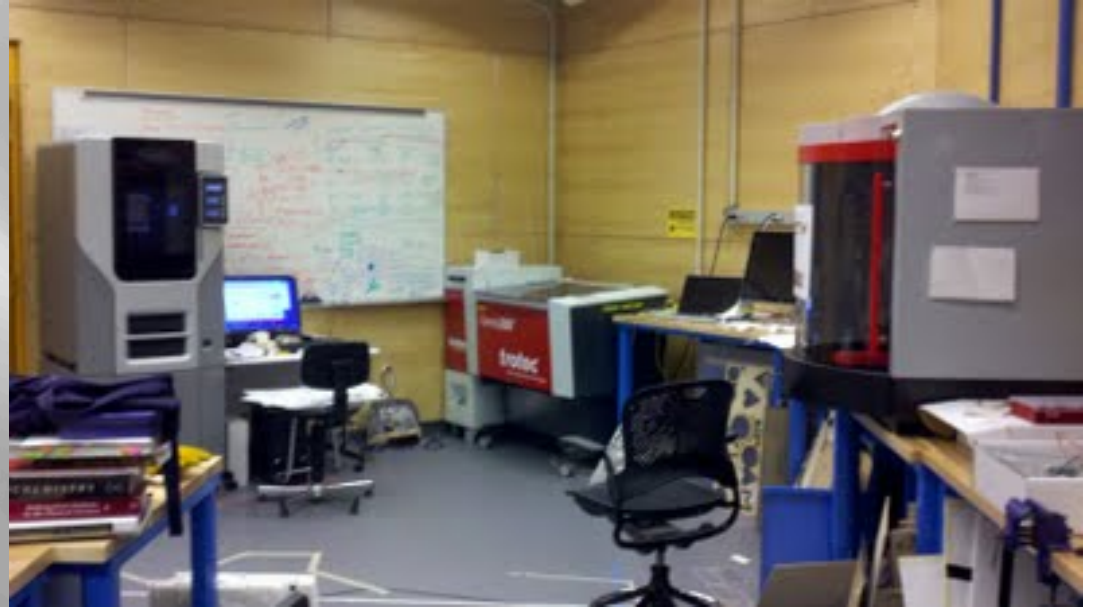


# RAPID PROTOTYPING FOR EVERYONE : PICTUREBLOCKS

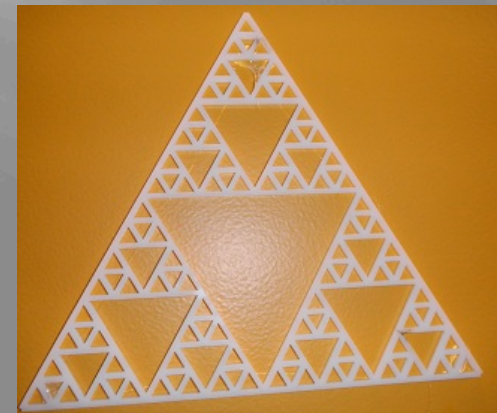
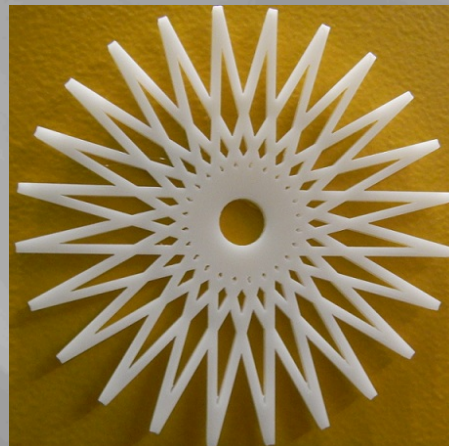
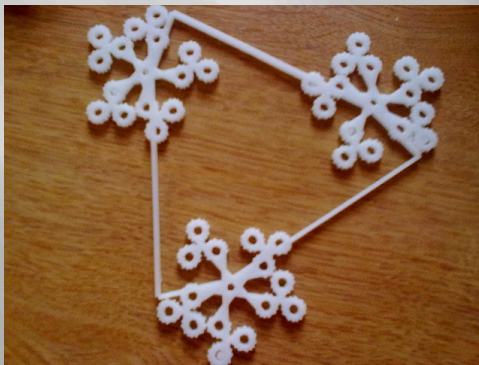
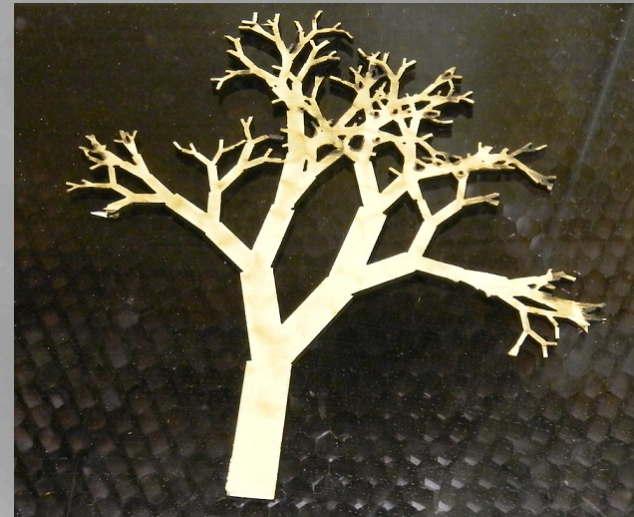
Ana Smaranda Sandu '14  
Supervised by prof. Franklyn Turbak

# What is Rapid Prototyping?

- Quick journey from design to physical artifact
- Used in industry, but also on a much smaller scale , at school or home.
- Wellesley College has a laser cutter, vinyl cutter, 3D printer.

