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The Representation of Help Givers in First Aid Instruction Materials: A Multimodal Reception Study

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ABSTRACT

This study explores how far a variety of choices in the visualization of help givers in first aid instruction materials can be associated the perception of these help givers in viewers. We present a reception study, in which we analyze 40 images from a first aid corpus by focusing on variations in their image type, perspective, camera angle, shot size, color, facial expression visibility, and gender. A total of 107 participants evaluated these images using 20 pairs of trait adjectives on a 6-point scale. Results indicate that drawings had a slightly higher positive composite score than photographs. Bird's-eye perspectives, front-facing camera angles, and full-body shots all yielded a higher positive composite score, which suggests a preference for visual cues related to directness and completeness. Color images were favored over grayscale. Interestingly, images with obscured facial expressions were rated higher, potentially due to reduced emotional cues allowing for individual interpretation. Images portraying female help givers consistently received higher positive scores than male help givers. These findings show the relation between visual design and the perceived positive characteristics of help givers. The insights can be useful in the process of optimizing first aid material design.

Introduction

First aid instruction materials are designed to provide clear, accessible, and effective guidance on life-saving techniques. Given the urgency and high stakes of first aid scenarios, these materials must ensure that users can quickly comprehend and apply the information presented. A key element in their design is the combination of text and imagery, where visual representations play a crucial role in supplementing, clarifying, or even replacing textual instructions. Previous research has explored the relationship between picture-text relations and meaning-making in instructional materials (e.g., van der Sluis et al., 2018, 2025; Wildfeuer et al., 2023). In the present study, we focus on a particular aspect of the pictorial content: the visual representation of help givers within these materials. By zooming in on the visual display of these important characters in the overall material, we investigate how variations in visual representation, such as the use of drawings versus photographs, monochrome versus color imagery, and realistic versus comic-inspired styles (among other comparisons), could be related to the perception of these characters and, ultimately tell us something about the effectiveness of these communicative artifacts. While first aid materials aim to instruct users about the correct procedures for administering aid (e.g., by displaying CPR or the Heimlich maneuver), the visual portrayal of help givers can arguably be related to how these instructions are received, interpreted, and applied in real-life situations.

The central aim of this study is to explore particular attributes that individuals associate with help givers depicted in different visual formats. By examining these associations, we seek to determine whether certain stylistic choices improve or hinder the perceived positive characteristics of help givers. Our study builds on theoretical perspectives in multimodal analysis, instructional design, and the perception of personality traits, and tries to assess levels of realism and abstraction in medical imagery, gender representation, and the relation between shot types and perspectives on the one hand and viewer reception on the other. Our aim is also to contribute more generally to the dynamically evolving context of health communication and the question whether there are specific types of visuals or particular ways of visually representing medical details that are more effective than others (see, e.g., Kearns et al., 2021. To investigate these questions, we conducted a reception study using a selection of 40 images from the Pictures and Text (PAT) project corpus (see further details below and van der Sluis & Redeker, 2019). Participants evaluated these images based on perceived personality traits of help givers, using Peabody's (1987) representative trait adjectives and a 6-point Likert scale. The results provide insights into how visual representation shapes user engagement and comprehension,

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with implications for the design of more effective and inclusive first aid instruction materials.

Theoretical background

First aid instruction materials

First aid instructions prepare us for the role of a helper in an emergency situation by providing guidance on how to respond in an emergency situation and, based on specific knowledge, how to assess the priorities for the casualty (Dunne, 2016), focusing on saving lives and minimizing injury (Celik, 2011). First aid training by healthcare organizations worldwide teaches the relevant procedures as indispensable basic life support skills (Olasveengen et al., 2020; Panchal et al., 2020) by offering face-to-face lessons or interactive teaching online. Similar but often much more condensed knowledge is provided in professional textbooks, leaflets, or posters, which instruct users with texts and images to perform procedural tasks to save someone's life. In the present study, we work with pictures from the PAT corpus on first aid instructions. First aid training of the public has had extremely beneficial consequences and the demand for effective learning materials has increased (Eisenburger & Safar, 1999; Greif et al., 2021).

First aid instruction materials must prioritize clarity and accessibility to make sure that users, regardless of their background or level of expertise, can easily grasp, learn, and apply life-saving techniques in critical situations. Effective instructional design can rely on straightforward language, logical sequencing, and intuitive layout to minimize confusion and maximize usability (see, e.g., Morrison et al., 2019). Visual elements play a key role, as images can supplement or even replace text (Katz et al., 2006). Effective design strategies should also make instructions more universally comprehensible, for instance for individuals with limited literacy skills or those who have difficulty with the language used in the verbal content that accompanies the images in the instruction. These materials also follow genre-specific conventions, such as displaying the manner in which an action should be performed, or the result of a procedural action, and incorporating step-by-step visual guidance. Forms of instructions which involve user-controlled sequencing or more interactive approaches have recently been evaluated as becoming more important and being efficient (e.g., Birkun, 2024; Jaffe, 1997; Stamenković & Wildfeuer, 2024).

The critical evaluation of the effectiveness of first aid instructions in terms of empirical evidence is a crucial component of the ERC (The European Resuscitation Council) education guidelines (Greif et al., 2021). Concluding from these guidelines, the variety of instructional techniques is generally seen as effective in providing theoretical knowledge about first aid procedures (Berkebile & Safer, 1973; Breivik et al., 1980). However, the breadth of instructions available in different layouts and media genres has been found to show significant variation specifically on the level of visualizations. The specific visual portrayal of helpers is one particular aspect of the different forms of visualization that need to be tested, and it is in the foreground of our analysis. In first-aid material, the depicted helper is an important social actor for viewers to engage with. Research in social perception shows that viewers gain impressions of trustworthiness and competence from facial and bodily cues within milliseconds, often also before attending any accompanying text (e.g., Todorov et al., 2015). Their portrayed facial features and the emotional expression function as key social signals to recognize the character as a competent person and to establish an interpersonal relationship. Unclarity and ambiguity can hinder this recognition and may erode the perceived credibility of the instructional content (Bruce & Young, 1986).

