Exploring Metaphors to Understand Customer Responses to Humanoid Service Robots in Mösta Café Istanbul

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1. Introduction

According to Bogue, 2020 creating mechanical versions of humans has intrigued mankind since the Middle Ages. This interest, which began with Da Vinci's mechanical knight in 1495, was reinforced by more complex mechanical versions developed in the 18th and 19th centuries and led to the development of robots that are the precursors of today's humanoid robots. The first example of today's humanoid robots was developed at Waseda University in Japan between 1970 and 1973. This robot, named WABOT-1 (WAseda roBOT), had modern features such as mobility, stereo vision, and speech recognition, and could walk on two legs and measure distances and directions (Bogue, 2020). Linert & Kopacek, 2018 defined humanoid robots as robots that have a complete body with arms and legs or only a single body part, whose body shape is similar to the human body, and which are built to remind us of humans aesthetically. The term humanoid here is given as having human characteristics. On the other hand, from an engineering perspective, humanoid robots are intricate mechatronic systems in which the mechanical structure, computational systems, and algorithms function as a single unit. (Stasse & Flayols, 2019)

Since people generally observe each other during social interaction, they mutually attach importance to human characteristics such as the tone of their voices, the appearance of their faces, and body movements, and use this to achieve mutual harmony. (Siciliano & Khatib, 2019) That's why people tend to look for these features in the mechatronic systems that are developed to perform social tasks. In other words, for robots that interact with people to be accepted by society, they must appeal to people with their appearance, movements, and behaviors.(Stroessner & Benitez, 2019)

Fascination with humanoid robots has gone beyond mechanical curiosity and found its practical use in many industries. Traditionally, the purpose of designing autonomous robots has been to allow them to carry out missions in dangerous and hostile environments. They regularly carry out activities in hazardous and difficult environments, including minefield clearing, oil well inspection, or terrain exploration. On the other hand, other applications including delivery and cleaning allow humans to be in contact with robots regularly, ensuring human-robot interaction. However, the level of interaction between humans and robots on such tasks is still limited. (Breazeal, 2003)

Siciliano & Khatib, 2019 emphasize that humanoid robots can help people in places where they can be more intertwined with people, that is, in homes, offices, hospitals, and social areas. But for all that, the widespread use of such a system will have significant impacts on society on many issues, from economics to labor force, robot safety, and reliability. Both the developments in technology and the increasing dominance in the service industry have led to an increase in the development of service robots in this sector. (Garcia et al., 2007) Understanding the methods of categorizing or nomenclature of robots is essential in understanding their capabilities and spheres of application. The International Federation of Robotics (IFR) defines a service robot as any robot that can provide services partially or fully autonomously to the welfare of humans except manufacturing operations.

Unlike service robots, social robots are designed to enable a specific human-robot interaction that encourages an engagement that is as humanistic as possible (Hegel et al., 2009). As found by Hegel et al., 2009 the ability to correctly interpret other people’s behavior is one of the key human social skills.

This does not mean the robot has to be social itself but it must possess the ability to display social behavior when individuals assume a relationship with it and build certain expectations for its behavior in socially reciprocated situations. (Ringwald et al., 2023) suggest that it is better to design the service robots with the specific design criteria and approaches based on the target group's needs and the area the robot performs tasks Perception of the robot should be appropriate to its role because different places need different works to do. For instance, the role of the robot that is placed in the museums is the introduce exhibitions and guide people (Yan et al., 2014). So for this robot communication skills come to the fore. Several approaches developed to improve the usability and user experience of social robots. For instance, Yan et al., 2014 developed a social robot perception system that aims to improve the robot's understanding of the surrounding environment and offers the use of audio, tactile, and laser reading signals to help the robot comprehend the interaction with humans.

In this paper's research, the main focus is the robots that are used or going to be used in cafes and restaurants. In this context, although some criteria, such as facial design, have a common feature, they should be subject to extra attention because cafes and restaurants are places, where people perform activities such as eating and drinking, and a disturbing visual, will significantly affect customer satisfaction. People show serious sensitivity to this issue, especially as they associate facial patterns with communication emotions and protective instincts. (Blow et al., 2006) In the case of human likeness, it is another aspect of the overall perception of humanoid robots. Conducted research by (Mende et al., 2019) suggests that it would only be when the consumers experience truly unpleasant emotions towards highly humanoid service robots as compared to their human counterparts that they tend to increase compensatory food consumption in this case. Nevertheless, it is expected that the concept of machinizing the humanoid service robots will lower this effect as well. To examine these design issues more deeply, designers and design researchers are trying to examine the subject with various approaches and find new methods. One of these approaches is to convey users' impressions of humanoid robots through metaphors. For example, Kuhn et al., 2020 work on social robots suggests that robots used for service purposes are defined by metaphors such as "allies", "partners on a journey" and "friends", which are related to cooperation.
This article aims to examine the impressions created by robot service personnel in a cafe called Mösta in Istanbul, where humanoid robot service personnel are used, through metaphors.