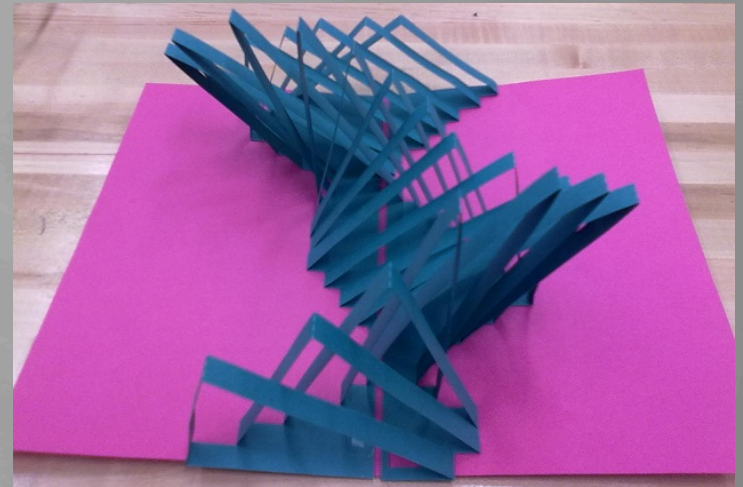


# Laser cutter





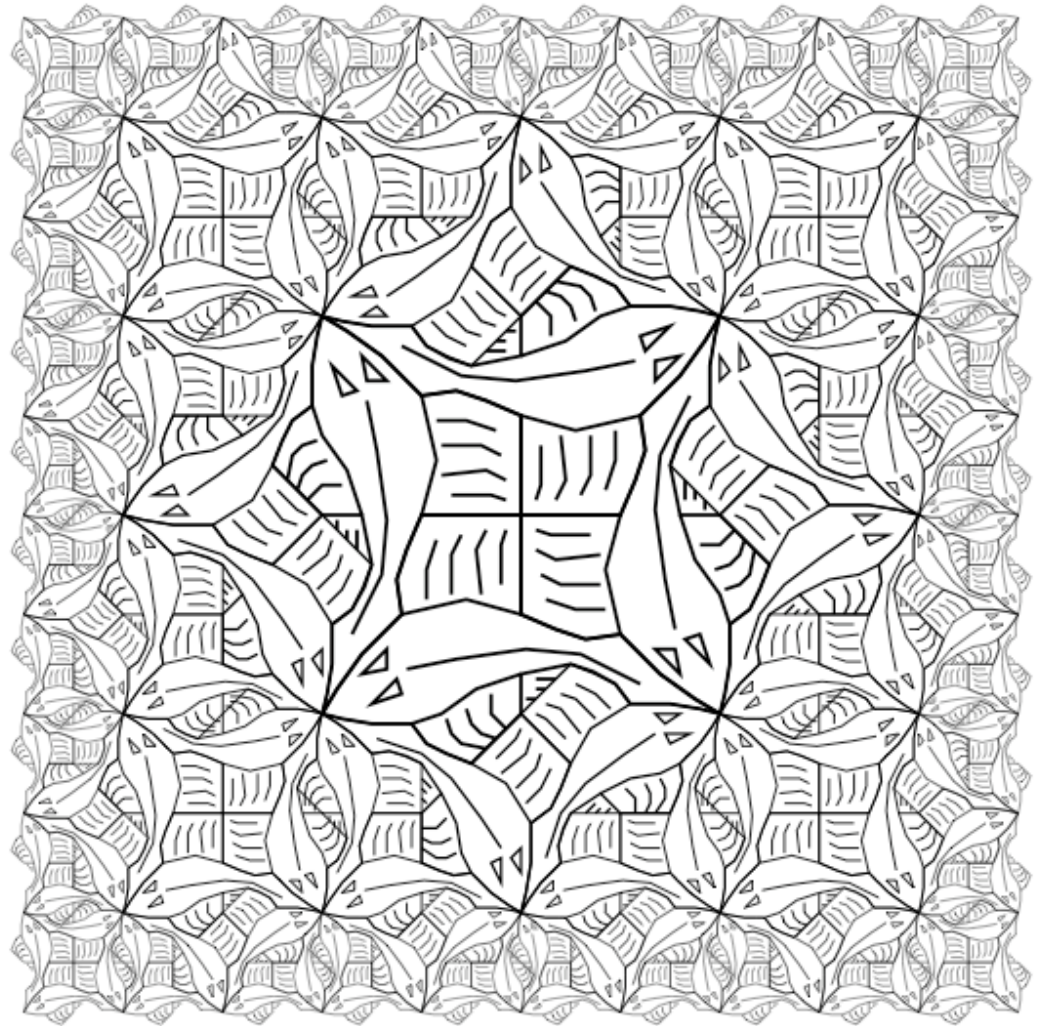
# Vinyl cutter





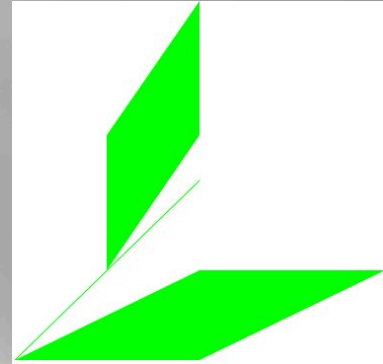
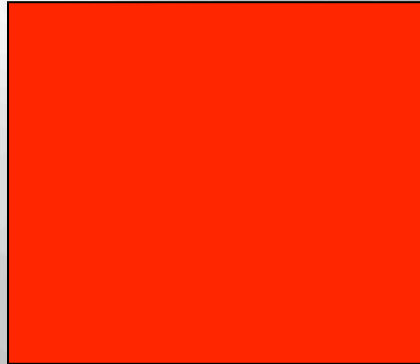
# Peter Henderson's Picture Language

- ▣ Described in his paper "Functional Geometry" (1982)
- ▣ Adapted in Abelson and Sussman "Structure and Interpretation of Computer Programs"
- ▣ Adapted in MIT 6.001 course and Wellesley College CS111 - Introduction to programming course



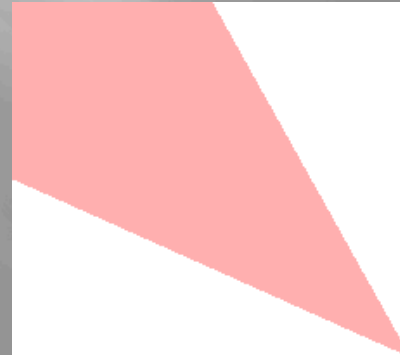
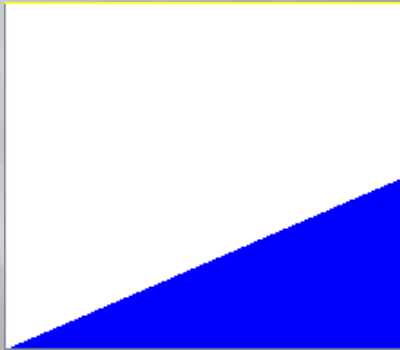
# PictureWorld: Some Primitive Pictures

rp  
(red patch)



leaves

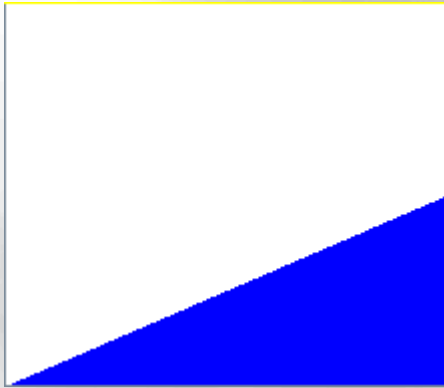
bw  
(blue wedge)



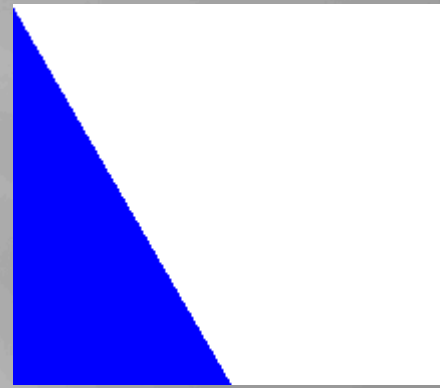
kite



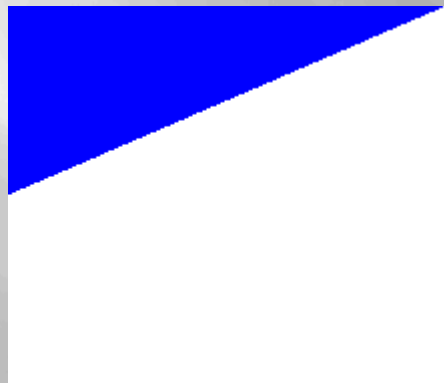
# Rotating Pictures



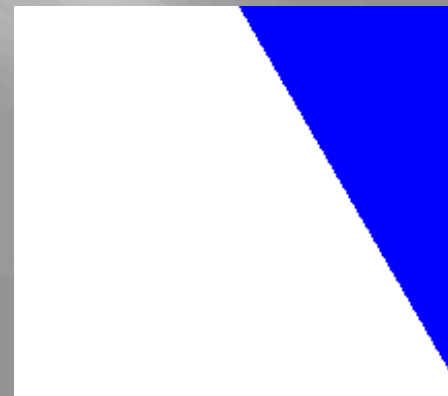
bw



clockwise90(bw)

