

Utilizing Adobe Illustrator's Blend and Transform in Designing Op-Art Items

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Abstract

Op-Art can strengthen the product image and can combine culture elements which satisfies consumers' visual requirement. Some applications of op-art are in security prints, fashion design, packaging design, architecture, interior design, publishing media, and printing designs.

The problem is the few softwares specialized in Op-Art production. These softwares are based on geometric shapes in creating visual art items.

Concerning the wide facilities of blend and transform options and effects in Adobe Illustrator software, many op-art items can be investigated. The goal is to highlight the importance of these tools options and effects and its ease, efficiency, and functionality in designing countless variety of op-art items.

The availability, prevalence, and ease of use of the Adobe softwares are very important advantages that encourage designers to use in most of their works. The research aims to design Op-Art items by using Illustrator's blend and transform and utilizing these items in various designs.

Keywords: Op-Art, Adobe Illustrator, Blend, Transform, packaging design, Guilloche.

1. Introduction

1.1 Op-Art (1965-70)

Op Art can be defined as a type of abstract or concrete art consisting of non-representational geometric shapes which create various types of optical illusion. For instance, when viewed, Op Art pictures may cause the eye to detect a sense of movement (eg. swelling, warping, flashing, vibration) on the surface of the painting. And the patterns, shapes and colors used in these pictures are typically selected for their illusional qualities, rather than for their substantive or emotional content. In addition, Op artists use both positive and negative spaces to create the desired illusions. (Op Art History, 2016)

Historically, the Op-Art style may be said to have originated in the work of the kinetic artist Victor Vasarely. Vasarely (1906–1997) was a pioneer of Op Art who wished to bring art within the reach of everyone. Vasarely saw the artist's role as an "artist-engineer", an artist who would create original art works, but the idea behind them could be used for the benefit of all society. Vasarely called his illusory movement art, kinetic. Kinetic Art is the general term for art which has genuine moving parts (kinetic = movement). This movement can be generated mechanically, electrically, electro-magnetically or simply by air as with mobiles. (Victor Vasarely Art, 2014)

Modern interest in the retinal art movement stems from 1965 when a major Op Art exhibition in New York, entitled "The Responsive Eye," caught public attention. As a consequence, the style began appearing in print graphics, advertising and album art, as well as fashion design and interior decorations. Other artists associated with Op-Art include: Yaacov Agam, Josef Albers, Richard Allen, Getulio Alviani, Richard Anuszkiewicz, Carlos Cruz-Diez, Tony DeLap, Gunter Fruhtrunk, Julio Le Parc, John McHale, Yuri Messen-Jaschin, Reginald H. Neal, Bridget Riley, Jesus Rafael Soto, Julian Stanczak, Günther Uecker, Ludwig Wilding, and Marian Zazeela (Op Art History, 2016)

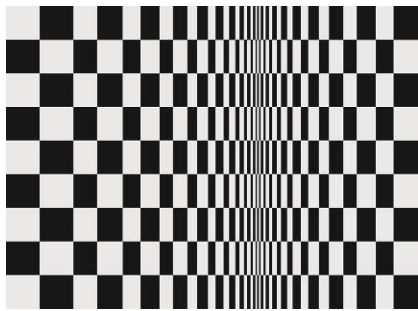


Figure 1. Movement in Squares (1961) by Bridget Riley (Op Art History, 2016)

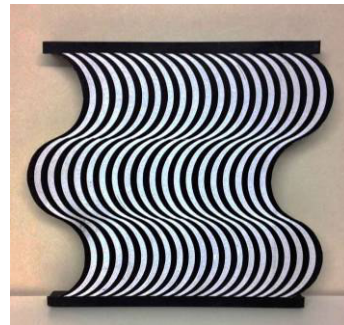


Figure 2. Anamorphose Anam 2817, 1998.(Ludwig Wilding, 2016)

Some applications of op-art are in security prints, fashion design, packaging design, architecture, interior design, publishing media, and printing designs.

Examples of using Op-Art in packaging are shown in the next figures.



Figure 3. packaging for salt & pepper shakers, (Beach Branding, 2013)



Figure 4. gum package, (Beach Branding, 2013)



Figure 5. CD cover, (Beach Branding, 2013)



Figure 6. bags, (Uzuri, 2016)



Figure 7. wine bottles, (Motif Wine, 2013)



Figure 8. wine bottles, (Yunita, 2015)

Some examples of using Op-Art in designing guilloche pattern are shown in figure (10). (Free Vector, 2016)

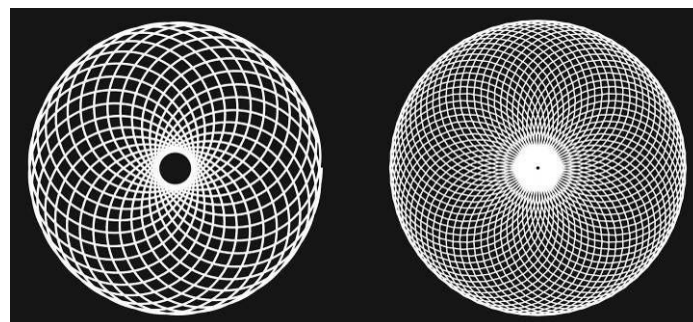


Figure 9. Guilloche pattern

Example of using Op-Art in fashion design is shown in figure (11). (Issey Miyake, 2016)



Figure 10. Op-Art in fashion design

Example of using Op-Art in publishing media design is shown in figure (12). (op-art.co.uk, 2012)

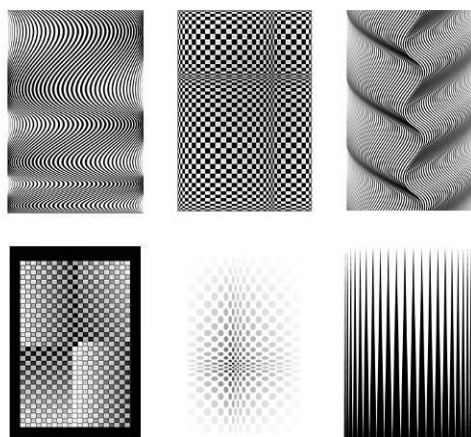


Figure 11. Op-Art in iPhone wallpaper design

1.2 Op-Art Computer Softwares

The concept of Op Art has been developed over several decades. However, until late last century, most works were developed step by step with human hands and the artists' own imagination. The process of creating a piece of art could be time consuming and complicated.

