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The relationships between humans and robots in the service encounters:

The role of satisfaction and age

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Index:

Abstract

Thanks to technological evolution, we are increasingly interacting with robots or artificial intelligence systems. In particular, academic literature includes an increasing number of studies regarding relationships between humans and androids (HRI). This study hereby explores the differences in perception during robot-human and human-robot interaction in a service encounter. Using the data acquired through the distribution of a survey to 175 Italian respondents, we analyzed the effects of this interaction at a reception point in a hotel. Specifically, we observed how people generally tend to be more satisfied when interacting with a robot rather than a human. Moreover, it made us aware of how age can influence this relationship following studies on how young people are more satisfied when perceiving interaction with a robot. Lastly, we noted that greater satisfaction produces more WOM. In any case, perception of interaction with robots does not produce greater WOM.

Introduction

"The best advertising is done by satisfied customers". This is how Philip Kotler, a well-known professor and luminary in the field of marketing, relates satisfaction with the world of advertising and dissemination of information. The role of satisfaction is at the base of his statement. In fact, a satisfied consumer would be more willing to share a brand, product or service with other people thus bringing substantial benefits to a company. In order to make our customers become ambassadors, we will have to satisfy their expectations through product performance or service performance or unforgettable experiences. In this context, the capability of the brand or service suppliers to establish good communication with customers is of utmost importance. Our study will focus on the analysis of perceptive-communicative differences between humans and robots within a service encounter context. Specifically, the hospitality sector is one of the most rapidly expanding ones and services for every type of consumer can easily be adapted therein. For this reason, we have decided to develop our study by simulating interaction with a hotel receptionist and subsequently testing our theories on the basis of perceptions deriving from human-human or human-robot contact. This context includes there is a variable which stems from WOM which in turn derives from the interaction process during service encounter through mediation given by customer satisfaction. Moreover, the age of respondents as a moderation factor was taken into due consideration in the model. Actually, it is positive WOM which becomes the final product that companies should strive for and focus most of their efforts on, because people tend to really believe in what is suggested to them by common people rather than trust company advertising techniques. Therefore, rather than invest in advertising, it might be more profitable to invest in customer satisfaction. In a nutshell, customers' needs must be clear in our minds before we can fully satisfy them, in order to obtain positive WOM for the purpose of increasing awareness, loyalty and revenues.

The study provides an introduction split into each single factor taken into consideration in the model. Therefore, in the light of the co-related literature, we shall discuss the robot - human relationship (HRI), the context of service marketing focusing on service encounters, the roles of satisfaction and WOM respectively. Subsequently, the four theories (comprising supportive literature) as well as the model adopted will be introduced; following this, there will be a data collection method and related analysis which follows the order of introduction of the theories. We shall then derive the theoretical and managerial implications and finally, we shall reach a conclusion including the main limitations, thus proposing further hints for research.

Human-Robot Interactions:

Over the years, many experts have analyzed human behaviour in social interactions and realized that often, these were influenced by the context and/or environment in which they were studied. In particular, social interaction is established when two or more individuals act in the presence of another individual thus influencing one another. The influx that one individual is capable of imprinting to another individual depends on several different character and situational traits. Specifically, during personal encounters, interaction is established by:

The situation: that is, the time and place in which things occur

The participants: i.e. the number, character and personality of the individuals

The centres of attention: that represent the points in which attention is concentrated during interaction

In any case, our study will not focus on person-to-person interaction, but on the differences in the relational approach between humanoids and humans, taking into due consideration customer satisfaction and WOM.

Human-Robot Interaction (HRI) is still studied very much especially in reference to the improvement of people's lives in the years ahead. This is the reason why it is fundamental to provide the context and procedures through which interaction between man and robot occurs. Interaction can be defined as communication between man and robot in HRI as well. This type of communication can occur in different ways and with different procedures and can depend on different factors, but it is essential to distinguish when and where it can occur. We can split this type of communication into Remote Interaction and Proximate Interaction. In the first type, the actors will not be placed close to one another, but there will be a certain time and/or space distance, while in the second category, robots and humans will interact in the same room. Apart from defining the context, the following should be stressed: how the process which leads to achieving the target depends on the confluence of factors like the margin of autonomy, the type of exchanged information, progress, the ability to learn, training of the robot and human and lastly the difficulty of the work to be carried out. All of these variables are equally important, but for the purpose of this project, we shall focus on the information exchanged because it creates satisfaction thus providing WOM. Interaction efficiency will derive from Interaction Time[1], that is, time required for communication or robot training, mental effort for interaction[2], situation awareness [3] deriving from interaction and the amount of shared understanding[4]. There are two aspects that will determine

[1] Crandall J.W., Goodrich M.A., Olsen Jr. D.R., Nielsen C.W., *Validating human-robot interaction schemes in multi-tasking environments*, IEEE Transactions on Systems, Man, and Cybernetics: Part A- Systems and Humans, vol.35, no. 4, pp.438-449, 2005

[2] Sheridan T. B., *Humans and Automation: System Design and Research Issues*. John Wiley and Sons, 2002

[3] Endsley M. R., Bolt´e B.,Jones D. G, *Designing for Situation Awareness: An Approach to User-Centered Design*. New York: Taylor and Francis, 2003.

[4] Johnston J.,Fiore S. M.,Paris C.,Smith C. A. P., *"Application of cognitive load theory to developing a measure of team decision efficiency*," *Military Psychology*, 2006.

how information is exchanged: means of communication and its format. The first aspect concerns use of our senses. In particular, reference is to be made to sight, hearing and touch through the use of visual displays, gestures, speeches, audio or physical interaction. The format depends on the domain used.

One of the most interesting theories on human-robot interaction is certainly ”Uncanny valley theory”. This theory was introduced in 1970 by Masahiro Mori; he studied how the sensation of pleasantness and familiarity deriving from interaction with a humanoid would foster human resemblance to the point where realism not only creates a drop in positive reactions, but also a sensation of apprehension and anguish. However, according to Yu Chung-en[5](2018), although this effect can occur in the reactions, the latter would depend on perception of the researcher because the non verbal cues play a fundamental role in service perception.

From this aspect, it is simple to grasp how the ease of formulating our impressions is extremely important in relationships. The Expectation Confirmation Theory asserts that people set their expectations regarding technology on appearance until performance assessment is either confirmed or denied. In this sense, it has been proven that the aspect and procedures of interaction are fundamental for the perception of relationships between humans and robots. Specifically, although discursive interaction remains the best choice, digital interaction is important as well as in HRI[6]. Goez, Kiesler and Powers (2003)[7] showed how "*people systematically preferred robots for jobs when the robot's human-likeness matched the sociability required in those jobs. In two other experiments, people complied more with a robot whose demeanor matched the seriousness of the task."* Moreover, they also that humanoids use anthropomorphic cues which make them seem semi-real. The derived perceptions would confer skills and personality to robots. In this way, the expectations of human beings for robots will be in line with conferments. Psychological research has highlighted how the response to robots will occur spontaneously, subconsciously, rapidly and strongly linked to stimuli[8]. Dautenhahn[9] outlined three different types of approach between humans and robots:

Robot-centred HRI: robots acts as an autonomous entity which pursues its own goals based on its motivation.

Human-centred HRI: this approach tends to obtain acceptable and convenient results for humans.

Robot cognition-centred HRI: acknowledges robots as intelligent entities which are capable of taking independent decisions and solve problems on their own.

The next part includes an extensive study of relationships between humans and robots in the service encounter marketing context.

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[5] Yu Chung-En; *Humanlike Robot and Human Staff in Service: Age and Gender Differences in Perceiving Smiling Behaviors*; IEEE 7th International Conference on Industrial Technology and Management (ICITM), 2018

[6] Haring K.S., Silvera-Tawil D., Watanabe K., Velonaki M.; *The Influence of Robot Appearance and Interactive Ability in HRI: A Cross-Cultural Study*, International conference on social robotics, 2016, pp 392-401

[7] Goetz J.; Kiesler S.; Powers A.; *Matching robot appearance and behavior to tasks to improve human-robot cooperation*, The 12th IEEE International Workshop on Robot and Human Interactive Communication, 2003. Proceedings. ROMAN 2003.

[8] Aarts H, Dijksterhuis A. *Attitudes and social cognition - habits as knowledge structures: Automaticity in goal directed behavior*, in Journal of Personality and Social Psychology, vol. 78, 2000, pp. 53-63

[9] Dautenhahn K., *Socially intelligent robots: dimensions of human-robot interaction*, Philos Trans R Soc Lond B Biol Sci., 2007; 362(1480): 679–704.

Service Marketing & Service Encounters

Technological progress has always modified routines and lifestyles of people. Research in robotics have brought to light several types of androids which are capable of carrying out different types of tasks, depending on the goal to be achieved in their given field of application. However, major use of robots in industry has been rather impeded by consumers and workers alike because of the capability of machines to replace humans at the workplace. Nowadays, humanoids are used in many sectors like the retail industry, hospitality, customer service, banks, family entertainment and more so that they can facilitate humans in everyday life. HRI validity can be spotted not only in efficiency associated with labour costs, but also in the capability of robots to gather customer data in face-to-face relationships. This interaction occurs in the service marketing sector, that is, the wide marketing strategy category which focuses on the sale of any type of physical goods. In this domain, we can define service robots as "System-based autonomous and adaptable interfaces that interact, communicate and deliver services to an organization's customers. In a frontline service setting, they represent the interaction counterpart of a customer and therefore can be viewed as social robots"[10]. Wirtz et al. (2018) have outlined the main differences between service robots and frontline employees. In particular, service employees need training and can be exposed to bias thus are prone to become highly competitive and are able to think creatively (out-of-box); service robots do not require training, they are relatively exposed to bias, thus cannot be highly competitive and have limited thinking skills.

In marketing, the purpose of this type of interaction is create positive customer experiences. In order to reach this goal, it is fundamental to understand the importance that given instances have when potential clients are exposed to our company and, in particular, to personnel. These points of contact are called "moments of truth" (Gronroos 1988) and are very important for both parties involved in order to understand if the business has met demands. Service encounters is the definition commonly given to instances in which clients and staff interact. Shostack (1985) defines them as "period of time during which the customer and the service firm interact in person over telephone or through other media". "Essentially, a service encounter has been defined as a social interaction involving one human being interacting with another (Czepiel et al.1985)". Moreover, Czepiel et al. (1985) outlined the seven service encounter features which can be considered as differentiating factors between encounters. According to his theory, service encounters would be: goal -oriented, considered as being part of work itself or as a relationship with strangers, narrow in scope and task- oriented, usually having a default set of rules to facilitate interaction and have client and provider default roles.

Generally, in a service encounter, because of lack of familiarity and intimacy between providers and clients, success is often underrated, while failure is correlated with internal factors[11].