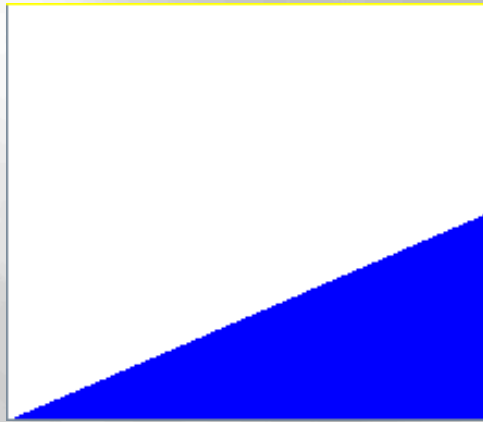


clockwise180(bw)

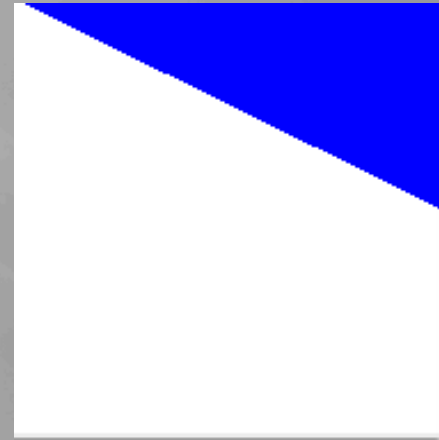


clockwise270(bw)

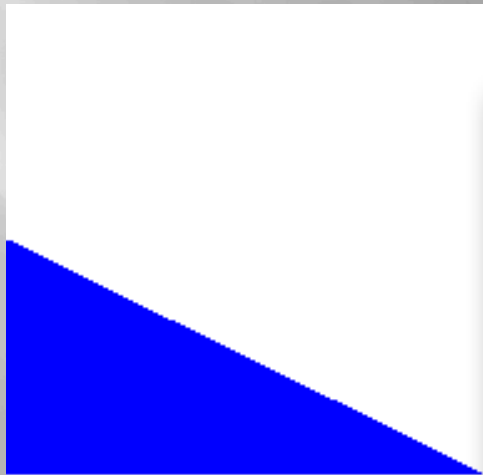
# Flipping Pictures



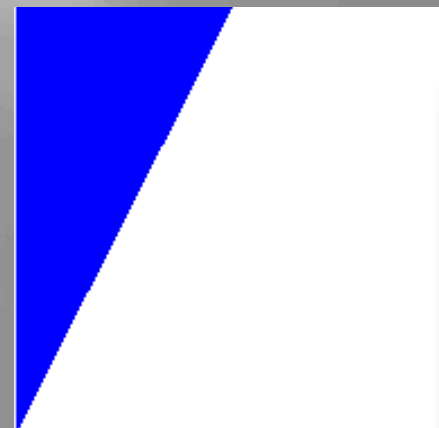
bw



flipVertically(bw)



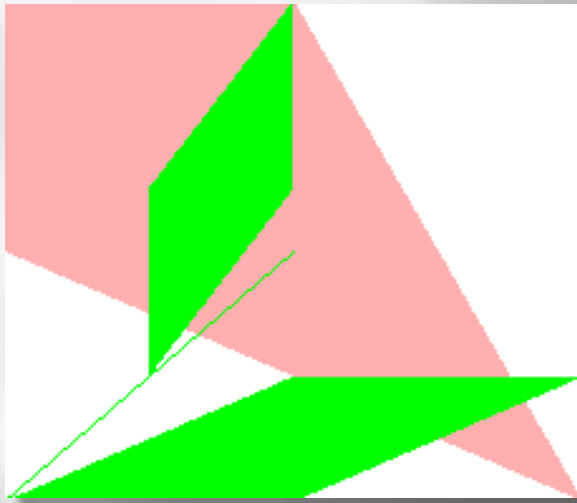
flipHorizontally(bw)



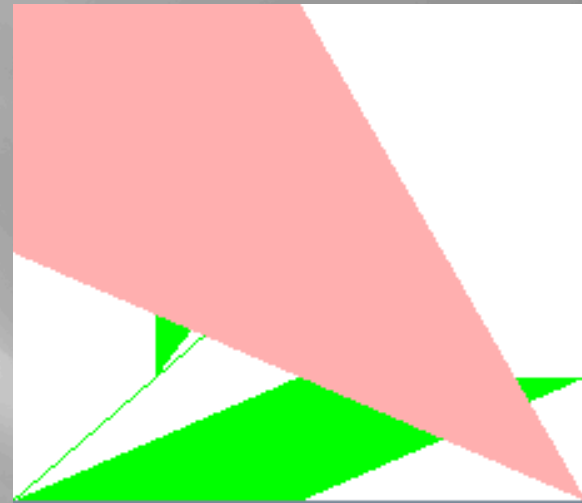
flipDiagonally(bw)



# Putting one picture over another

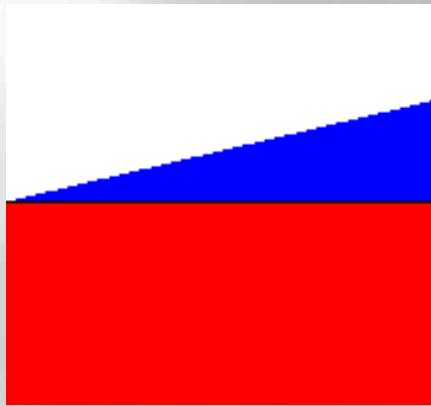


`overlay(leaves,kite)`

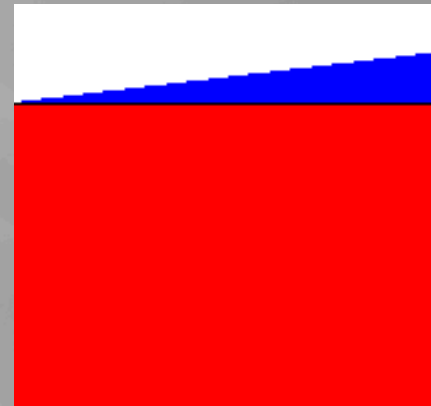


`overlay(kite,leaves)`

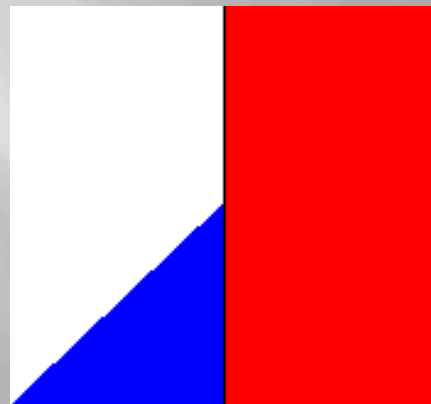
# Putting one picture above or beside another