In a previous study, van der Sluis et al. (2025) evaluated instructional pictures depicting Heimlich maneuver thrusts through three studies and their corpus analysis revealed a range of inconsistencies which have had its impact on the interpretation of the final product. For instance, a user survey found depictions unclear, especially in illustrating abdominal pressure, while expert feedback highlighted safety concerns, particularly regarding incorrect hand placement. Most importantly, the experts in the study also commented on the realism of the facial expressions of the helpers and victims and suggested that unrealistic, understated, as well as exaggerated presentations may distract the user from the purpose of the instructional material. Especially, the expert comment that in one of the pictures the helper may appear intimidating and the fact that the study did not cover the users' sense of realism of the pictures is a strong motivation to further investigate the perception of helpers. While other work found inconsistencies in further forms of emergency instructions (e.g., Cantrell et al., 2013), van der Sluis et al.'s (2025) study generally stressed the need for an improved visual clarity in first aid instructions. In our study, we continue these efforts by focusing on the portrayal of help givers more particularly.

Instructions, comics, and multimodality

Another connection that has increasingly been recognized in the fields of health communication, multimodal studies, and visual narratives is the relationship and overlap between medical instructions or knowledge dissemination and comics. Many first aid instruction materials, particularly those designed to teach emergency response techniques such as the Heimlich maneuver or CPR, incorporate visual storytelling elements akin to comics. These so-called "instruction comics" blend sequential images, speech bubbles, or captions in a particular page layout to present step-by-step guidance in a structured and engaging manner (Wildfeuer et al., 2023). Comics are uniquely suited for instructional purposes due to their ability to convey complex actions in a visually intuitive and temporally organized manner (Kearns et al., 2021; Tavares et al., 2023). Unlike static illustrations or pure text instructions, comics facilitate comprehension by breaking down actions into smaller, digestible units, presented in a logical sequence (see also Bateman et al., 2017). The presence of multiple panels allows for a clear representation of cause-and-effect relationships, which can demonstrate both the correct execution of first aid procedures and the potential consequences of inaction. Wildfeuer et al. (2023) analyzed the structural similarities between instruction comics and traditional comics and showed the prevalence of typical comic book layout features such as inset panels, overlapping images, and extraposed captions (captions displaced from the main image they refer to) (see also Cohn, 2013). These elements contribute to a multimodally complex presentation of first aid procedures which guide the reader through a sequence of actions with both visual and textual cues. For instance, an instruction comic on the Heimlich maneuver may use an inset panel to emphasize the proper hand placement while a larger panel illustrates the full motion of the thrust. Furthermore, research by Pederson and Cohn (2016) supports the idea that instruction comics frequently incorporate extraposed captions, which play a crucial role in medical communication. These captions provide additional details on preparatory actions, such as confirming whether a victim is actually choking or instructing a bystander to call emergency services before proceeding with an intervention. Such captions are often strategically placed at the top or bottom of the page, making sure they are noticed before the reader engages with the sequence of procedural steps.

The trend of using comics for medical education and patient care has been well-documented (see, e.g., Czerwiec et al., 2015; Green & Myers, 2010; Krüger-Fürhoff & Squier, 2020). The advantages of comics over other instructional media stem from their ability to combine visual representation with narrative progression, which makes medical procedures more accessible to a wide range of audiences, including those with limited medical knowledge (Joshi et al., 2019; Kearns et al., 2021; Leiner et al., 2018). As we were able to see in our corpus, even those instructions which do not contain drawings still resemble the structure of comics. Their single-page format requires a high degree of visual efficiency, often incorporating lists, tables, and varied panel arrangements to improve clarity (Wildfeuer et al., 2023), which is often highly similar to the layout of textbook pages or posters more generally. The effectiveness of instruction comics in conveying first aid procedures raises important questions regarding their usability compared to traditional first aid manuals and visual guides. van der Sluis et al. (2017) analyzed multimodal instructional materials and found that while static images and written explanations are useful, they lack the dynamic flow of sequential visual storytelling. Comics, by contrast, can pace information delivery across multiple panels, and thus allow users to process each step in manageable segments (Kearns et al., 2021). They incorporate elements of both narrative and instructional genres, which creates a unique multimodal artifact that blends storytelling with direct guidance (Wildfeuer et al., 2023). Their structured yet flexible design allows them to be adapted for different audiences, including children, non-native speakers, and individuals with varying levels of literacy.

From a multimodal perspective, both comics as well as textbook pages serve as distinctive media that integrate written language and visual elements within a structured, static, two-dimensional space. As spatial artifacts, they require recipients to actively construct meaning from their multimodal composition. According to Bateman et al. (2017), comic book pages or textbook pages, like posters, function as canvases – semiotic spaces that carry meaningful regularities which can be identified and interpreted. The notion of canvas is central to multimodal analysis, as it highlights how textual and pictorial elements interact within a defined visual structure (Bateman, 2008; Bateman et al., 2017). In comics, the spatial arrangement of these elements plays a crucial role in guiding the reader's interpretation and navigation through the narrative.

Character faces and their emotions

The comic book or textbook page as the overall canvas on which meaning is created serves as the starting point for our zoomed-in perspective on representations of characters on these canvases, constructed for example by semiotic modes such as line drawings or photographs. The way in which the characters in instructional images are depicted and which medium-specific elements are used for the portrayal of specific characteristic traits, facial expressions, or emotions are already crucial questions in visual studies (e.g., Tseng et al., 2018; Wilde, 2024), especially in relation to readers' attention and engagement (Eisner, 1985) as well as their familiarity with and perceptibility of the visualized content (Forceville, 2006). Especially within the first aid context, readers are likely to infer the competence and trustworthiness of the visualized helper from the portrayed facial expression (MacRae, 1995; Mason et al., 2006) as well as from the helper's gender (Dong et al., 2018; Li et al., 2021).

From a production perspective, depicting facial expressions or the emotions they convey presents significant challenges, even for skilled artists. McCloud (2006) suggested that by manipulating the intensity of basic emotional expressions, artists can reliably create and communicate a range of complex emotions in comics. However, empirical research by Stamenković et al. (2018) demonstrated that this process was far more difficult than McCloud's model implies. Their study – based on three questionnaire-based tasks: intensity matching, label matching, and compositionality rating – revealed that while viewers could often judge the intensity of emotions correctly, identifying specific emotions and understanding complex expressions proved to be much more problematic. One of the main difficulties in drawing emotions is the inherent ambiguity and overlap between different emotional states. Even when a character's face is designed to represent a specific emotion, viewers may interpret it differently, which sometimes leads to seeing unintended emotions or a fail to recognize the intended one.

