



The effect of non-facial emojis-text congruency on user satisfaction in chatbot interactions

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Abstract

Improving human–chatbot communication requires understanding how different design elements can make interactions clearer and more effective. This research examines emoji–text congruency as one mechanism that enhances user satisfaction in chatbot interactions. Across two experiments conducted in the travel (Study 1) and healthcare (Study 2) domains, we show that when emojis are semantically aligned with the accompanying text, users perceive the chatbot as more competent, which in turn increases satisfaction. To isolate this effect from anthropomorphic influences, the studies focus on non-facial emojis, which convey meaning without mimicking human expressions, thus avoiding potential discomfort associated with excessive human-likeness. However, the positive effect of congruency weakens when the chatbot adopts an overly informal language style. These findings highlight the importance of integrating visual and verbal cues coherently to improve user experience and inform the design of effective, professional virtual assistants.

Keywords Chatbots · Emojis · Competence · Paralanguage · User satisfaction

Large Language Model chatbots (LLM-chatbots) are virtual assistants that use Natural Language Processing (NLP) to simulate human dialogue. LLM-chatbots (hereafter chatbots) play key roles in marketing, especially customer service, offering multilingual support, instant responses, and round-the-clock availability (Li & Zhang, 2023; Smutny & Schreiberova, 2020). For instance, Bank of America’s AI-powered virtual assistant, Erica, assists customers with tasks such as problem-solving and personalized advice (Aggarwal, 2023). Similarly, KLM Royal Dutch Airlines

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employs chatbots to help passengers with flight check-ins, booking modifications, and travel-related questions, demonstrating the adaptability and convenience of LLM-based solutions (Daly, 2018). Chatbots' market is expected to grow by 23.3% over the next five years (Grand View Research, 2023), with projections suggesting they will handle 95% of online service interactions by 2028 (Chong et al., 2021).

Despite these advantages, chatbots are not without limitations. According to CGS (2019), 86% of consumers still prefer interacting with human agents due to frequent miscommunications with chatbots (Sheehan et al., 2020). Research indicates that such negative experiences lower users' perceptions of a chatbot's competence or ability to efficiently execute tasks (e.g., Cuddy et al., 2008; Nguyen et al., 2023). For example, Austrian Airlines' Messenger bot is designed to provide canned responses regardless of the customer's query, often resulting in irrelevant or incomplete answers that frustrate users and increase dissatisfaction (Leah, 2022).

User-chatbot interactions include non-verbal cues that complement written text. Consistency of a response is influenced by the extent to which different communicative tools are effectively integrated. The congruence between language and paralinguistic cues should be a way to avoid misunderstandings related to non-verbal textual cues by meeting linguistic expectations (Burgoon, 1995; Miller et al., 2016). For example, a chatbot saying "Hi there, I am your gardening assistant. How can I assist you today? 🌸" conveys coherence through a flower emoji that matches the topic. Conversely, the message "Hi there, I am your gardening assistant. How can I assist you today? 🔥" may disrupt this coherence, introducing surprise or novelty through the fire emoji that does not directly relate to gardening. While the first example shows how emojis can complement and visually support the message, the second illustrates how emojis can deliberately disrupt coherence to attract attention or provoke interest. This raises the question: How does the congruence between verbal and paralinguistic cues, such as text and emojis, influence users' satisfaction with the chatbot?

Past research shows contrasting findings on the effectiveness of (mis)matches in verbal and visual language. Some researchers find that consistency across modes improves processing fluency and clarity (Reber et al., 2004), with textual paralinguistic cues enriching digital communication by compensating for the absence of non-verbal cues like facial expressions (Luangrath et al., 2017). These elements help clarify tone and meaning, bridging the expressive limitations of text-based interactions. Other researchers suggest that moderate incongruity across communication modes can increase attention, memorability, and even humor, particularly in advertising or face-to-face communication (Halkias & Kokkinaki, 2013; Huang, 2020; Morioka et al., 2016). In chatbot interactions, it is still unclear whether consistency or inconsistency is more effective, and why.