1.1 Aim and Scope

In this paper, research intend to view the images created by humanoid robot service personnel from the perspective of Mösta Cafe. Being in the Anatolian side of Istanbul, this café is an interesting location where the two intersections of technology and hospitality are consummated. Through the methodological lens of a metaphor, we strive to reveal delicate layers of participant emotion that find their way into interactions and understanding the human-robot interactions
First, this study aims at developing a holistic view of the relationship between individuals and humanoid robots in service-oriented environments. To do so, the metaphors underlying participants' narratives are analyzed; thus deciphering the complex fabric of emotions, perspectives, and orientations defining these innovative encounters. Second, the discussion is focused on design items to disclose visual and behavioral triggers that create interpretations of people.
The research questions and the subquestions that are tailored specifically for the scope of this research are outlined below.

Research Questions

What metaphors or analogies do participants use to describe their experience or feelings when interacting with humanoid robots in cafes or restaurants?

Subquestions:

How do participants relate their emotional state during interactions with humanoid robots through metaphors or analogies?

How do individuals who have never interacted with humanoid robots before describe their initial experiences using metaphors or analogies?

Do people's familiarity with technology influence their interpretations of humanoid robots?

How do design elements (appearance, gestures, voice, etc.) of humanoid robots influence people`s interpretations and attitudes towards their roles in service sectors?

Subquestions:

How do participants perceive humanoid robots based on their physical appearance in service roles?

Are there certain design features that evoke specific attitudes or interpretations (e.g., facial expressions, voice, and communication style)?

Are the metaphors primarily focused on physical attributes and actions of the robots or do they also encompass emotional aspects of the interaction?

2. Methodology

2.1 Theoretical Framework

A comprehensive literature review was carried out to establish the focal point of the qualitative methods to be used in carrying out this study. Academic Search Ultimate, ACM Digital Library, Taylor and Francis, and Gobi Ebooks databases were used by accessing Istanbul Technical University library databases. In addition, it was aimed to create resources for the academic background of the study through electronic searches made from the Google Scholar digital library. The keywords used included: humanoid robots, service robots, social robots, and human-robot interaction. After these manual searches, a total of 49 articles were extracted and examined. During these reviews, 9 articles were eliminated due to their main scope being developing engineering applications. In addition, 20 articles were excluded because the research was conducted in a laboratory environment, not in real social environments where people are randomly present. After applying these criteria, 20 articles remained. The remaining articles are categorized under 3 subheadings: Historical Development, Definition of Humanoid Robots, and People's Attitude to Robots.

Historical Development:
In their quest to understand the complex nature of designing robot faces, (Blow et al., 2006) offer an insight into aesthetic issues within robotics. Furthermore, (Garcia et al., 2007) studied the development of robotics research explicating on key achievements and milestones achieved in this area (Siciliano & Khatib, 2019)) added to this historical thread, providing an overview with focus on scope of humanoid robots.

Definition of Humanoid Robots:
Breazeal, 2003 provided fundamental insights into the emotional facets of sociable humanoid robots that highlighted how emotions interact with robotics. (Hegel et al., 2009) and Linert & Kopacek, 2018 added another layer of detail, shedding light on the nature of social robots along with their use for entertainment.

People's Attitude to Robots:
There was an attempt by Cooney, 2021to describe the subjective perception of robot art, distinguishing metaphorical personalized interpretations helping in expression one's feelings and inspiredness. Friedman, 2023 discussed ethical issues related to sex robots replacing human interaction from an Ubuntu standpoint. Kuhn et al., 2020 focused on the relationships between humans and robots, focusing specifically at partnerships as authority. Additionally, Stroessner & Benitez, 2019 focused on the social perception of humanoid and non-humanoid robots to identify how gendered or machinelike features affect people's perceptions.

2.2 The Real-World Case Mösta Cafe

For this research, the real-world case was examined. Mösta cafe in Istanbul is trying to expand the use of these humanoid robots in the service area and is currently using a hybrid service system for this. Mösta Cafe is a cafe that adopts the 3rd generation coffee shop concept. Here, orders are taken by human baristas and orders are delivered by robots. The robot used is a humanoid robot named Cadebot developed by Ubtech Robotics Corp. This robot, which has a total mass of 55 kg, has two LED panels on it. The first LED touch panel on the top, designed as a head, serves as the face and has an interface design resembling two eyes. Only necessary information, such as the menu and the discounted drink of the day, is provided on the panel on the body. The robot does not have any arms or legs. It carries the orders on 4 tray-like parallel projections on its back. A camera is hidden below the LED panel that resembles a face, and thanks to this camera, the robot can understand the surroundings and distinguish the faces of other human service personnel. On the touch panel that acts as a face, the necessary operations are performed the necessary commands are given, and the table where the orders will be delivered is entered. Its additional environmental sensors help the robot detect obstacles in the environment and prevent possible collisions.

