Medical Xpress

Psychotextiles could be next big thing in fabrics

September 14 2016, by George Stylios

Torro! Credit: Giovanni Cancemi

While most of us feel pain if we're pricked by a needle, or taste sourness sucking a lemon, scientists understand less about how we're affected by what we see. This is because seeing is a much more complicated activity. It involves shape, dimension and colour in a three-dimensional context

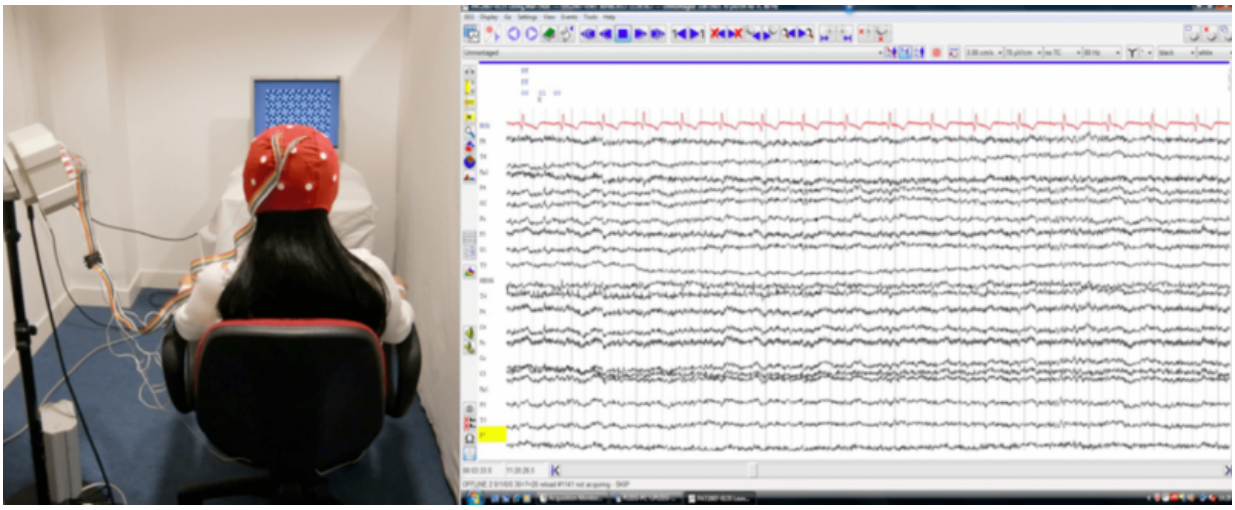
with multiple object associations that are changing over time.

We know that certain works of art make us feel certain emotions. The Mona Lisa by Da Vinci is admired because her smile has a calming effect on us, for example, while The Scream by Munch makes us anxious.

We also know that some colours and shapes influence our emotions. We already use these insights in design and in commercial advertising. The colour red arouses us for example, drawing attention to the object in question. This is why Coca Cola cans and many lipsticks are red – not to mention danger signs.

We experience something similar with sharp angles, which is why chevrons are used in road signs. On the other hand, more rounded angles and the colour green produce a calming effect.

But do other visual characteristics produce the same emotions in the majority of the population? And if so, can we manipulate them to change our state of mind? Our insights into colours and shapes come mainly from neuroscientists looking for ways to treat people with psychiatric problems such as depression and schizophrenia. They have tended to be limited and not practical for using in everyday life – which is what we wanted to achieve.



