VisonLab<sup>tm</sup> is a set of user-modfiable vision demonstrations and experiments, many of which are presented in Stereoscopic. It is a teaching tool designed for Introductory and Experimental Psychology; Sensation and Perception.

It is flexible and easy to use with a menu-driven program that permits you to set up a teaching laboratory in as little as half an hour.

There are two parts. The first part consists of demonstrations and the second consists of psycho-physical experiments.

**Demonstrations**: A partial list is illustrated below and a complete list in the dialog that follows:

Illusions: Muller-Lyer, Ponzo, Poggendorff, Color Assimilation

Apparent & relative motion: Phi phenomenon, motion recruitment, motion in depth, cycloid motion

Stereo forms: disparity-biased Necker cubes, tilted & rotated bars, Random dot stereograms: static, dynamic & moving

After-effects: McCollough, motion

Kinetic depth: rotating sphere, Saturn illusion, structure from motion

Subjective contours: static, stereo apparent motion, & rotating subjective squares Equiluminance: heterochromatic flicker, various illusions, square & circle interposition Fusional/rivalrous stimuli

**Tachistoscopic demos**: Sperling partial report, metacontrast masking **Reading demos** 

Choose Visual	Display Type:		
Motion-in-Deptil Cycloid demons Perception of C Necker Cube d Tilted and Rota Random Dot SI McCollough Aft Square-wave b Random Dots M Concentric Rim Subjective Con Equiluminance Assimilation der What will Fuse Ponzo Illsuion der Poggendorf Illu Muller-Lyer Illus Rotating Spher Saturn Illusion. Structure-from- Metacontrast D Tachistoscopic	ion. ment demonstration. stration. Causality Demonstration lemonstration. sted Bars demonstration tereogram demonstration tereogram demonstration re-effect demonstration ars Motion After-effect dem gs Motion After-effect dem gs Motion After-effect dem dotion After-effect dem stration After-effect dem demonstration. demonstration. e demonstration. e demonstration. e demonstration. Hemonstration.	n. n. demonstration. onstration. lemonstration.	
		COK.	Cancel

Each of the demonstrations has a dialog box associated with it permitting the user to modify key parameters. For example, consider the color assimilation demonstration (space between colored lines is pure white, not colored as it appears).

There is a dialog which permits changing the width of the lines, the color of the lines and the radius of the circle.

Assimilation Paran	neters		×
Radius (mm) Separation (mm)	75 2	Modify Colors	
	OK )	Cancel	



Note that pressing the "Modify Colors" button brings up a new dialog, which allows color specification in several different units, including CIE coordinates and cone contrast units.

Colors		
,	ckground Color 📃 💌	
Red 0.255	Green 0-255	Blue 0-255
RGB percentages Red% 0.0000-100.0000 0.0000	Green% 0.0000-100.0000	Blue% 0.0000-100.0000
CIE × 0.3300-0.3300 0.3300	Y 0.3300-0.3300 0.3300	Lum 0.0000-92.9800
CONE EXCITATION Short 0.00000-0.00000 0.000000	Medium 0.0000-0.0000	Long 0.0000-0.0000
	[	OK Cancel

Other demonstrations permit even more extensive stimulus modifications. For example, the subjective contour demonstration has the basic mode as illustrated here, but also has a stereo mode in which the square that is not really there appears to float above the screen, a dichoptic mode in which the "pac-men" figures are presented to different eyes, and an apparent motion mode in which the pac-men figures change back and forth to give the impression that it is the square that is not there moving back and forth—not the pac-men figures.



Subjective Contour Parameters	
Mode Normal Background Blank Background Element Size 2 Disparity 16 Modify Colors	Pacman Radius 20 Subjective Rectangle Width (mm) 100 Height (mm) 100

This illustrates a guiding principle behind VisionLab. The demonstrations should be more than simple objects that students can see in books; rather they should be dynamic modifiable objects so that students may experiment on them.

The following Dialog boxes and demonstrations provide additional examples.