Figure 1 Humanoid robot- Cadebot in Mösta Cafe Istanbul

2.3 Data Generation

The data for this study was collected using a mixed-methods approach, combining non-participant observation as an unobtrusive research method and participant observation with interviews to explore individuals' perceptions of humanoid robots in service areas.

2.3.1 Non-Participant Observation

Non-participant observations have a significant advantage in terms of convenience, as they can be carried out in almost all social areas.
On the other hand, the fact that these observations are generally related to gross behavior and consist of observations of social environments makes it inadequate in some matters. (Kellehear, 2020)

During the non-participant observations, no communication was made with the cafe customers, only their reactions, attitudes, and demeanor were examined remotely. The focus is on observing and documenting behaviors as they naturally occur. During this observation period, people were able to act more naturally because they were not aware that they were being observed. Although this unobtrusive research method is suitable for observing the physical reactions and emotional states of the customers who come to Mösta cafe, it is not sufficient to understand their thoughts about the robot, their concerns, and the characteristics they care about. Since it was understood that the method was insufficient in these matters, the Participant observation method was used in addition to this method.
Fifteen individuals were observed without intervention, constituting the non-participant observation group.

2.3.1.1 Process

The table below reflects the demographic characteristics of the people observed at the time of non-participant observation. 5 out of a total of 15 people observed were receiving service from the cafe as a family member. Of these 5 people, 2 were mothers and fathers and the other 3 were 3 boys under the age of 18. 6 of the other 10 people who came gave the impression that they were regular customers of the cafe. 40% of the customers were between the ages of 18-29, 26.67% were between the ages of 30-39 and 13.34% were above 40 years of age.

Demographics of Samples	Number of Observations	Percentages
Gender		
Female	6	40%
Male	9	60%
Age		
Less than 18	3	20%
18-29	6	40%
30-39	4	26.67%
More than 40	2	13.34%

2.3.1.2 Outcomes

It was observed that people who came to the cafe, from the moment they stepped into the cafe, became curious about the robots and tried to understand what the robot was doing. When the robot service personnel is not performing their duties, it goes into waiting mode in the corner, so customers who enter cannot contact the robot before placing an order.
Since a hybrid division of labor strategy is followed, in which robots and humans serve together, orders are taken by human baristas. Another reason for this is that the robot cannot take voice orders. It was observed that users tried to examine the robot during the preparation of the order. When the robot picked up the order from the bar and brought it to the table, customers showed facial expressions that showed excitement. While customers were receiving their orders from the tray-like protrusions on the robot, in 7 out of 11 deliveries, the robot tried to move before all the orders were received. In 5 of these 7 movements, after a very short time, the robot stopped in place according to the data coming from other

sensors, and thus the customers received all their orders. In the remaining 2 of the 7 movements, the Human Barista had to send the robot back to the table for delivery. Although expressions of surprise were observed in 9 customers who were exposed to this negative delivery experience, other negative expressions such as anger and dissatisfaction were not observed. Especially in the family that came with their children, the children under the age of 18 were more interested in the robot than other adult customers, and one got the impression that this family ordered more than once just because of this interest.

Figure 2 Humanoid robot waiting orders (left), non functioning stage (right)

2.3.2 Participant Observations

Observation carried out with the participation of the researcher, aiming to learn the daily activities, rituals, and interactions of a group of people or people who can be grouped on a common denominator, and the events that take place during this interaction, both the explicit and implicit aspects of their routines and cultures, is called participant observation. (Musante, 2015)