We maintain that for chatbots, using emojis that are congruent with the accompanying text is particularly important because they lack the rich nonverbal cues, such as tone of voice, facial expressions, and gestures, that humans naturally use to convey emotion and intent (Xiao et al., 2024). Here, emojis may serve as a visual cue that relates to competence. While human communicators may be forgiven for ambiguous expressions, users tend to expect machines to behave with consistency and logic. Incongruent emojis, therefore, can seem more like design errors than stylistic choices (Adu-Mensah et al., 2024; Luger & Sellen, 2016). Moreover, efforts to humanize

chatbot interactions must be carefully calibrated. Overly anthropomorphic cues risk triggering discomfort, such as the “uncanny valley” effect (Mori, 1970). Thus, it becomes especially relevant to consider whether less human-like emojis, particularly non-facial ones, might offer a better balance by enhancing message clarity and coherence, and, in turn, higher perceived competence by the chatbot, without introducing features that feel exaggeratedly lifelike, appearing unrealistic or unsettling when delivered by a machine (Kaiser & Grosz, 2021; Muzakky et al., 2021). However, non-facial emojis have higher semantic complexity that may increase the risk of misinterpretation (Cao et al., 2024). Therefore, their use should be informed by a nuanced understanding of how language and paralinguistic cues are processed in human-computer interaction, ensuring that they support rather than hinder communication.

In line with this, we argue that congruence between text and non-facial emojis (NF emojis) can influence chatbot perceived competence, a core driver of satisfaction in customer service contexts (Grandey et al., 2005). This dimension becomes even more critical in AI-mediated service encounters, where users value performance-related attributes over personality-related ones (Gelbrich et al., 2025). We show that when text and NF emojis align coherently, user’s satisfaction increases because the chatbot is perceived as a competent agent.

Our work contributes to the literature on chatbot design (Crolic et al., 2022) by focusing on an underexplored form of textual paralinguistic (TPL): NF emojis. We investigate how these emojis influence user satisfaction, demonstrating that NF emojis enhance message effectiveness when congruent with the accompanying text. While our study focuses specifically on non-facial emojis, it does not compare their effects with facial emojis, and therefore the observed text–emoji congruency effect should not be interpreted as exclusive to non-facial emojis. This focus is especially relevant for chatbots, which lack the rich nonverbal cues that humans rely on to convey emotion and intent. We show that congruence of text-emojis serves as essential visual signals of competence. While much marketing research has focused on facial emojis and their effects on customer behavior (Orazi et al., 2023), our study highlights the communicative importance of the broader range of less lifelike emoji symbols in chatbot interactions.

Next, we contribute to the literature on digital service communication (Grewal et al., 2022) by showing that the positive effects of chatbots using semantically congruent emojis extend across different contexts, though their impact varies depending on the language style used. However, in line with prior research that highlights the importance of aligning chatbot communication with its intended role (e.g., Zhukova & Brehm, 2024), we find that the positive effects of congruent text and emojis diminish when the language becomes overly informal or vernacular. In sum, while congruent emojis and text can enhance communication, their effectiveness may be compromised if the language style is not carefully considered, emphasizing the need for a well-aligned tone that preserves both competence and context-appropriateness.

To test our hypotheses, we conducted two experiments in distinct service domains: travel (Study 1) and healthcare (Study 2). These studies show that when emojis are semantically aligned with the accompanying text, users perceive the chatbot as more competent, which in turn enhances their satisfaction. They also allow us to assess whether these effects generalize across service types. Specifically, we generalize

across utilitarian contexts where consumers perceive higher risk and expect greater formality and professionalism, and hedonic contexts where affectivity and friendliness are more valued due to the lower perceived risk (Barrett et al., 2024; Sulaiman & Wilson, 2019).

1 Literature review

1.1 User-chatbot interactions

The term “chatbot” is derived from the combination of “chat” and “robot”, originally coined as “chatterbot” to describe robots capable of engaging in conversations with humans (Luo et al., 2022). Primarily deployed in customer service, chatbots often serve as the first point of contact, providing quick and accessible assistance for common queries and support tasks (Chung et al., 2020; Nordheim et al., 2019). These systems are increasingly being refined and enhanced through the integration of cutting-edge technologies such as large language models (LLMs), giving rise to a new generation of AI-powered or LLM-based chatbots capable of more natural, context-aware, and flexible interactions (Sánchez Cuadrado et al., 2024). As a result, there has been growing interest in how chatbots perform in customer service contexts, including how they address the need for human-like interaction (Sheehan et al., 2020). While chatbots offer several advantages such as cost-effectiveness, round-the-clock availability, and rapid response times (Adam et al., 2021; Gnewuch et al., 2017; Wirtz & Pitardi, 2023), they also face challenges like user distrust, privacy concerns, misunderstanding, and a sense of dehumanization in their interactions (e.g., De Cosmo et al., 2021; Luo et al., 2019; Sands et al., 2021). Consequently, researchers are exploring ways to improve chatbot performance while preserving their inherent advantages.

