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Designing Visual Abstracts Used in Scientific Publications

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Abstract

Visual abstracts (VAs) are visualized summary information that play an important role in increasing the reading rate and spreading of academic publications. This study, which focuses on the design of VAs used in scientific publications, has a compilation design. The visual abstracts design guide of five existing publishing houses and journals was examined in the study. The criteria suggested in the study are presented in the context of graphic/visual communication design criteria and visual perception theory, considering the Gestalt perception principles and based on scientific and artistic design principles. In addition, how VAs contributing to scientific publications should be drawn and within the framework of which rules scientific data should be converted into VAs are given with design criteria. As a result of the study, the framework of Gestalt perception theories and design principles was determined, and the new guide was reached by combining it with the criteria of the publishing houses considered. In the study, the design of the new design proposal on three bases was found successful in terms of clarity and perception. "Grouping scientific data as theoretical design: the phase of organizing theoretical knowledge", "visual design: determining the data to be converted into visuals" and "social media design: the phase of preparing for social media" has been a very useful process for researchers who will work in this field.

Keywords: Visual abstract, scientific visualization, data visualization, visual abstract design method, Gestalt perception principles, graphic design criteria.

Introduction

It is known that vision is more prominent than all other sense organs in learning. Because vision accounts for 87% of the five human senses (Lee & Yoo, 2023). Therefore, a person without vision problems first perceives information through the sense of sight and then combines and processes the data with the perceptions of other sensory organs. While learning, when any scientific definition is made, the first thing the brain does is to visualize a picture about that subject. It combines some images it has seen before that are suitable for the definition and provides understanding. With this method, the information is converted into visuals. Improving learning and making it permanent is the creation of meaningful images by interconnected images in the mind. This is why well-drawn or designed images are remembered for a long time. It can be said that transforming information into visuals and creating a meaningful image is a healthy way of learning. This means that information needs to be made visible so that it can be learned faster, accessible, better discussed, and combined with other information (Eppler & Burkhard, 2007; Gürdal, 2024). Recently, a change has begun to occur in the understanding of perception under the name of "active vision". Active vision means that we should think of graphical or visual designs as cognitive tools that develop and expand our brain (Ware, 2008). It is seen that the brain, which gets used to this teaching, can transfer the images it imagines in its mind to paper in a much better way. As the brain develops and expands with this perspective, it changes its perspective on its environment and combines watching with learning, not with blank stares. This situation increases the visual memory in the mind, combines information with useful background knowledge, and expands the limits of creative ability in translating it into visuals. In other words, the patterns observed in the brain are collected as grouping transformations rather than a disorderly distributed majority. Since the brain is directed to think according to the model of good order, the variety of possible expressions is organized into concepts that are typical of any field (Arnheim, 2015).

In other words, in one of the first discoveries in Gestalt psychology, groups of stimuli organize themselves automatically in visual perception (Wertheimer, 1912; cited in Gordon, 2004). The process of converting the text read by the brain into visuals is called data visualization. Data visualization is directly proportional to the brain's ability to keep as many images in its mind as possible and to combine these images with the theoretical knowledge learned under the right conditions. Card et al. (1998) define information visualization as the use of visuals as a supportive element to enhance cognition. It is known that visualizations can help people understand data better and accelerate the comprehension process. While analyzing with the visual thinking method strengthens human memory, they can become external cognitive aids (Fekete et al., 2008). In addition, Norman (2014) says that visuals can greatly help task performance and productivity. In addition, the advantages provided by the ever-developing technology in visual drawing also help the information visualization stage. Pictograms, infographics, diagrams, charts, maps, visual instructions, and technical illustrations are primary tools that help visualize information in the mind. Scientists who realize the importance of information or data visualization often use these useful graphical images in their academic articles. By using comprehensive visualizations in both their case studies and numerical data, the authors have managed to increase the understandability of the article. Therefore, it is seen that many articles that use comprehensive visual designs are read and understood more than those that consist only of text. In this context, it can be seen that many academic publications today have started to publish their studies with the help of visuals.

Scientific publications have recently become articles that attract the attention of not only scientists but also ordinary people. Especially the growth of digital access opportunities has increased the speed of access to scientific publications. Since accessing information faster and easier than before means that there is a lot of similar information or publications, it has brought to the fore the idea of designing the most understandable ones. Scientists who wanted to increase the recognition of the article in question, especially on digital platforms, felt the need to use their data in visual designs, so they looked for methods to reach their followers in the shortest way. Therefore, the desire to access scientific publications has brought to the agenda the question of how we can deliver the articles written by scientists and academics to wider audiences. The only way for a scientific article to become widespread and increase its readability on social media is to design VAs of the article. These visuals, which are designed as a single piece with visual graphics and statistical findings and form the essence of the article, are easily read and shared by many social media readers. According to research, it is seen that in recent years, academic publishing houses have taken this rise into consideration and asked authors for VAs of scientific publications. There has been a rapid increase in the use of visual abstracts in academic publications since 2016. Visual abstracts have increasingly been used in academic articles to improve screening and to assist in article selection for inclusion in academic publications on social media. One of the most striking studies on this subject was conducted by Ibrahim et al. (2017), in which 44 academic publications were shared on social media (Twitter) with and without visual summaries. As a result, it was seen that articles shared using visual abstracts created a significant difference in terms of being seen and read on social media (Ibrahim et al., 2017). In a study conducted by Yoon and Chung (2017), it was seen that the use of visual abstracts in articles published in the field of social sciences increased by 350%

between 2011 and 2015. Sharing the VAs of a published publication on all possible social platforms will ensure that the scientific information in question is read more and disseminated, thus ensuring that the author(s) are recognized, and the data is known to a wider audience. Publisher, taking advantage of the fact that visual reading is easier and faster than text reading, have started to use this in almost all magazine writing rules. Therefore, the authors wrote their research considering that they would be able to transform the data and findings into visual images in their publications. In this case, visual drawings such as scientific visualization and scientific illustration, which exist with the existence of science, can be used together with data visualization to help academic publications.

This study provides information about the design methods and criteria of VAs which have become quite frequently used in academic articles. When the literature is scanned for the study, there are some existing design criteria tables, but it is seen that there are deficiencies in terms of visual communication design and graphic design criteria. In addition, since the VAs in question appeal to the readership and the main theme is the visual representation of the summary text in the article, they should also be considered and designed in terms of perception theories. In the studies conducted, it is seen that these basic elements are not included in the criteria. Therefore, the VAs design criteria in this study offer a new and up-to-date draft by considering all these basic requirements. Literature was also used for the design criteria created. Thus, a strengthened criteria table was created by feeding from both the publications published by scientists and the principles of design and perception.

