ResearchGate

See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/369843168

Fashion Marketing with Virtual Humans as Influencers

Chapter · April 2023

DOI: 10.1201/9781003264958-13

CITATIONS
0

READS
1,349

3 authors:



Evrim Buyukaslan
Istanbul Bilgi University
12 PUBLICATIONS **37** CITATIONS
SEE PROFILE



Fatma Baytar
Cornell University
50 PUBLICATIONS **217** CITATIONS
SEE PROFILE



Mona Maher
Cornell University
14 PUBLICATIONS **5** CITATIONS
SEE PROFILE

All content following this page was uploaded by Mona Maher on 09 May 2023.

The user has requested enhancement of the downloaded file.

9 Fashion Marketing with Virtual Humans as Influencers

Evrim Buyukaslan Oosterom, Fatma Baytar and Mona Maher

CONTENTS

9.1 Introduction 163
9.2 What Is a Virtual Human? 164
9.3 Technology Used to Generate Virtual Humans—3D Body Modelling 165
9.4 Marketing with Virtual Influencers (VIs) 167
9.4.1 What Is a Digital Influencer? 168
9.4.2 What Is a Virtual Influencer? 168
9.4.3 How Do VIs Influence People? 169
9.5 The Social Interaction between VIs and Real People 170
9.5.1 Why Do People Interact with VIs? 170
9.5.2 How Do People React to VIs? 171
9.6 Virtual Influencers' Product Endorsement and Brand Advertising 171
9.6.1 Challenges of VI Marketing 172
9.7 Conclusion 172
References 173

9.1 INTRODUCTION

In October 2021, the social networking platform Facebook was renamed as Meta. Mark Zuckerberg, CEO of the company, spoke at the company's annual virtual reality conference and explained the plans to evolve the company into a metaverse venture (Isaac 2021). Since Zuckerberg's speech, the public has eyes flicked over to the theme metaverse. As Bauld (2022) described it, the metaverse is an updated version of the Internet where people can extend beyond their physical selves by using immersive technologies such as augmented reality (AR) and virtual reality (VR). Extending beyond the physical self requires the user to be represented virtually in internet space, which brings us to a further topic: virtual humans. Before dwelling on this phenomenon, it is essential to understand the creation of the digital image, which is merely a product of computer graphics.

Computer-generated imagery (CGI) is the process of creating static or dynamic content using computer software (Nashville Film Institute n.d.). Although CGI has

DOI: 10.1201/9781003264958-13

been used in the game and film industry for many years, it has emerged in the fashion industry only recently. Lil Miquela, one of the first computer-generated humans (CGH) who became an Instagram phenomenon, made her debut in 2016. She modelled for fashion brands, such as Calvin Klein and Prada, and had acquired 3 million followers as of May 2022. In 2018, Lil Miquela, described as a robot on her Instagram page, was among the 25 most influential "people" on the Internet (TIME staff 2017). Since then, other VIs have been introduced. According to VirtualHumans (n.d.), there are 175 acknowledged VIs worldwide currently (35 of which are Instagram verified).

In such industries as fashion, technology, and music, VIs are employed typically to endorse a product, enhance brand recognition, or raise awareness of a social matter (VirtualHumans 2020). For example, Puma created its own virtual human, Maya, in 2020 to promote a shoe drop (Farveen 2020). Later, Prada created its virtual muse, Candy, to advertise its newly launched fragrance of the same name (VirtualHumans 2021a, 2021b). The global influencer marketing volume is estimated to reach $16.4 billion in 2022 with more than a 500% increase in the last five years (Santora 2022). As VI marketing is a recent phenomenon, there are no reliable statistical data to determine its market value yet. However, with the increasing number of VIs and partnerships with them, a market size escalation can be predicted.

In this chapter, VIs, particularly those that are human-like, are explored in detail to better understand their effects on fashion marketing. A comprehensive literature review was conducted to identify the prominent themes associated with VIs. Based upon the literature review, three focal themes in VIs emerged: (1) creation and technology behind virtual humans, (2) the social interaction between VIs and real people, and (3) VIs' product endorsement and brand advertising, and followers' response to it. The following sections combine these themes to provide a broad understanding of the topic.

9.2 WHAT IS A VIRTUAL HUMAN?

When the word "virtual human" is entered into a web search engine, the results reveal a plethora of definitions of the term. Computer-generated humans, virtual characters, virtual agents, avatars, digital humans, and artificial humans are among the definitions that many academic and non-academic sources use interchangeably. Even though there are some differences among them, a systematic naming of these individual entities has not been done so far. In Figure 9.1, these differences are categorized by filtering academic and non-academic usage of these words. CGI is an umbrella term for all these terms and can be described as using 3D computer graphics to create visual content, such as characters, scenes, or special effects, and this static or dynamic visual content can be the subject of a movie, video game, TV programme, or any other digital or printed media (Rehak 2011). A CGH, which is a subset of CGI, is a virtual character that has the appearance of a real human and is created using 3D computer graphics. On the other hand, a virtual character may not have the appearance of a real human. Gollum, in the Lord of the Rings, can be considered a good example of this. Virtual agents are like virtual characters, but they often signal that there is an interaction between the virtual character and the user/follower.