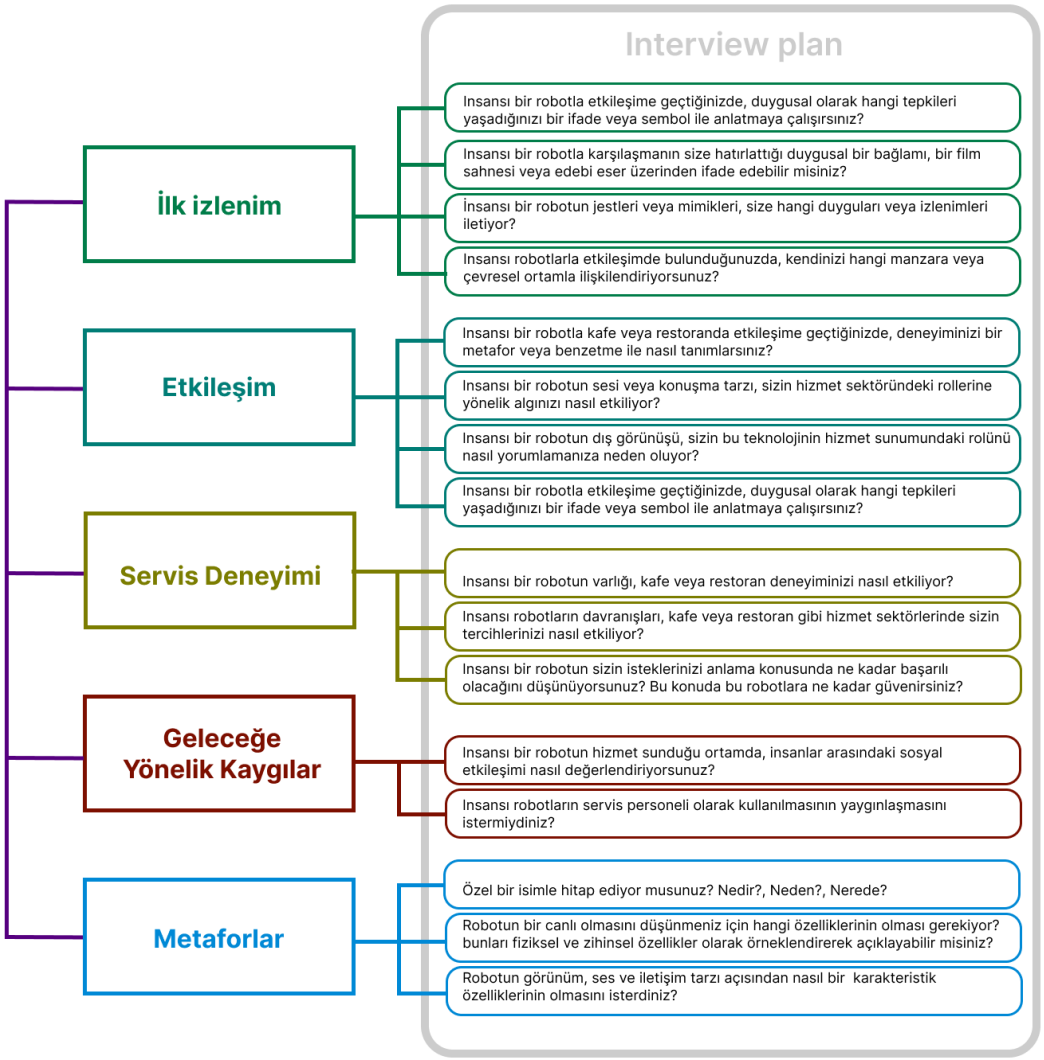
According to (Vinten, 1994) participant-based observation is perhaps the most practical form of assessing shared workplace conduct. He emphasizes that some features of these
practices can be quickly and easily concealed if viewed from an external perspective. That is, to understand the intricacies of day-to-day activities in an organization one may need practical immersion into the workplace and observation from within (participant observation).

During the participant observation method, the participants were determined by the researcher and came to the cafe by prior agreement. Here, before the participants arrived, the cafe was introduced only as a cafe using robot service personnel, and location information was provided. Participants met with the researcher in the predetermined area and entered the cafe with the researcher. The observation process started from the moment of entered the cafe.

2.3.2.1 Process

Furthermore, six participants conducted dynamic participant observation by sharing meals and discussing robots. The interviewees were chosen through purposive sampling following their

willingness to engage in discussions on the theme. Since the research was conducted in Türkiye and the participants were Turkish, the interview questions were prepared in Turkish too. The table below graphically shows the interview plan and the Turkish questions asked during the interview. The interview plan is divided into 5 main parts and these parts are named First Impression, Interaction, Service Experience, Future Concerns, and Metaphors.



2.3.2.2 Outcomes

During participant observation, reactions similar to non-participant observation were observed, and the robot tried to move during the delivery of the order. Below are some key quotes from the interview with participants after the "cafe experience".

First impression:

"Karşımda bir insan yerine bir robotun olması ve benimle etkileşime girecek olması heyecan vericiydi. Ön ekranındaki yüz ifadesi hoşuma gitti ancak sonrasında 'arkasını' dönmesiyle bu duygusal etkileşimi azalttığını düşünüyorum."

"Gurur ve mutluluk duydum ancak bir yandan da gerildim."

