

## **ColorMotionDemos: version 1.2.1 (2009 Sep 08)**

### **Content:**

Demonstrations of motion-induced color mixing and segregation

Originally developed by J. Watanabe

Fixed by Kazushi Maruya (2009 sep 08)

using Psychlops software (<http://psychlops.l.u-tokyo.ac.jp>)

### **References:**

[1] Nishida, S., Watanabe, J., Kuriki, I., & Tokimoto, T. (2007). Human visual system integrates colour signals along motion trajectory. *Current Biology*, 17, 366-372.

[2] Watanabe, J. & Nishida, S. (2007). Veridical perception of moving colors by trajectory integration of input signals. *Journal of Vision*, 7(11):3, 1-16, <http://journalofvision.org/7/11/3/>

### **Files:**

MixDemo: Motion-induced color mixing [1]

SegDemo: Motion-induced color segregation [2]

AmbDemo: Co-variation of color and motion in ambiguous motion [2]

ColorMotionDemos.cpp: Source code

readme.rtf: This file

- Exe files for Mac (10.4, Universal code for PowerPC & Intel) and Win (with OpenGL-compatible graphic card)

- To build each demo from the source code, uncomment one of the following line in “psychlops\_main()”

```
exp.setProcedure(&MixDemo);  
exp.setProcedure(&SegDemo);  
exp.setProcedure(&AmbDemo);
```

### **Usage:**

Use arrow keys to change variable.

UpArrow /DownArrow key: Change type of variable

RightArrow /LeftArrow key: Increase and decrease the variable

**Notes:**

Screen size: 1024 x 768

Refresh rate: 60 Hz

Original study ([1][2]) used 160 Hz. The effects observed in these demonstrations are limited.

**MixDemo:** Color-alternating motion stimulus vs flash stimulus (control).

**VARIABLES**

*Stimulus Type:* Stimulus types presented at top/bottom positions

1: Motion/Motion, 2: Flash/Flash, 3: Motion/Flash

*Mode:* Presentation mode

1: Continuous loop

2: Short presentation with pre/post masks starting with “space” hit

*Duration:* Duration (in ms) under short presentation mode

*Bar Width:* The width of a bar (in pixel)

*Eccentricity:* Vertical position of stimulus arrays

*SOA:* Stimulus onset asynchrony (in frame) - A single stimulus flash is always 1 frame.

*Motion Direction:* -1 or 1

*Green luminance:* Relative to the maximum luminance of your system (1.0)

**NOTES**

- The expected effect is that the magnitude of apparent mixture is stronger in motion stimuli than in flash stimuli. At each retinal location, the two stimuli result in spatiotemporal patterns that are similar except for a time displacement.
- *Stimulus Type=3* is best to see the difference between the two stimuli.
- Adaptation with longer presentation sometimes reduces color mixing in motion stimulus. In that case, use short presentation mode or change direction.
- The best condition depends on your hardware and viewing condition. We have also noticed a significant individual difference. You may get better effects by adjusting *SOA*, *Bar Width* and *Eccentricity*.

**SegDemo:** Color-keeping motion stimulus vs. flicker control stimulus

## VARIABLES

*Stimulus Type:* Stimulus types presented at top/bottom positions

1: Motion/Motion, 2: Flicker/Flicker, 3: Motion/Flicker

*Bar Interval:* The interval between adjacent bars in bar width, which also determines temporal rate, indicated as the second number (Hz).

*Bar Width:* The width of a bar (in pixel)

*Eccentricity:* Vertical position of stimulus arrays

*Motion Direction:* -1 or 1

*Green luminance:* Relative to the maximum luminance of your system (1.0)

## NOTES

- The expected effect is that the magnitude of apparent mixture is weaker in motion stimuli than in flicker stimuli. At each retinal position, the rate of color alternation is the same.
- *Stimulus Type*=3 is best to see the difference between the two stimuli.
- You may get better effects by adjusting *Bar Interval*. We obtain a good effect with *Bar Interval* = 2 for CRT, and 3 for LCD.

**AmbDemo:** Color-keeping motion stimulus vs flicker control stimulus

## VARIABLES

*Path-length Ratio:* The interval between adjacent bars.

*Bar Width:* The width of a bar in pixel

*SOA:* Stimulus onset asynchrony (in frame) - Stimulus exposure is always 1 frame.

*Eccentricity:* Vertical position of stimulus arrays

*Motion Direction:* -1 or 1

*Green luminance:* Relative to the maximum luminance of your system (1)

## NOTES

- As you increase the path-length ratio, the jump size of the color-keeping path relative to that of the color-alternating path increases. As a result, the perceived motion changes

from the color-keeping path to the color-alternating path. This motion change is accompanied by a change in color perception from color segregation to color mixing.

- You may get better effects by changing *SOA*.