 2014), as shown in Figure 9. At the perception stage, the brain can interpret stimuli that do not exist in the physical world as if they were there, taking into account not only the stimulations coming from the eye, but also expectations arising from previous experiences (Crick, 1995). Everything gains meaning within its own context and turns into different objects when it is abstracted from its context. Thus, it is revealed that seeing is a comprehensive and perception-related process (Çakır, 2014). Perception is the latest stage of many pieces that have been made in our past and have gained a place in our memory.

Visual perception is the effort to be able to distinguish stimuli in a meaningful way. The ability to notice the details of an object and be able to see these details sensually. This is shaped in parallel with the knowledge gained and the experiences experienced. Perception makes a choice of its own accord from what it has seen before, and then activates the phenomenon of orientation that is outside of itself by Deciphering consciousness. For this reason, correctly acquired knowledge and expectations realized with visual knowledge will also facilitate perception (Dinçeli, 2020). In the process of visual perception, images are one of the most important elements that help visual communication. Images are a variable and organic structure.

They are images that change according to a person's perception. They are structures that are constantly affected by the external world, subjective experiences, senses, visuality and psychological states and show movement with these characteristics (Çakır, 2014).

Visual perception is an important factor that determines how easy graphic design can be understood. The more easily a graphic work can be understood, the higher its effectiveness. Regardless of the type and subject of the graphic design work, the first priority expectation is that it can be perceived by the audience.

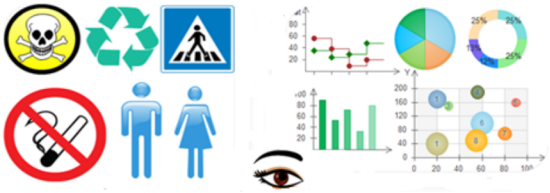


» **Figure 9:** *Visual perception processes*

Graphic Design and Visual Perception

Graphic design is the general name of the processes of designing design elements in a rational way using technological possibilities to prepare a visual communication product. The Deciency of a high level visual perception between the buyer and the design product prepared at the end of these processes is the first criterion of a successful graphic design study. In order for the design to be interpreted correctly, it must be perceived correctly (Uğur & Özsoy, 2020). The relationship between graphic design and visual perception begins with the act of seeing and is completed with the perception by Deciphering, as shown in Figure 10. At the perception stage, it perceives the Deconstructed elements that make up the holistic structure that creates the design by grouping the relationship or layout between various design elements (Timur & Keş, 2016). In other words, it perceives from the partial data transmitted by the sensory organs by transforming it into a holistic, structural meaning" (İnceoğlu, 2011: p.128). Perception is not a physiological process that depends only on the senses" (Parsil, 2012: p.28).

At the same time, the importance that an individual attaches to stimuli is the process of making sense of past experiences around certain principles by converting them into meaningful perceptual experiences by the brain. Since the pictogram is a visual communication design element, it is evaluated within the framework of graphic design concepts. In order to design pictograms in accordance with the intended use, attention should be paid primarily to the visual perception dimension. It does not matter if a pictogram that is problematic in terms of visual perception is successful in terms of design elements and design technique.



» **Figure 10:** *Visual perception and graphic design studies (Freeman, n.d.)*

In general, the visual perception process in graphic design develops through three main processes under the name of selective perception, perceptual organization and perceptual invariance (Özkirişçi, 2020). This psychological process, on which visual perception is based, is associated with Gestalt laws (Timur & Keş, 2016).

When examining the relationship between visual perception and graphic design, it is necessary to know the functioning of vision and perception mechanisms, as well as to take into account the factors affecting perception and their effects on humans. The visual perception dimension of pictograms determines how users perceive and understand pictograms. This is an element that is also taken into account during the design of pictograms.

Graphic Design Parameters that determine the Visual Perception Performance of Occupational Health and Safety Pictograms

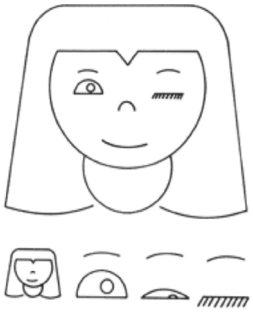
Occupational health and safety pictograms are fast-perceived visual information tools created to prevent health problems and occupational accidents that may occur in the work environment. It is very important that it does not have a complex structure for its rapid detection. The first framework of the concept of lean consists of few parts, balanced, consistent and thus covers studies that are easily followed by the eye and perceived quickly.

