Consumers' Adoption of Fashion Robot Advisers: A Joint-Network Analysis

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Background: The rise of artificially intelligent (AI) robots has already created considerable disruption in the labor markets for the manufacturing and service industries. This disruption has made fashion supply-chain processes become more capital intensive (Stock & Nguyen, 2019). We use the term "fashion robot advisor (FRA)" as a label for a robot with AI that has big-data knowledge on fashion and consumer behavior. This knowledge allows the FRA to provide compelling high-tech shopping experiences and personalized customer service to trigger engagement in fashion retail stores (Lin et al., 2016). Due to a lack of understanding about robots, consumers face some challenges when using FRAs such as infringement of privacy, distrust, and unfamiliar appearance as well as system malfunctions. These challenges raise the potentially difficult issue of users' adoption of FRAs (Stock & Nguyen, 2019). Therefore, through personal interviews and a focus group, this study identifies a set of 14 attributes that lead to the use or nonuse of FRAs. Using psychological network analyses (Epskamp & Fried, 2018), we then (1) examine the relation and connectivity between the perceived characteristics of FRAs (knowledgeableness, social intelligence, humanlikeness, attractiveness, dependability, collaborativeness, usefulness, and ease of use) and the attributes of consumers (anxiety toward robots, negative social influence, technological self- efficacy, consumer innovativeness, desire for control, and perceived risk) and (2) investigate the network differences between the two consumer groups who possess these attributes that lead to the use or nonuse of FRAs.

Theoretical framework: This study is grounded on Krämer et al.'s (2012) Theory of Human-Robot Interactions (HRI). According to their theoretical proposition, relationship building and communicative behavior in human-to-human interaction will actually take place in HRI when humans perceive that robots are sufficiently social. However, Krämer et al. (2012) also explain that the level of attachment to any robot is dependent on the perceived benefits for the user. Therefore, the HRI can explain how both the characteristics of FRAs and the psychological attributes of consumers can influence users' adoption of FRAs.

Methods and analytic strategies: The study uses four methodological strategies: (1) incorporating a focus group and personal interviews, (2) checking the survey items and selecting the video clip with two pretests, (3) using a presentation method of a video clip stimuli of FRAs, and (4) collecting empirical data for the psychological joint-network analyses. The data were collected through an online survey that used consumer panelists from a market research agency, and 464 responses were retained for the network analyses. Among these 122 individuals had negative adoption (no to use of FRAs), and 342 had positive adoption of FRAs (yes to use of FRAs). The respondents' gender was fairly evenly distributed (51.7 % were female) and their mean age was 42.5. To examine the relations between the perceived characteristics of FRAs and the attributes of consumers, we ran network analyses using R statistical software. To jointly estimate the networks for negative and positive adoption, we used the Fused Graphical Lasso (FGL) with information criterion.

Results: We performed a confirmatory factor analysis (CFA) to evaluate the construct validities. All factor loadings were greater than 0.50 with a range of 0.55 to 0.93. *Figure 1* shows the jointly estimated networks for the two groups. For both groups, the edge-weight between anxiety toward robots (C1) and negative social influence (C2), between knowledgeableness (R1) and social intelligence (R2), and between humanlikeness (R3) and attractiveness (R4) were significantly stronger than all other edge-weights. In the negative adoption group, the edge-weight between usefulness (R7) and innovativeness (C4) shows a negative correlation between these two variables. In the positive adoption group, the edge-weight between technological self-efficacy (C3) and desire for control (C5) was significantly stronger than all others. *Figure 2* presents the centrality plot of strength. It indicates that social intelligence (R2) and humanlikeness (R3) had the highest strengths across the two groups. Furthermore, perceived risk (C6) in the negative group and desire for control (C5) in the positive group had significantly lower strengths than the 13 other attributes in each centrality plot.

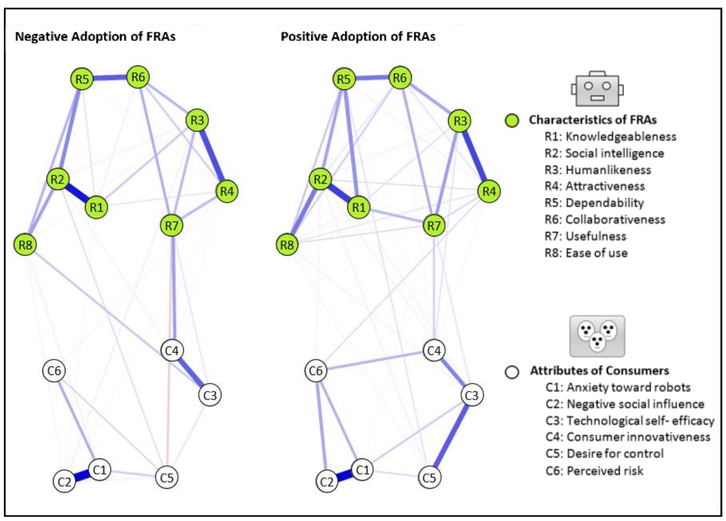

Figure 1. Joint-networks of adoption of FRAs

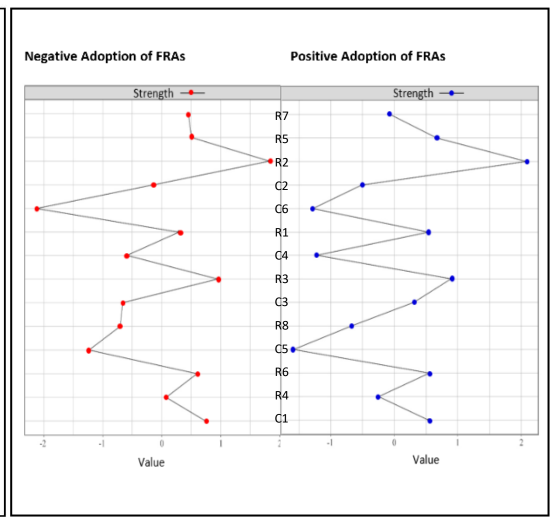

Figure 2. Node strength centrality

Predictability (R^2) was 0.57 in the negative group and 0.68 in the positive group. In both networks, social intelligence (R2), knowledgeableness (R1), dependability (R5), and humanlikeness (R3) had high predictability (R^2 : 0.89 to 0.74) whereas perceived risk (C6) had low predictability (R^2: 0.14 to 0.42). The results of the network comparison test indicated that the two network structures were significantly different (M = 0.35, $p < 0.05$). Further, the edge strength between technological self-efficacy (C3) and desire for control (C5) in the positive group was significantly stronger than the one in the negative subpopulation (E = 0.12, $p < 0.05$).

Conclusion/Implication: The findings show that consumers with high technological self-efficacy and with a low desire for control are likely to use FRAs, and the link between these two characteristics is significantly stronger than the link for consumers who tend to refuse to use FRAs. Thus, educating them on how to use FRAs in their shopping, reducing anxiety about the method of instructional delivery, and encouraging consumers to use the robot technology are critical factors in increasing the willingness to using FRAs. The study also calls attention to FRAs' social intelligence and appearance when designing service robots. After all, the better social cues and humanlike appearance of FRAs will likely increase the interactions with consumers. This study contributes to the literature on the HRI and to the human-computer interaction that involves robots or AI, particularly in fashion retail sectors. Furthermore, this study provides a new graphical approach of joint-networks that conceptualize consumers' technology adoption as a complex interplay of psychological attributes.

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