On that note, Ojha et al. (2021) observed that comic-specific elements such as pictorial runes (small visual symbols that appear alongside or within images to convey non-verbal meaning, such as emotion, motion, mood, or abstract concepts) support communicating emotions. Interestingly, these elements usually stand in spatial proximity, but separate from the faces of the characters (see also Forceville, 2011; Tasić & Stamenković, 2017). Media artifacts that are not intentionally created as comics and that only use particular features might therefore not always make use of these specific elements or a combination of these with other elements, but rather find other ways of representing emotions. van der Sluis et al. (2025), for example, do not discuss facial expressions in further detail, but one expert participant in their study noted that coloring the victim's face in blue might have been distracting from the actual instructional material. The authors also highlight that relevant aspects of a first aid procedure should not be "obscured by any graphical enhancement (e.g., arrows or lines) nor by the visualisation of the helper and victim themselves" (van der Sluis et al., 2025). While comics are generally the preferred medium to convey health-related and instructional information (Kearns et al., 2021), the complex multimodal construction of specific aspects such as facial expressions and emotions seems to be a challenging aspect and its effectiveness and influence on processes of knowledge dissemination still have to be tested further.

Related to this is the fact that the process of translating emotions into drawn lines is itself imprecise. Even highly skilled artists may struggle to unambiguously cue particular emotions, as nuances of expression can be difficult to capture visually. The complexity increases in more photorealistic forms of art, where small details in shading or line work can significantly alter the perceived emotion (Faigin, 1990) – similar to what has been examined by Ojha et al. (2021) for combinations with runes. Consequently, different levels of stylization in comics are relatable to how emotions are perceived, with more abstract or exaggerated styles sometimes allowing for clearer emotional communication (Groensteen, 2003; McCloud, 1993).

Methodology

Research questions and operationalization

The present reception study investigates whether (and to what degree) choices in the visualization of help givers in first aid instruction materials can be associated with the perception of these help givers in viewers. Specifically, it seeks to investigate whether the perception of visualized help givers is related to the following characteristics:

- Type of visualization, i.e., photographs versus drawings.

In first aid instruction material in the form of a textbook, poster or leaflet, characters can be represented in both photographs or drawings, see Figure 1. Even within the same medium (see the discussion below), several different formats can be used.

- View, i.e., perspective, angle, shot size.

Both photographs and drawings can represent characters with a very close distance or from further away. Sometimes helper and victim are shown together to demonstrate a particular action, sometimes the focus is on particular body parts of the help giver. The choice of a particular camera angle or perspective can therefore be highly relevant.

- Coloring, i.e., color versus monochrome.

Color can be used to make representations more realistic or to highlight specific actions by the help giver.

- Emotional display, i.e., facial expression.

Facial expressions can reveal help-givers' emotional state.

- Presented gender, i.e., female, male, gender neutral.

Whether help givers are represented in a specific and perhaps stereotypical gender can be linked to the overall perception of them.

Some of the mentioned characteristics are prompted by the variety in the corpus (e.g., type of visualization, view, coloring), while others are motivated by findings from other studies (emotional display, gender) (cf. Dong et al., 2018; Li et al., 2021; MacRae, 1995; Mason et al., 2006). To address our research aims and analyze the perception of help givers' representation in instruction materials, a reception study was conducted in which participants evaluated personality traits of the represented characters in a corpus of first aid instruction images. For this, Peabody's (1987) representative trait adjectives were used. In this section, we will first describe the details of our corpus and then introduce the theoretical and methodological framework designed to evaluate attributes associated with the help givers represented in this corpus. We will also give an overview of the participants that took part in our study as well as the procedure of how they rated the images using the categories provided.

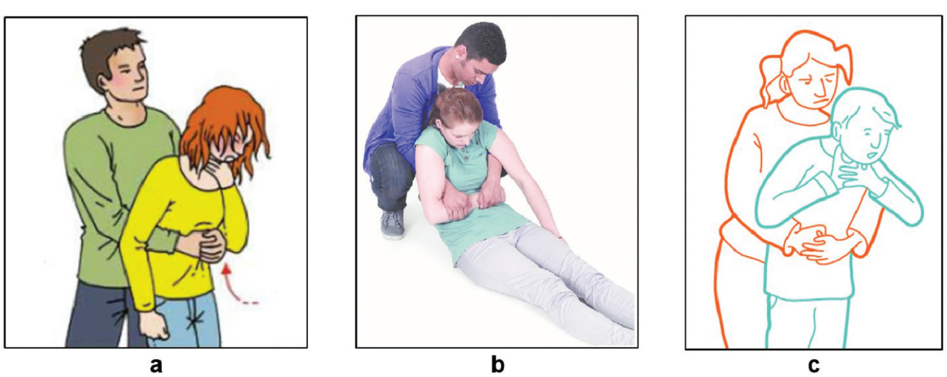

Figure 1. Examples of images from the corpus used in the study.

Data: the PAT project corpus

First aid instruction material can be very diverse, depending on the medium or media used for the instruction. These can be posters, leaflets, or textbooks, but also videos or e-learning content (see more about the effectiveness of different types of material in Greif et al., 2021). In this study, we focus on printed textbook material that is used in live training sessions and for learning at home. As the primary source for these instructions, we used the PAT project corpus (van der Sluis & Redeker, 2019). The PAT project addressed the use, effects, and optimization of first-aid instructions that contain pictures and text (PAT).

