

Utilising the Helmet as a Drawing Field and the Application of Drawing Knowledge

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A helmet is one of the protectors used to protect the head from injuries caused by collisions. Drawing is an activity that enables the expression of ideas and the required fields. One field is the place where drawing can be carried out. Currently, helmets are produced in a large selection of models and colours, including images. By using a qualitative method and a literature review, experimental observation and unstructured interviews as a data collection method, the results show that helmets have become one of the fields that can be utilised for drawing by applying techniques that use simple or machined equipment.

Key words: Helmets, field, drawing, application, knowledge.

Introduction

Helmets protect the head from injury. The helmet is used to protect the user's head from the collisions that occur during activities (Costa-Scorse, 2017). Today, helmets have developed into one of the most widely used protective devices for various activities (Collins, 2016). Helmets were used as head protection for various military or civilian activities, such as sports, mining or driving (Becker, 2019). They are made from impact-resistant material (worn by soldiers, firefighters, miners, motorcycle riders, divers and many others) (Turner, 2015). This form of body protection is worn on the head and is usually made of metal or other hard materials such as kevlar, resin fiber or plastic (Nayak et al., 2018).

Due to the growth in the use of helmets, increasing numbers of manufacturers are engaged in their production (Kuhn et al., 2017). A variety of helmet products that are circulating in the community, with many choices of models and colours (Tembeck, 2016). Not surprisingly, the

helmet has become a medium for producing images and designs (Howells & Negreiros, 2019).

The field is one of the most basic elements in fine arts. Field elements are developments from the appearance of lines that are combined under certain conditions (Glatthorn et al., 2018). The field is a flat shape parallel to the dimensions of length and width, and covers the surface. The field can also be interpreted as a form that occupies space and the shape of the field as its own space is called *dwimatra* space (Sanyoto, 2005) (Ching, 2017). Fields that occupy space can form flat parallel *tafril*, which have length and width or can be virtual in shape – that is, the field that seems to make an angle with *tafril* so that it seems to have depth (Sanyoto, 2005).

The field can be observed visually in every object that is in nature or works of art (Jones, 2016). What distinguishes it is the deliberate or accidental creation process. The field can also be intended to emphasise the value of expression, motion, rhythm, and direction, and can provide boundaries of shape or space (Rivkin & Ryan, 2017). In its application, the field is known as a flat shape without thickness, which has a display dimension and width, and a position and direction that are bounded by a line (Ku & Demaine, 2016). So that the field can also expand, the function of a form is present because of the presence of colour and light, and its limits (Kane, 2017).

Drawing is a visual representation of an object or image produced on a flat surface. It contains an artistic composition produced through the application of colour (Maynard, 2018). It can also be interpreted as an illustration used to explain more clearly about an object and visual representation produced in a two-dimensional form, and can be an artefact that shows a tendency towards an image or object, tool, media or technique (Aprianto, 2004). Drawing expresses imagination and emotion, and can become a visual form of strokes resulting from the use of drawing tools (Maulana & Shukri, 2017).

Imagination is triggered by seeing something interesting or inspiring. Drawing enables imagination that is in memory to be conveyed through pictures (Araki & Raphael, 2018). Drawing is a simple activity, which is considered efficient for communicating ideas. It can also be a way to provide information or express one's feelings visually in the form of lines and colours on a two-dimensional plane (Adams, 2019). Drawing enables the description of what comes to mind with a scratch on paper. The term 'image' has now evolved, and can be found in various places and forms of media (Wheeler, 2017).

The Scope of the Problem

Today, each helmet manufacturer is trying to make its products look superior to those of other manufacturers. The presence of various shapes and colours can provide differentiation between producers. The shape of the helmet has evolved considerably, with numerous types and functions of helmets now in circulation. The shape of the helmet has also changed from its initial form, and each time features a wide range of different colours and visual elements. These visual elements are produced from a drawing that utilises several techniques and tools. Besides, with the technique and development, drawing is no longer only from the paper field but can be developed into other fields such as helmets. Based on the development of the helmet, it has indirectly produced a new field to be utilised.