In the digital age some of the problems associated with creating the artwork can be overcome with the use of computer software. The various changing of patterns and colors can be generated by logical calculations. The idea of using computing techniques and mathematical methods can help artists enter a new exciting era of Op Art. On the whole, the existing commercial software that can generate Op Art is quite limited in terms of variability and is not effective in terms of producing specific styles of Op Art.

1.2.1 An overview of existing tools

- **Adobe Photoshop:**

The implementation of drawing Op Art with Photoshop has not been defined. In other words, there is no existing Op Art function for the user to follow. However, users can develop their own approach step by step.

Advantages: Generating Op Art can be done with drawing tools and plug-in brushes can be downloaded to achieve better results. Photoshop was chosen due to its robust and easy to use interface.

Disadvantages: Copying, pasting and dealing with multiple layers can be time consuming and complicated. It is not very flexible because a part of a developed painting can change and so the user would have to manually make other corresponding changes to maintain the balance.

• **Op Art Generator Software**

Some software has been developed to simulate Bridget Riley's works, for example a final year project by J Lacey (Imperial College, Department of Computing 2004.) However, only limited variables are available to modify the resulting image. The degree of freedom that is given to the user is low and the animator function is not complete.

Advantages: Many forms of Art have been successfully generated. Variables have also been provided to adjust the image.

Disadvantages: However, only a limited number of variables have been provided to adjust the image. No other effects have been provided. The user can only adjust the rate of shrinking, color and the size. Effects such as adding shadows and rotate have not been provided.

• **Professional Design Company**

Few Design companies produce Op Art vectors and patterns for their customers electronically. An example being ARSENAL, professional design weaponry, who produce and sell designed Photoshop brushes and vector art with Op Art patterns, which the user can then use as a background to a website or other designs.

• **Programs written by Artists**

Some artists write their own program to help develop an Op Art painting. By writing their own code, the artists can achieve some advanced effects and therefore create some amazing paintings.

• **Pop Art Studio**

A software that can generate the most popular pop-art style paintings such like Andy Warhol's work. Users can open their own picture and modify it to one's favorite style and then save it as JPG file. Many renders which can turn a user's own photo into Pop Art style paintings are presented but only one type of Op Art painting can be generated.

Software with following capabilities is needed to:

- Help elementary users who are interested in Op Art to create their own customized art with more variables and flexibility. Functions such as adding shadows are needed
- At the same time, shorten the normal developing time.
- The user can then uses the produced work for various things such as computer wallpaper, fashion design and psychology research.
- The work can be saved as svg files and can be viewed by Firefox.
- Animation can be generated to show the effect of changing variables. (Iain Phillips, 2009)

1.3 Illustrator Blend Tool

In Illustrator, a blend is a series of paths that Illustrator creates based on two other paths. A series of paths transforms from the first path into the second path, changing fill and stroke attributes as it moves.

Blends, on the other hand, are a series of transformed paths between two end paths. The paths between the end paths mutate from one end path into the other. All the attributes of the end paths change throughout the transformed paths, including shape, size, and all paint style attributes. The major benefit is the ability to blend multiple colors at one time. But even more useful than creating realistic changes in color is blending's capability to transform shapes from one shape to another.

Because blends work on both stroke and fill attributes of objects, designer can create some really exciting effects that aren't possible by using any other technique, electronic or traditional.

Originally, Adobe marketed the Blend tool as a tool whose primary purpose was to transform shapes, not blend colors. Instead, designers used the tool for blending colors to create what were known as vignettes or what traditional artists called gradients. In the recent Illustrator versions the Blending function became live, or editable.

This huge change allows users to change the color, shape, and location of the blend shapes. The blend instantly rebends to the new changes. Another great change was the capability to blend along a path. (Ted Alspach, 2010). If user moves one of the original objects, or edit the original object's anchor points, the blend changes accordingly. In addition, the new objects blended between the original objects don't have their own anchor points. User can expand the blend in order to divide the blend into distinct objects. (Adobe Illustrator Help, 2014)

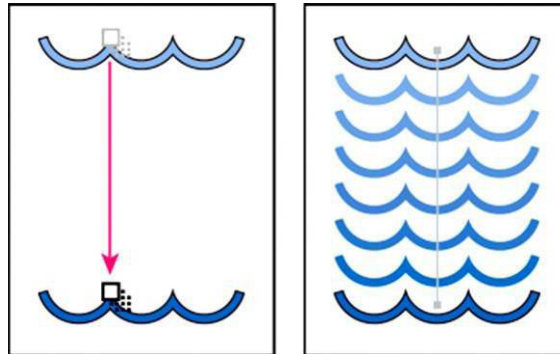


Figure 12. Using a blend to distribute shapes evenly between two objects

1.3.1 Blend Option

The Blend options are Make, Release, Blend Options, Expand, Replace Spine, Reverse Spine, and Reverse Front to Back. With Illustrator's Blend capability, it may not need to release a blend to change it. User can use the Direct Selection tool to select the end paths and edit the paths or change their color, and the blend instantly updates. The Blend Options dialog box lets users change the Spacing and Orientation aspects. (Ted Alspach, 2010)


Spacing Determines how many steps are added to the blend.


Smooth Color Lets Illustrator auto-calculate the number of steps for the blends. If objects are filled or stroked with different colors, the steps are calculated to provide the optimum number of steps for a smooth color transition. If the objects contain identical colors, or if they contain gradients or patterns, the number of steps is based on the longest distance between the bounding box edges of the two objects.

Specified Steps Controls the number of steps between the start and end of the blend.

Specified Distance Controls the distance between the steps in the blend. The distance specified is measured from the edge of one object to the corresponding edge on the next object (for example, from the rightmost edge of one object to the rightmost edge of the next).