The part of the corpus we started with consisted of 46 first aid instructions taken from two editions of *Het Oranje Kruis Boekje* (2011 and 2016), a textbook used in certified educational trainings on first aid procedures with which the so-called "First Aid Diploma" can be obtained. *Het Oranje Kruis* is one of the Dutch organizations that provide and offer first aid trainings to educate first responders to act accurately in emergency situations. The instructions in *Het Oranje Kruis Boekje* are usually designed in the form of double-page spreads that include both written language and images. The latter are either photographs or drawings, showing both the general scenarios in which first aid measures are processed as well as particular actions or tasks performed by helpers on victims. Specific text units are partly separated with colored backgrounds or in dedicated text boxes. Many double page spreads include a table grid format with rows, columns, and panel-like segments. More specific elements are numbers or arrows indicating the step-wise procedure. An example of the recent version from 2021 can be found at https://www.thiememeulenhoff.nl/mbo/ehbo. Apart from the instructions published by *Het Oranje Kruis*, the PAT corpus contains first-aid instructions from online sources. In total, the PAT corpus includes 295 first-aid instructions comprising 1140 images. The instructions present 92 first-aid procedures categorized in 15 topics identified by *Het Oranje Kruis*. As part of the PAT (Picture and Text) project, the datasets were annotated using the PAT Workbench, a custom-made web tool designed to annotate multipage multimodal documents (van der Sluis et al., 2016).

For our study, a subset of 40 images was selected from the images in the PAT corpus. We collected those images in which the help giver's face was at least partially visible, and we tried to represent as many different tasks and helpers as possible. We did this by avoiding taking several items from the same set. Examples of these images are given in Figure 1. Examples (a) and (c) show drawings that present an action from the Heimlich maneuver; example (b) presents a photo that displays an action from the Rautek maneuver.[1]

In Table 1, we present the 40 images used in our study, described according to the visual characteristics given in Research questions and operationalisation. We provide this description in the form of an initial annotation that all three authors made in preparation for the study. For this, we compared our individual annotations, reviewed the overall agreement, and discussed cases in which we did not initially agree (e.g., for the perspective and angle of some images). The initial interrater agreement was 95.6%, with raters agreeing on 306 out of 320 attributes.

Selecting and measuring personality traits

In order to evaluate the personality traits of the represented characters in our corpus, we used Peabody's (1987) representative trait adjectives. We opted to use an existing list instead of our own, given the fact that Peabody's selection was quite extensive, based on a large body of previous work, which ensured a high degree of standardization. Peabody's study argued for selecting representative variables from natural language trait adjectives and classifies them according to meaning similarity, and structuring scales accordingly. Based on this framework, our study used pairs of contrasting adjectives (e.g., disorganized-organized, incompetent-capable, distrustful-trustful, rash-cautious) to evaluate attributes associated with help givers in the selection of pictures from a dedicated corpus. There are 57 available pairs in Peabody's (1987) results. As we had 40 images, rating them on all 57 pairs would mean collecting 2280 scores from every participant, which is why we decided to make a selection of adjective pairs.

From the full set of trait adjectives that are available in Peabody's (1987) setup, we selected 20 pairs of adjectives (from different scale classes) which we found potentially relevant to the perception of help givers, i.e., those pairs which described characteristics that could be related to the process of help giving. Table 2 gives an overview of these. All authors agreed on this selection of adjectives through critical review and discussion. For this, we used descriptions provided by first aid professionals themselves (Dunne, 2016). The resulting 20 attribute pairs were used by participants to rate the images in our corpus via a questionnaire.

For a second step in our study and in order to evaluate the results later on, we also consulted eight medical professionals from the Netherlands, Germany, and Serbia, all well-trained in first aid and most of them frequently practising it. They performed two tasks: (1) they rated the importance of the attribute pairs given in Table 2 for the evaluation of first aid performances and (2) they selected those attribute pairs they deemed most important. From their rating and selection, we calculated the correlation of the mean scores, which was 0.708. As a result, we present the following shortlist of key attribute pairs:

- irresponsible – responsible
- disorganized – organized
- incompetent – capable
- distrustful – trustful
- temperamental – calm
- careless – thorough
- rash – cautious
- unassured – self-confident
- uncooperative – cooperative
- impulsive – self-controlled

These key pairs are a selection (i.e., a shortlist) of the 20 attribute pairs given above. We decided to have this selection in order to provide further validity of the initial choice, i.e., to

Table 1. Overview of the characteristics of the 40 images used in the study.

#	Maneuver	Photo or Drawing	Persp.	Angle	Shot	Color	Fac. exp. visib.	Gender of helper
1	Rautek	Drawing	Bird	Right	Full	Yes	No	Female
2	Rautek	Photo	Neutral	Left	Full	Yes	No	Male
3	Rautek	Photo	Neutral	Right	Medium	Yes	No	Male
4	Heimlich	Drawing	Neutral	Right	Medium	Yes	Yes	Female
5	Heimlich	Drawing	Neutral	Right	Medium	Yes	Yes	Male
6	Turning a victim	Drawing	Neutral	Front	Medium	Yes	No	Male
7	Heimlich	Drawing	Bird	Right	Full	Yes	No	Female
8	Heimlich	Drawing	Neutral	Right	Medium	Yes	Yes	Male
9	Heimlich	Drawing	Neutral	Left	Medium	Yes	Yes	Male
10	Recovery position	Photo	Bird	Left	Full	Yes	No	Female
11	Heimlich	Drawing	Neutral	Right	Medium	No	Yes	Male
12	Back thrusts	Drawing	Bird	Left	Full	Yes	No	Gender neutral
13	Heimlich	Drawing	Neutral	Front	Medium	No	Yes	Male
14	Heimlich	Drawing	Neutral	Right	Full	No	Yes	Male
15	Back thrusts	Photo	Neutral	Right	Medium	Yes	No	Female
16	Rautek	Drawing	Bird	Right	Full	Yes	No	Female
17	Rautek	Photo	Bird	Front	Other	Yes	No	Male
18	Heimlich	Photo	Neutral	Left	Medium	Yes	Yes	Male
19	Heimlich	Drawing	Bird	Left	Full	Yes	No	Female
20	Heimlich	Drawing	Bird	Left	Full	No	No	Female
21	Recovery position	Drawing	Neutral	Front	Full	Yes	No	Male
22	Back thrusts	Photo	Neutral	Right	Medium	Yes	Yes	Female
23	Heimlich	Photo	Bird	Right	Medium	Yes	Yes	Male
24	Rautek	Drawing	Neutral	Left	Full	No	Yes	Male
25	Bandaging	Drawing	Neutral	Right	Full	Yes	Yes	Male
26	Rautek	Photo	Bird	Right	Medium	Yes	No	Female
27	Heinlich	Drawing	Neutral	Front	Medium	Yes	Yes	Male
28	Other	Drawing	Bird	Right	Other	Yes	Yes	Gender neutral
29	Check breat./Resuscit.	Drawing	Neutral	Front	Other	Yes	Yes	Female
30	Defibr./Re-suscit.	Drawing	Bird	Front	Medium	Yes	No	Female
31	Back thrusts	Photo	Neutral	Left	Medium	Yes	Yes	Male
32	Rautek	Photo	Bird	Right	Medium	Yes	No	Male
33	Heimlich	Photo	Neutral	Left	Medium	Yes	No	Female
34	Resuscit.	Photo	Bird	Front	Medium	Yes	No	Female
35	Rautek	Photo	Bird	Right	Medium	Yes	No	Male
36	Bandaging	Photo	Neutral	Front	Full	Yes	Yes	Male
37	Rautek	Photo	Neutral	Left	Medium	Yes	No	Female
38	Heimlich	Photo	Neutral	Right	Medium	Yes	Yes	Male
39	Recovery position	Photo	Bird	Right	Full	Yes	No	Male
40	Recovery position	Drawing	Neutral	Left	Medium	Yes	No	Male

