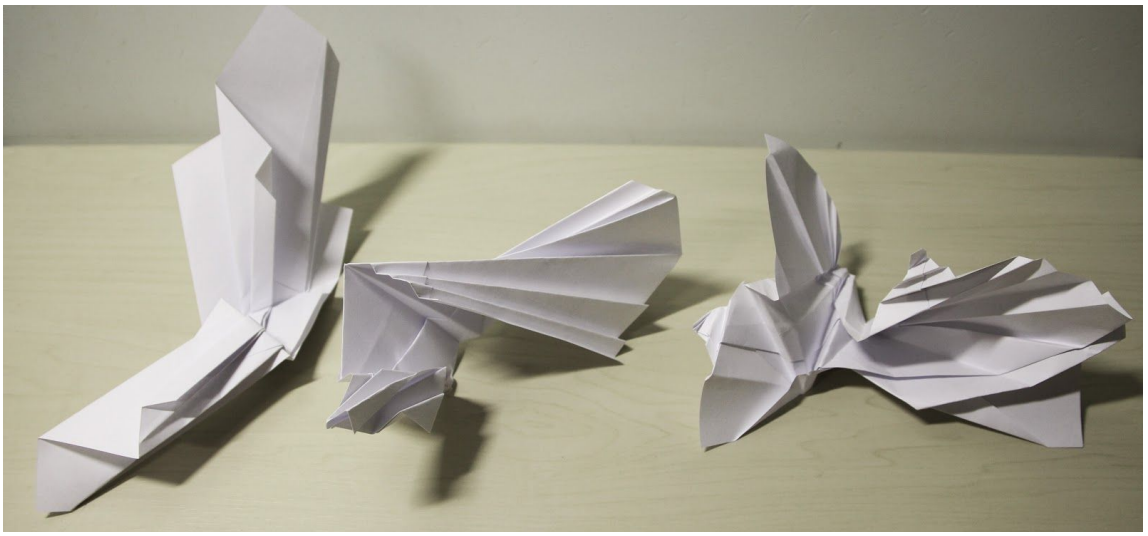
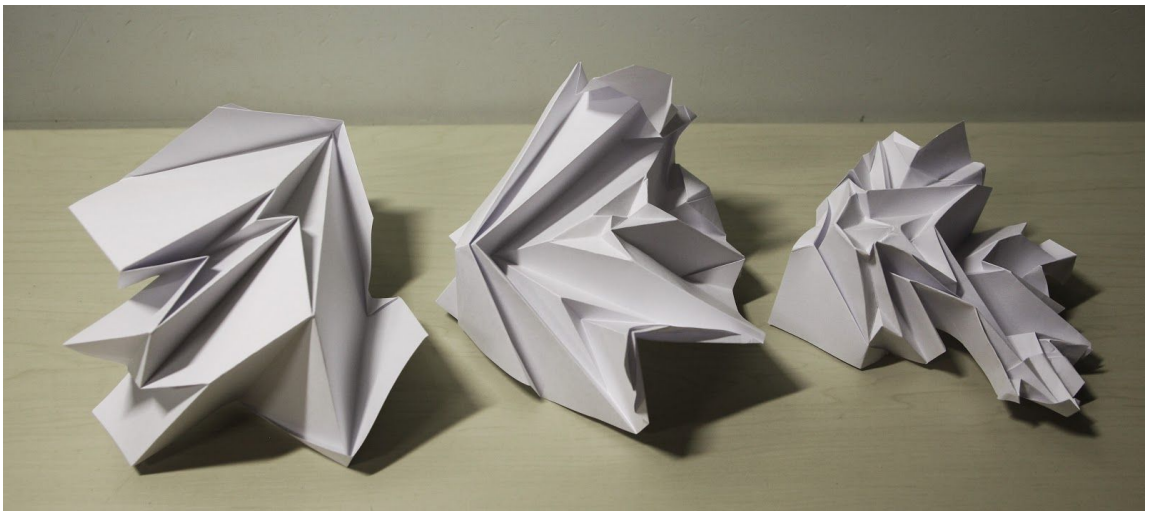
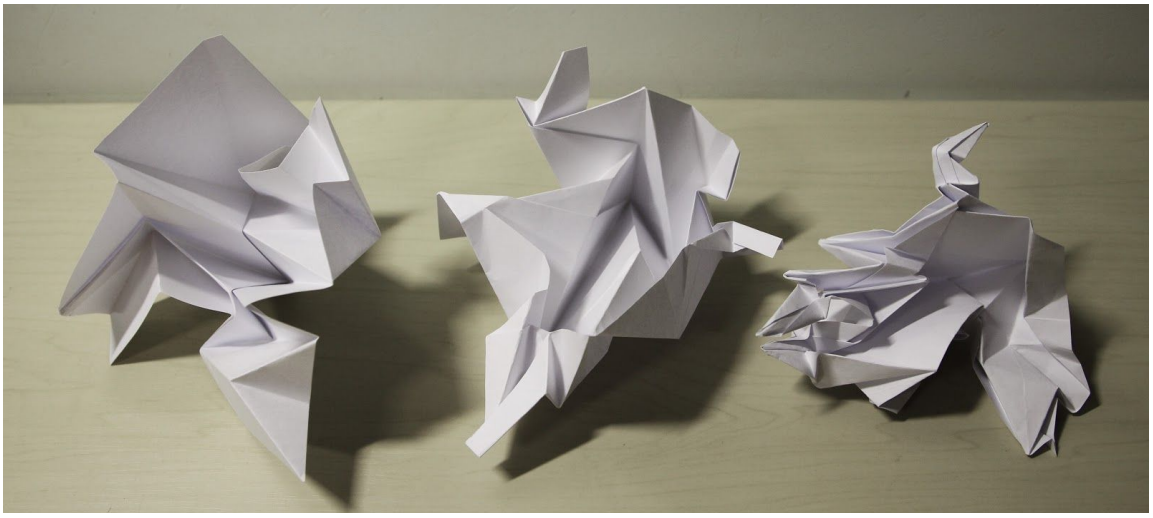
Chan Hiu Yan

Serialist Origami, 2019







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Serialist Origami, 2019
Three triads folded from uncut square paper of 210mm x 210mm

"Serialist Origami" is an origami piece that adopts an untraditional approach to paper folding, arranging the steps by serialism. The arrangement of folding steps are not determined by the intended appearance of the final piece, but rather by a boolean flowchart cycle. The decisions within the structure is controlled by chaos theory. The artwork ventures to break through conventional origami that follows symmetry, whether representational or geometric. It explores new possibilities of origami that focuses on procedure and emphasizes the nature of different types of folds, seeing the means as the ends.

Methodology

Twelve types of common folding techniques are defined as a series of objects.

1. Mountain
2. Valley
3. Crease
4. Pleat
5. Outside reverse
6. Inside reverse
7. Sink
8. Crimp
9. Rabbit ear
10. Squash fold
11. Open out
12. Petal fold

The types of origami folds are then divided into three categories. From these three categories will be created the three triads, thus giving each triad its unique style and characteristics from the types of folds.

The Basic Folds
Mountain and valley folds are inverses of each other, making up the basic folds that all other types of folds build upon. Crease is a valley and mountain fold that cancels one another, in order to leave a mark. Pleating is the combination fold of adjacent mountain and valley folds.