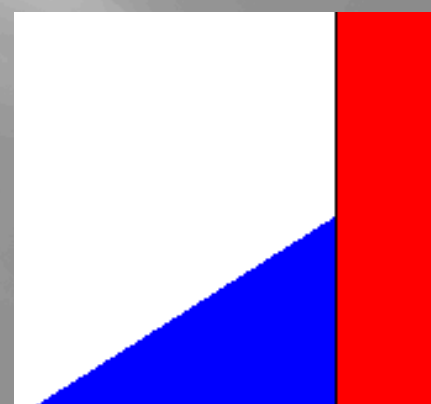
above(bw,rp)



above(bw,rp,0.25)



beside(bw, rp)



beside(bw,rp,0.75)



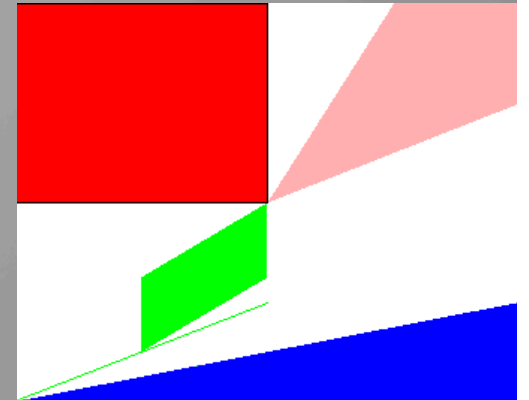
# My Work: PictureBlocks

## The environment

The image displays the PictureBlocks environment interface. On the left is a vertical menu with categories: Program, PictureOperations, PrimitivePictures, Control, Logic, Math, Procedure, Variables, Strings, Colors, and Experimental. The main area contains a palette of blocks. The 'PictureOperations' category is active, showing blocks like 'Load pic', 'empty', 'wedge color', 'fish color', 'diamond color', 'kite color', 'hex color', 'patch color', 'leaves color', and 'checkmark' (with color1 and color2 inputs). In the workspace on the right, a sequence of blocks is shown: a red 'above' block with two 'pic' inputs, a blue 'wedge color' block with a 'Blue' input, and a red 'clockwise270' block with a 'pic' input.

# My work: PictureBlocks

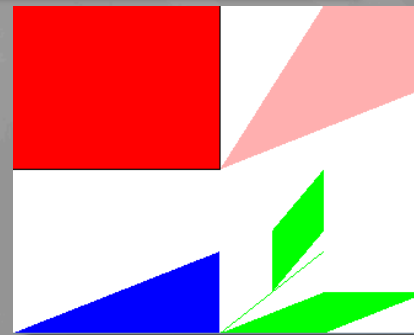
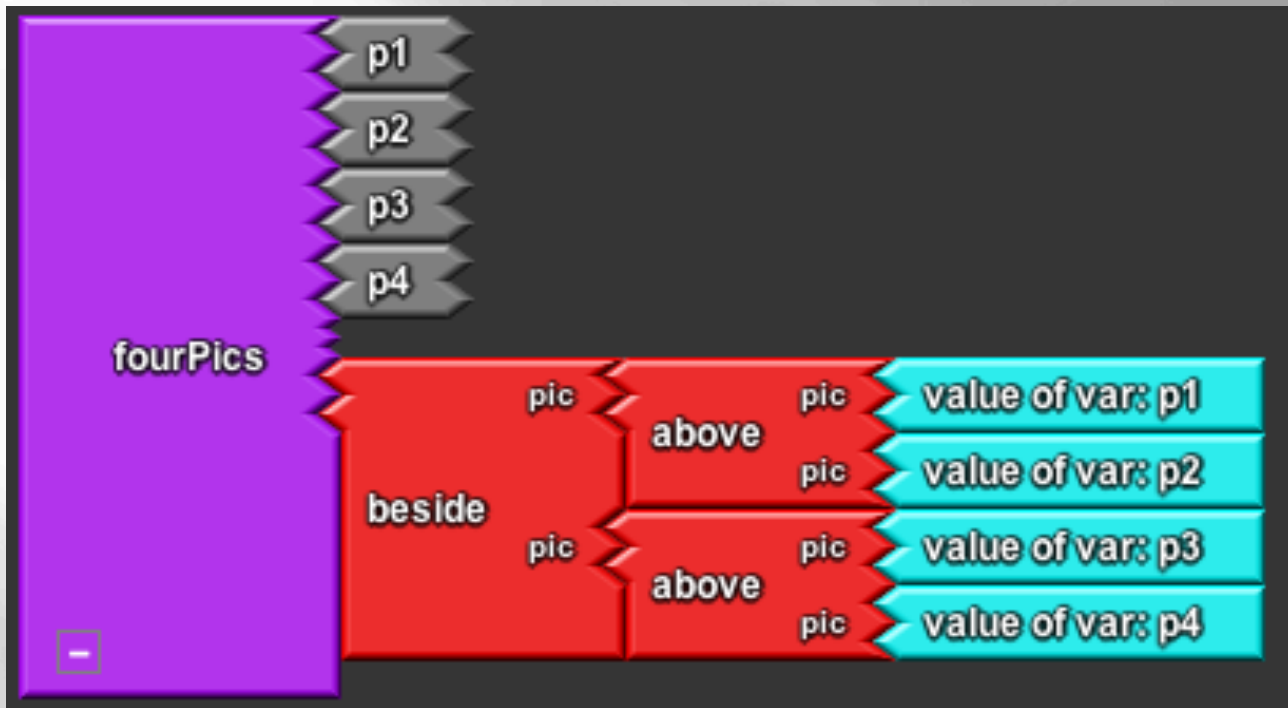
## The blocks