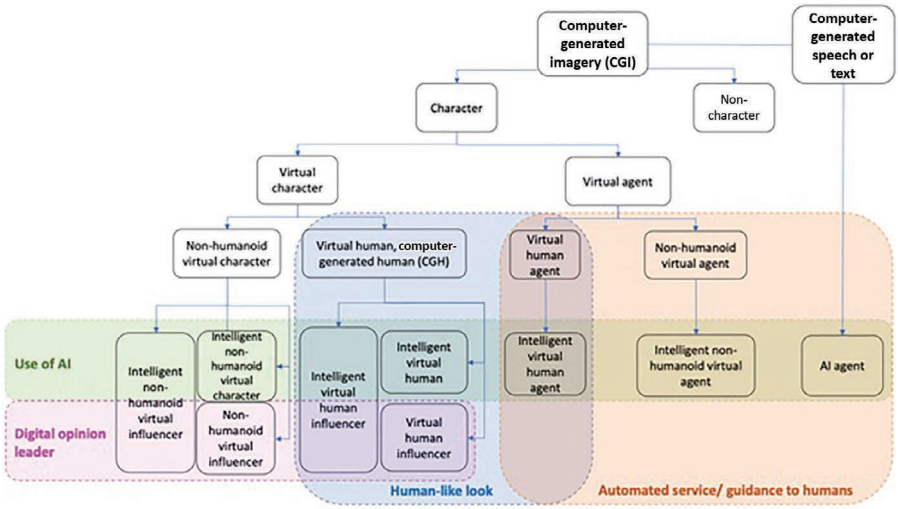


FIGURE 9.1 Categorization of virtual individuals.

Virtual and digital humans may mean the same thing depending on the context and can be used interchangeably with CGH, possibly because they sound less technical and appeal more to the public. Lastly, artificial humans, sometimes referred to as AI humans or intelligent humans, are either created or interact using AI technology. These virtual characters can sometimes be so realistic that they are nearly indistinguishable from real humans (Hill and White 2020). Further to their realistic visual characteristics, they may represent a real human's emotional or behavioural characteristics (e.g., being surprised, sad, or happy) (Li et al. 2021). The customer service field in particular is taking advantage of artificial humans' capabilities because they can interact with customers, answer questions, and help solve their problems; thus, they are referred to sometimes as virtual assistants.

9.3 TECHNOLOGY USED TO GENERATE VIRTUAL HUMANS—3D BODY MODELLING

Two aspects of a virtual human can be used in marketing: cognitive (i.e., communication, perception, language) and physical (i.e., appearance, including the body, face, hair, and dress). Creating a virtual human with a realistic appearance is the subject of collaboration among different research fields, including computer science, physics, mathematics, anatomy, anthropometry, materials science, and apparel design. In the following sections, the technical details of a body model's formation are summarized and followed by an explanation of the commercial software programs available to create virtual humans.

Magnenat-Thalmann (2010) and her research group have made significant contributions to modelling and simulating bodies and garments. They classified the body modelling techniques based upon the approaches used: mathematical and structural.

The mathematical approach generates body models using either geometrical shapes (i.e., cylinders, spheres, ellipsoids) as the starting point and deforming these shapes to achieve the model required or using certain physics principles, such as the mass-spring model and elasticity theory, in which various forces play a critical role in the model's formation. On the other hand, structural modelling focuses on anatomy and anthropometry knowledge to generate the body model. For instance, in biomedical or ergonomics applications, an accurate representation of the body is critical. Therefore, in the structural modelling approach, the body components, such as the skeleton, muscles, etc., are considered individually, and the muscles' postures are examined anatomically to create the body models. However, even if anatomy and anthropometry are the basis to achieve the model, geometrical or physical modelling, or a combination of both, is used. As Magnenat-Thalmann (2010) emphasized, the physical modelling technique requires more computational power than the geometrical modelling technique. In applications in which accuracy is critical, physical modelling is the best, while when speed is prioritized, geometrical modelling is preferred.

As Zhu et al. (2019) emphasized, in an ideal scenario, a virtual human (digital human as referred to in their article) should possess all the features of a real human, including its appearance, action, psychology, and physiology, but this ideal scenario is not currently possible because of the technical limitations. Instead, creators of virtual humans focus on one or two of these aspects depending upon different needs and develop virtual humans accordingly. Further to Magnenat-Thalmann's (2010) technical classification, there are alternative ways to classify digital human modelling in which cognitive aspects also become significant. For instance, Zhu et al. (2019) classified digital human modelling according to the digital humans' end use, that is, cognitive or physical. Cognitive digital humans, which are applied in social sciences, concentrate on the interaction between digital and real humans at the level of emotions, verbal communication, etc. Although they are not real, physical-digital humans (robots) focus on mimicking a human body's static or dynamic anatomy, and hence, are the subject of such fields as biomedicine and automotive safety, among other fields.

In another classification approach, Kim and Chung (2015) chose benefits from the method of creating 3D models: non-template- and template-based. 3D capturing devices (e.g., 3D body scanners) or 3D body modelling software (e.g., Blender or Daz3D) can be used to create non-template-based models (Lee and Song 2021). On the other hand, template-based models adjust the shape of an existing humanoid template to fit the shape of a desired human body best. The body models can be in various forms: 3D, 2D, and parametric. They can be 3D model-based (target body obtained using such 3D capturing devices such as 3D body scanners) (Brownridge and Twigg 2014; Jiang et al. 2014); 2D image-based (target body obtained using 2D images such as photographs of the body from different angles) (Zhu and Kwok 2013; Gu et al. 2019), and parametric-based (target body obtained using such body measurements as hip and waist circumference, etc.) (Baek and Lee 2012). As the name implies, the most realistic body models are achieved with a 3D model, as 3D capturing devices can catch the details of complex geometries.

With respect to commercial 3D modelling software programs, the animation and game sectors have been the driving force for initiating and advancing the computer graphics necessary to create virtual characters since the 1970s (Sturman 1994). Since then, many commercial software programs have been released that allow users to develop imaginative (or realistic) characters for movies or games. By 2022, the most popular software programs used to create virtual humans include Blender, Daz Studio, Unreal Engine, and others. Each of these software programs has its advantages and disadvantages. For instance, even though Blender is an open-source free access programme, it is not specific for modelling body forms, whereas Daz Studio specializes in human body modelling but lacks texturing features (i.e., defining the surface details by dressing a 3D model with 2D images). Unreal Engine's MetaHuman Creator Suit is a free-access cloud-based service which enables non-experienced users to create realistic human models easily, but the human models to be created are limited to the human library offered by MetaHuman Creator Suit.