Visual Abstract: Using Visualized Information as a Summary

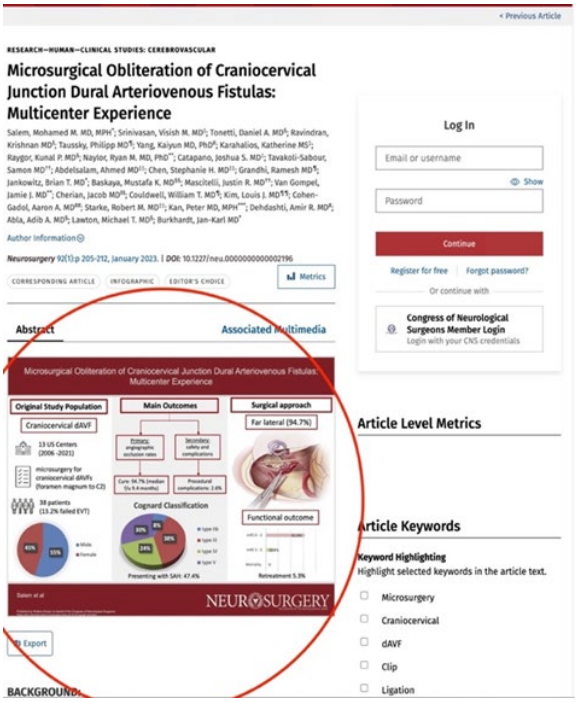
Scientific visuals in scientific publications are a frequently used method of expression. VAs also provide visualization of academic data and findings. VAs are the summary of the cause-effect and findings of textual information written on pages with visual figures or graphical designs. In simpler terms, VAs are a visual presentation of all the information contained in the abstract section of an article. Its purpose: The aim is to see the main findings and conclusions from the VA with a single glance, without reading the abstract of the article (Ibrahim, 2018a; Ramos & Concepcion, 2020; Yoon & Chung, 2017). VAs are concise, visually engaging representations of research papers, scientific papers, or complex ideas. They aim to convey the key findings and concepts in the publications in a clear and accessible way. VAs often include graphic elements such as charts, diagrams, and images to enhance understanding. Thus, they ensure that the article becomes widespread on academic and social platforms. VAs have been present in the scientific world under different names since the existence of science. In the past, scientific illustration, central illustration, visual map, graphical table, infographics, etc. Similar visual tools were used with different names such as. Nowadays, they have turned into visual tools that are used more result-oriented than purpose-oriented. They are designs that closely resemble infographics. Like infographics, they are visual representations of information using a combination of graphs, icons, or illustrations with minimal text. VAs, also known as VAs, are like infographics, but the term specifically refers to concise VAs of the main findings of an article (Spicer & Coleman 2022).

Since academic publications convey their findings to their readers faster with the help of visuals, VAs have begun to replace academic abstracts. Images and graphics are very useful

in literature searches and finding keywords, especially in scientific publications. VAs abstracts are a preferred method in literature reviews because they visually simplify a lot of information and facilitate meaning. Looking at the research, the journal Nature Chemistry wrote in an article published in 2011 that VAs were used in a chemistry journal called Angewandte Chemie, published in Germany in 1976, and then again in scientific publications in 1077 and 1982. Recently, especially since 2011, VAs have begun to be used frequently in scientific articles. Journals have started to use VA titles on their home pages (Figure 1). It is now possible to access articles using keywords on social media or the internet.

Figure 1.

Visual Abstract Neurosurgery Publications (Salem et al., 2023)



The Annals of Surgery editorial board found that articles shared as VAs on social media received nearly three times more visits than when shared as text titles alone. In addition, the publishing house said that the reader reads and perceives the VA faster than the text summary, thus saving the time of researchers looking for sources quickly. Many reputable journals use VAs as equivalent to article summaries (Ibrahim et al., 2017). Therefore, it is understood that VAs are a part of the publishing process that will be among the publishing criteria of many publishing houses. It is also now assumed to be a tool to replace posters. There is no comprehensive design method and method guide for VAs, which are new in the scientific world. Although many publishing houses try to create a guide for VAs by considering basic design principles, research shows that these guides are insufficient. Below are VAs used by some prestigious scientific publishing houses. Figure 2 includes a VAs published in the Annals of Surgery. Although it basically visualizes the data in the article summary, some design deficiencies stand out. The colors of the figures used are close to the background color, making perception difficult. It is appropriate to order the information in accordance with the summary text. The difference in proportion between the figures causes inconsistency in the perception of reality for the reader. In addition, since the images used differently and scattered are not

placed according to the grouping perception of the Gestalt theory, the eye trying to read each image one by one causes a waste of time.

The VA of the publication in the Journal of Hospital magazine designed by DocWithBotie in Figure 3 is also different from Figure 2 in terms of placement. Using a dark background in the design that includes the data in the publication summary will increase the possibility of causing problems for readers with vision difficulties. In addition, the small size of the figure drawing makes it difficult to understand. It is also recommended to include keywords in every VA. According to the Gestalt theory of perception, the understanding of the design is made quite difficult because the figure-ground relationship, front-back placement and perspective rules are ignored.

Figure 2.

Visual Abstract (Rumer et al., 2022)

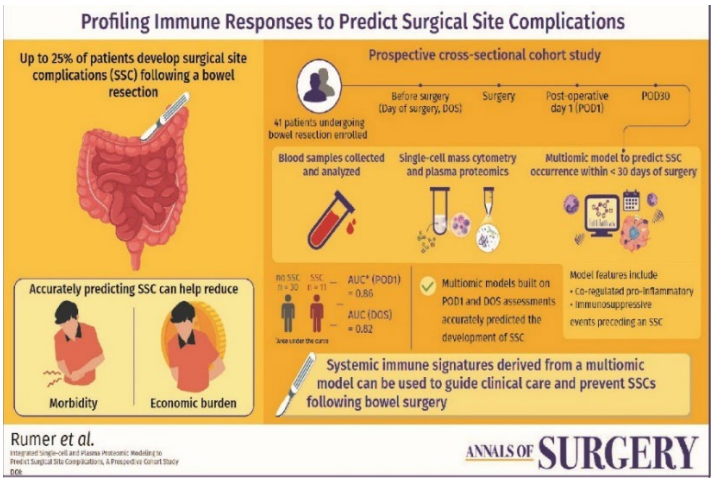
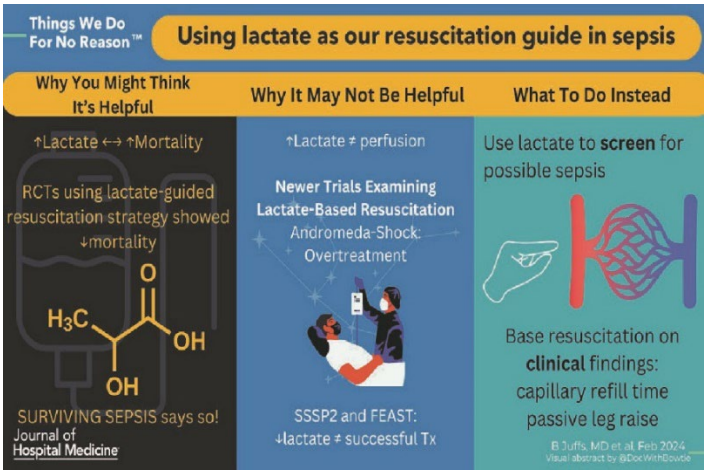


Figure 3.

Visual Abstract (Juffs & Russo, 2023)



The VA in Figure 4 visualizes the data of the study titled "Incidence of ESKD Among Native Hawaiians and Pacific Islanders Living in the 50 US States and Pacific Island Territories". In the VA, it is seen that the images are insufficient. Basic data are shown with numbers and country flags, and scientific illustrations are not used for the publication content. The small size of the images used makes visual reading difficult. In addition, in a design where

a gradual-divided design approach is used, the texts and images are separate and scattered, making perception difficult.

Figure 4.

