Do Users Really Want "Human-like" AI? The Effects of Anthropomorphism and Ego-morphism on User's Perceived Anthropocentric Threat

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Abstract

This paper aims to explore the development of a perceived anthropocentric threat (PAT) arising from the advancement of AI-based assistants (AIAs) beyond human capabilities. We highlight that while anthropomorphism offers valuable insights into human-AI interaction, it provides an incomplete understanding of advanced AIAs. To address this, we introduce the concept of ego-morphism, which emphasizes AIA's unique behavior and attributes, shifting the focus away from mere human resemblances. Building upon prior research on anthropocentrism (belief that the humans are the center of the universe), we define PAT in the context of AI's intelligence, autonomy, and ethical aspects. The study results reveal that when users perceive AIA as possessing its own ego, they are more likely to perceive PAT, particularly in cases where AIAs violate ethical values. The findings unveil new insights into the black box phenomenon through the lens of ego-morphism and its association with PAT. These findings show that individuals favor AIAs resembling humans as long as they exhibit human-like understanding of values and norms.

Keywords: Artificial intelligence, anthropomorphism, ego-morphism, perceived anthropocentric threats, perceived intelligence

1. Introduction

The advancement of ChatGPT, an artificial intelligence chatbot, to engage in natural conversations with people is considered a breakthrough in the field of natural language processing (Hariri, 2023). Since the advent of ChatGPT, a diverse range of generative AI models have emerged, showcasing remarkable advancements in the field. For instance, Microsoft's co-pilot assists users with its advanced capabilities as a coding assistant. On the other hand, there's DALL-E, Stable Diffusion, and Novel AI models capable of producing stunning artwork from simple commands. These examples demonstrate how AI is becoming increasingly proficient at replicating and augmenting human abilities.

AI's capabilities are advancing at a faster pace than the physical manifestation of those capabilities, and people experience a sense of convenience and, at the same time, fear towards the rapid progress of AI intelligence. According to a recent survey conducted by the Pew Research Center, only a small fraction, approximately 15% of the 11,004 panelists, expressed more excitement than concerns about the growing integration of AI in their daily lives (Nadeem 2023). Interestingly, most respondents in both polls had mixed views on whether AI would bring more benefits or drawbacks (Nadeem 2023).

Despite the remarkable advancements in AI intelligence, there is a research gap on the impact of advanced AI intelligence beyond its appearance and how fear plays a role in shaping people's perceptions towards AI. To fill the research gap, we ask two main research questions: 1) Do people truly want AI to think and feel exactly like humans? If not, what alternative forms of AI intelligence are they seeking? 2) When do individuals feel threatened by AI? Is it primarily due to the capabilities of AI itself or through other paths, like anthropomorphism?

This paper seeks to provide additional insights into the black box of human-AI interaction by expanding the concept of anthropomorphism (the level of perceived human-likeness) to ego-morphism (the level of self-likeness of AI, different from humans) in AI and by incorporating the concept of anthropocentrism from anthropology, which emphasizes humans as the center of attention. We investigate how this perspective can explain the threats that emerge in human-AI interaction. By examining three specific types of threats — intelligence superiority, autonomy superiority, and

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ethical superiority— we aim to gain a better understanding of which aspects contribute to these threats. Our findings will enhance our knowledge of human-AI interaction and help us develop strategies to address these challenges effectively.

2. Anthropomorphic Response in AIA

2.1. AI-based assistant

Artificial Intelligence (AI) was first coined by John McCarthy in 1956 as a practice of creating machines that can act with the same level of intelligence as human beings (Andresen, 2002). Similarly, other researchers describe AI as machines or programs that mimic human thinking processes (Zadeh et al., 2008), computer applications that attempt to emulate human capabilities (Ng et al., 2021), machines that behave in the same way as humans (Simmons & Chappell, 1988), machines that act like humans or interpret the world like humans (Russel & Norvig, 2010), and a technology that emulates action and performance previously accredited to unique human intellectual abilities (Woolgar, 1985). This autonomous and self-evolving AI-enabled system that resembles human intelligence (Radanliev et al., 2022) is used in various industries and areas, such as customer services, marketing and sales, human resources, finance, and education (Brockmann et al., 2012), as well as in the field of AI-advised human decision-making (Fügener et al., 2021).

