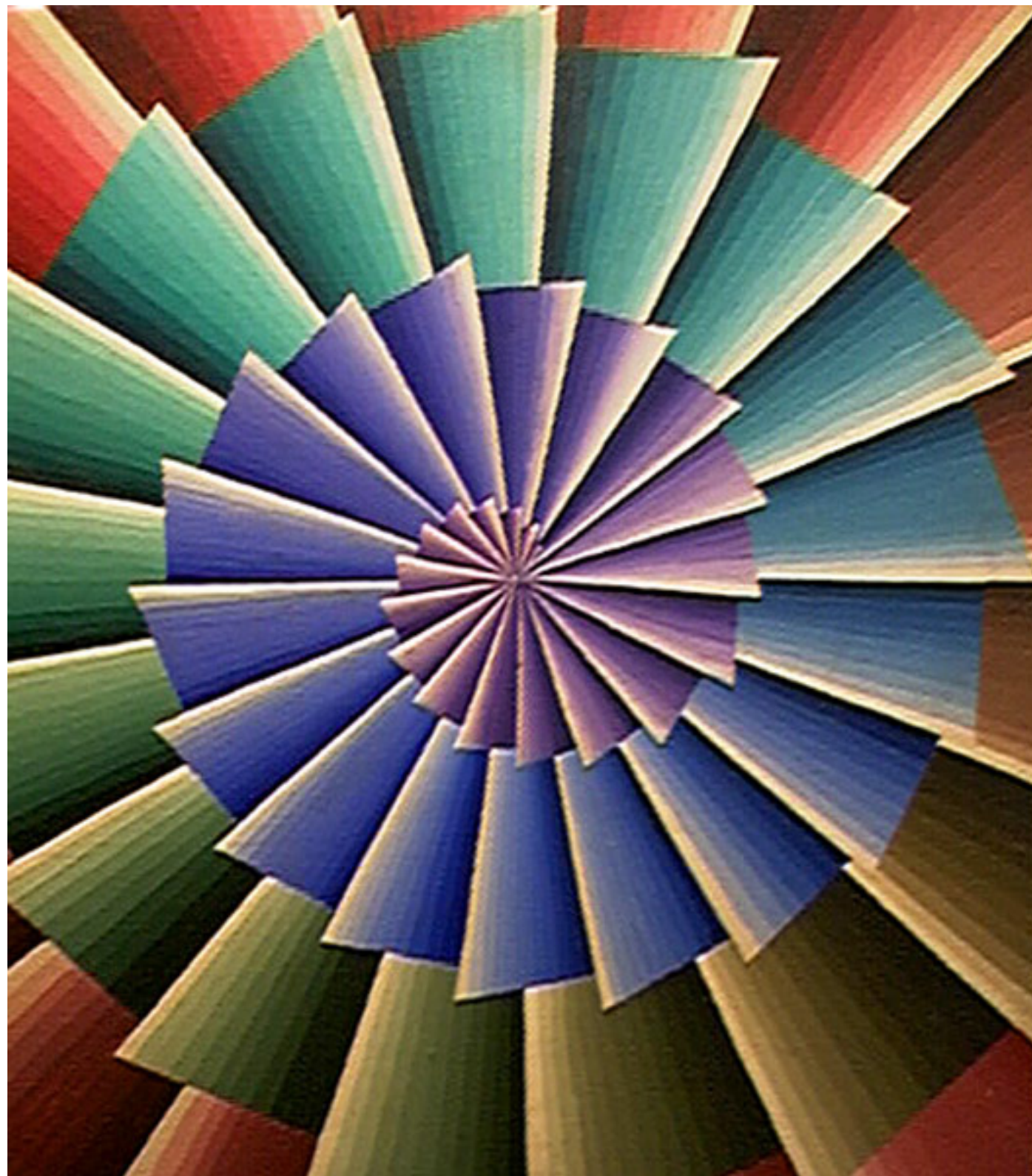




Akiyoshi Kitaoka (Department of Psychology, Ritsumeikan University, Kyoto, Japan)



Alex Fraser (1923-2002), a geneticist and a painter, reported a motion illusion in a stationary image, named ‘escalator illusion’ (Fraser and Wilcox, 1979). Sawtooth-wave luminance gradients give illusory motion along them. Some observers saw illusory motion from dark to light, while others reported the reversal.

Fraser, A. and Wilcox, K. J. (1979) Perception of illusory movement. *Nature*, 281, 565-566.

Following studies failed to reproduce the latter but examined the former revealing the role of eye movement, blink or abrupt presentation as well as its dependence on eccentricity, stimulus duration or contrast (Faubert and Herbert, 1999; Naor-Raz and Sekuler, 2000).

Faubert, J. and Herbert, A. M (1999) The peripheral drift illusion: A motion illusion in the visual periphery. *Perception*, 28, 617-621.

Naor-Raz, G. and Sekuler, R. (2000) Perceptual dimorphism in visual motion from stationary patterns. *Perception*, 29, 325-335.

Kitaoka and Ashida (2003) suggested that this illusion consists of two competitive, basic illusions and devised a new pattern to increase illusion magnitude dramatically, including ‘Rotating snakes’.

Kitaoka, A. and Ashida, H. (2003) Phenomenal characteristics of the peripheral drift illusion. *VISION*, 15, 261-262.

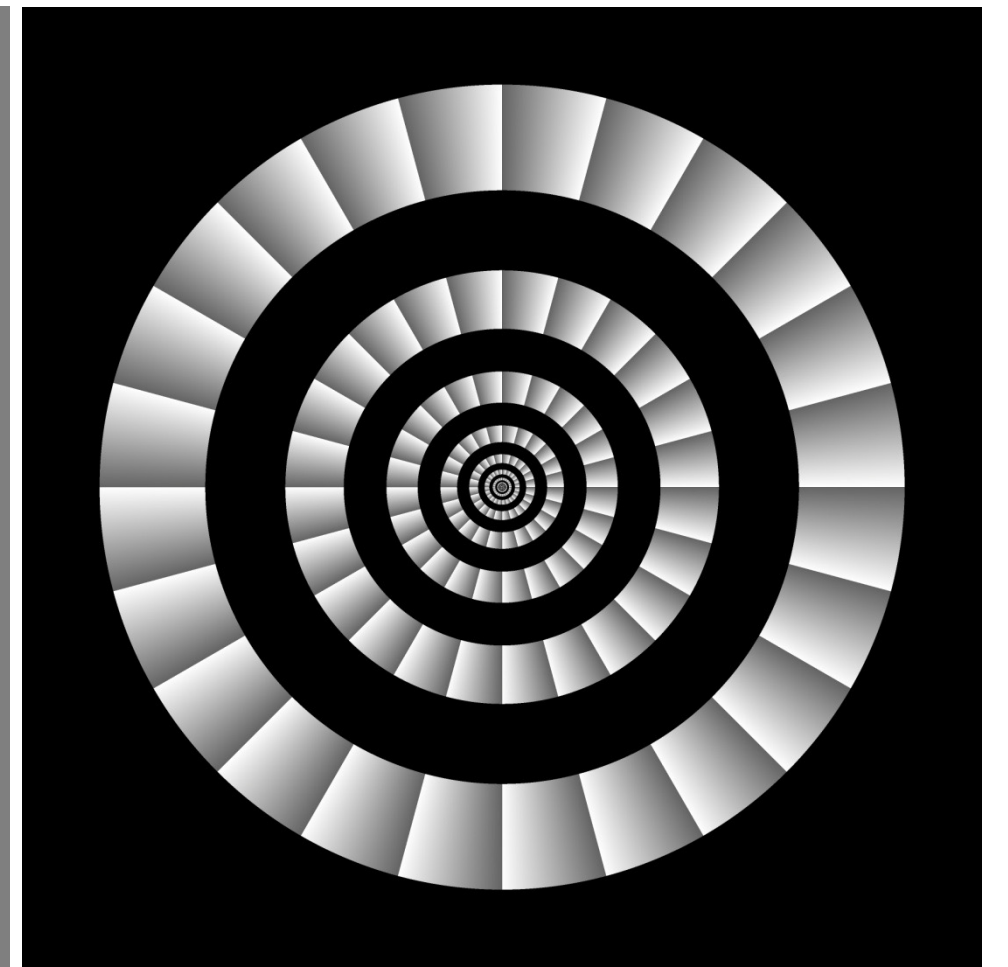
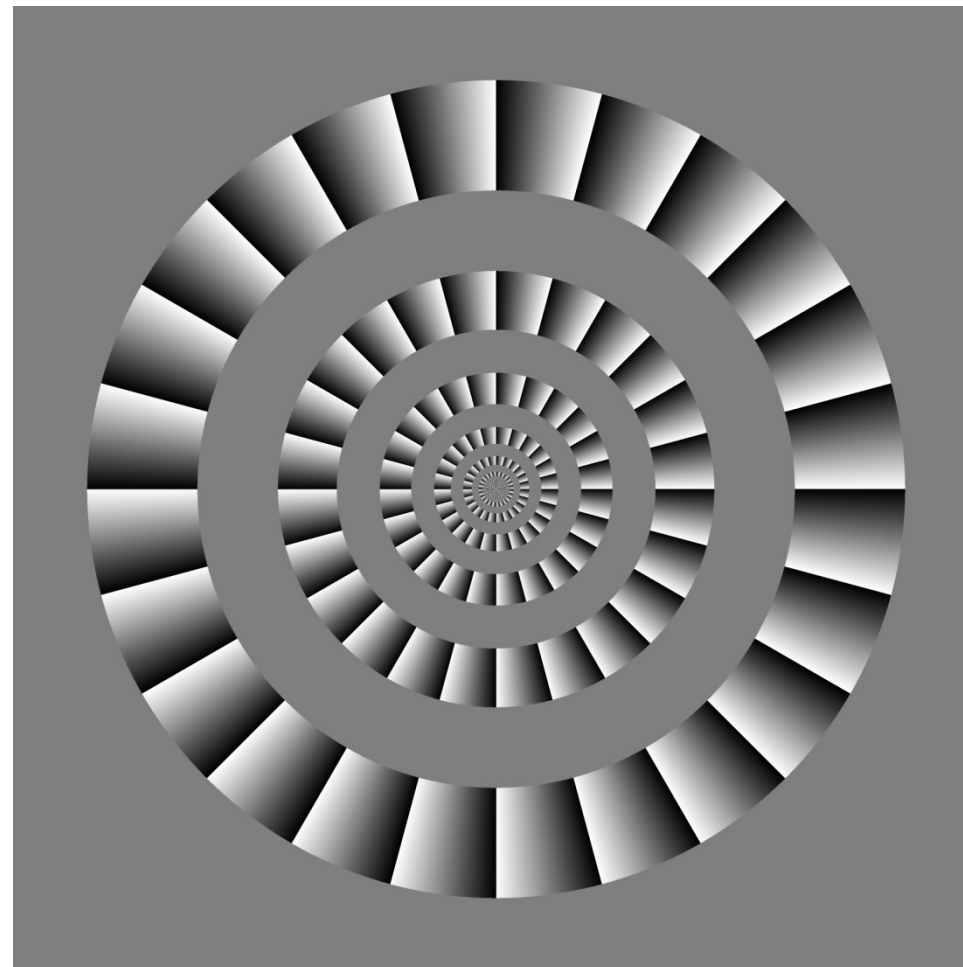
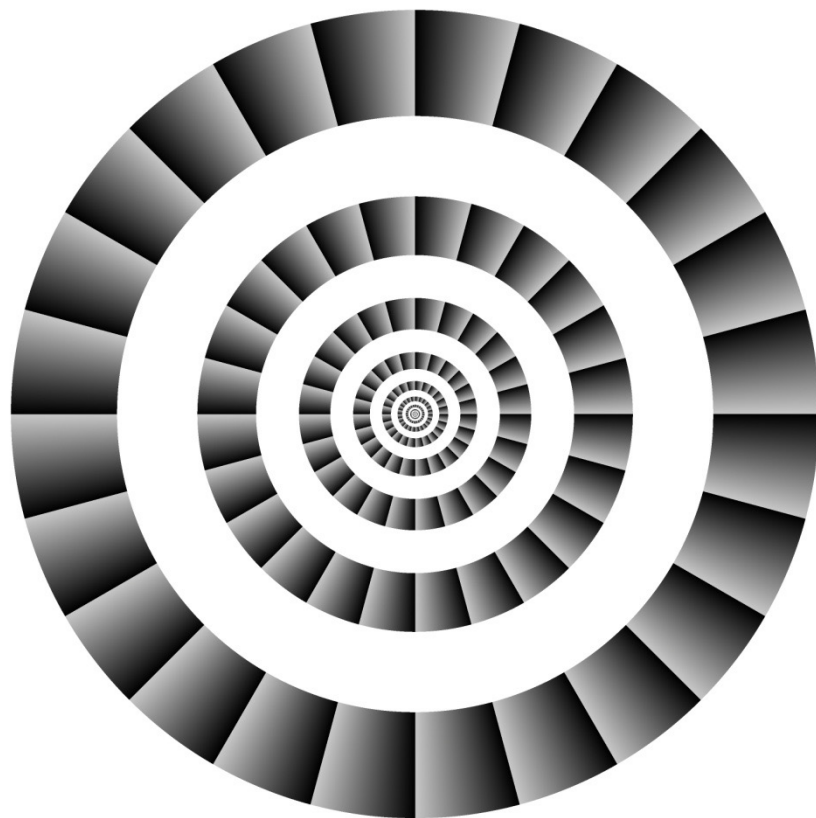
Moreover, I have suggested some color factors and recently found a novel effect in a darkened image. (They are shown in this poster)