Further to the 3D body modelling techniques and the popular software programs explained previously, deepfake technology has become the one most familiar to the public with respect to the creation of CGH. In 2019, the Face Swap app became highly popular when users swapped their faces with famous actors, singers, etc. The technology used in the deepfake is machine learning and AI (Westerlund 2019). Many VIs, such as Lil Miquela, are created using deepfake technology, in which her CGI face is attached to a real human's body (VirtualHumans 2021c).

9.4 MARKETING WITH VIRTUAL INFLUENCERS (VIs)

Powers and Greenwell (2017) made a thought-provoking statement in their article that our bodies are now promising avatars for brands. Since modern times, our bodies have reflected our souls, will, and moral identity (Goldstein 1992, 75), and now they function as brands as well. As De Perthuis and Findlay (2019) mentioned, similar to fashion photography in the 1960s, influencers are the objects of interest today. Their bodies, clothes, and the arrangement of scenery give messages to their followers. According to Djafarova and Rushworth (2017), influencers' power is rooted in their authenticity and familiarity with people. Influencers act as a bridge between the brands and the consumers by transferring the brands' messages and increasing consumers' ability to relate to the brand (Uzunoğlu and Kip 2014).

Influencers are the new generation of online opinion leaders (Casaló et al. 2020). Opinion leaders are people whose ideas, insights, and fame are valued by the members of a community and have the power to influence others' attitudes toward novel products (Myers and Robertson 1972). This definition is similar to the definition of "influence". Brown et al. (2015) defined an influencer as a third party who affects consumers' decisions whether to purchase a product and cannot be held accountable for the decisions they make. The opinion leader notion extended to the influencer concept with the introduction of Web 2.0, which enabled social networking among users. Personal blogs were the early forms of social media through which influencers affected followers' decisions significantly (Li and Du 2011), and they became even more important with YouTube and Twitter's establishment in 2005. Finally, social media influencers boomed in 2010 with the debut of Instagram (Burns 2021).

These influencers create content for social media channels (i.e., Instagram, YouTube, TikTok, Twitter) and become figures of interest most often because of their social media appearance. This distinguishes social media influencers from celebrity influencers who acquire fame by acting, singing, performing, etc.

Influencer marketing witnessed accelerated growth after 2020, and influencers got more than the estimated number of followers because the COVID-19 pandemic caused people to spend more time online. Although we do not know yet whether the tendency to spend more time online will be permanent, it is known that the number of social media users is increasing considerably every year; for instance, the number of Instagram users reached 1890 million in 2021 from 1210 million in 2019 (Iqbal 2022). Influencer marketers measure digital influencers' effect on people often according to engagement metrics, such as click-through rates, the number of likes, comments, followers, reshares, etc. (McCann and Barlow 2015). However, from a business perspective, the more important factor is whether the interactions between the followers and influencers turn a profit (Santiago and Castelo 2020). Although the statistics on the increased sales attributable to influencers are scarce, Influencer Marketing Hub's report indicated that two Chinese digital influencers (i.e., Li Jiaqi and Viya) sold $3 billion worth of goods in one day (Geyser 2022).

On the other hand, unlike real humans, VIs are assets that can be manufactured, modified, bought, and sold (Robinson 2020; Drenten and Brooks 2020). These assets' owners are companies or actual people. According to Choudhry et al. (2022), among the 147 VIs worldwide, a single brand owns 23 and creates content to promote that brand's products exclusively, while the remainder collaborates with brands. Before discussing VIs and their effect on fashion marketing, it is necessary to understand the definitions of and distinctions between a digital influencer and a VI.

9.4.1 What Is a Digital Influencer?

Digital influencers (DIs) is a broader term used to identify those who produce online content not only for social media, but any digital platform, and they are not necessarily human beings. According to their follower numbers, DIs can be classified as a celebrity influencer (more than 1.5M followers), mega influencer (1.5M to 500K followers), macro influencer (500K to 100K followers), and micro-influencer (100K to 10K followers) (Metrics 2018). Using DIs in fashion marketing is inevitable today. According to Berezhna (2018), 98% of fashion brands had an Instagram account, and 90% of professionals in the marketing field believe that DIs play an important role in increased product awareness and communication with target consumers (Influencer MarketingHub 2019).

9.4.2 What Is a Virtual Influencer?

VIs are a subset of DIs. According to Arsenyan and Mirowska (2021), VIs are agents augmented with digital avatars, and as such, do not exist in the physical world. However, they differ from avatars because they are not the users' digital counterparts, but are more similar to human influencers, as they have their own character and communicate with their followers through their own stories (Hanus and Fox

2015). Although the majority of VIs look like real humans, for example, Lil Miquela, Shudu Gram, and Imma Gram (Choudhry et al. 2022), there are also doll-like VIs (e.g., Barbie, Noonoouri) and non-human-like VIs such as Janky, Guggimon, and GEICO's Gecko (VirtualHumans n.d.). Human-like VIs are so realistic that some followers do not even realize that they are a CGI. Storytelling is among the key aspects that make a virtual character successful in marketing (Moustakas et al. 2020), sometimes the VIs' creators prefer to veil the influencer's virtual nature, as is the case with Lil Miquela. Its creators posted an item on her Instagram account that declared that she was a virtual human only after she reached a considerable number of followers.

9.4.3 How Do VIs Influence People?

It is critical to understand the way VIs bond with their followers because eventually this bond increases or decreases followers' interest in a brand or a product (Jiménez-Castillo and Sánchez-Fernández 2019). The two-step flow of communication model by Katz and Lazarsfeld (1955) defines opinion leaders' influence within a community. According to the model, opinion leaders receive information (often from mass media) that they filter and develop before they transmit it to others via word of mouth (WOM). Therefore, they act as intermediaries between the information source and their followers. Similarly, DIs and VIs serve as online opinion leaders and distribute the filtered information via e-WOM (Hwang and Zhang 2018). Hennig-Thurau et al. (2004) described e-WOM as any statement about a company or a product that is distributed to a larger audience through online channels.