"Bana insan da değil ben de değil daha farklı bir varlık gelip bana hizmet ediyor. Bu da normal bir kafeye gidip, yemek yemekten, bir şeyler yiyip içmekten daha farklı bir durum "

benim için.”

Interaction:

“İnsan servis personelleri ile kıyasladım aynı zamanda bu kadar uzak gibi gözüken bir teknolojinin artık kullanılıyor olması heyecanlandırıcıydı.”

“İlk geldiğimde ben sesli uyarı veya karşılama bekledim merhaba hoşgeldiniz bekledim”

“İlk geldiğinde gözleri dümdüz bakıyordu. Hiçbir mimik yoktu ama biraz daha arkasını, daha doğrusu işte o tepsileri bize doğru dönerken gözleri yana kayar gibi oldu. Ama tam olarak suratında bir ifade yada o gözlerinde. Bir şey ifade edebilecek anlam yoktu.”

“Daha çok böyle göz çağrışımı yaptıran bir ara yüz gibiydi. Bence çok şey değildi. Öyle bir duygu aktaracak kadar. Gelişmiş bir şey de değildi yani donanım da değildi.”

“Robotla aramda soğuk bir iletişim olduğunu düşündüm açıkçası, sanırım görünüş olarak bana çok insansı hissettirmedi”

“Robot bize verdiğimiz siparişi masamıza getirmekle sorumluydu. Herhangi bir sesli iletişimimiz olmadı. Servis ederken bize arkasını döndü böylece arayüzünü göremedik(normalde duygularını belirten bir yüzü vardı ve kafasını okşayınca tepki veriyordu)”

Service Experience

“Herhangi bir engele takılmadan ve düşürmeden yemeğimi bana getirmesi beni etkiledi”

“Robotla etkileşime girme düşüncesi heyecan verici. Ancak kafedeki deneyimimde biraz daha fazlası için beklentiye girmiştim. Bunu yeterince sağlamadı.”

“Mesela full otonom bir sistemde bundan endişe ediyorum. Farklı bir şey söylediğimde siparişte normalde bende olmayan bir şey eklemek istedim ve bunu bana anlayıp geri şey yapabilecek mi? Sağlayabilecek mi? Ama yarı otonom bir sistemde, iyi düzenlenmiş bir arayüzde bunun olabileceğini, hatta daha düzenli ve kesin bir şekilde olabileceğini sanıyorum.”

Future Concerns

“Benim. Şöyle söyleyeyim mesela ben bir sipariş veriyorum, o sisteme giriliyor. Bazı restoranlarda ya da küçük kafelerde disiplin konusunda ilk hangi yemek hazırlanırsa o masaya gidiyor. Bu servis süresiyle alakalı. İnsanlarda bu erken robota şu konuda güvenebiliriz. Benim bilgilerim robotun sistemine daha önce girildiği için servis önceliği bana veriliyor ve bu konuda kendimi daha güvende ya da rahat hissedebilirim.”

“ Teknoloji günümüzde telefonların kameraları olsun, güvenlik kameraları olsun, hani en yaygın örnekle asansörlerde ki ve sensörlü kapılardaki benim hareketlerimi izliyor, gözlemliyor ya da benim dokunmam ile beraber asansör kapısı kapanmıyor, açılıp bekliyor. Günümüzde artık buna çok alıştığımız güvenlik ve kameralarla gözlemlemek açısından benim için rahatsız edici bir unsur olduğunu düşünmüyorum. “

“Aksine daha güvenli bir ortam olduğu için beni de rahatsız etmez zaten bunu bekliyorum. Hani şey. Ortamda ve kontrolümde olmadan etrafımda zaten bir şeyler sürekli kaydediliyor, şey yapılıyor. Belki başka insanların telefonlarından. Belki güvenlik kameralarından vesaire.”

Metaphors

“İlk gördüğümde tatlı olduğunu düşündüm.”

“Bana belirsizlik yabancılık hissettirdi tam bilmediğim bir şeyle karşılaştım”

“Organik bi varlığa benzetmedim, Dizi film reklam maskotlarına benzettim”

“Yüzünden dolayı köpeğe benzettim ama hayli uzun bir köpeğe”

“Benim için bir çocukmuş olduğu hissiyatını oluşturdu herhangi bir köpekden büyük olduğu için herhangi bşr hayvan hissiyatını oluşturmadı.”

Figure 3 Humanoid robots coming to the service (left) waiting for customers took their meals.