Table 2. A selection of trait adjectives belonging to different scale classes from Peabody's (1987) setup.

Scale class	Descriptors
assertiveness	timid – bold
unassertiveness	unassured – self-confident uncooperative – cooperative, rash – cautious
affiliation	unkind – kind, cold – warm, unfriendly – friendly, quarrelsome – peaceful
impulse expression	distrustful – trustful, unenthusiastic – enthusiastic
impulse control	impulsive – self-controlled, frivolous – serious
conscientiousness	inactive – active, careless – thorough, disorganised – organised, irresponsible – responsible
emotional stability	unstable – stable, temperamental – calm
intelligence & ability	incompetent – capable, unintelligent – intelligent

have someone more acquainted with actual first aid select what truly is relevant to this context. In this way, we went one step beyond what could be taken as our own assessment of what to include in the instrument. In the results section, we will present the results both for the unfiltered list of all 20 pairs and for the selection of 10 most relevant pairs (the latter based on experts' responses).

Instead of assessing individual adjective pairs, we decided to create a composite measure, an overall positivity score. The composite measure allows for a simpler way of comparing different choices with a single measure and avoids singling out particular adjectives. The composite measure reflects general positivity across multiple trait adjectives. The term we will be using to refer to it will be *positive composite score*. Given this, the internal consistency of those items combined into the composite score was assessed using Cronbach's Alpha. The values across the 40 individual picture scales ranged from .949 to .983 when all 20 attributes were used to create one measure and from .933 to .976 when the experts' selection of attributes was used. In both cases, the values indicate excellent reliability (McCrae et al., 2011; Nunnally & Bernstein, 1994).

Participants

The study involved 107 university students (76 female, 31 male) with an average age of 21, all native speakers of Serbian. Participants had varying levels of first aid experience, distributed as follows: 66 participants had no first aid experience, 9 participants had some experience but no formal training, and 32 participants had received first aid training (most likely the one included in the mandatory driver education in Serbia). We selected university students as participants because they were less likely to have extensive prior training or repeated exposure to first aid materials, which made them an appropriate group for assessing first aid visuals with few primed viewers. At the same time, they were not too young and did not require an introduction to what first aid is. This target population was also more likely to be making first steps into more specific first-aid procedures in the years ahead. Students of medical and nursing programs were deliberately excluded from the study.

Procedure

Our participants rated all 40 single images using the bigger set of 20 pairs of adjective traits (see Table 2 in a randomized order via an online Google Forms questionnaire. Ratings were collected using a 6-point Likert scale, where each side represented one of the contrasting adjectives (e.g., impulsive 1 - 2 - 3 - 4 - 5 - 6 self-controlled). The participants were asked to describe the person depicted in the image/drawing by selecting intensity levels on adjective scales. Each scale ranged from 1 to 6, where 1 and 6 represented the extreme values. Participants could choose the extremes or intermediate ratings between them (2, 3, 4, or 5) to provide a more precise assessment of the depicted helper.

As our participants were native speakers of Serbian, two independent experts (one court translator and university-level teacher of English and another university-level teacher of English) performed a translation and back-translation procedure to ensure that the terms in the target language properly reflected the original relations. The study was approved by the Research Ethics Committee of the Faculty of Philosophy, University of Niš. The participants provided their informed consent by accepting a statement at the beginning of the questionnaire, which noted that the study was entirely anonymous and that, by submitting their responses, participants agreed that the collected data would be used solely for scientific purposes.

Results

In this section, we will first present the results based on calculations that included all 20 evaluated adjective pairs for all images. After this, we will present the results based on calculations where only the most relevant 10 pairs for all images are selected.

All 20 pairs of adjective traits

For our analysis, we grouped the 40 images according to the following criteria: image type, perspective, angle, shot size, color, visibility of the facial expressions, and help giver's gender. We then compared whether various values belonging to these categories would be significantly different from each other. Table 3 shows the descriptive statistics for all these categories counting the results for all 20 adjective pairs selected. These are illustrated in Figure 2. The mean number shows the average rating on the 1–6 scale for all items belonging to each of the compared categories (positive composite score) and here based on all 20 adjective pairs. When it comes to the mean numbers, 1 stands for the negative trait and 6 for the affirmative one.

Table 3. Descriptive statistics for various image characteristics based on all 20 adjective pairs.