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[10] Wirtz J., Patterson P.G., Werner H. Kunz, Gruber T., Nhat Lu V., Paluch S., Martins A.; *Brave new world: service robots in the frontline,* Journal of Service Management, 2018

[11] Sparks B, Weber K.; *The service encounter*, Handbook of Hospitality Operations and IT, Peter Jones, Chapter 6, 2008

Numerous studies have been carried out in order to observe interaction between robots and humans both in proxemics and service marketing sectors. Studies were carried out on how humans tend to prefer a more intimate approach with androids by physical interaction over verbal interaction[12]. Furthermore, people generally prefer humanoid robots over mechanical ones[13]. In line with this theory, preferences for given traits have influenced research participants and made them avoid contact with all types of robots[14]. This conclusion leads us to state that those who preferred humanoid robots tended to allow any robot which they interacted with to come into closer contact with respect to those who preferred mechanical robot[15].

Steinfield et al. (2006)[16] determined the metrics to be used when measuring efficient interaction between robots and humans:

- Interaction characteristics: observational or conversational
- Persuasiveness: the capability of robots to make humans change their attitude or behaviour
- Trust: the trust which humans have concerning robot flaws
- Engagement: the capability of robots to catch a human being's attention during interaction
- Compliance: how aspects and compliance with norms influence co-operation between the actors.

Despite the numerous efforts made by science and in particular by robotics, still today there are many problems with interaction. This occurs because human beings associate physical appearance and behaviour or intellectual expectations. Unfortunately, these expectations often become unfulfilled because of technological limits and inability to create a level of human intelligence equal to the one in humans themselves. In this way, robot limits emerge immediately during interaction, thus causing a sense of frustration and disillusion[17].

Clearly, expectations play a fundamental role in human-robot relationships. In order to really grasp the effective function, we can introduce "Role Theory". Each role is an array of rights, duties, expectations, norms and behaviour that an individual has to face and fulfill. This model is based on the fact the people behave in a predictable way and behaviour occurs in a specific context. In this sense, individuals would behave in line or in contrast with their well-established social status. Therefore, in the scope of services, the respect of one's role can lead to providing a better service. By applying this theory, consumers usually have expectations for

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[12] Koay, K. L., Syrdal, D. S., M. L. Walters, K. Dautenhahn,*'Living with Robots: Investigating the Habituation Effect in Participants' Preferences During a Longitudinal Human-Robot Interaction Study'*, Proceedings of the 16th IEEE International Workshop on Robot and Human Interactive Communication (RO-MAN 2007), South Korea, 564-569, (2007)

[13] Syrdal D. S., Koay K. L., Walters M. L., Dautenhahn K.; *'A Personalised Robot Companion? - The Role of Individual Differences on Spatial Preferences in HRI Scenarios'*, Proceedings of the 16th IEEE International Workshop on Robot and Human Interactive Communication (RO-MAN 2007), Korea,26-29, (2007)

[14] Walters M.L., Syrdal D. S., Dautenhahn K., Te Boekhorst R., Koay, K. L ; *'Avoiding the Uncanny Valley – Robot Appearance, Personality and Consistency of Behavior in an Attention-Seeking Home Scenario for a Robot Companion*', Journal of Autonomous Robots, 24(2), 159-178, (2008)

[15] Walters M.L.,Dautenhahn K., Te Boekhorst R., Koay K.L., Sverre D. Syrdal, Nehaniv C.L.; *An Empirical Framework for Human-Robot Proxemics*,2009

[16] Steinfeld, A., Fong, T., Kaber, D., Lewis, M., Scholtz, J., Schultz, A., & Goodrich, M. (2006). *Common metrics for human-robot interaction*. Paper presented at the *Proceedings of the 1st ACM SIGCHI/SIGART* Conference on Human-Robot Interaction, 33-40.

[17] Lowgren J.,Carroll J.M., Hassenzahl M., Erickson T., *The encyclopedia of Human- computer interaction (second edition)*, Interaction design foundation

robots in their given role during service encounters as service representantives of the company[18]. The implication here is that if role expectations are fulfilled, customers will be potentially satisfied and keen on interacting again.

Satisfaction

We could define satisfaction as an emotional reaction of happiness that occurs when a goal or wish has been achieved. Like all other emotions, satisfaction can be included among behaviour motivators because they play an essential role in all fields of human science. The first study of customer satisfaction was carried out in 1965 by Cardozo[19]. Satisfaction is defined as a response of customers deriving from inconsistency between expectations prior to consumption and post-consumption perception[20]. Petruzellis et al. state that consumers would be satisfied when their expectations are fulfilled; very satisfied when expectations are exceeded and totally satisfied when they gain more than what they expected[21]. According to Fornell, the first element to see in order to assess service satisfaction is perceived quality, while the second one is perceived value[22]. Although perceived value appears in different moments of the purchase process, fulfillment is always considered as post-consumption assessment. Oliver[23] (1997) defines satisfaction with a service provider as response to service encounter, both emotionally and assessment-wise. We have observed how satisfaction of customers depends on dyadic interaction between customers and service providers. Moreover, in pure services where there is no exchange of goods and the quality of the service is hard to measure, customer satisfaction can only be determined by service encounter quality[24]. On the basis of studies on unexpected events that could occur in service encounters, Bitner et al. (1990) demonstrated how 43% of the fulfilled encounters derive from positive behavioural attitudes which were unexpected by employees. On the contrary, 43% of the unfulfilled encounters derive from the inability of employees to address adverse situations, thus establishing a negative memory of a given experience[25]. This consideration was observed by Farrell et al (2001) who state that perception of service quality strongly depend on personnel behaviour[26]. Clearly, negative results would lead to negative emotions which will, in turn, influence purchase intention. Consumer reactions would be more negative if the company could have avoided bankruptcy. The ability and promptness of saving a state of bankruptcy would increase

[18] Stock R.M., Merkle M.; *Can Humanoid Service Robots Perform Better Than Service Employees? A Comparison of Innovative Behavior Cues*, Hawaii International Conference on System Sciences, 2018

[19] Cardozo, R.N. *An experimental study of customer effort, expectation, and satisfaction*. J. Mark Res. 1965, 3, 244–249.

[20] Oliver, R.L. *Whence consumer loyalty*. Journal of Marketing, 1999, 63, 33–44

[21] Petruzellis, L.; D'Uggento, A.M.; Romanazzi, S.; *Student satisfaction and quality of service in Italian universities*, Manag. Serv. Qual. 2006, 16, 349–364.

[22] Fornell, C.; Johnson, M.D.; Anderson, E.W.; Cha, J.; Bryant, B.E. *The American customer satisfaction index: Nature, purpose, and findings*. Journal of Marketing, 1996, 60, 7–18.

[23] Oliver, R. L. (2010). *Satisfaction: A behavioral perspective on the consumer* (2nd ed.). Armonk, NY: M.E. Sharpe

[24] Solomon M.R., Surprenant C., Czepiel J.A.; *A Role theory perspective on dyadic interactions: the service encounter*, New York University, Graduate School of Business Administration, 1982

[25] Bitner M. J.,Booms B. H., Stanfield Tetreault M.; *The service encounter: Diagnosing favorable and unfavorable incidents*; Journal of Marketing, vol. 54, 1990, pp. 71-84

[26] Farrell, A.M., Souchon, A.L. and Durden, G.R. (2001), *"Service encounter conceptualisation: employees' service behaviours and customers' service quality perceptions"*, Journal of Marketing Management, Vol. 17 No. 5, pp. 577-93.

satisfaction, but would not guarantee repurchase intention. Oliver[22] (2010) highlighted how, in order to forget a negative experience, you need 12 positive ones. The Expectation Disconfirmation Paradigm developed by Oliver is in line with the above-mentioned studies and it is at the base of other given theories regarding customer satisfaction. This concept describes the satisfaction development process. Starting from the comparison between expectations and results obtained from interaction, there will be an assessment which would confirm or disconfirm the value of the perceptions. The expectations could be active or passive. The former would easily be disclosed by consumers; the latter are barely processable. Confirmation will occur when expectations are in line with the perceptions, otherwise, there would be disconfirmation. Concerning the latter, disconfirmation may be positive or negative. If the service offered exceeds the expectations, positive disconfirmation is obtained; conversely, if the expectations exceed the service, negative disconfirmation is obtained. Other studies consider satisfaction as being a sum of ratings[26]. In this perspective, satisfaction is continually updated by making adjustments on the first experience which remains essential for further ratings. Concerning interactions in the service sector, findings showed satisfaction is not only an emotional outcome connected with consumption experience,[27] but also a strong predictor of purchase intention, word-of-mouth and loyalty[28]. Meuter et al. (2000) in their study concerning satisfaction in technology-based service encounters, they highlighted the tendency of individuals to allocate a negative result of the encounter to technology and only a small percentage declared responsibility for the outcome[29]. On the basis of a study by Osawa[30] et al (2017) in which they used a robot as a receptionist, it was possible to study client interaction with customers. However, if on one hand employee work load was reduced, communication capabilities of robots were inadequate. With regards to satisfaction, service homogeneity by robots might be greater in cases where a customer is not so empathetic or is outright unpleasant thus generating negative emotions in employee. In conclusion, current studies have shown how service encounters can have a positive impact on satisfaction. Unfortunately, most current literature focuses only on adopting robots in service marketing instead of studying the relationships between humans and androids including related perceptions.

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[27] Olsen, S.O. (2002), *"Comparative evaluation and the relationship between quality, satisfaction, and repurchase loyalty"*, Journal of the Academy of Marketing Science, Vol. 30 No. 3, pp. 240-9.

[28] Liljander, V. and Strandvik, T. *,"The relation between service quality, satisfaction and intentions"*, Kunst, P.and Lemmink, J. (Eds), Managing Service Quality, Paul Chapman, London, 1995, pp. 45-63
Ravald, A. and Gro¨nroos, C. (1996), *"The value concept and relationship marketing"*, European Journal of Marketing, Vol. 30 No. 2, pp. 19-30.

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[30] Osawa H., Ema A., Hattori H.,Hakiya N., Kanzaki N., Kubo A., Koyama T., Ichise R.; *What is Real Risk and Benefit on Work with Robots?: From the Analysis of a Robot Hotel*, Conference: the Companion of the 2017 ACM/IEEE International Conference, 2017

Word-Of-Mouth (WOM)

Word-of-Mouth can be defined as disclosure of information, ideas and opinions about a given product or service which occurs among people who trust one another. It usually stems from an informal exchange of opinions among interlocutors who are not interested parties because they are actually those individuals who have come into contact with the given product or service. In recent years, WOM has become a very effective marketing tool thanks to technological development. Indeed, the Internet enables fast dissemination of information in many different ways, thus enabling data collection and monitoring of derived results. WOM aims at developing new consumer – consumer and consumer-seller relationships through the communication tools thus bringing benefits to both parties; therefore, the actual marketing target groups themselves will be disseminating the messages. Apart from the above-mentioned aspects, WOM is an excellent marketing tool for the following reasons:

- People tend to trust other customers' opinions rather than the sellers'
- From the buyer's point of view, consumers are perceived as people who are well-informed about products and services
- From the sellers' point of view, consumers would be more informed and persuaded when having to fulfill their own needs

Moreover, in order to gain benefit from positive WOM, there has to be a commitment to create excellent customer experience so that it will become unforgettable for the consumer.