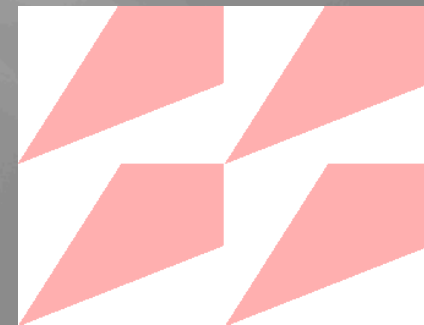
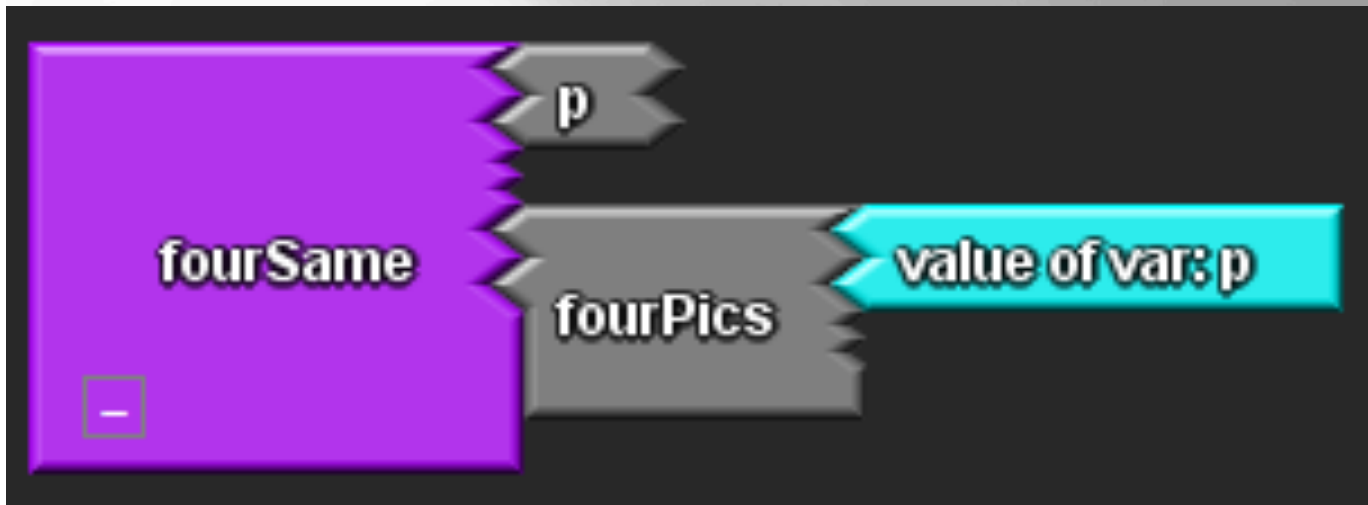
```
above( beside (patch(Color.red),  
               kite(Color.pink)),  
       overlay (wedge(Color.blue),  
               leaves(Color.green)),  
       0.5)
```



# Abstraction

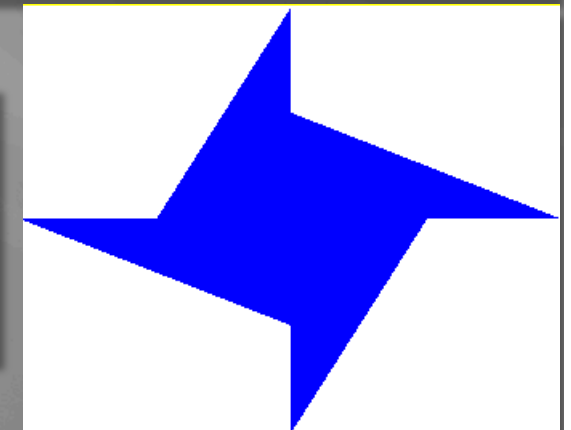
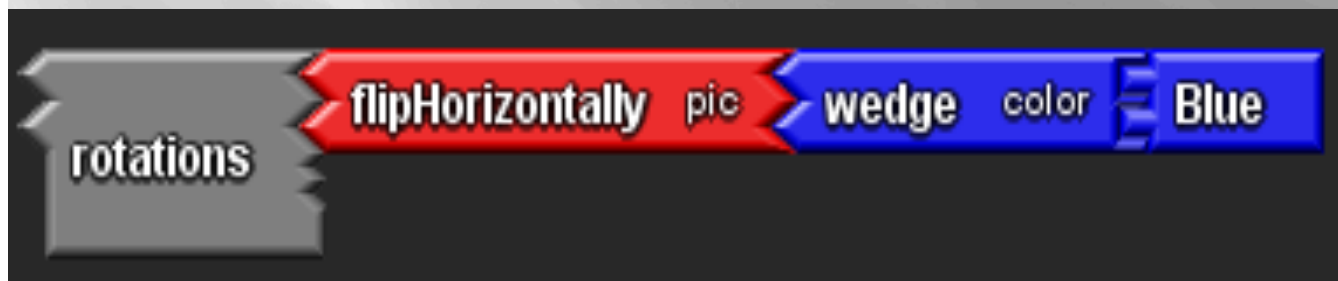


# Abstraction

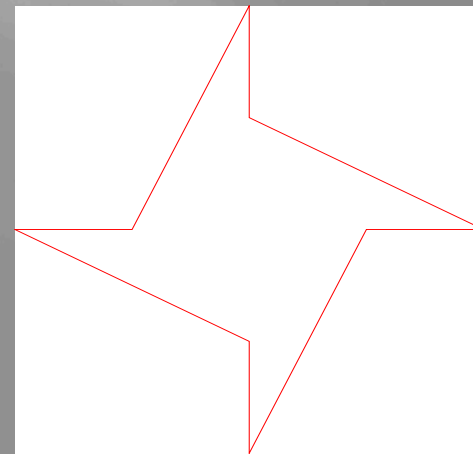
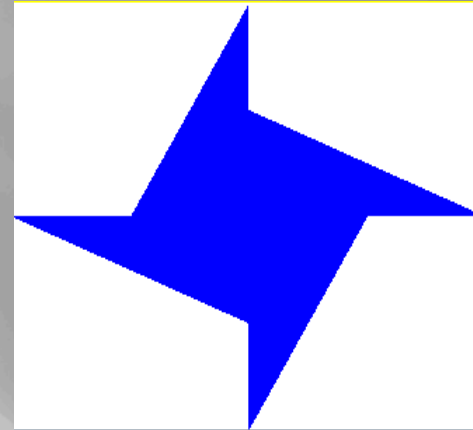




