Shape-fitting a Narrative

Review the vocabulary words for this section: ***input/output, algorithm, raster/bitmap vs. vector image, SVG file, and Processing.***
https://docs.google.com/document/d/159qWlTNXdo6wXtaCTpJtQV7dVNJpkSxH7z7KmXu6ISA/edit?usp=sharing
You'll need 4 motifs from the ***Narrative Image*** exercise.

I. Gather Inputs (motifs saved as bitmap PNG files). You will need 4 PNG files.

A. Hand-drawn motifs, scanned into bitmap files:

1. Prepare your motifs to be scanned if you made them by hand-drawing.
    a. Use tracing paper, black pen and make sure to fill in all your shapes.
    b. Make sure that your lines are even (not feathered) to make quality vector lines.
    c. Use the black paper circle guide to check your motif against.
    d. Watch out for places where you need to preserve inner design details–make sure to avoid continuous outlines that surround these details. ***See example below***:

In this globe image (above), if the outer circle was a continuous line, the inner details (continents) would be lost when the paper is cut.

    e. Avoid smudges and make sure the ink is dry before scanning.
    f. Make sure the scanner plate is clean before you scan.
2. Scan the images in Black/White with a resolution of 150 dpi. Crop your scan area to just around your motif and save each motif as its own PNG file.

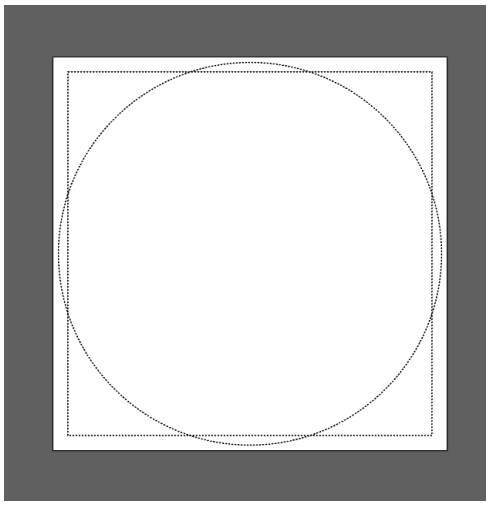
B. (Alternatives) Motifs made from digital found images (bitmaps):

1. If you rather use images you find online, and you know Photoshop, you can prepare the bitmap motifs in Photoshop (for the sake of time, we won't cover Photoshop skills):
    a. The best images are simple shapes and line-art.
    b. Use any technique to isolate your image from the background and replace with a white background: Some are the ***Magic eraser*** (***E*** key), the ***lasso*** tool (***L*** key) or ***magic wand*** tool (***W*** key) to select. ***Quick Mask Edit*** mode (***Q*** key) with the ***paintbrush*** (***B*** key) and the ***eraser*** tools (***E*** key) to isolate.
    c. Save your working file as a PSD and export each motif as its own PNG file.
    d. Depending on your image, it may help to convert it to Black and White (***Image > Mode > Greyscale***) before tracing in Illustrator.

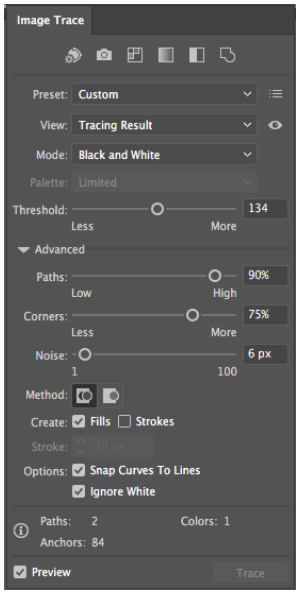
2. Another way (without using Photoshop) is to print your found images and use tracing paper to hand trace and then scan your drawings (follow the instructions above for hand-drawn motifs). Or, cut shapes in black paper and scan the pieces.
3. You can also work entirely in Illustrator, using any other techniques you know. For the sake of time, we will not cover Illustrator skills outside of **Image Trace**.