A growing body of research has focused on understanding how and when user-chatbot interactions shape consumer behavior. For instance, studies have shown that using chatbots can enhance purchase intention, driven by factors such as perceived social presence or their ability to increase brand awareness (Han, 2021; Jiang et al., 2022; Lo Presti et al., 2021). Moreover, adopting a more human-like and personalized approach in chatbot interactions has been found to significantly improve customer experience, which in turn fosters customer loyalty (Jenneboer et al., 2022). A key area of interest in literature is the role of chatbots in boosting customer satisfaction (e.g., Chung et al., 2020). This variable is particularly important, as it has been shown to drive a range of positive consumer outcomes, including positive word-of-mouth, repurchase intention, customer loyalty, and the intention to reuse the chatbot (e.g., Rossmann et al., 2020; Yun & Park, 2022).

1.2 Anthropomorphic cues and language in user-chatbot interactions

Given their design to emulate human-to-human communication and predominantly textual nature, many studies have examined how chatbots can be endowed with human-like characteristics, as well as how various communicative elements, such

as linguistic ones, affect their effectiveness (e.g., Schanke et al., 2021; Xu et al., 2022). Anthropomorphic design cues, such as verbal elements, visual identity, and interactivity, play a central role in shaping user perceptions of chatbots. Past research found that dynamic response delays enhance perceived humanness and social presence, thereby increasing satisfaction (Gnewuch et al., 2018). Conversely, high message interactivity can compensate for limited visual anthropomorphism, improving users' attitudes toward websites (Go & Sundar, 2019). However, these effects are not always beneficial: heightened anthropomorphism may backfire when users are angry, leading to expectancy violations and negative reactions (Crolig et al., 2022). Contextual alignment also matters; for instance, gender congruence between user and chatbot has been found to enhance purchase intentions (Zogaj et al., 2023). Linguistic features significantly influence user experience, too. Warm, chatbot-initiated messages foster brand engagement (Kull et al., 2021), while a social-oriented communication style enhances trust and satisfaction, particularly in service recovery settings (Wang et al., 2023). Language concreteness also plays a role: Jimenez-Barreto et al. (2023) showed that more concrete language boosts perceptions of competence, satisfaction, and shopping efficiency. Together, these findings underscore the multifaceted nature of chatbot communication and the need to consider both visual and linguistic anthropomorphic cues and their congruence in designing effective user interactions. Table 1 reports the most relevant studies on user-chatbot interactions which involve anthropomorphic, linguistic, or combinations of both features.

1.3 NF emojis-text congruence and user satisfaction

Emojis, that are graphic symbols that encompass representations of facial expressions, abstract concepts, emotions, animals, plants, activities, gestures, and objects (Rodrigues et al., 2018), are often paired with text in user-chatbot interactions. They can be divided into two main categories: human-face emojis, such as 😊, and 😘, and non-human face emojis, which encompass objects, symbols, gestures, body parts, plants, and animals, such as 🍷, 🍷, 🍷, 🍷, and 🍷 (Jaeger et al., 2019). While most research on chatbot emojis focuses on facial ones (e.g., Beattie et al., 2020; Liu et al., 2023; Yu & Zhao, 2024), little attention has been given to non-facial emojis and their potential impact on user perceptions.

Emojis play a critical role in enhancing message consistency in chatbot communication, where traditional nonverbal cues such as tone of voice, gestures, and facial expressions are absent (Xiao et al., 2024). As forms of textual paralinguage, emojis can evoke vivid mental imagery, making messages more concrete and easier to interpret (Borst & Kosslyn, 2010). When emojis align with the meaning and tone of the accompanying text, they reduce ambiguity and increase users' confidence in understanding the message (Riordan, 2017). This alignment is particularly crucial in chatbot interactions, where users expect consistent, logical communication. Incongruent or poorly matched emojis can break this coherence and feel more like design flaws than expressive elements (Adu-Mensah et al., 2024; Luger & Sellen, 2016).

