

# The Impact of Anthropomorphization of Kinesics and Appearance on the Technology Acceptance of Embodied Conversational Agents

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Abstract: With the evolution of anthropomorphic Intelligent Agents (IAs), users perceive them beyond inanimate tools. This research examines the impact of anthropomorphic design on technology acceptance, and the mediating roles of trust and empathy. Using A/B testing, participants engaged in online interactions and completed a survey. Findings suggest anthropomorphism elevates acceptance both directly and through trust and empathy in Embodied Conversational Agents (ECAs). Contrary to hypothesis, the Uncanny Valley manifested in a U-shaped pattern. The study emphasizes the significance of non-verbal cues in ECAs in enhancing Technology acceptance

## INTRODUCTION

Intelligent agents with natural language processing are prevalent in customer service but face challenges from unhumanized interactions. Based on the Computer As Social Actors Theory, humans subconsciously apply interpersonal norms to machine interactions. Embodied Conversational Agents (ECAs) can enhance user social presence with anthropomorphic designs. This study explores ECA's kinesics and appearance on user acceptance, mediated by trust and empathy.

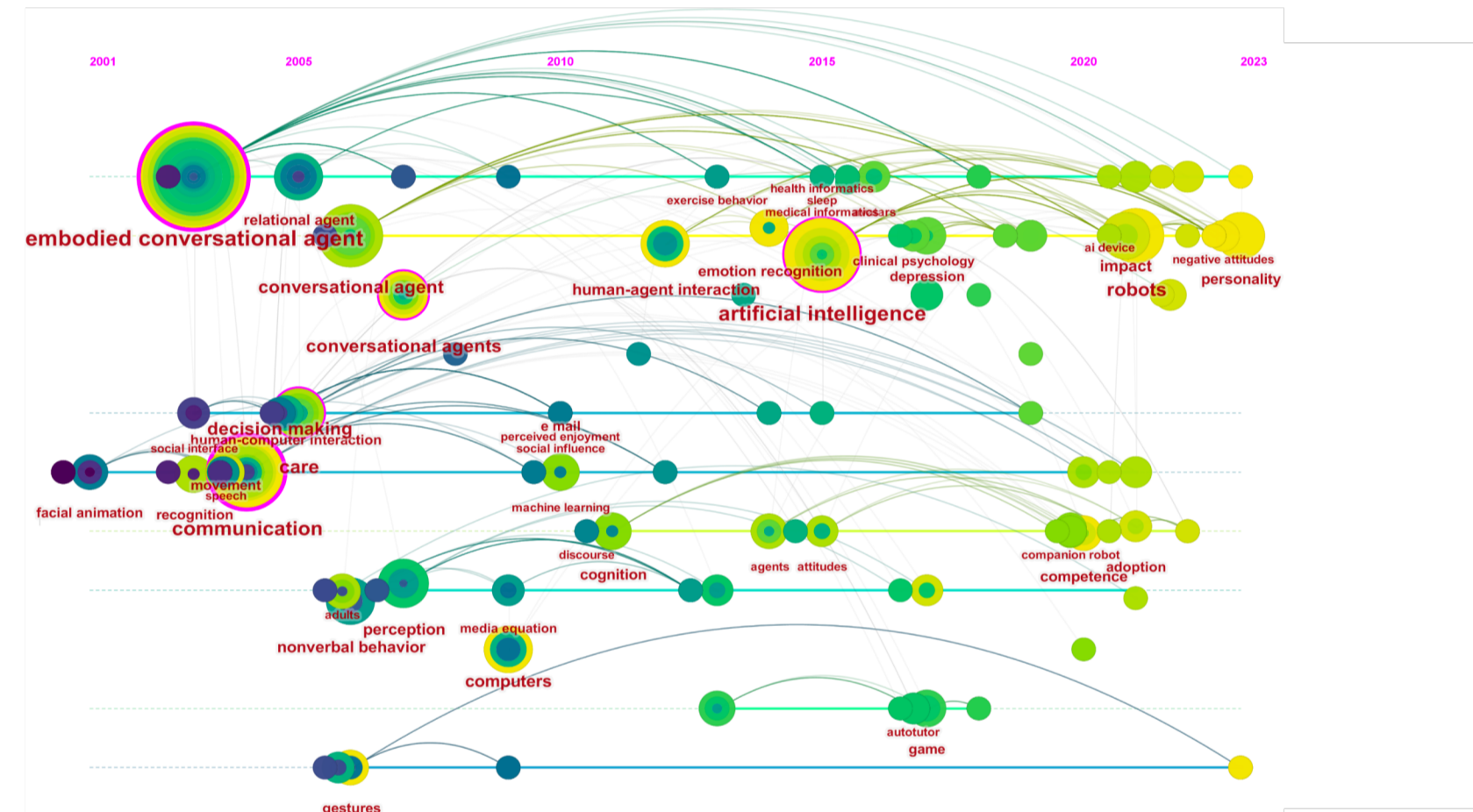
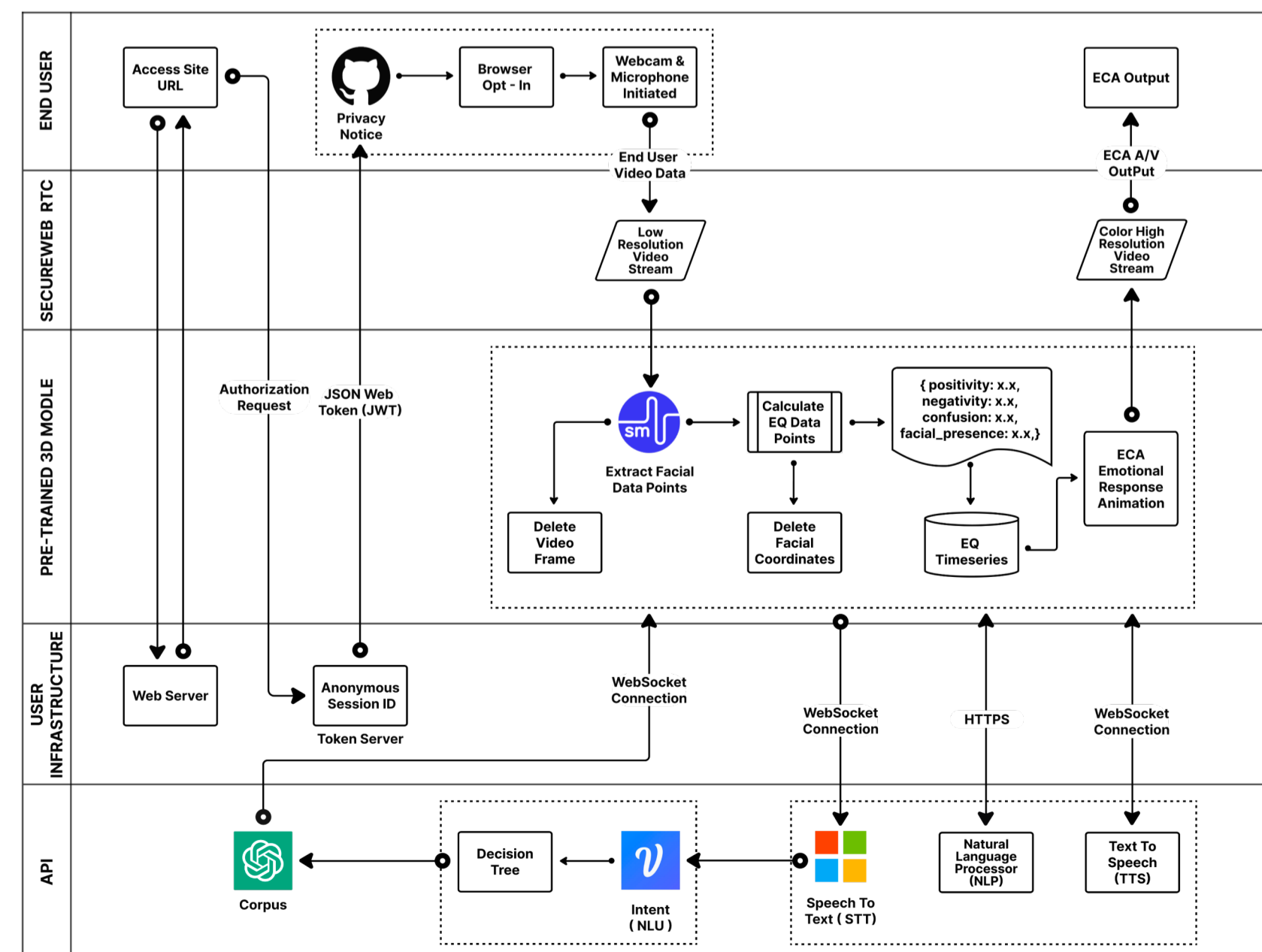


