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Artificial intelligence in the fashion industry

Research being carried out by a research team around Professor Ohbyung Kwon at Kyung Hee University and Dr Christine (Eunyoung) Sung at Jake Jabs College of Business and Entrepreneurship, Montana State University, involves examining consumers' evaluations of fashion products designed using generative adversarial networks (GANs), an Artificial Intelligence (AI) technology. They analyse consumers' buying behaviour and offer practical advice for businesses that are considering using GANs to develop products for the retail fashion market.

Artificial Intelligence (AI) technology is changing the retail landscape. Generative AI is being used to produce creative outputs; tasks that have traditionally been considered exclusive to humans. In particular, generative adversarial networks (GANs), an Artificial Intelligence technology, powerful machine learning models that can generate realistic images, videos, and voice outputs, are successfully performing creative tasks previously considered unique to humans. In retail fashion, where products are designed to meet both the aesthetic and hedonic needs of the consumer and speed and novelty are important, GANs offer a cost-effective means of generating new product designs.

Research being carried out by Ohbyung Kwon, Professor of Management Information System at Kyung Hee University, Christin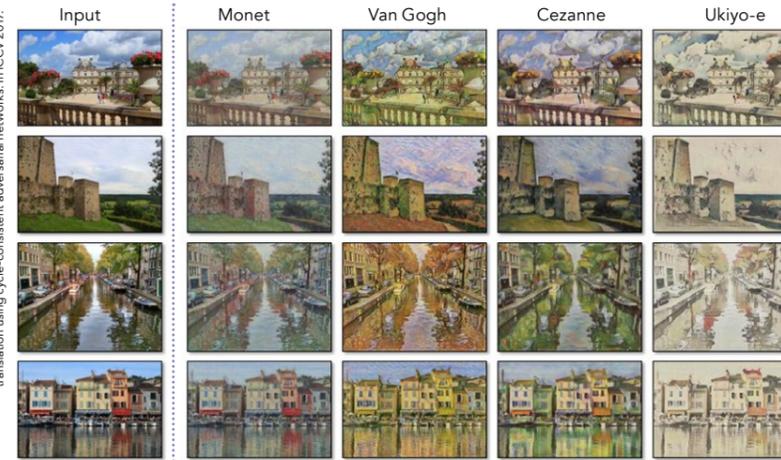e (Eunyoung) Sung, Assistant Professor of Marketing at Jake Jabs College of Business and Entrepreneurship, Montana State University, together with Kwonsang Sohn, PhD student, and Gukwon Koo, Master student, also from Kyung Hee University, involves examining consumers' evaluations of fashion products designed using a technology called cycleGAN. In the course of this study, the research team investigate how consumers' purchase intentions and willingness to pay are affected by the consumption values associated with retail products developed using GAN-synthesised images. They also compare consumers' evaluations of GAN-generated and non-GAN-generated products to ascertain any differences between purchase intentions and willingness to pay. Furthermore, they assess whether disclosing the use of GAN technology influences consumers' evaluations.

CONSUMPTION VALUES AND BUYING BEHAVIOUR
Fashion has symbolic, intangible and emotional value. Retail fashion is motivated both by aesthetics and the customers' hedonic tendencies. The researchers use consumption value theory to explain customers' buying behaviour and how it relates to image design.

Consumption value theory suggests that consumers' perceptions of potential utility and benefits underpin their assessment of the value of products and services. Using a multidimensional theory of consumption value, the researchers consider the effects of four consumption values making up the purchase decision-making process: functional value, social value, emotional value and epistemic value.

They hypothesise that consumption values positively affect purchase intentions and test the hypotheses that the use of GAN technology affects the relationship between each of the four consumption values (functional, social, emotional and epistemic) and the consumers' purchase intentions.

WILLINGNESS TO PAY
Another important factor which can predict the perceived value of products and consumer needs is willingness to pay. This can also explain consumers' buying behaviour in that it reflects the perceived quality of the product. The researchers also hypothesise that willingness to pay positively affects purchase intentions and test the hypotheses that the use of GAN technology affects the relationship between functional, social, emotional and epistemic values and the consumers' willingness to pay.