1. Mountain
2. Valley
3. Crease
4. Pleat

The Symmetric Folds
Outside and inside reverse folds are inverses of each other, an execution of simultaneous valley fold on one flap and mountain fold on the other flap. While the reverse folds take place

on the edge of the paper, sinking folds take place in the center. Crimp is the combination fold of adjacent outside and inside reverse folds.

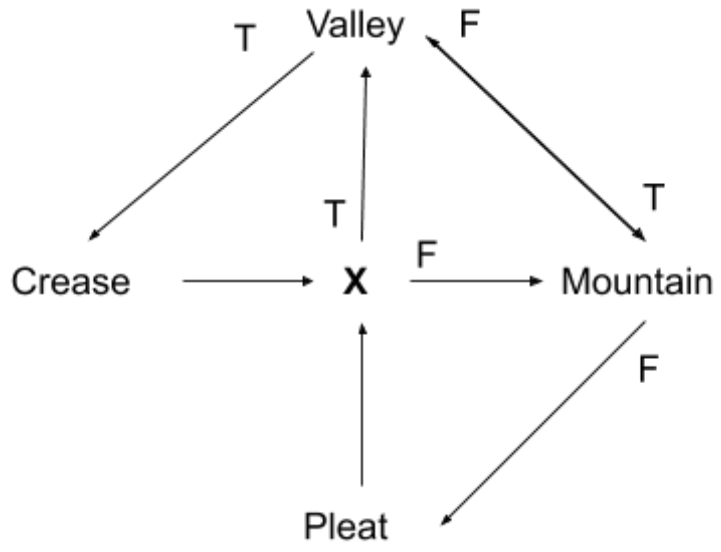
1. Outside reverse
2. Inside reverse
3. Sink
4. Crimp

The Shaping Folds
Rabbit ear involves pulling the paper together to form a flap. Squash fold involves opening up a flap and pressing downward. Open out takes a section of folded paper and opens out the hidden paper. Petal fold is a combination fold of rabbit ear and squash fold that forms a new double flap.

1. Rabbit ear
2. Squash fold
3. Open out
4. Petal fold

With these three categories of folds identified, each category is then organized into a boolean flowchart cycle that determines the path of decision-making of the next step.

The Basic Folds Flowchart

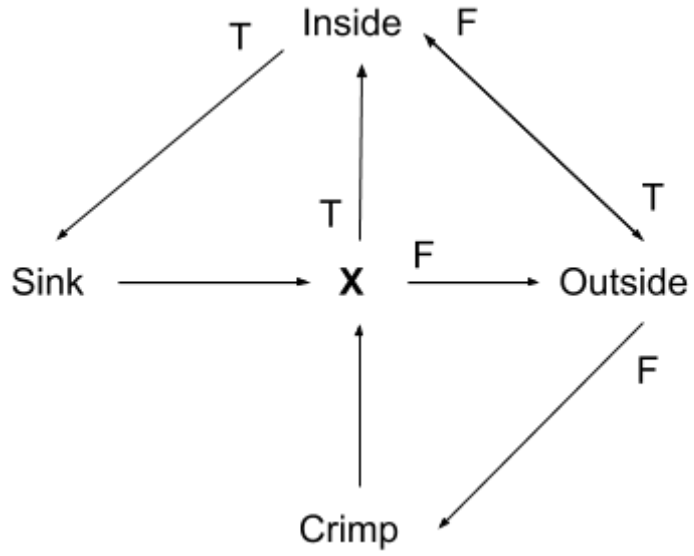


The first decision starts at the “X.” Using chaos theory, a pseudo random number returns a true or false value which determines the next step. In the chart above starting at “X,” if it is true, the next step will be “Valley,” if false it will be “Mountain.”

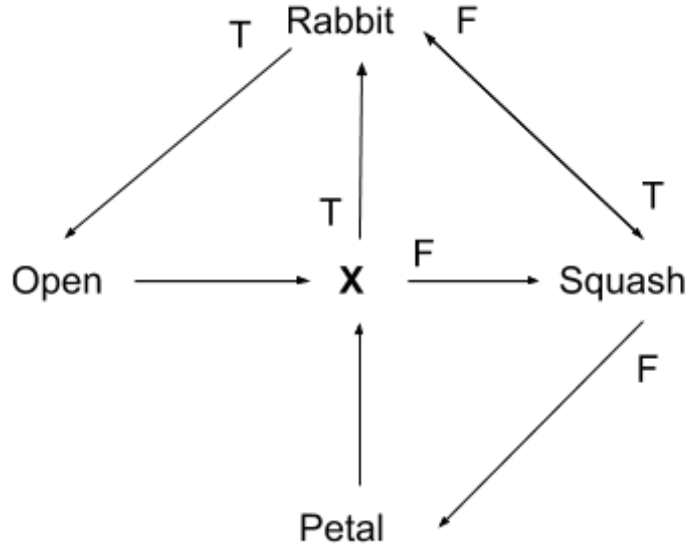
The next step is always determined by the previous step. If the previous step is “Valley” and the boolean is false, the next step will be “Mountain.” If the previous step is “Mountain” and the boolean is false, the next step will be “Pleat.” If the previous step is “Pleat” and the boolean is true, the next step will be “Valley.”

The same goes for the other flowcharts.

The Symmetric Folds Flowchart



The Shaping Folds Flowchart



Chaos theory is implemented using Processing code. This equation is used to return a value between 0 and 1.

$$x_{t+1} = 3.9 * x_t * (1 - x_t)$$

If the value is larger than 0.5, the program prints out “true.” If the value is less than or equal to 0.5, the program prints out “false.”

The initial value of x is also pseudo random, determined by the second of the clock when the program starts.

Each time creating a new origami piece, the program is started afresh to give it a new initial x value. As one step is completed, the next step is generated by pressing a key. Thus the work is taking one step at a time, not foreseeing all future steps. In a sense it is spontaneous and impromptu, unlike the traditional way of planning and designing.

Although the order and the type of folds are decided by the program, the artist chooses where to implement the fold according to personal aesthetic sense. Here, the folds are purposely placed asymmetrically. Unlike traditional geometric origami, most folds are not placed edge-to-edge or point-to-point, but rather offsetted and irregular.