Thus, the user can perceive the message after a quick mental process. The second framework defined by simplicity is based on preferences for converting meaning into form. The visualization forms of a successful design should contribute to understanding and facilitate understanding (Tuğcan, 2016).

In order for pictograms to be easily understood by users, it is not enough to use only high-resolution and clear images. In addition, the design size is also important to increase the intelligibility of pictograms.

Design criteria determining the visual perception performance of a pictogram, a graphic design product; 1. form (form), 2. size (dimension), 3. composition (arrangement), 4. color and 5. the shape is the perception of the ground (background).

Form: Form semantically refers to visual clarity performance. Regardless of the means and purpose, pictograms are based on visuals produced from manipulations of formal elements. Within the scope of this manipulation process, animate and inanimate objects are simplified and transformed into stylized images. It is related to the formal representation of a visual in the design with a living- inanimate object, where it represents intelligibility. We do not describe Ivan Sutherland's “Sketchpad” simple drawing of the winking girl he drew for his system as realistic', but it is an effective visual representation of the winking girl (Uğur, 2022), as shown in Figure 11.



» **Figure 11:** *Ivan Sutherland's ”Sketchpad"' system (Sutherland, 2003)*

The format serves as a means of conveying the message in the design. The human brain tends to read and combine forms with the codes it has already created and make sense of them (Eken, 2021).
The format used in the design, on the other hand, should be used carefully and on the spot, taking into account that it can carry a meaning no matter how abstract or simple it is, as shown in Figure 12.

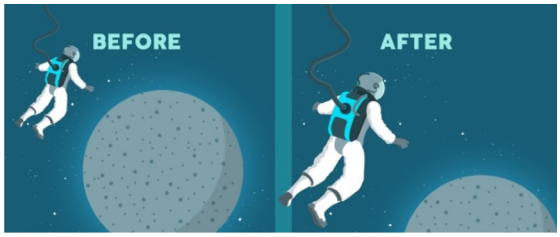
The most sensitive issue of the pictogram design stage related to occupational health and safety is the process of converting a complex technological device into a pictogram visual. In terms of visual representation, it is more difficult to convert a complex technology into a pictogram than to convert a simple technology into a pictogram. At the first stage of the pictogram design process, a comprehensive analysis and photographing of the relevant technology from all points of view is carried out in order to create data (knowledge accumulation) from a visual point of view. At the second stage, the details that will create the format (form) are determined. In the third stage, pictogram sketches are prepared based on these details.

At the last stage, the option that is the simplest and best representing the technology is determined from the sketches prepared. The visual perception performance of the selected form (format) is increased with graphic design applications to reach its final form. The starting point of a pictogram in terms of visual perception is the similarity of its transformed form to a pictogram with the fact of that technology, which creates a visual representation performance with another expression.

» **Figure 12:** *Examples of pictograms designed in different formats related to the same topic*

Size (Measure): Measure is the expression of the dimensions of the use of objects in design. Ratio, on the other hand, is defined as the measurement relationship of the parts of a whole with the whole (Turani, 1995: p.104). It is very important to make a harmonious and balanced measurement with each other by paying attention to the purpose and visual perception limits in graphic design, as shown in Figure 13. The determination of the dimensions of the design elements determines the level of visual perception, while at the same time determining the relationship with each other and the order of importance. The specified measurement preferences form the visual hierarchy of the design.

The priority in measurement preferences is to ensure visual perception performance at the maximum level. When aesthetic expectations get in the way of visual perception, the semantic structure of design begins to lose its importance to a large extent. In a graphic design study, visual perception and message value are directly proportional. In designs where the message value decreases and visual perception is not important, there is no harm in applying extreme (radical) preferences related to the dimensions of the design elements that make up the design, contrast levels, empty (negative) areas that are of great importance in visual perception. Measurements that are smaller than necessary create a distance effect in visual perception. The larger the necessary dimensions, on the other hand, express closeness. As much as hierarchical ordering is paid attention to when sizing design elements, maximum attention should be paid to their dimensions in order to easily perceive the characteristic (anatomical) structures of living inanimate objects included in the design. Excessive or small dimensions may cause objects to be perceived differently.



» **Figure 13:** *Different size application examples (Toma, n.d.)*

Graphic design studies are subject to measurement limitations as in different industrial production activities.