In his book "Contagious: Why things catch on", Berger[31] outlines the six successful word-of-mouth drivers. Through STEPPS, he states that the more a service or brand represents social values (Social currency), contains easily distinguishable and memorable elements (Triggers), appeals to emotions or stimulates them (Emotion), enters the public domain (Public), has a practical value (Practical value) and tells a story (Stories), the more probable it is for those who tried them to, in turn, recommend them to others thus creating positive WOM. Kozinets[32] et al. (2010) outlined three WOM models which are usually applied to marketing:

1) Organic interconsumer influence model: in this type, word-of-mouth occurs spontaneously without any external influence from the seller. It is the type of WOM which occurs between people who have previously tried a product or service.
2) Linear marketer influence model: this type includes more influential consumers with respect to other types, that is, who are able to influence choices made by others because their view is taken into consideration by the community.

[31] Jonah Berger; *"Contagious: Why Things catch on"*, Simon and Schuster, 2013

[32] Kozinets R. V., de Valck K., C.Wojnicki A Wilner S.J.S.; *Networked Narratives: Understanding Word-of-Mouth Marketing in Online Communities*, Journal of Marketing, vol. 74, 2010,71 –89

3) Network co-production model: according to this model, there is WOM among potential customers who would also be directed towards marketing efforts made by companies. Therefore, consumers will combine marketing techniques and multidirectional flow of messages.

A study dated 1943 on dissemination showed how interaction among customers is more influential than marketing efforts when it comes to conveying purchase factors[33]. In general, if a consumer usually receives positive WOM during service encounter, he will be more prone to purchase[34]. In any case, it might happen that by receiving contrasting opinions, we refer service performance assessment to service encounter. Generally, WOM could be positive or negative thus generating either recommendations or complaints. It has been shown that, with respect to the positive one, negative word-of-mouth has major effects on consumers even though it is moderated by the power of the brand itself and the information we remember[35]. Mazzarol et al.[34] (2007) revealed that the value of the forwarded message and the how strong it is forwarded enhance the possibility of there being word-of-mouth. Dissemination of information could condition perceptions concerning service quality. In particular, this occurs prior to purchase of a product because consumers are not sure of what type of service they would receive.

Very often, it is not possible to assess personnel skills in a service encounter before or after or even at a later time. In this scope, WOM could be extremely useful because it becomes the only assurance prior to interaction, thus is a service quality indicator for those who receive the message. In the world of services, Murray[36] (1991) studied how word-of-mouth influences service consumers more than those who buy products. Finally, in view of our study, it is important to enhance the bond between satisfaction and WOM. The following types of relationships can occur between the two above-mentioned elements:

- Positivity bias: a high level of satisfaction will occur with greater WOM with respect to a low level of satisfaction
- Negativity bias: a low level of satisfaction will occur with greater WOM with respect to a high level of satisfaction
- Symmetric relationship: high and low levels of satisfaction will occur with similar WOM

[33] Ryan B, Gross N.C., *"The Diffusion of Hybrid Seed Corn in Two Iowa Communities"* Rural Sociology, 1943, 15-24

[34] Mazzarol, T., Sweeney, J.C. and Soutar, G.N. (2007), *"Conceptualizing word-of-mouth activity, triggers and conditions: an exploratory study"*, European Journal of Marketing, Vol. 41 Nos 11/12, pp. 1475-94.

[35] Herr, P.M., Kardes, F.R. and Kim, J. (1991), *"Effects of word-of-mouth and product attribute information on persuasion: an accessibility-diagnosticity perspective"*, Journal of Consumer Research, Vol. 17, 1991, pp. 454-62.

Laczniak, R.N., DeCarlo, T.E. and Ramaswami, S.N. (2001), *"Consumers' response to negative word-of-mouth communication: an attribution theory perspective"*, Journal of Consumer Psychology, Vol. 11 No. 1, 2001, pp. 57-73.

[36] Murray, K.B., *"A test of services marketing theory: consumer information acquisition activities"*, Journal of Marketing, Vol. 55 No. 1, 1991, pp. 10-25.

In his study, Richins[37] (1983) highlighted how the tendency to activate negative WOM is positively co-related with the level of dissatisfaction and negatively co-related with the ability of the seller to respond to complaints.

Theoretical Background

Taking into due consideration the literature studied to date, we can see the co-relation between WOM and satisfaction. In particular, numerous studies have demonstrated that when expectations are exceeded, a great level of satisfaction will influence WOM. Unfortunately, in the field of Human-Robot Interaction, studies co-related with WOM are quite lacking. In general, in order to intensify WOM, consumers need to become excited and astounded. We observed that customers tend to be impressed by innovative services because the latter can assure something new and unexpected in reference to a service encounter. Therefore, these services would exceed expectations thus generating satisfaction and eventual WOM[38]. The aspect and procedure for interaction with robots are fundamental in perception of people before and after interaction as well[5]. Strait et al. (1997) studied robotic communication and noticed how robots which interact with people following a human behavioural pattern are perceived as effective, when interaction is observed, but not necessarily when an individual is directly interacting with a robot[39]. Turkle (2011) studied human-robot interaction and came to the conclusion that people could feel more at ease interacting with a robot[40]. Although the robot used in the experiment hardly resembled a human, the average age of those who took part in the study was relatively low. Therefore, we can suppose that:

H1: We expect higher WOM for perceived interaction with robots compared to humans

In a service encounter, customers often assure identification by trust, involvement or WOM in reference to service providers who can offer not only an emotional value, but a social one as well. Regarding services provided by robots, according to the Technology Acceptance Model, the customer's desire to adopt new technology will depend on the use of it and the perception concerning it. Therefore, it is easy to understand how acceptance of services provided by robots depends on their capability of coping with the relational, social and functional needs of customers[9]. Seeing that consumers generate expectations not only on the final result but on interaction as well, robots would have to create a snug service encounter for the customer, so as to assure a given level of satisfaction that would become a useful attitude for service providers.

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[37] Richins M.L.; *Negative word of mouth by dissatisfied customers: A pilot study*, Journal of Marketing 47(1):68-78

[38] Bettencourt L. A., Brown S. W., "*Relationships among Workplace Fairness, Job Satisfaction, and Prosocial Service Behaviors"*, Journal of Retailing, vol. 73:1, 1997, pp. 39-61

[39] Strait, M., Canning, C., Scheutz, M.; *Let me tell you! investigating the effects of robot communication strategies in advice-giving situations based on robot appearance, interaction modality and distance*. Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction, pp. 479–486. ACM (2014)

[40] Turkle, S.; *Alone together: Why we expect more from technology and less from each other* , Basic Books, 2011.

There are very few studies in service marketing concerning comparison between robots and humans in relation to customer satisfaction. Despite this, Stock & Merkle[17] (2018) analyzed behavioural relationships which occur between humans and robots. By studying the relationships in light of Expectancy Disconfirmation Paradigm, they observed how the innovative hints given by an interaction with a Humanoid Service Robot (HSR) exceed customer expectations thus generating satisfaction in customers. Merkle[41] (2019) also added that customer satisfaction deriving from a meeting with a robot (HRI) is completely comparable with the one deriving from a human meeting (FLE). The same study was used to monitor how service robots manage to create more customer satisfaction after service failure with respect to human – human interaction. Considering the results obtained in previous studies and the average age of our respondents:

H2: We expect higher satisfaction for perceived interaction with robots compared to humans

Numerous studies take age into due consideration as a control variable, although it is quite rare to find articles which take this factor into due account when assessing HRI. Brandl[42] et al. (2016) studied robot-human interaction and noted how age was not connected with perceptions regarding robots, in contrast with research carried out by Yu Chung-En[5] (2018), who stated that men and women in different age groups have conflicting perceptions of robots.
Hudson[43] et al. (2017) observed how young men living in big cities tended to use robots. Research carried out in the hospitality sector in Russia revealed how young people are in favour of using robots in hotels[44]. In the same sector, Ivanov et al. (2018) stated that people under 30 were slightly more skeptical towards robots with respect to the over 30s. In any case, the latter seems to buck the trend in reference to common literature in the given field because, generally, young people are more accustomed to using technology, therefore are more in favour of innovation. At this point, we can affirm that:

H3: Age will moderate the relationship between condition and satisfaction. Specifically, we expect younger respondents to be more satisfied when they perceived to interact with robots compared to humans.

Literature has many times over demonstrated that satisfaction and WOM are closely related. As we have previously said, there are many reasons to believe that not everyone who is satisfied will contribute positively to WOM. Research carried out by Bodo Lang[45] (2011) brought to light differences related to perceived

[41] Merkle M., *Customer Responses to Service Robots Comparing Human-Robot Interaction with Human-Human Interaction*, Hawaii International Conference on System Sciences, 2019
[42] Brandl, C., Mertens, A., & Schlick, C.M. (2016) Human-robot interaction in assisted personal services: factors influencing distances that humans will accept between themselves and an approaching service robot. *Human Factors and Ergonomics in Manufacturing*, 26(6), 713- 727.
[43] Hudson, J., Orviska, M., & Hunady, J.; *People's attitudes to robots in caring for the elderly*. International Journal of Social Robotics, 9(2), 199-210.
[44] Ivanov S. H.,Garenko A ,Webster C.; *Young Russian adults' attitudes towards the potential use of robots in hotels*; Technology in society, 2018
[45] Lang B., *How word of mouth communication varies across service encounters*, Journal of Service Theory and Practice , 2011, 21(6):583-598

satisfaction in encounters with different types of service providers and effects on WOM. He discovered that in longer and more exciting service encounters, satisfied consumers tended to adopt word-of-mouth, while in more rational and shorter encounters, dissatisfied consumers tended to use more word-of-mouth than those who were satisfied. Although there is no research in the field of service encounters in relation to perceived differences between robots and humans, according to previous literature:

H4: The robot/human relationship and WOM will be moderated by satisfaction. Specifically, higher satisfaction will lead to higher WOM

Framework of the study

This study aims at analyzing how different types of interaction, which can occur between robots and humans, influences WOM. In this sense, we thought of completing the model with the moderation factor given by age and the one given by satisfaction. In particular, the following have been assumed: a direct effect given by different interactions on WOM, a moderation effect given by the age of respondents on customer satisfaction during service encounter, a mediation factor given satisfaction when mediating the effect of independent variables (Robot / Human) on WOM (Independent variable).