The Processing code is as follows.

```
float x;
int n = 0;

void setup(){
  size(1000,500);
  x = (second()+1)/61.;
}

void draw(){
  line(0,height/2, width, height/2);
}

void keyPressed(){
  x = chaos(x);
  println(x>0.5);

  float y = map(x, 0,1,height, 0);
  ellipse(n*10, y, 10,10);

  n++;
}

float chaos(float input){
  return 3.9*input*(1-input);
}
```

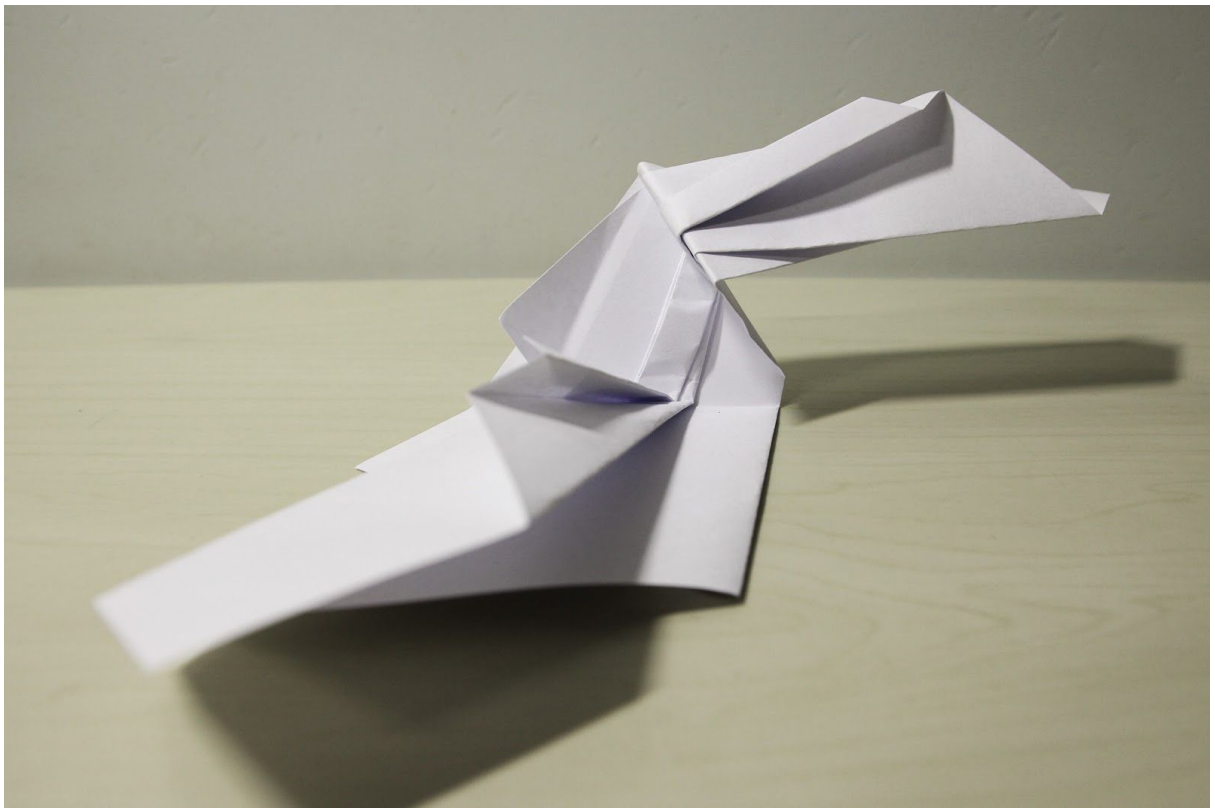
Implementation

Each piece within a certain triad is made from the same category of folding techniques. The difference among the three pieces is the number of folds executed, namely 12, 24, and 36. The more number of iterations, more intricate details can be observed, sometimes resembling a fractal.

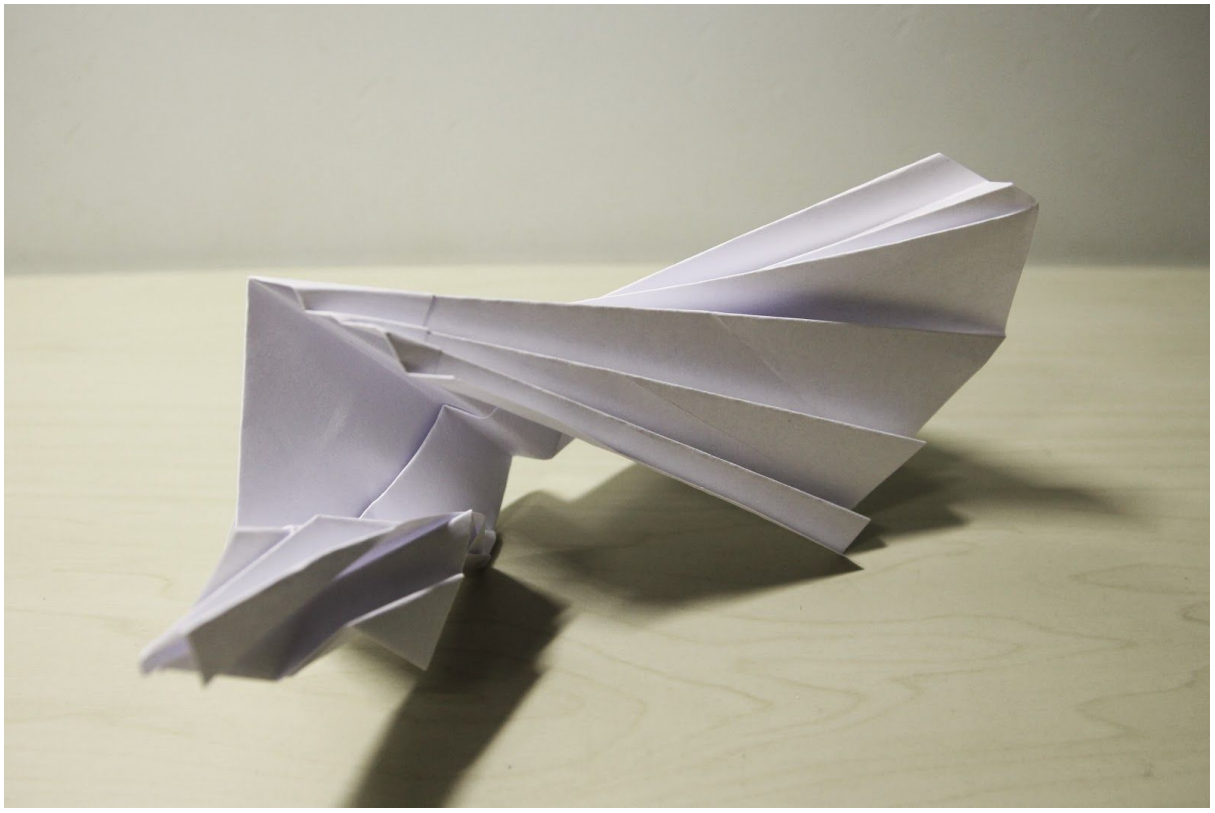
The following charts document the order of boolean values and types of folds in each piece of the triads, as generated by the program.