Visual Abstract (Xiang et al., 2020)

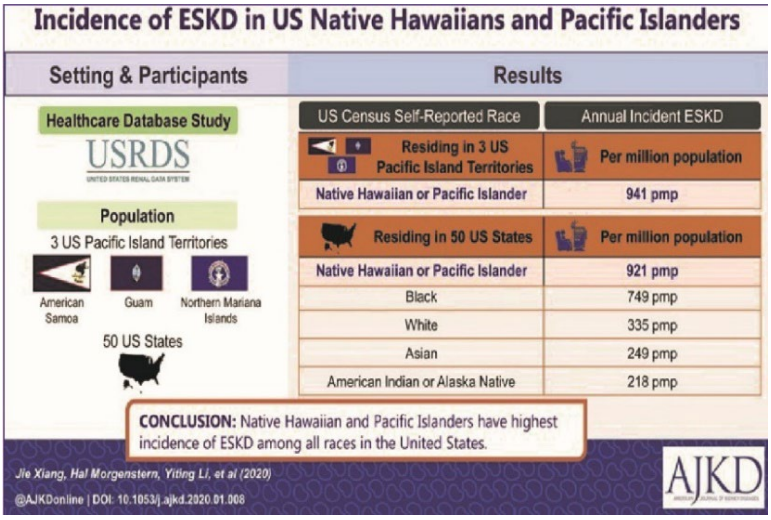
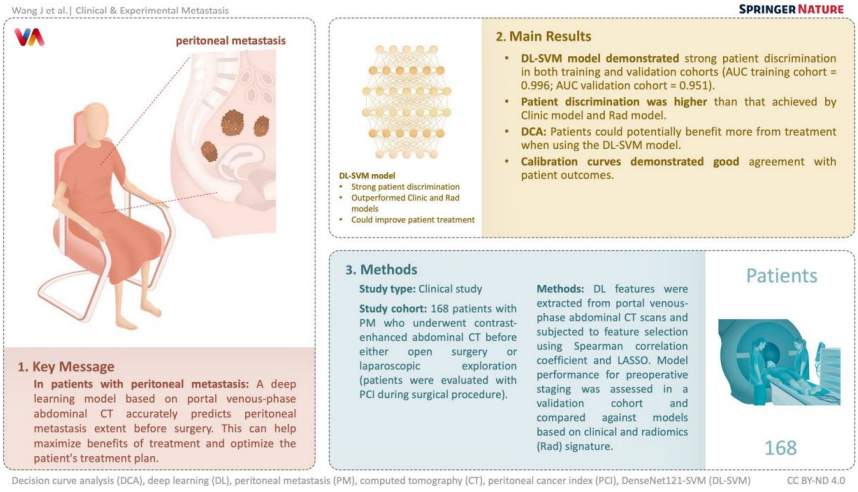


Figure 5 is the VA of the study titled “CT-based deep learning model: a novel approach to the preoperative staging in patients with peritoneal metastasis”. It is one of the designs that best fits the definition of VA design. The data are presented in three sections. The first part of the summary includes the key message and two illustrations that give preliminary information to the reader from whole to part. This allows the reader to have a quick idea about the subject. In the second part, a meaningful scientific illustration visualizes the main results under the title main result. In the third chapter, the method is written and supported by scientific illustration.

Figure 5.

Visual Abstract (Wang et al, 2023)



As can be seen from the examples, each VAs are different from the others. They do not offer integrity. Each publishing house has published its own design method on its website and requested it from its authors. In this study, the examples discussed were examined and a new and comprehensive criteria table was proposed by completing the deficiencies.

Rationale

As can be seen from the examples, there is no single standard for VAs that have started to be used for academic publications. However, just like the basic headings that articles must have, VAs must include design methods and criteria. Summarizing pages of textual information in a single image requires a lot of creativity and design skills. For this reason, VAs used for scientific publications must have design criteria. Today, especially in reputable journals, these guidelines are used although they may not show complete integrity. The design guidelines created assist journal editors. The five examples discussed are VAs published in high impact factor journals of different publishing houses. It is seen that each visual summary has its own design approach and does not provide consistency with other designs. The main reasons for this situation are that there is no commission unity for VAs design method and criteria guides. In addition, the existing guides lack basic design criteria for visual communication design and graphic design. This study, which is thought to contribute to the formation of a consistent common design guide for VAs, which are still new in the scientific world, has also been adapted from existing guides. Considering the missing design elements, it has been rearranged from a designer's perspective, adhering to the literature.

Some of the journal and publishing houses that create visual abstract design guides are as follows:

Ibrahim (2018b) created criteria for designing visual abstracts with his doctor colleagues, in his study titled "Use of a visual abstract to disseminate scientific research". Lee and Yoo (2023) presented design suggestions in his article "The current state of graphical abstracts and how to create good graphical abstracts".

Duke University School of Medicine (n.d.) has created a website called "Getting published: Visual & video abstracts" and outlined a roadmap for academics publishing academic material".

Elsevier (n.d.) created templates for its authors by opening a space called "Graphical abstract" on its corporate page and provided information about graphical abstract/visual abstract.

The publication titled "That table of contents image looks really interesting: *Click*!" published by Buriak (2023) also created a roadmap with the author.

However, each VAs are different from the others. They do not provide integrity. In addition, almost all scientists who created the criteria table are from the medical field and have worked very little with designers. This has brought up deficiencies in the context of some design and visual perception theories. These deficiencies include color, typography, balance, rhythm, space, ratio-proportion, visual hierarchy, emphasis, unity, integrity and continuity. In this study, a new design method and criteria table is presented based on the old ones in the existing VAs design criteria guides. The proposed criteria are presented in the context of graphic/visual communication design criteria and visual perception theory, considering Gestalt perception principles and based on scientific and artistic design foundations.

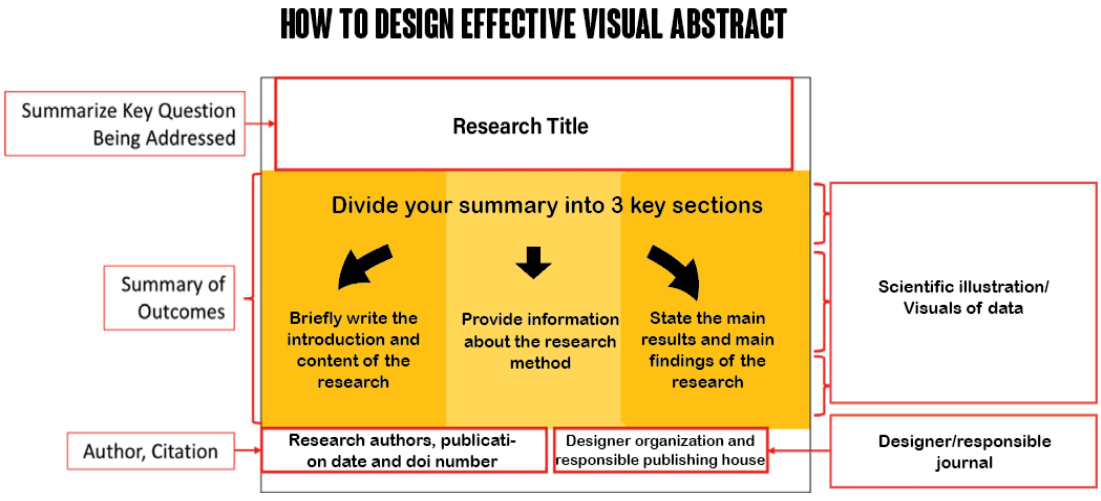
Visual Abstract Design Methods and Criteria

The study sought an answer to the question of what a VAs design method is created with the basis of design criteria and perception theories. A literature review was conducted for the study and a new proposal was presented by completing the deficiencies of the existing criteria. The new design method and criteria table proposal was presented in the context of graphic/visual communication design criteria and visual perception theory, based on scientific and artistic design principles, considering Gestalt perception principles.

VAs are visual representations of summary texts in scientific publications. Therefore, when VAs are being designed, the research in question must be completed and ready for printing (ready for sharing) by the researcher. When designing VAs, the designer should not make any changes to the summary text. Scientific problems and findings should not be left to the designer's interpretation. VAs are more simplified versions of central-scientific illustrations, and graphical abstracts are more detailed versions. Therefore, the aim of scientific illustration should not be deviated from the aim of faithfulness to science and reflecting reality. Visual information should be arranged, organized, and interconnected information should be coded with close visuals and colors. Linked data should be used closely and complex information should be simplified. Simple graphics should be used, and the main message or key findings of the content should be identified. According to the summary text, the order in which you can see the problem, method, findings and results in order of reading from left to right is followed. In this context, the VAs creation methods and criteria are as follows. (Figure 6)

Figure 6.