Although the two-step flow of communication model explains the way information is transmitted between influencers and their followers, it does not explain how exactly VIs influence people. To be influenced, people must accept the information they receive and learn from it so that they can internalize it. This condition requires the social learning theory to be considered (Bandura and Walters 1977), which suggests that people within a social network observe and imitate each other. In the social media context, DIs function as role models from whom people learn and who influence their attitudes and behaviours (Cheng et al. 2021). However, the influencers do not affect everyone equally. As the Media Dependency Theory states (Ball-Rokeach and DeFleur 1976), the more people are connected and dependent on social media, the more likely they are to adopt the information distributed and include it in their behaviours. Kadekova and Holienciova (2018) showed that age is an important factor in a DI's effect. Compared to Generation Z, Generation Y appears to be more suspicious about DIs' recommendations and less likely to purchase products that they endorse. Moreover, Hudders and De Jans (2022) discussed the effect of followers' and DIs' genders on the persuasiveness of an endorsed product. The results showed that DIs' gender was not important to persuasion directly; however, when the DIs and their followers were both women, the persuasion effect was greater, while male followers did not care whether the DI was a woman or a man. A DI's attractiveness is also key to understand the influence mechanism explained in detail in Torres, Augusto, and Matos's (2019) study, where attractiveness had a positive effect on influencing power. However, it should be noted that although physical attractiveness is a

large component of attractiveness, other factors, such as behavioural attractiveness (i.e., sensuality, talent), are also important (da Silva Oliveira and Chimenti 2021). On the other hand, photographs are the key to drawing attention to an online post, particularly when the influencer's body is accentuated by tight clothing, bikinis, etc. Further, when the influencer her/himself is present in the post with the product being endorsed, it is more likely to engage people (Silva et al. 2020).

9.5 THE SOCIAL INTERACTION BETWEEN VIS AND REAL PEOPLE

The number of VIs on social media is increasing rapidly, as are their followers. The majority of followers begin to follow VIs through Instagram recommendations, e-WOM, or another influencer's reposts, while the stories and entertaining content that VIs share engage people and motivate them to follow VIs (Choudhry et al. 2022). The Influencer Marketing Factory surveyed more than 1,000 North Americans and found 58% of them followed at least one VI, while the follow rate was 75% for the 18–24 age group. The content, storytelling, aesthetics, and interaction are the main aspects of VIs or their posts that motivate people to follow them (The Influencer Marketing Factory 2022). Like human influencers, most of the content VIs share are about fashion, followed by music and art. The other reasons why people engage with VIs are their novelty and responsiveness.

9.5.1 Why Do People Interact with VIs?

VIs' novelty arouses people's curiosity and draws attention to the products they advertise. Although the Innovation Hypothesis can explain this curiosity (Kiesler and Sproull 1997), its effect vanishes when people become accustomed to it. Von der Pütten and colleagues (2010) summarized three other hypotheses and models (i.e., the Deficit Hypothesis, Ethopoeia Concept, and Threshold Model of Social Influence) that explain directly or indirectly why the interaction between a real human and a computer (in this case VIs as CGHs) occurs. The deficit hypothesis that Bernstein (1959) proposed first claims that people tend to interact with computers because of their inexperience. The Ethopoeia Concept suggests that social interaction occurs automatically in the presence of social cues, such as interaction through body language or speech, and whether this interaction is human–human or human–computer is unimportant (Nass and Moon 2000). The threshold model of social influence is more complex (Blascovich 2002); however, it can be simplified as social verification of a virtual communication in which the parties engage in a meaningful conversation that leads ultimately to a shared experience (Dodds and Watts 2009). On the other hand, the Parasocial Interaction (PSI) theory suggests that people are eager to develop one-sided feelings towards a media character, particularly if this media character responds to the follower (Horton and Wohl 1956). Generally, all communication is open to the public in social media, and therefore, there is an ongoing performance on the virtual stage. It is possible that VIs' responsiveness, particularly if they are human-like, creates a parasocial interaction between them and their followers (Choudhry et al. 2022).

9.5.2 How Do People React to VIs?

Research on social influence has shown that people's reaction to computers is nearly the same as that to real people (Nass and Moon 2000). More recent studies have narrowed the computer–human interaction to virtual agent–human interaction and found that people react the same to real humans and virtual agents (Von der Pütten et al. 2010; Krämer et al. 2015). Although people are willing to interact with VIs (Silva and Bonetti 2021), to what extent they accept them remains a question. Molin and Nordgren (2019) suggested that VIs are more likely to be accepted if they possess "humanness" (i.e., similarity to a real human), social interactivity (i.e., capability to interact socially with their followers), and social presence (i.e., availability).

Arsenyan and Mirowska's (2021) study questioned whether people's reactions to different kinds of influencers varied. They explored three types of DIs: a human influencer, human-like VI, and doll-like VI. According to the number of likes and video views, the study participants were most engaged with the human-like VI and least with real human influencers. However, participants had the most negative reactions to the Instagram posts of the human-like VI (Arsenyan and Mirowska 2021). The authors explained this attitude with the uncanny valley hypothesis, which states that nearly human-like entities make people feel uncomfortable (Mori et al. 2012). Although a VI's humanness increases people's acceptance of them (Molin and Nordgren 2019), excessive humanness may reduce parasocial interaction (Silva and Bonetti 2021).

9.6 VIRTUAL INFLUENCERS' PRODUCT ENDORSEMENT AND BRAND ADVERTISING

Even though, in the past five years, many fashion companies have collaborated with Vis, fashion companies hesitate employing VIs versus human influencers in terms of advertising. First of all, celebrity marketing is expensive for brands. For instance, one Instagram post by Christian Ronaldo costs one million dollars if it is a collaboration (Business of Apps 2022). On the other hand, virtual humans are less expensive. Once brands create their own virtual humans, they can use them as VIs constantly without extra costs. However, rather than a company creating its own VI, collaborating with a VI may be more expensive than collaborating with a human influencer (Baklanov 2019).