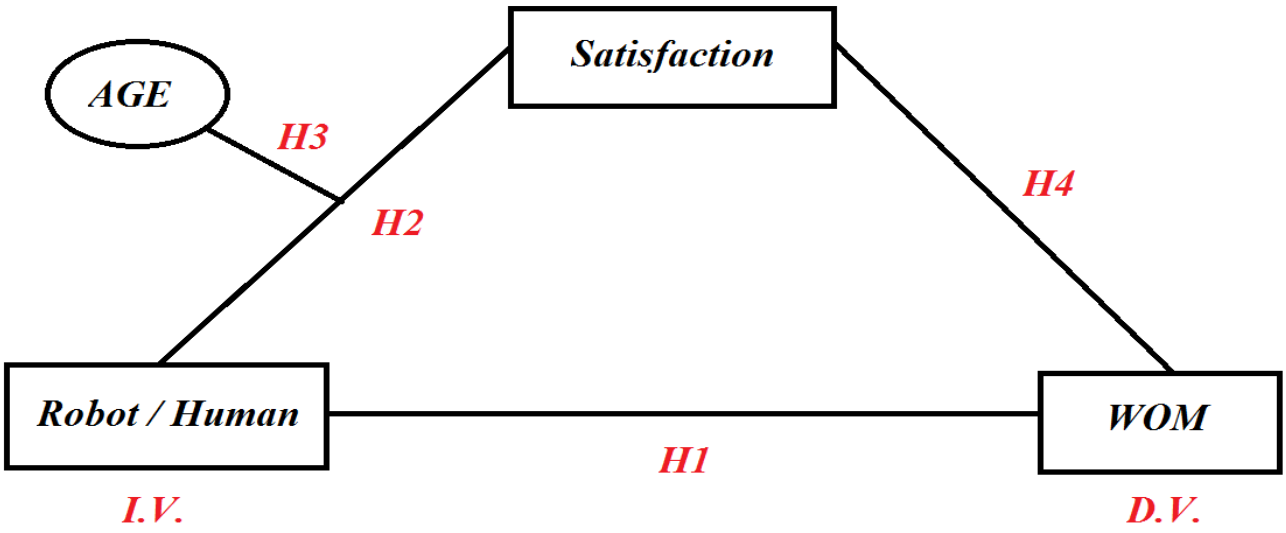

Figure 1. Proposed model

In order to refute these theories, a questionnaire was provided to assess emotional response, presence of attachment anxiety, perceived ease of use and any possible WOM. The beginning of this questionnaire contains a short video which serves as stimulus for subsequent answers as well as questions related to gender and age. The 25 second video includes the simulation of interaction between a human and a hotel receptionist. The questionnaire was structured in such a way that the respondent, on the basis of his gender, could observe either male interaction (in case the male gender was selected) or female interaction (if the female gender was selected). Furthermore, the questionnaire included randomization in order to obtain an even number of interactions both with the human receptionist and the individual with robotic features. Specifically, during interaction it was asked to check-in at a hotel, then the receptionist would ask for the name in order to conclude the operation and, before ending the interaction, the human would ask for information on a good restaurant and obtain an answer from the receptionist. The type of interaction is standardized, in fact, the only parts that vary are the customer's voice and (male /female) and receptionist (human/robot).

Figure 2. Service encounter (Robot)

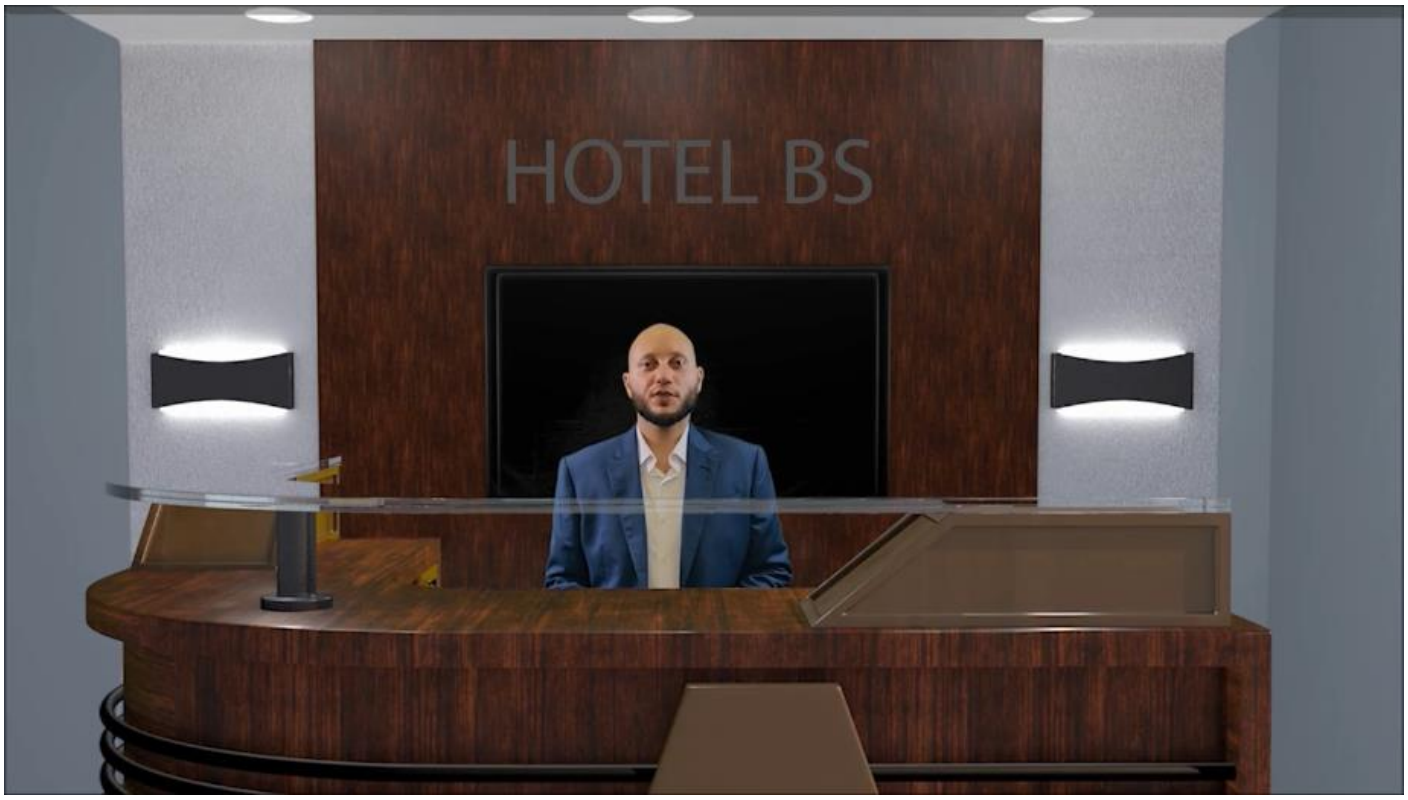

Figure 3. Service encounter (Human)

Methodology

Sample and data collection

Data is collected by using a questionnaire set up on the online platform Qualtrics and is sub-divided into four parts. The first part is introduced after having watched the video, the scale used is composed by nine, seven-point Likert-type items which measure the emotional response from watching the video, that is, from interaction with the receptionist. The scale used for the first part derives from research by Price et al. (1994)[46] on consumers' emotional responses to service encounters and its reliability is equal to 0.92 for positive items and 0.88 for negative ones. The second part consists of two different scales used to measure both perceived ease of use and satisfaction service encounter. The first scale used is consists of three items regarding perceived ease of use deriving from research by Davis[47] (1989) (Cronbach's Alpha 0.94), while the second scale used consists of six items which measure customer satisfaction. The latter was taken from a study by Van Dolen[48] et al. (2002) and its reliability for customer interaction is 0.88. Subsequently, to assess attachment style, a scale including sixteen items deriving from a study by Collins and Read[49] (1990) (Cronbach's Alpha 0.72)

[46] Price L. L., Arnould E.J., Deibler S.L.; *Consumers' emotional responses to service encounters The influence of the service provider;* International Journal of Service Industry Management, 6,3:34-63

[47] Davis Fred D., *Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology*, MIS Quarterly, Vol. 13, No. 3 (Sep., 1989), pp. 319-340

[48] Van Dolen W., Lemmink J., De Ruyter K., De Jong A., *Customer-sales employee encounters: a dyadic perspective*, Journal of Retailing, 2002 - Elsevier

[49] Collins N. L., Read Stephen J.; *Adult Attachment, Working Models, and Relationship Quality in Dating Couples*; Journal of Personality and Social Psychology1990, Vol. 5 8, No. 4, 644-663

was used. Lastly, a scale including only three items from a study by Babin[50] et al. (2005) was used to assess WOM (Cronbach's Alpha 0.90). All items were measured on a seven-point Likert scale ranging from 1 indicating strongly disagree to 7 indicating strongly agree. The survey was distributed among 224 individuals of which only 175 responded completely. The remaining 49 discarded responses derive from two main factors. Firstly, the response time for the questionnaire was excessively reduced in order to have responded accurately and consciously. Secondly, the interruption of the questionnaire that led to incomplete replies. Respondents were contacted through an anonymous link generated by Qualtrics and subsequently sent through applications (Facebook and Whatsapp). The sample mainly includes Italian university students thus bringing the average age to 29. Age varies from minimum 19 to max. 67, of which 44% are women and 56% are men. With regards to details on the questionnaire, please refer to the attachment.

Data analysis

Data related with the questionnaire provided through Qualtrics was exported to SPSS in order to be analyzed. To assess the validity of our theories, we applied Model 7 by Andrew F. Hayes, updated to version 3.3 of SPSS. Initially, we carried out an exploratory factor analysis to assess any co-relation between the variables and in turn, to test the theories. In this way, we managed to observe which items measure which factors. In particular, the component matrix shows the Pearson correlation between components and items. Adopting factor analysis, we found that the main co-related components were related to satisfaction and WOM (ref. figure 6 on attachment). Specifically, we noted that:

1) All the items created a single component both for WOM and for satisfaction; however, with regards to the latter, 5 components out of 6 were acceptable. (the reverse did not obtain an acceptable value)
2) The co-relation of the acceptable values was high
3) The reliability monitor test yielded rather high Cronbach's Alpha values both for Satisfaction (0.920) and for WOM (0.927) and this implies that internal solidity is high level.

In any case, it should be emphasized that we didn't find the same solidity level for attachment style, emotional response and perceived ease of use. In the latter cases, we found a cross loadings problem in contrast with previous studies carried out in specular contexts. By generally observing the data, we find that about 60% of the respondents found it rather easy to interact with the human receptionist as well as the robot. In order to study the theories, we set a significance level of 0.05 and assigned the value of 1 to the people who interacted with the robots and a value of 2 to those who interacted with humans. At this point, we shall proceed and analyze each single theory.

[50] Barry J. Babin, Yong-Ki Lee, Eun-Ju Kim, Mitch Griffin ; *Modeling Consumer Satisfaction and Word-of-Mouth: Restaurant Patronage in Korea*; Journal of Services Marketing Volume 19 · Number 3 · 2005 · 133–139

Results

H1.

By applying the above-mentioned model, we tested the first theory, then we observed the direct effect yielded by the independent variable (robot/human) on the dependent one (WOM). In particular, we expected that the interaction with the robot in relation to the human would lead to an increased WOM. We found p-value = 0.3442 ($p > 0.05$) and adverse bootstrapping (LLCI = -.3283; ULCI = .1152) which did not confirm our first hypothesis (ref. figure 5).

H2.

By observing figure 5, we gather how the second theory was confirmed by p-value = .0414 ($p < 0.05$) and a favourable bootstrapping (LLCI = -2.4915; ULCI = -.0501). If we observe the negative coefficient, we see that theory ($\beta = -1.2708$) is confirmed and it is in favour of robots. This implies that people are generally more prone to be satisfied when interacting with robots rather than with humans.

H3.

In the third theory, we studied the moderation factor yielded by the age of the respondents in light of the relationship which occurs between the independent variables and the mediator (Satisfaction). In particular, we expected young people to be more satisfied when perceiving interaction with robots and not with humans. This theory was confirmed because the p-value was less than 0.05 and favourable bootstrapping (p-value = .0357; LLCI = .0030; ULCI = .0855). This means that the indirect effect of conditions on WOM through satisfaction depends on the age.