Helmets currently in circulation have different colours and appearances, and many patterns have been applied to them. In relation to how it looks, the helmet has become one of the fields that can be utilised to create an image. Various tools and techniques are used to apply the drawing process to the particular field of helmets, exploring ideas and creativity, and providing a means of expression and self-actualisation. Such an activity can also be used to make an existing field more meaningful, because drawing in other fields can directly convey information and knowledge to the public about the benefits of an existing field – even one that is already in use.

Formulation of the Problem

The following research questions were formulated:

RQ1: What makes a helmet suitable for use as a field for drawing?

RQ2: How can a helmet be used as a field for drawing?

Research Method

A qualitative research method was used for this research. This is an approach where research findings are not obtained through statistical procedures or other forms of calculation. Instead, the procedure produces findings obtained from data collected by using various means. These include observations and interviews, but can also include documents, books, video tapes and even data that has been collected for other purposes, such as census data (Moleong, 2002).

Research that uses qualitative methods aims to explain phenomena through deep data analysis. This research does not use population size or sampling even where the population or sampling is very limited (Nazir, 2005).

Data-collection Methods

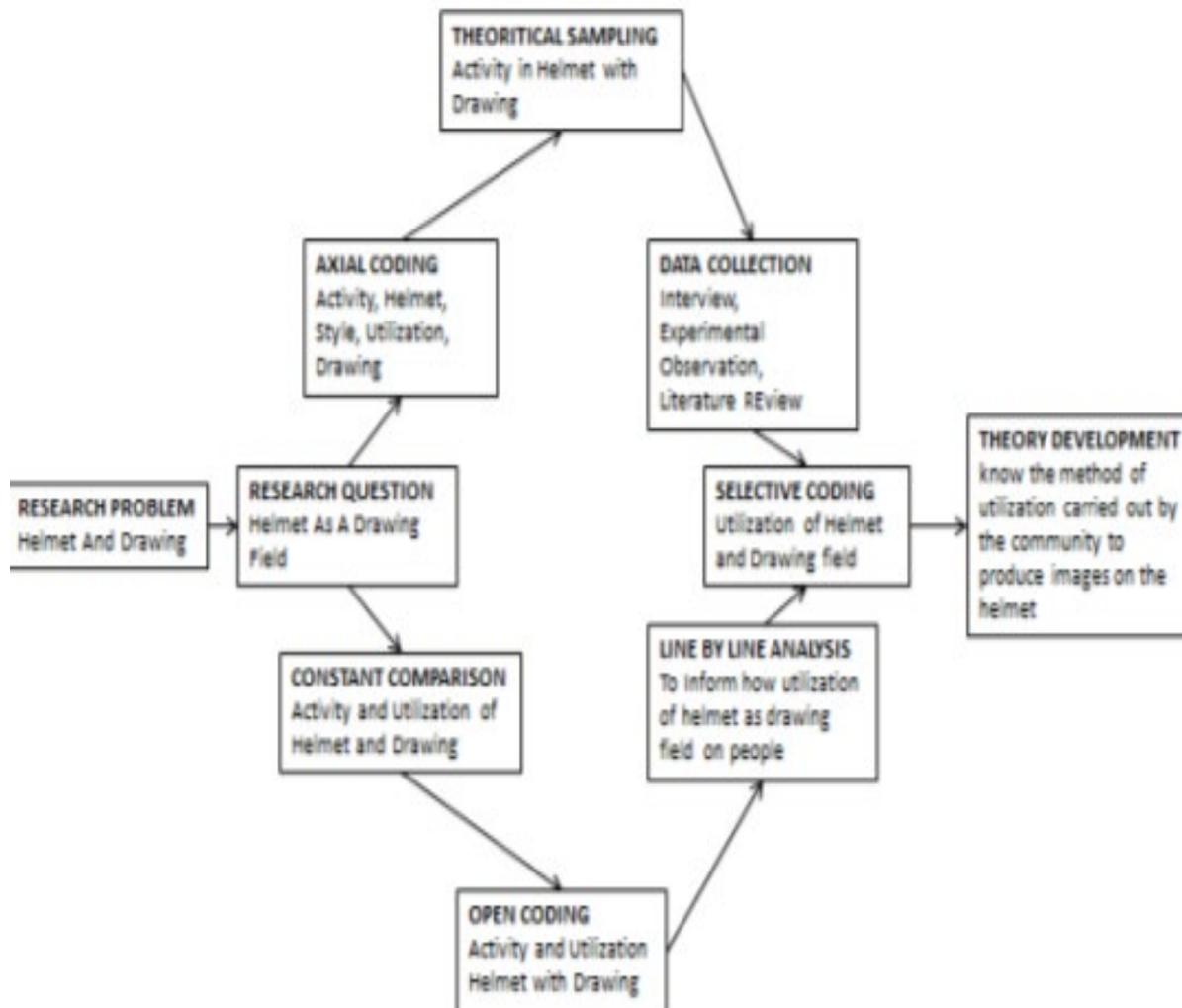
In addition to using qualitative methods, in this study, data collection was carried out through the following means:

- *Literature review.* A literature study is ‘a discussion based on reference books that aim to strengthen the discussion material and as a basis for research’ (Nazir, 2005). In this research, a literature study is used to gather data or information related to the theory that is the basis of the research.
- *Experimental observation.* Experimental observation is an activity in research that intentionally causes certain symptoms to be observed (Sugiyono, 2012). In this study, an observation was made to control certain elements in the situation. In other words, this situation is regulated following the objectives of the study, to avoid or reduce the emergence of other factors that are not expected to affect the situation (Poerwandari, 2001).
- *Unstructured interview.* An interview is a dialogue conducted by the interviewer to obtain information from the interviewee. In this study, the interviews conducted were unstructured interviews with certain characteristics: very open questions; interview speed that is difficult to predict; a high degree of flexibility; loose interview guidelines; and a variable sequence of questions, word use and conversation flow. The purpose of the interview is to understand a particular phenomenon (Herdiyansyah, 2012). The use of interviews is intended to be make the process less burdensome for the interviewee In practice, though, the answers given by the interviewee are often unexpected and often use informal words.

Discussion of methods

The method used in this study is directed towards theoretical sampling, which is the process of collecting data to produce a theory. While collecting, coding and analysing the data, and deciding what data to collect and where to obtain it, the researcher develops the theory. This data-collection process is controlled by theories that are being developed, either substantively or formally (Glaser & Strauss, 1967).

The data used in this study refer to the comments of interviewees and survey respondents (Figure 1). The process used ensured that the study obtained strong results regarding the various treatments of the helmet in the context of its use as a field for drawing.



Source: Choi et al. (2018).

Figure 1. Flow chart analysis method

Results and Discussion

Helmets as Head Protectors

Helmets are known to be used as human head protectors when carrying out certain activities. Protection of the head is intended to minimise the negative impact of an impact on the the head. Based on the Standards issued by the Indonesian National Standardisation Agency (2007), there are three types of helmets in circulation:

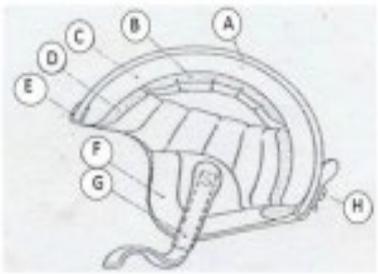
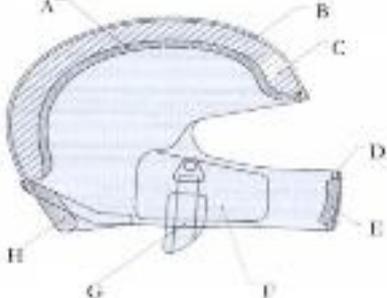
- *Protective helmet.* This is part of a motor cycle rider’s equipment in the form of a head protector cap that functions to protect the wearer’s head in the event of a collision.
- *Standard open helmet (open face).* The form of a helmet that covers the head up to the neck and covers the front of the ear.
- *Standard covered helmet (full face).* The shape of the helmet that covers the head, neck and mouth.