II. Illustrator Image Trace (Convert Bitmaps to Vectors) and SVG Output.

1. Open the Adobe Illustrator template: TraceTemplate.ai



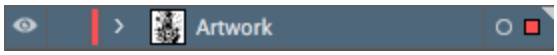
2. Navigate to the ***Layers panel*** and ***Hide*** (click on ***eye*** icon) the ***SilhouetteGuide*** layer. Select the ***Artwork*** layer.
3. After you do this, ***Save As*** (***File > Save As*** shortcut: ***shift + command + S*** keys) a new Illustrator file (rename), so you don't overwrite your master template.
4. ***Place*** (***File > Place*** or short-cut: ***shift + command + P*** keys) your motif PNG file into the ***Artwork*** layer. Work on one motif at a time. Follow the steps below for each motif:
5. ***Image Trace:*** Use the ***Select tool*** (***V*** key) to select the motif object and use the image trace function (***Object > Image Trace > Make*** *or find it in your* ***control bar***) to trace your image. Open the window for ***Image Trace*** (***Window > Image Trace***) to adjust the settings to get the best results. ***Black and White logo*** is a good preset for line drawings or ***Silhouette*** if using a photo. Use the sliders to tweak the following settings until you are happy: ***Threshold, Paths, Corners, Noise***:
    a. The larger your threshold number, the more of the image will be converted to black.
    b. Higher paths will increase the complexity of your image, and this is sometimes helpful for picking out details in hand-drawn lines.
    c. Higher corners value gives sharper corners.
    d. Keeping the noise level low helps to ignore any potential artifacts from your scan.

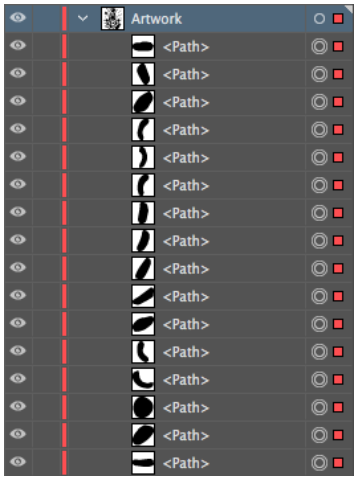


Make sure to check “ignore white” (***Advanced > Options > Ignore White***).

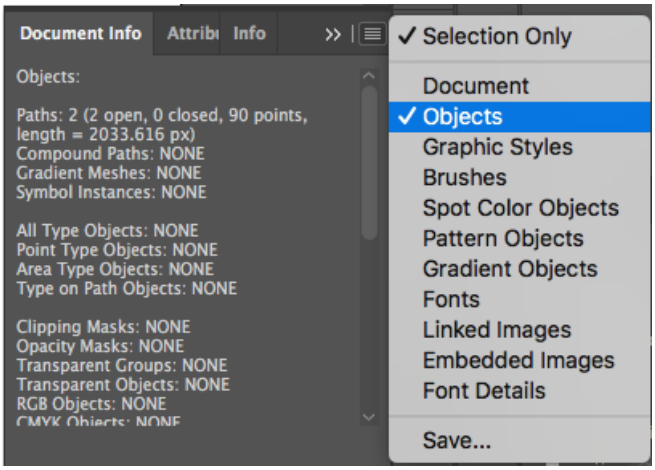
6. Next make sure to ***Expand*** (***Object > Image Trace > Expand*** or click the ***Expand*** button on the ***Control panel***) your traced image.

7. Then ***Select*** (***V*** key) the artwork object and ***Ungroup*** (***Object > Ungroup*** or short-cut: ***shift + command + G*** keys).
8. ***Check and delete duplicate paths:*** Open the object’s sub-layers (***Layer Window > click arrow to the left of your layer’s icon***) and in the sub-layers scroll down look at each layer (each layer should contain a black shape or line). Look for any blank layers and ***Delete*** those layers.

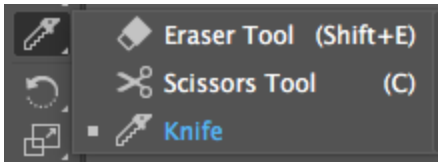




9. ***Check for and close "open paths": Select*** the whole object and then open the ***Document Info*** panel (***Window > Document Info***). In the upper right dropdown menu select ***Objects***.

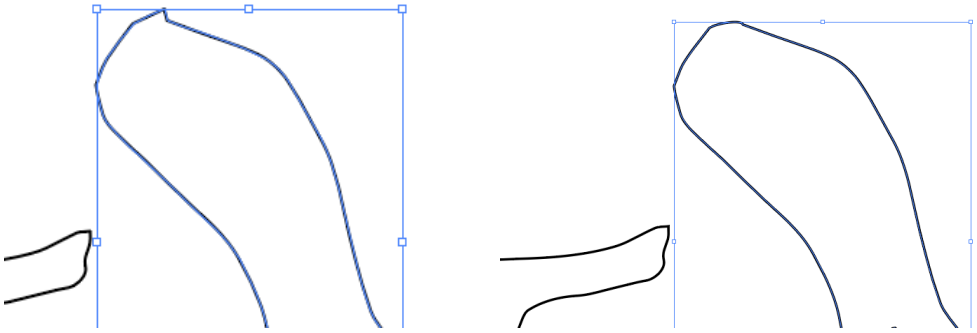


The information for your object will be displayed including how many paths and how many are open. You can do a quick-and-dirty method if you have a lot of open paths and just want to close them all. To do this, use the knife tool and draw a large circle around the outside of the entire object with the knife. This will automatically close all open paths. This only works if your object has a fill. Note: the closures may be crude.