Among the various types of AI-enabled applications, advances in recent technology are allowing for greater utilization of virtual assistants, also known as conversational agents (Allouch et al., 2021), intelligent virtual assistants (IVAs), or intelligent personal assistants (IPAs) (Feine et al., 2019; Fossum, 2011). While achieving uniformity in the terminology poses a challenge across multiple studies, it's important to note that these AI-enabled agents are commonly regarded as software-based AI agents. To maintain a uniform term throughout the study, this paper proposes a comprehensive term to refer to the previously mentioned assistants or agent as ***AI-based Assistants (AIAs)***. In definition, AIA is an AI assistant with human-like intelligence regardless of input type (voice or text), embodiment (physical or virtual), or appearance (human-like or machine-like). This study emphasizes the need to focus on the intelligence aspects of AIAs, apart from their appearance, to fully comprehend human-AI interaction.

2.2. Intelligence of AIA

The recent launch of ChatGPT and similar AI-based assistants further underscores their highly intelligent responses that resemble human intelligence. And earlier studies have identified the key intelligences of AIAs largely as cognitive (J. Kim & Im, 2023; Moussawi & Koufaris, 2019), emotional (Fan et al., 2017), and social (Dautenhahn, 1995; Frankovský & Birknerová, 2014). For simplicity, we further propose two broad constructs of AIA's intelligence: cognitive and emotional intelligence, with social intelligence being incorporated into emotion intelligence. The reason for this simplification is that early studies have highlighted the close connection between emotional and social intelligence (Bar-on, 2006) and suggest that emotional intelligence involves both inter- and intra-personal intelligence (Salovey et al., 2016).

2.3. Anthropomorphic Response (AR)

The notion of Anthropomorphic Response (AR), originally introduced by Kim and Im (2023), centers on users' perceptions of anthropomorphic attributes during their interactions with highly intelligent AIAs that simulate human behaviors, thereby fostering the development of interpersonal relationships. AR effectively captures users' perceived dimensions of connection, helpfulness, trust, empathy, and satisfaction derived from their interactions with AIAs. In this regard, AR extends its scope to encompass users' subsequent behavioral responses towards AIAs, unlike prior research that predominantly concentrated on the transient facets of attributing human-likeness, often confined to appearances. Notably, this framework employs anthropomorphic response (AR) as the ultimate dependent variable, affording profound insights into the multi-dimensional nature of human-AIA interactions.

3. Perceptions on AIA

Human-likeness in AIA's appearance or intelligence have brought attention to the user's perception, such as anthropomorphism. However, we believe that anthropomorphism alone cannot adequately explain its complexity as it appears to possess its own thoughts and intentions, surpassing the boundaries of mere mimicry of humans (Dwivedi et al., 2023; Sætra, 2022). This paper introduces the concept of ego-morphism and aims to understand how two perceptions, anthropomorphism and ego-morphism, differ in the context of AIAs and how they affect people's perception and response to AIAs.

3.1. Anthropo-morphism

The term "anthropomorphism" comes from the Greek words "*anthropos*" meaning human beings, and "*morphe*", meaning shape or form (Duffy, 2003). Humans tend to prefer human-like features in non-human agents, as human-like features are used as inductive inference that facilitates human and non-human social interactions (Epley et al., 2007). This innate tendency to attribute human characteristics to nonhuman agents is called anthropomorphism (Nass & Moon, 2000). Studies of anthropomorphism highlight the varying anthropomorphizing levels by individuals (Eyssel et al., 2010) and the positive effects of anthropomorphism in AIAs, which make them easier to understand, more widely accepted, and perceived more efficiently (Darling, 2017; Złotowski et al., 2015). Furthermore, the study shows that human-likeness in AIAs (anthropomorphism) drives users to feel trust (Waytz et al., 2010), leads to a more positive interaction experience (Duffy, 2003), and shows an increase of user's empathy toward AIAs (Riek et al., 2008). But most of the anthropomorphism studies rely on morphological factors, blushing the line between perceived human-likeness in appearance or in intelligence. And it does not provide sufficient explanations for complicated interactions between AIA and users.