Image Type	Mean	Std. Dev.
Drawing	4.13	0.71
Photo	4.04	0.78
Perspective	Mean	Std. Dev.
Bird	4.29	0.78
Neutral	3.96	0.72
Angle	Mean	Std. Dev.
Right	3.97	0.74
Left	4.14	0.77
Front	4.27	0.75
Shot Size	Mean	Std. Dev.
Medium	4.04	0.73
Full	4.17	0.75
Colored	Mean	Std. Dev.
Yes	4.15	0.72
No	3.69	0.92
Facial Expression Visibility	Mean	Std. Dev.
Facial expression visible	3.91	0.73
Facial expression not visible	4.24	0.75
Helper Gender	Mean	Std. Dev.
Female	4.26	0.72
Male	4.00	0.75

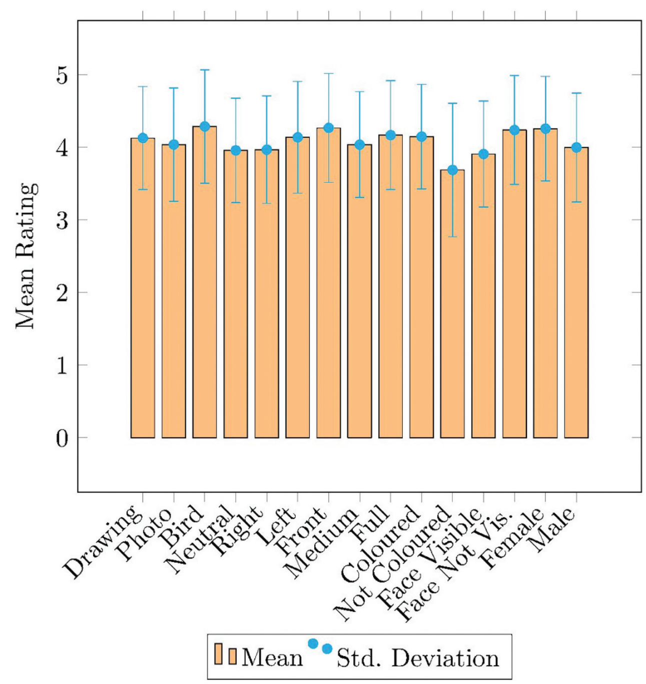

Figure 2. Mean ratings for all image characteristics (all pairs), represented by the main bars. The error bars represent the standard deviation from the mean score.

A series of t -tests was conducted to compare various image characteristics in terms of participant ratings based on all 20 pairs of adjectives and these explored whether the differences among different pairs of variables were statistically significant or not. The results indicated a significant difference between drawing images ($M = 4.13$, $SD = 0.71$) and photo images ($M = 4.04$, $SD = 0.78$), t (106) = 2.89, $p = .005$. A significant difference in the positive composite score was found between bird's-eye perspective images ($M = 4.29$, $SD = 0.78$) and neutral perspective images ($M = 3.96$, $SD = 0.72$), t (106) = 10.02, $p < .001$. Regarding camera angle, left-angled images ($M = 4.14$, $SD = 0.77$) were rated significantly higher than right-angled images ($M = 3.97$, $SD = 0.74$), t (106) = −5.69, $p < .001$. Similarly, front-facing images ($M = 4.27$, $SD = 0.75$) were rated significantly higher than left-angled images, t (106) = −3.48, $p = .001$, and right-angled images, t (106) = −7.60, $p < .001$. For shot size, full-body images ($M = 4.17$, $SD = 0.75$) received a significantly higher positive composite score than medium-shot images ($M = 4.04$, $SD = 0.73$), t (106) = −4.80, $p < .001$. A significant difference was also found between color images ($M = 4.15$, $SD = 0.72$) and grayscale images ($M = 3.69$, $SD = 0.92$), t (106) = 8.62, $p < .001$. Similarly, regarding facial expression visibility, images where facial expressions were not visible ($M = 4.24$, $SD = 0.75$) were rated significantly higher than those where facial expressions were visible ($M = 3.91$, $SD = 0.73$), t (106) = −10.04, $p < .001$. Lastly, helper gender was significantly related to the participant ratings, with female helpers ($M = 4.26$, $SD = 0.72$) receiving a higher positive composite score than male helpers ($M = 4.00$, $SD = 0.75$), t (106) = 8.07, $p < .001$.

The shortlisted 10 pairs of adjective traits

Table 4 is similar to the previous one, but it shows the descriptive statistics for all these categories counting the results for only the 10 shortlisted adjective pairs. These are illustrated in Figure 3. The mean number once again shows the average rating on the 1–6 scale for all items belonging to each of the compared categories (positive composite score), but now based on the 10 expert-shortlisted adjective pairs. Again, 1 stands for the negative trait and 6 for the positive one.

Table 4. Descriptive statistics for various image characteristics based on the shortlisted adjective pairs.

Image Type	Mean	Std. Dev.
Drawing	4.19	0.75
Photo	4.10	0.81
Perspective	Mean	Std. Dev.
Bird	4.33	0.80
Neutral	4.03	0.76
Angle	Mean	Std. Dev.
Right	4.02	0.77
Left	4.22	0.82
Front	4.33	0.79
Shot Size	Mean	Std. Dev.
Medium	4.11	0.76
Full	4.21	0.79
Colored	Mean	Std. Dev.
Yes	4.21	0.75
No	3.75	0.97
Facial Expression Visibility	Mean	Std. Dev.
Facial Expression Visible	3.98	0.76
Facial Expression Not Visible	4.29	0.79
Helper Gender	Mean	Std. Dev.
Female	4.32	0.76
Male	4.07	0.79

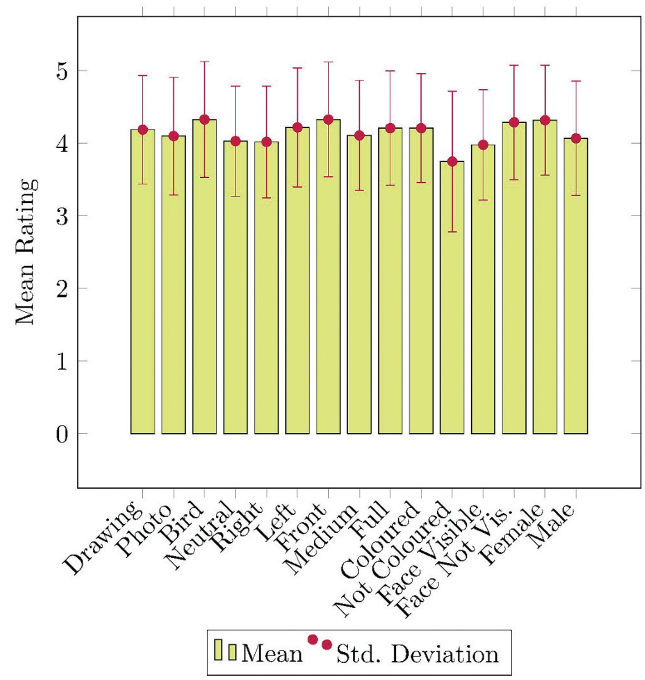

Figure 3. Mean ratings for all image characteristics (shortlisted pairs), represented by the main bars. The error bars represent the standard deviation from the mean score.