Orientation Determines the orientation of blended objects.

Align to Page  Orients the blend perpendicular to the x axis of the page.

Align to Path  Orients the blend perpendicular to the path.

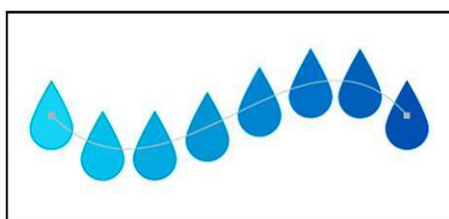


Figure 13. Align to Page option applied to a blend

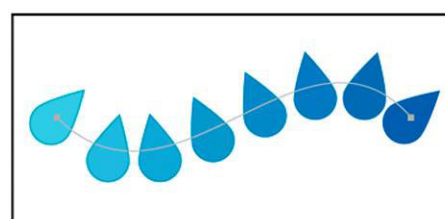


Figure 14. Align to Path option applied to a blend

Spine of a blended object

The spine is the path along which the steps in a blended object are aligned. By default, the spine forms a straight line. Users can also reverse the stacking order in a blended object as shown in figures (15) and (16).

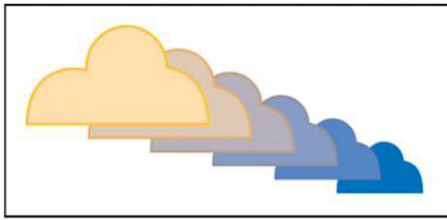


Figure 15. Original stacking order

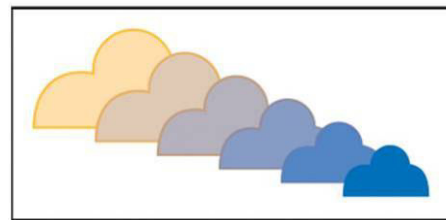


Figure 16. Reverse Front To Back command

Release or expand a blended object: Releasing a blended object removes the new objects and restores the original objects. Expanding a blended object divides the blend into distinct objects, which user can edit individually like any object. (Adobe Illustrator Help, 2014)

1.3.2 Transform effects

Using effects is a convenient way to reshape objects without making permanent changes to their underlying geometry. Effects are live, which means that can modify or remove the effect at any time.

Transform reshapes an object by resizing, moving, rotating, reflecting (flipping), and copying it. (Adobe Illustrator Help, 2014)

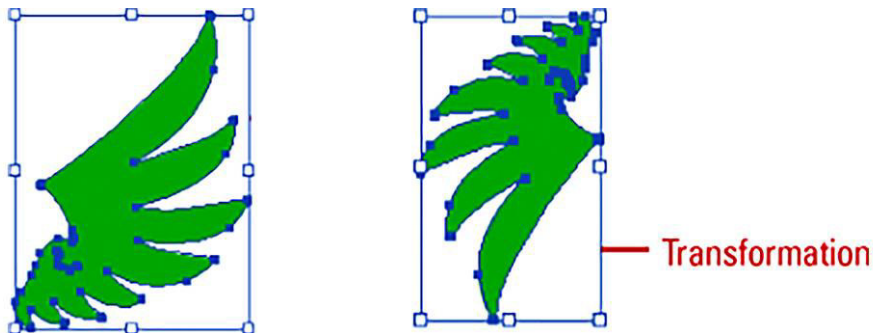


Figure 17. Transform effect

Users can do any of the following:

- Scale Horizontal or Vertical: specify to scale objects from their reference point.
- Move Horizontal or Vertical: specify to move objects left or right and up or down.
- Rotate Angle: user can enter a rotate angle or drag the dial.
- Reflect X or Y: to create a mirror reflection.
- Random: to apply random transformations using the values in the dialog box.
- Scale Strokes & Effects: to scale strokes and effects along with objects.
- Transform Objects: to transform only objects.
- Transform Patterns: to transform only the object's fill pattern.
- Reference Point: User can click a square to change the reference point.
- Copies: user can enter the number of copies he wants. (Steve Johnson, 2012)