The Basic Folds Triad Iterations Chart

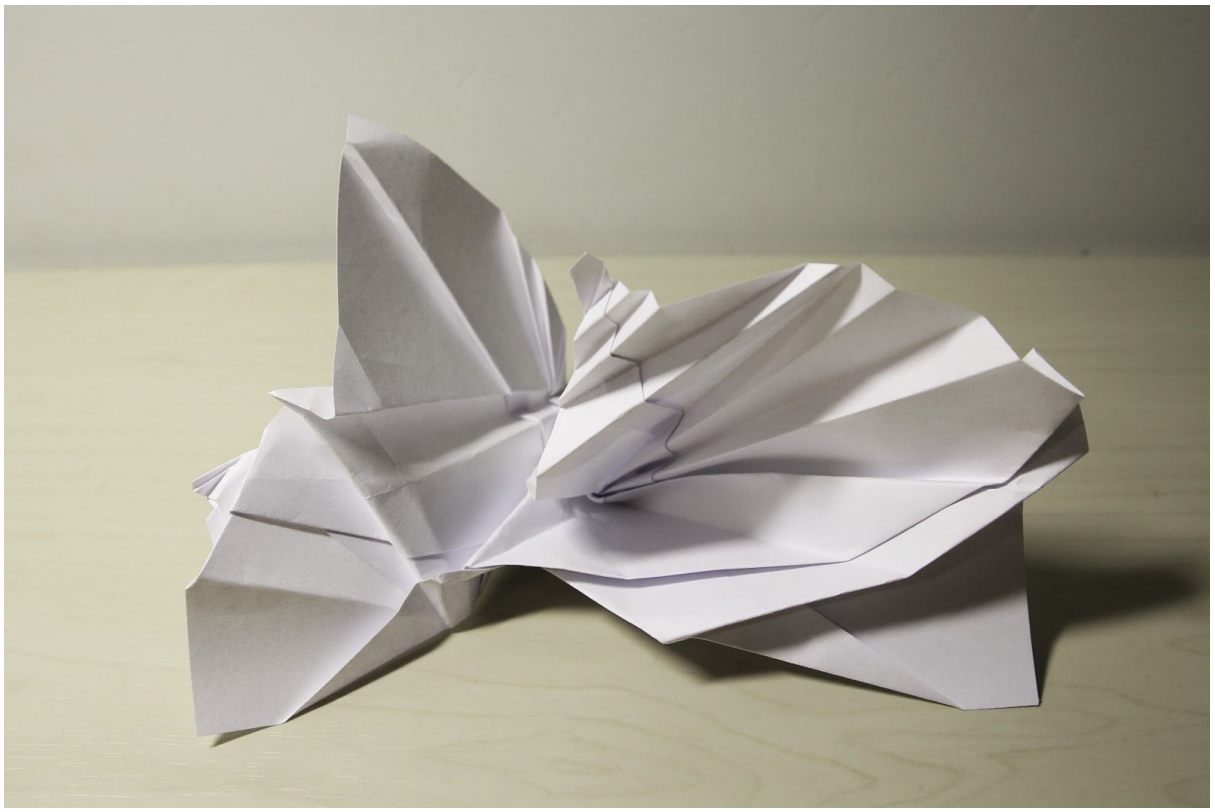
12 iterations		24 iterations		36 iterations	
TRUE	V	FALSE	M	TRUE	V
FALSE	M	TRUE	V	FALSE	M
FALSE	P	TRUE	C	TRUE	V
TRUE	V	FALSE	M	FALSE	M
FALSE	M	TRUE	V	FALSE	P
TRUE	V	TRUE	C	TRUE	V
TRUE	C	FALSE	M	FALSE	M
FALSE	M	TRUE	V	TRUE	V
TRUE	V	TRUE	C	TRUE	C
FALSE	M	FALSE	M	TRUE	V
TRUE	V	TRUE	V	FALSE	M
TRUE	C	FALSE	M	FALSE	P
		FALSE	P	TRUE	V
		TRUE	V	FALSE	M
		FALSE	M	TRUE	V
		TRUE	V	FALSE	M
		FALSE	M	TRUE	V
		FALSE	P	FALSE	M
		TRUE	V	FALSE	P
		FALSE	M	TRUE	V
		FALSE	P	FALSE	M
		TRUE	V	TRUE	V
		FALSE	M	FALSE	M
		TRUE	V	TRUE	V
				TRUE	C
				FALSE	M
				FALSE	P
				TRUE	V
				FALSE	M
				FALSE	P
				TRUE	V
				FALSE	M
				TRUE	V
				FALSE	M
				TRUE	V
				TRUE	C