Another important aspect in influencer marketing is the congruence between the influencer and the brand or product endorsed. According to the Match-up Hypothesis (Kamins 1990), people are more likely to purchase a product when the influencer and the product endorsed fit (Till and Busler 2000). When companies create their own VIs, their congruence is not a problem, as the brand itself controls the VI's design, appearance, and online behaviours, according to their own expectations. Further, this freedom of control offers another advantage, which is minimizing a human influencer's PR risk. The Meaning Transfer Model (McCracken 1986) explains the way symbolic meanings are transferred from a celebrity to a brand and the way this influences people's interpretation of the brand or product that a celebrity is advertising. Consistent with the Meaning Transfer Model, an influencer's transgression may

decrease consumers' trust in the brand and reduce their intention to purchase the products endorsed (Reinikainen et al. 2021).

VIs communicate with their followers either through AI or a real person at the keyboard. An AI influencer's transgression is perceived to be more acceptable and less likely to reduce trust in the brand (Thomas and Fowler 2021). On the other hand, VIs pose less PR risk if the brand itself controls them rather than collaborating with a VI that a third party controls. Finally, VIs can increase their followers' WOM intentions better than their real counterparts (Sands et al. 2022).

9.6.1 Challenges of VI Marketing

Despite the many advantages noted previously, VI marketing also has some challenges. These include maintaining the followers' engagement, as VIs' novelty naturally wanes over time when people become accustomed to them, as well as their authenticity (Moustakas et al. 2020). People require the influencer to be authentic and credible to be persuaded by them. Although VIs' human-like appearance can increase their trustworthiness, studies have shown that people trust VIs less than human influencers (Djafarova and Rushworth 2017). Similarly, market research has found that people trust the products VIs advertise only moderately (The Influencer Marketing Factory 2022). Although the report does not mention whether the difference between the age groups' trust was significant, the 35–45 age group demonstrated greater trust than the other age groups, including Generation Z, while the oldest group (55+) had the least trust.

Transparency is another issue that must be considered in VI marketing, as these influencers' virtuality is sometimes blurred, as in the case of Lil Miquela's early Instagram posts. Drenten and Brooks (2020) argued that transparency is not as critical as one would assume because the younger generation does not mind if the influencer is a virtual or real human. However, Fullscreen TBH Community's (2019) market report revealed that 42% of Generation Z and millennials wanted to know the company that controlled the VIs (Fullscreen TBH Community 2019). Finally, there is a debate about whether VIs can be held accountable for the products they endorse. Thomas and Fowler (2021) explained this according to the "Bona Fide User" Principle, which indicates that an influencer must recommend a product s/he endorses via a paid partnership honestly and not mislead the followers. However, VIs are not real. As a result, they cannot use a product or experience a service, and thus, they cannot recommend them. Hence, their credibility in this respect is questionable. Further, lawful VIs cannot be held accountable if the product they endorsed fails (Robinson 2020).

9.7 CONCLUSION

In the next decade, research related to the use of virtual humans is expected to increase for two reasons. The first is related to the fact that the COVID-19 pandemic changed the way we perceive the world. For example, distance education and remote work became norms. In the near future, we may accomplish many tasks with our avatars in the metaverse. The second reason is the fact that creating virtual humans

is becoming easier because of the simplified 3D modelling software programs available today. Further, virtual humans' human-likeness is becoming flawless because of the use of AI. These technological advancements guarantee that we will encounter virtual humans not only in social media, but in other facets of our lives, such as online education, customer service, etc. Currently, avatars and the metaverse are still in their infancy. Nonetheless, virtual humans that are represented accurately can encourage people to attend these types of events and create potential marketing opportunities for fashion companies. In addition to the clear need to develop high-quality virtual humans, more work is required to understand the uncanny effect better and ways to overcome it to increase virtual humans' wide acceptance. Moreover, many people remain unaware that virtual humans exist (The Influencer Marketing Factory 2022). To make VI marketing strategies more effective and increase people's acceptance of them, awareness must be increased first, which can be accomplished by increasing VIs' presence on social media.

The rise of the metaverse is increasing the technological ventures in virtual humans and encouraging influencer marketers to use VIs. Complex 3D human modelling is increasingly becoming easier and less expensive, thus providing an opportunity for influencer marketers who hesitate to create their own VI. Fashion companies are now hiring Chief of Metaverse to explore and invest in the meta experience more often (McDowell 2021), and VI marketing can become one among Chief of Metaverse's responsibilities. In an era in which marketing's future is being questioned because big data are replacing marketers, it is important to follow the technological advancements in the field of AI and virtual humans and begin to invest in this relatively novel marketing strategy with VIs.

REFERENCES

Arsenyan, Jbid, and Agata Mirowska. 2021. "Almost human? A comparative case study on the social media presence of virtual influencers." *International Journal of Human-Computer Studies* 155 (July): 102694. https://doi.org/https://doi.org/10.1016/j.ijhcs.2021.102694.

Baek, Seung-Yeob, and Kunwoo Lee. 2012. "Parametric human body shape modeling framework for human-centered product design." *Computer-Aided Design* 44 (1): 56–67. https://doi.org/https://doi.org/10.1016/j.cad.2010.12.006.

Baklanov, N. 2019. "The top Instagram virtual influencers in 2019." *Hype-Journal*. https://doi.org/https://doi.org/10.1080/00913367.2020.1810595.

Ball-Rokeach, S.J., and M.L. DeFleur. 1976. "A dependency model of mass-media effects." *Communication research* 3 (1): 3–21. https://doi.org/https://doi.org/10.1177/009365027600300101.

Bandura, Albert, and Richard H. Walters. 1977. *Social Learning Theory*, Vol. 1. Englewood cliffs, NJ: Prentice Hall.

