



# *Exploring the Therapeutic Potential of Kinetic Textiles in Mental Health*

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## Abstract

Smart textiles are becoming increasingly popular worldwide, whether in building, fashion, aerodynamics, or even art. With technology continually evolving and becoming further integrated into our lives, one growing concern is the quality of our lives and the deterioration of our mental health.

The goal of this research is to better understand how kinetic textiles and fractal patterns work, as well as how they affect the human mind. The paper will investigate the two issues using previous research publications.

The findings from this study can be used to produce samples based on kinetic textiles.

**Keywords:** Anxiety reduction, Fabrigami, Fractal, Kinetic textiles, Stress relief.

## 1. Introduction

Kinetic textiles, as the name implies, are fabrics that have some degree of motion induced in them. For this work, we are particularly interested in dynamic textiles, a type of fabric that can change shape by folding and unfolding according to origami theory. The study investigates how specific origami patterns and shapes might relax our brains. It focuses on studying how visual therapy, when combined with mindful breathing practices, may soothe the human mind. Along with the aforementioned research, the paper will do research and analysis on current kinetic textile works created by artists and designers. A emphasis on how these kinetic textile prototypes will be developed with the assistance

This research, at last, will increase our scope of research in developing a product.

## 2. Background

This part of the paper deals with the research on the perspectives which will play an important role in understanding psychology of mind and what components of its environment can affect it positively.

### 2.1 Patterns And Its Effects On Mind

Visuals can have a very strong impression on the way our brain acts and processes. It is commonly observed that our brain can process things better and faster, when things are supported with visuals and shapes and also holds the capacity to prompt different emotions in us. Especially, some shapes, patterns and imagery have a set impact on us which can relax our mind thus improving our mental health.

In this section, we are going to discover the same by studying how few patterns like fractals, circular and symmetry affect the mind.

#### 2.1.1 Fractal patterns

Fractals can be defined as never ending patterns with complex nature and hold a similarity when observed at different scales. They hold an aesthetic sense in the complexity of their visuals. Fractals have been found in our surroundings like mountains, rivers, flowers, trees, clouds, wave patterns and nerve impulse. Fractals have also been set as a base for many traditional arts like in paintings, mandalas, mosaics and many more. Nowadays, they are computer generated and there is a lot of softwares available to generate them with the help of mathematics. There have been many studies which also proves that fractal architecture is good for us.

According to studies, our human nervous system is attuned with time fractals. On analysing the functioning of the brain, it displays noise signals, similar to,  $1/f$  noise or pink noise. Pink noise or  $1/f$  noise is a noise which has the same amount of energy in its every octave and has the property to relax our mind and even help people fall asleep faster. These noises are fractal in nature and are determined with the changing of the world. These studies show that our brain, which is also fractal in nature, tries to recognize the fractal characteristics everywhere and is inclined towards such structures and feels relaxed<sup>1</sup>. The researchers reveal that fractals can be installed or put in work in the background environment since the observation for only 10 sec is enough to produce a relaxing effect<sup>2</sup>.

Keeping the above theories over fractals in mind, we will try to compute them over the origami structure we prepare with the help of kinetic textiles.



Figure 1: Fractal Patterns in succulent plant

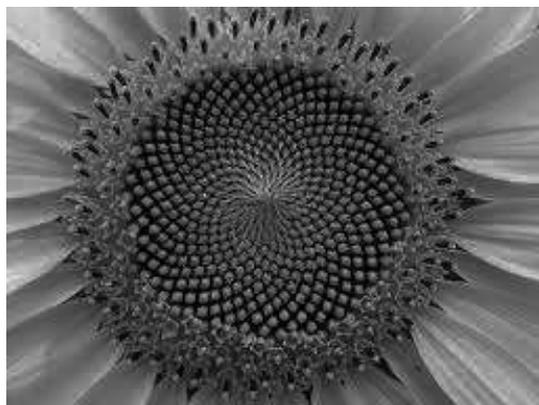


Figure 2: Fractal Patterns in sunflower

#### 2.1.2 Symmetry

Symmetry, in simple terms can be termed as self similarity when made to undergo different transformation. Symmetry can be found everywhere be it in books, art, nature and in cultures. It is a noticeable visual that the human system can efficiently detect and that too rapidly. Among all types of symmetry, mirror symmetry is the one whose perception is most effortless and rapid. Observations have also revealed that it is easier to see mirror symmetry when it is in its vertical orientation than

in horizontal orientation. There is evidence that shows the mind picks up mirror symmetry even when there is no specific requirement for it to do so<sup>3</sup>.

Psychology of the human mind is quite interesting to observe and can be inculcated in any artwork, product or creation to bring more focus on it.