The material used to shape helmets should also be noted:

- It is important to make use of materials other than strong metal, which are not affected by ultraviolet light, and do not change if placed in an open space at a temperature of 0°C to 55°C for at least four hours; the material used must also be resistant to the effects of gasoline, oil, soap, water, detergents and other cleaners.
- A supplementary helmet material also needs to be used, which must be resistant to weathering, waterproof and not affected by changes in temperature.
- There is a need to pay attention to materials that come into contact with the body; the helmet must not be made of materials that can cause irritation or disease to the skin, and the strength of impact or physical changes should not be affected as a result of direct contact with the user’s sweat or oils in the skin.

Eight main components are found in helmets (Table 1). Each component has a function and several additional elements that are intended to provide safety to helmet users. For the sake of user comfort and safety, standardised helmets emphasise more comfort for the inside and safety as well as strength for the outer layer.

Table 1: Construction and components of helmets

Component Name	Image	
		
	(1) Open-face helmet	(2) Full-face helmet
A. (1) Shell (2) Helmet nets	1. Shell: The hard and smooth part is the outermost part of the helmet. 2. Helmet nets: The part of the helmet that is directly in contact with	

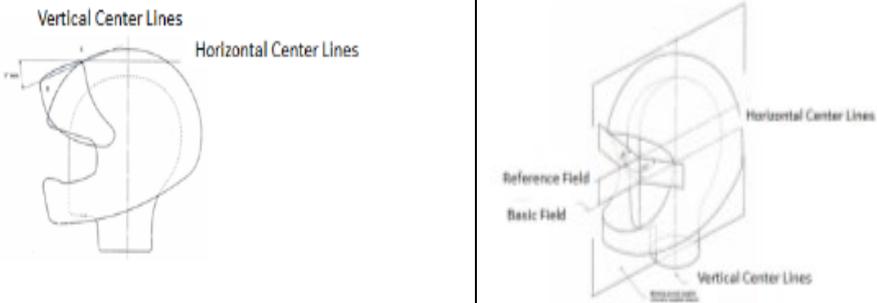
<p>B.</p> <p>(1) Helmet nets</p> <p>(2) Shell</p>	<p>the head; the size of the helmet's net can be fixed or can be changed by the wearer.</p> <p>3. There is a need for a retaining device. which functions to maintain the position of the helmet above the head.</p> <p>4. The hole in the helmet is to enable air circulation inside the helmet.</p> <p>5. There are additions from the lid above the eyes.</p>
<p>C.</p> <p>(1) Protective layer</p> <p>(2) Safety layer/shock absorber</p>	<p>1. Safety layer: Soft lining is installed at the innermost part of the helmet to provide comfort during use and also serves to protect the wearer's head.</p> <p>2. Protective layer: The inner layer of the helmet is mounted to absorb impact energy.</p> <p>3. The face of the helmet can protect part or all of the face and is made of a clear layer (transparent).</p>
<p>D</p> <p>(1) Comfort layer</p> <p>(2) Top frame</p>	<p>Comfort pads: Soft material intended to provide user comfort.</p>
<p>E</p> <p>(1) Rim</p> <p>(2) Pads</p>	<p>1. The completeness of the holder strap that covers the lower jaw of the wearer of the helmet, when the holder strap is locked.</p> <p>2. There is a part that is separate, or can be moved or completely (harvested) from a helmet that protects the lower part of the face.</p>
<p>F.</p> <p>(1) Ear protectors</p>	<p>There needs to be a hole in the helmet located at the ear, so that the user can still hear when using the helmet.</p>
<p>G</p> <p>(1) Rope holder</p>	<p>Part of the helmet in the form of a rope is equipped with a lock.</p>
<p>H.</p> <p>(1) Glass ties</p> <p>(2) Neck protection</p>	

The Field of the Helmet

The use of helmets is adjusted to suit the purpose of each – from the helmet that is focused on providing protection from a falling object to the head to the helmet that has an aerodynamic element and is ventilated. Generally, though, the helmet is designed to minimise the impact of a force to the the head, because some activities hold the inherent risk of accidents involving the head.