H4.

In conclusion, in the third theory, we tested whether the relationship between robot-human and WOM was effectively mediated by satisfaction. Specifically, in line with numerous literature studies, we expected that increased satisfaction would have yielded more WOM. We found that this assumption was confirmed because the p-value was below 0.05 and favourable bootstrapping (p-value =.0000; LLCI =.7420; ULCI = .9191).

With regards to the tables related with SPSS output, please refer to attachment (figure 5).

Theoretical implications

Taking our sample and the average age of the respondents into due consideration, we expected confirmation of our first theory (in line with the reference literature). Wary of the fact that the average age of our respondents was not too high (29), we thought young people would be more involved in interactions with robots and that they would have been more prone to disseminate positive WOM. Moreover, if we think about our present era, young people are generally tech savvy and keen on sharing their emotions, thoughts and sensations through new as well as old models of WOM. Probably, the lack of this behaviour in our study might depend on the fact that the individuals did not develop any real emotional relationship during service encounter thus they didn't share this experience with the others. Having simulated the encounter without any real, direct approach restricted any involvement of the people who responded. As we said previously, in order to influence WOM, it is important to make consumers feel at home and this could easily occur through direct interaction rather than interaction mediated by having viewed the video; least likely it is to explain the lack of correlation from previous studies in which older adults had been observed, that is, the possibility that humans could perceive a robot as a partial threat for his/her own future in the labour market.

The results in the second theory should not come as a surprise because, having handed out the questionnaire to relatively young people, we did expect to find more interaction with robots. Perception given by interaction with an android rather than a human would surely astound the customer, who certainly will not expect to be received by an android capable not only of carrying out its work (check-in operations), but recommend a place to dine as well. It is indeed this surprise effect that will convey a certain level of satisfaction to the consumer; the latter will surely remember this encounter both positively and negatively. If we add the possibility of the encounter to be highly positive, this could very well lead to positive word-of-mouth.

The moderation factor in this study is fundamental because age became crucial when defining the theories and the ways to interpret them. This factor becomes even more crucial in the third theory where it was found that young people are more satisfied when perceiving interaction with robots. With respect to the previous ones, this study shows how the age of respondents could effectively influence perception during a service encounter. In particular, the graph shows that as age increases, satisfaction for interaction with humans increases, while with robots it decreases (ref. figure 7). Furthermore, by studying the flow of the straight lines and their slope constants it is clear that:

- The drop in satisfaction with robots is faster with respect to the increase in satisfaction with humans.
- At the age 29, the individuals would be equally satisfied in perceiving interaction with robots or another human. This aspect is the point of indifference because the under 29s tend to be more satisfied with the perception of robotic interaction while those who are over 29 prefer to interact with humans.

- Concerning the period shown in the related figure (13 years), the difference between the two perceptions changes considerably; by expanding the graph, we can see how the initial satisfaction level given by interaction with a robot (4,62) will never be exceeded in the lifetime of a common person considering the scarce slope of the human interaction line.

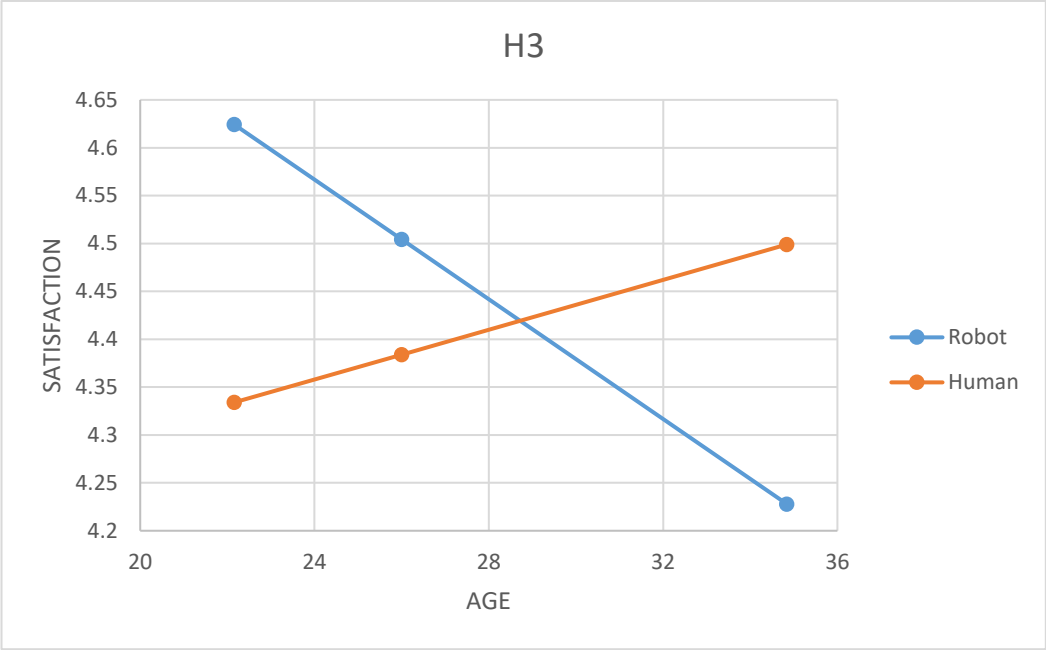

Figure 7.

In general, many consumers still have to date little experience with new technologies, especially those who were born in the period between the “baby boomer” and “X” generations. This can lead people to perceive anxiety when approaching robots especially if there are problems during interaction.

Lastly, we studied how, in robot-human relationships, major satisfaction assures more WOM. Many studies found this relationship in various sectors, although in the HRI field, this concept has remained rather unexplored. Undoubtedly, the capability of robots and their personalities play a key role in the achievement obtained with service encounters. In any case, the assumption given by our H4 cannot be totally generalized because the relationship between customer satisfaction and WOM depends undoubtedly on the features in the sector in which we are operating. On the other hand, satisfaction is often generated by service failure situations, thanks to the ability of providers to compensate. Clearly, in these cases, the probability of positive WOM is low, but not to be completely excluded. In the context of our studies, positive WOM would depend on the ability of robots to convey positive perceptions to the customer thus creating pleasant interaction.

Managerial implications

Our study provided important details for people who operate in the hospitality sector or who would like to benefit from the help of androids in the world of services. From the results obtained, we can see how

fundamental it is to satisfy customers. In particular, having found that young people prefer to interact with robots and not with humans, it would be possible to gradually introduce the latter with human support. In this way, the anthropic work load could be reduced without encountering any problems deriving from incapability of robots to cope with all types of complaints; having studied how the age factor influences perception, we can then implement customer satisfaction strategies. In fact, if we know that our targets are rather young people, we could use more human-robot interactions with human personnel assistance; viceversa, if our reference targets are adults, we would less likely adopt robotic solutions. In this way, we would be able to maximize our customers' satisfaction so that our company could focus more on the consumers' demands thus maintaining quality standards. In relation to our studies, if we are capable of making customer experience particularly satisfying, people would then likely interact with our company and use positive word-of-mouth which in turn will bring further benefits such as awareness, loyalty and revenues.

Limitations and future research

Despite the fact that our analysis produced satisfying results, some aspects could have influenced our study. It is important to note how the first limitation of our survey was given by the selection of a strongly homogeneous age sample. In fact, a more heterogeneous choice would have strongly influenced the results of the first theory, but probably also emotional response, attachment style and perceived ease of use. Another barrier might have been produced by country limitation because the questionnaire was given only to Italian respondents; culture influences perception of services and interaction very much. Lastly, the remaining limitation derives from failing to interact actively with the receptionist since direct interaction would have surely attracted and thrilled the individuals, thus making the experiment and results more realistic and true. However, the disposable resources such as technology, money and time did not allow us to deal with the study in a complete way.

In the future, we recommend extending the study not only within the hospitality sector, but in other sectors as well so as to outline how culture influences perception (e.g. collective culture against individual culture). In order to assure further insights, humanoids and robots could be compared, the preferences during service encounter and whether there are quite positive perceptions in interaction with humans.

Lastly, considering that currently these technologies are not being used, we would recommend repeating the study in the years to come to check the changes in the light of evolution and compliance of people with technology.

Conclusion

In conclusion, if robots resemble humans, it will be easier for young people to accept them and probably for older people as well, according to the Uncanny valley paradigm. If it is capable of making people perceive pleasant sensations during the day and feel at ease during service encounters, strong satisfaction will occur

during. Considering the results of our study and the ones in the past, if satisfaction occurs, probably there will be greater positive WOM, while if the customer is unsatisfied, the probability of negative WOM is higher. In line with Role Theory, satisfaction will be greater when interacting with robots in cases where expectations are respected during his task. In case the expectations are exceeded, there is a good chance that customers share by positive WOM. In the light of what robots should be able to repeat human interaction both physically and emotionally in order to make customers feel at home without being too "human" and consequently jeopardize the encounter due to potential apprehension. This model establishes that if the afore-mentioned situation should occur, robots will be able to assure quality, homogeneous service by reducing personnel costs and improving efficiency. On the other hand, probably the limits determined by the robots' inflexibility and limited cognitive and emotional ability will make them useless in all sectors and contexts. Physical contact, exchange of opinions, gesturality, appearance and behaviour which make a difference between one service encounter and another, will never be replicable by androids. Currently, machines are able to carry out standard tasks better than humans, but service relations are not based only on the final product, but also on the process which brought customers to acquire a service. Therefore, despite the efforts made, it will be hard to transpose relations among humans into relations between humans and robots.

