Exploring the Power of Human-AI Collaboration: The Role of Perceived Mind and Expertise in Generative Fashion Design

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Introduction: Generative AI, a type of AI that produces new content based on a set of input data and parameters (Murphy, 2022), is transforming the fashion industry by enabling a generative design process. Through the generative design process, designers can explore design possibilities or optimizations and generate new designs with enhanced efficiency. For example, fashion brands such as Acne Studios, Greedilous, and Levi's showcased their products designed through AI-powered design processes. However, theoretical understanding is not yet sufficient despite a few pioneering studies exploring how consumers perceive AI-designed products. Building on mind perception theory, this study examines (a) how consumers perceive AI and humans and (b) how such perception affects the evaluations of the brand offering products designed through generative design with varying levels of human elements.

Literature Review & Hypotheses: Mind perception theory explains that people ascribe minds to other entities–including humans and non-humans–and consider the contents of the minds along with *experience* and *agency* (Gray et al., 2007). *Experience* is the perceived mental capability to feel and sense pain, pleasure, pride, and emotions (Epley & Waytz, 2010). On the other hand, *agency* is the perceived intentional capacity to act, plan, and exert self-control.

Human work, such as data imputation and design output selection, is inevitable in AI-powered design processes in nature. This may yield varying levels of human elements incorporated into the generative fashion design: AI (low), humanized AI designers (mid-level), human-AI collaboration (high), and humans (highest; human work only). The literature suggests humans are perceived to have high experience and agency, whereas machines or robots are perceived to have low experience and moderate agency. In this vein, consumers will perceive the highest experience (H1a) and agency (H1b) from human designers, followed by entities working for human-AI collaboration, humanized AI designers, and AI. Given that both experiential ability and analytical thinking are emphasized as critical qualifications for expert designers (Lawson & Dorst, 2013), mind perception of experience (H2a) and agency (H2b) will be positively associated with perceived design expertise. Furthermore, perceived design expertise affects the persuasion of designers' work and brand evaluation (Ratneshwar & Chaiken, 1991; Xu & Mehta, 2022). Therefore, perceived design expertise will be positively associated with brand attitude (H3) and will mediate the relationship between perceived experience (H4a) and agency (H4b) and brand attitude. Lastly, this study posits the moderating effect of fashion involvement. Fashion involvement includes one's awareness and understanding of fashion. It is highly interrelated with increased value judgments, enthusiasm, consciousness, and participation

in fashion purchase decisions (Hewei, 2022; Zaichkowsky, 1994). Hence, fashion involvement is expected to strengthen the positive effect of perceived design expertise on brand attitude (H5).

Methods & Results: A four-level (design process: AI vs. humanized AI designer vs. human-AI collaboration vs. human) between-subject experiment was conducted. 289 adults living in the U.S. were recruited (Prolific; M_{age}=35.73, SD_{age}=12.42, 41.87% female). The design process was manipulated using a sweater image and descriptions which were created with a generative AI platform Midjourney and tested through two pretests. Participants were randomly assigned to one condition, viewed a product image and descriptions, and completed the questionnaire. The multi-item scales were adopted from the existing literature to measure the variables (α>.91). Perceived human intervention in the design process was measured for manipulation check.

Perceived human intervention between the conditions was different (F=32.04, p<.001, η^2_p=.25), which was the highest in the human condition but the lowest in the AI or humanized AI designer condition. MANOVA and Structural Equation Modeling were performed to test the hypotheses. Exploratory factor analysis with principal component analysis and direct oblimin methods was conducted. The factors with loadings greater than .40 and eigenvalue greater than 1 were retained, resulting in 5 factors accounting for 86.62% of the total variance. A measurement model with maximum likelihood estimation showed an acceptable measurement model fit (χ^2=1116.11, df=575; χ^2/df=1.94; CFI=.97; NNFI=.96; RMSEA=.06; SRMR=.04). Convergent validity was supported as the composite reliability was greater than .89 for all constructs, and all item loadings were significant (p<.001; 11.06<t<49.99). The variance extracted for all constructs was greater than .62. Discriminant validity was also tested by comparing variance extracted estimates with the squared correlations.

The effects of the design process were significant on perceived experience (F=377.13, p<.001, η^2_p=.80) and agency (F=86.16, p<.001, η^2_p=.48). Post-hoc tests showed that perceived experience was the highest in the human condition (M=6.72), followed by human-AI collaboration (M=2.84),

humanized AI designer (M=1.62), and AI (M=1.49) conditions. In contrast, perceived agency was the highest in the human condition (M=6.60), followed by human-AI collaboration (M=3.96), AI (M=3.60), and humanized AI designer (M=3.32) conditions. Thus, H1a was supported but not H1b. Next, the structural model was estimated to test H2-H5. The model fit was adequate (χ^2=616.02, df=236; χ^2/df=2.61; CFI=.97; NNFI=.96; RMSEA=.07; SRMR=.06). Unlike perceived experience (p=.683), perceived agency was positively associated with perceived design expertise (β=.54, p<.001). Perceived design expertise was positively associated with brand attitude (β=.58, p<.001). Thus, H2a was rejected while H2b and H3 were supported. The fashion involvement × perceived design expertise interaction had a significant positive effect on brand attitude (β=.14, p=.006), indicating fashion involvement strengthens the positive effect
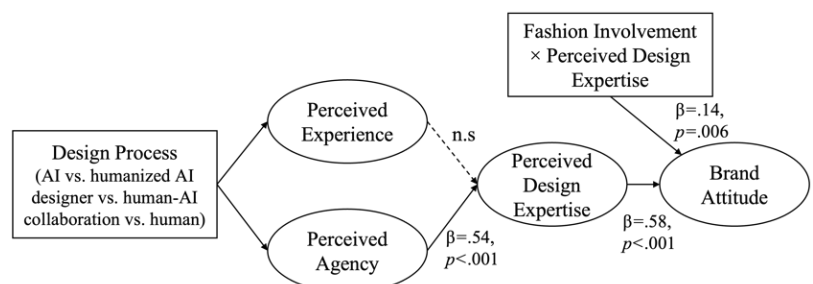
of perceived design expertise on brand attitude. Thus, H5 was supported. To test the mediation, the hypothesized model was compared to an alternative model where direct paths from perceived experience and agency to brand attitude were added. The χ^2-difference test did not show significant difference between the two models ($\Delta\chi^2$=3.48, p=.176), indicating full mediation of perceived design expertise between perceived agency and brand attitude. Thus, H4a was not supported while H4b was supported.

Conclusion: The findings help understand consumer evaluations of fashion products designed through generative design through the lens of mind perception theory. Embracing human-AI collaborative values into the generative design is helpful in enhancing perceived experience and agency, while humanizing AI designers versus not does not lead to significant differences in perceived experience and agency. Especially, the findings confirm the critical role of perceived agency in contributing to brand attitude via perceived design expertise, which is amplified for consumers with higher fashion involvement. Fashion brands who aim to utilize generative fashion design are recommended to focus on developing and emphasizing meaningful human intervention in human-AI collaboration and its impact on creating intentional fashion design with improved design expertise. It will be worthwhile for future research to replicate this study with various products, for example, for which perceived experience may be much valued.

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