

Why does thatcher illusion arise and what can it tell us about face processing

[Psychology](#)



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Topics on face recognition processing were always interested by psychologists. Recognition is defined as the approaches to information stored in memory and here, face recognition involves how people interpret faces. Facial recognition begins with simple patterns (i. e. eyes, nose, mouth etc) that are combined in a known configuration to make a recognisable face. Since we normally perceive faces as a whole (Bartlett & Searcy, 1993; Rossion & Boremanse, 2008, Tanaka & Farah, 1993), and in an upright orientation (Rock, 1973); illusions may occur when we try to perceive inverted faces.

Rock in 1973 demonstrated that the perceived form depends on the orientation of a stimulus in the world coordinates. The common view to see an object in its upright orientation would render us difficulty to perceive its upside-down form. This inversion effect is much larger for faces than for any other object categories, and this phenomenon was known as the 'Face Inversion Effect' (Yin, 1969). Thatcher Illusion, which is one of the most powerful face inversion illusions in face recognition, was introduced by Thompson in 1980.

It was named because Margaret Thatcher's face was first used to demonstrate the effect. It was found that people would perceive individual features on inverted face but hardly perceive the face as a whole. Thus people were not surprise when shown an edited image with inverted eyes and mouth when the image was inverted; however they found it odd once the edited picture with inverted eyes and mouth is in an upright orientation.

The Thatcher illusion explains the face inversion effect and nonetheless, it also tells us some crucial ideas on how human processes face recognition. <https://assignbuster.com/why-does-thatcher-illusion-arise-and-what-can-it-tell-us-about-face-processing/>

It was believed that faces are perceived both " featurally" and holistically. Thatcher Illusion indicated that when faces are inverted, it would be more difficult for us to interpret the expression and identity. Therefore we will not find thatcherized faces (i. e. images of faces with inverted eyes and mouths) look grotesque when they are inverted since we focus on individual features rather than the faces holistically. Thatcherized images however would be alarming when they are shown in normal orientation, in which people usually perceive faces as a whole.

This paper will first focus on discussing the face inversion effect, and then illustrate the demonstration and causes of Thatcher Illusion, and finally elaborate the explanation on how the Thatcher Illusion relates to face recognition processing. Face inversion effect The face inversion effect was introduced by Yin in 1969 and was defined as the larger decrease in face recognition performance than for other mono-oriented objects when they are presented upside down. Since people are used to the way they perceive a form, for example seeing faces in an upright orientation, recognition of an inverted face would be difficult.

Yin (1969) reported that participants of his experiment were unable to perceive a general impression of the whole image for inverted faces. When a face stimulus is presented at an upright orientation, the processing of facial features (e. g. eyes, mouth, nose etc.) would be affected by alterations to the identity or the position of one or several other features of the face (Tanaka & Farah, 1993). Fig. 1 shows an inverted face of a famous talk show host which we may hardly tell his expression or even to identify him at the first sight.

It was explained that recognizing inverted faces is difficult for us because we are relatively insensitive to the spatial relationships between the features of inverted faces. Human faces are similar (with features such as eyes and mouth) but unique (with distinguish spatial relationships). Thus those spatial relationships carry much of the information about personal identity which helps us identifying others. As stated above, orientation affects how we perceive objects; therefore we would find it more difficult to recognize upside-down faces than normally upright faces.

The introduction of the idea of face inversion illusion leads to the interest on face inversion recognition; and Thompson in 1980 found a powerful inversion illusion in face recognition: the Thatcher Illusion. Thatcher Illusion Thatcher Illusion (Thompson, 1980) was a vivid illusion of Rock's (1973) work and it supported previous findings that inversion interferes with the face recognition processing. It was named Thatcher Illusion or Margaret Thatcher Illusion because Margaret Thatcher's face was first used to demonstrate the effect, see fig. 2 and fig. 3.

The effect can definitely be applied to other faces though; and faces in the Thatcher illusion stimuli are generally called "thatcherized faces". Images on the right in both fig. 2 and fig. 3 were thatcherized, i. e. mouth and eyes are inverted. People typically found both images in fig. 2 looks normal. Although some of them might find the right image looks a bit unnatural because the shadow around the mouth and eyes are strange, they overall thought the two images were abnormal. However, when the thatcherized faces were

shown upright (fig. 3), people were alarmed and realized the grotesqueness in the image on the right.