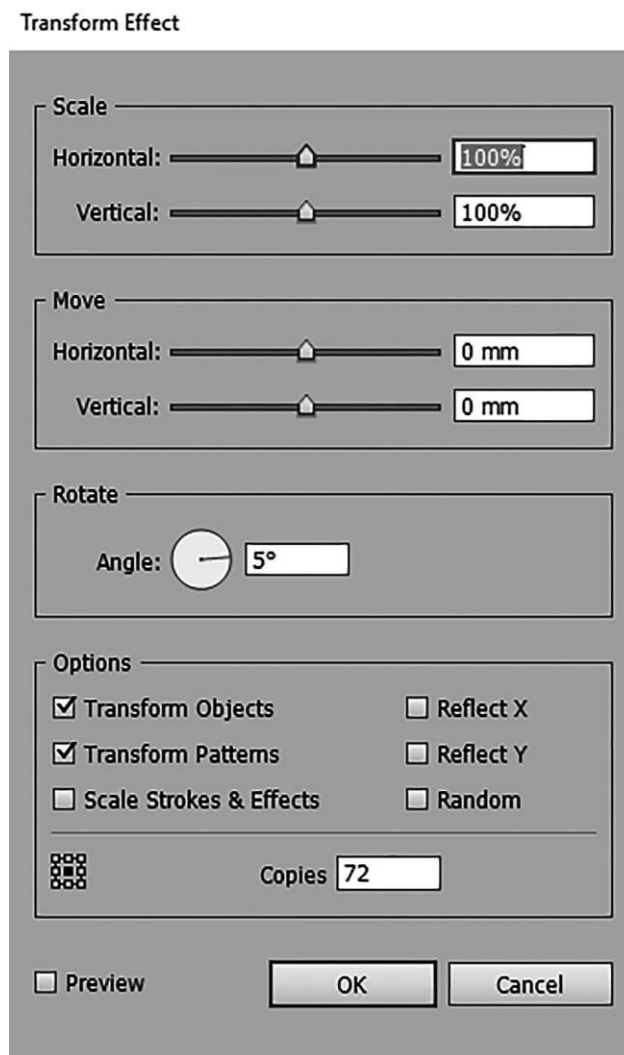


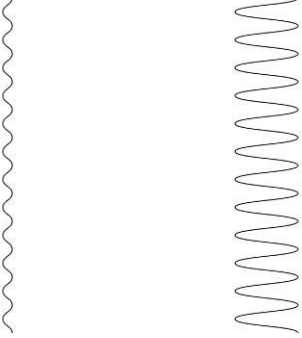
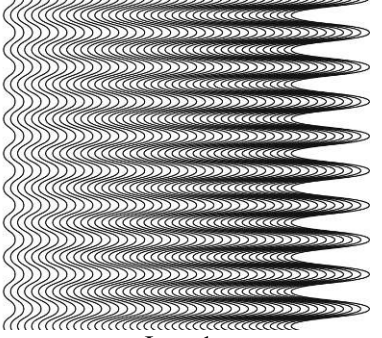
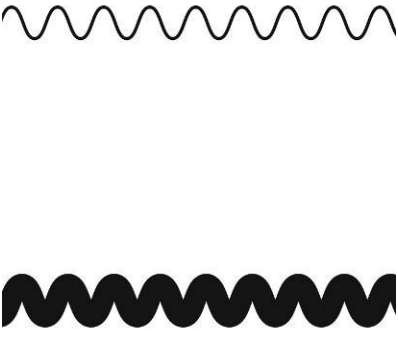
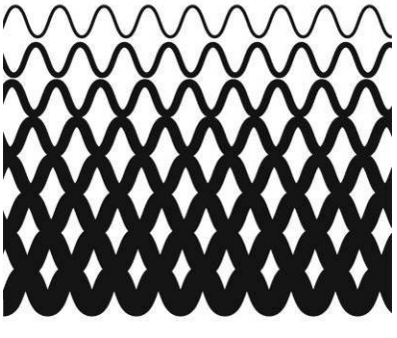


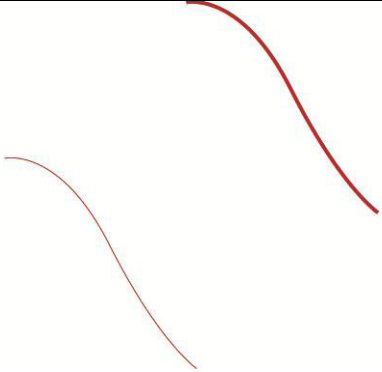
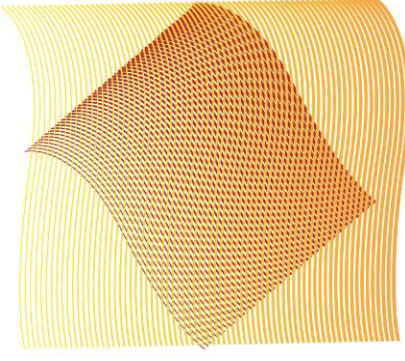
Figure 18. Transform effects


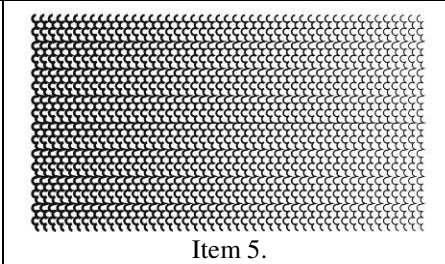
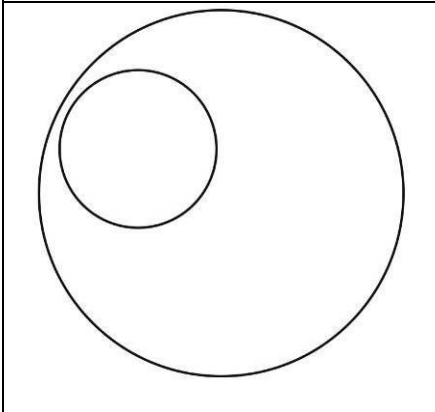
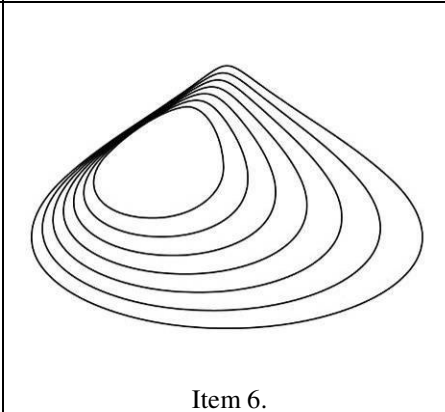
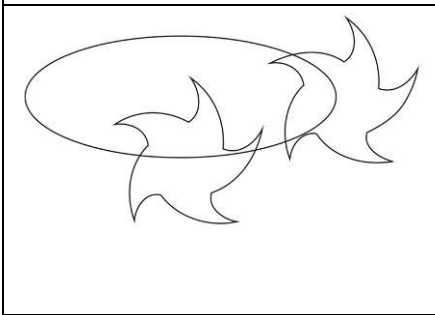
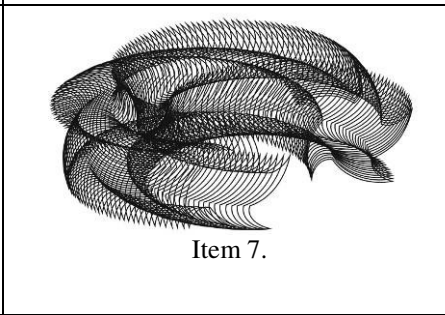
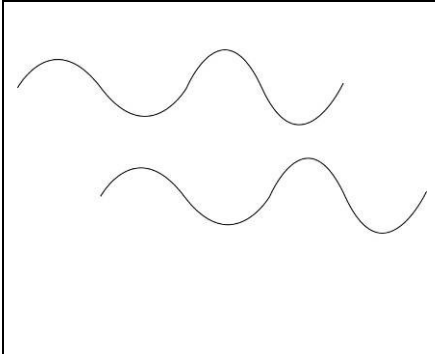
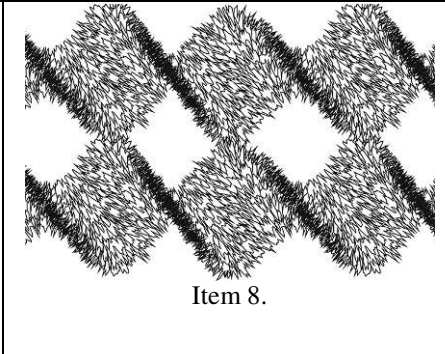
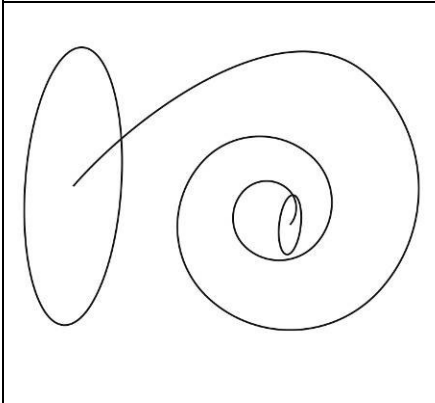
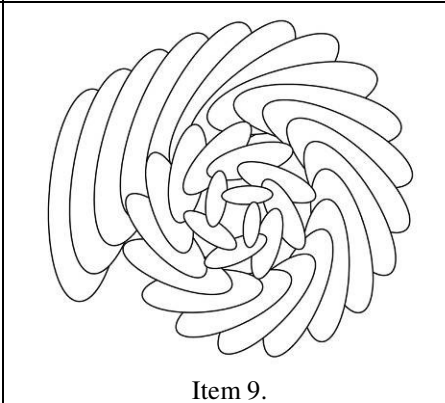
2. Experimental study