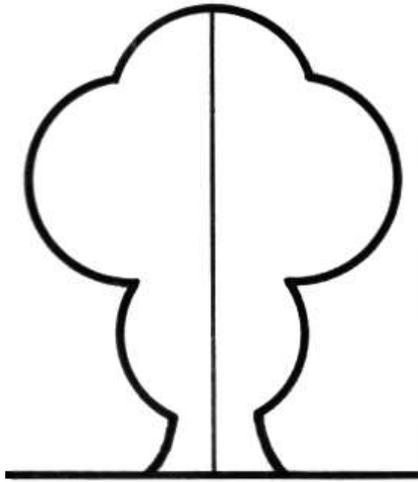


Figure 3: Symmetry in nature

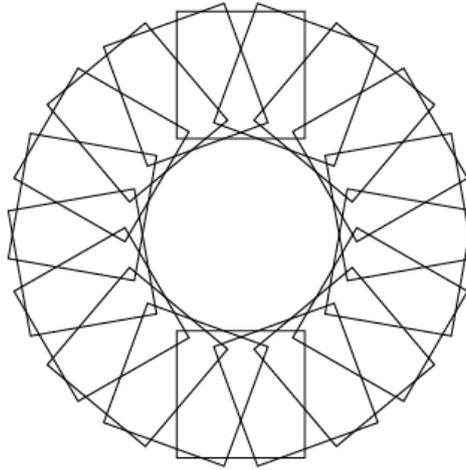


Figure 4: Symmetry in patterns

## 2.2 Pattern Of Motion And Its Relation With Mindful Breathing

Patterns that are kinetic in nature have a deeper impact on the human mind. When a structure is moving, either contracting or relaxing, it invokes the human mind to concentrate on the regular movement. This concentration helps our body to slowly sync the breathing rate with the rate of contraction and relaxation. Focusing on breathing pattern is termed as ‘Mindful Breathing’.

This practice is a self soothing solution for anxiety reduction wherein a breathing pattern is observed of the participant. Breathing rate increases due to stress and anxiety of any kind faced in day to day life which may lead to other severe health effects. Graduate students are highly prone to anxiety as a result of academics and tests on a regular basis. Studies show that test anxious individuals show impaired academic performance that eventually results in lack of motivation, focus and early stages of depression. Practising mindful breathing on a daily basis has shown better control of thoughts and emotions and helps in building a positive approach<sup>4</sup>. Studies have shown that slow, deep or also referred to as diaphragmatic breathing techniques benefit the functioning of the nervous system and thus mind. It has also shown improved cardiovascular and cardiorespiratory function and respiratory efficiency. Most therapeutic breathing methods involve deep or diaphragmatic breathing in which the diaphragm muscle contracts to inhale air deep into the lungs<sup>5</sup>.

The study suggests that if the structures contract and relax at a slower pace, the viewer will try to slow down and focus on their breathing rate which will ultimately lead to stress reduction.

## 2.3 Existing Stress Relief Solutions Which Used Kinetics

Several methods have been introduced as stress relief solutions that are currently available for all age groups and mainly focus on anxiety reduction through visual aids and graphics. These solutions range from various products to app based solutions that aim to improve the user’s focus and attention span.

### 2.3.1 Apps

Digital media has been one of the key aspects in influencing mental health especially during and after pandemic. A lot of individuals and/or organisations have initiated meditation and mindfulness through the digital format. Several user centric

phone based apps have been developed and proved to be effective. Study shows that the apps have helped individuals in stress reduction however its efficiency is still uncertain<sup>6</sup>.

#### Example 1- Calm

Calm is a paid app that helps users through audio therapy- the app takes help of soothing tunes, short inspiring stories and podcasts. A consumer study shows that the highest rate of improvement was in anxiety disorders, followed by depression<sup>7</sup>.

#### Example 2 - Mesmerise

Mesmerise is a paid app that uses kinetic visuals that have a focus point which helps in creating a psychedelic experience. The visuals are mainly fractal and colourful that grabs the attention. The app allows the user to choose the pace of these visuals in order to suit the selected breathing pattern.

### 2.3.2 Products

#### Fidget spinners

Fidget spinners are kind of fidget toys used especially by children for stress relief, anxiety and hyperactivity disorder. According to a paper<sup>8</sup>, the visual of repetitive spinning of the fidget is appealing to people and holds mindfulness and meditative spectrum, being one of the reasons it is popular and recommended by therapists and counsellors for mental health. It helps students to focus and cope up with their attention paying challenges. It also helps to manage anxiety and sensory issues and to get tuned in the environment. Visual spinning of fidget is what helps out people, so this can be one factor which we can try to keep note of.



Figure 5: Fidget spinner in motion

#### Breathing cushion

Breathing cushion is a product which was developed to reduce stress and anxiety on hugging the cushion. Many researches and tests demonstrated that hepatic technologies can reduce anxiety. Thus Alice Haynes along with her team developed this cushion which had a syringe pump installed in it which was responsible for its inflation and deflation giving it a breathing stimulation. Participants who tested it described it as - calming, soothing, relaxing and that it felt like the pillow was breathing<sup>9</sup>.



Figure 6: Breathing cushion

### 3. Scope Of Research

The aforementioned study demonstrates that we may design kinetic structures that aid in conscious breathing and, as a result, stress reduction, which serves as the foundation for developing samples using textile materials. We can build Fabrigami (fabric origami) that compresses and relaxes, as well as a visually beautiful motion that has a calming effect. The structures to be constructed will be based on the study of forms, shapes, and patterns, such as fractal formations, as well as the study of colors. Further research will be conducted on colours, their calming characteristics, and their appropriate use. Further sample development will determine the raw materials and mechanisms required.

### 4. Conclusion

This investigation assisted us in identifying and analyzing kinetic structures and their textile significance for stress and anxiety alleviation. It helps you learn visual meditation and how particular forms and movements fool the human mind into feeling peaceful and serene. It also provided insight into kinetic textiles and its connection to the realm of technology. The resulting samples will be designed to aid in attentive breathing without requiring extensive supervision.

Multiple forms with visual benefits will be arranged to create an entire area with kinetic motions created in them at a slower pace, encouraging the user to focus on its movement and sync their breathing rate with it. Based on survey results, these forms will be created using the appropriate materials and colors.

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Figure references:

Figure 1: Internal- What is fractal

Figure 2: Simply.Science- Fractals in nature

Figure 3: Interaction Design Foundation- Symmetry vs Asymmetry

Figure 4: LaptrinhX- A study of symmetry

Figure 6: NewScientist