Adopted from “**Alex Fraser, Geneticist and Painter**”

(<http://doctoralexfraser.blogspot.jp/p/spirals.html>) <access August 25, 2012> (with permission from Alan Fraser)



# Evidence for two competitive, basic illusions (Light-type Fraser-Wilcox illusion)

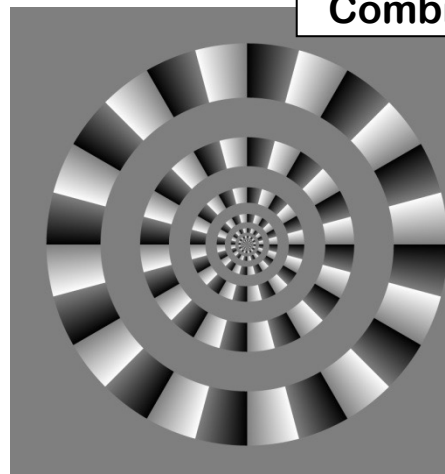
The direction of illusory motion depends on the background luminance. The background is brighter than luminance gradients, the direction is from dark to light (clockwise: left image), while the background is darker, illusory motion is from light to dark (counterclockwise: right image). The background is of medium luminance, the direction is ambiguous or there is weak or no illusion (middle image).



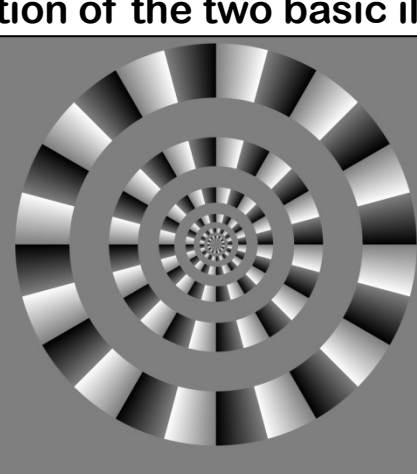
Combination of the two basic illusions

Suggested Basic illusions

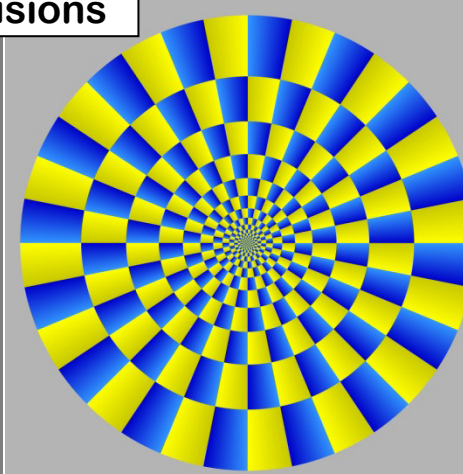
Dark to light	Light to dark
	



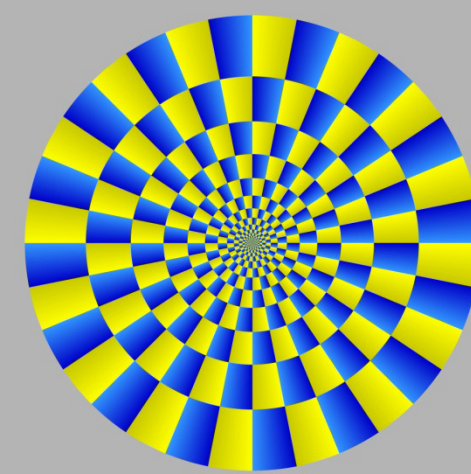
clockwise



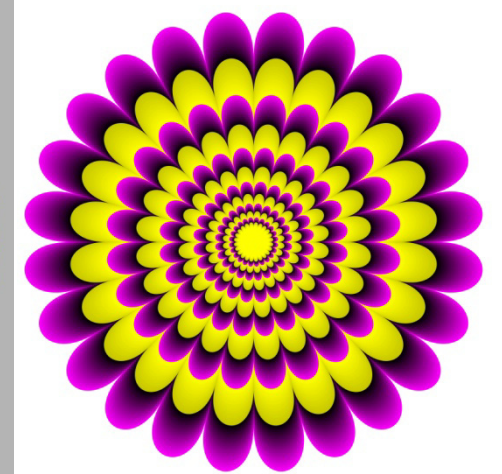
counterclockwise



counterclockwise

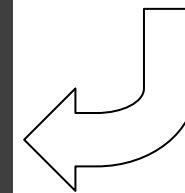
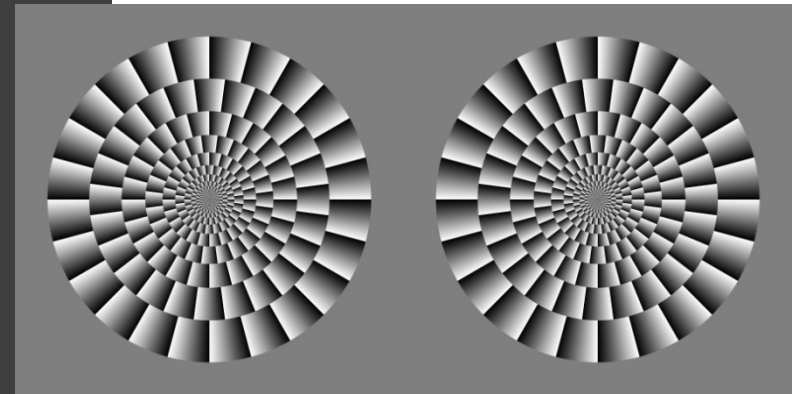
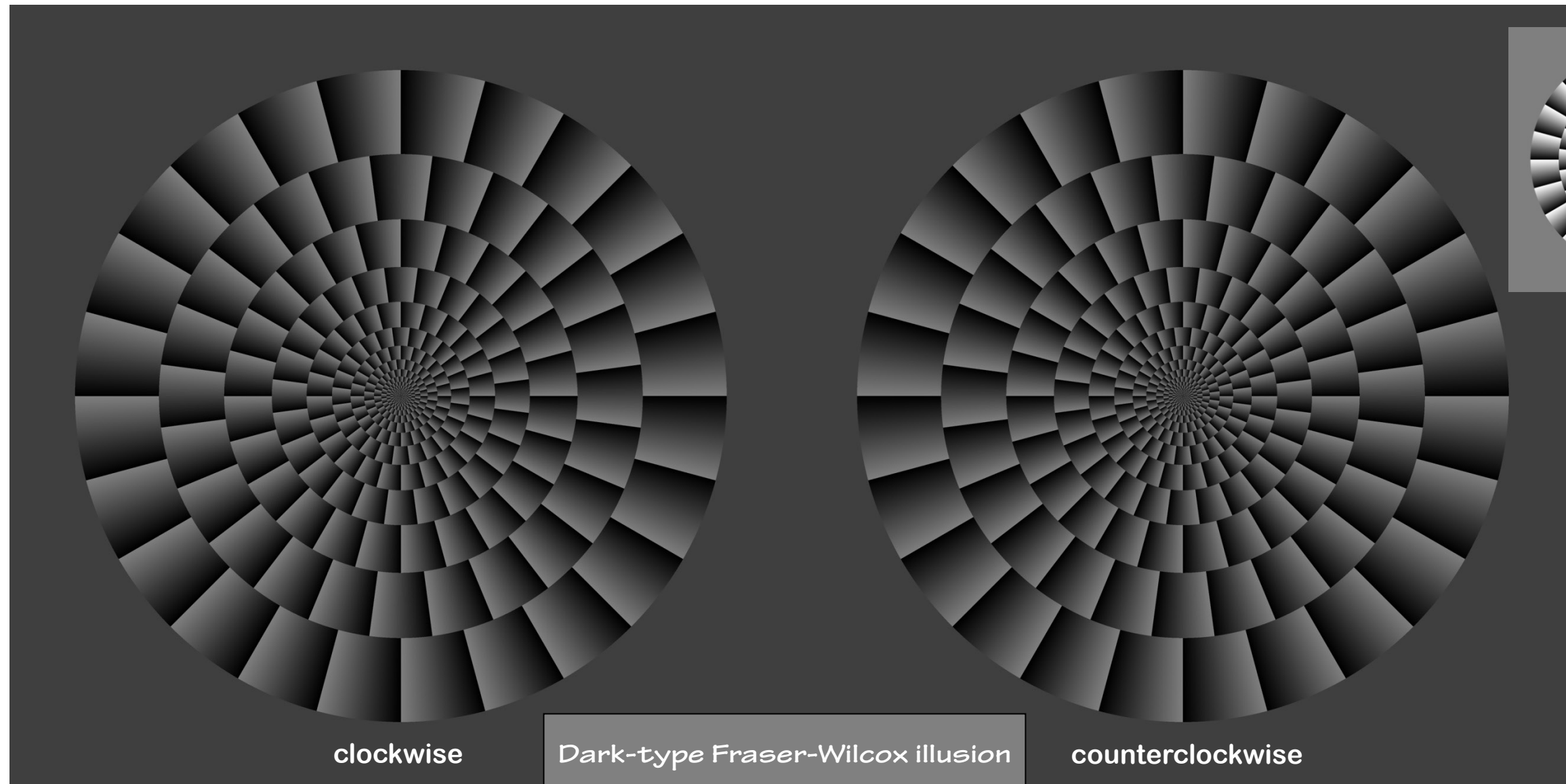


clockwise



expansion

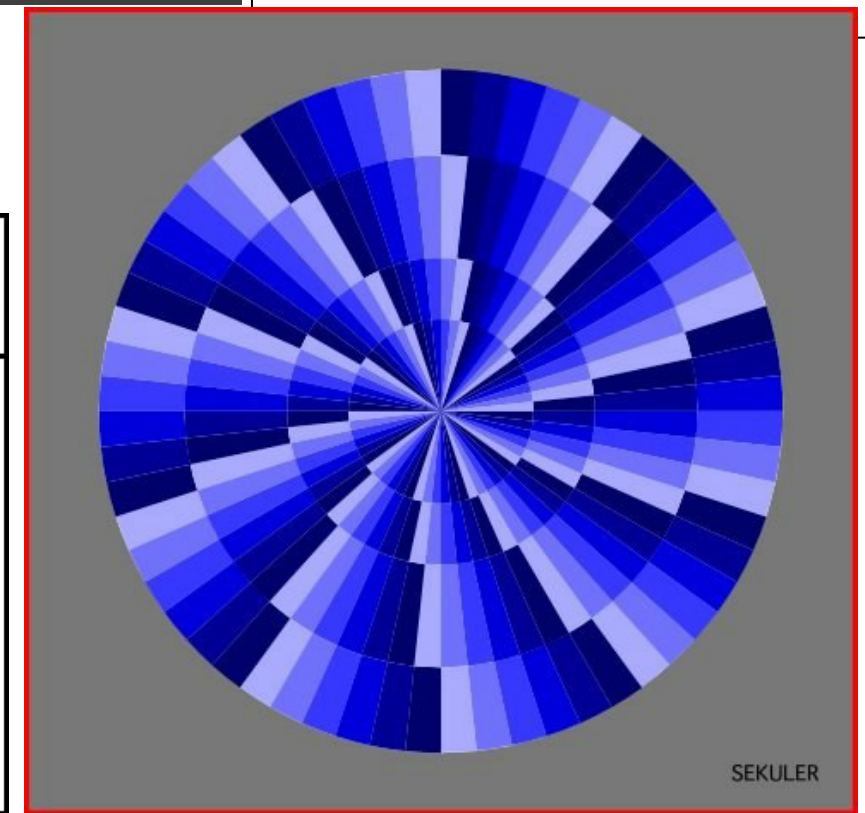
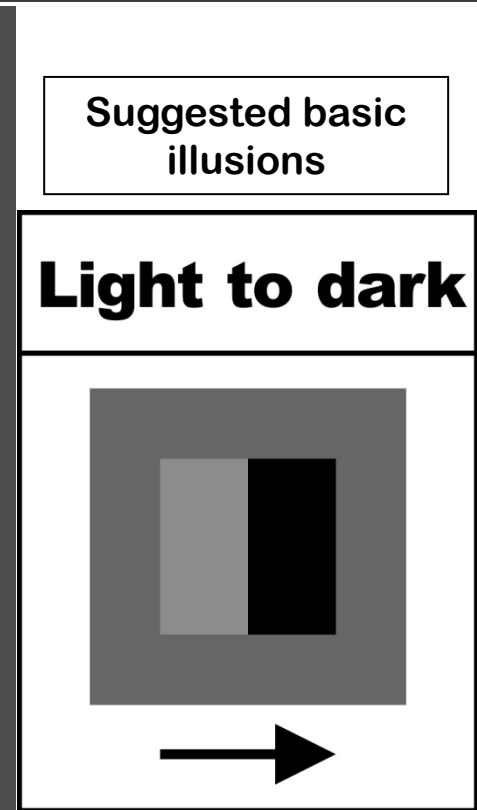
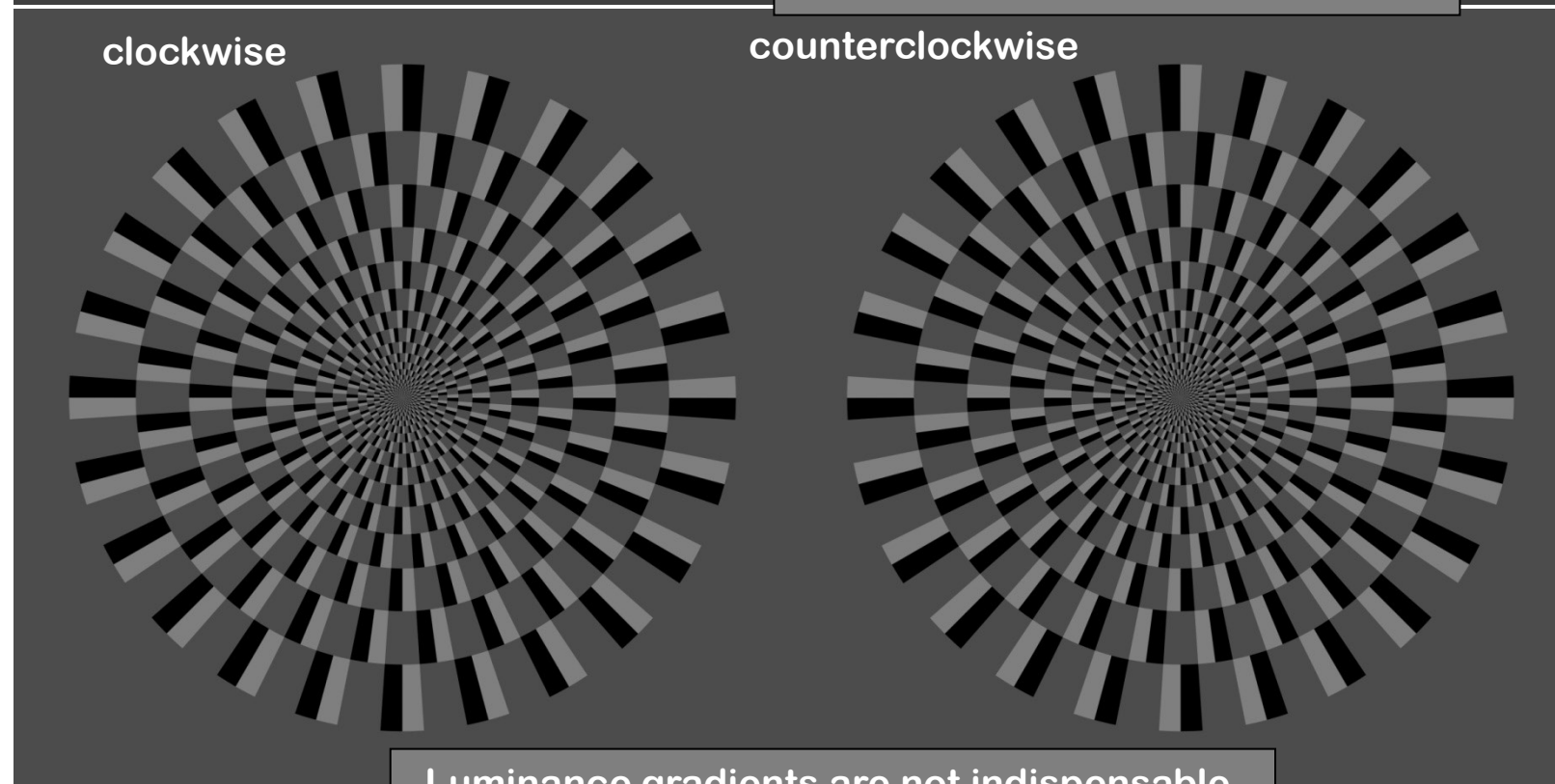
# Dark-type Fraser-Wilcox illusion (Darkening enhances illusion from dark to light when the background is of medium luminance)