Graphical Abstract (Elseiver, n.d.)



Visual Abstract Design Method

It is recommended that designs be vector-based. The reason is that if the designed or drawn visual Criteria for designing effective VAs are line-based and are to be printed, the printing quality must be perfect. Among the professional design programs in question, Adobe Illustrator and Adobe Photoshop come first. If users use such design-based programs, they can also edit and share the extension on all kinds of social media platforms. Other basic graphical-

based programs that can be used are Power Point, Google Charts, Venngage, Visualize, Canva, Piktocharts, Snappa, Visme (West et al., 2020).

The criteria below are presented based on scientific and artistic design principles, considering the Gestalt principles of perception in the context of graphic/visual communication design criteria and visual perception theory. While creating the theoretical design title, information and data visualization literature sources were examined and a design-based proposal was presented (Katz, 2012). While creating the title visual design, many sources were used, especially Gordon's (2004) work "Theories of visual perception". Verstegen's (2005) "Arnheim, Gestalt and art: A psychological theory" is also among the basic sources. For data visualization, "Computational visualization: graphics, abstraction and interactivity" (Strothotte, 2012), and for graphic design basics, "Design elements: A graphic style manual" were used (Samara, 2007). The title of social media design was based on Ibrahim's (2018b) work titled "Use of a Visual Abstract to Disseminate Scientific Research"

Visual Abstract Design Criteria

VAs are visual representations of scientific data in academic publications. Therefore, making some literary and numerical data visible is a process that requires design intelligence. The reader needs to understand the results or findings in the article in question by just looking at the visuals. As with all visual communication design elements, considering design principles while designing VAs facilitates understanding. Below are the stages that the designer should consider from the theoretical stage to the sharing stage on social media.

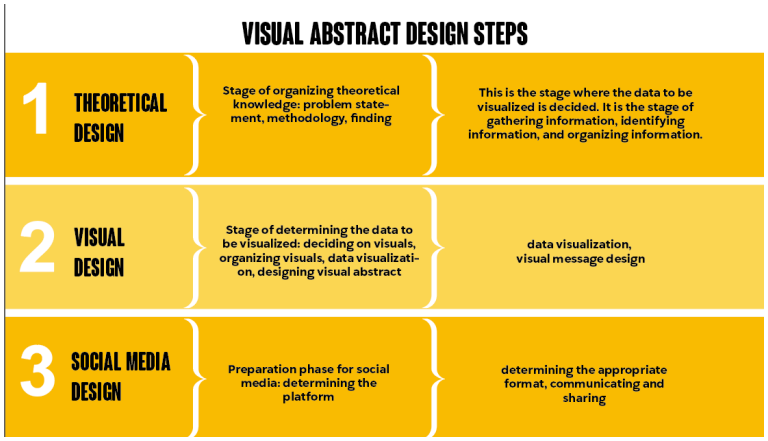
Design criteria can be listed in three basic criteria (Figure 7).

1. Theoretical design: The stage of organizing theoretical knowledge

2. Visual design: Determining the data to be converted into visuals

3. Social media design: Preparation phase for social media

Figure 7.
Visual Abstract Design Methods and Criteria



1. Theoretical Design: Organizing Theoretical Knowledge

It is the study carried out on the theoretical information that will form the essence of the article to be illustrated and will be represented. It is the process of collecting information, determining information, and organizing information. This stage deals with the preparation of

the summary written by the researcher for the visual editing stage. Editing of theoretical information is usually done at the request of the author of the article. The author determines the information or group of information he wants to highlight. Creating visual representations of scientific data or scientific concepts is about what and how we explain. The author's request and the designer's interpretation must coincide exactly. This is the stage where the decision is made about which data will be in which order and whether it will support the previous or the next one (Katz, 2012).

Since not all the information in a summary text can be included in VAs, the writer or designer must decide what will be included in the visuals. The importance and learning order, which we call the information hierarchy, will turn into a visual hierarchy during visualization. This situation aims to guide readers to the findings section of the study through visual images. Since visual designs always include a sequence that focuses the reader on the target, image and text integrity must be well thought out and designed. The problem statement, method, results and findings, which are the most important stages of the study in the summary text, are sequentially followed by the next stage of design to decide on their groups and visuals.

2. Visual Design: Determining the Data to be Converted into Visuals, Data Visualization, Designing A Visual Abstract

It is the design phase where visuals are determined according to the problem, purpose and findings in the textual summary, and the visual hierarchy is planned from the problem to the findings. In this part, the designer and researcher work integrated. Or the researcher who will make his own drawing should not deviate from the reality of the summary text. Research shows that VAs of science experienced from past to present should use simple, clear colors, textures, lines, light, shadows and fonts. The data to be converted into visuals must be determined in advance, as explained in the first article. Visual representations can explain the scientific concepts claimed in publications much better than terms and can even accelerate learning thanks to their memorability (Samara, 2007). Gestalt perception theories for visual design elements are as follows: figure-ground relationship, proximity, similarity, completion, continuity and simplicity principle (Gordon, 2004).

Data Visualization

Data visualization is the most important stage in VA design. Since it addresses the cognitive field, it deals with drawing the most accurate visual that will help the reader understand the defined cognitive data. First of all, while writing their publications for which a VAs will be drawn, authors should also imagine visual images that can represent their problems, methods and findings. Then, the most appropriate scientific images are selected and sorted according to the information hierarchy. According to the completed preparations, the most appropriate drawing technique should be selected for the visual to be represented. Represented concepts, graphs, icons, pictograms and illustration techniques are used to visualize the data under consideration. At this stage, we should focus on the center of information and choose infographics, which have been an important language of communication since the past, correctly and appropriately (Gürdal-Pamuklu, 2022). Visuals must be interesting, catchy and instructive. Data visualization is an element that requires attention both artistically and scientifically. Since the visualized data must be considered

according to the common understanding of readers from every nation and language, it is necessary to bring up the rules of cognitive perception when it comes to visualizing scientific data. Visual communication does not include speech or explanation. Images represent and reference the article. Therefore, the designer or researcher cannot convert random data into visuals. It should be designed considering its scientific and intellectual infrastructure (Strothotte, 2012).

In many studies; Card et al. (1998), Bertschi et al. (2011), Estrada and Davis (2015) expressed how important visuals are in understanding to strengthen cognition and suggested that some cognitive consequences be considered when visualizing. They viewed visualization as the most important stage of the learning process and stated that visualization not only strengthens reasoning but also provides signals for making effective decisions and other solutions (Bertschi et al., 2011). Experts state that the essence of the benefit provided by visualization is that a set of permanent data that references basic information and is stored in memory using human cognitive processes affects people throughout their lives.

Although people have become accustomed to digital, learning still takes place in the physical world (Bertschi et al., 2011). Therefore, he says that the data to be converted into visuals should be expressed with known and frequently encountered objects in the physical world. The cognitive and perceptual arguments that should be taken into consideration when visualizing data are the rules that should be considered to perceive the designed visual and to accelerate learning according to the readers' thinking. When designing VAs, considering cognitive and perceptual arguments contributes to creating effective VAs.

Using cognitive and perceptual bases in visual abstract:

Increasing memory and available processing resources,
Decreased search for information,
Fast recognition of patterns,
Activation of perceptual inference processes,
Tracking coding information and clues in a manipulable environment,
It will enable the use of perceptual attention mechanisms.

Designing Visual Abstract

In order for the designed visual to be perceived correctly and the message to be perceived quickly, it must be designed on a cognitive and perceptual basis. For this, it is useful to consider visual perception theories and Gestalt rules (Kerren et al., 2008; Verstegen, 2005).

Complying with these theories ensures that the designed summaries are perceived instantly and accurately.