AI TECHNOLOGY
With regards to their awareness of AI, consumers fall into three categories: laggards, aficionados and realists. Most consumers are realists who are aware of both the benefits and risks of AI technology. The laggards believe that AI technology carries high level of risks and low level of benefits, while the aficionados perceive high level of benefits and low level of risks with AI.

Rapid advances in AI technology enable new consumer experiences and therefore affect consumption values. AI technology is being applied to the retail fashion industry in order to improve consumption experiences. Consequently, the researchers want to identify the effect of AI technology. Subjects are grouped according to their exposure to non-GAN technology, GAN with disclosure and GAN without disclosure, so that the researchers can test the hypotheses that there are differences among the three groups and each of the four consumer values.

ALGORITHM AVERSION
Algorithm aversion occurs in a variety of industries including finance, manufacturing and healthcare. This can have major effects on consumer decision-making. Antagonistic attitudes towards algorithms are particularly prominent where personal preference forms a critical part of decision-making. The researchers therefore want to test the hypotheses that there are differences among the three groups with respect to their purchase intentions and their willingness to pay.

EXPERIMENTAL METHODS AND PROCEDURE
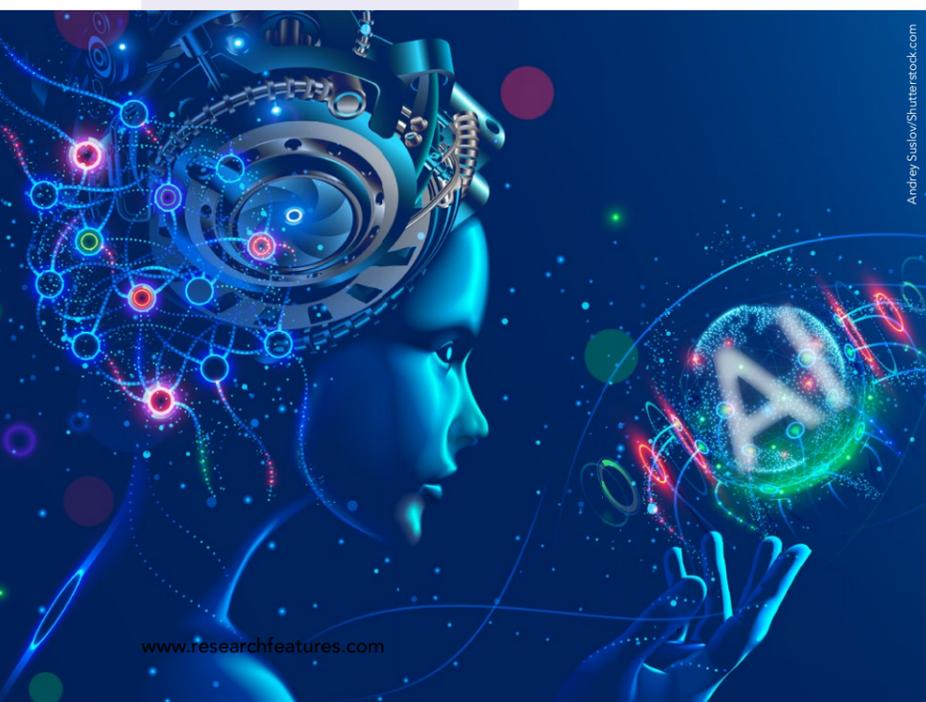The team around Prof Kwon and Dr Sung developed sample products in the form of GAN-generated and non-GAN-generated images of long-sleeved t-shirts as experimental stimuli. There were four different top designs in the style of artistic works of van Gogh, Monet, Jeong-seon and Ukiyoe.
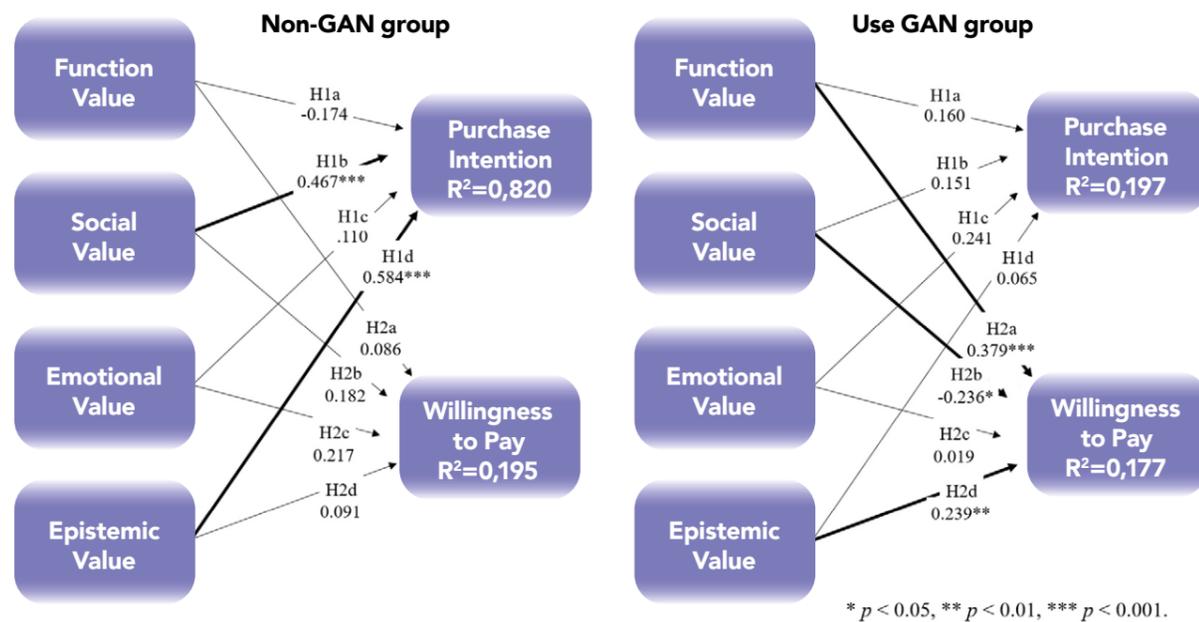
An online advert resulted in 163 participants between 20 and 39 taking part in the experiment. Each participant was assigned to one of three groups: non-GAN, GAN without disclosure and GAN with disclosure.