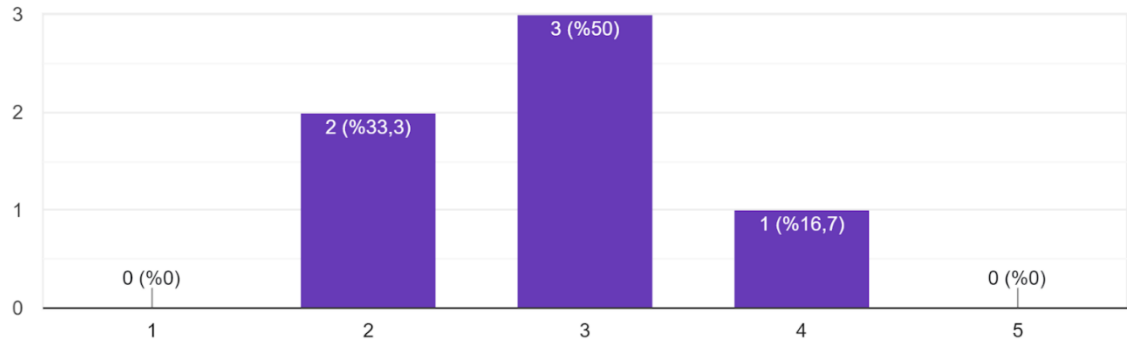
3. Findings

In cafes, debating humanoid service robots difference in outlook and understanding were identified. First, there was some hesitation in terms of the robot’s gestures and facial expressions among respondents; it seemed obvious that right from the start emotional cues were absent. Some expected a stronger interaction in turn, where they wanted the robot to change and respond according to personalized preferences. The introduction of humanoid service robots in cafes was seen as a revolutionary force bringing with it an element that made the experience special and distinct from café norms. Familiarity with the behavior of a robot was expected to diminish uncertainty affecting positively on overall cafe service experience. However, some problems were associated with the robot’s inability to complete specific commands which prompted designers to choose a semi-autonomous system. Sometimes trust in the robot’s performance differed, speaking of security issues and influence on social life; they could be noticed within cafes. Although positive expectations were developed about the rise in social interactions, concerns arose as regards negative behaviors towards robots by customers in unregulated settings.

The participants showed the trend that they prefer robots not to look like a person and behave in a neutral manner, which should be without any gender-specific features. They proposed distinctiveness type through characters, names, and some features but uniformly introducing individuality could prevent the alienation of the correctness.

Bu robotların fiziksel olarak ne kadar insana benzemesini isterdiniz? Bir ila beş arasında puanlayarak cevaplayınız.

6 yanıt



Bu robotların zihinsel kapasitesinin ne kadar insana benzemesini isterdiniz? Bir ila beş arasında puanlayarak cevaplayınız.

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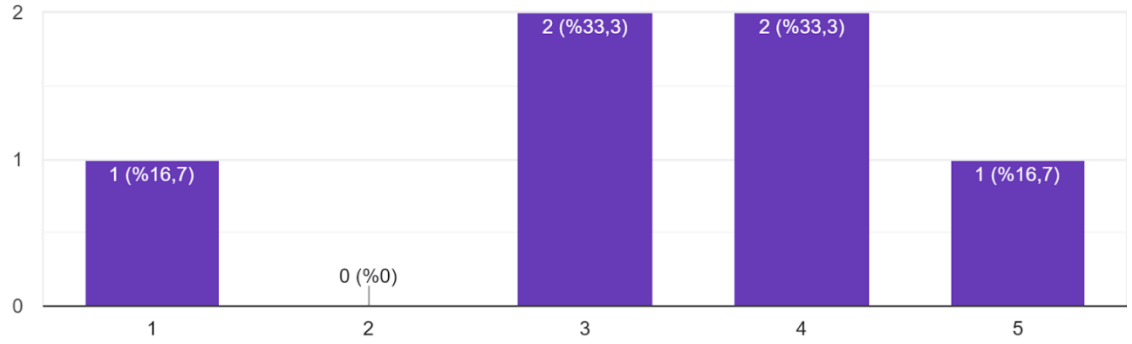
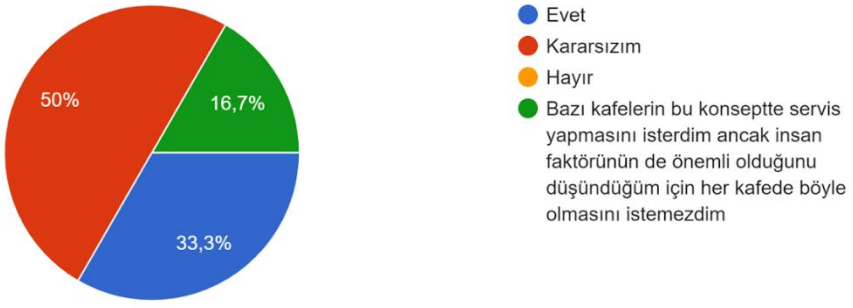


In general, the subjects displayed a favorable stance on the pervasive use of humanoid service robots in cafes expecting greater productivity and quality through refined services.