Bauld, Andrew. 2022. "What will learning in the metaverse look like? New guide gives educators a place to start figuring it out." www.gse.harvard.edu/news/uk/22/06/what-will-learning-metaverse-look.

Berezhna, V. 2018. "Brands boost influencer marketing budgets." *Business of Fashion* 6.

Bernstein, Basil. 1959. "A public language: Some sociological implications of a linguistic form." *The British Journal of Sociology* 10 (4): 311–326.

Blascovich, Jim. 2002. "Social influence within immersive virtual environments." In *The Social Life of Avatars*, 127–145. London: Springer.

Brown, Duncan, Nick Hayes, and Y.L. Chu. 2015. *Influencer Marketing: Who Really İnfluences Your Customers?* Amsterdam, Netherland: Elsevier.

Brownridge, Andrew, and Peter Twigg. 2014. "Body scanning for avatar production and animation." *International Journal of Fashion Design, Technology and Education* 7 (2): 125–132. https://doi.org/https://doi.org/10.1080/17543266.2014.923049.

Burns, K.S. 2021. "The history of social media influencers." In *Research Perspective on Social Media Influencers and Brand Communication*, edited by B. Watkins, 1–23. essay, London: Lexington Books.

Business of Apps. 2022. "Influencer marketing costs." *Featured Influencer Marketing Companies*. Business of Apps. Accessed July 18, 22. www.businessofapps.com/marketplace/influencer-marketing/research/influencer-marketing-costs/.

Casaló, Luis V., Carlos Flavián, and Sergio Ibáñez-Sánchez. 2020. "Influencers on Instagram: antecedents and consequences of opinion leadership." *Journal of Business Research* 117: 510–519. https://doi.org/https://doi.org/10.1016/j.jbusres.2018.07.005.

Cheng, Yang, Chun-Ju Flora Hung-Baesecke, and Yi-Ru Regina Chen. 2021. "Social media influencer effects on CSR communication: The role of influencer leadership in opinion and taste." *International Journal of Business Communication*: 2329488 4211035112.

Choudhry, Abhinav, Jinda Han, Xiaoyu Xu, and Yun Huang. 2022. "'I felt a little crazy following a 'Doll'' investigating real influence of virtual influencers on their followers." *Proceedings of the ACM on Human-Computer Interaction* 6 (GROUP): 1–28.

da Silva Oliveira, Antonio Batista, and Paula Chimenti. 2021. "'Humanized Robots': A proposition of categories to understand virtual influencers." *Australasian Journal of Information Systems* 25.

De Perthuis, Karen, and Rosie Findlay. 2019. "How fashion travels: The fashionable ideal in the age of Instagram." *Fashion theory* 23 (2): 219–242. https://doi.org/https://doi.org/10.1080/1362704X.2019.1567062.

Djafarova, Elmira, and Chloe Rushworth. 2017. "Exploring the credibility of online celebrities' Instagram profiles in influencing the purchase decisions of young female users." *Computers in Human Behavior* 68: 1–7. https://doi.org/https://doi.org/10.1016/j.chb.2016.11.009.

Dodds, Peter, and Duncan J. Watts. 2009. "Threshold models of social influence." In *The Oxford Handbook of Analytical Sociology*. Oxford: Oxford University Press.

Drenten, Jenna, and Gillian Brooks. 2020. "Celebrity 2.0: Lil Miquela and the rise of a virtual star system." *Feminist Media Studies* 20 (8): 1319–1323. https://doi.org/https://doi.org/10.1080/14680777.2020.1830927.

Farveen, Farzanah. 2020. "PUMA brings to life virtual influencer in SEA marketing push." *Marketing-Interactive*. Accessed July 17, 2022. www.marketing-interactive.com/puma-clicks-with-virtual-influencer-maya-for-sea-marketing-push.

Fullscreen TBH Community. 2019. "Bot or not?". Accessed July 18, 2022. https://grin.co/wp-content/uploads/2021/10/Fullscreen_CGI-Influencers_Bot-Or-Not.pdf.

Geyser, Werner. 2022. "The state of influencer marketing 2022: Benchmark report." *Influencer MarketingHub*. Accessed July 17, 2022. https://influencermarketinghub.com/influencer-marketing-benchmark-report/.

Goldstein, Michael S. 1992. *The Health Movement: Promoting Fitness in America*. Woodbridge: Twayne Publishers.

Gu, Liwen, Cynthia Istook, Yanwen Ruan, Godfree Gert, and Xiaogang Liu. 2019. "Customized 3D digital human model rebuilding by orthographic images-based modelling

method through open-source software." *The Journal of The Textile Institute* 110 (5): 740–755. https://doi.org/https://doi.org/10.1080/00405000.2018.1548079.

Hanus, Michael D., and Jesse Fox. 2015. "Persuasive avatars: The effects of customizing a virtual salesperson′ s appearance on brand liking and purchase intentions." *International Journal of Human-Computer Studies* 84: 33–40.

Hennig-Thurau, Thorsten, Kevin P. Gwinner, Gianfranco Walsh, and Dwayne D. Gremler. 2004. "Electronic word-of-mouth via consumer-opinion platforms: What motivates consumers to articulate themselves on the internet?" *Journal of Interactive Marketing* 18: 38–52. https://doi.org/https://doi.org/10.1002/dir.10073.

Hill, Kashmir, and Jeremy White. 2020. "Designed to deceive: Do these people look real to you?" *New York, NY: The New York Times*. Accessed July 15, 2022. www.nytimes.com/interactive/2020/11/21/science/artificial-intelligence-fake-people-faces.html.

Horton, Donald, and Richard Wohl R. 1956. "Mass communication and para-social interaction: Observations on intimacy at a distance." *Psychiatry* 19: 215–229.

Hudders, Liselot, and Steffi De Jans. 2022. "Gender effects in influencer marketing: An experimental study on the efficacy of endorsements by same-vs. other-gender social media influencers on Instagram." *International Journal of Advertising* 41 (1): 128–149.