While facial emojis are often used to convey emotion, NF emojis can be especially effective in chatbot settings. These symbols account for around 80% of all emojis in the Unicode database (Consortium, 2023) and they make messages more vivid and

Table 1 Relevant studies on user-chatbot interactions

Authors	Focus	Type of interaction	Mediator	Dependent variable	Emojis	Main Findings
Gnewuch et al. (2018)	Anthropomorphic cues	Chatbot only	None	Perceived humanness; social presence; satisfaction	None	Dynamic response delays increase users' perception of humanness and social presence, and lead to greater satisfaction with the overall chatbot interaction.
Go and Sundar (2019)	Anthropomorphic cues	Human vs. chatbot	Social presence; perceived homophily; perceived continuity; perceived dialogue	Perceived expertise; perceived friendliness; website attitudes; behavioral intention	None	High message interactivity can compensate for low anthropomorphic visual cues, while identifying the agent as human raises user expectations for interactivity.
Beattie et al. (2020)	Both	Human vs. chatbot	None	CMC competence; social attraction; credibility	Face emojis	Participants rate emoji-using chatbots similarly to human sources, with both perceived as more socially attractive and credible compared to verbal-only message senders.
Kull et al. (2021)	Linguistic features	Chatbot only	Brand self-distance	Brand engagement	None	Warm chatbot-initiated messages lead to increased brand engagement compared to competent and neutral ones.
Sands et al. (2021)	Linguistic features	Human vs. chatbot	Emotion; rapport	Experience satisfaction; purchase intention	None	Using an educational script boosts satisfaction and purchase intent with human service agents over chatbots. Conversely, with an entertaining script, both human agents and chatbots perform similarly.
Crolic et al. (2022)	Anthropomorphic cues	Chatbot only	Increased pre interaction expectations	Customer satisfaction; firm evaluation; purchase intentions	None	When the customer is in an angry emotional state, chatbot anthropomorphism negatively affects customer satisfaction, firm evaluation, and purchase intentions due to expectancy violations.
Jimenez-Barreto et al. (2023)	Linguistic features	Human vs. chatbot	Chatbot competence; consumer competence	Satisfaction; willingness to use the chatbot; shopping efficiency	None	Heightened chatbot language concreteness enhances perceptions of competence, satisfaction, and shopping efficiency.
Wang et al. (2023)	Linguistic features	Chatbot only	Cognition-based trust; affect-based trust	Service recovery satisfaction	None	A social-oriented chatbot communication style is more effective than a task-oriented one, enhancing consumer satisfaction by increasing trust levels.
Zogaj et al. (2023)	Anthropomorphic cues	Chatbot only	Self-congruence	Purchase intentions	None	When there is a congruence between chatbot designed gender and user's gender, this positively impact on purchase intentions.

Table 1 (continued)

Authors	Focus	Type of interaction	Mediator	Dependent variable	Emojis	Main Findings
Liu et al. (2023)	Both	Chatbot only	Perceived intelligence	Reuse intention	<i>Face emojis</i>	Using humorous emojis in chatbot service recovery increases consumers' willingness to reuse them, with perceived intelligence partially mediating this effect.
This study	Both	Chatbot only	Perceived competence	User satisfaction with chatbot	<i>Non-Face emojis</i>	A chatbot using semantically congruent NF emojis in a customer service context leads to higher user satisfaction, with perceived competence mediating this effect. Using an informal language, though, weakens the positive effect of NF emojis-text congruence on satisfaction.