Based on the information obtained, the helmet has two fields: the basic field and the reference field. These two fields are related to a vertical and horizontal centre line and are influenced by the basic pattern informing it (Becker, 2000). The pattern is adapted to the shape of the human head.

Table 2: Helmet three-dimensional field

Information	Image	
Basic field		
Reference field	<p>There are two basic areas in helmets:</p> <ol style="list-style-type: none"> 1. the base of the head – a plane that contains a line under the ear canal and eyelid 2. the basic field of the test head pattern – an area in the test head pattern relating to the base of the head. 	
Vertical centre line	<p>A construction plane that is parallel to the base plane of the test head pattern and a certain distance, regardless of the head plane according to the size of the test head pattern</p>	
Horizontal centre line	<p>A straight line of the head, the shape of the head or protective helmet that specifically passes the point of balance away from the head and back of the head in the reference plane of the suitability of the test head pattern; perpendicular to the base plane and in the centre plane of symmetry.</p>	

Drawing Field

The drawing field is a flat shape without thickness; it has dimensions of length width so that it forms a breadth; it has a position and direction; and it is bounded by lines. Fields are often equated with areas. In relation to drawing, the field is a place that is used for drawing. The

line on the court is included in a ‘tangible and virtual form’ (Ching, 2002). The line that forms a plane can be seen as a boundary if it has a thickness. As for the virtual form, lines in a plane are not visible but remain a real boundary.

The field is considered as a space that includes a ‘*dwimatra* room’ (Figure 2). Is a place where the object is located, which can be as tangible as a material that is in the environment. It should be noted that, despite having a thickness, the field only has dimensions of length and width. That said, the field is only visually available on the visible side. Broadly, though, the field can be developed, because in a tridimensional context, the field can be also be utilised on the other side.

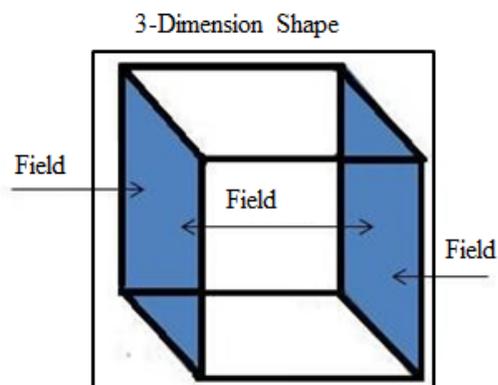


Figure 2. Three-dimensional shape and field

Field shape

There are various forms of fields that include geometry and non-geometry. Geometry fields are known as regular fields and are made based on mathematical rules/formulae, such as rectangular shapes, circles and fields that have regular shapes. Non-geometry fields are created freely and not limited to a specific form (Alexfan, 2006). These fields can be created from the use of geometric fields or from objects drawn from nature. Forms contained in nature can be simplified into fields with geometry and non-geometry, as well as being a combined plane that is flat. When discussing the shape of the field more broadly, it can be classified into the shape of the surface, such as flat and curved fields.

Flat Field

Flat planes are known to be ‘parts of shapes and fields bounded by straight or curved lines’. They can be geometric, non-geometric or abstract concepts. A flat plane can be defined as a flat shape that has two dimensions, namely length, and width, but it does not have height or thickness or depth.

A flat plane can be interpreted as a ‘concrete’ object that can be seen, touched and held. As a concrete object, a flat plane is formed because of the side bounded by a line (Figure 3). If viewed more broadly, then the flat plane on a three-dimensional object has several different sides and can be seen and developed into a separate or fused plane.