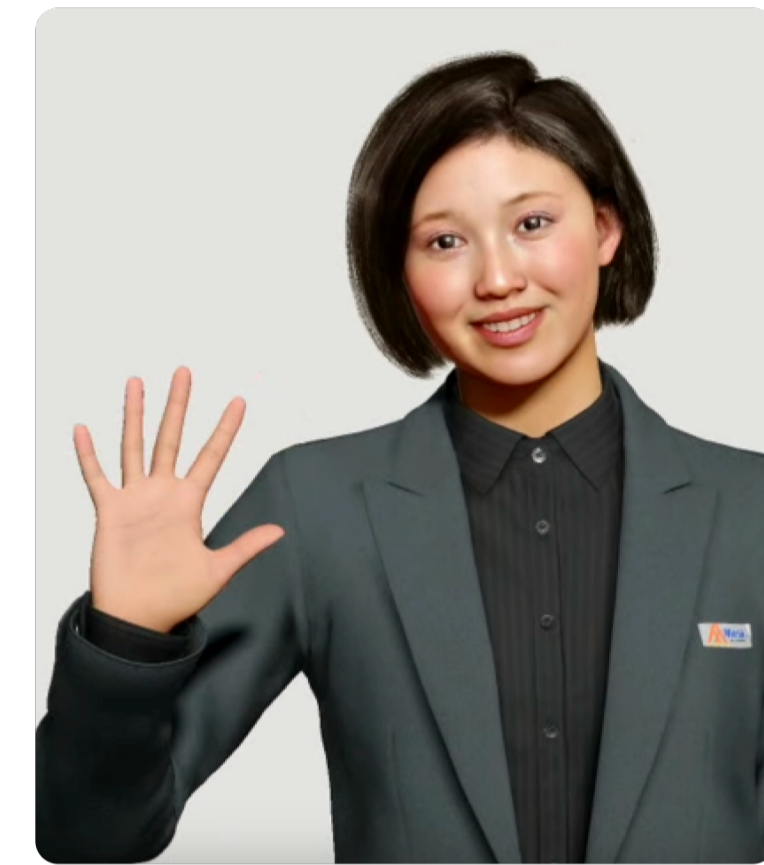
Fig.1: Timeline Keyword Map of ECAs

## TECHNOLOGY ARCHITECTURE

Fig.2: Technical Construction Process of ECAs



## METHODOLOGY



Left: Group A's ECA features anthropomorphic facial expressions and gestures, dressed in expert attire. Group B lacks these anthropomorphic designs. Below: Participant of the online test.