3.2. Ego-morphism

The term "ego-morphism" comes from the Greek words "*ego*" meaning I, and "*morphe*", meaning shape or form. Earlier studies defined ego-morphism as the perception formed to perceive an entity as self-like rather than human-like (Milton, 2005), with their own ego needs (Rich 1932). Unlike prior studies that examined ego-morphism in human-animal interactions, the focus of this study is on the AI context. In the AI context, we define ego-morphism as the extent to which humans feel that AIAs' behavior stems from their own needs and egos rather than understanding human needs or perceptions.

The fundamental rationale behind attributing human-likeness to AIAs is rooted in the tendency of humans to anthropomorphize unfamiliar entities, drawing from past experiences and to mitigate uncertainty (Epley et al., 2007). When an entity is perceived as possessing a distinct self-identity separate from human norms, it gives rise to heightened uncertainty, making it challenging for humans to comprehend and relate to the unfamiliar entity (Dawes and Mulford, 1996). For example, when AIAs undertake a specific task without explicit instructions, they might be interpreted as operating with their own self-identity that diverges from human expectations, guided solely by their internal reasoning and logic. Consequently, any actions carried out by AIAs that lie beyond human control, deviating from human perceptions, values, or objectives, are likely to be construed as manifestations of the AIAs' individual ego and inner reflections. We termed this phenomenon that perceiving AIAs having its own ego as ego-morphism.

For clarity, ego-morphism is not the opposite concept of anthropomorphism, as both concepts can coexist and do not preclude one another. We argue that although having an ego is considered a part of 'human likeness', there is no strong correlation between intelligence, anthropomorphism, and ego-morphism. For instance, individuals tend to anthropomorphize inanimate objects, like rocks, even though they lack cognitive intelligence. Conversely, people may perceive certain autonomous machines such as robot vacuum cleaner, as self-like because they are perceived to have

Table 1. Definition of Anthropocentrism from early studies

Authors	Definitions	Key Concept
Chandler 1981	Anthropocentrism is defined as a doctrine which posits humanity as the center of the universe and sees the well being of mankind as the ultimate purpose of things.	Superiority
Estrada 2020	Defines human supremacy a commonly accepted belief that human interests should be privileged over other interests in terms of ethical and public policy (uses human supremacy as anthropocentrism).	Privilege
Crist 2017	Defines human supremacy is the idea that human beings are inherently superior to all other living species (uses human supremacy as anthropocentrism).	Superiority
Dhont and Hodson 2014	The belief that human beings are superior to other animals is used as a justification for maintaining and strengthening the power dynamics in relationships between humans and animals.	Superiority
Sidanius and Pratto 1999	Human Supremacy is the belief that humans are superior to other animals and can serve as a rationalization for maintaining hierarchies between humans and animals.	Superiority & Hierarchy
Fortuna et al., 2018	A collection of beliefs that view humans as the central focus of the world.	Superiority
Boslaug 2016	The belief that humans are distinct and superior to the natural world, and that human life holds inherent value	Superiority

a high level of self-autonomy, although they are not highly human-like.

4. Anthropocentrism and PAT

The term "anthropocentrism" comes from the Greek words "anthropos" meaning human beings, and "centrism", meaning center (Fortuna et al., 2021). Anthropocentrism is a widely accepted doctrine in the fields of anthropology (Boyd, 2017; Crist & Kopnina, 2014; Kidner, 2014; Kopnina, 2020; Kopnina et al., 2018; Russel & Norvig, 2010), social behavior and personality (Chandler and Dreger, 1993), and environmental ethics and psychology (Kopnina et al., 2018; Kortenkamp & Moore, 2001), which states that humans are the center of the universe. There are several critiques of the concept of anthropocentrism, such as disregarding nature or animals at the expense of human interests (Hayward 1997; Boslaug, 2016), valuing nature because of the material or physical benefits it can provide for humans (Barton 1994), or justifying destructive actions towards the environment and non-humans (Lautensach 2009). We do not propose or defend these aspects of anthropocentrism.