1. During design, images drawn close to each other create groups in perception according to those that are farther away. This situation is called the proximity principle in visual perception. Images that are close to each other are perceptually grouped together.

2. When visualizing data, similar colors, textures, shapes and sizes are considered perceptually close to each other. The similarity principle is close to the tendency for similar images to be perceived as grouped together.

3. Similar images that repeat each other are continuous in the design. This causes images that have continuity in perception to be grouped in perception.

4. During drawings, images designed in a planned manner and forming symmetry with each other are grouped in perceptual alignment.

5. In the perception principle called closure, the drawing with a completed contour or a linear unity is perceived as a single image.

General image editing method:

Image size: Recommended to be at least 1328 x 531 pixels (wxh) using a minimum resolution of 300 dpi. If a larger image is to be submitted, the same ratio (500 width x 200 height) should be used.

Font: A sufficiently large font such as Times, Arial, Courier or Symbol can be used. The font size should be at least 8 and at most 12. Otherwise, the image will be scaled down to fit the table of contents in a 200 pixel high window.

File type: Preferred file types are TIFF, EPS, PDF or MS Office files.

Additional text: No outline or abstract should be included. Any text or labels should be part of the image file.

If all authors, journal and publication year are not listed, add “First Author et al.”

Include a link to the article, for example a DOI.

Must be readable from top to bottom or left to right (Elseiver, n.d.; Duke University, n.d.).

It is an important step to decide which drawing technique will be used to draw the decided data. In designs where digital drawing methods are generally used, images should be drawn simply, simply and clearly, without requiring excessive detail. Scientific illustration drawing rules also apply to image drawings in VAs. The designer or illustrator must make drawings in color and texture that match the original of the representation in question, without deviating from scientific truth. Since VAs consist of graphical images that serve the result, photorealistic drawings are not made as much as central illustrations. An infographic or pictogram can replace detailed illustrations. Since the VA is images designed to read, understand and share the scientific publications in all kinds of digital environments, the design elements used during the design are very important.

Below are the graphical basics that should be taken into consideration when drawing images.

1. Establishing a visual information hierarchy, establishing an order of importance among visuals, provided that they do not deviate from the summary text,

2. Arranging images in a logical and easy-to-follow order,

3. Creating meaningful concept visualizations and avoiding visuals that have connotative meanings,

4. Using international and common graphics,

5. More text should not be used unless necessary. Fonts used in drawings should be chosen in legible characters and sizes whenever possible, and excessive serifed or handwritten fonts should be avoided,

6. Using true-to-life colors, drawing in CMYK color codes if it will be printed, and RBG color codes if it will be used digitally,

7. Using light tones as the background color and avoiding colors close to each other that will create confusion and cause vision problems. Assuming that the designed VAs can also be read by visually impaired readers, international color harmony should be observed,

a) Avoiding mixed textures and shading,

b) Using simple, clear and few lines,

c) It is recommended to pay attention to the space ratios and to draw realistically the size, smallness, distance and closeness between the images (Samara, 2007).

3. Social Media Design: Adaptation to Social Media Platform

With the spread of social media, scientific articles are followed with interest by many people who are interested in that field. The widespread and accelerated access to information has brought people closer to social media. In this context, it is seen that scientific publications are becoming more widespread on social media shared online should be taken into consideration. In addition, keywords should be entered according to the status of social media and making the readership more diverse. Therefore, it has been brought to the agenda to adapt the VAs designed based on this need to social media platforms. First of all, during the data visualization and VAs creation stages, the designer must design the size and colors of the images used to be suitable for use in digital environments. For this, the first step is to select social media platforms where VAs will be shared. Then, the design is made according to the digital screen dimensions (pixel ratio) to be shared. Like desktop computers, smartphones or tablets. Care should be taken to ensure that the color code of colored VAs to be shared in digital environments is RGB. The platform rules and system of VAs to be and the VA should be found quickly in search engines (Ibrahim, 2018b).

Method

This study, which focuses on the design of VAs used in scientific publications, has a review design. Review articles organize studies conducted on a specific topic or field within the framework of the author's research approach. The study was considered as a systematic review study among the review methods. Since certain methods are considered in systematic reviews, it is a very useful method especially in scientific results (Çınar, 2021). The aim of reviews studies is to summarize the approaches and ideas of other researchers on the research topic at hand and to create a synthesis (Herdman, 2006; Khan et al., 2003). Review articles are not just collecting all the information. They should be organized according to the main ideas, not just as a list of sources. For this reason, it can be said that instead of listing and detailing each source separately, the main themes and topics that unite these sources should be presented (Karasar, 2009; Uman, 2011). In the study, five existing publishing house and journal VAs design guides were examined. A new VAs design guide was proposed by revealing their deficiencies. The criteria proposed in the study were considered in the principles of Gestalt perception and based on the foundations of scientific and artistic design. It is presented in the

context of communication design criteria and visual perception theory. In addition, how VAs that contribute to scientific publications should be drawn and within which rules scientific data should be converted into VAs are given with design criteria. It has been determined that many researchers conducting academic studies need VAs to increase the accessibility of their publications on digital platforms.

Ethical Permits of Research:

In this study, all the rules specified to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with. None of the actions specified under the heading "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, have been taken.

Ethics Committee Permission Information:

Since the research is conducted with open access documents, ethics committee approval is not required.

Discussion and Conclusion

In this study, which aims to evaluate VAs within the framework of Gestalt perception theories and design principles determined based on literature, VAs was evaluated within the framework of different variables of perception theories. In this context, the framework of Gestalt perception theories and design principles was determined, and the new guide was reached by combining it with the criteria of the publishing houses considered.

It was deemed appropriate to divide the new design proposal in the study into three basics and grouped as Theoretical design: The stage of organizing theoretical knowledge, Visual design: Determining the data to be converted into visuals and social media design: Preparation phase for social media. Each title was written based on literature and its content. It was taken into consideration that the visual summary design would affect the whole based on Gestalt perception theories. The proximity principle was taken into consideration in the design process within the framework of perception theory, and the characteristics of the reader audience were also taken into consideration. The similarity principle was taken into consideration by recommending its use throughout the design. The principle of continuity in perception was taken into consideration in order to enable the reader to follow the ongoing information. During the drawings, images that are designed in a planned manner and create symmetry with each other are grouped in perceptual alignment. This important theory of perception is taken into consideration throughout the VAs design. The basic design principles of figure-ground relationship, proximity, similarity, completion, continuity and simplicity were taken into consideration for the entire comprehensive use of the design.

As a result of the study, five literature sources were examined, and their deficiencies were completed, and a new proposal was created. Ibrahim (2018b), in his study titled "Use of a visual abstract to disseminate scientific research", established criteria for designing VAs with his team of physician colleagues. Lee and Yoo (2023) presented design suggestions in his article "The current state of graphical abstracts and how to create good graphical abstracts". Duke University School of Medicine has created a website called "Getting published: Visual & video abstracts" and outlined a roadmap for academics publishing academic material. Elsevier

created templates for its authors by opening a space called “Graphical abstract” on its corporate page and provided information about graphic al abstract/visual abstract. The publication titled “That table of contents image looks really interesting: *Click*!” published by Buriak (2023) also created a roadmap with the author. As a result, the new design method and criteria table proposal was presented in the context of graphic/visual communication design criteria and visual perception theory, based on scientific and artistic design principles, considering Gestalt perception principles.

As a result, we know that summaries designed according to these criteria increase the reading of the publication and ensure its dissemination. A well-designed visual design can keep a person’s viewing time for many seconds. Just like we want to stand in front of a work of art in museums for hours and watch every detail of the work. Well-designed VAs like this attracts the reader’s attention and help them read the article. In the light of all this information, it is anticipated that all scientific visuals designed by considering the VAs design methods and criteria in the study will attract the attention of readers and researchers. Since the methods given were created as a result of long research and experience, with the fact that visuals enable communication without speaking, academic researchers will be able to have their publications read from all over the world, regardless of the language they speak.