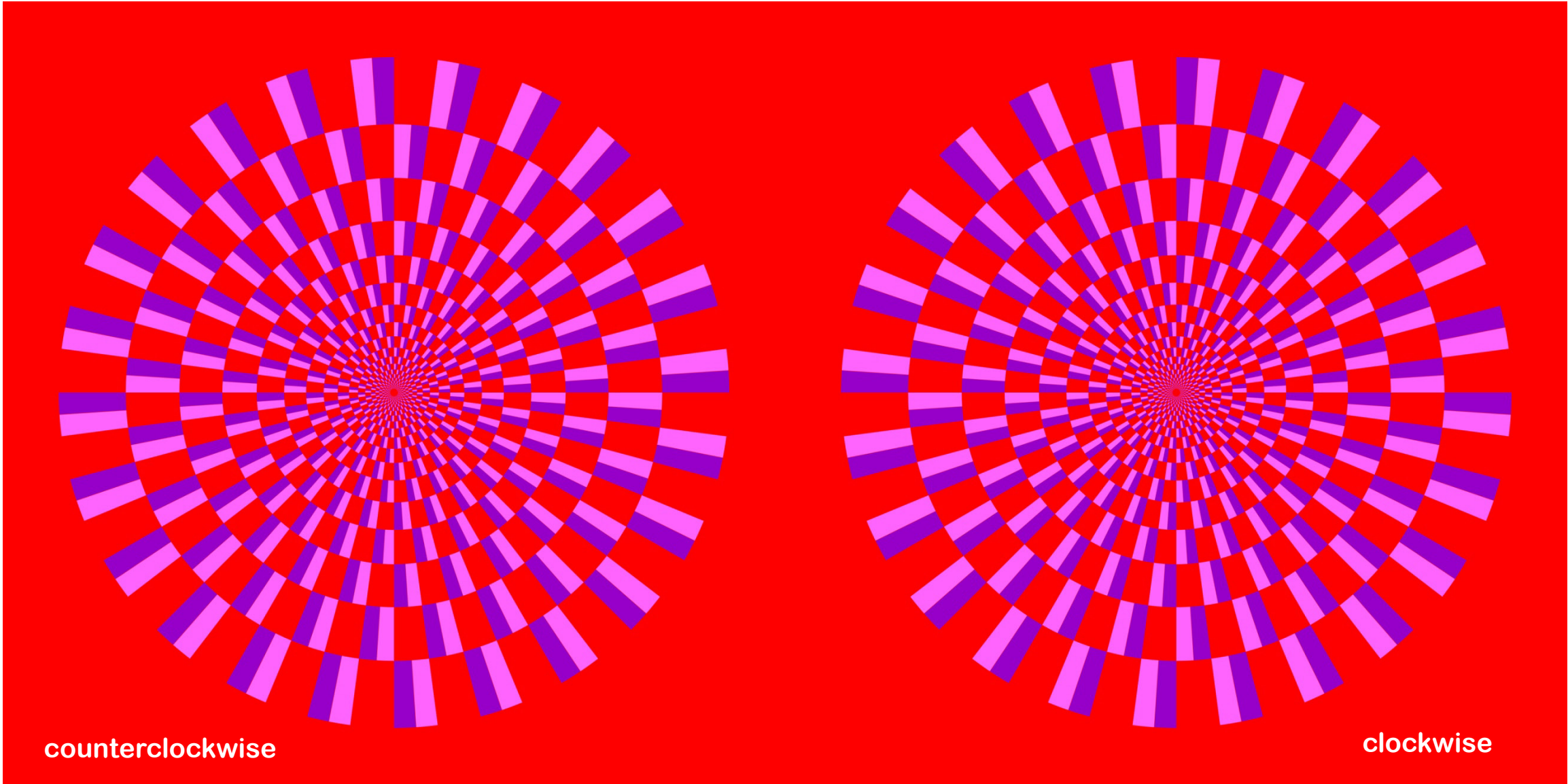
This type is consistent with the explanation based upon the difference in latency (Faubert and Herbert, 1999).

The color illusion image presented by Naor-Raz and Sekuler (2000) (shown below) might be attributable to this type.

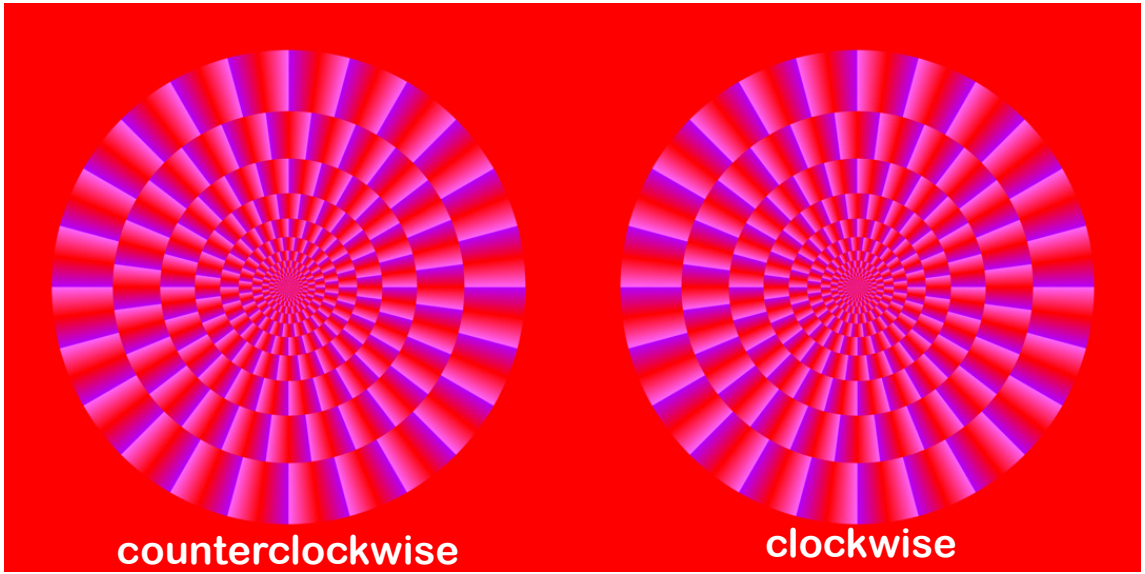
<http://www.perceptionweb.com/perception/perc0300/sekuler.jpg> <access August 26, 2012>  
<with permission from Robert Sekuler>