Within these limits, the design should have a maximum level of visual perception. Pictograms related to occupational health and safety are included in the group of design products that should be easily visible from a certain distance, such as posters, as shown in Figure 14. The size (measure) of each design element contained in a pictogram is very important for its mission to be determined precisely by taking into account the limits of optical perception in hierarchical order of importance.

» **Figure 14:** *Examples of pictograms with different dimensions related to forklift work safety*

Composition (Arrangement): Composition refers to how the design elements are arranged together and how they are combined Decoupled, as shown in Figure 15. The arrangement for selecting visual data is determined by Deciphering the thought it describes and coming to life in our minds, determining the distinction between right and wrong (Boydaş & Gümüş, 2022). In the perceptual organization approach, the main stimulus of perception is the way stimuli are organized, that is, their composition (Özkirişçi, 2020).

Knowing the relationship of the design elements with each other in a graphic arrangement, as well as knowing how all the components are meant in eye and mind coordination, and what they correspond to, is of vital importance for the design process and the designer (Özkirişçi, 2020). Trying to Decipher the relationship or layout between the design elements in a graphic design composition is considered to be a natural human visual perception activity. The fact that human perception has a tendency to group elements and different components in a fragmented structure within a wide structure proves this situation (Arıkan, 2008: p.24). As a result of editing, how the design will look and how it will be perceived will be shaped. The opposite of order is disorder. The complex structure resulting from a carefully unplanned arrangement makes visual perception difficult. What is important in terms of visual perception in pictogram design is to create a simple design. When the design elements that do not contribute to the design or create unnecessary repetitions are eliminated, the resulting simple (lean) structure is perceived faster and easier.

» **Figure 15:** *Examples of different compositions on the same topic*

Color: Color as a design element has an impact on the principles of graphic design. Color is the most important instrument for creating balance, emphasis, hierarchy and integrity in design as well as a means of expression for the designer (Uğur, 2021). Color is a factor that significantly affects visual perception. Color is relative and can vary according to the colors around it. This phenomenon is called simultaneous contrast. Green placed next to red will make both colors more dominant, but it will not have as strong an effect between the close shades of red as it does with green (Arntson, 2011: p.136; Eken, 2021). Carefully choosing how to combine colors with each other is very important for visual perception, as well as important for communicating your message more effectively. Color is both a design element and an editing tool in graphic design. Color serves as a tool in the creation of hierarchical structure (order of materiality).

Pictograms of importance such as occupational health and safety should be noticeable in the environment in which they are located, should be able to attract attention from long distances and should be detected quickly. In graphic design, color contrasts are used to create a remarkable design. Accents and contrasts in the design can be easily created with color contrasts. Contrast refers to the difference between two colors or the difference in brightness at two levels. Increasing the contrast makes important information more obvious and makes the image more understandable. In addition, colors with a high activity value are preferred to increase the attention attractiveness of pictograms.

According to the researches, warm colors such as yellow, red and orange are remarkable and have the priority of perception. according to the results of the study with 87 participants, the best performance was achieved with pictograms designed on a yellow background (Kovačević, Brozović & Bota, 2014), as shown in Figure 16.

» **Figure 16:** *Examples of pictograms designed in different colors on the same subject*

Shape-Ground (Background) perception: Shape is the two-dimensional state of objects. Wherever there is a shape, there is definitely a floor. In other words, the ground is needed for the appearance of the shape, as shown in Figure 17. The characteristics of the ground are also effective for the perception of the shape. The ground relationship of the shape affects the first view very much (Gezer, 2019). The human perception system makes a distinction between shape and Declivity. The shape is what a person focuses on (Uğur, 2019) While the shape is more remarkable than the ground, in some cases it can also be the opposite.

The shape makes a more impressive impression and is remembered better. We have perceptions that the shape and the ground change places with each other. While we see a form as a shape first, we can see it as a ground a little later. However, we cannot see a form as both a shape and a ground at the same time.

The basic principle in the shape-ground relationship is the independence of the shape. The first process to be performed to make it independent is to differentiate the floor very significantly according to the color of the shape (Uğur, 2019). The figure-ground law depends on the opposition (Boydaş & Gümüş, 2022).

» **Figure 17:** *Examples of visual design for ground perception of shape*

Pictograms are simplified visual structures consisting of geometric lines. The geometric space areas of these simple structures (floor) may also unwittingly evoke an undesirable visual form. This situation is also a common negative in motifs and decorative elements consisting of geometric structures, as shown in Figure 18. This situation, which creates an optical illusion, significantly complicates the perception of the pictogram.