Source: Author's elaboration

specific (Peng & Zhao, 2021), attributes that contribute to language concreteness (Hansen & Wanke, 2010), which is linked to increased customer satisfaction (Packard & Berger, 2021). Moreover, emojis convey thoughtfulness toward the recipient (Coyle & Carmichael, 2019). NF emojis may offer a better fit for machine-generated communication by supporting clarity and contextual alignment without crossing into overly human-like territory. Introducing highly anthropomorphic features, such as overly expressive faces or simulated emotional nuance, can feel unnatural or even unsettling in chatbot communication, as users are often more comfortable when machines maintain a distinct identity. Over-humanization may lead to discomfort, inconsistency with user expectations, or the uncanny valley effect (Kaiser & Grosz, 2021; Mori, 1970; Muzakky et al., 2021). In contrast, well-chosen NF emojis allow for enhanced meaning without mimicking human traits too closely. These emojis must be selected carefully to ensure they reinforce, rather than confuse, the intended message. Ultimately, the effectiveness of emojis in chatbot communication depends less on their resemblance to human behavior and more on their congruence with the message and their contribution to communicative clarity. In line with this, we predict that:

H₁: Messages with high NF emojis-text congruency will increase user satisfaction with the chatbot more than messages with text only or with low NF emojis-text congruency.

1.4 Mediating effect of chatbot's perceived competence

Competence, that is the perception that an entity is intelligent, capable, and effective, is a key driver of user satisfaction in human–AI interactions. This construct is remarkably robust across cultures and contexts (Cuddy et al., 2009) and plays a central role in how users evaluate chatbots in service settings. Research shows that users rely on the chatbot's textual output to form competence judgments, looking for signs of clarity, correctness, and confidence (Følstad & Brandtzaeg, 2020). For instance, user satisfaction with chatbot interactions is primarily shaped by the chatbot's ability to perform its core functions such as answering questions promptly, understanding intent, and providing useful information, all performance markers that are closely linked to perceived competence (Akhtar et al., 2019; Ashktorab et al., 2019). This is especially relevant in AI-mediated interactions, where users tend to prioritize performance-related attributes such as competence over personality-related ones like empathy (Gelbrich et al., 2025).

In this context, we argue that the strategic use of congruent NF emojis can enhance perceived competence, which in turn increases user satisfaction. Unlike facial emojis that may evoke emotional anthropomorphism and risk feeling artificial in machine-generated messages (Kaiser & Grosz, 2021; Mori, 1970), non-facial emojis contribute to the message's semantic clarity without imitating human traits. When appropriately used, NF emojis act as visual anchors that reinforce message meaning and reduce ambiguity (Riordan, 2017), thereby enhancing the perceived precision and efficiency of the chatbot, two key factors that increase perceived competence. This is consistent with findings that textual paralanguage can increase message vividness and concrete-

ness (Borst & Kosslyn, 2010), which are known to positively impact evaluations of chatbot intelligence and capability.

By improving message coherence without increasing cognitive load or anthropomorphic discomfort, congruent NF emojis help users perceive the chatbot as more competent. This perception, in turn, strengthens satisfaction, as users feel they are engaging with a reliable and effective communication partner (Ashktorab et al., 2019; Coulter & Coulter, 2002). In sum, perceived competence operates as a key psychological mechanism linking the congruent use of NF emojis and text to improved user satisfaction with the chatbot. We thus predict that:

H₂: Perceived competence mediates the relationship between high congruent NF emojis-text (vs. low-congruent NF emojis-text vs. text-only) and user satisfaction with the chatbot.

1.5 Chatbot's language style

In chatbot communication, linguistic style not only shapes user impressions but also serves as a key signal of anthropomorphism. Informal language, that is characterized by colloquial tone, contractions, and casual phrasing, is typically associated with human communication and thus tends to increase perceptions of human-likeness (Jiang et al., 2022). In line with our arguments, anthropomorphic cues like informal language can be a double-edged sword in user-chatbot interactions. In some contexts, such as healthcare or technical support, informal tone may undermine perceptions of competence (Cox & Ooi, 2022; Szmids & Derlatka, 2024). Crucially, this anthropomorphic signal may become problematic when combined with highly congruent NF emoji-text compositions, which are more aligned with machine logic than human expressiveness. NF emojis often serve the functional role of clarifying instructions, emphasizing key points, or reinforcing concrete meanings (Peng & Zhao, 2021). When these precise visual elements are paired with informal, human-like language, the stylistic inconsistency may reduce user satisfaction with the chatbot. In other words, rather than enhancing the chatbot's communicative effectiveness, this combination can dilute the perceived competence of the system. Users may experience a mismatch between the chatbot's tone (casual and human-like) and its content (structured and task-focused), leading them to question its intelligence, capability, and effectiveness, or competence.