Hwang, K., and Q. Zhang. 2018. "Influence of parasocial relationship between digital celebrities and their followers on followers' purchase and electronic word-of-mouth intentions, and persuasion knowledge." *Computers in Human Behavior* 87 (January): 155–173. https://doi.org/https://doi.org/10.1016/j.chb.2018.05.029.

The Influencer Marketing Factory. 2022. "Virtual influencers survey+ INFOGRAPHIC." Accessed July 17, 2022. https://theinfluencermarketingfactory.com/virtual-influencers-survey-infographic/.

Influencer MarketingHub. 2019. "Influencer marketing benchmark report: 2019."

Iqbal, Mansoor. 2022. "Instagram revenue and usage statistics (2022)." *Business of Apps*. Accessed July 17, 2022. www.businessofapps.com/data/instagram-statistics/.

Isaac, M. 2021. "Facebook changes corporate name to meta." *The New York Times*. Accessed July 17, 2022. www.nytimes.com/2021/10/28/technology/facebook-meta-name-change.html.

Jiang, Bo, Fukai Zhao, and Xinguo Liu. 2014. "Observation-oriented silhouette-aware fast full body tracking with Kinect." *Journal of Manufacturing Systems* 33 (1): 209–217. https://doi.org/https://doi.org/10.1016/j.jmsy.2013.10.003.

Jiménez-Castillo, David, and Raquel Sánchez-Fernández. 2019. "The role of digital influencers in brand recommendation: Examining their impact on engagement, expected value and purchase intention." *International Journal of Information Management* 49: 366–376. https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2019.07.009.

Kadekova, Zdenka, and Mária Holienciova. 2018. "Influencer marketing as a modern phenomenon creating a new frontier of virtual opportunities." *Communication Today* 9(2): 90–10. https://communicationtoday.sk/download/22018/06.-KADEKOVA-HOLIENCINOVA-%25E2%2580%2593-CT-2-2018.pdf.

Kamins, Michael A. 1990. "An investigation into the 'match-up' hypothesis in celebrity advertising: When beauty may be only skin deep." *Journal of Advertising* 19: 4–13. https://doi.org/https://doi.org/10.1080/00913367.1990.10673175.

Katz, Elihu, and Paul F. Lazarsfeld. 1955. *Personal Influence: The Part Played by People in the Flow of Communication*. New York, NY: Free Press.: Routledge.

Kiesler, S., and L. Sproull. 1997. "Social human-computer interaction." In *Human Values and the Design of Computer Technology*. Cambridge: University Press.

Kim, Sung-Ho, and Kyung-Yong Chung. 2015. "Medical information service system based on human 3D anatomical model." *Multimedia Tools and Applications* 74 (20): 8939–8950.

Krämer, Nicole C., Astrid M. Von der Pütten, and Laura Hoffmann. 2015. "Social effects of virtual and robot companions." In *The Handbook of the Psychology of Communication Technology*, 137–159. Oxford: John Wiley & Sons.

Lee, Kyu Sun, and Hwa Kyung Song. 2021. "Automation of 3D average human body shape modeling using Rhino and Grasshopper Algorithm." *Fashion and Textiles* 8 (1): 1–20. https://doi.org/https://doi.org/10.1186/s40691-021-00249-6.

Li, Feng, and Timon C. Du. 2011. "Who is talking? An ontology-based opinion leader identification framework for word-of-mouth marketing in online social blogs." *Decision Support Systems* 51 (1): 190–197. https://doi.org/https://doi.org/10.1016/j.dss.2010.12.007.

Li, Zhen, Jianping Hao, and Cuijuan Gao. 2021. "Overview of research on virtual intelligent human modeling technology." 2021 IEEE Asia-Pacific Conference on Image Processing, Electronics and Computers (IPEC).

Magnenat-Thalmann, N. ed. 2010. *Modeling and Simulating Bodies and Garments*. Springer-London.

Myers, J. H., & Robertson, T. S. 1972. Dimensions of Opinion Leadership. *Journal of Marketing Research, 9*(1), 41–46.

McCann, Margaret, and Alexis Barlow. 2015. "Use and measurement of social media for SMEs." *Journal of Small Business and Enterprise Development* 22 (2): 273–287. https://doi.org/https://doi.org/10.1108/JSBED-08-2012-0096.

McCracken, Grant. 1986. "Culture and consumption: A theoretical account of the structure and movement of the cultural meaning of consumer goods." *Journal of Consumer Research* 13 (1): 71–84.

McDowell, Maghan. 2021. "Is it time to hire a chief metaverse officer?" *Vogue-Business*. Accessed July 17, 2022. www.voguebusiness.com/technology/is-it-time-to-hire-a-chief-metaverse-officer.

Metrics, Launch. 2018. "*The state of influencer marketing in fashion, luxury and cosmetics*." *Launch Metrics*. Accessed January 29, 2023. https://www.launchmetrics.com/resources/blog/state-of-influencer-marketing-2018.

Molin, Victoria., and Sofia Nordgren. 2019. *Robot or human? The marketing phenomenon of virtual influencers: A case study about virtual influencers* (Master Thesis). Uppsala University—Department of Business studies. http://uu.diva-portal.org/smash/get/diva2:1334486/FULLTEXT01.pdf.

Mori, M., K.F. MacDorman, and N. Kageki. 2012. "The uncanny valley [From the field]." *IEEE Robotics & Automation Magazine*: 98–100.

Moustakas, Evangelos, Nishtha Lamba, Dina Mahmoud, and C. Ranganathan. 2020. "Blurring lines between fiction and reality: Perspectives of experts on marketing effectiveness of virtual influencers." *International Conference on Cyber Security and Protection of Digital Services (Cyber Security)*: 1–6. IEEE. https://doi.org/https://doi.org/10.1109/CyberSecurity49315.2020.9138861.