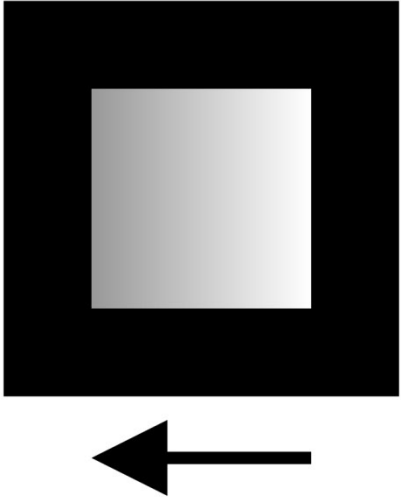
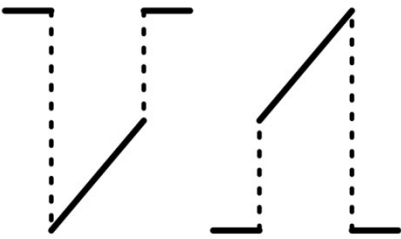
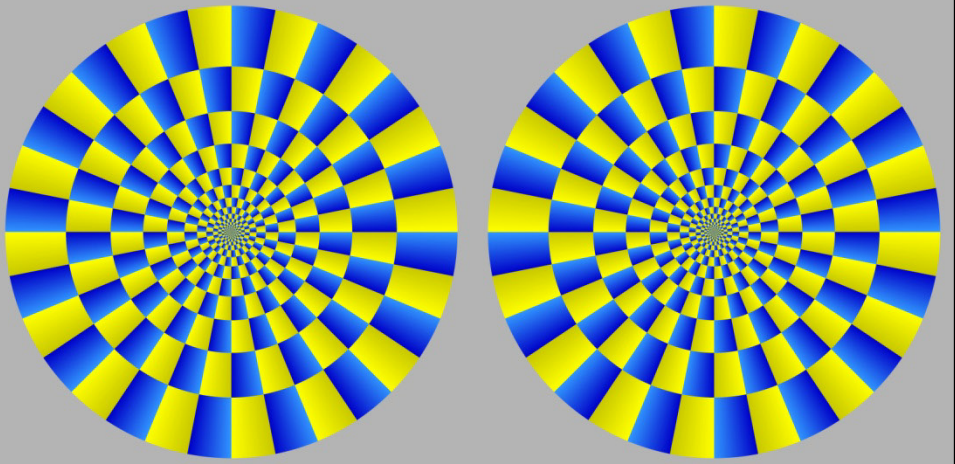
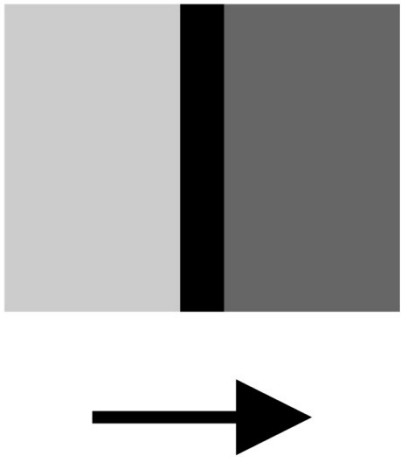
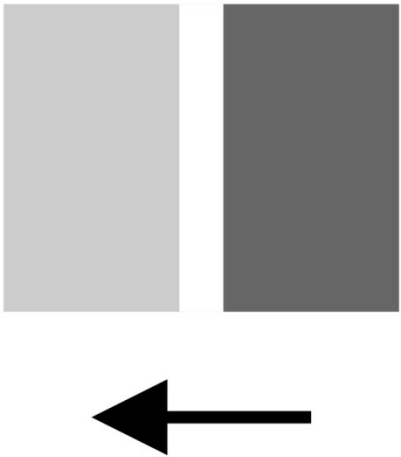
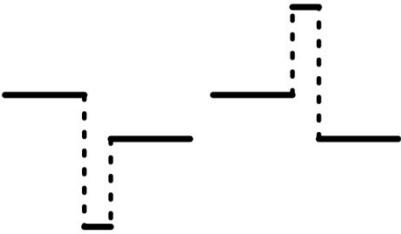
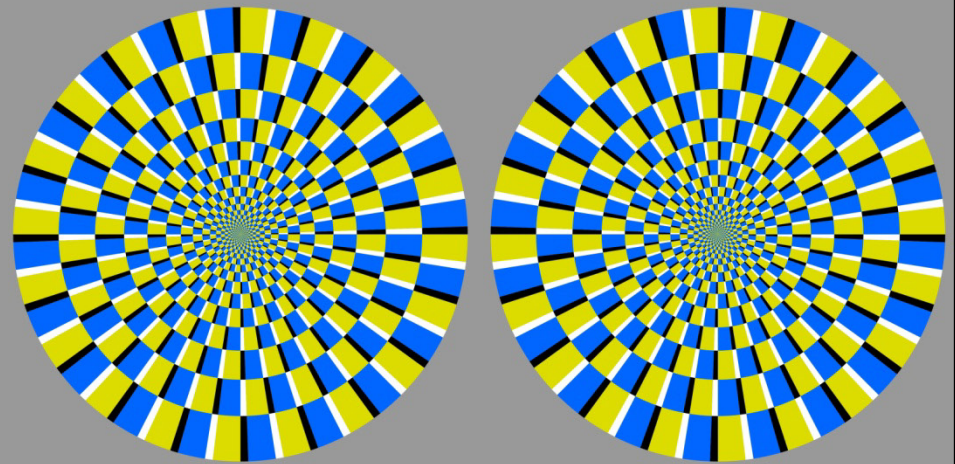
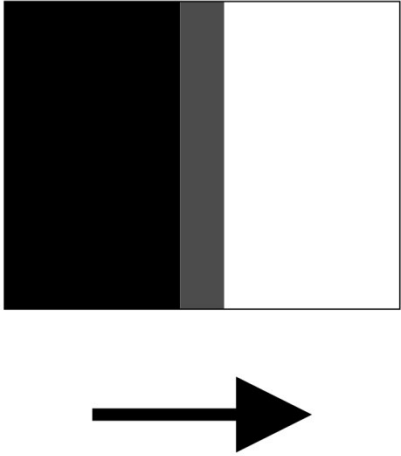
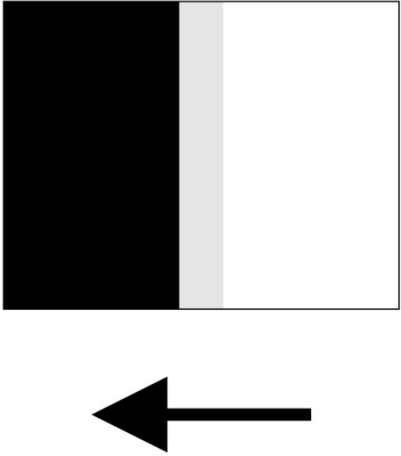
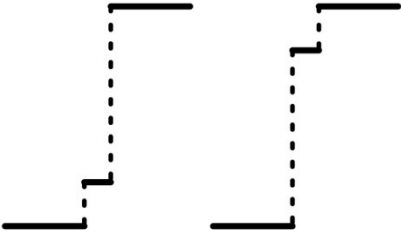
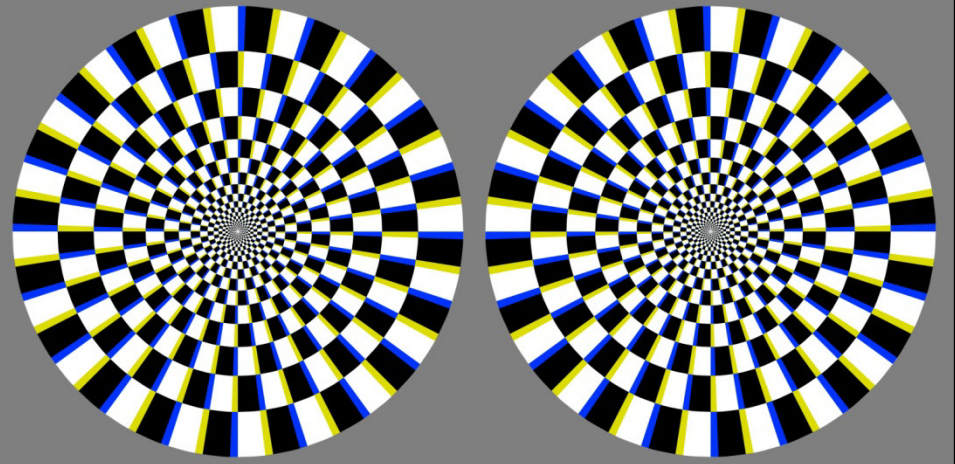
# Exception of Dark-type Fraser-Wilcox illusion