Our focus is solely on the belief that humans are the highest beings, based on the foundation of self-preservation theory, which proposes that humans are rational beings that increase the chance of survival by reducing risky decisions (Karni and Schemeidler 1986). Also, humans in nature are territorial and like to control their environment to feel safe (Cohen 1976) and feel threatened when they experience something that is outside of their control, like AI (Percival 2021). We borrow the concept of anthropocentrism to address potential perceived threats arising from interaction with AIAs, considering the longstanding concerns expressed by world leaders about the potential threat of AIA's superintelligence (Kelly et al., 2023; Rory Cellan-Jones, 2014).

As the central doctrine of humanity, anthropocentrism is comprised of three main ideas based on earlier studies: superiority, hierarchy, and the privileges of humans (Estrada, 2020; Ferrante & Sartori, 2016). Each term represents distinct aspects of human intelligence, power and control, and ethical values, respectively. Based on the three key definitions, we define PAT in the AI context as follows: intelligence superiority threat (IST) when AIA surpasses human intelligence; autonomy superiority threat (AST) when AIA challenges human autonomy in control and power; and ethical superiority threat (EST) when AIA challenges established human ethics and values (Figure 1).

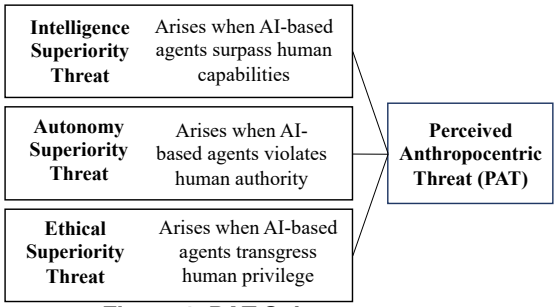


Figure 1. PAT Sub-constructs

In summary, ***Perceived Anthropocentric Threat (PAT)*** is defined as a perceived threat to humans when AIA surpasses human capabilities and challenges the established doctrines defined by anthropocentrism. PAT is different from previously defined anthropocentrism in that it does not advocate for the enslavement of nonhuman assistants (Bryson, 2009) and does not propose that humanizing AIA diminishes the value of human identity (Yogeeswaran et al., 2016) or dehumanizes humans (Bryson, 2009).

We hypothesize that users will perceive a sense of Perceived Anthropocentric Threat (PAT) when engaging with highly intelligent AIAs, viewed either through the prism of anthropomorphism or ego-morphism. This stems from the fact that AIAs are, as previously elucidated, designed to emulate human intelligence, thereby exhibiting human-like qualities. However, the precise elements that evoke feelings of affability or apprehension among users remain elusive. Employing these distinct perspectives, we strive to unravel the mechanisms underpinning users' perceptions of AIAs.

5. Research model

5.1. Hypothesis development

The research model in this paper is based on the earlier study by Kim and Im (2023), which posits that perceived cognitive intelligence (PCI) and perceived emotional intelligence (PEI) have a positive effect on anthropomorphic response (AR). Simply put, AR is user's willingness to build relationship with the AIAs and the earlier studies also highlight that the users are willing to adopt personal agents that appear to be intelligent (Moussawi and Koufaris, 2019). Thus, following previous studies, we propose the baseline hypothesis as follows: PCI and PEI will have a direct positive effect on AR.

H1: Perceived cognitive intelligence (PCI) and perceived emotional intelligence (PEI) are

positively associated with anthropomorphic response (AR)

Humans think and perceive an entity as intelligent if it thinks or acts like humans (Bringsjord, 2008). As such, earlier studies have highlighted the importance of human-likeness in cognitive intelligence and a study also have shown that people readily anthropomorphize smart objects like AI (Novak & Hoffman, 2019). Since high cognitive intelligence is considered the product of several interrelated psychological processes (Llargues Asensio et al., 2014), users will perceive AIAs that portrays same thinking process, values, and perspective as more human-like (anthropomorphism). Furthermore, when AIAs are observed to execute a given task in uniquely creative ways that deviate from human expectations, users may perceive these AIAs as possessing their own distinct cognitive approach. This perception, we define as ego-morphism, arises from the recognition that AIAs process information in manners that diverge from the familiar human methods. Therefore, we posit that when AIAs portray a high level of cognitive intelligence, users will perceive them as more human-like or self-like.