Experiment in progress. Credit: George Stylios

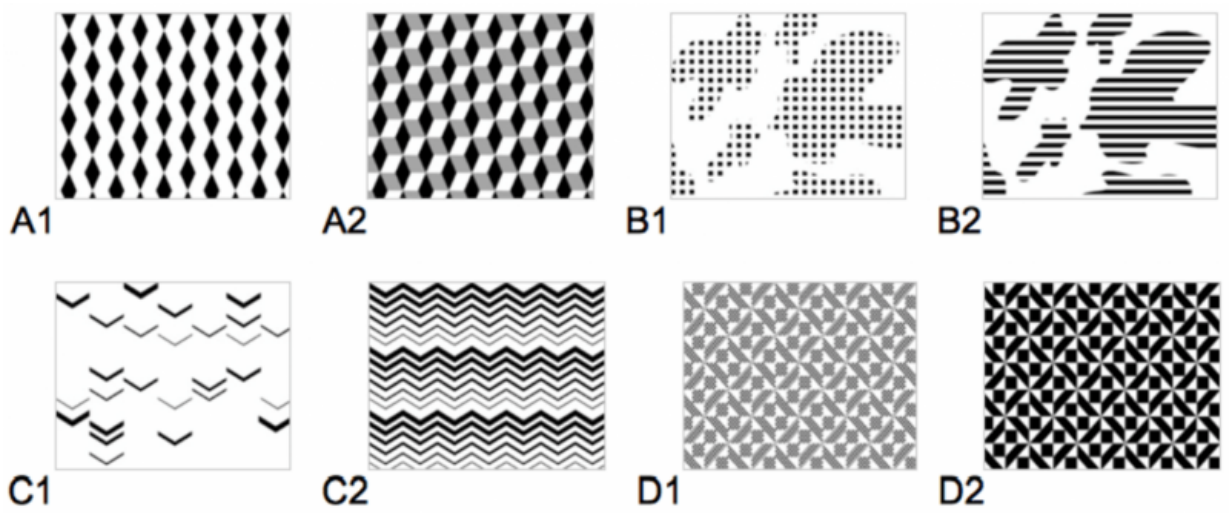
Spot the pattern

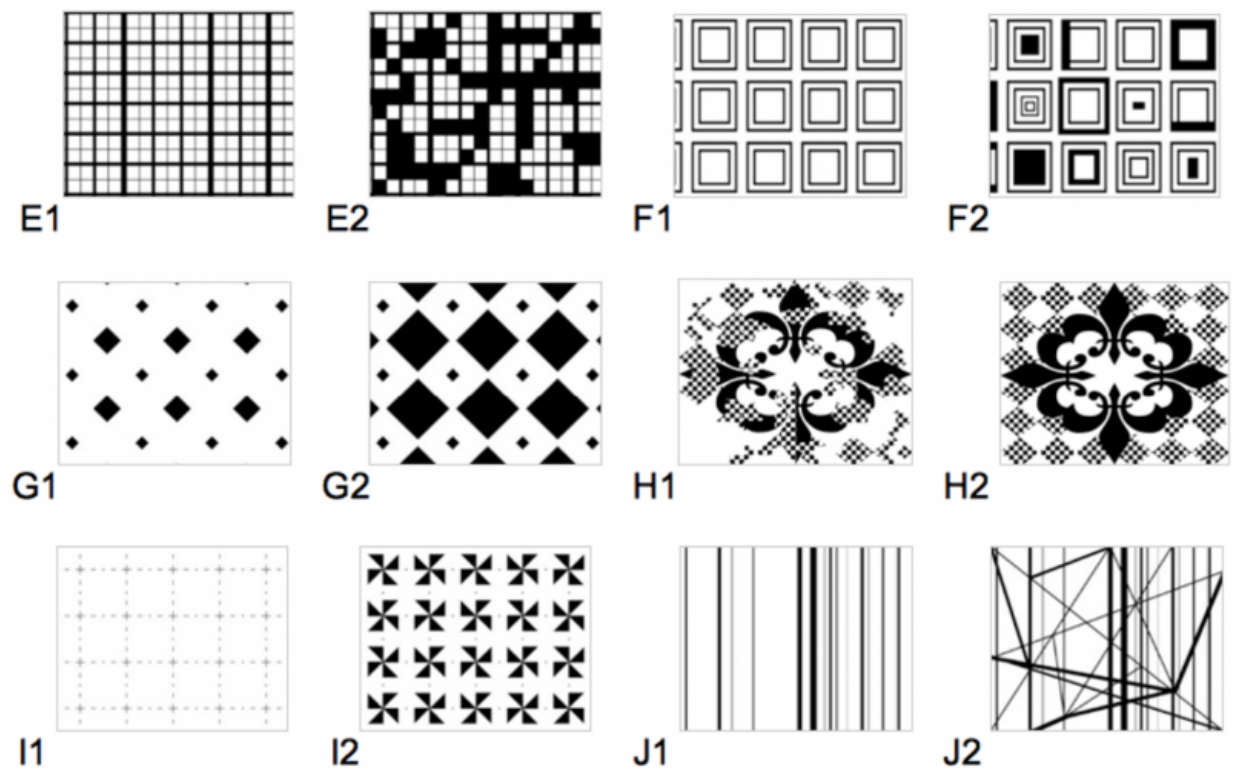
The study carried out by myself and Meixuan Chen, a research student, involved two stages. In the first stage, we tested ten pairs of patterns on 20 participants. This may not sound like a big group, but you have to appreciate that we tested each participant for a number of hours. The findings correlated across over 80% of them, a big majority, which in this kind of study is considered enough to draw conclusions about the population as a whole.