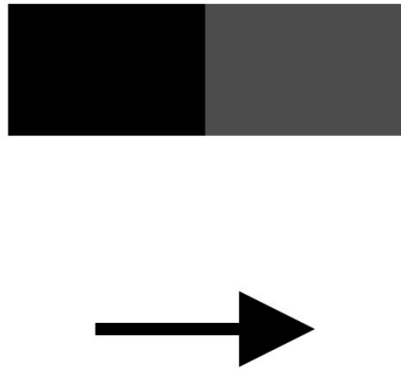
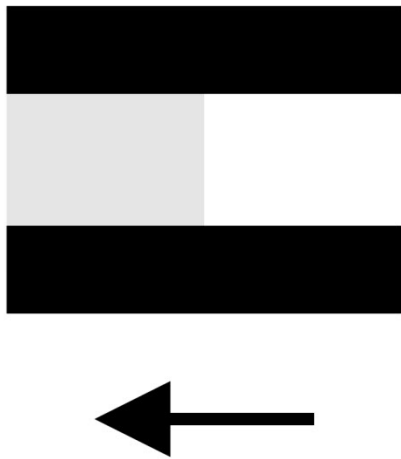
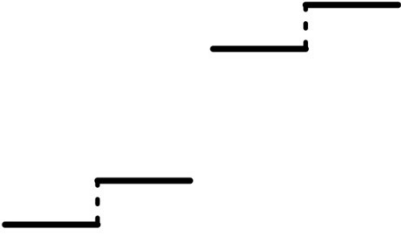
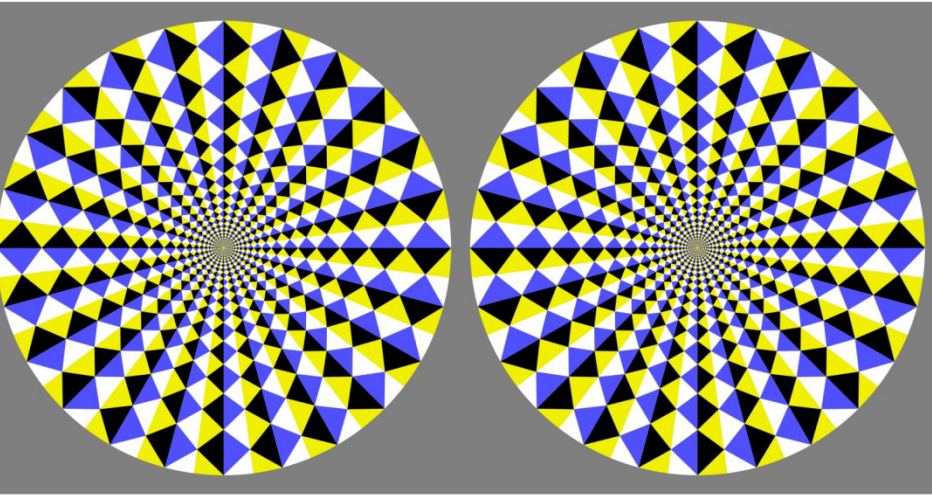
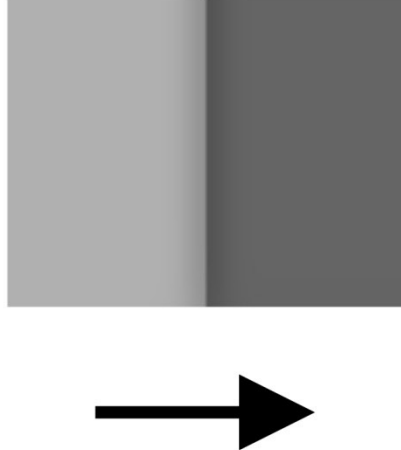
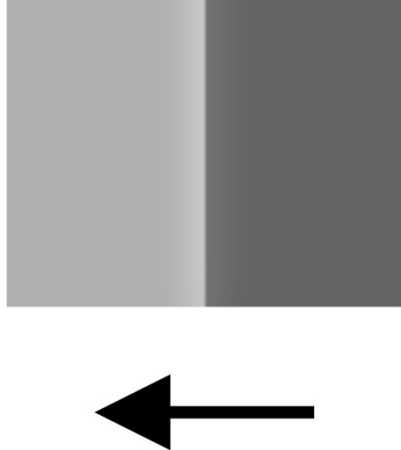
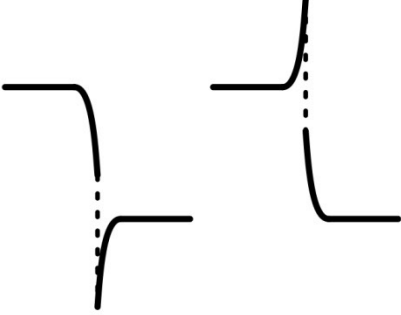
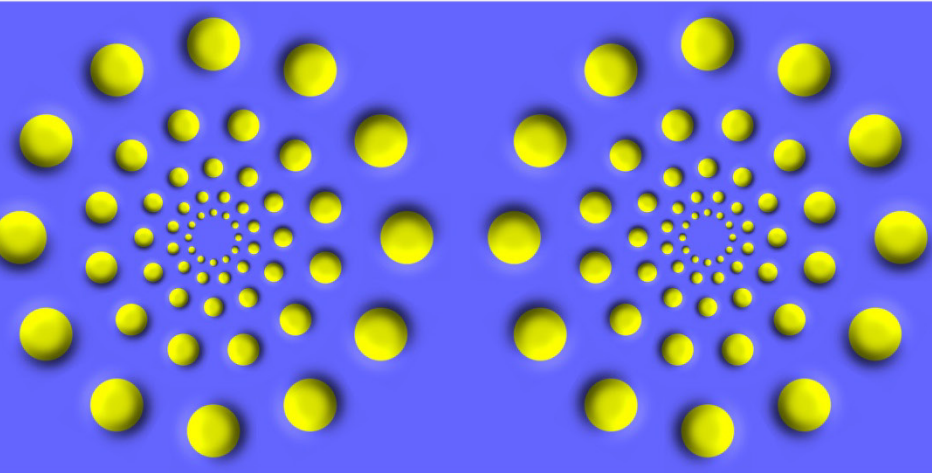
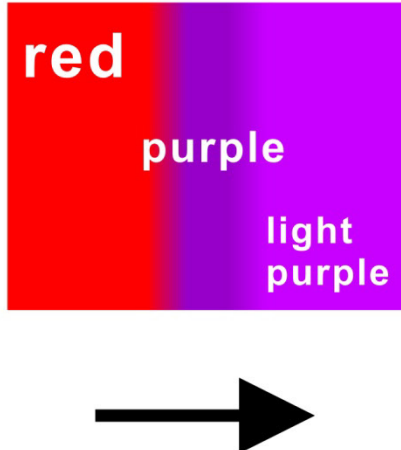
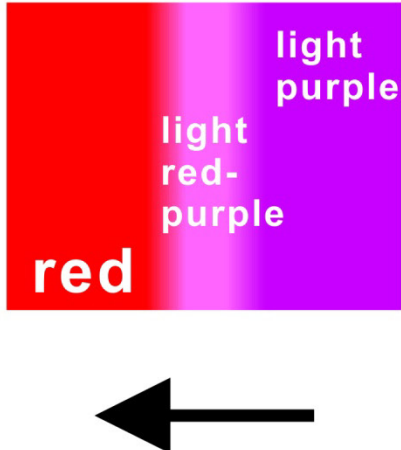
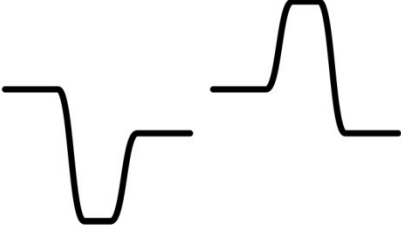
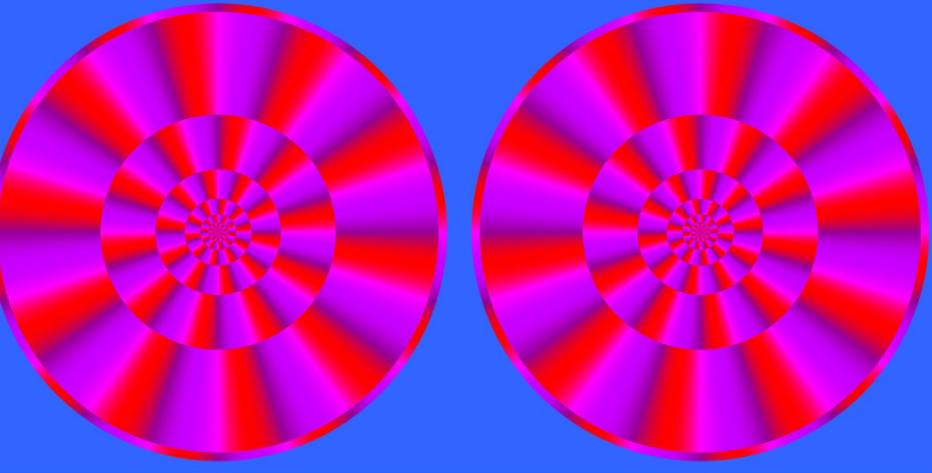


<This printed image does not work well. PC displays make a much stronger effect.>



# Temporary classification of the Light-type Fraser-Wilcox illusion

	<b>Dark to light</b>	<b>Light to dark</b>	<b>Luminance profiles</b>	<b>Examples</b> The left disk or ring appears to rotate counterclockwise while the right one clockwise.
<b>Type I</b>				
<b>Type IIa</b>				
<b>Type IIb</b>				

<p><b>Type III</b></p>				
<p><b>Type IV</b></p>				
<p><b>Type V</b></p> <p>(This chromatic type might not be an independent type)</p>				

This classification is produced for pictorial convenience to draw illusion images and does not necessarily indicate possible corresponding mechanisms.

I have also called this set 'optimized Fraser-Wilcox illusion' elsewhere (e.g. <http://www.psy.ritsumeai.ac.jp/~akitaoka/nisshin2008ws.html>).

Type V was presented by Shaul Baskin before 2005, who is the chief of Wezit Research Group (<http://www.visnsoft.com/>).

# Conclusion

## Present classification of the illusions of the Fraser-Wilcox illusion group

### Fraser-Wilcox illusion group

#### 1. Dark Type

Light-to-dark type

Special color type

#### 2. Light Type

Several subtypes (Type I, IIa, IIb, III, IV, V)