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Appendix:

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**************************************************************************
OUTCOME VARIABLE:
 WOM

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .8165      .6667      .5972   172.0633     2.0000   172.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant     1.4467      .2712     5.3352      .0000      .9115     1.9820
Conditio     -.1066      .1123     -.9486      .3442     -.3283      .1152
Satisfac      .8306      .0449    18.5173      .0000      .7420      .9191

****************** DIRECT AND INDIRECT EFFECTS OF X ON Y *****************
```

```
**************************************************************************
OUTCOME VARIABLE:
 Satisfac

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .1675      .0280     1.6874     1.6448     3.0000   171.0000      .1809

Model
              coeff         se          t          p       LLCI       ULCI
constant     6.5875     1.0114     6.5135     .0000     4.5912     8.5839
Conditio    -1.2708      .6184    -2.0550     .0414    -2.4915     -.0501
Q3           -.0755      .0340    -2.2181     .0279     -.1427     -.0083
Int_1         .0443      .0209     2.1174     .0357      .0030      .0855

Product terms key:
 Int_1    :        Conditio x        Q3
```

Figure 5.

Questionnaire:

Please use this scale to answer the questions from 1 to 16:

1. Strongly disagree
2. Disagree
3. Disagree somewhat
4. Neither agree or disagree
5. Agree somewhat
6. Agree
7. Strongly agree

Attachment Style questions:

1. I feel a certain amount of anxiety in my relationships with others.

   1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

2. My desire to be close to others scares people away.

   1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

3. I often need reassurance from others in my relationships.

   1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

4. I want to merge completely with another person.

   1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

5. I find that others don’t want to get as close as I would like.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

6. I get nervous if others are not available when I need them.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

7. I find it difficult to allow myself to depend on others.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

8. I don't like it when others get too close to me.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

9. I find it difficult to trust others completely.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

10. I try to maintain a certain amount of distance between myself and others.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

11. I am very self-reliant in my dealings with others.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

12. I often discuss my problems and concerns with others.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

13. I turn to others in times of need.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

14. I find it relatively easy to get close to others.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

15. I enjoy giving support to others.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

16. I am comfortable depending on others.

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐

In line with the previous scheme:

Emotional response questions:

In line with what you have previously seen, rate how do you feel:

Happy

Warm-hearted

Caring

Affectionate

Loving

Sad

Sorry

Regretful

Angry

Perceived ease of use questions:

Interacting with the receptionist did not require a lot of my mental effort.

I found the interaction with the receptionist easy

My interaction with the receptionist is clear and understandable.

Satisfaction questions:

This was one of the best encounters I could have had.
This encounter was exactly what I needed.
I am satisfied with this encounter.
I have truly enjoyed this encounter.
This encounter was a good experience.
I am not happy with this encounter. (r)

WOM questions:

I will say positive things about this hotel to other people

I will recommend it to someone who seeks my advice

I will encourage friends and relatives to visit the hotel

Factor analysis

Figure 6.

Component Matrix[a]

	Component
	1
Q12 – I will say positive things about this hotel to other people	.933
Q12 – I will recommend it to someone who seeks my advice	.918
Q12 – I will encourage friends and relatives to visit the hotel	.928

Extraction Method: Principal Component Analysis.

Reliability Statistics
WOM

Cronbach's Alpha	N of Items
.920	3

Component Matrix[a]

	Component
	1
How would you evaluate the encounter from 1 to 7? - This was one of the best encounters I could have had	.854
How would you evaluate the encounter from 1 to 7?- This encounter was exactly what I needed	.778
How would you evaluate the encounter from 1 to 7?- I am satisfied with this encounter	.928
How would you evaluate the encounter from 1 to 7?- I have truly enjoyed this encounter	.932
How would you evaluate the encounter from 1 to 7?- This encounter was a good experience	.901

Extraction Method: Principal Component Analysis.

Reliability Statistics
Satisfaction

Cronbach's Alpha	N of Items
.927	5

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Department of Business and Management

Chair of Marketing Plan & Markstrat Simulation

The relationships between humans and robots in the service encounters:

The role of satisfaction and age

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Abstract

Thanks to technological evolution, we are increasingly interacting with robots or artificial intelligence systems. In particular, academic literature includes an increasing number of studies regarding relationships between humans and androids (HRI). This study hereby explores the differences in perception during robot-human and human-robot interaction in a service encounter. Using the data acquired through the distribution of a survey to 175 Italian respondents, we analyzed the effects of this interaction at a reception point in a hotel. Specifically, we observed how people generally tend to be more satisfied when interacting with a robot rather than a human. Moreover, it made us aware of how age can influence this relationship following studies on how young people are more satisfied when perceiving interaction with a robot. Lastly, we noted that greater satisfaction produces more WOM. In any case, perception of interaction with robots does not produce greater WOM.

Introduction

"The best advertising is done by satisfied customers". This is how Philip Kotler, a well-known professor and luminary in the field of marketing, relates satisfaction with the world of advertising and dissemination of information. The role of satisfaction is at the base of his statement. In fact, a satisfied consumer would be more willing to share a brand, product or service with other people thus bringing substantial benefits to a company. In order to make our customers become ambassadors, we will have to satisfy their expectations through product performance or service performance or unforgettable experiences. In this context, the capability of the brand or service suppliers to establish good communication with customers is of utmost importance. Our study will focus on the analysis of perceptive-communicative differences between humans and robots within a service encounter context. Specifically, the hospitality sector is one of the most rapidly expanding ones and services for every type of consumer can easily be adapted therein. For this reason, we have decided to develop our study by simulating interaction with a hotel receptionist and subsequently testing our theories on the basis of perceptions deriving from human-human or human-robot contact. This context includes there is a variable which stems from WOM which in turn derives from the interaction process during service encounter through mediation given by customer satisfaction. Moreover, the age of respondents as a moderation factor was taken into due consideration in the model. Actually, it is positive WOM which becomes the final product that companies should strive for and focus most of their efforts on, because people tend to really believe in what is suggested to them by common people rather than trust company advertising techniques. Therefore, rather than invest in advertising, it might be more profitable to invest in customer satisfaction. In a nutshell, customers' needs must be clear in our minds before we can fully satisfy them, in order to obtain positive WOM for the purpose of increasing awareness, loyalty and revenues.

The study provides an introduction split into each single factor taken into consideration in the model. Therefore, in the light of the co-related literature, we shall discuss the robot - human relationship (HRI), the context of service marketing focusing on service encounters, the roles of satisfaction and WOM respectively. Subsequently, the four theories (comprising supportive literature) as well as the model adopted will be introduced; following this, there will be a data collection method and related analysis which follows the order of introduction of the theories. We shall then derive the theoretical and managerial implications and finally, we shall reach a conclusion including the main limitations, thus proposing further hints for research.

Human-Robot Interactions:

Human-Robot Interaction (HRI) is still studied very much especially in reference to the improvement of people's lives in the years ahead. This is the reason why it is fundamental to provide the context and procedures through which interaction between man and robot occurs. Interaction can be defined as communication between man and robot in HRI as well. This type of communication can occur in different ways and with

different procedures and can depend on different factors, but it is essential to distinguish when and where it can occur. We can split this type of communication into Remote Interaction and Proximate Interaction. In the first type, the actors will not be placed close to one another, but there will be a certain time and/or space distance, while in the second category, robots and humans will interact in the same room. Interaction efficiency will derive from Interaction Time[51], that is, time required for communication or robot training, mental effort for interaction[52], situation awareness [53] deriving from interaction and the amount of shared understanding[54]. There are two aspects that will determine how information is exchanged: means of communication and its format. The first aspect concerns use of our senses. In particular, reference is to be made to sight, hearing and touch through the use of visual displays, gestures, speeches, audio or physical interaction. The format depends on the domain used. One of the most interesting theories on human-robot interaction is certainly ”Uncanny valley theory”. This theory was introduced in 1970 by Masahiro Mori; he studied how the sensation of pleasantness and familiarity deriving from interaction with a humanoid would foster human resemblance to the point where realism not only creates a drop in positive reactions, but also a sensation of apprehension and anguish. However, according to Yu Chung-en[55] (2018), although this effect can occur in the reactions, the latter would depend on perception of the researcher because the non verbal cues play a fundamental role in service perception. From this aspect, it is simple to grasp how the ease of formulating our impressions is extremely important in relationships. The Expectation Confirmation Theory asserts that people set their expectations regarding technology on appearance until performance assessment is either confirmed or denied. In this sense, it has been proven that the aspect and procedures of interaction are fundamental for the perception of relationships between humans and robots.

The next part includes an extensive study of relationships between humans and robots in the service encounter marketing context.

Service Marketing & Service Encounters

Interaction mostly occurs in the service marketing sector, that is, the wide marketing strategy category which focuses on the sale of any type of physical goods. In this domain, we can define service robots as “System-based autonomous and adaptable interfaces that interact, communicate and deliver services to an organization’s customers. In a frontline service setting, they represent the interaction counterpart of a customer and therefore can be viewed as social robots”[56]. Wirtz et al. (2018) have outlined the main differences between service robots and frontline employees. In particular, service employees need training and can be exposed to bias thus are prone to become highly competitive and are able to think creatively (out-of-box); service robots do not require training, they are relatively exposed to bias, thus cannot be highly competitive and have limited thinking skills. Numerous studies have been carried out in order to observe interaction between robots and humans both in proxemics and service marketing sectors. Studies were carried out on how humans tend to prefer a more intimate approach with androids by physical interaction

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over verbal interaction[57]. Furthermore, people generally prefer humanoid robots over mechanical ones[58]. In line with this theory, preferences for given traits have influenced research participants and made them avoid contact with all types of robots[59]. This conclusion leads us to state that those who preferred humanoid robots tended to allow any robot which they interacted with to come into closer contact with respect to those who preferred mechanical robot[60].

Satisfaction