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BIOGRAPHICAL NOTES

Contribution Rate of Researchers

Author 1: 100%

Conflict Statement

There is no conflict of interest that the authors will declare in the research.

Bilimsel Yayınlarda Kullanılan Görsel Özetlerin Tasarlanması

Özet

Görsel özetler (GÖ), akademik yayınların okunma oranının artmasında ve yaygınlaşmasında önemli rol oynayan görselleştirilmiş özet bilgilerdir. Bilimsel yayınlarda kullanılan GÖ'lerin tasarlanmasına odaklanan bu çalışma, derleme tasarımına sahiptir. Çalışmada var olan beş adet yayınevi ve derginin görsel özet tasarlama kılavuzu ele alınmıştır. Çalışmada önerilen kriterler, Gestalt algı ilkelerini dikkate alarak ve bilimsel ve sanatsal tasarım temellerine dayanarak grafik/görsel iletişim tasarımı kriterleri ve görsel algı teorisi bağlamında sunulmaktadır. Ayrıca bilimsel yayınlara katkı sağlayan görsel özetlerin nasıl çizilmesi gerektiği, bilimsel verilerin hangi kurallar çerçevesinde görsel özete dönüştürülmesi gerektiği tasarım kriterleri ile verilmiştir. Çalışma sonucunda Gestalt algı kuramları ve tasarım ilkelerinin çerçevesi belirlenmiş ve ele alınan yayınevlerinin kriterleri ile birleştirilerek yeni kılavuza ulaşılmıştır. Çalışmada yeni tasarım önerisinin üç temelde tasarlanması açıklık ve algı açısından başarılı bulunmuştur. "Bilimsel verilerin teorik tasarımı: teorik bilginin organize edilmesi aşaması", "Görsel tasarım: görsele dönüştürülecek verilerin belirlenmesi" ve "sosyal medya tasarımı: sosyal medyaya hazırlık aşaması" olarak gruplandırılması bu alanda çalışma yapacak araştırmacılar için oldukça kullanışlı bir süreç olmuştur.

Anahtar Kelimeler: Görsel özet, bilimsel görsel, veri görselleştirme, görsel özet tasarlama metodu, Gestalt algı ilkeleri, grafik tasarım ilkeleri.

Giriş

Görmenin öğrenmede diğer tüm duyu organlarından daha ön planda olduğu bilinmektedir. Çünkü görmenin öğrenme sürecindeki rolü %87'dir. (Lee & Yoo, 2023). Bu nedenle görme sorunu olmayan bir kişi önce görme duyusu ile bilgiyi algılar ve daha sonra bu veriyi diğer duyu organlarının algılarıyla birleştirerek işler. Öğrenme sırasında herhangi bir bilimsel tanımlama yapıldığında beynin ilk yaptığı şey o konu hakkında bir resim canlandırmaktır. Tanıma uygun daha önce gördüğü bazı resimleri birleştirerek anlamayı sağlar. Bu yöntemle bilgiler görsellere dönüştürülür. Öğrenmenin geliştirilmesi ve kalıcı hale getirilmesi, zihinde birbirine bağlı resimlerle anlamlı resimler oluşturulmasıdır. Bu yüzden iyi çizilmiş veya tasarlanmış resimler uzun süre akılda kalır. Bilginin görsellere dönüştürülerek anlamlı bir resim oluşturulmasının sağlıklı bir öğrenme yolu olduğu söylenebilir. Bu, bilginin daha hızlı öğrenilebilmesi, erişilebilir olması, daha iyi tartışılabilmesi ve diğer bilgilerle birleştirilebilmesi için görünür hale getirilmesi gerektiği anlamına gelir (Eppler & Burkhard, 2007; Gürdal, 2024). Son zamanlarda algı anlayışında "etkin görme" adı altında bir değişiklik yaşanmaya başlanmıştır. Etkin görme, grafiksel veya görsel tasarımları beynimizi geliştiren ve genişleten bilişsel araçlar olarak düşünmemiz gerektiği anlamına gelir (Ware, 2008). Bu öğretiye alışan beynin, zihninde canlandırdığı imgeleri çok daha iyi bir şekilde kâğıda aktarabildiği görülmektedir. Beyin bu bakış açısıyla gelişip genişledikçe, çevresine ilişkin bakış açısını değiştirmekte ve boş bakışlarla değil, izlemeyle öğrenmeyi birleştirmektedir. Bu durum,

zihindeki görsel hafızayı artırmakta, bilgiyi yararlı arka plan bilgisiyle birleştirmekte ve onu görsellere dönüştürmede yaratıcı yeteneğin sınırlarını genişletmektedir. Başka bir deyişle, beyinde gözlemlenen örüntüler, düzensiz dağılmış bir çoğunluk yerine, gruplama dönüşümleri olarak toplanmaktadır. Beyin iyi düzen modeline göre düşünmeye yönlendirildiğinden, olası ifadelerin çeşitliliği herhangi bir alana özgü kavramlar halinde düzenlenir (Arnheim, 2015). Başka bir deyişle, Gestalt psikolojisindeki erken keşiflerinden birinde uyaran grupları görsel algıda kendilerini otomatik olarak organize etmektedir (Wertheimer, 1912; akt. Gordon, 2004). Beyin tarafından okunan metnin görsellere dönüştürülmesi sürecine veri görselleştirme denir. Veri görselleştirme, beynin zihninde mümkün olduğunca çok sayıda görüntüyü tutma ve bu görüntüleri doğru koşullar altında öğrenilen teorik bilgiyle birleştirme yeteneğiyle doğru orantılıdır. Card vd. (1998) bilgi görselleştirmeyi, bilişi geliştirmek için destekleyici bir unsur olarak görsellerin kullanılması olarak tanımlar. Görselleştirmelerin insanların verileri daha iyi anlamalarına ve kavrama sürecini hızlandırmalarına yardımcı olabildiği bilinmektedir. Görsel düşünme yöntemi ile analiz yapmak insan hafızasını güçlendirirken harici bilişsel yardımcılar haline gelebilir (Fekete vd., 2008). Ayrıca Norman (2014), görsellerin görev performansına ve üretkenliğe büyük ölçüde yardımcı olabileceğini söylemektedir. Ayrıca görsel çizimde sürekli gelişen teknolojinin sağladığı avantajlar, bilgi görselleştirme aşamasına da yardımcı olmaktadır. Piktogramlar, infografikler, diyagramlar, çizelgeler, haritalar, görsel talimatlar ve teknik çizimler, bilgiyi zihinde görselleştirmeye yardımcı olan birincil araçlardır. Bilgi veya veri görselleştirmenin önemini fark eden bilim insanları, akademik makalelerinde sıklıkla bu yararlı grafiksel görüntüleri kullanırlar. Yazarlar hem vaka çalışmalarında hem de sayısal verilerde kapsamlı görselleştirmeler kullanarak makalenin anlaşılırlığını artırmayı başarmışlardır. Bu nedenle, kapsamlı görsel tasarımlar kullanan birçok makalenin, yalnızca metinden oluşan makalelere göre daha fazla okunduğu ve anlaşıldığı görülmektedir. Bu bağlamda, günümüzde birçok akademik çalışmanın görseller yardımıyla yayımlanmaya başladığı görülebilir.