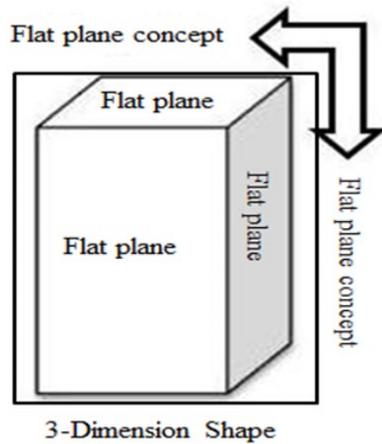


Figure 3. Flat plane in three-dimensional shape

Curved Area

A curved plane is a group of shapes with several parts to produce them; they are processed in such a way that they become curved shapes. The curved plane is known to have a layer as a surface plane. The layer is then processed in such a way that it becomes a form that is distinguished from the flat shape.

The appearance of the curved plane aims to create a new form that can be used differently (Figure 4). Except for the shape of a sphere, in an object that has curves, not all of its parts are curved because there are one or more planes that are flat on its sides.

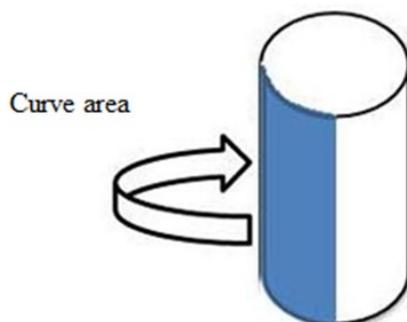


Figure 4. Curve area in three-dimensional shape

Utilisation of the field in drawing

Drawing realises an object in the form of an image. This is done first through the process of seeing, imagining and practising. Drawing represents an object. As it develops, drawing can also be an activity that involves emotions and expressions in its application. For this reason, the shape represented can change and take various forms.

Based on its application, it can be applied with a field as a container or an area of the drawing. If it is related to the plane, then the drawing will adjust to the plane. Based on its shape, the field consists of flat and curved fields. Utilisation of the two fields can provide one area to produce an image (Figure 5). A variety of techniques are applied to utilise fields for drawing. The techniques and materials used can be adapted to the material and texture of the plane that the field is used to describe.

Utilization of Flat area as Drawing field



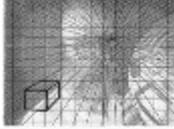
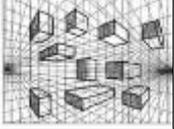
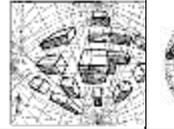
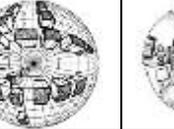
Utilization of Curve area as Drawing field

Figure 5. Utilisation of flat and curve field in drawing

Field and Perspective

The term ‘perspective’ can be explained simply as ‘picture view’. With the use of perspective, an object or space can be clearly depicted on a flat plane (Table 3).

Table 3: Types of perspectives

	1 Vanishing point	2 Vanishing point	3 Vanishing point	4 Vanishing points	5 Vanishing points	6 Vanishing points
Image						
Information	A drawing technique utilising a point that is assisted by a line originating from a point that is used as a reference for drawing objects.	A drawing technique that utilises horizontal lines and at each end there are reference points and assist lines for drawing objects.	A drawing technique that is used to describe something that is very broad, large, and tall and visually experiences extreme distortion. This method is used for drawing outdoor environments.	Often referred to as ‘multiple perspectives’; a drawing technique that results from the development of perspective methods 1, 2 and 3 missing points. This method is used for curved surface surfaces so that flat objects drawn will adjust to the surface.		

Perspective is utilised in an image of an object or space to display the impression of three dimensions. It conveys the depth of an object. In its application, perspective drawing is built by three elements: long, short, and depth or volume (Misrianto, 2003).

Helmets and Drawing Field

The basic shape of the helmet is adapted to the shape of the human head. There is a layer that is used for the wearer to feel comfortable and safe on the inside and outside. The safe category for helmets is ‘helmets are made of thick outer shells and are not damaged immediately if they collide and can wrap the entire head and leave enough room to look ahead’. The helmet must also be light enough, not narrow and not loose, for comfort, and must allow the wearer to see clearly at all times and in all conditions (Babek, 2002).