We could define satisfaction as an emotional reaction of happiness that occurs when a goal or wish has been achieved. Like all other emotions, satisfaction can be included among behaviour motivators because they play an essential role in all fields of human science. The first study of customer satisfaction was carried out in 1965 by Cardozo[61]. Satisfaction is defined as a response of customers deriving from inconsistency between expectations prior to consumption and post-consumption perception[62]. Petruzellis et al. state that consumers would be satisfied when their expectations are fulfilled; very satisfied when expectations are exceeded and totally satisfied when they gain more than what they expected[63]. According to Fornell, the first element to see in order to assess service satisfaction is perceived quality, while the second one is perceived value[64]. Although perceived value appears in different moments of the purchase process, fulfillment is always considered as post-consumption assessment. Oliver[65] (1997) defines satisfaction with a service provider as response to service encounter, both emotionally and assessment-wise. We have observed how satisfaction of customers depends on dyadic interaction between customers and service providers. Moreover, in pure services where there is no exchange of goods and the quality of the service is hard to measure, customer satisfaction can only be determined by service encounter quality. The Expectation Disconfirmation Paradigm developed by Oliver is in line with the above-mentioned studies and it is at the base of other given theories regarding customer satisfaction. This concept describes the satisfaction development process. Starting from the comparison between expectations and results obtained from interaction, there will be an assessment which would confirm or disconfirm the value of the perceptions. The expectations could be active or passive. The former would easily be disclosed by consumers; the latter are barely processable. Confirmation will occur when expectations are in line with the perceptions, otherwise, there would be disconfirmation. Concerning the latter, disconfirmation may be positive or negative. If the service offered exceeds the expectations, positive disconfirmation is obtained; conversely, if the expectations exceed the service, negative disconfirmation is obtained. In conclusion, current studies have shown how service encounters can have a positive impact on satisfaction. Unfortunately, most current literature focuses only on adopting robots in service marketing instead of studying the relationships between humans and androids including related perceptions.

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Word-Of-Mouth (WOM)

Word-of-Mouth can be defined as disclosure of information, ideas and opinions about a given product or service which occurs among people who trust one another. It usually stems from an informal exchange of opinions among interlocutors who are not interested parties because they are actually those individuals who have come into contact with the given product or service. In recent years, WOM has become a very effective marketing tool thanks to technological development. Indeed, the Internet enables fast dissemination of information in many different ways, thus enabling data collection and monitoring of derived results. WOM aims at developing new consumer – consumer and consumer-seller relationships through the communication tools thus bringing benefits to both parties; therefore, the actual marketing target groups themselves will be disseminating the messages. Generally, WOM could be positive or negative thus generating either recommendations or complaints. It has been shown that, with respect to the positive one, negative word-of-mouth has major effects on consumers even though it is moderated by the power of the brand itself and the information we remember[66]. Mazzarol[67] et al. (2007) revealed that the value of the forwarded message and the how strong it is forwarded enhance the possibility of there being word-of-mouth. Dissemination of information could condition perceptions concerning service quality. In particular, this occurs prior to purchase of a product because consumers are not sure of what type of service they would receive.

Theoretical Background

Taking into due consideration the literature studied to date, we can see the co-relation between WOM and satisfaction. In particular, numerous studies have demonstrated that when expectations are exceeded, a great level of satisfaction will influence WOM. Unfortunately, in the field of Human-Robot Interaction, studies co-related with WOM are quite lacking. In general, in order to intensify WOM, consumers need to become excited and astounded. We observed that customers tend to be impressed by innovative services because the latter can assure something new and unexpected in reference to a service encounter. Therefore, these services would exceed expectations thus generating satisfaction and eventual WOM[68]. The aspect and procedure for interaction with robots are fundamental in perception of people before and after interaction as well[5]. Strait et al. (1997) studied robotic communication and noticed how robots which interact with people following a human behavioural pattern are perceived as effective, when interaction is observed, but not necessarily when an individual is directly interacting with a robot[69]. Turkle (2011) studied human-robot interaction and came to the conclusion that people could feel more at ease interacting with a robot[70]. Although the robot used in the experiment hardly resembled a human, the average age of those who took part in the study was relatively low. Therefore, we can suppose that:

H1: We expect higher WOM for perceived interaction with robots compared to humans

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[66] Herr, P.M., Kardes, F.R. and Kim, J. (1991), *"Effects of word-of-mouth and product attribute information on persuasion: an accessibility-diagnosticity perspective"*, Journal of Consumer Research, Vol. 17, 1991, pp. 454-62.
Laczniak, R.N., DeCarlo, T.E. and Ramaswami, S.N. (2001), *"Consumers' response to negative word-of-mouth communication: an attribution theory perspective"*, Journal of Consumer Psychology, Vol. 11 No. 1, 2001, pp. 57-73.

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In a service encounter, customers often assure identification by trust, involvement or WOM in reference to service providers who can offer not only an emotional value, but a social one as well. Regarding services provided by robots, according to the Technology Acceptance Model, the customer's desire to adopt new technology will depend on the use of it and the perception concerning it. Therefore, it is easy to understand how acceptance of services provided by robots depends on their capability of coping with the relational, social and functional needs of customers[9]. Seeing that consumers generate expectations not only on the final result but on interaction as well, robots would have to create a snug service encounter for the customer, so as to assure a given level of satisfaction that would become a useful attitude for service providers.
There are very few studies in service marketing concerning comparison between robots and humans in relation to customer satisfaction. Despite this, Stock & Merkle[17] (2018) analyzed behavioural relationships which occur between humans and robots. By studying the relationships in light of Expectancy Disconfirmation Paradigm, they observed how the innovative hints given by an interaction with a Humanoid Service Robot (HSR) exceed customer expectations thus generating satisfaction in customers. Merkle[71](2019) also added that customer satisfaction deriving from a meeting with a robot (HRI) is completely comparable with the one deriving from a human meeting (FLE). The same study was used to monitor how service robots manage to create more customer satisfaction after service failure with respect to human – human interaction. Considering the results obtained in previous studies and the average age of our respondents:

H2: We expect higher satisfaction for perceived interaction with robots compared to humans

Numerous studies take age into due consideration as a control variable, although it is quite rare to find articles which take this factor into due account when assessing HRI. Brandl[72] et al. (2016) studied robot-human interaction and noted how age was not connected with perceptions regarding robots, in contrast with research carried out by Yu Chung-En[5] (2018), who stated that men and women in different age groups have conflicting perceptions of robots.
Hudson[73] et al. (2017) observed how young men living in big cities tended to use robots. Research carried out in the hospitality sector in Russia revealed how young people are in favour of using robots in hotels[74]. In the same sector, Ivanov et al. (2018) stated that people under 30 were slightly more skeptical towards robots with respect to the over 30s. In any case, the latter seems to buck the trend in reference to common literature in the given field because, generally, young people are more accustomed to using technology, therefore are more in favour of innovation. At this point, we can affirm that:

H3: Age will moderate the relationship between condition and satisfaction. Specifically, we expect younger respondents to be more satisfied when they perceived to interact with robots compared to humans.

Literature has many times over demonstrated that satisfaction and WOM are closely related. As we have previously said, there are many reasons to believe that not everyone who is satisfied will contribute positively to WOM. Research carried out by Bodo Lang[75] (2011) brought to light differences related to perceived satisfaction in encounters with different types of service providers and effects on WOM. He discovered that

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in longer and more exciting service encounters, satisfied consumers tended to adopt word-of-mouth, while in more rational and shorter encounters, dissatisfied consumers tended to use more word-of-mouth than those who were satisfied. Although there is no research in the field of service encounters in relation to perceived differences between robots and humans, according to previous literature:

H4: The robot/human relationship and WOM will be moderated by satisfaction. Specifically, higher satisfaction will lead to higher WOM

Framework of the study

This study aims at analyzing how different types of interaction, which can occur between robots and humans, influences WOM. In this sense, we thought of completing the model with the moderation factor given by age and the one given by satisfaction. In particular, the following have been assumed: a direct effect given by different interactions on WOM, a moderation effect given by the age of respondents on customer satisfaction during service encounter, a mediation factor given satisfaction when mediating the effect of independent variables (Robot / Human) on WOM (Independent variable).

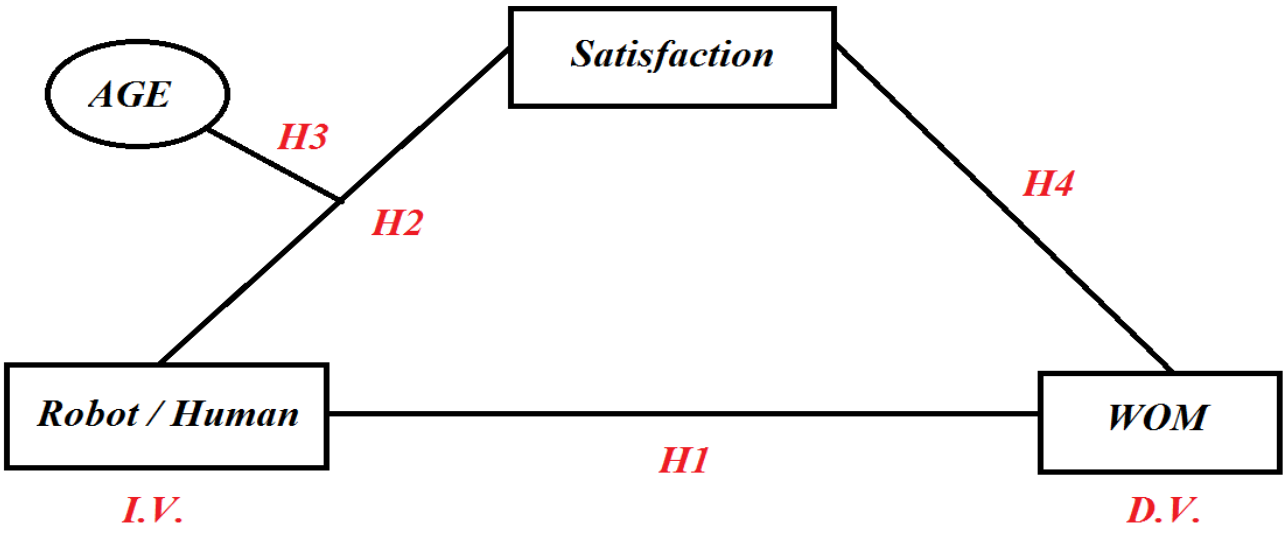

Figure 1. Proposed model

In order to refute these theories, a questionnaire was provided to assess emotional response, presence of attachment anxiety, perceived ease of use and any possible WOM. The beginning of this questionnaire contains a short video which serves as stimulus for subsequent answers as well as questions related to gender and age. The 25 second video includes the simulation of interaction between a human and a hotel receptionist. The questionnaire was structured in such a way that the respondent, on the basis of his gender, could observe either male interaction (in case the male gender was selected) or female interaction (if the female gender was selected). Furthermore, the questionnaire included randomization in order to obtain an even number of interactions both with the human receptionist and the individual with robotic features. Specifically, during interaction it was asked to check-in at a hotel, then the receptionist would ask for the name in order to conclude

the operation and, before ending the interaction, the human would ask for information on a good restaurant and obtain an answer from the receptionist. The type of interaction is standardized, in fact, the only parts that vary are the customer's voice and (male /female) and receptionist (human/robot).

Methodology

Sample and data collection

Data is collected by using a questionnaire set up on the online platform Qualtrics and is sub-divided into four parts. The first part is introduced after having watched the video, the scale used is composed by nine, seven-point Likert-type items which measure the emotional response from watching the video, that is, from interaction with the receptionist. The scale used for the first part derives from research by Price et al. (1994)[76] on consumers' emotional responses to service encounters and its reliability is equal to 0.92 for positive items and 0.88 for negative ones. The second part consists of two different scales used to measure both perceived ease of use and satisfaction service encounter. The first scale used is consists of three items regarding perceived ease of use deriving from research by Davis[77] (1989) (Cronbach's Alpha 0.94), while the second scale used consists of six items which measure customer satisfaction. The latter was taken from a study by Van Dolen[78] et al. (2002) and its reliability for customer interaction is 0.88. Subsequently, to assess attachment style, a scale including sixteen items deriving from a study by Collins and Read[79] (1990) (Cronbach's Alpha 0.72) was used. Lastly, a scale including only three items from a study by Babin[80] et al. (2005) was used to assess WOM (Cronbach's Alpha 0.90). All items were measured on a seven-point Likert scale ranging from 1 indicating strongly disagree to 7 indicating strongly agree. The survey was distributed among 224 individuals of which only 175 responded completely. The remaining 49 discarded responses derive from two main factors. Firstly, the response time for the questionnaire was excessively reduced in order to have responded accurately and consciously. Secondly, the interruption of the questionnaire that led to incomplete replies. Respondents were contacted through an anonymous link generated by Qualtrics and subsequently sent through applications (Facebook and Whatsapp). The sample mainly includes Italian university students thus bringing the average age to 29. Age varies from minimum 19 to max. 67, of which 44% are women and 56% are men. With regards to details on the questionnaire, please refer to the attachment.