Genel olarak robotların servis personelleri olarak kafelerde daha fazla kullanılmasını ister miydiniz?

6 yanıt



The need for the integration of sound effects and verbal feedback highlights how essential it is to remain sensitive in synchronization between robots and automated service in a cafe environment so that this technology can be implemented without causing any discomfort.

Interview outcomes

First Impression:

Excitement and Novelty: Customers' excitement and novelty existed when a robot, to some extent humanlike was in the scene of the café. It was exciting the presence of this robot which replaced a human.

Emotional Interaction: The first positive change was slightly overshadowed by the negative reaction of the robot ' turned away', diminishing emotional interaction. While the expression was picked up on, it is perceived as a sign of a minor reduction in the emotional connection.
Interaction:

Comparison to Human Service: Customers no longer compared the robot to human service, but rather enjoyed its novelty as a high tech applied in an already conventional environment.

Expectations of Greetings: This expectation of social interaction, apparent in some customers' needs for traditional human-like greeting or acknowledgment upon arrival promotes the anticipation of these types of cues.

Limited Emotional Expression: The absence of such relevant smiles or other natural characteristics on the robot's interface and interaction creates a cold communication feeling, not allowing the human to achieve it with his/her counterpart as one like himself.

Concerns About Human-Like Appearance: While the robot looked very exciting, it was not fully human-like and this made people question how genuine was their interaction.

Service Experience:

Impressive Delivery: In cases of successfully delivered orders without disruptive errors, positive events were observed creating a favorable perception on its ability.

Expectations Not Fully Met: Some of the customers were predisposed to a more involving and exciting experience, which implies that even in its present form, the state of robotic capacities was not up to their expectations.

Future Concerns:

Service Priority and Safety: Along the same lines, customers talked about potential future options like personalization of service once certain information was entered tallying them with priority and safety provisions.

Acceptance of Surveillance: Discussed was the acceptance of surveillance technologies in everyday life; it says that customers feel safe under this well-monitored environment.

Metaphors:

Cuteness and Uncertainty: Below metaphors illustrate the psychological effect of an image and behavioral patterns observed in a robot: "cute" or "strange".

TV Series Commercial Mascots: This reference to TV programs advertising mascots shows a parallel with promotional or entertainment characters.

Animal and Child Metaphors: Dog and child metaphors imply a familiarity that is likely to affect how people understand robots' behavior.

In conclusion, the thematic analysis generates a variety of emotions and customer perceptions involved in dialogues with humanoid service robots. Although part of the experience is perceived positively, some concerns and expectations regarding the possibility that robot would be more emotionally oriented and adaptable in the future still exist. Moreover, metaphors are an important element of the initial interpretation and customers' first perception of understanding what a humanoid service robot is.

4. Conclusion

Integrating the humanoid robots into conventional robots has evolved concerns both technical and ethical. Negrotti, 2008highlights the significance of interpreting technological breakthroughs based on their natural consequences and not drumming them with machine superiority. The "smartphone hypothesis" posits that social robots can be accepted in human settings provided they provide nuanced emotionally loaded and creative interaction as by art-making applications. This includes designing at the collaborative level and prototyping along with artists who do not necessarily have a background in engineering (Cooney, 2021). Humanoid robots indeed pose several ethical issues, including how and whether such technology should be incorporated into society (Friedman, 2023). Though the idea of humanness depends on robots' heads, not all human-like features have a significant implication in shaping this perception (DiSalvo et al., 2002). Participants displayed a favorable stance on pervasive use, expecting greater productivity and quality through refined services. Nevertheless, there were questions about what the robot was capable of doing when specific commands required to be completed; security issues arose as well and negativistic behavior engineers may observe towards robots in unregulated environments. Interestingly, participants preferred humanoid service robots to avoid looking like humans and behave neutrally, suggesting a preference for distinctiveness through characters, names, and features. The integration of sound effects and verbal feedback was considered essential for a seamless experience, highlighting the importance of sensitivity in synchronizing robot automated service into a cafe environment

In conclusion, the results indicate that although an optimistic integration of humanoid robots may be possible, a variety of ethical considerations should receive proper consideration as well as design decisions and the particular setting in which implementation occurs. Balancing technological progress and moral implications is pivotal for the successful evolution of humanoid robots in society. It is, therefore important to engage in ongoing research and development but at the same time not be blindsided by such societal implications of these advancements.