Rise of Thatcher Illusion There are three competitive hypotheses explaining why the Thatcher illusion arises. The first hypothesis is called the expression hypothesis: (a) the grotesque appearance of a Thatcherized face is due to its expression, (b) inversion impairs the encoding of expression, and therefore (c) inversion disrupts the perception of grotesqueness of a thatcherized face (Bartlett & Searcy 1993: 284). This hypothesis suggested that we have difficulties when encoding expressions on inverted faces, so we do not realize the problem with the expressions unless the faces are right-side up.

The second hypothesis suggested that the illusion is related to reference frames. It was found that we use two reference frames when we see an object such as a face. One of which is based on the object itself, and the other is based on our contextual or egocentric sense of orientation (e. g. what is supposed to be on the top and what at the bottom). When thatcherized faces were inverted, the top of the mouth and eyes are different for the two reference frames. However, once the images were in their usual orientation, the two reference frames were then in agreement, and the face became grotesque.

The third hypothesis is based on the binary process theories of facial perception (Rossion & Boremanse, 2008). It is assumed that we process faces by considering individual features (e. g. , eyes, mouth and nose) and their configuration (i. e. how they are organized and related to each other). It is difficult for us to process the " configural" information when the faces are

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inverted. Thus we will rely on the "local features" rather than perceiving faces as a whole. In this case, thatcherized faces will not look strange since we are only focusing on individual features.

However, when the faces are right-side up, they look grotesque because both the configuration and the features are clearly shown. This explanation is the most determined among the three hypotheses and is related to face recognition processes; it will be elaborated in detail in the following section.

Thatcher Illusion and faces recognition process Thatcher illusion indicated that faces recognition could be depend on the face holistically or on individual facial features (e. g. eyes, nose and mouth).

According to the holistic hypothesis, upright faces are stored as unparsed perceptual wholes in which individual components are not explicitly represented (Tanaka & Farah, 1993). The "featural" hypothesis on the other hand suggested that face recognition is characterized by a high sensitivity to information about local features. Thatcher illusion showed that both hypotheses occur in faces recognition process, while they involve in different situations. As illustrated in the previous section, people found both the original and thatcherized faces normal when they were inverted.

It can be explained that we are only able to process individual features in inverted images since it is unusual for us to perceive inverted faces.

Therefore, the right-side up eyes and mouth in the thatcherized image looks actually more familiar and people typically think that both inverted pictures are usual. On the other hand, we can easily perceive the images holistically once they are in their normal orientation (i. e. in the orientation that we are

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familiar with). When recognising up- right faces, " both component and configural information will be combined into a single holistic representation" (Schwaninger, Carbon, Leder, 2003: 84).

This means faces are now seen as wholes, the relationship between local features as well as the entire representation would be considered in the process of face recognition. In this situation, the upside-down eyes and mouth on the thatcherized image are completely out of place on an otherwise recognizable face, this is the reason people are alarmed by thatcherized faces. Conclusion The title of this paper invites discussing and analyzing the demonstration and causes of Thatcher Illusion and explaining the relation between the Thatcher Illusion and face recognition processing.

Thatcher Illusion was introduced by Thompson in 1980. However it was not elaborate in details in Thompson's work, thus the Face Inversion Effect (Yin, 1969) was first discussed since it helps explaining the Thatcher Illusion. The theory of face inversion effect suggested that we are relatively insensitive to the spatial relationships between the features of inverted faces, so recognizing inverted faces would be difficult for us. Hence in the case of Thatcher Illusion, our ability in interpreting inverted thatcherized face is impaired thus we may not realize its grotesqueness.

When the thatcherized face is back into its normal orientation, we can then perceive both the featural and holistic information of the image and found the face looks grotesque. There are mainly three approaches explaining why the Thatcher Illusion arises: expression hypothesis which suggested that we do not realize the problem with the xpressions when encoding expressions
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on inverted faces; the second argument was the interpretation of reference frames which stated that we use two reference frames when interpreting an object.

One of them is based on the object, and the other is based on our perceptual sense of orientation. Last but not least the binary process theories of facial perception is the most powerful and logical explanation of the Thatcher illusion. The third hypothesis, which also explains the face recognition process, suggests that we process faces by considering both individual facial features and their configuration.

By elaborating this hypothesis, we can suggest some crucial ideas about the process of face recognition: faces recognition could depend on perceiving the face holistically or focusing on individual facial features; and these two ways involve in different situations. Importantly though, face recognition process is a very complicated mechanism and there will never be too many clarifications. Our knowledge in this field has been improved by previous studies; however further research is essential so as to provide more evidence on how people process faces.