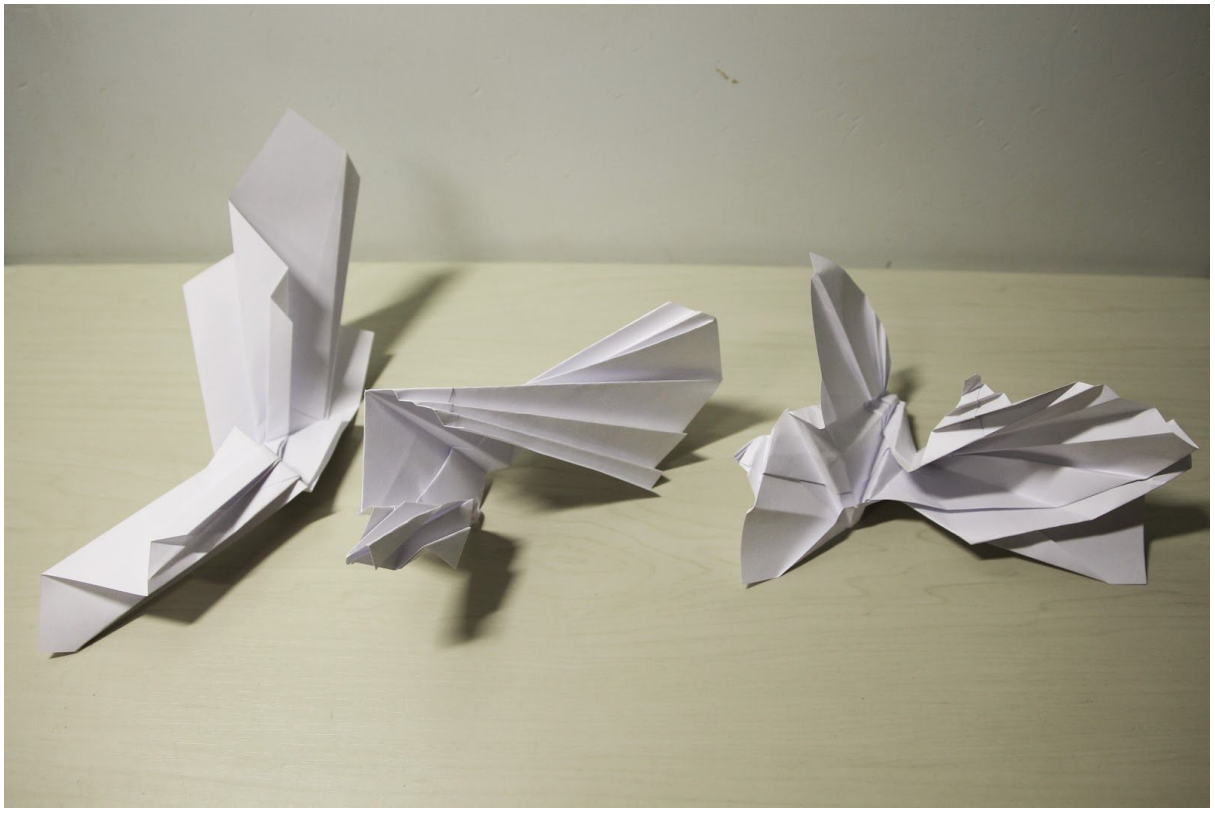
Basic Folds - 12 iterations



Basic Folds - 24 iterations



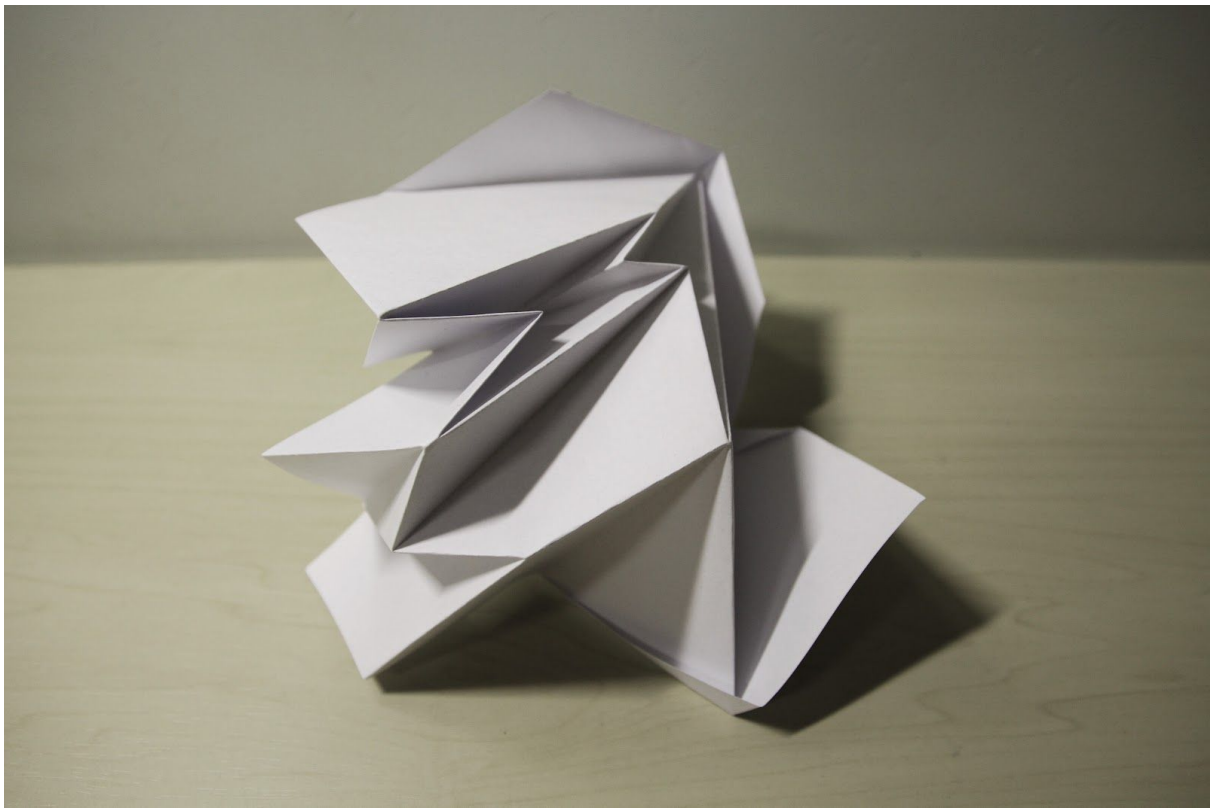
Basic Folds - 36 iterations



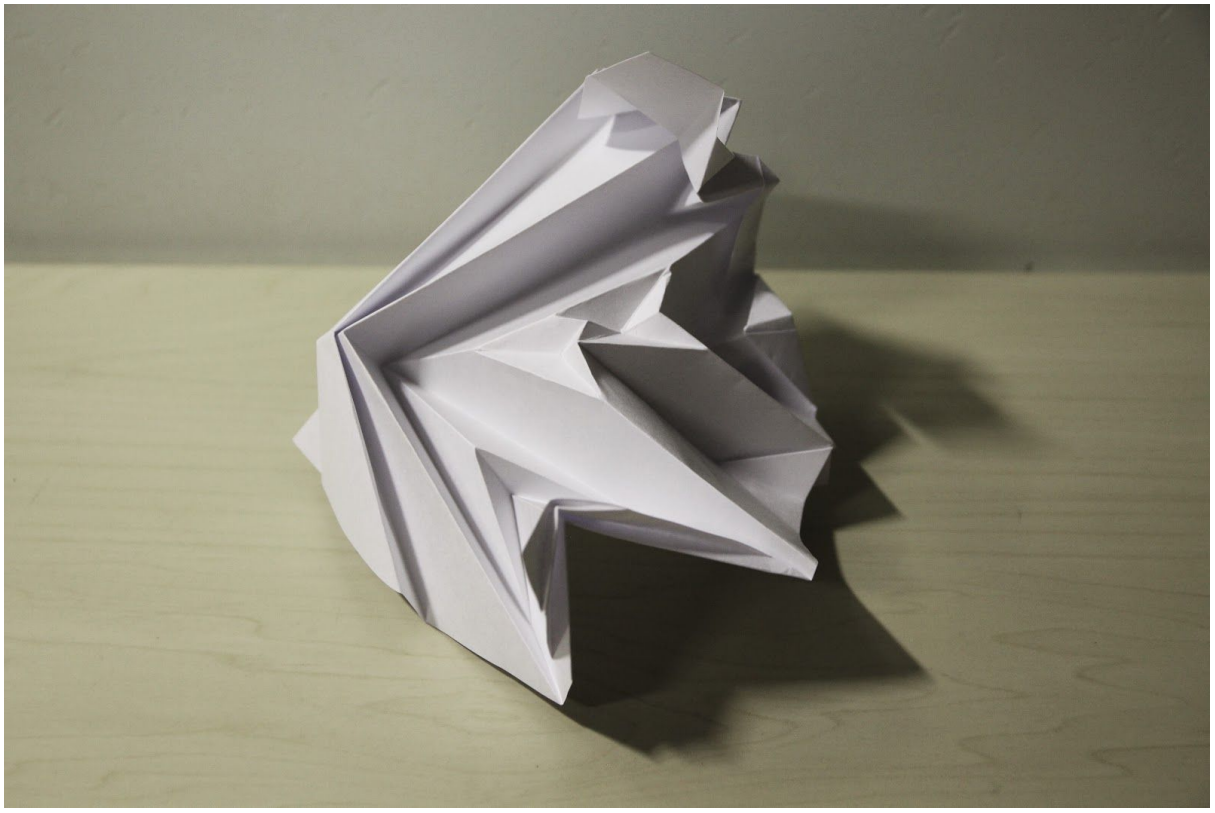
The Basic Folds Triad

The Symmetric Folds Triad Iterations Chart

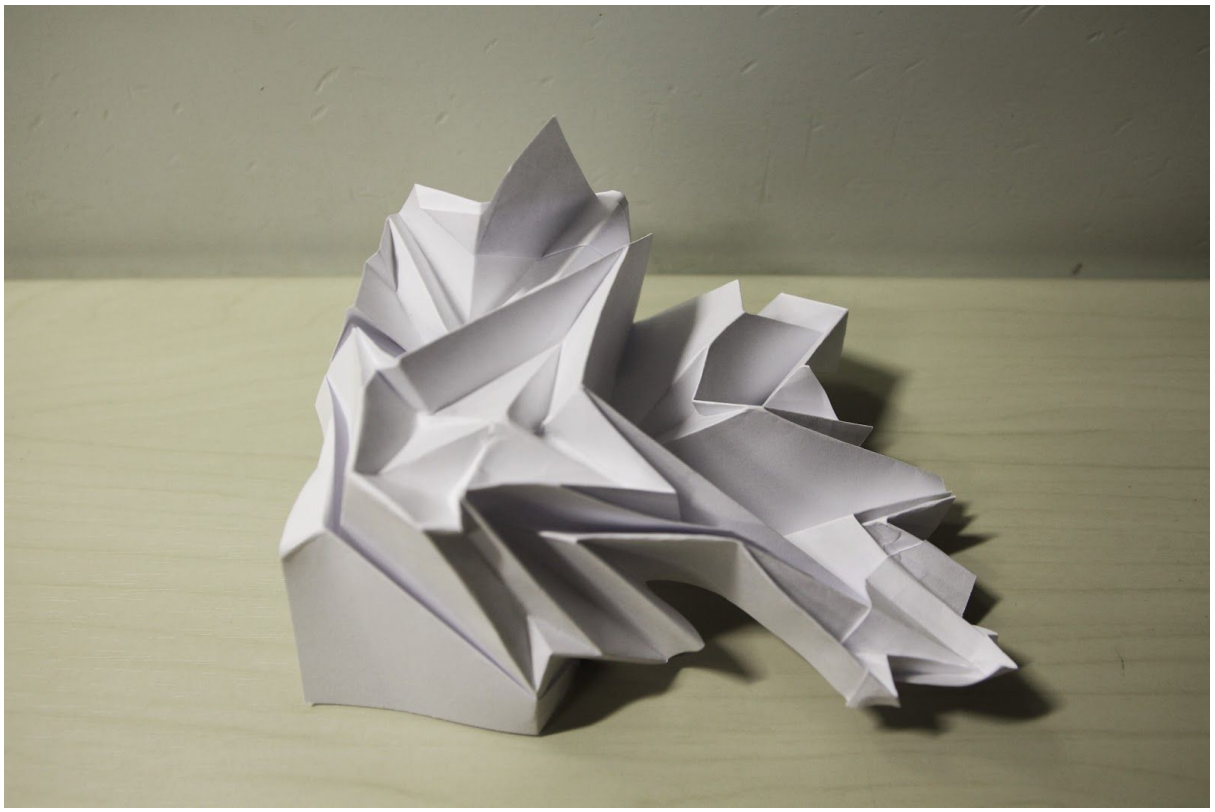
12 iterations		24 iterations		36 iterations	
TRUE	I	TRUE	I	FALSE	O
TRUE	S	FALSE	O	TRUE	I
FALSE	O	TRUE	I	TRUE	S
TRUE	I	TRUE	S	TRUE	I
TRUE	S	FALSE	O	TRUE	S
TRUE	I	TRUE	I	FALSE	O
FALSE	O	FALSE	O	TRUE	I
TRUE	I	TRUE	I	TRUE	S
FALSE	O	FALSE	O	TRUE	I
TRUE	I	TRUE	I	TRUE	S
TRUE	S	FALSE	O	TRUE	I
FALSE	O	FALSE	C	FALSE	O
		TRUE	I	FALSE	C
		FALSE	O	TRUE	I
		TRUE	I	FALSE	O
		FALSE	O	TRUE	I
		TRUE	I	FALSE	O
		FALSE	O	TRUE	I
		TRUE	I	TRUE	S
		TRUE	S	FALSE	O
		TRUE	I	FALSE	C
		TRUE	S	TRUE	I
		TRUE	I	FALSE	O
		FALSE	O	TRUE	I
				TRUE	S
				TRUE	I
				TRUE	S
				TRUE	I
				TRUE	S
				FALSE	O
				TRUE	I
				FALSE	O
				TRUE	I
				FALSE	O
				FALSE	C
				TRUE	I