5. References

1. Blow, M., Dautenhahn, K., Appleby, A., Nehaniv, C. L., & Lee, D. (2006). The art of designing robot faces. *Proceedings of the 1st ACM SIGCHI/SIGART Conference on Human-Robot Interaction*, 331–332. https://doi.org/10.1145/1121241.1121301
2. Bogue, R. (2020). Humanoid robots from the past to the present. *Industrial Robot: The International Journal of Robotics Research and Application*, *47*(4), 465–472. https://doi.org/10.1108/IR-05-2020-0088
3. Breazeal, C. (2003). Emotion and sociable humanoid robots. *International Journal of Human-Computer Studies*, *59*(1–2), 119–155. https://doi.org/10.1016/S1071-5819(03)00018-1
4. Cooney, M. (2021). Robot Art, in the Eye of the Beholder?: Personalized Metaphors Facilitate Communication of Emotions and Creativity. *Frontiers in Robotics and AI*, *8*. https://doi.org/10.3389/frobt.2021.668986
5. DiSalvo, C. F., Gemperle, F., Forlizzi, J., & Kiesler, S. (2002). All robots are not created equal. *Proceedings of the 4th Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques*, 321–326. https://doi.org/10.1145/778712.778756
6. Friedman, C. (2023). Ethical concerns with replacing human relations with humanoid robots: an ubuntu perspective. *AI and Ethics*, *3*(2), 527–538. https://doi.org/10.1007/s43681-022-00186-0
7. Garcia, E., Jimenez, M. A., De Santos, P. G., & Armada, M. (2007). The evolution of robotics research. *IEEE Robotics & Automation Magazine*, *14*(1), 90–103. https://doi.org/10.1109/MRA.2007.339608
8. Hegel, F., Muhl, C., Wrede, B., Hielscher-Fastabend, M., & Sagerer, G. (2009). Understanding Social Robots. *2009 Second International Conferences on Advances in Computer-Human Interactions*, 169–174. https://doi.org/10.1109/ACHI.2009.51
9. Kellehear, A. (2020). Simple Observation. In *The Unobtrusive Researcher* (pp. 115–138). Routledge. https://doi.org/10.4324/9781003137344
10. Kuhn, M., Pollmann, K., & Papadopoulos, J. (2020). I'm Your Partner - I'm Your Boss. *Companion of the 2020 ACM/IEEE International Conference on Human-Robot Interaction*, 322–324. https://doi.org/10.1145/3371382.3378250
11. Linert, J., & Kopacek, P. (2018). Humanoid robots Robotainment. *IFAC-PapersOnLine*, *51*(30), 220–225. https://doi.org/10.1016/j.ifacol.2018.11.290
12. Mende, M., Scott, M. L., van Doorn, J., Grewal, D., & Shanks, I. (2019). Service Robots Rising: How Humanoid Robots Influence Service Experiences and Elicit Compensatory Consumer Responses. *Journal of Marketing Research*, *56*(4), 535–556. https://doi.org/10.1177/0022243718822827
13. Musante, K. (2015). Participant observation. In *Handbook of methods in cultural anthropology* (pp. 251–292).
14. Negrotti, M. (2008). Where the Future Doesn't Come From: On the Logic of Naturoids. *Design Issues*, *24*(4), 26–37.
15. Önal, O. Investigating user experiences with domestic service robots through metaphors: The case of robot vacuum cleaners (Doctoral dissertation, Graduate School).
16. Ringwald, M., Theben, P., Gerlinger, K., Hedrich, A., & Klein, B. (2023). How Should Your Assistive Robot Look Like? A Scoping Review on Embodiment for Assistive Robots. *Journal of Intelligent & Robotic Systems*, *107*(1), 12. https://doi.org/10.1007/s10846-022-01781-3
17. Siciliano, B., & Khatib, O. (2019). Humanoid Robots: Historical Perspective, Overview, and Scope. In *Humanoid Robotics: A Reference* (pp. 3–8). Springer Netherlands. https://doi.org/10.1007/978-94-007-6046-2_64
18. Stasse, O., & Flayols, T. (2019). *An Overview of Humanoid Robots Technologies* (pp. 281–310). https://doi.org/10.1007/978-3-319-93870-7_13

19. Stroessner, S. J., & Benitez, J. (2019). The Social Perception of Humanoid and Non-Humanoid Robots: Effects of Gendered and Machinelike Features. *International Journal of Social Robotics*, *11*(2), 305–315. https://doi.org/10.1007/s12369-018-0502-7
20. Vinten, G. (1994). Participant Observation: A Model for Organizational Investigation? *Journal of Managerial Psychology*, *9*(2), 30–38. https://doi.org/10.1108/02683949410059299
21. Yan, H., Ang, M. H., & Poo, A. N. (2014). A Survey on Perception Methods for Human–Robot Interaction in Social Robots. *International Journal of Social Robotics*, *6*(1), 85–119. https://doi.org/10.1007/s12369-013-0199-6