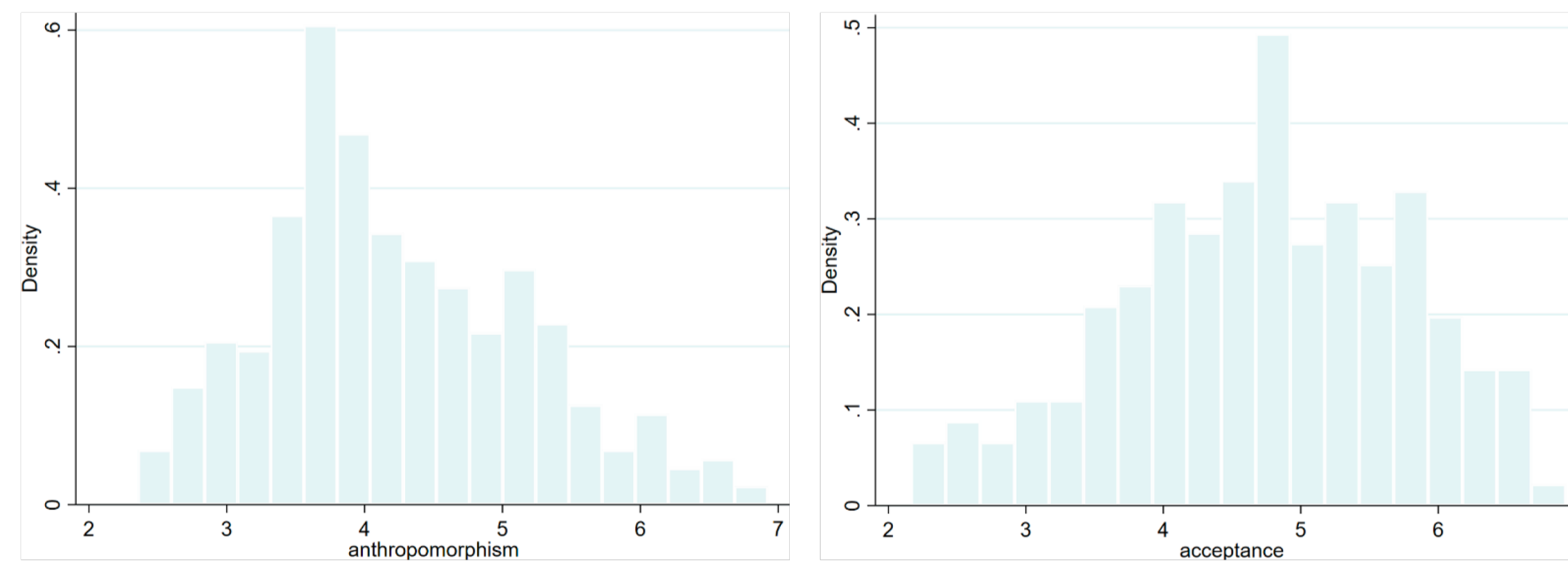


## RESULTS

Variable	Obs	Mean	Std. Dev.	Min	Max
Acceptance	364	4.723	1.037	2.166	6.928
Appearance	364	4.301	1.055	1.856	7.000
Animacy	364	4.169	1.046	1.755	6.849
Anthropomorphism	364	4.234	0.938	2.358	6.923
Technical	364	4.825	1.086	1.742	7.000
Privacy	364	4.611	1.077	1.545	7.000
Trust	364	4.713	0.988	1.779	7.000
Empathy	364	4.501	1.132	1.395	7.000
Lnage	364	3.281	0.157	2.996	3.584
Lninternet	364	3.756	0.500	2.890	4.920
Marriage	364	0.088	0.284	0.000	1.000
Employment	364	0.637	0.481	0.000	1.000
Ecas	364	1.519	0.694	1.000	4.000

After cleaning the survey data for outliers and missing values, this study obtained a total of 364 valid data.

Fig 3: Histogram Distribution of Key Variables



Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acceptance	1.000*							
Appearance	0.508*	1.000						
Animacy	0.610*	0.568*	1.000					
Anthropomorphism	0.640*	0.869*	0.885*	1.000				
Technical	0.545*	0.391*	0.408*	0.418*	1.000			
Privacy	0.512*	0.246*	0.415*	0.356*	0.619*	1.000		
Trust	0.570*	0.346*	0.451*	0.423*	0.894*	0.895*	1.000	
Empathy	0.359*	0.286*	0.506*	0.429*	0.321*	0.382*	0.379*	1.000

Table 2: Correlational Analysis

Table 1: Descriptive Statistics

After regression and mediation effect analyses, it is found that anthropomorphic design(kinesics and appearance) has a significant impact on technology acceptance. Trust(privacy and technology) plays a significant mediating role between anthropomorphism and acceptance, whereas empathy exerts a relatively weaker mediation effect. Despite the initial assumption of an inverted U-shaped relationship (representing the "Unusual Valley" effect), the data shows a direct U-shaped relationship.

Variables	Anthropomorphism	Appearance	Animacy	Acceptance
Anthropomorphism				0.736***
Appearance				0.537***
Animacy				0.613***
Trust	0.475***	0.311***	0.427***	
Privacy trust	0.478***	0.288***	0.453***	
Technical trust	0.471***	0.336***	0.398***	
Empathy	0.595***	0.334***	0.587***	
Acceptance (technical)	0.389***	0.461***	0.406***	
Acceptance (privacy)	0.387***	0.471***	0.389***	
Acceptance (trust)	0.485***	0.571***	0.498***	
Acceptance (empathy)	0.154***	0.277***	0.137**	