In short, informal language works best when aligned with other anthropomorphic cues, such as facial emojis or storytelling elements. When paired instead with the clarity-oriented and machine-consistent nature of NF emoji-text combinations, it may blur the communicative intent and weaken user perceptions. This suggests that informality must be applied with care in chatbot contexts, particularly when other design elements signal system-like precision rather than human likeness. Building on this reasoning, we predict that:

H₃: The positive effect of high-congruent NF emojis-text on perceived competence and user satisfaction with the chatbot is weakened when an informal language is used.

In the next section, we present two studies in which we test NF emojis-text (in)congruency on user satisfaction in two different contexts. We also provide preliminary evidence of the weakening effect related to an informal, vernacular text-based style in user-chatbot interactions.

2 Study 1

To examine how emoji–text congruence influences user perceptions of chatbots, Study 1 tests the effects of congruent, incongruent, and absent emoji use on users’ satisfaction with chatbots. This study also provides evidence of the mediating role of perceived competence.

2.1 Sample, method and procedure

Study 1 includes two-hundred seventy-eight participants ($M_{age}=27.06$, $SD=8.72$; 74.8% female). They were recruited via social media and randomly assigned to one of three conditions (high congruency emojis vs. text only vs. low congruency emojis) between-subjects design. Respondents were first told that they would interact with a virtual travel assistant in a scenario where they would be provided with customer support to book their flight or hotel. The interaction was designed to resemble a real-time conversation: participants viewed the chatbot’s messages on screen and selected their responses from a set of predefined options. After making their choice, they clicked an arrow button to proceed to the next exchange, simulating the act of sending a message. The chatbot guided users through typical service tasks, such as choosing an accommodation or modifying a previous booking. Examples of the stimuli used in the three conditions are provided in Fig. 1.

At the end of the simulation, respondents rated their satisfaction with the chatbot using two items: “I feel satisfied by my experience of using the chatbot”, “I am pleased by my experience of using the chatbot”, measured on a 7-point Likert scale (where 1 = strongly disagree and 7 = strongly agree; $r=.931$, $p<0.001$; adapted from McKinney et al., 2002). We additionally measured perceived competence using two items: “I think the chatbot is competent”, and “I consider the chatbot capable”, also measured on a 7-point scale (where 1 = strongly disagree and 7 = strongly agree; $r=.848$, $p<0.001$; adapted from Awale et al., 2019).

In a pre-test with fifty-seven respondents, perceived congruency was measured with two items “The sentences and the emojis used by the chatbot fit together well”, “The sentences and the emojis sent by the chatbot stand for similar things”, on a

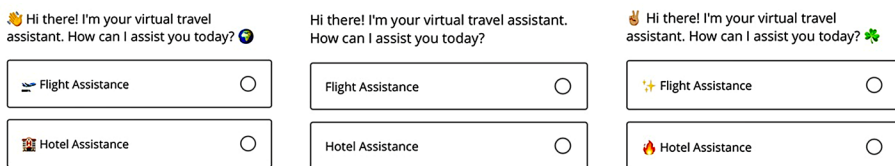


Fig. 1 Screenshot of stimuli used in Study 1. Source: Author’s elaboration

7-point Likert scale (where 1=strongly disagree and 7=strongly agree; $r=802$, $p<0.001$; adapted from Speed & Thompson, 2000). Participants were exposed to the same simulated interaction as in the main study but only assigned to either the high or low congruency condition (as congruency cannot be assessed in the text-only condition) and were then asked to evaluate the perceived congruency. Respondents indicated that the manipulation of text-emoji congruency was successful. An independent t-test showed a significant difference between the high congruency condition ($M=5.62$, $SD=1.41$) and low congruency condition ($M=3.30$, $SD=2.05$; $t_{(55)}=4.97$, $p<0.001$).

2.2 Results

User satisfaction with the chatbot. Using one-way ANOVA, we find a significant main effect of emoji-text congruency on user satisfaction with the chatbot ($F_{(2, 275)}=63.663$, $p<0.001$) (Fig. 2), confirming that higher congruence between text and emojis increases satisfaction. Satisfaction was higher in the high congruence condition ($M=5.75$, $SD=1.62$), followed by the text-only condition ($M=4.58$, $SD=1.18$), and lowest in the low congruence condition ($M=3.34$, $SD=1.55$).