» **Figure 18:** *Examples of shape ground perception in occupational health and safety pictograms*

Conclusion

The main priority in business life from a legal and ethical point of view should be an understanding of production that takes into account the right to life of the individual, society and nature. Taking into account even the smallest risks related to occupational health and safety and making the necessary is the priority task of both enterprises and legal institutions that follow. The basic philosophy in this regard is to take preventive steps without experiencing any negative consequences. In the fast pace of business life, the tasks of taking, implementing and supervising measures related to occupational health and safety are of such importance that they cannot be considered only as the duties of departments and corporate structures whose job definitions have been made by law.

All employees in an enterprise have responsibility directly and indirectly. The people and institutions involved in all kinds of activities related to occupational safety and occupational health have to do their best.

Although modern technologies that enter into business life every day have equipment that prioritize occupational health and safety, the reality of health problems and occupational accidents continues to maintain its place in the fast and intense pace of business life. Business environments also contain a wide variety of hazards and risks with different technologies and working structures.

Measures related to occupational health and safety should be applied at this fast and intensive pace without compromise. One of the dimensions of these measures is the warning signs, signs and visuals. Pictograms constitute the most important pillar of this group of stimuli. The simple (lean) visual structure of pictograms should give quick and clear messages to employees and people associated with the business environment.

The use of advanced graphic design technologies and knowledge is a must for the preparation of pictograms related to occupational safety and health as effective visual structures. In such designs, putting aside material concerns, working with very successful graphic designers is the first priority. Enterprises should show the sensitivity they show in promotional sales and marketing in the quality of their work on occupational safety and health.

In order for the pictograms related to occupational health and safety to perform their duties at the highest performance, they can be provided by being sensitive from the design to the high-resolution printing and the position and illumination in the environment in which they are located. Although the boundaries have been drawn with legal standards, today, when pictogram production has become commercialized, the necessary care is being taken according to the knowledge and experience of those who make these designs.

Pictograms are generally graphic design products that do not carry aesthetic concerns. The priority is that it is easily detected. From the point of view of visual perception, it is inevitable to question the reason for the existence of a problematic pictogram. Errors are unacceptable in terms of visual perception in pictograms for occupational health and safety. Since any kind of inadequacy that may occur in visual perception will have negative consequences, it is necessary to act very carefully. The visual perception dimension and message effectiveness of the pictograms designed for occupational health and safety are too important to be left to subjective evaluations.

At the design stage, it is necessary to know each element that affects visual perception performance and make preferences accordingly.

In terms of visual perception, it is important for the graphic designer to know the algorithm in the visual perception of the viewer and to make the right decisions that will increase the intensity and quality of the elements contained in the pictogram in a successful pictogram design.

The first stage in occupational health and safety and pictogram design is the transformation of technologies and actions that are the subject of warnings and information into simple symbols. The designs that were realized with artistic skills before digital technologies are now completely made with computer technologies.

Designs prepared as vector or bitmap designs sometimes have more geometric forms than necessary, so they can turn into structures that are not pleasing to the eye in order to create a simple structure. It is the lack of showing the necessary care to the degree of priority and importance in pictograms prepared with digital technologies. When the element that should be emphasized in a pictogram designed in a standard structure falls into the background, the effectiveness of the pictogram also decreases greatly. For example, the primary danger on the forklift warning sign is being crushed under the wheels of the forklift and injuries caused by the impact of the transport ends. In order to stimulate these disadvantages of the forklift, the wheels and carrier ends should be more emphatic. Or the color and temperature form used to express temperature in hot surface warning pictograms should be designed in such a way that it is perceived more in the foreground as a visual hierarchy. Occupational health and safety and pictograms need to be separated from the visuals that are constantly encountered in life.

Today, even in the user manual of a simple device, a large number of images are used. For this reason, non-highlighting visuals do not attract people's attention at all. Dynamic (moving) designs will be more effective instead of static symbols to express the negativity that may occur. For example, in the warning pictogram of a crane, instead of a fixed crane and a human symbol underneath, a falling load or a human symbol crushed under a fallen load will be more stimulating and highlighting. In today's visual intensity, the effect of visual elements that are weak in attracting attention on people is very low. For this reason, graphic designers who design occupational health and safety and pictograms should make designs that incorporate more accentuating and contrasting shapes, colors, backgrounds and compositions.

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