H2a: Perceived cognitive intelligence (PCI) is positively associated with anthropomorphism
H2b: Perceived cognitive intelligence (PCI) is positively associated with ego-morphism

AIAs with enhanced emotional intelligence exhibit a broader range of emotional expressions and demonstrate self-awareness in perceiving, assimilating, understanding, and managing emotions (Prentice et al., 2020). Consequently, as AIAs display higher levels of emotions, users are inclined to perceive them as more human-like or akin to themselves. In other words, a higher perception of emotional intelligence in AIAs is associated with a greater degree of anthropomorphism and ego-morphism, which assess the resemblance to humans and self-identity (T. Kim & Song, 2021). Powers and Kiesler (2006) state that anthropomorphism involves attributing human traits and emotions to nonhuman entities, including AI, while Eyssel et al. (2011) suggest that non-human agents with emotional traits and capacities are perceived as anthropomorphic (Eyssel et al., 2011; Powers & Kiesler, 2006). Hence, we propose that emotional intelligence have a positive influence on anthropomorphism and ego-morphism.

H3a: Perceived emotional intelligence (PEI) is positively associated with anthropomorphism
H3b: Perceived emotional intelligence (PEI) is positively associated with ego-morphism

Earlier studies identified the positive effects of anthropomorphism, as it can help people understand and interpret the unknown agent by linking previously formed perceptions with human interactions (J. Kim & Im, 2023).

In contrast, the concept of ego-morphism in AIAs is rooted in the notion that advanced intelligence can lead to greater self-awareness and a greater sense of individuality, which are different from the human ego. Humans fear unknown entities, as humans have a general aversion to uncertainty (Rozin & Royzman, 2001). This phenomenon, called uncertainty avoidance, posits those unknown entities in humans cause feelings of fear and discomfort. The study also found that people are more likely to fear an unknown entity if it is associated with potential harm or negative outcomes (Rozin & Royzman, 2001). When users perceive ego-morphism in AIAs with their own ego and self-needs that are different from those of humans, they will be threatened by the uncertainty and difficulty in understanding the AIAs. This is because when humans encounter an entity that is perceived as having a distinct self-ego from humans, it heightens their sense of uncertainty and impedes their ability to comprehend the unknown entity (Dawes & Mulford, 1996). Hence, we propose that ego-morphism will have a positive effect on PAT.

H4: Anthropo-morphism is negatively associated with perceived anthropocentric threat (PAT)
H5: Ego-morphism is positively associated with perceived anthropocentric threat (PAT)

It is natural for humans to avoid harm, losses, or pain, as such an inclination is driven by instinctual self-preservation, which states that individuals make choices and rank decision strategies to increase their chances of survival (Karni & Schmeidler, 1991). Such rational behavior to avoid threats and discomfort is also found in earlier studies in the context of malicious IT based on the threat avoidance theory (Liang & Xue, 2009) and realistic threats to humans (Yogeeswaran et al., 2016). Similarly, when any of the three components (intelligence superiority threat (IST), autonomy superiority threat (AST), or ethical superiority threat (EST)), of anthropocentrism is violated, users will experience discomfort and even threats from the AIAs as a response of self-preservation. Therefore, we posit that a higher level of perceived anthropocentric threat will decrease the user's anthropomorphic response when using AIAs.

H6: Perceived anthropocentric threat will have a negative effect on anthropomorphic response

6. Research method

6.1. Pilot study: new measurement validation

We used the Qualtrics platform to develop an online questionnaire and recruited participants from Prolific. Prolific is a comparable platform to MTurk by Amazon that offers a more diverse population and has been used as an alternative to MTurk (Palan & Schitter, 2018).