The shape of the outside of the helmet is influenced by the shape of the inside. The shape of the field on the helmet will adjust to the basic shape of the helmet’s outer shell. The shape of the plane on the helmet is dominated by the shape of the curve (Figure 6), while the plane is flat on certain sides of the helmet. The shape of the curved field does not refer to a three-dimensional shape like a ball; however, it is necessary to use other three-dimensional forms to produce a helmet that has a shape that will adjust to fit the shape of the human head.



Figure 6. Helmet shape and field

Field of Drawing on a Helmet

The helmet has experienced various developments during human history. However, the basic function of the helmet as a protector has not changed. Although initially the helmet was only made to cover a portion of the head, the helmet must be equipped with ear protectors, neck cover, shield or chin cover (Babek, 2002).

The use of helmets in drawing activities can be applied to certain areas of the helmet (Figure 7). Drawing can be applied to areas where closure is good – such as the outer shell. In these fields, field conditions are not only covered but also available as an empty space that can be used for drawing.

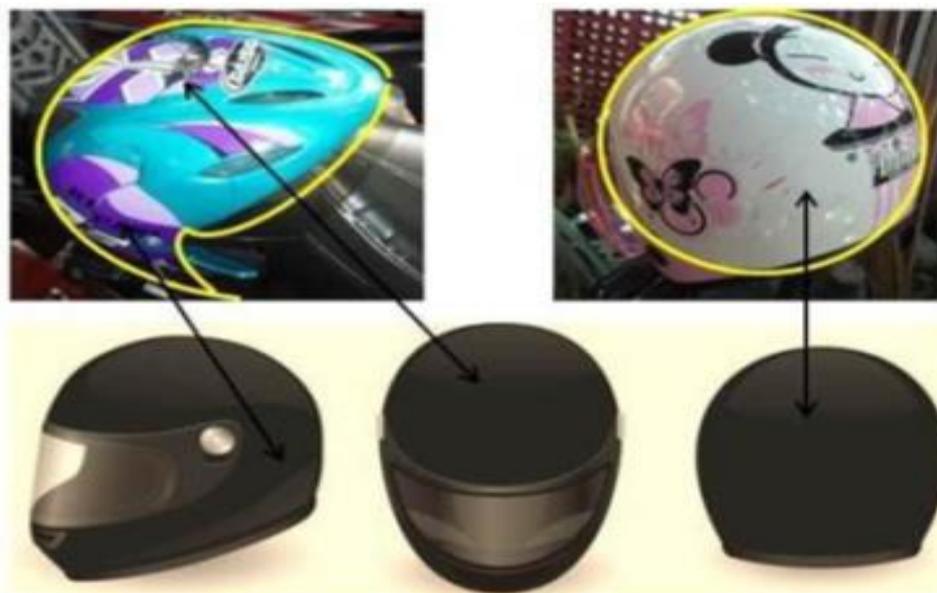


Figure 7. Drawing field on helmet

Drawing on a Helmet

Drawing is one activity that is considered efficient. Drawing activities only require a field that can be used to create an image and imagination. Imagination is needed to create an image in one's mind (Ching, 2002). Then the image is applied to a field. It is important to be well acquainted with the type of field where the image will be applied. There also needs to be a 'help line' in the form of a perspective that is adapted to the shape of the field to help humans realise their imaginations (Figure 8).