Ponzo Illusion Parameters	
Mode Subjective Contour	▼ Stereo Type Consistent ▼
Side Bar Length (mm)	120 Modify Colors
Side Bar Separation (mm)	60
Angle (degrees)	10
Horizontal Bar Length (mm	40
Disparity (xpixels)	10
	OK Cancel



Equiluminance Parameters	X
Stimulus <u>Hering Illusion</u> ▼ Kaniza Square Width (mm) 100 Height (mm) 100 Radius (mm) 25	Modify Colors Flickering Circles Radius (mm) 50 Frames/Cycle 4 💌 Mean Luminance Bgrnd
Interposition	
Square (mm) 100 Radius (mm) 50	
	OK Cancel



Muller-Lyer Illusion Properties	
Mode Normal	Stereo Type Consistent 💌
Shaft Properties Length (mm) 100 Separation (mm) 100.75 Thickness (mm) 2	Arrow Properties Length (mm) 45 Thickness (mm) 2 Angle (degrees) 60
Disparity (xpixels) 10	Modify Colors OK Cancel



The user adjusts the shaft on the right until it appears to match the one on the left.

Random-Dot Stereogram Paramete	rs 🛛 🔀
<ul> <li>Dynamic</li> <li>Mouse-controlled</li> <li>Front-Back</li> <li>Disparity</li> <li>Background (xpixels)</li> <li>-2</li> <li>Object (xpixels)</li> <li>16</li> </ul>	Modify Colors         Size         Object (mm)       75         Element Width (mm)       1         Element Height (mm)       1
	Cancel



When viewed stereoscopically, a center square appears to float above the background.

Metacontrast Properties						
Mode Binocular Fixation Duration (seconds) 2	Modify Colors Blank Duration (frames) (= 30 msec)					
Test Properties Radius (mm) 10	MaskProperties					
× Offset (mm)	Radius (mm)					
Y Offset (mm)	Duration (frames) 10 (= 100 msec)					
Duration (frames) 5 (= 50 msec)						
	Cancel					



When viewed in sequence with the proper temporal parameters, the circle in the middle is not seen.

## **Psychophysical Experiments**

The user may select from a variety of psychophysical & statistical methods to conduct experiments, collect & analyze data. The psychophysical are: methods of adjustment, constant stimuli, staircase, quest, and signal detection.

The complete list of experiments are:

- Line Length Discrimination
- Dot Detection (permits plotting of on-center, off-surround receptive fields)
- Stereo acuity
- Spatial Frequency shift after-effect
- Stereoscopic Size Constancy
- Muller-Lyer Illusion

Sample menus that illustrate the breadth and sophistication of the psychophysical methods follow:

💑 Line Length Discrimination: Met	hodmaker Main	
<u>File E</u> dit <u>H</u> elp Actions		
EXPERIMENT TYPE		discrimination V
Current Interwoven	(1 to 1)	
STANDARD VALUE		
Length	mm (10.00 to 200.00)	10.00
INITIAL DEPENDENT VALUE		
Length	mm (10.00 to 200.00)	10.01
LIMITS		
Logical Lower Limit	(-99999 to 99999)	10.000000
Logical Upper Limit	(-99999 to 99999)	200.000000
Physical Lower Limit	(-99999 to 99999)	10.000000
Physical Upper Limit	(-99999 to 99999)	200.000000
DISPLAY STANDARD and COMPAR	ISON	
Display Values		enabled 💌
Missed Frames Warning		
When to display		after experiment
BEEP AT BEGINNING OF EACH T	RIAL	
Trial Beep		enable 💌
		~