In each

(a) Dark-to-light type

(b) Light-to-dark type

Color enhancement

(a) General

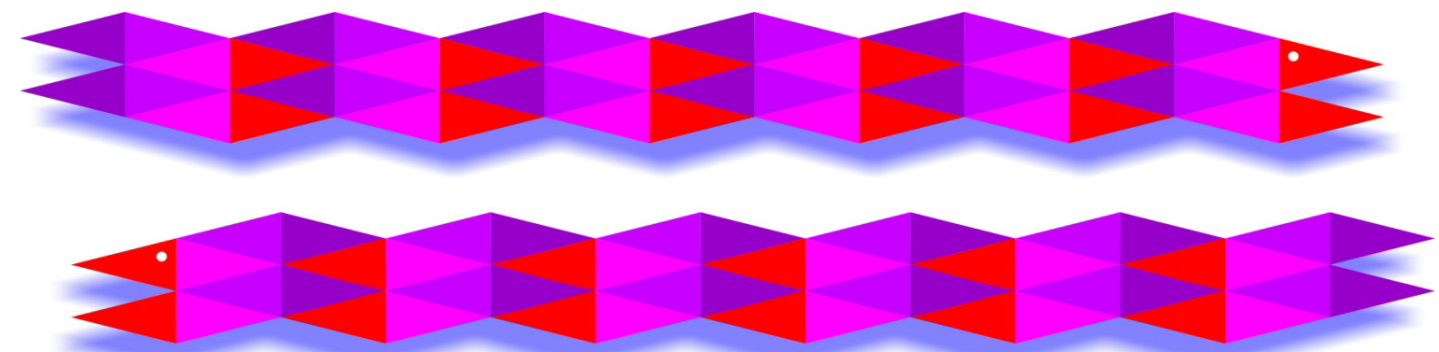
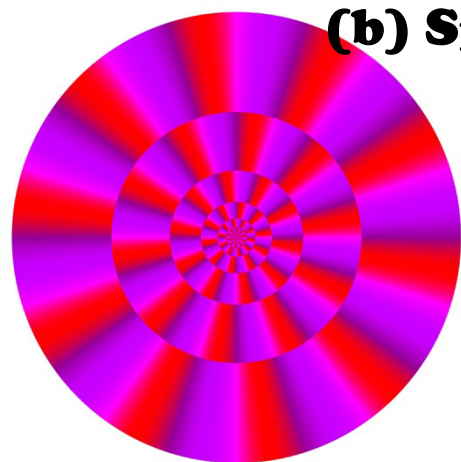
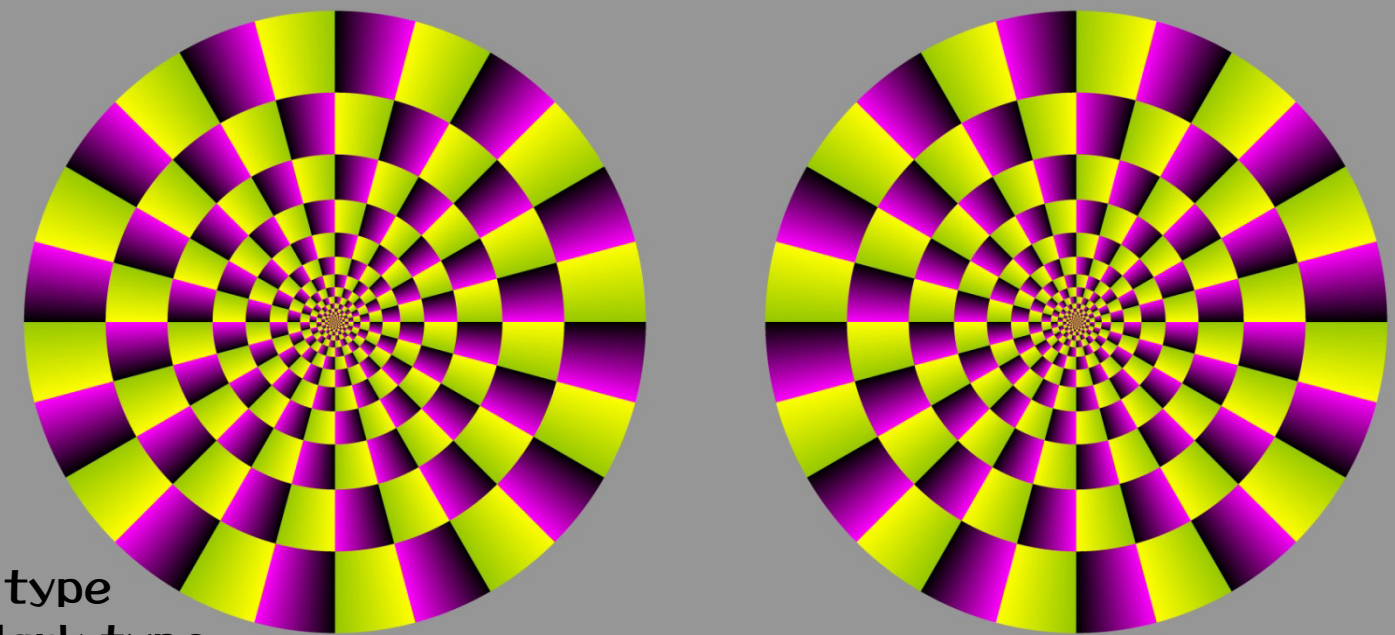
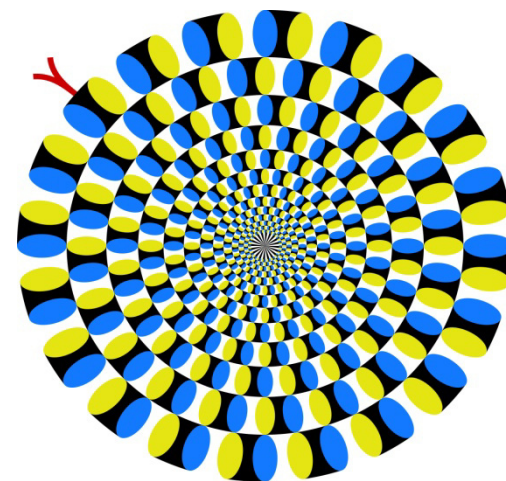
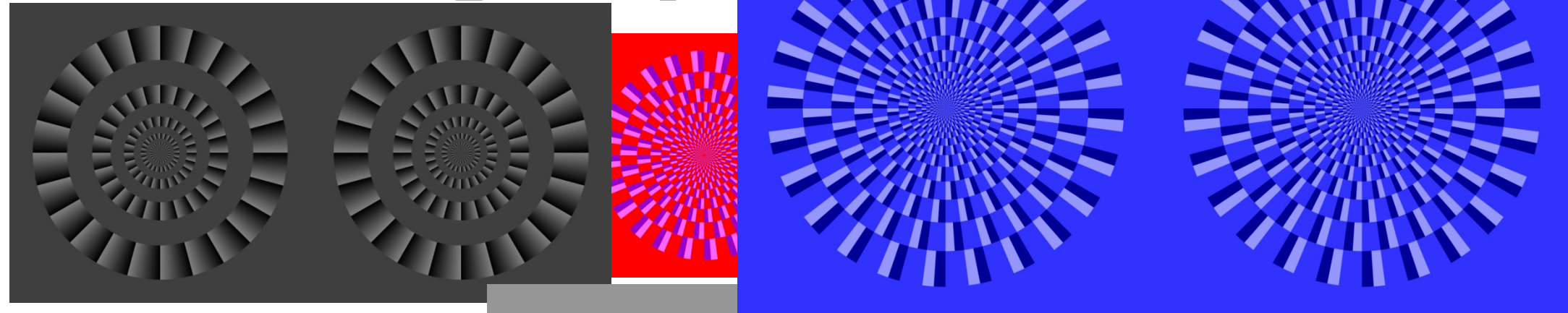
Red and blue tend to enhance the dark-to-light type  
Yellow and green tend to enhance the light-to-dark type  
(though these rules remain anecdotal)

(b) Special ('Type V' or 'red Fraser-Wilcox illusion')

Special combination of red and purple (purple, light-purple, magenta (light red-purple), red) enhances transient illusory motion just after eye movements, blinks or flickers.

(i) Dark-to-light type

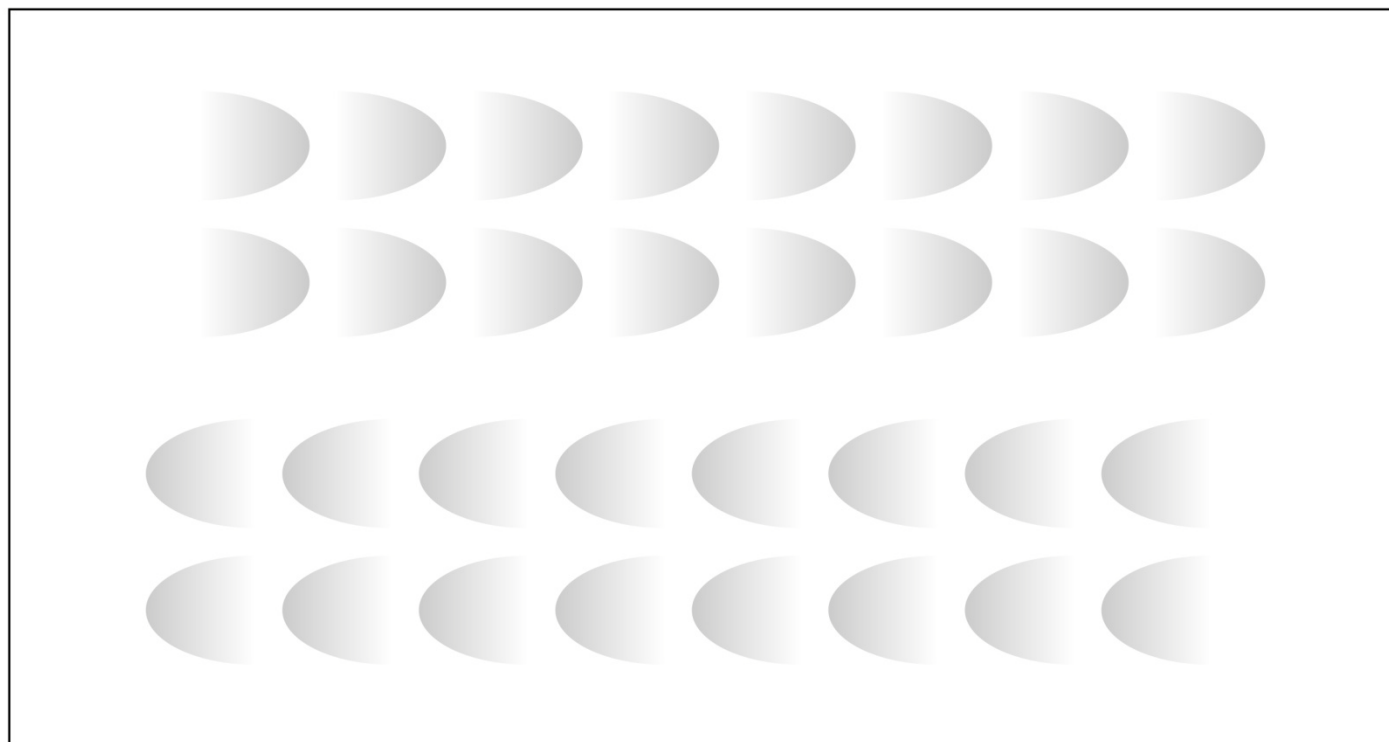
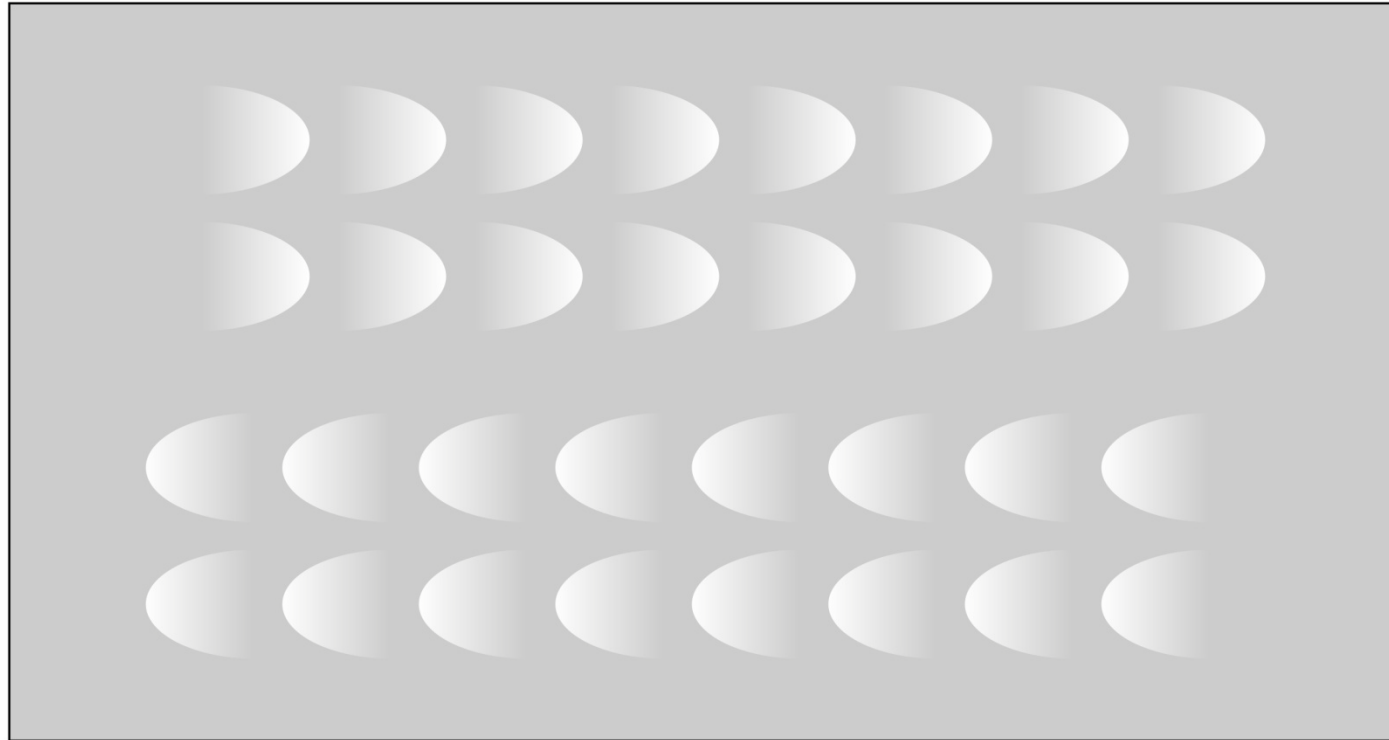
(ii) Light-to-dark type