As you can see from the picture above, each participant was shown the images on a computer screen. We investigated their emotional responses by measuring their brain and heart activity respectively using EEG and ECG monitors, as well as asking them how they felt about each pattern.

We didn't show the participants different categories of patterns at this stage, but rather a wide selection. We deliberately made them black and

white, since using colours would have risked contaminating the results. Here are the patterns:





Credit: George Stylios

When we analysed the results, we discerned two trends. Our participants took more pleasure from repeating patterns than non-repeating ones, and were more excited by intense patterns than weak ones.

With repeating patterns, for example, we found that participants registered an increase of theta brain waves in an area called the Fz channel location at the midline of the frontal lobe. The literature correlates this with pleasant emotion. At the same time, our participants found non-repeating patterns less pleasant and found weaker patterns more calming.

It is important to appreciate that pleasure and excitement are not the

same thing in neuroscience. Exciting things surprise us and make us sit up and take notice. They are not necessarily pleasant, however. Things can be exciting and unpleasant, just as they can be pleasant but not hold our attention.

The challenge for product designers is to create products that are both pleasant and exciting at the same time. Apple is the classic example of a company that achieved this with their Mac computers in the 1990s. These machines looked so different to the rest of the market that they surprised people, yet were also extremely pleasant from a visual point of view.

Wise woollens

For the second stage of our study, we designed and produced four smart knitted fabrics on campus from a purpose-made electrochromic composite yarn. Each fabric – we call them psychotextiles – could toggle between two kinds of patterns on a graduating scale.

Two of our fabrics toggled between a repeating and non-repeating pattern, while the other two toggled between weak and intense patterns. We tested them on 20 more people in a similar way to the first stage. It confirmed what we found before. Not only that, we showed that by shifting between patterns, we could make the participant switch from one emotion to the other and back again. As the video shows, different patterns produced activity in different parts of participants' brains that are linked to certain emotional responses.

These results raise fascinating possibilities. By using a smart fabric, it means someone could choose a pattern to achieve a particular emotion – clothes that lift your mood or calm you down, for example; or wallpaper that can be manipulated to create a party atmosphere. It could be set to respond to the weather, to the time of day or year or whatever.

It could be a kind of "visual medicine" that becomes an alternative to the likes of antidepressants. Equally it might transform product manufacturing, engineering and the teaching of art and design. In future we might talk about psychoart, psychointeriors, psychomaterials and psychoarchitecture, to name only a few.

First there needs to be a major research push into the interaction between the human brain and the surrounding environment. Researchers might look at more chaotic patterns, patterns with lettering, mixtures of angles and curves, patterns with three-dimensional effects and so on.

The next step would be to start combining patterns with different colours and shapes. After that, we might look more closely at smells and sounds and start mixing these with the visual elements. If we are to make the most of the reactions that we have in common, the future starts here.

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