10. If you only have a few open paths, you'll probably want to manually close them for more control. To do this, change the object to an outline in order to better see the gaps. ***Select*** the whole object again and then change the fill/stroke to: ***No Fill*** (***a white box with red diagonal slash***) and a 1pt black ***Stroke*** line.

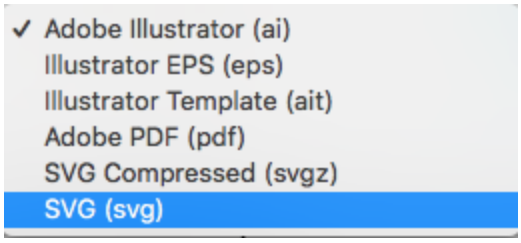
11. ***Zoom in*** (***Command + Plus*** keys) and look carefully at your traced image. Are there any gaps in the outline or strange holes?
12. If you have "open paths" (shapes with a gap in the outline), use your ***Pen tool*** (***P*** key)  and ***click the two points*** on either side of the gap to "close the path".
13. ***Clean-up Paths:*** Delete any odd shapes or points that don't belong to your image, by using ***Direct Selection tool*** (***A*** key)  ***click*** on that single point and ***Delete***. If you have weird jaggies on a curve or line, use the ***Delete Anchor Point tool*** (in the submenu of the ***Pen tool or*** short-cut: ***minus*** key)  and remove any extra anchor points that are making your curves or lines extra bumpy.

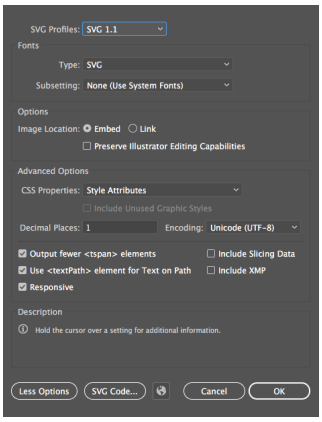


The above image (L) shows a stray anchor point and then (R) after its been deleted.

14. Once you are happy with all your paths, **Select All** the pieces (***mouse drag over everything with the Select tool on*** or short-cut: ***command + A*** keys) and change the fill back to black and the stroke to “no stroke”.

15. ***Regroup*** the objects (**command + G** keys). Remember to ***Save*** (***command + S*** keys).
16. Select (***V*** key) the object and resize it to fit just within the circle guide. You can either use (***Object > Transform > Scale > Uniform***: enter values) or ***hold down shift key*** and ***mouse drag out*** on the handle of the object to proportionally resize the object.
17. ***Unlock*** the ***Guides layer*** and ***Delete*** your guides.
18. ***Save As*** (***shift + command + S*** keys) and in the window choose the **SVG (svg) format**. Click ***Save*** button. If the ***Advanced Options*** menu is not available, click the ***More Options*** button. Under ***Advanced Options***, make sure that ***CSS Properties*** is set to ***Style Attributes***.





Note: Illustrator has an ***Export Assets*** feature that can export SVGs -- ***do not use this feature***. The SVG settings for ***Export Asset*** is not compatible with Processing.
To use with Coded Cuts software, ***manually Save As*** to select the correct SVG settings.

19. Repeat Steps 4-18 for all 4 motifs.

20. Name each of your SVG files to the following:
    a. 01_Small.svg
    b. 02_Medium.svg
    c. 03_Large.svg
    d. 04_XLarge.svg

III. Shape-Fitting in Processing

1. Copy all SVG files to Processing sketch data folder (in CirclePacking/data)
2. Open **CirclePacking.pde** in Processing
3. Run sketch (press “Play” button)
4. Sketch will automatically create a composition using random starting points
5. Click in the canvas window to add additional circles
6. Wait until composition is complete
7. Press ‘c’ to clear the shapes and begin a new composition
8. Optional: adjust the amount of random rotation by changing the **randomRotation** variable at top of sketch (range is 0.0 to 1.0). Press “Play” again.
9. Click on circles to change cut mode. There are 3 modes: cut through 1 layer, cut through 2 layers, cut through 2 layers with a circular outline
10. **Press ‘s’ to save layers**
11. In the Finder (OSX) or Explorer (Windows), locate “CirclePacking_layer_0.svg” and “CirclePacking_layer_1.svg” in data folder of sketch.

IV. Laser Cutting Instructions

- Follow instructions in **SVG Output Clean-up for Laser-ready Files**.