## Other similar illusions

### 'Central drift' illusion

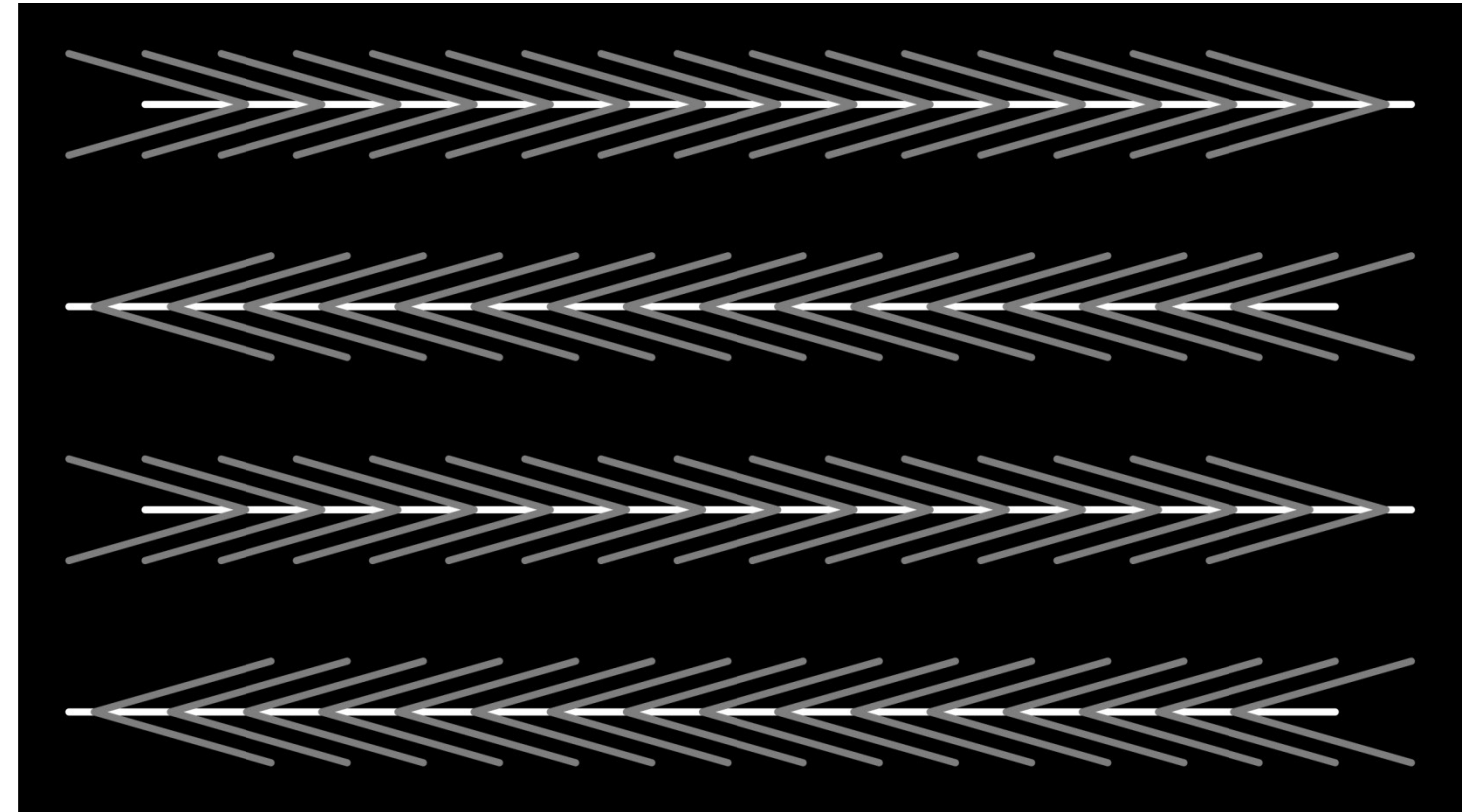
Kitaoka, A. and Ashida, H. (2004) A new anomalous motion illusion: the "central drift illusion". Talk presentation in the 2004's winter meeting of the Vision Society of Japan.



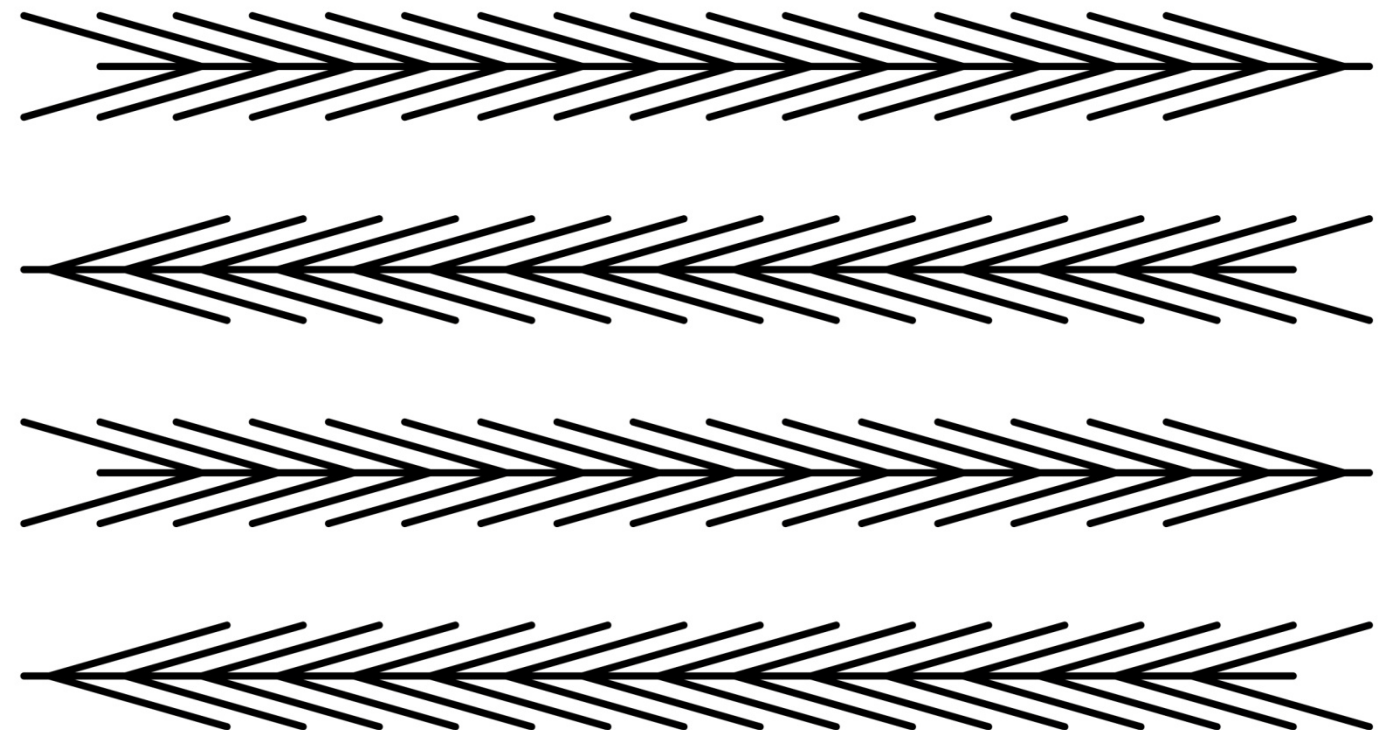
The direction of illusory motion is from low-contrast to high-contrast (toward round heads). This characteristic is a reversal of the Fraser-Wilcox illusion.

### 'Arrow drift' illusion

Kitaoka, A. (2007) A new motion illusion in a stationary image characterized by line drawing. Talk presentation in the 2007's winter meeting of the Vision Society of Japan.



Horizontal line segments appear to move toward the heads of arrows.



Horizontal line segments appear to move toward the rears of arrows.

This illusion remains an open question, too.