The experiment depends on using Adobe Illustrator blend and transform options and effects in designing op-art items, starting the design with different shapes, editing produced items with different options, trying to design specified op-art style like Riley's style in Movement in Square op-art pattern, and utilizing the produced items in packaging designs, guilloche for security designs, and designing an Islamic bar and pattern.

2.1 Using Blend and Transform to produce op-art items

Table 1. Blend and transform for producing various op-art items

Original Shapes	Effect	Resulted Shape
	Blend with 40 steps and align to page orientation	 Item 1.
	Blend with 6 steps and align to page orientation	 Item 2.
	Blend with 5 steps and align to page orientation	 Item 3.
	- Blend with 50 steps and align to page orientation - Putting two shapes together on each other	 Item 4.

	<ul style="list-style-type: none"> - Blend with 45 steps and align to page orientation 	 <p style="text-align: center;">Item 5.</p>
	<ul style="list-style-type: none"> - Blend with 5 steps and align to page orientation - Warp effect 	 <p style="text-align: center;">Item 6.</p>
	<ul style="list-style-type: none"> - Blend with 100 steps between two stars and align to page orientation - Replace spine on ellipse 	 <p style="text-align: center;">Item 7.</p>
	<ul style="list-style-type: none"> - Blend with 10 steps and align to page orientation - Repeat item - Transform effect (Roughen with 3% size and 49 detail/in.) 	 <p style="text-align: center;">Item 8.</p>
	<ul style="list-style-type: none"> - Blend with 30 steps between two ellipses and align to page orientation - Replace spine on spiral 	 <p style="text-align: center;">Item 9.</p>


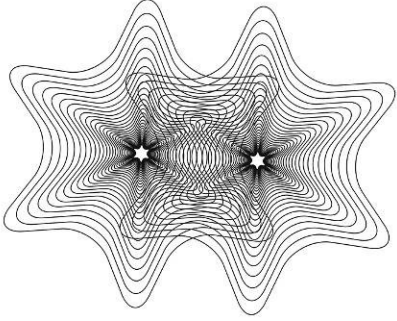
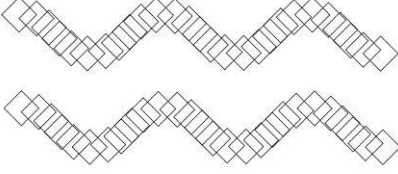
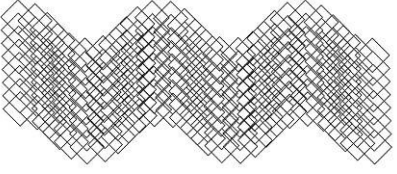