Again, t -tests were conducted to compare various image characteristics in terms of participant ratings, but now based on the 10 shortlisted adjectives. The results indicated a significant difference between drawing images ($M = 4.19$, $SD = 0.75$) and photo images ($M = 4.10$, $SD = 0.81$), t (106) = 2.38, $p = .019$. A significant difference in the positive composite score was found between bird's-eye perspective images ($M = 4.33$, $SD = 0.80$), and neutral perspective images ($M = 4.03$, $SD = 0.76$), t (106) = 9.21, $p < .001$. Regarding camera angle, left-angled images ($M = 4.22$, $SD = 0.82$) were rated significantly higher than right-angled images ($M = 4.02$, $SD = 0.77$), t (106) = −5.93, $p < .001$. Similarly, front-facing images ($M = 4.33$, SD = 0.79) were rated significantly higher than left-angled images, t (106) = −2.92, $p = .004$, and right-angled images, t (106) = −7.44, $p < .001$. For shot size, full-body images ($M = 4.21$, $SD = 0.79$) received significantly higher ratings than medium-shot images ($M = 4.11$, $SD = 0.76$), t (106) = −3.33, $p = .001$. A significant difference was also found between color images ($M = 4.21$, $SD = 0.75$) and grayscale images ($M = 3.75$, $SD = 0.97$), t (106) = 8.11, $p < .001$. Similarly, regarding facial expression visibility, images where facial expressions were not visible ($M = 4.29$, $SD = 0.79$) were rated significantly higher than those with visible facial expressions ($M = 3.98$, $SD = 0.76$), t (106) = −9.14, $p < .001$. Lastly, helper gender was significantly related to the ratings, with female helpers ($M = 4.32$, $SD = 0.76$) receiving a higher positive composite score than male helpers ($M = 4.07$, $SD = 0.79$), t (106) = 7.44, $p < .001$.

Discussion

This study examined how various visual choices can be associated with the perception of help givers. More precisely, it investigated differences in perception based on image type (photographs vs. drawings), perspective, camera angle, shot size, color vs. monochrome presentation, facial expression visibility, and gender of the help giver. The results indicate that all these factors can be associated with the perception of help givers, with some differences being more pronounced than others.

To begin with, it becomes clear that the choice between drawings and photographs can be related to the perception of help givers, with drawings receiving a slightly higher positive composite score than photographs. This might relate to users' overall stronger engagement with schematic illustrations that do not include too much detail or background elements and demand less cognitive load to be processed (Houts et al., 2006; Mayer & Moreno, 2002). We can also conclude from our analysis that perspective can be associated with perception. Help givers shown from a bird's-eye perspective were rated more positively than those viewed from a neutral perspective. This suggests that looking down on a scene may be related to the way help givers are interpreted, potentially making them appear more competent or in control, or simply more visible. This clearly supports the idea that perspective encodes social relations between the depicted subject and the viewer (cf. Kress & van Leeuwen, 2020[1996, 2006]). In our case, the positioning of the camera in relation to the subject seems to contribute to how help givers are evaluated, with direct, front-facing views leading to the most positive impressions, i.e., the highest positive composite score.

Building on work in the multimodality context (Kress & van Leeuwen, 2020[1996, 2006]), the bird's eye perspective might also reduce a direct social confrontation of the viewer with the helper on the interpersonal level, while at the same time making the procedural steps clear. Our results are also coherent with findings in embodied simulation contexts and VR environments, where a bird's eye perspective benefits the participants' spatial accuracy and cognitive ability in a VR environment (Barsalou, 2009; Fukuzawa & Nakashima, 2025).

We could see that the camera angle could also be related to perception. Images taken from a left angle were rated more favorably than those taken from a right angle, while front-facing images received an even higher positive composite score than both angled views. This finding aligns with Ramlatchan and Watson (2017) who report that instructors are perceived as more credible when able to make virtual eye contact with the recipients of multimedia trainings. Differences also emerged in the evaluation of shot sizes. Full-body images were rated higher than medium shots, suggesting that showing the entire figure of the help giver may stimulate positive perceptions compared to a more cropped presentation. Color images received more favorable ratings than grayscale images, which suggests that the presence of color may make help givers appear in a more positive way (cf. Olurinola & Tayo, 2015).

The visibility of facial expressions also played a role in the perception process. Images in which facial expressions were not visible had a higher positive composite score than those where facial expressions were clearly seen. This suggests that withholding emotional cues from the face might lead to a more positive evaluation of the help giver, possibly by allowing viewers to interpret the scene in a way that aligns with their own perspectives. This can be considered to be in line with the findings related to the general difficulties people have when recognizing the meanings of facial expressions in depicted faces (e.g., Stamenković et al., 2018), i.e., it can be useful not to pay attention to something difficult in situations in which we need to react quickly and efficiently. In contrast, the study by van der Sluis et al. (2025) shows – on the basis of comments by certified first aid instructors – that the facial expression of the victim, for example, is important to support the realistic representation of the scenario. This means that studying the faces of those who give and receive help might be an important next step in these efforts. While van der Sluis et al. (2025) further highlight that "various means can be used to emphasize the importance of particular aspects of the procedure," our study suggests that fewer portrayed details likely allow for easier identification and focusing on elements which are at that particular moment more relevant than expressing emotions, i.e., filtering out information which is not immediately relevant. At this point, it is worth adding that the results of our study challenge a possible common-sense assumption that representational realism would be optimal in instructional design by default. The preference for drawings over photographs, coupled with the higher positive composite score for images with non-visible facial expressions, indicates that abstraction and simplification can be advantageous. This supports the conclusion in van der Sluis et al. (2025) that in first aid contexts, clarity, and ease of comprehension may take precedence over detailed emotional cues. Simplified visuals can be more effective in conveying clear instructions. It is exactly in this way that we hope to contribute to instructional design in the future: our results suggest particular preferences for specific representational characteristics and it should be these that are taken as a starting point for the future design of first aid instruction images.