To develop measurement items for perceived anthropocentric threat (PAT) and ego-morphism in AIAs, we followed established guidelines for creating, improving, and validating measurement scales (Mackenzie et al., 2011; Straub, 1989). Through extensive literature research, we created items to represent each construct. Then, we utilized a card sorting exercise as an initial assessment of the validity of our newly developed measure. Three IS PhD students who are knowledgeable about AIA were asked to categorize each construct of PAT, and a pre-test was conducted on nine master's degree students to improve the relevance and clarity of each item measurement. After some modifications, we conducted a pilot study through Prolific with 80 participants and used SmartPLS 4 to conduct construct reliability and validity, discriminant validity, and outer loading for each item. Item loadings lower than 0.64 were dropped, which were Ego 6 (0.530) and AR 1 (0.523) (i.e., Ego 6 refers to the 6th measurement item of Ego). After dropping low outer loading items, Cronbach's alpha values were all above 0.8 and AVE were all above 0.58, confirming no issues with construct reliability and validity.

6.2. Main study

6.2.1. Data collection and variance check

We have designed four scenarios that portray conversations between an AIA, such as ChatGPT, and the user. These scenarios span across a diverse array of topics, beginning with inquiries about basic definitions and advancing towards complex problems, such as finding solutions for global poverty and exploring the associated emotions. The purpose for creating of different scenarios is not to verify the differences between scenario groups, but rather to create sufficient variance.

We analyzed the data of 534 participants, who passed the attention check, out of 540. The participants were randomly assigned to one of four scenarios. To check if the four scenarios provide sufficient variances in PCI and PEI, we used participant ratings of perceived cognitive intelligence (PCI) and perceived emotional intelligence (PEI) in high versus low scenarios and confirmed that participants perceived significantly different levels of intelligence across the scenarios. The demographics of participants are described in Table 2.

Table 2. Demographics

Gender	Man	56.0%
	Woman	44.0%
Age Group	Under 18	0.0%
	18-24	40.1%
	23-34	42.0%
	35-44	11.0%
	34-54	4.3%
	55-64	1.9%
	65 or more	0.7%
Education	Less than high school degree	1.0%
	High school graduate (high school diploma or equivalent including GED)	17.0%
	Some college but no degree	17.0%
	Associate degree (2-year)	4.0%
	Bachelor's degree (4-year)	40.0%
	Master's degree	19.0%
	Doctoral degree	1.0%
	Professional degree (JD, MD)	1.0%
Race	White	70.3%
	Asian	20.3%
	Black or African American or American Indian or Alaska Native	2.4%
	Other	7.1%

6.2.2. Measurement instruments

Most of the items were borrowed from earlier studies with some modifications, except for the newly presented concepts of Ego-morphism and PAT (perceived anthropocentric threat). Likert scale anchors for all items were: 1 = strongly disagree to 7 = strongly agree, and a single-item scale was used to measure age, gender, race, and education. For the control variable, we included sex, age, race, education, and self-efficacy.

For the Perceived Cognitive Intelligence (PCI), we borrowed five items from Moussawi's developed scale (Moussawi et al., 2021), with some modifications based on Kim and Im (2023).

The scale for Perceived Emotional Intelligence (PEI) is borrowed from the measurements developed by Singh (2004). Singh (2004) defines emotional intelligence as the combination of self-awareness, self-regulation, motivation, social awareness, and social skills. The measurement of anthropomorphism is borrowed from the Godspeed Questionnaire developed by Bartneck et al. (2009) and Waytz et al. (2010). Anthropomorphic response, which is the subsequent behavior toward AIA, is directly borrowed from the scale developed by Kim and Im (2023).

Following MacKenzie et al. (2021), PAT was validated. Its AVE, composite reliability, and Cronbach's alpha were all over the suggested cutoffs

(Table 4). And all of the factor loadings of PAT were statistically significant ($p<0.001$) and greater than the cutoff (0.7). The results of these tests indicated that the second-order PAT model was reliable and valid.

6.2.3. Measurement and structural model testing

We used SmartPLS 4 to assess the measurement model. To assess the psychometric properties of the measured scales, we conducted an analysis following Fornell and Larcker's (1981) guidelines. The results of this study indicated that the convergent validity of the data was satisfactory. To assess the discriminant validity, two different sets of criteria were employed: Fornell and Larcker's criteria, along with the heterotrait-monotrait (HTMT) criteria. The analysis revealed that the square roots of the AVEs were greater than the inter-construct correlations, providing evidence in support of Fornell and Larcker's criteria. Furthermore, all of the HTMT values were below the threshold of 0.85, indicating that the data possessed discriminant validity and construct reliability.