Participants were directed to visit a website and uploaded one of several images of the long-sleeved t-shirts and evaluated it. Those in the first group viewed and evaluated top designs based on a non-GAN-generated image. Participants in the second viewed top designs based on GAN-generated images but were not told that the designs were generated using AI. Those in the third group also viewed top designs based on GAN-generated images and this information was disclosed to them. The participants were asked to compare the uploaded designs with a design based on the original image. Interestingly, most members of the GAN without disclosure group asked if they could actually purchase the tops.

RESULTS
Statistical analysis of the results revealed the influence of each consumption value dimension on the participants' willingness to pay and purchase intentions for retail fashion products. Differences in the effects of consumption values on consumers' responses were uncovered, revealing the effects of AI technology. The results demonstrate that when GAN technology is used, functional, social and epistemic consumption values affect willingness to pay. Furthermore, when GAN technology is not used, social and epistemic consumption values affect purchase intentions. When participants were unaware that generative AI technology had been used, they tended to perceive the GAN-generated images as more novel than the original images.

The cycleGAN algorithm is able to generate designs in the style of different artists and artistic genres, such as Monet, van Gogh, Cezanne and Ukiyo-e.

> *When participants were unaware that AI technology had been used, they tended to perceive GAN-generated images as more novel than the original ones.*

Non-GAN group

Function Value		
	H1a -0.174	Purchase Intention R²=0,820
	H1b 0.467***	
Social Value	H1c .110	
	H1d 0.584***	
Emotional Value	H2a 0.086	Willingness to Pay R²=0,195
	H2b 0.182	
	H2c 0.217	
Epistemic Value	H2d 0.091	

Use GAN group

Function Value		
	H1a 0.160	Purchase Intention R²=0,197
	H1b 0.151	
Social Value	H1c 0.241	
	H1d 0.065	
Emotional Value	H2a 0.379***	Willingness to Pay R²=0,177
	H2b -0.236*	
	H2c 0.019	
Epistemic Value	H2d 0.239**	

*p < 0.05, ** p < 0.01, *** p < 0.001.

Detailed results of the study: When GAN technology is used, functional, social and epistemic consumption values affect willingness to pay (bold arrow lines). When GAN technology is not used, social and epistemic consumption values affect purchase intention (bold arrow lines).