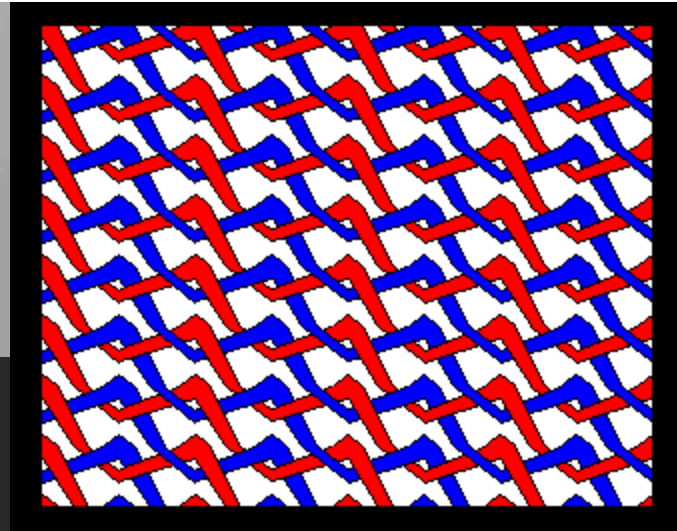
# Abstraction



# Path from design to artifact

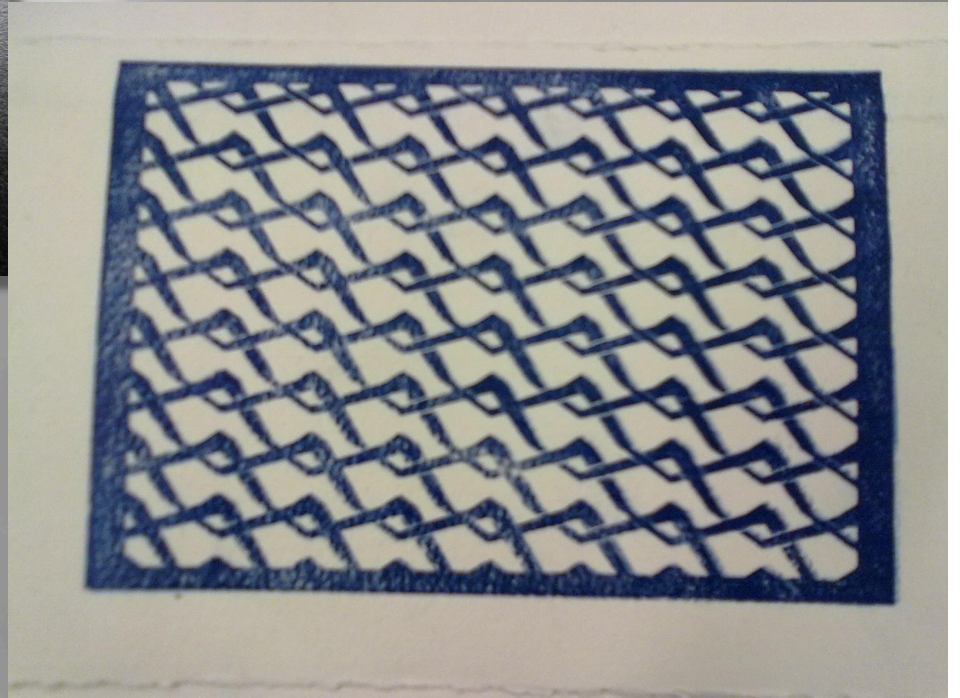
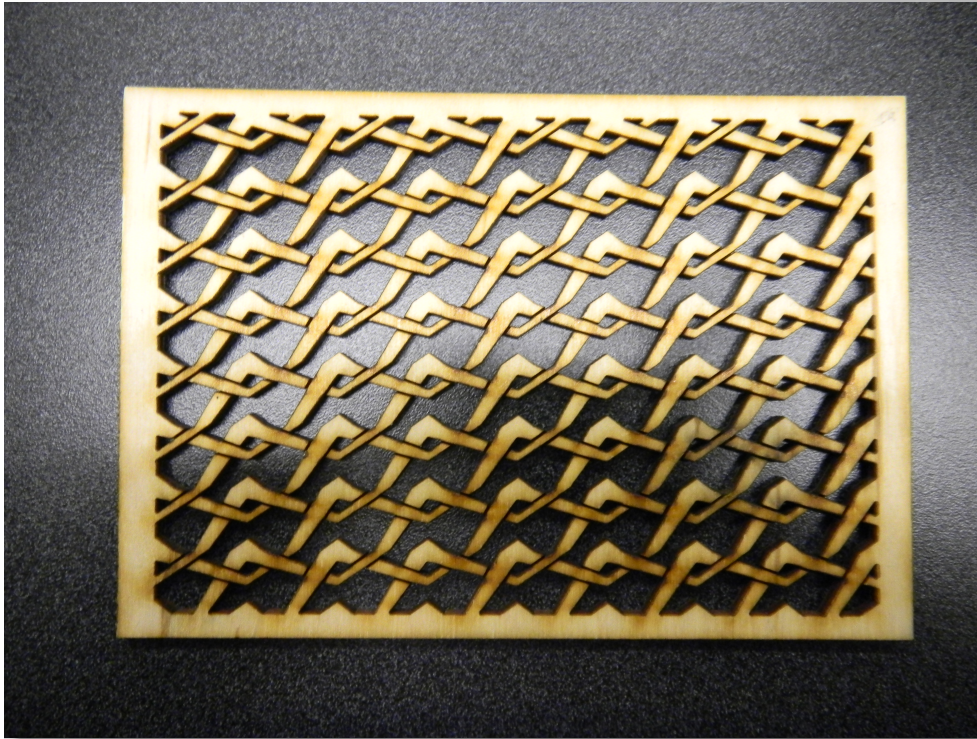


# Options...



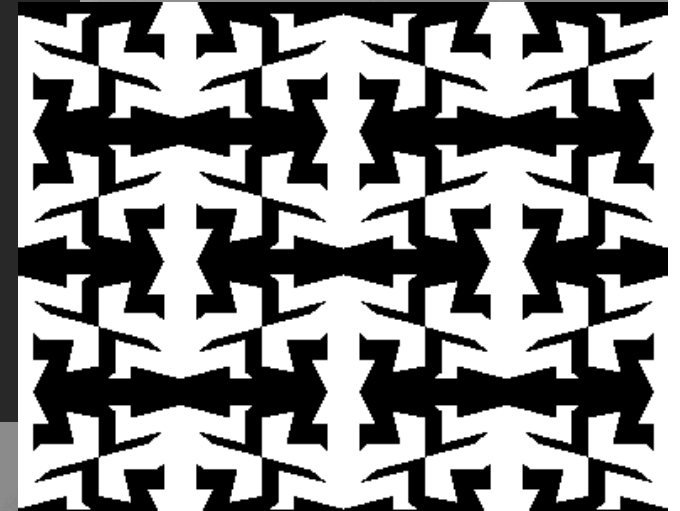
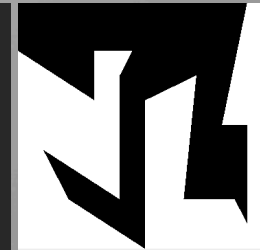


# Artifacts generated

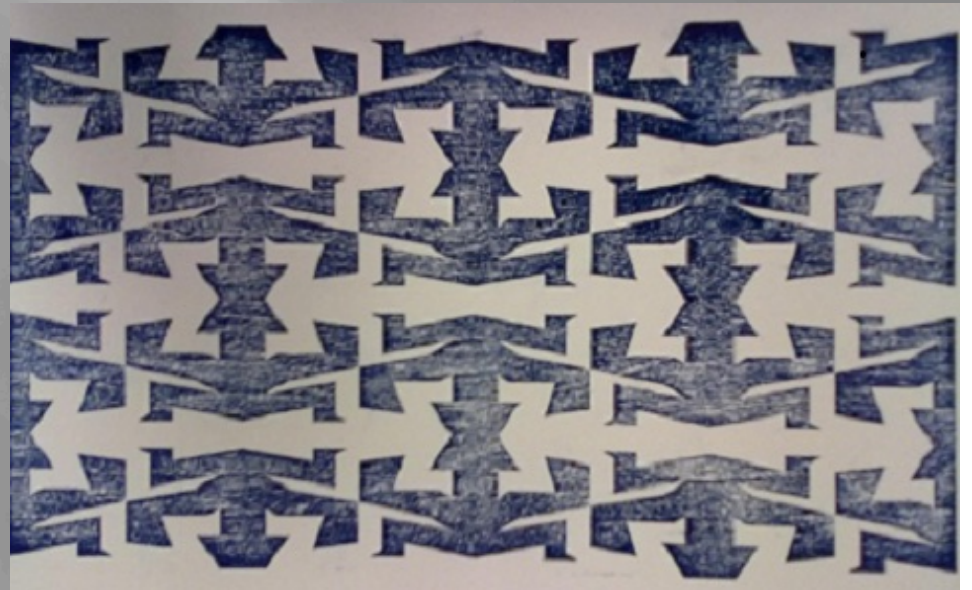
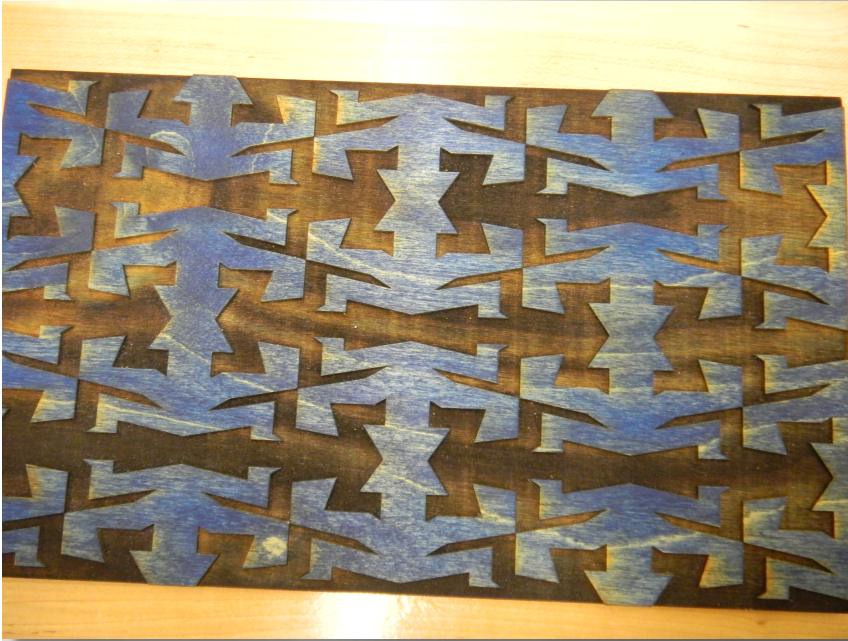