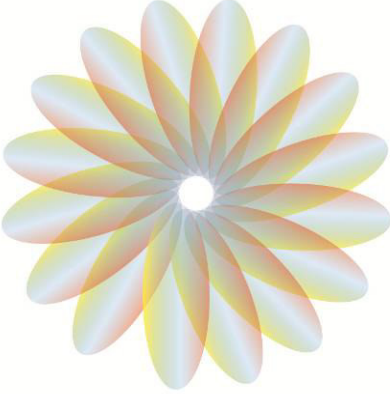
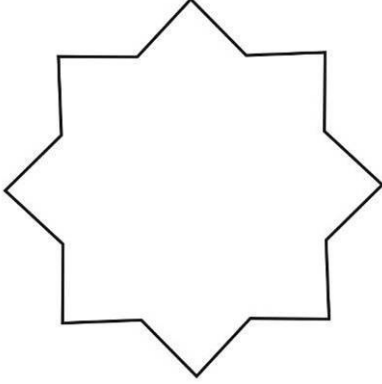
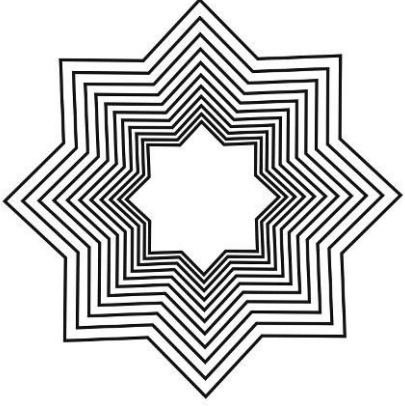
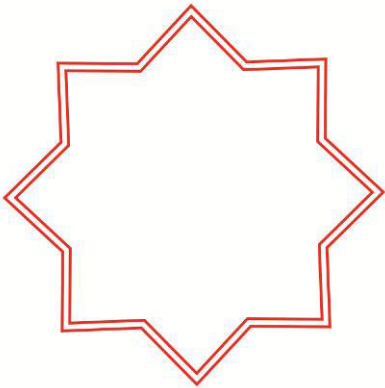
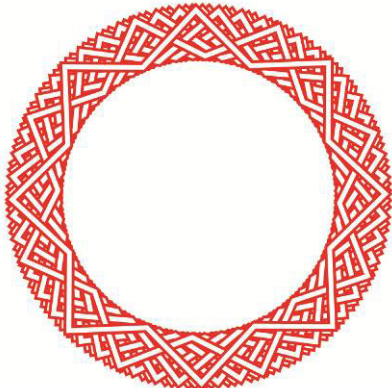
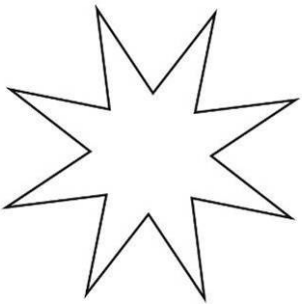
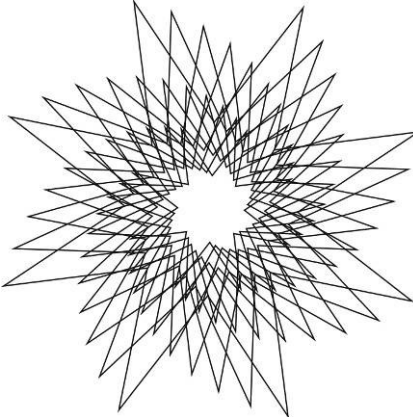
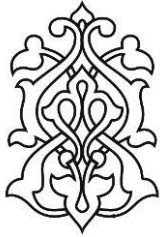
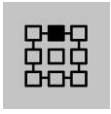
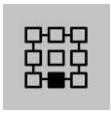
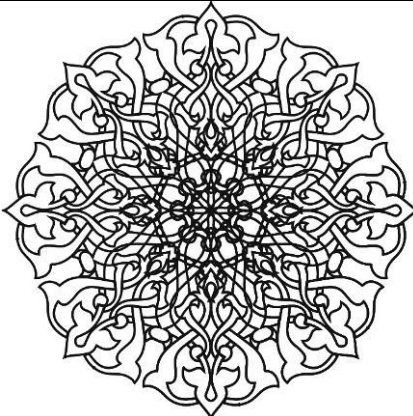
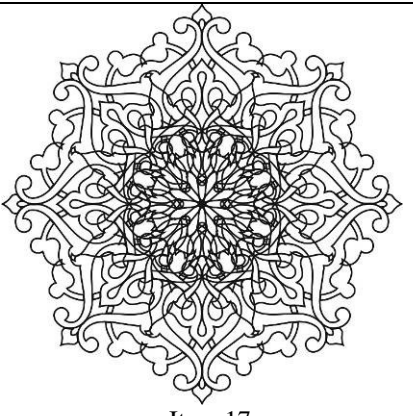
	<p>- Transform effect: Horizontal and vertical scale of 110% with 30 copies. - Repeat item</p>	 <p>Item 10.</p>
	<p>- Blend with 6 steps and align to page orientation.</p>	 <p>Item 11.</p>
	<p>- Transform effect: Horizontal move of 6 mm. 15 copies. 22 degree angle rotation.</p>	 <p>Item 12.</p>

Table 2. Transform effects for producing Islamic op-art items

	<p>- Transform effect: • Horizontal and vertical scale of 90% with 10 copies.</p>	 <p>Item 13.</p>
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	<p>- Transform effect:</p> <ul style="list-style-type: none"> • 20 copies. • (-161) degree angle rotation. 	 <p>Item 14.</p>
	<p>- Transform effect:</p> <p>Horizontal and vertical scale of 110%.</p> <ul style="list-style-type: none"> • 10 copies. • 189 degree angle rotation. 	 <p>Item 15.</p>
	<p>- Transform effect:</p> <ul style="list-style-type: none"> • 10 copies. • 45 degree angle rotation. • Reference point:  <p>- Transform effect:</p> <ul style="list-style-type: none"> • 7 copies. • 45 degree angle rotation. • Reference point: 	 <p>Item 16.</p>  <p>Item 17.</p>

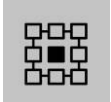
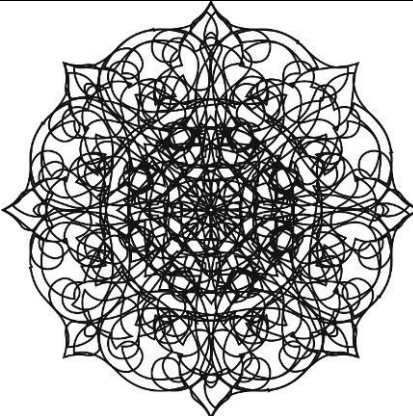

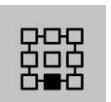

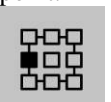

	<p>- Transform effect: • 6 copies. • 45 degree angle rotation. • Reference point:</p> 	 <p>Item 18.</p>
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Table 3. Transform effects for producing Pharaonic op-art itemes

	<p>- Transform effect: Horizontal and vertical scale of 90%. • 18 copies. • 24 degree angle rotation. • Reference point:</p> 	 <p>Item 19.</p>
	<p>- Transform effect: Horizontal and vertical scale of 90%. • 18 copies. • 24 degree angle rotation. • Reference point:</p> 	 <p>Item 20.</p>