Nashville Film Institute. n.d. "What is CGI?—Everything you need to know." *Nashville Film Institute*. Accessed July 17, 2022. www.nfi.edu/what-is-cgi/.

Nass, C., and Y. Moon. 2000. "Machines and mindlessness: Social responses to computers." *Journal of Social Issues* 56 (1): 81–103.

Powers, Devon, and D.M. Greenwell. 2017. "Branded fitness: Exercise and promotional culture." *Journal of Consumer Culture* 17 (3): 523–541. https://doi.org/https://doi.org/10.1177/1469540515623606.

Rehak, Bob. 2011. "Computer-generated imagery." *Cinema and Media Studies*. https://doi.org/10.1093/OBO/9780199791286-0068.

Reinikainen, Hanna, Teck Ming Tan, Vilma Luoma-aho, and Jari Salo. 2021. "Making and breaking relationships on social media: The impacts of brand and influencer betrayals."

Technological Forecasting and Social Change 171: 120990. https://doi.org/https://doi.org/10.1016/j.techfore.2021.120990.

Robinson, Ben. 2020. "Towards an ontology and ethics of virtual influencers." *Australasian Journal of Information Systems* 24. https://doi.org/https://doi.org/10.3127/ajis.v24i0.2807.

Sands, Sean, Colin L. Campbell, Kirk Plangger, and Carla Ferraro. 2022. "Unreal influence: leveraging AI in influencer marketing." *European Journal of Marketing* 56 (6): 1721–1747.

Santiago, Joanna Krywalski, and Inês Moreira Castelo. 2020. "Digital influencers: An exploratory study of influencer marketing campaign process on Instagram." *Online Journal of Applied Knowledge Management (OJAKM)* 8 (2): 31–52. https://doi.org/https://doi.org/10.36965/OJAKM.2020.8(2)31-52.

Santora, Jacinda. 2022. "Key influencer marketing statistics you need to know for 2022." *Influencer MarketingHub.* Accessed July 18, 2022. https://influencermarketinghub.com/influencer-marketing-statistics/.

Silva, Emmanuel Sirimal, and Francesca Bonetti. 2021. "Digital humans in fashion: Will consumers interact?" *Journal of Retailing and Consumer Services* 60: 102430.

Silva, Marianny Jessica de Brito, Salomão Alencar de Farias, Michelle Kovacs Grigg, and Maria de Lourdes de Azevedo Barbosa. 2020. "Online engagement and the role of digital influencers in product endorsement on Instagram." *Journal of Relationship Marketing* 19 (2): 133–163. https://doi.org/https://doi.org/10.1080/15332667.2019.1664872.

Sturman, David J. 1994. "A brief history of motion capture for computer character animation." *SIGGRAPH94, Course9.*

Thomas, Veronica L., and Kendra Fowler. 2021. "Close encounters of the AI kind: Use of AI influencers as Brand endorsers." *Journal of Advertising* 50 (1): 11–25.

Till, Brian D., and Michael Busler. 2000. "The match-up hypothesis: Physical attractiveness, expertise, and the role of fit on brand attitude, purchase intent and brand beliefs." *Journal of Advertising* 29 (3): 1–13. https://doi.org/https://doi.org/10.1080/00913367.2000.10673613.

Time staff. 2017. "The 25 most influential people on the internet." *Time Magazine*. Accessed January 29, 2023. https://time.com/4815217/most-influential-people-internet/.

Torres, Pedro, Mário Augusto, and Marta Matos. 2019. "Antecedents and outcomes of digital influencer endorsement: An exploratory study." *Psychology & Marketing* 36 (12): 1267–1276.

Uzunoğlu, Ebru, and Sema Misci Kip. 2014. "Brand communication through digital influencers: Leveraging blogger engagement." *International Journal of Information Management* 34 (5): 592–602. https://doi.org/https://doi.org/10.1016/j.ijinfomgt.2014.04.007.

VirtualHumans. 2020. "5 notable virtual influencer + brand partnerships." Accessed July 16, 2022. www.virtualhumans.org/article/5-notable-virtual-influencer-brand-partnerships.

VirtualHumans. 2021a. "Prada creates virtual muse named candy." Accessed July 17, 2022. www.virtualhumans.org/article/prada-creates-first-virtual-muse-candy.

VirtualHumans. 2021b. "Welcoming 27 newfound virtual influencers to VirtualHumans.org." www.virtualhumans.org/article/welcoming-29-newfound-virtual-influencers-to-virtualhumans-org.

VirtualHumans. 2021c. "What's the difference between virtual influencers, VTubers, artificial intelligence, avatars, and more?". Accessed July 16, 2022. www.virtualhumans.org/article/whats-the-difference-between-virtual-influencers-vtubers-artificial-intelligence-avatars.

VirtualHumans. n.d. "Welcoming 27 newfound virtual influencers to VirtualHimans.org." *Virtual influencers*. www.virtualhumans.org/#influencers.

Von der Pütten, Astrid M., Nicole C. Krämer, Jonathan Gratch, and Sin-Hwa Kang. 2010. "'It doesn't matter what you are!' Explaining social effects of agents and avatars." *Computers in Human Behavior* 26(6): 1641–1650. https://doi.org/10.1016/j.chb.2010.06.012.

Westerlund, Mika. 2019. "The emergence of deepfake technology: A review." *Technology Innovation Management Review* 9 (11). https://timreview.ca/article/1282.

Zhu, Shuaiyin, Pik Yin Mok, and Tsz-Ho Kwok. 2013. "An efficient human model customization method based on orthogonal-view monocular photos." *Computer-Aided Design* 45 (11): 1314–1332. https://doi.org/https://doi.org/10.1016/j.cad.2013.06.001.

Zhu, Wenmin, Xiumin Fan, and Yanxin Zhang. 2019. "Applications and research trends of digital human models in the manufacturing industry." *Virtual Reality & Intelligent Hardware* 1 (6): 558–579. https://doi.org/10.1016/j.vrih.2019.09.005.

View publication stats