🔏 Li	ne Length Discrimination: Metl	hodmaker Main	: Staircase	
Eile	Edit Help Actions			
e	Current Interwoven STEP SIZES Type**	(1 to 1)		additive
	Initial Step Size**	10.10.		0.02
	Final Step Size**	TO TO.		0.01
F	REVERSALS			
	Practice**	even integer	(0-10)	2
	Experimental**	even integer	(2-1000)	4
P	Retry Trial**			enabled 💌
	Number of Seen or YES resp	ponses before	decrease	
	Before first reversal**		number (1-5)	1
	After first reversal**		number (1-5)	1
	Number of Not Seen or NO m	responses befo	re increase	
	Before first expt rever	sal**	number (1-5)	1
	After first expt revers	al**	number (1-5)	1
N	Num Steps if not seen or NO <sup>†</sup>	** .00-	-10.00)	1.000000
N	Num Steps if seen or YES**	(1.00-	-10.00)	1.000000
	Max Number of Trials at U	pper Limit**		999

🔏 Line Length Discrimination: Methodmaker Main : Quest		
<u>File Edit Help Actions</u>		
		^
Current Interwoven (1 to 1)	1	_
QUEST PARAMETERS		
Type of psychometric function**	Weibull	•
Slope of psych. func.**	from 0.1 to 20 3.500000	
Prob(mistaken key press)**	from 0 to 1 0.010000	
Which is primary**	threshold	. 💌
Threshold Definition**	<pre>\$\$ correct (1 to 99) 50.000000</pre>	_
Epsilon** log uni	its (-11.416 to 3.790) -0.909569	
Gammachance p(yes/correct)**	(0.00 to 0.98) 0.000	
Jitter for placement**	+/- dB (0 to 99) 0	
Statistic to be used for placement**	mode	•
Type of prob density funtion**	Gaussian	
Lower limit for prior**	log units (-5 to -1) -2.500000	
Upper limit for prior**	log units (1 to 5) 2.500000	
SD of prior p-density function**	dB (0.1 to 99.0) 12.000000	
Termination rule**	fixed num	of trial
Number of trials**	from 1 to 9999 30	
ADDITIONAL QUEST PARAMETERS		
Retry Trial	enabled	•
Max Number of Trials at Upper Limit**	999	~

💑 Line Length Discrimination: Methodmaker M	ain : Signal	
<u>File E</u> dit <u>H</u> elp Actions		
		^
Current Interwoven (1 to 1)		1
SIGNAL DETECTION PARAMETERS		
Stimuli Gen**		user-input 🔻
Number of Levels**	integer (2-8)	8
Trials per Level**	integer (2-100)	10
# of Catch Trials**	integer (0-100)	10
Practice Trials per Level**	integer (0-10)	0
<pre># of Practice Catch Trials**</pre>	integer (0-10)	0
Provide Feedback**		No
Confidence Levels	integer (3-10)	5
Retry Trial		enabled 🔻
SIGNAL DETECTION STIMULI VALUES (10.0)	0 to 200.00)	
(1) 10.00 (2)	10.00 <b>(3)</b> 10.00	
( <b>4</b> ) 10.00 (5)	10.00 (6) 10.00	
<b>[7]</b> 10.00 <b>[8]</b>	10.00	~

💑 Line Length Discrimination: Met	hodmaker Main : Metho	d of constant stimuli		
<u>File E</u> dit <u>H</u> elp Actions				
Current Interwoven	(1 to 1)			
MOCS PARAMETERS				
Show table on-screen			No Table	
Central Offset Mode**			disabled 🔻	
Stimuli Gen**			user-input 🔻	
Number of Levels**	integer (1-200)		7	
Trials per Level**	integer (1-1000)		10	
Practice Trials/Lvl**	steger (0-100)		0	
Levels Randomization Meth	hod		Completely Random	
Retry Trial			enabled 💌	
FORCED-CHOICE PARAMETERS				
Selection of alternatives	5**		random	
Restrict Number of Consecutive Trials at Same Placement				
Status**			disabled 💌	
MOCS STIMULI VALUES (10.00	to 200.00)			
(1) 10.01	[2] 10.01	<b>(3)</b> 10.01		
(4) 10.01	<b>(5)</b> 10.01	<b>(6)</b> 10.01		
<b>(7)</b> 10.01			~	