Finally, the images with female help givers received a higher positive composite score than those with male help givers, indicating that gender may be linked to how individuals are perceived in helping roles – it is worth noting that these tendencies were retained even when we selected only male participants (we wanted to check this given that a majority of our participants were female). These results also relate to the link between societal perceptions and the perceived attributes of help givers. The consistent preference for female helpers shows the possible relatedness of gender stereotypes and the perceived affirmative characteristics of help givers – in this case it serves to showcase the stereotypical idea that caring is a naturally feminine activity (e.g., MacRae, 1995). Alternatively, in current studies in which the design of first aid instructions for life saving operations is investigated and in which a defibrillator is used (e.g., Stamenković & Wildfeuer, 2024), the portrayal of female victims is scarce. To use a defibrillator the chest of the victim should be bare to allow the proper placement of electrodes. In the case of female victims, bras form an obstacle for placing electrodes, however very little to no attention is paid to this aspect in the instructional texts nor in the accompanying images. Moreover, female victims are less often resuscitated and saved because bystanders in emergency situations are reluctant to touch the breasts of a female victim (Israelsson et al., 2014; Kramer et al., 2015; Souers et al., 2021). In the context of first aid education research (Greif et al., 2021), the relation between gender differences and teaching effectiveness is not yet fully evaluated; however, the need for tailored approaches to address gender-specific learning needs in first aid education programs has been called for by Neyisci (2024).

When we discuss the potential implications of these scores, we can say that these perceptual differences may not merely be aesthetic preferences; they may have real consequences for behavior in emergency situations. If help givers are perceived in an affirmative way due to specific visual features, such as being shown in color, from a front-facing angle, or as a simplified drawing, this may affect how likely viewers are to engage with the material, remember the instructions, and feel confident enough to act in a real-life emergency. In contexts like first aid, where hesitation can cost lives, encouraging positive perceptions of instructional figures may increase adherence to the steps shown, boost self-efficacy, and increase willingness to help. Therefore, optimizing visual design may not be just a matter of style but a potentially life-saving element. Further studies would be needed to support these potential implications.

Several limitations of the present approach must be acknowledged. Firstly, the participant pool, comprised primarily of university students in one country, limits the generalizability of our findings, though the population was chosen as potentially less primed than other populations we could have assessed. Arguably, the relatively small sample may evaluate the representation of help givers differently compared to viewers from other age groups, with other levels of education, or with prior knowledge of or experience in first-aid and/or the medical domain. Our study was designed as an exploratory investigation into the so-far understudied relationship between visual design choices and the perception of help givers in first aid materials. It is thus among the first to experimentally examine how specific design choices shape perceptions, and its findings offer new insights into potentially universal perceptual and cognitive processes. For example, some of the preferences for front-facing angles or the better rating of female help givers align with established theories of visual engagement and suggest a broader applicability across cultures and age groups. It is nevertheless obvious that in the next step we should go beyond what is immediately available. We see the current findings as a starting point for more foundational explorations with more diverse demographics, following the most recent trend toward more experimental and user- or reception-oriented empirical multimodality research (cf. Castaldi, 2025). Secondly, the use of a pre-selected image corpus may not fully represent the breadth of visual representations in first aid materials. Expanding the image selection is essential. Thirdly, reliance on Peabody's trait adjectives provides good quantitative data, but does not fully explain why participants perceived help givers in certain ways. Guided interviews with individual participants or potentially focus groups would be beneficial and would perhaps support some of our hypotheses further. Finally, other contextual factors, such as the complexity of the first aid scenario and cultural differences, demand further investigation.

Conclusions

This study has explored how visual features can be related to the perception of help givers in instructional images and how visual design choices can be linked to the perceived characteristics of help givers within first aid instructional materials. Results showed that image type, perspective, camera angle, shot size, color, facial expression visibility, and gender could be associated with viewer evaluations when it comes to the affirmative perceptions of help givers, resulting in a higher positive composite score (a measure we introduced to assess general positivity). Notably, help givers portrayed in drawings, having front-facing views, full-body shots, and color had a higher positive composite score. Surprisingly, images without visible facial expressions were rated higher, implying that viewers may value abstraction more than detailed expression. The consistent preference for female help givers might highlight the role of gender stereotypes. These findings can point to the important role of multimodal communication in conveying crucial information, particularly in high-stakes contexts such as first aid. We hope that the results can be useful to those who decide how to frame instructions in the domain of providing medical aid.

To build upon these findings, future research could proceed in several directions. Cross-cultural studies can explore the relations between cultural differences and perception. The role of narrative in stimulating emotional engagement and information retention also deserves attention. Studies which would examine the impact of specific design elements, like font and layout (or at least their relatedness), would contribute to producing more optimized materials. Exploration of interactions between dimensions such as facial expression visibility and the helper gender, which can be related to the perceived positivity (cf. Dong et al., 2018) could also be addressed. Investigating the interaction between the portrayed patient's characteristics and the help giver's portrayal could also offer additional insights. Crucially, future studies should incorporate qualitative methods, such as semi-structured interviews and focus groups. By asking participants to articulate their reasoning behind their ratings, a deeper understanding may be gained of the processes related to their perceptions. For example, participants could be asked to describe what specific visual cues in an image led them to rate a help giver the way they did. In addition, our study could be complemented by sampling other and larger populations with different demographic characteristics.

Note

1. Source: 1a: http://leerjaar2-ehbo.jouwweb.nl/; 1b: Het Oranje Kruis (2011). Het Oranje Kruisboekje, De officiele handleiding voor eerste hulp. Thieme Meulenhoff. ISBN 9789006921717; 1c : Het Oranje Kruis (2011). Het Oranje Kruisboekje, De officiele handleiding voor eerste hulp. Thieme Meulenhoff. ISBN 9789006921717

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Author contributions

CRediT: **Dušan Stamenković**: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing; **Ielka van der Sluis**: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing; **Janina Wildfeuer**: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing

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Data availability statement

The dataset relevant to this study can be found in the supplemental data at OSF: https://doi.org/10.17605/OSF.IO/M8QUV.

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