Examining the impact of awareness of the use of generative AI on consumers' perceptions of product value revealed that functional and emotional values are higher for the non-disclosure group, demonstrating the participants' conflicting perspectives on generative AI. This verifies the AI aversion phenomenon, particularly in the use of AI in product design where consumers prefer to rely more on human input. While the pace of technological innovation is rapidly accelerating, consumers do not always view these technologies favourably and may place a lower value on their product designs. Social value was found to be higher, however, when the use of GAN was disclosed. This suggests that consumers' perceptions of AI are likely to change over time and that AI is socially desirable among 20- to 39-year-olds.
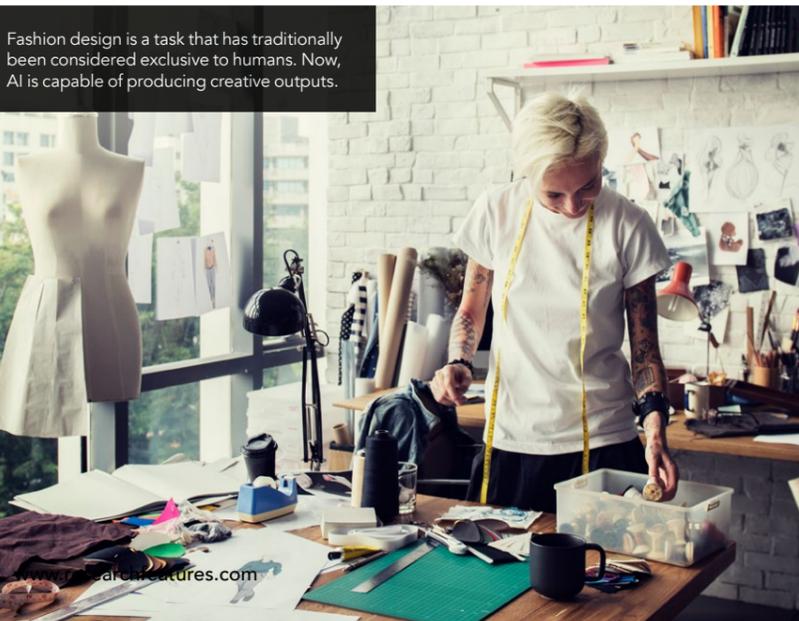
PRACTICAL IMPLICATIONS
This study evaluates the utility of GANs from consumers' perspective and proposes practical advice to businesses that are considering using GANs to develop products for the retail fashion market. To date, little research has been carried out on the impact of GAN-designed fashion products and

consumers' buying behaviour in a retail context. This research offers practical implications for the application of AI in the fashion industry and GANs in particular. The researchers have demonstrated that consumers value GAN-generated product designs more than products designs using traditional methods. They have also shown that emotional value ranks highest among the consumption values, and therefore promote the use of GANs in generating customised designs.

While research has demonstrated that the negative effects of AI aversion on social value can be more noticeable when it comes to product design, this study has established that social value improves when the consumer is made aware of the use of GAN technology. The researchers recommend that companies emphasise the use of state-of-the-art technology and give consumers time to recognise the value of GAN-generated products, highlighting that "rather than replacing humans, AI fosters collaboration".

This study proposes practical advice to businesses that are considering using GANs to develop products for the retail fashion market.

Fashion design is a task that has traditionally been considered exclusive to humans. Now, AI is capable of producing creative outputs.
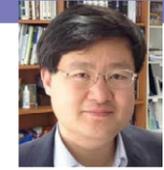
Behind the Research

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Research Objectives

The research team use AI technology to examine consumers' evaluations of fashion products.

Detail

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References

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Personal Response

What is the main interest in GAN technology?

❝ CycleGAN, an AI technology, can transform one image to mass images by machine learning. The main interest in cycleGAN is that it can generate countless attractive designs based on one image. The technology works as follows: CycleGAN can generate mass designs of fashion clothing via machine learning technology (algorithm) based on one image. This means that AI technology can be used to generate new, ingenious designs. This benefits the fashion industry by developing design creativity, reducing the design fee, and offering attractive designs to fashion consumers as a business effect. CycleGAN therefore draws our attention for research on the application of this AI technology. ❞