Bilimsel yayınlar son zamanlarda sadece bilim insanlarının değil sıradan insanların da ilgisini çeken makaleler haline geldi. Özellikle dijital erişim olanaklarının artması bilimsel yayınlara erişim hızını artırdı. Bilgiye eskisinden daha hızlı ve kolay erişim, çok sayıda benzer bilgi veya yayın olması anlamına geldiğinden, en anlaşılır olanları tasarlama fikrini ön plana çıkardı. Özellikle dijital platformlarda söz konusu makalenin tanınırlığını artırmak isteyen bilim insanları, verilerini görsel tasarımlarda kullanma ihtiyacı hissettiler, bu nedenle takipçilerine en kısa yoldan ulaşmanın yollarını aradılar. Dolayısıyla bilimsel yayınlara erişim isteği, bilim insanları ve akademisyenler tarafından yazılan makaleleri daha geniş kitlelere nasıl ulaştırabiliriz sorusunu gündeme getirdi. Bilimsel bir makalenin yaygınlaşmasının ve sosyal medyada okunabilirliğinin artmasının tek yolu makalenin görsel özetlerini (GÖ) tasarlamaktır. Görsel grafikler ve istatistiksel bulgularla tek parça olarak tasarlanan ve makalenin özünü oluşturan bu görseller, birçok sosyal medya okuyucusu tarafından kolayca okunup paylaşılmaktadır. Yapılan araştırmalara göre son yıllarda akademik yayınevlerinin bu artışı dikkate alarak yazarlardan bilimsel yayınların görsel özetlerini istedikleri görülmektedir. 2016 yılından itibaren akademik yayınlarda görsel özetlerin kullanımında hızlı bir artış görülmektedir. Sosyal medyada akademik yayınlara dahil edilmek üzere taramayı iyileştirmek ve makale seçimine yardımcı olmak amacıyla görsel özetler akademik makalelerde giderek

daha fazla kullanılmaktadır. Bu konuda en dikkat çeken çalışmalardan biri Ibrahim vd. (2017) tarafından yapılmış, çalışmada 44 adet akademik yayın görsel özetli ve görsel özetsiz olarak sosyal medyada (Twitter) paylaşılmıştır. Sonuç olarak görsel özet kullanılarak paylaşılan makalelerin sosyal medyada görülme ve okunma açısından anlamlı bir fark yarattığı görülmüştür Yoon ve Chung (2017) tarafından yapılan bir çalışmada, sosyal bilimler alanında yayımlanan makalelerde görsel özet kullanımının 2011-2015 yılları arasında %350 oranında arttığı görülmüştür. Yayımlanmış bir yayının görsel özetlerinin mümkün olan tüm sosyal platformlarda paylaşılması, söz konusu bilimsel bilginin daha fazla okunmasını ve yayılmasını sağlayacak, dolayısıyla yazar(lar)ın tanınmasını ve verilerin daha geniş kitlelerce bilinmesini sağlayacaktır. Görsel okumanın metin okumaya göre daha kolay ve hızlı olmasından yararlanan yayıncılar, bunu hemen hemen tüm dergi yazım kurallarında kullanmaya başlamıştır. Bu nedenle yazarlar, yayınlarında verileri ve bulguları görsel imgelere dönüştürebileceklerini düşünerek araştırmalarını yazmışlardır. Bu durumda bilimin varlığıyla birlikte var olan bilimsel görselleştirme, bilimsel resimleme gibi görsel çizimler, akademik yayınlara yardımcı olmak için veri görselleştirmeyle birlikte kullanılabilir.

Bu çalışmada akademik makalelerde oldukça sık kullanılmaya başlanan GÖ tasarım yöntemleri ve kriterleri hakkında bilgi verilmektedir. Çalışma için literatür tarandığında mevcut bazı tasarım kriter tabloları bulunmaktadır ancak görsel iletişim tasarımı ve grafik tasarım kriterleri açısından eksiklikler olduğu görülmektedir. Ayrıca söz konusu GÖ'ler okuyucu kitlesine hitap ettiği ve ana temanın makaledeki özet metnin görsel temsili olduğu için algı teorileri açısından da ele alınmalı ve tasarlanmalıdır. Yapılan literatür taramalarında yer alan kılavuzlarda bu temel unsurların yer almadığı görülmektedir. Dolayısıyla bu çalışmadaki GÖ tasarım kriterleri tüm bu temel gereklilikleri göz önünde bulundurarak yeni ve güncel bir taslak sunmaktadır. Oluşturulan tasarım kriterleri için literatürden de yararlanılmıştır. Böylece hem bilim insanlarının yayımladığı yayınlardan hem de tasarım ve algı ilkelerinden beslenerek güçlendirilmiş bir kriter tablosu oluşturulmuştur.

Örneklerden de görülebileceği üzere akademik yayınlarda kullanılmaya başlanan GÖ'ler için tek bir standart bulunmamaktadır. Ancak makalelerin sahip olması gereken temel başlıklar gibi, GÖ'ler de tasarım yöntemleri ve kriterlerini içermelidir. Metinsel bilgi sayfalarını tek bir görselde özetlemek çok fazla yaratıcılık ve tasarım becerisi gerektirir. Bu nedenle bilimsel yayınlar için kullanılan GÖ'lerin tasarım kriterlerine sahip olması gerekir. Günümüzde özellikle saygın dergilerde bu kılavuzlar tam bir bütünlük göstermeseler de kullanılmaktadır. Oluşturulan tasarım kılavuzları dergi editörlerine yardımcı olmaktadır. Ele alınan beş örnek, farklı yayın evlerinin yüksek etki faktörlü dergilerinde yayımlanmış GÖ'lerdir. Her GÖ'nin kendine özgü bir tasarım yaklaşımı olduğu ve diğer tasarımlarla tutarlılık sağlamadığı görülmektedir. Bu durumun başlıca nedenleri, GÖ tasarım yöntemi ve kriter kılavuzları için komisyon birliği olmamasıdır. Ayrıca mevcut kılavuzlarda görsel iletişim tasarımı ve grafik tasarım için temel tasarım kriterleri eksiktir. Bilim dünyasında henüz yeni olan GÖ'ler için tutarlı bir ortak tasarım kılavuzunun oluşumuna katkıda bulunacağı düşünülen bu çalışma da mevcut kılavuzlardan uyarlanmıştır. Eksik tasarım öğeleri göz önünde bulundurularak ve literatüre bağlı kalınarak bir tasarımcının bakış açısından yeniden düzenlenmiştir.

Görsel soyut tasarım kılavuzları oluşturan dergi ve yayınevlerinden bazıları şunlardır:

Ibrahim (2018b), "Use of a visual abstract to disseminate scientific research" başlıklı çalışmasında doktor meslektaşlarıyla birlikte görsel özetleri tasarlamak için kriterler oluşturmuştur.

Lee ve Yoo (2023), "The current state of graphical abstracts and how to create good graphical abstracts?" başlıklı makalelerinde tasarım önerileri sunmuşlardır.

Duke Üniversitesi Tıp Fakültesi (t.y.), "Getting published: Visual & video abstracts" adlı bir web sitesi oluşturmuş ve akademik materyal yayımlayan akademisyenler için bir yol haritası çizmiştir.

Elsevier (t.y.), kurumsal sayfasında "Graphical abstract" adlı bir alan açarak yazarları için şablonlar oluşturmuş ve grafiksel özet/görsel özet hakkında bilgi vermiştir.

Buriak (2023) tarafından yayımlanan "That table of contents image looks really interesting: *Click*!" başlıklı yayında yazarlara bir yol haritası oluşturulmuştur.

Ancak her GÖ diğerlerinden farklıdır. Bütünlük sağlamaktadır. Ayrıca, kriter tablosunu oluşturan bilim insanlarının neredeyse tamamı tıp alanındandır ve tasarımcılarla çok az çalışmışlardır. Bu, bazı tasarım ve görsel algı teorileri bağlamında eksiklikler ortaya çıkarmıştır. Bu eksiklikler arasında renk, tipografi, denge, ritim, alan, oran-orantı, görsel hiyerarşi, vurgu, birlik, bütünlük ve süreklilik yer almaktadır. Bu çalışmada, mevcut GÖ tasarım kriteri kılavuzlarındaki eski kriterlere dayalı yeni bir tasarım yöntemi ve kriter tablosu sunulmaktadır. Önerilen kriterler, Gestalt algı prensipleri göz önünde bulundurularak ve bilimsel ve sanatsal tasarım temellerine dayanarak grafik/görsel iletişim tasarımı kriterleri ve görsel algı teorisi bağlamında sunulmaktadır.