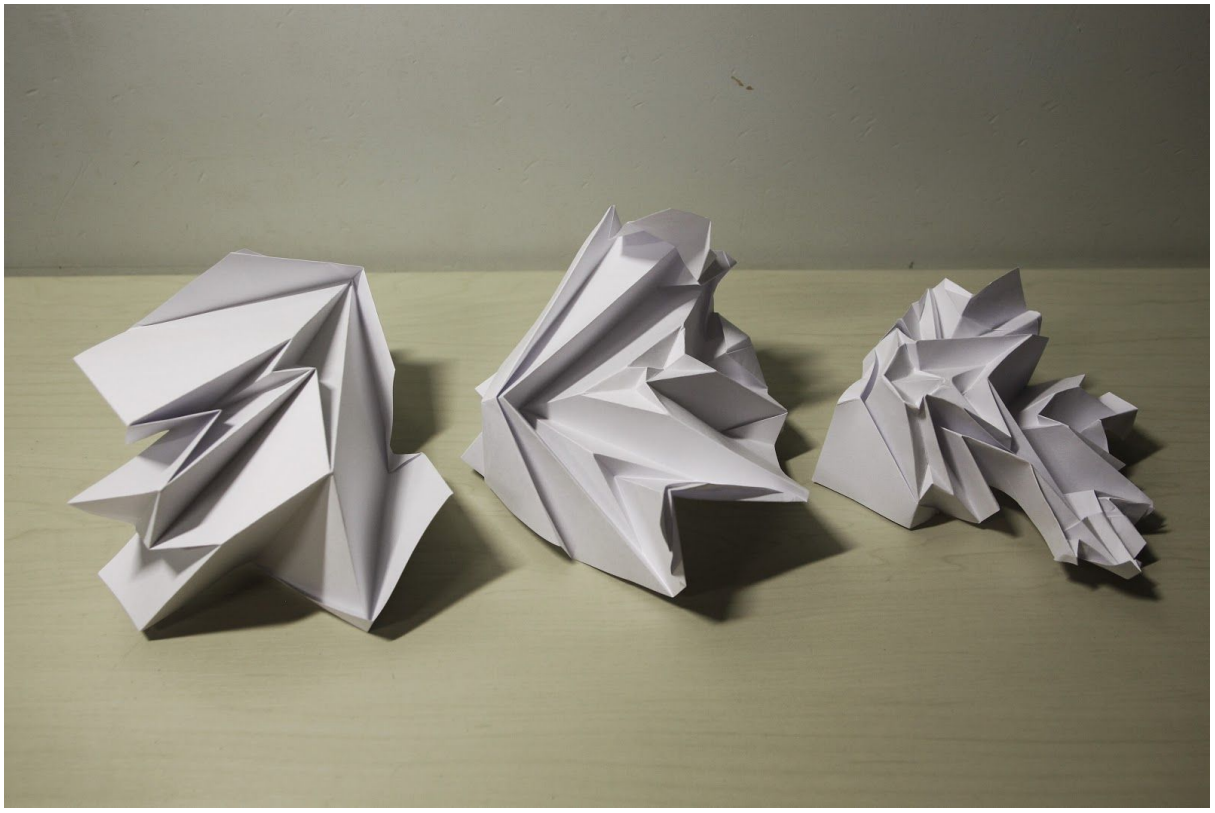
The Symmetric Folds - 12 iterations



The Symmetric Folds - 24 iterations



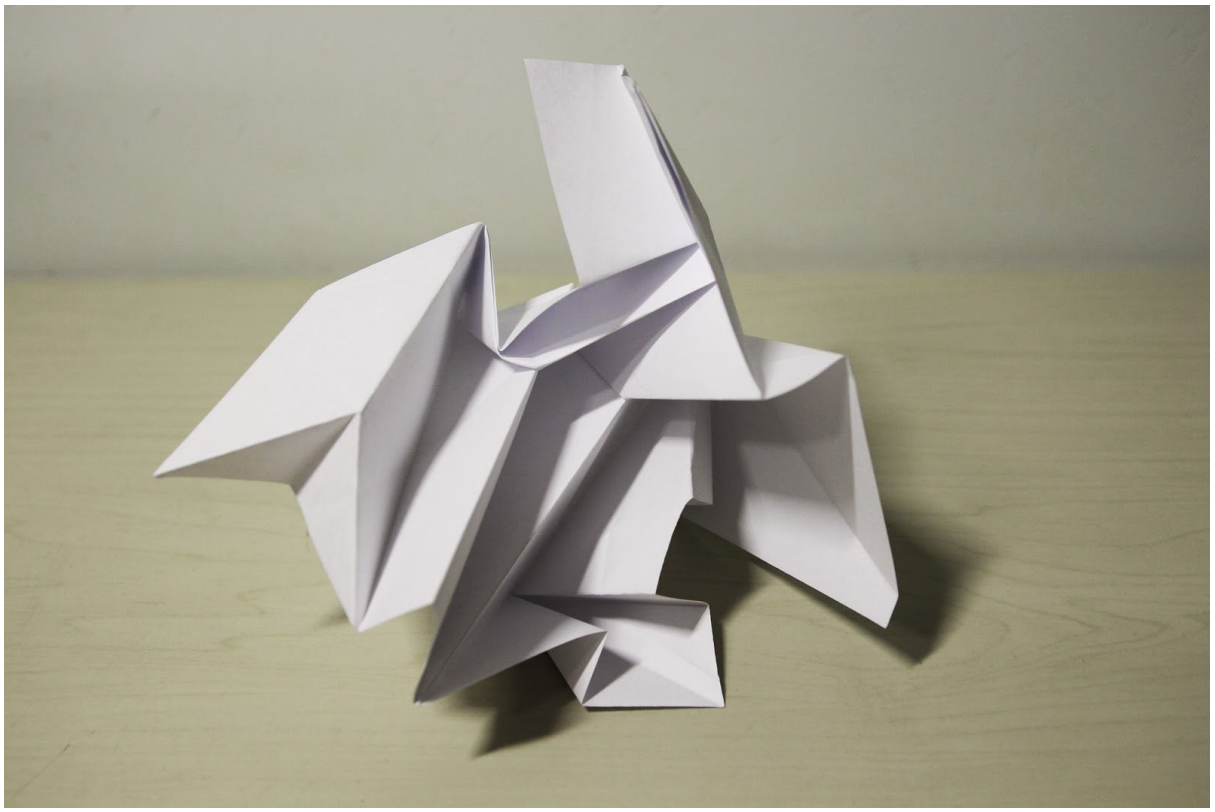
The Symmetric Folds - 36 iterations



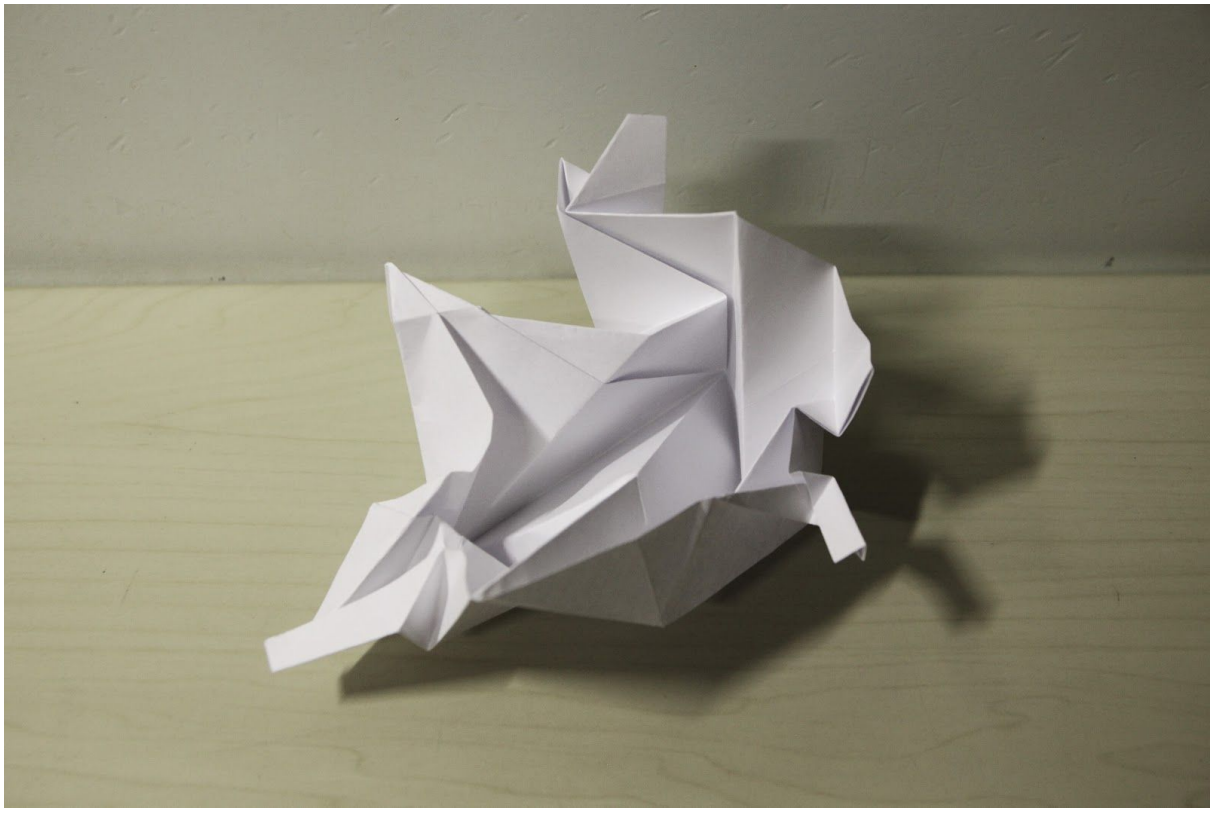
The Symmetric Folds Triad

The Shaping Folds Triad Iterations Chart

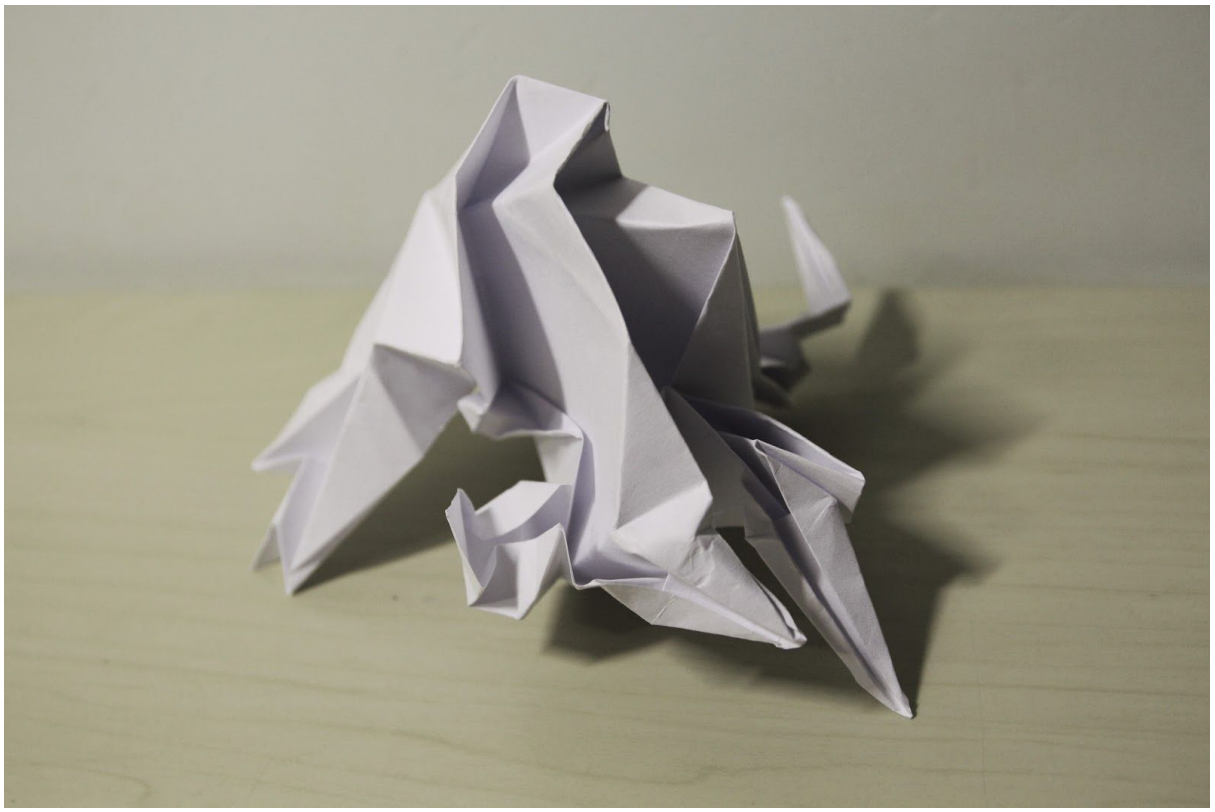
12 iterations		24 iterations		36 iterations	
FALSE	S	TRUE	R	TRUE	R
TRUE	R	FALSE	S	FALSE	S
TRUE	O	TRUE	R	TRUE	R
FALSE	S	FALSE	S	FALSE	S
TRUE	R	TRUE	R	FALSE	P
TRUE	O	FALSE	S	TRUE	R
FALSE	S	TRUE	R	FALSE	S
TRUE	R	TRUE	O	TRUE	R
TRUE	O	TRUE	R	TRUE	O
FALSE	S	FALSE	S	TRUE	R
TRUE	R	TRUE	R	FALSE	S