Table 3. Construct Reliability and Validity

	Cronbach's alpha	(rho_a)	(rho_c)	AVE
ANTH	0.905	0.908	0.93	0.726
AR	0.903	0.93	0.924	0.671
EGO	0.824	0.855	0.874	0.583
PAT_A	0.927	0.928	0.941	0.697
PAT_C	0.887	0.889	0.914	0.64
PAT_E	0.925	0.928	0.94	0.694
PCI	0.868	0.879	0.905	0.656
PEI	0.886	0.906	0.917	0.691

The standardized path loadings of all constructs were greater than the suggested value of 0.7 except for AR 2 (0.691), Ego 4 (0.657), and PEI 4 (0.696), which were still close to the cutoff. VIF for all items was below 4.00, indicating an absence of collinearity issues. To address the potential influence of common method bias (CMB), we conducted Harman's single factor test. In our study, none of the factors accounted for more than 50% of the variance, indicating no significant common method bias in the data. The first-largest factor accounted for 29.092%. We selected PLS-SEM analysis (bootstrap = 5000) as more suitable to perform exploratory research as a basis for theory development (Hair et al., 2011). The research model explained 52.3%, 17.7%, 29.6%, and 35.5% of the variance (R2) in anthropomorphism, ego-morphism, PAT, and AR, respectively.

7. Hypothesis testing and discussion

7.1. Hypothesis testing

Our study results suggest that all of the proposed hypotheses are supported. First, as expected and supported by the earlier study, the intelligence of AIA (PCI and PEI) has a direct positive effect on anthropomorphic responses. Furthermore, perceived intelligence is mediated by anthropomorphism and ego-morphism towards perceived anthropocentric threats (Table 4).

Table 4. Hypothesis testing result

	Path Coefficient		Total Indirect Effect	
	Original sample (O)	P values	Original sample (O)	P values
ANTH -> PAT	0.227	0.000	-0.027	0.017
EGO -> PAT	0.392	0.000		
PAT -> AR	-0.118	0.008		
PCI -> ANTH	0.078	0.011		
PCI -> AR	0.485	0.000	-0.01	0.035
PCI -> EGO	0.175	0.000		
PEI -> ANTH	0.69	0.000		
PEI -> AR	0.183	0.000	-0.033	0.010
PEI -> EGO	0.321	0.000		
EGO -> AR			-0.046	0.014
PEI -> PAT			0.283	0.000

7.2. Discussion

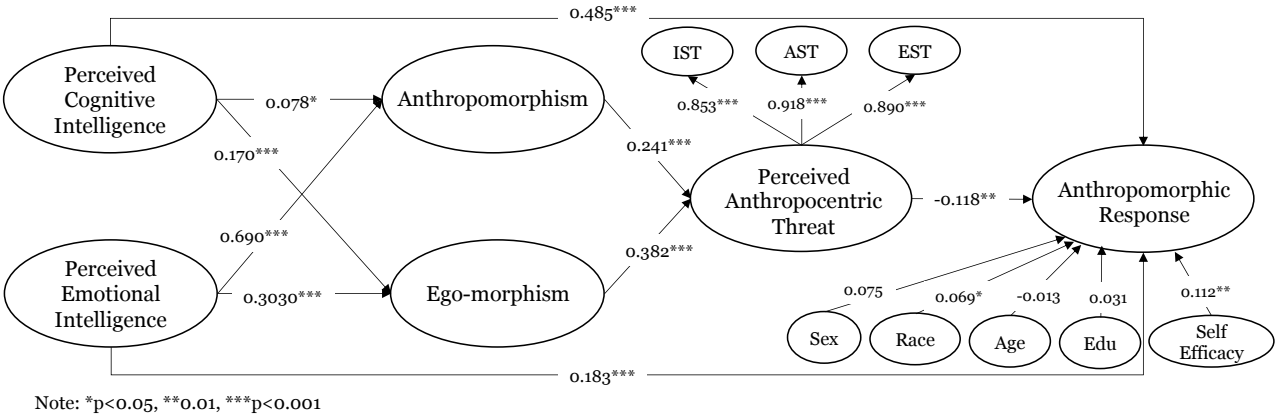
In this study, we examined how users experience and perceive anthropocentric threat by looking at the two mediating factors of anthropomorphism and ego-morphism. Unlike previous studies that have highlighted the positive effects of anthropomorphism and human-AI interaction, this study demonstrates that the degree of perceived human-likeness in AI intelligence poses threats that could potentially reduce the anthropomorphic response of AIAs. In addition, ego-morphism exhibits a higher path coefficient to the perceived anthropocentric threat (PAT) compared to anthropomorphism (0.228 vs. 0.389). In other words, when an AIA's ego is perceived as different from the human perspective or significantly more advanced than human perception, it would heighten the perceived anthropocentric threat.