Yöntem

Bilimsel yayınlarda kullanılan GÖ'lerin tasarımına odaklanan bu çalışma, bir derleme tasarımına sahiptir. Derleme makaleleri, yazarın araştırma yaklaşımı çerçevesinde belirli bir konu veya alanda yürütülen çalışmaları düzenler. Çalışma, derleme yöntemleri arasında sistematik bir derleme çalışması olarak sürdürüldü. Sistematik derlemelerde belirli yöntemler dikkate alındığından özellikle bilimsel sonuçlarda oldukça kullanışlı bir yöntemdir (Çınar, 2021). Derleme çalışmalarının amacı, ele alınan araştırma konusu hakkındaki diğer araştırmacıların yaklaşımlarını ve fikirlerini özetlemek ve bir sentez oluşturmaktır (Herdman, 2006; Khan vd., 2003). Derleme makaleleri sadece tüm bilgileri toplamak, bir kaynak listesi olarak değil ana fikirlere göre düzenlenmelidir. Bu nedenle her bir kaynağı ayrı ayrı listelemek ve detaylandırmak yerine, bu kaynakları birleştiren ana temaların ve konuların sunulması gerektiği söylenebilir (Karasar, 2009; Uman, 2011). Çalışmada mevcut beş yayınevi ve derginin GÖ tasarım kılavuzları incelenmiştir. Eksiklikleri ortaya konularak yeni bir GÖ tasarım kılavuzu önerilmiştir. Çalışmada önerilen ölçütler Gestalt algısı ile bilimsel ve sanatsal tasarım temellerine dayanmaktadır. İletişim tasarımı kriterleri ve görsel algı teorisi bağlamında sunulmaktadır. Ayrıca, bilimsel yayınlara katkıda bulunan GÖ'lerin nasıl çizilmesi gerektiği ve bilimsel verilerin hangi kurallar çerçevesinde GÖ'lere dönüştürülmesi gerektiği tasarım kriterleri ile verilmektedir. Akademik çalışma yürüten birçok araştırmacının, yayınlarının

dijital platformlarda erişilebilirliğini artırmak için GÖ'lere ihtiyaç duyduğu belirlendiğinden çalışmanın bu ihtiyaca karşılık geleceği ön görülmektedir.

Araştırmanın Etik İzinleri:

Bu çalışmada "Yükseköğretim Kurumları Bilimsel Araştırma ve Yayın Etiği Yönergesi" kapsamında uyulması gerektiği belirtilen tüm kurallara uyulmuştur. Yönergenin ikinci bölümü olan "Bilimsel Araştırma ve Yayın Etiğine Aykırı Eylemler" başlığı altında belirtilen eylemlerin hiçbiri gerçekleştirilmemiştir.

Etik Kurul İzin Bilgileri:

Araştırma açık erişimli dokümanlarla yürütüldüğünden etik kurul onayı gerekmemektedir.

Tartışma ve Sonuç

Literatüre dayalı olarak belirlenen Gestalt algı kuramları ve tasarım ilkeleri çerçevesinde GÖ'leri değerlendirmeyi amaçlayan bu çalışmada GÖ'ler algı kuramlarının farklı değişkenleri çerçevesinde değerlendirilmiştir. Bu bağlamda Gestalt algı kuramları ve tasarım ilkelerinin çerçevesi belirlenmiş ve ele alınan yayınevlerinin kriterleri ile birleştirilerek yeni kılavuza ulaşılmıştır.

Çalışmada yeni tasarım önerisinin üç temelde bölünmesi ve gruplandırılması (Teorik tasarım: Teorik bilginin organize edilmesi aşaması, Görsel tasarım: Görsele dönüştürülecek verilerin belirlenmesi ve Sosyal medya tasarımı: Sosyal medyaya hazırlık aşaması) uygun görülmüştür. Her başlık literatüre ve içeriğine dayalı olarak yazılmıştır. Gestalt algı kuramlarına dayalı görsel özet tasarımının bütünü etkileyeceği dikkate alınmıştır. Algı kuramı çerçevesinde tasarım sürecinde yakınlık ilkesi dikkate alınmış ve okuyucu kitlesinin özellikleri de göz önünde bulundurulmuştur. Tasarım boyunca kullanımı önerilerek benzerlik ilkesi dikkate alınmıştır. Okuyucunun devam eden bilgiyi takip edebilmesi için algıda süreklilik ilkesi dikkate alınmıştır. Çizimler sırasında, planlı bir şekilde tasarlanmış ve birbirleriyle simetri oluşturan görüntüler algısal hizalamada gruplandırılır. Bu önemli algı teorisi, GÖ tasarımı boyunca dikkate alınır. Tasarımın tüm kapsamlı kullanımı için figür-zemin ilişkisi, yakınlık, benzerlik, tamamlama, süreklilik ve sadelik temel tasarım ilkeleri göz öznünde bulundurulur.

Çalışma sonucunda beş literatür kaynağı incelendi ve eksiklikleri tamamlanarak yeni bir öneri oluşturuldu. Ibrahim (2018b), "Use of a visual abstract to disseminate scientific research" başlıklı çalışmasında, doktor takım arkadaşlarıyla birlikte GÖ tasarlamak için kriterler oluşturdu. Lee ve Yoo (2023), "The current state of graphical abstracts and how to create good graphical abstracts?" adlı makalelelerinde tasarım önerileri sundular. Duke Üniversitesi Tıp Fakültesi (t.y.), "Getting published: Visual & video abstracts" adlı bir web sitesi oluşturdu ve akademik materyal yayımlayan akademisyenler için bir yol haritası çizdi. Elsevier (t.y.), kurumsal sayfasında "Graphical abstract" adlı bir alan açarak yazarları için şablonlar oluşturdu ve grafiksel özet/görsel özet hakkında bilgi verdi. Buriak (2023) tarafından yayımlanan "That table of contents image looks really interesting: *Click*!" başlıklı yayın da yazarla bir yol haritası oluşturdu. Sonuç olarak, Gestalt algı ilkelerini göz önünde bulundurarak, bilimsel ve sanatsal tasarım ilkelerine dayalı, grafik/görsel iletişim tasarımı

tasarım kriterleri ve görsel algı teorisi bağlamında yeni tasarım yöntemi ve kriter tablosu önerisi sunuldu.

Sonuç olarak, bu kriterlere göre tasarlanan özetlerin yayının okunmasını artırdığı ve yayılmasını sağladığı görülmektedir. İyi tasarlanmış bir görsel tasarım, bir kişinin görüntüleme süresini saniyelerce koruyabilir. Tıpkı müzelerde bir sanat eserinin önünde saatlerce durup eserin her ayrıntısının izlenmek istenmesi gibi. Bu tür iyi tasarlanmış GÖ'ler okuyucunun dikkatini çeker ve makaleyi okumasına yardımcı olur. Tüm bu bilgiler ışığında, çalışmada GÖ tasarım yöntemleri ve kriterleri dikkate alınarak tasarlanan tüm bilimsel görsellerin okuyucuların ve araştırmacıların dikkatini çekeceği öngörülmektedir. Verilen yöntemler uzun araştırmalar ve deneyimler sonucunda oluşturulduğundan, görsellerin konuşmadan iletişimi mümkün kılması sayesinde, akademik araştırmacılar konuştukları dil ne olursa olsun yayınlarının dünyanın her yerinden okunmasını sağlayabileceklerdir.