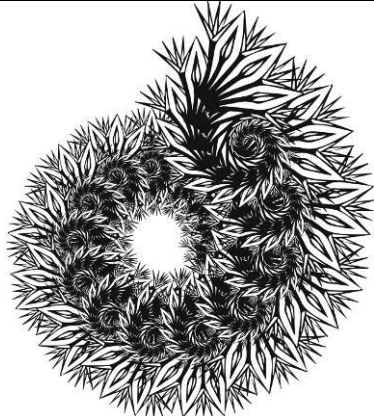







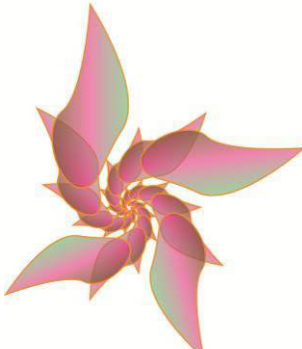





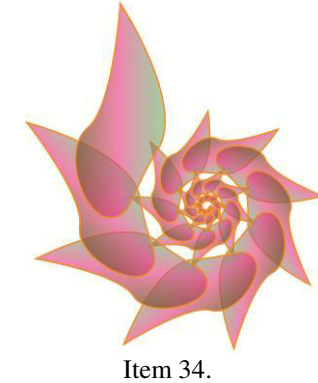
	<p>- Transform effect:</p> <ul style="list-style-type: none"> •Horizontal and vertical scale of 95%. •Horizontal move of 20 mm.. •Vertical move of 20 mm.. •15 copies. •(-28) degree angle rotation. 	 <p>Item 21.</p>
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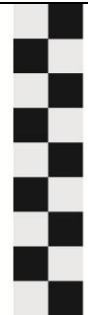
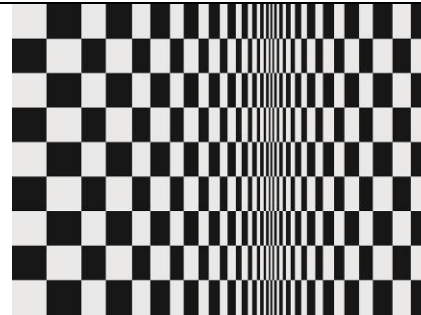
Table 4. The effect of modifying the rotation angle:

 <p>Gradient fill with opacity less than 100%</p>	<p>- Transform effect:</p> <ul style="list-style-type: none"> •Horizontal and vertical scale of 90%. •30 copies. •Horizontal move of 5 mm. , vertical move of 5mm.. •(-22) degree angle rotation. 	 <p>Item 22.</p>
 <p>Item 23.</p>	 <p>Item 24.</p>	 <p>Item 25.</p>
<p>(-45) degree angle rotation.</p>	<p>(-56) degree angle rotation.</p>	<p>(-60) degree angle rotation.</p>
		

Item 26. (-64) degree angle rotation.	Item 27. (-73) degree angle rotation.	Item 28. (-82) degree angle rotation.
 Item 29.	 Item 30.	 Item 31.
(-90) degree angle rotation.	(-118) degree angle rotation.	(-125) degree angle rotation.
 Item 32.	 Item 33.	 Item 34.
(-165) degree angle rotation.	(-187) degree angle rotation.	(-318) degree angle rotation.

Designing specified op-art style

Table 5. A trial of producing the Riley's style in Movement in Squares Op-Art.

	<p>- Transform effect: Horizontal scale of 75%.</p> <ul style="list-style-type: none"> • 10 copies. • Horizontal move of 20 mm.. <p>- Duplicating and flip horizontal is applied to the pattern.</p> <p>- Deleting unwanted part of the pattern.</p>	 Item 35.
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2.2 Applications of op-art items in various designs