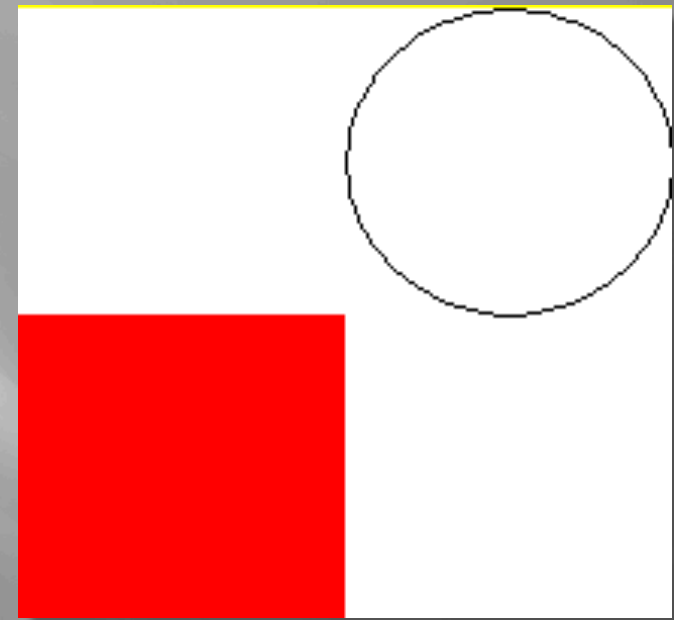
# ...options



# Artifacts generated



# Mommy, where do primitives come from...?



# Mommy, where do primitives come from...?

```
rectangle coords 0.0 0.0 1.0 1.0 fillColor 255 255 255  
polygon points 0.0 1.0 0.9 1.0  
              0.8 0.5 0.9 0.5  
              0.9 0.1 0.85 0.2  
              0.65 0.2 0.7 0.7  
              0.5 0.6 0.5 0.0  
              0.2 0.2 0.1 0.4  
              0.4 0.2 0.4 0.7  
              0.45 0.8 0.3 0.8  
              0.3 0.6 0.0 0.8 fillColor 0 0 0
```





# Sketcher – or an easier way to create designs

File Clear Figure Mode: Edit Line Mode: cut Color: Red  Filled

Top

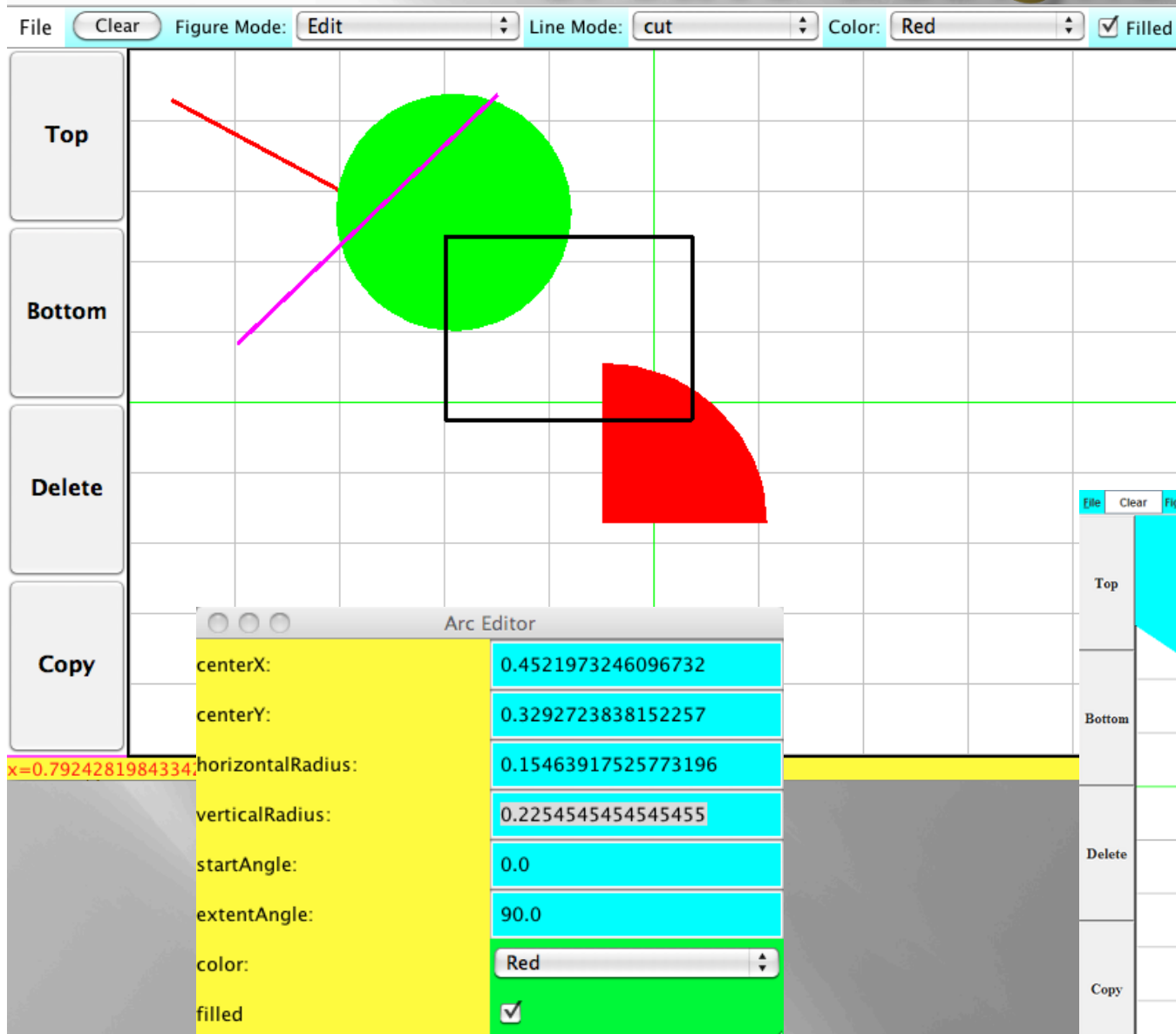
Bottom

Delete

Copy

Arc Editor

centerX:	0.4521973246096732
centerY:	0.3292723838152257
horizontalRadius:	0.15463917525773196
verticalRadius:	0.2254545454545455
startAngle:	0.0
extentAngle:	90.0
color:	Red
filled	<input checked="" type="checkbox"/>