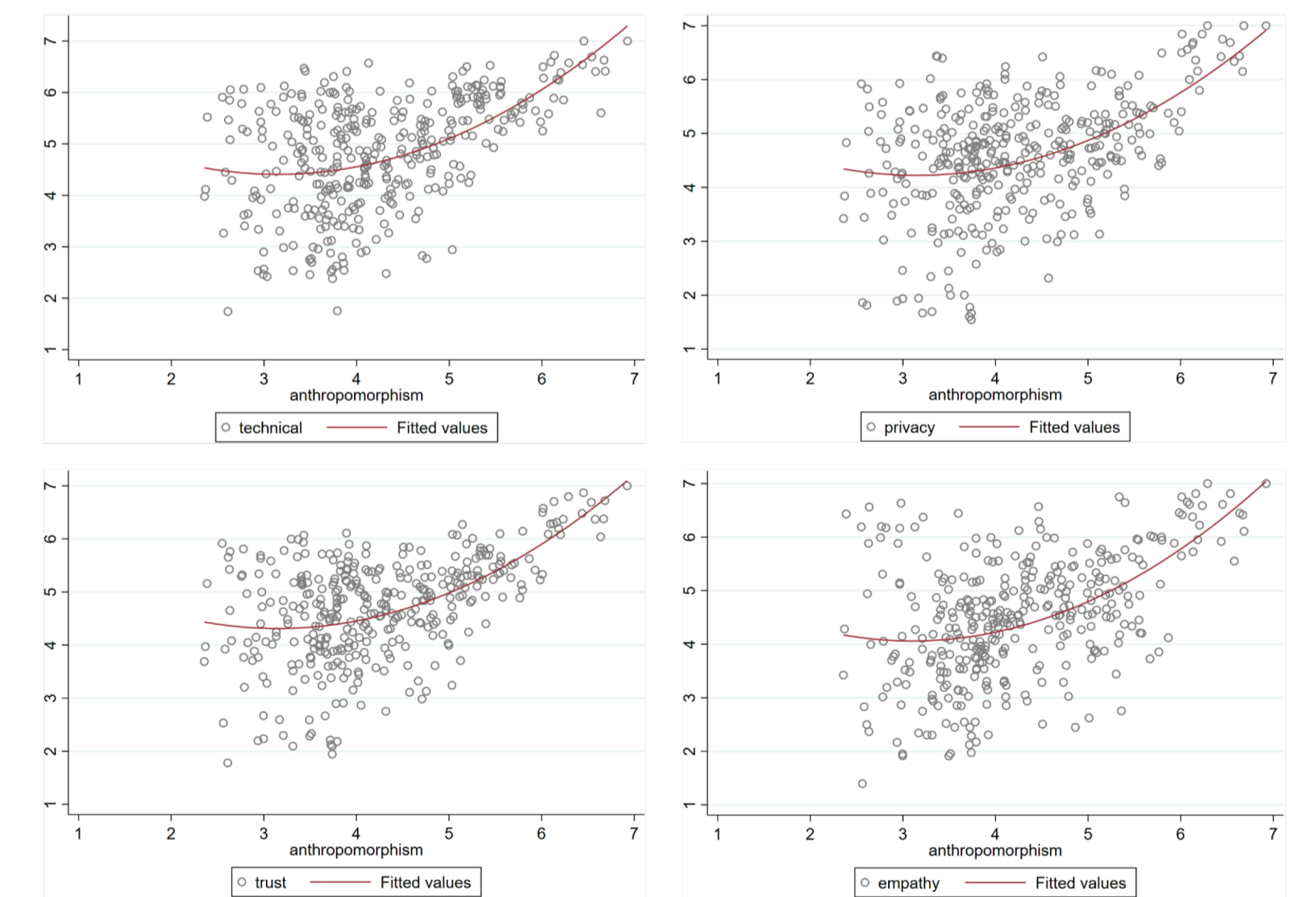


Table3, Fig.4 : Summary of Regression Analysis Results

## CONCLUSION AND FUTURE WORK

This study investigated anthropomorphic design from the dimensions of kinesics and appearance, validating four hypotheses. Hypotheses 1, 3, and 4 were supported, indicating that anthropomorphism can enhance technology acceptance and can also achieve this goal by bolstering trust and empathy in ECAs. This offers insights for the design of customer service ECAs. However, Hypothesis 2 diverges from expectations, possibly because ECAs altered shopping habits, leading to an initial decline, and the anthropomorphism level in the experiment haven't reached the uncanny valley's downturn threshold. Further research is needed in the future.