FALSE	S	TRUE	O	FALSE	P
		TRUE	R	TRUE	R
		TRUE	O	FALSE	S
		FALSE	S	TRUE	R
		FALSE	P	FALSE	S
		TRUE	R	TRUE	R
		FALSE	S	FALSE	S
		TRUE	R	FALSE	P
		TRUE	O	TRUE	R
		TRUE	R	FALSE	S
		FALSE	S	TRUE	R
		TRUE	R	FALSE	S
		TRUE	O	TRUE	R
				TRUE	O
				FALSE	S
				FALSE	P
				TRUE	R
				FALSE	S
				FALSE	P
				TRUE	R
				FALSE	S
				TRUE	R
				FALSE	S
				TRUE	R
				TRUE	O



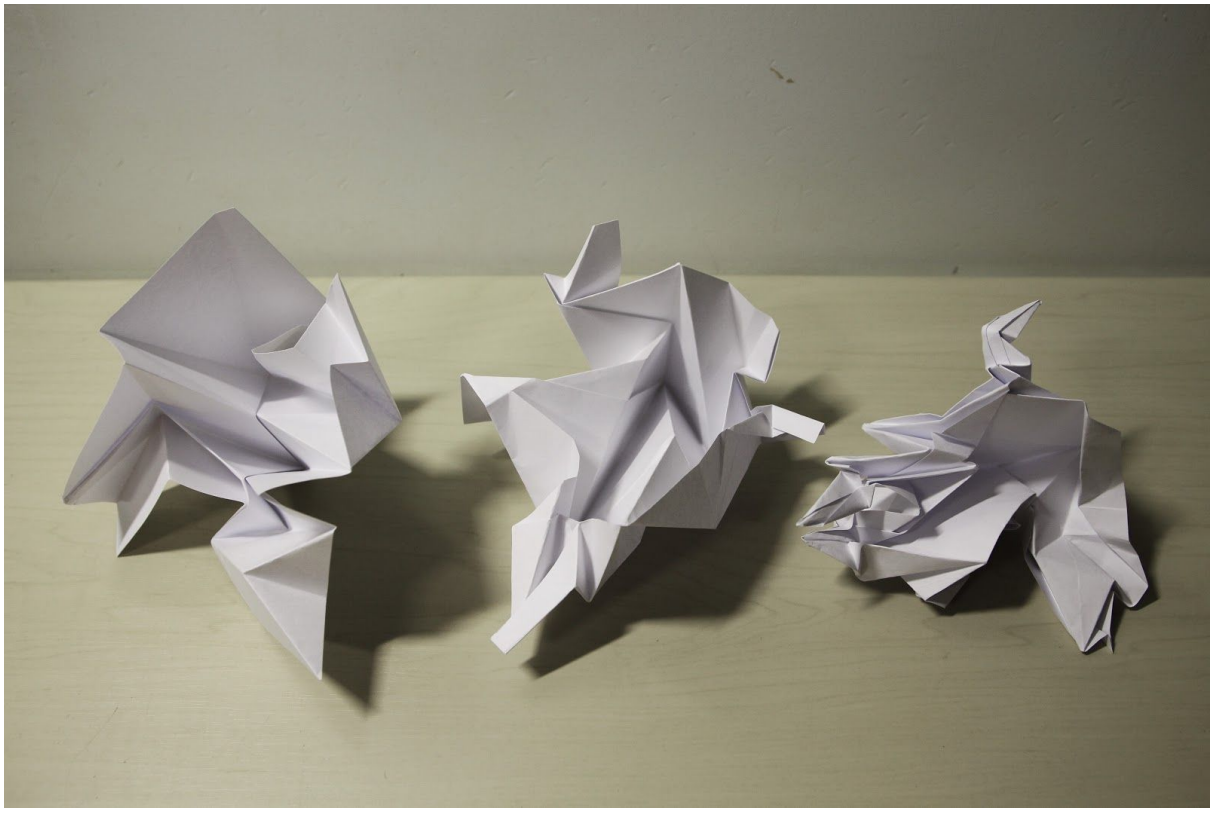
The Shaping Folds - 12 iterations



The Shaping Folds - 24 iterations



The Shaping Folds - 36 iterations



The Shaping Folds Triad

Serialist Origami - all three triads

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