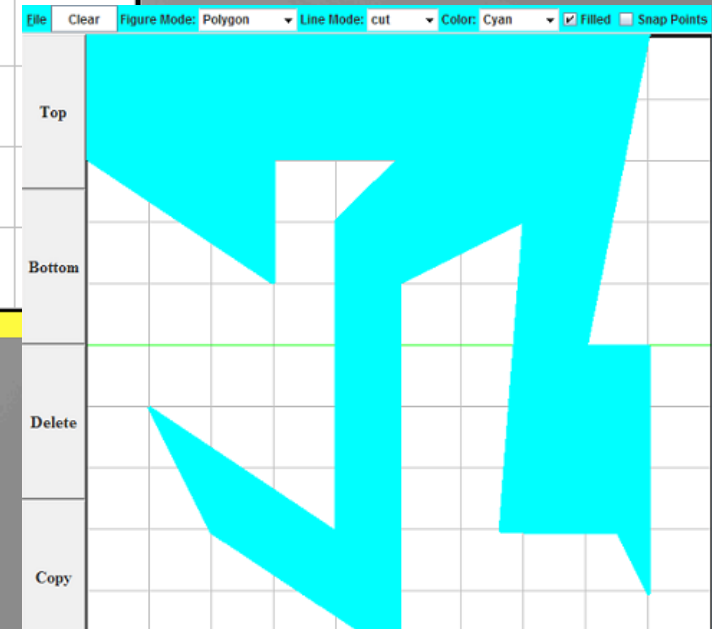
File Clear Figure Mode: Polygon Line Mode: cut Color: Cyan  Filled  Snap Points

Top

Bottom

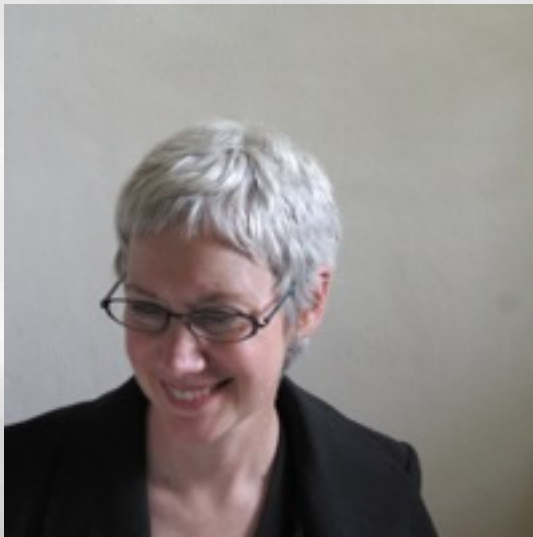
Delete

Copy



# Integration with art

Conducted interviews over the summer to gain more understanding how such a language can be used on campus



Phyllis  
McGibbon

Professor of Studio Art;  
co-director of the  
Architecture program;  
director of Studio Art

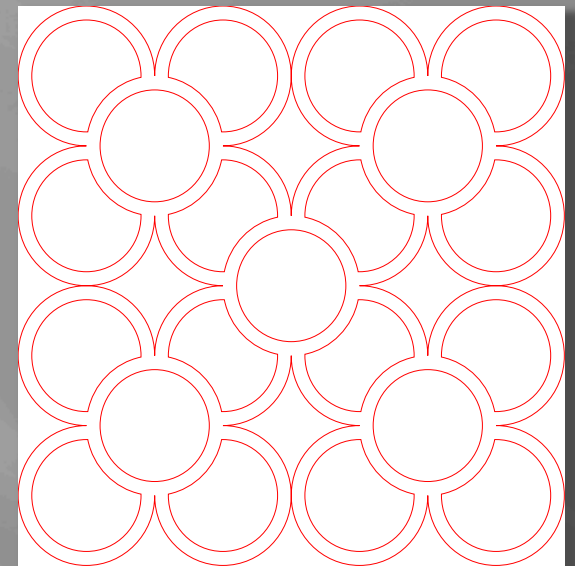
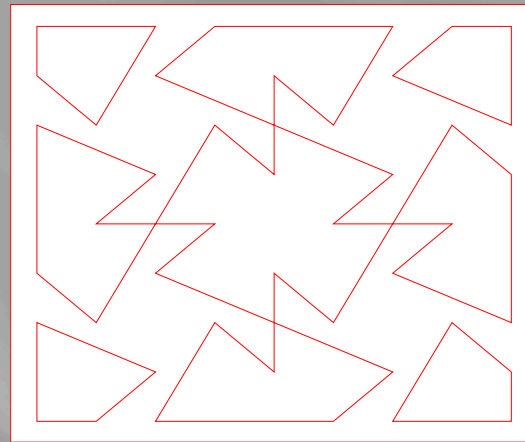
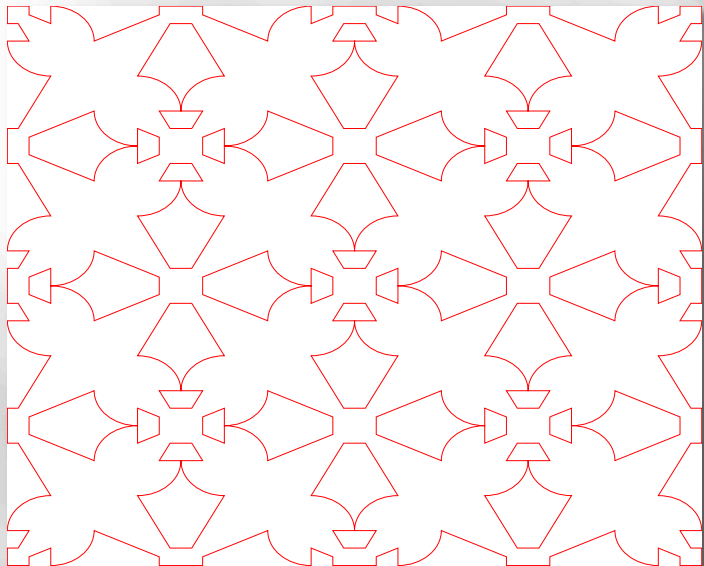


Katherine  
McCanless Ruffin

Book Arts Program Director

# Testing sessions

We have had a session in which students enrolled in CS111 at the time tested PictureBlocks and gave us important feedback.



# FUTURE WORK

- User studies
- Make it more accessible
- Explore other ways to make pictures
- We are also open to any ideas you might have!!!