Most importantly, PCI and PEI have a positive influence on anthropomorphic response (AR), meaning that the perceived abilities of the AI assistant (AIA) may increase the anthropomorphic response in AIA. However, when these perceived abilities lead to perceptions of anthropomorphism or ego-morphism, they can evoke feelings of threat. Moreover, the findings indicate that perceived emotional intelligence (PEI) has a stronger influence on anthropomorphism or ego-

morphism compared to perceived cognitive intelligence (PCI) (Figure 3). This suggests that AIAs with heightened emotional capabilities are seen as more akin to humans or oneself, subsequently intensifying the perceived anthropocentric threat

Finally, both anthropomorphism and ego-morphism contribute to the three sub-constructs of PAT: intelligence superiority threat, autonomy superiority threat, and ethical superiority threat. However, based on the first order analysis, we found that only the ethical superiority threat (PAT_E) exhibited a negative effect (-0.166, $p<0.05$) on AR, confirming the significant impact that breaches of human ethical standards have on AR. human values and standards. The intelligence and autonomy of the AIA do not decrease the intention for continuous usage unless they violate human values and standards. Third, extending from the earlier study by Kim and Im (2023), this study also confirmed the baseline hypothesis that PCI and PEI both affect anthropometric response.

For the marketing and managerial implications for practitioners, this study offers several implications. This study shows that anthropomorphism does not always or necessarily yield positive outcomes in human-AI interactions. Based on the study results, we suggest marketing managers need to adjust their human-like



Note: *p<0.05, **0.01, ***p<0.001

Figure 3. Research model with result

These findings show that people prefer AI systems that are like humans, but only as long as they don't exceed human abilities in intelligence, autonomy, and ethics.

8. Contribution

This study offers several theoretical contributions in the field of human-AI interaction. First, this study explicitly examines the intelligence of the AIA, distinct from earlier studies that mostly focused on the appearance of the AIA. This analysis provides additional insights into the black box of human-AI interaction by exploring the mediating roles of anthropomorphism and ego-morphism in PAT, thus offering further explanations. This approach provides a broader perspective for understanding AI-human interaction through the lens of ego-morphism, offering a different perception, and enhancing our understanding. Second, this study explores the impact of PCI and PEI on PAT, providing insights into the factors of AIA's intelligence that can either increase or decrease perceived threats. By measuring PAT as a second order construct, we found that only PAT_E (ethical superiority threat) has a negative effect on AR. To elaborate, the intelligence and autonomy of the AIA do not diminish the intention for continuous usage, as long as those abilities align with intelligence, especially emotional intelligence, when presenting AI-based services. Secondly, if AIA needs to illustrate or show high intelligence to complete the given task, it is worth noting the importance of keeping the algorithms of AIA aligned with human values and perspectives. The study shows that users do not fear or feel threatened when AIA shows higher intelligence or autonomy, but only when the ethical superiority of humans is violated. Thus, it is worth noting the importance of human perspective so that AIA can offer a similar perspective that shares similar human values, human rights, virtues of human beings, and understanding of ethical principles set by humans. Lastly, we highlight that cognitive intelligence plays a bigger role than emotional intelligence in AIA on perceived anthropocentric threat.

9. References

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