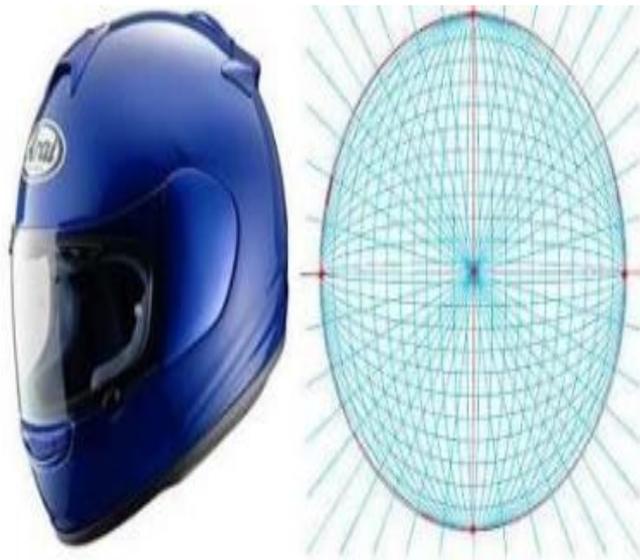


Figure 8. Helmet and drawing perspective

Helmets have a field that is surrounded by a curved shape. The shape of the curve is the tridimensional shape of the helmet – in other words, the overall shape of the helmet (Figure 9). To apply an image, it is necessary to have knowledge of multiple perspectives in drawing. The application of multiple perspectives is carried out on each side in terms of the shape of the respective fields due to differences in the shape of the field on the helmet.

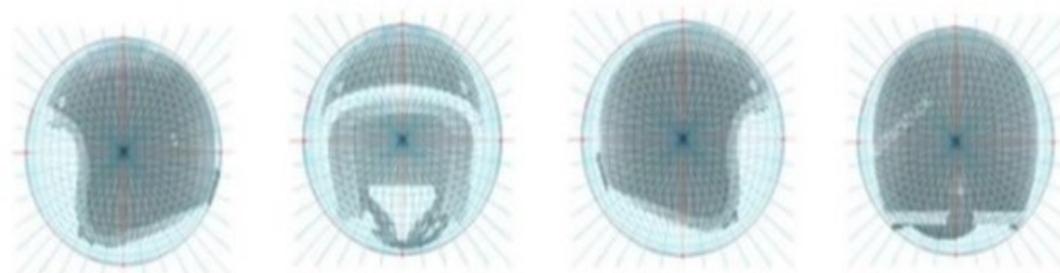


Figure 9. Applied perspective on helmet

Utilisation of multiple perspectives to draw on the curve can be a separate reference. Its use in the curved area will indirectly be a help to align the hands with the eyes when drawing. In practice, the difference in straight lines produced on a flat plane will have different results if applied to the curved plane. Apart from the application of multiple perspectives (Sanyoto, 2005), knowledge is needed about the equipment that will be used to apply the picture to the helmet, as it must be applicable to the basic material forming the helmet (Figure 10). This avoids missing or erasing the image that has been made. If the helmet is made of a plastic-type material that is resistant to heat, the equipment must be able to be applied to plastic materials – such as the use of acrylic paint for simple methods or spray paint (airbrush) for methods using machines.

Figure 10. Drawing on helmet



Conclusion

Helmets are used to protect the human head to minimise the negative effects of trauma on the head. Helmets have eight main components, each of which has a function intended to provide security to its user. The helmet is designed to emphasise comfort on the inside and safety and strength in the outer layer. A helmet has two fields, the base plane and the reference plane relating to a vertical and horizontal centre line, and is influenced by a basic pattern that matches the shape of the wearer's head.

In the practice of drawing, the field is considered as a place where objects are located that can be tangible in the environment. Despite having a thickness, the field only has dimensions of length and width. In practice, the field is divided into flat and curved fields, with each of them created by natural or artificial factors.



The field of the helmet is formed from the structure inside, so it has an external effect. This means that the outer shape of the helmet is not too different from the inner shape. In the context of helmets, fields are found on the outer shell of the helmet because there is free space available for the creation of images. The shape of the helmet is a field dominated by curved shapes, so different methods are needed to apply an image. The multiple perspective, together with the use of drawing equipment that is manual or engineered, can be used as a basis for making an image on the outer shell of the helmet..

The practice of drawing on a helmet needs to be considered as familiar to the wider community. Because of the different forms of the field, methods that can be practised in order to increase public knowledge. Drawing is an efficient activity to implement an idea. Knowledge of practice that uses drawing methods using simple equipment is required.

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