Data analysis

Data related with the questionnaire provided through Qualtrics was exported to SPSS in order to be analyzed. To assess the validity of our theories, we applied Model 7 by Andrew F. Hayes, updated to version 3.3 of SPSS. Initially, we carried out an exploratory factor analysis to assess any co-relation between the variables and in turn, to test the theories. In this way, we managed to observe which items measure which factors. In particular, the component matrix shows the Pearson correlation between components and items. Adopting factor analysis, we found that the main co-related components were related to satisfaction and WOM (ref. figure 6 on attachment). Specifically, we noted that:

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[76] Price L. L., Arnould E.J., Deibler S.L.; *Consumers' emotional responses to service encounters The influence of the service provider;* International Journal of Service Industry Management, 6,3:34-63

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[80] Barry J. Babin, Yong-Ki Lee, Eun-Ju Kim, Mitch Griffin ; *Modeling Consumer Satisfaction and Word-of-Mouth: Restaurant Patronage in Korea*; Journal of Services Marketing Volume 19 · Number 3 · 2005 · 133–139

4) All the items created a single component both for WOM and for satisfaction; however, with regards to the latter, 5 components out of 6 were acceptable. (the reverse did not obtain an acceptable value)
5) The co-relation of the acceptable values was high
6) The reliability monitor test yielded rather high Cronbach's Alpha values both for Satisfaction (0.920) and for WOM (0.927) and this implies that internal solidity is high level.

In any case, it should be emphasized that we didn't find the same solidity level for attachment style, emotional response and perceived ease of use. In the latter cases, we found a cross loadings problem in contrast with previous studies carried out in specular contexts. By generally observing the data, we find that about 60% of the respondents found it rather easy to interact with the human receptionist as well as the robot. In order to study the theories, we set a significance level of 0.05 and assigned the value of 1 to the people who interacted with the robots and a value of 2 to those who interacted with humans. At this point, we shall proceed and analyze each single theory.

Results

H1.

By applying the above-mentioned model, we tested the first theory, then we observed the direct effect yielded by the independent variable (robot/human) on the dependent one (WOM). In particular, we expected that the interaction with the robot in relation to the human would lead to an increased WOM. We found p-value = 0.3442 ($p > 0.05$) and adverse bootstrapping (LLCI = -.3283; ULCI = .1152) which did not confirm our first hypothesis (ref. figure 5).

H2.

By observing figure 5, we gather how the second theory was confirmed by p-value = .0414 ($p < 0.05$) and a favourable bootstrapping (LLCI = -2.4915; ULCI = -.0501). If we observe the negative coefficient, we see that theory ($\beta = -1.2708$) is confirmed and it is in favour of robots. This implies that people are generally more prone to be satisfied when interacting with robots rather than with humans.

H3.

In the third theory, we studied the moderation factor yielded by the age of the respondents in light of the relationship which occurs between the independent variables and the mediator (Satisfaction). In particular, we expected young people to be more satisfied when perceiving interaction with robots and not with humans. This theory was confirmed because the p-value was less than 0.05 and favourable bootstrapping (p-value = .0357; LLCI = .0030; ULCI = .0855). This means that the indirect effect of conditions on WOM through satisfaction depends on the age.

H4.

In conclusion, in the third theory, we tested whether the relationship between robot-human and WOM was effectively mediated by satisfaction. Specifically, in line with numerous literature studies, we expected that increased satisfaction would have yielded more WOM. We found that this assumption was confirmed because the p-value was below 0.05 and favourable bootstrapping (p-value =.0000; LLCI =.7420; ULCI = .9191).

Theoretical implications

Taking our sample and the average age of the respondents into due consideration, we expected confirmation of our first theory (in line with the reference literature). Wary of the fact that the average age of our respondents was not too high (29), we thought young people would be more involved in interactions with robots and that they would have been more prone to disseminate positive WOM. Moreover, if we think about our present era, young people are generally tech savvy and keen on sharing their emotions, thoughts and sensations through new as well as old models of WOM. Probably, the lack of this behaviour in our study might depend on the fact that the individuals did not develop any real emotional relationship during service encounter thus they didn't share this experience with the others. Having simulated the encounter without any real, direct approach restricted any involvement of the people who responded. As we said previously, in order to influence WOM, it is important to make consumers feel at home and this could easily occur through direct interaction rather than interaction mediated by having viewed the video; least likely it is to explain the lack of correlation from previous studies in which older adults had been observed, that is, the possibility that humans could perceive a robot as a partial threat for his/her own future in the labour market.

The results in the second theory should not come as a surprise because, having handed out the questionnaire to relatively young people, we did expect to find more interaction with robots. Perception given by interaction with an android rather than a human would surely astound the customer, who certainly will not expect to be received by an android capable not only of carrying out its work (check-in operations), but recommend a place to dine as well. It is indeed this surprise effect that will convey a certain level of satisfaction to the consumer; the latter will surely remember this encounter both positively and negatively. If we add the possibility of the encounter to be highly positive, this could very well lead to positive word-of-mouth.

The moderation factor in this study is fundamental because age became crucial when defining the theories and the ways to interpret them. This factor becomes even more crucial in the third theory where it was found that young people are more satisfied when perceiving interaction with robots. With respect to the previous ones, this study shows how the age of respondents could effectively influence perception during a service encounter. In particular, the graph shows that as age increases, satisfaction for interaction with humans increases, while with robots it decreases (ref. figure 7). Furthermore, by studying the flow of the straight lines and their slope constants it is clear that:

- The drop in satisfaction with robots is faster with respect to the increase in satisfaction with humans.
- At the age 29, the individuals would be equally satisfied in perceiving interaction with robots or another human. This aspect is the point of indifference because the under 29s tend to be more satisfied with the perception of robotic interaction while those who are over 29 prefer to interact with humans.
- Concerning the period shown in the related figure (13 years), the difference between the two perceptions changes considerably; by expanding the graph, we can see how the initial satisfaction level given by interaction with a robot (4,62) will never be exceeded in the lifetime of a common person considering the scarce slope of the human interaction line.

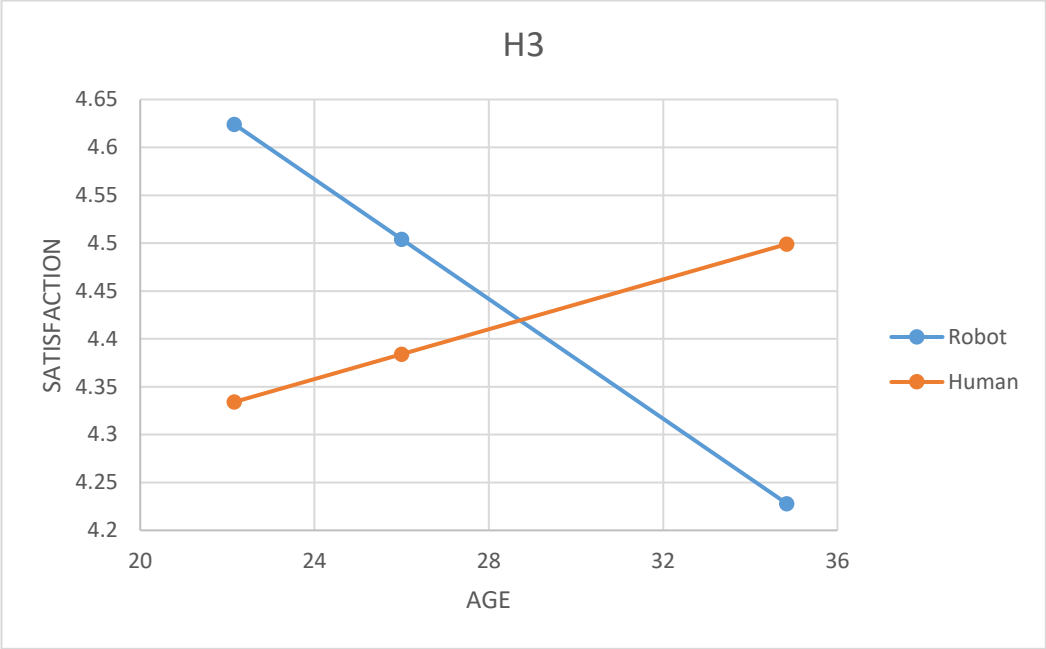

Figure 7.

In general, many consumers still have to date little experience with new technologies, especially those who were born in the period between the “baby boomer” and “X” generations. This can lead people to perceive anxiety when approaching robots especially if there are problems during interaction.
Lastly, we studied how, in robot-human relationships, major satisfaction assures more WOM. Many studies found this relationship in various sectors, although in the HRI field, this concept has remained rather unexplored. Undoubtedly, the capability of robots and their personalities play a key role in the achievement obtained with service encounters. In any case, the assumption given by our H4 cannot be totally generalized because the relationship between customer satisfaction and WOM depends undoubtedly on the features in the sector in which we are operating. On the other hand, satisfaction is often generated by service failure situations, thanks to the ability of providers to compensate. Clearly, in these cases, the probability of positive WOM is low, but not to be completely excluded. In the context of our studies, positive WOM would depend on the ability of robots to convey positive perceptions to the customer thus creating pleasant interaction.

Managerial implications

Our study provided important details for people who operate in the hospitality sector or who would like to benefit from the help of androids in the world of services. From the results obtained, we can see how fundamental it is to satisfy customers. In particular, having found that young people prefer to interact with robots and not with humans, it would be possible to gradually introduce the latter with human support. In this way, the anthropic work load could be reduced without encountering any problems deriving from incapability of robots to cope with all types of complaints; having studied how the age factor influences perception, we can then implement customer satisfaction strategies. In fact, if we know that our targets are rather young people, we could use more human-robot interactions with human personnel assistance; viceversa, if our reference targets are adults, we would less likely adopt robotic solutions. In this way, we would be able to maximize our customers’ satisfaction so that our company could focus more on the consumers’ demands thus maintaining quality standards. In relation to our studies, if we are capable of making customer experience particularly satisfying, people would then likely interact with our company and use positive word-of-mouth which in turn will bring further benefits such as awareness, loyalty and revenues.

Limitations and future research

Despite the fact that our analysis produced satisfying results, some aspects could have influenced our study. It is important to note how the first limitation of our survey was given by the selection of a strongly homogeneous age sample. In fact, a more heterogeneous choice would have strongly influenced the results of the first theory, but probably also emotional response, attachment style and perceived ease of use. Another barrier might have been produced by country limitation because the questionnaire was given only to Italian respondents; culture influences perception of services and interaction very much. Lastly, the remaining limitation derives from failing to interact actively with the receptionist since direct interaction would have surely attracted and thrilled the individuals, thus making the experiment and results more realistic and true. However, the disposable resources such as technology, money and time did not allow us to deal with the study in a complete way.
In the future, we recommend extending the study not only within the hospitality sector, but in other sectors as well so as to outline how culture influences perception (e.g. collective culture against individual culture). In order to assure further insights, humanoids and robots could be compared, the preferences during service encounter and whether there are quite positive perceptions in interaction with humans.
Lastly, considering that currently these technologies are not being used, we would recommend repeating the study in the years to come to check the changes in the light of evolution and compliance of people with technology.

Conclusion

In conclusion, if robots resemble humans, it will be easier for young people to accept them and probably for older people as well, according to the Uncanny valley paradigm. If it is capable of making people perceive pleasant sensations during the day and feel at ease during service encounters, strong satisfaction will occur during. Considering the results of our study and the ones in the past, if satisfaction occurs, probably there will be greater positive WOM, while if the customer is unsatisfied, the probability of negative WOM is higher. In line with Role Theory, satisfaction will be greater when interacting with robots in cases where expectations are respected during his task. In case the expectations are exceeded, there is a good chance that customers share by positive WOM. In the light of what robots should be able to repeat human interaction both physically and emotionally in order to make customers feel at home without being too “human” and consequently jeopardize the encounter due to potential apprehension. This model establishes that if the afore-mentioned situation should occur, robots will be able to assure quality, homogeneous service by reducing personnel costs and improving efficiency.

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