- Application in Packaging Design



Figure 19. Utilizing item 1. in packaging design – Ulker biscuit box



Figure 20. Utilizing item 2. in packaging design – Ulker biscuit box



Figure 21. Utilizing item 3. in packaging design – Ulker biscuit box



Figure 22. Utilizing item 4. in packaging design – Ulker biscuit box



Figure 23. Utilizing item 5. in packaging design – Ulker biscuit box

- Application in Guilloche Design for Security Prints

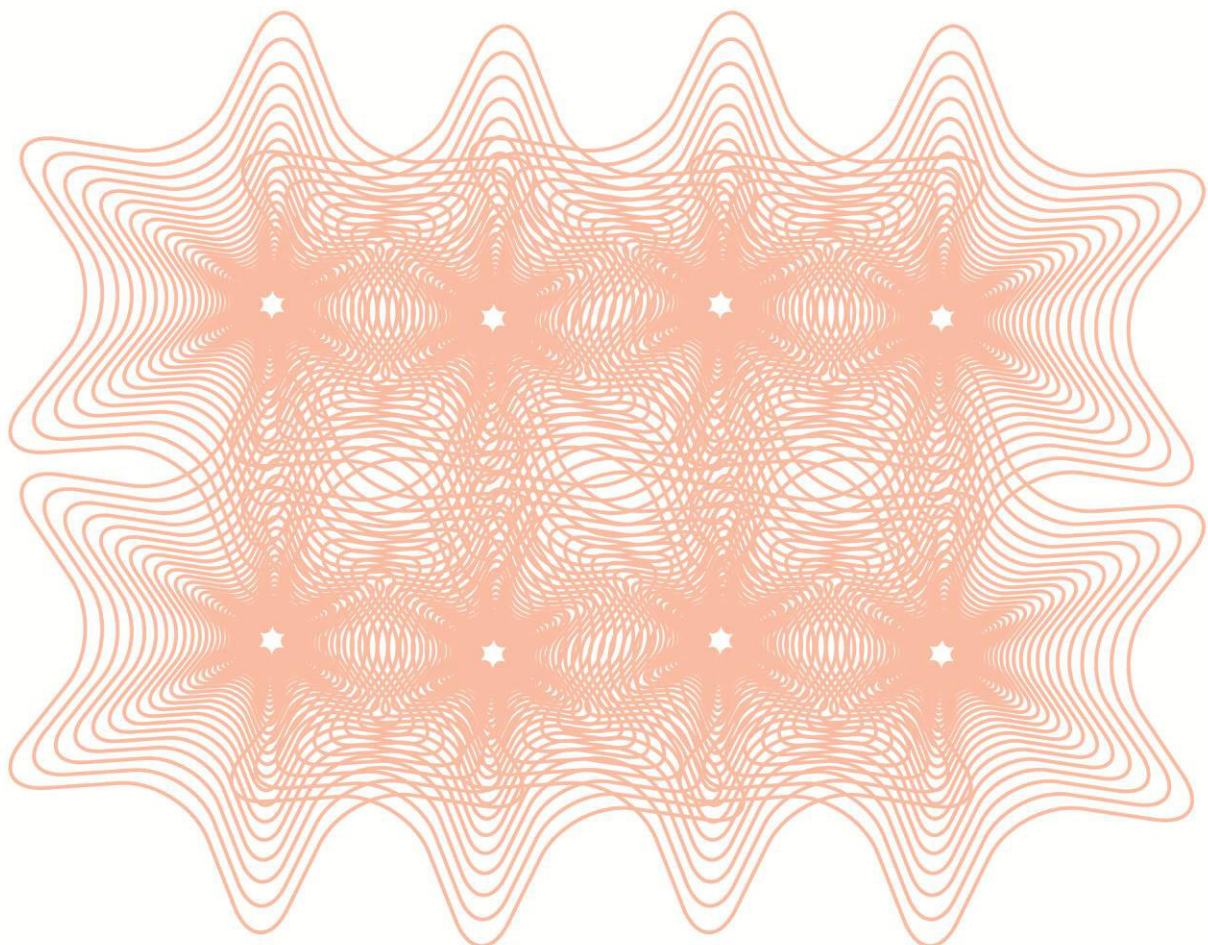


Figure 24. Utilizing item 10. in Guilloche design

- Application in Islamic Bar Design

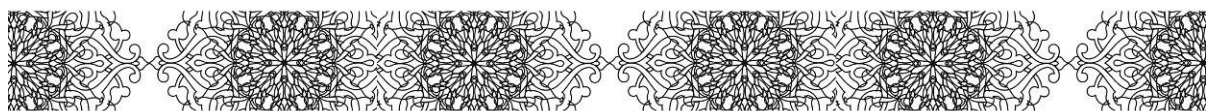


Figure 25. Utilizing item 17. in designing an Islamic bar

- Application in Islamic Background Design

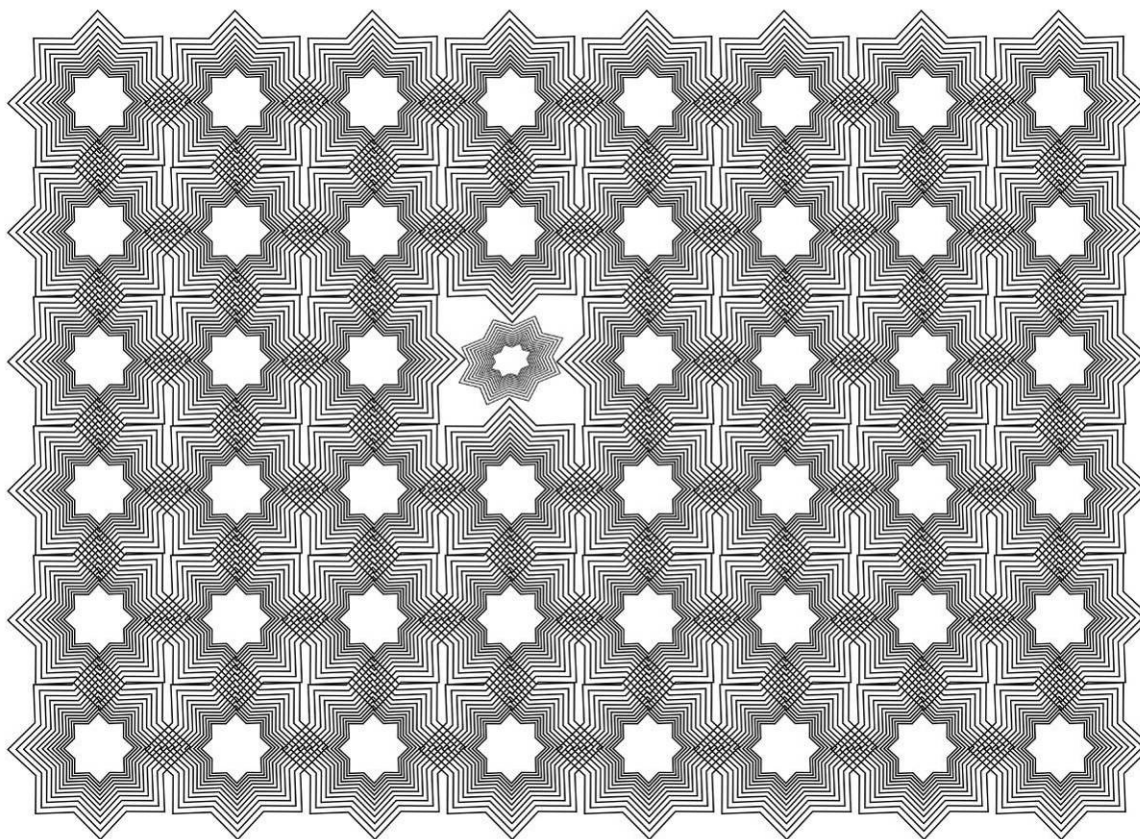


Figure 26. Utilizing item 13. in designing an Islamic background

3. Conclusion

Unlimited variations of op-art items could be designed using Adobe Illustrator tools.

Adobe Illustrator is very flexible in using none geometric shapes in composing the resulted op-art items. The shapes can be related to a specific culture or civilization of ancient people to utilize in any design needed.

It is very easy to edit the op-art item on Adobe Illustrator after designing it.

Op-art items designed can be utilized in many designs for printing, publishing, packaging, or any kind of design.

The resulted op-art item is changing according to the original shapes used.

Op-art item design always needs repeating or copying or duplicating as essential converting to produce the final design.

Adobe Illustrator can produce a specified op-art style easily using transform effects and more few steps to complete the pattern.

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