Planned contrasts indicated that the difference between high congruence and low congruence was significant ($p<0.001$), as well as for high congruence and text only conditions ($p<0.001$) and for text only and low congruence ($p<0.001$), providing support for H_1 .

Perceived competence. A one-way ANOVA was conducted to examine the effect of emoji-text congruency on chatbot perceived competence. The analysis revealed a significant main effect of emoji-text congruency on perceived competence ($F_{(2, 275)}=89.006$, $p<0.001$; Figure 3).

Planned comparisons indicated that the high congruency condition ($M=5.76$, $SD=1.11$) led to significantly higher perceived competence compared to both the

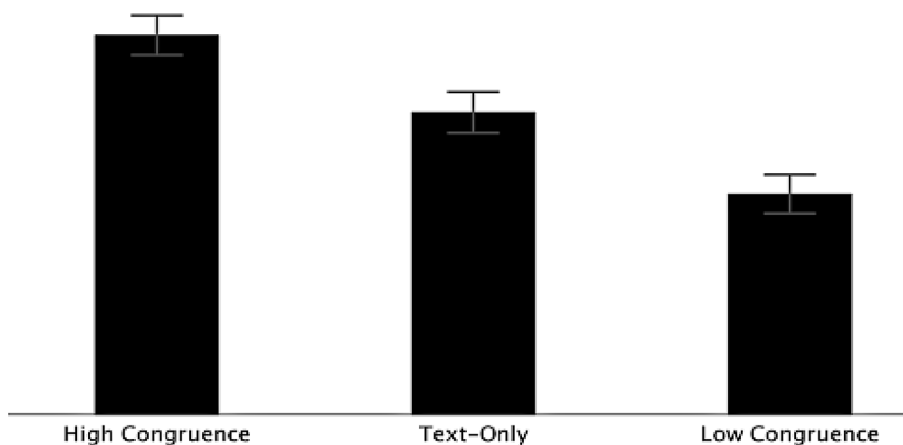


Fig. 2 User satisfaction with the chatbot depending on emoji-text congruence, Study 1. Source: Author's elaboration

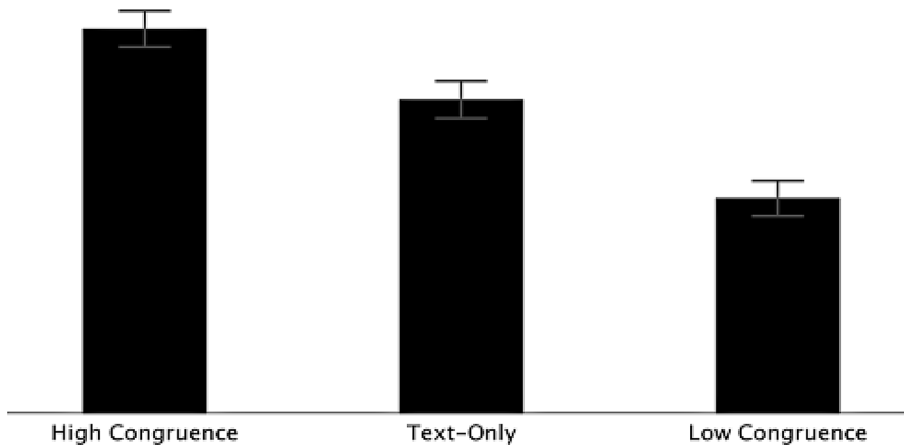


Fig. 3 Chatbot's perceived competence depending on emoji-text congruence, Study 1. Source: Author's elaboration

low congruency condition ($M=3.22$, $SD=1.66$, $p<0.001$) and the text-only condition ($M=4.70$, $SD=1.04$, $p<0.001$).

Mediation analysis. SPSS PROCESS Model 4 for multi-categorical variable analysis (10,000 bootstrap samples) tested whether perceived competence (continuous variable) mediates the effect of congruency (3 levels: high congruency, text only, low congruency) on user satisfaction (continuous variable). We generated dummy codes to compare high congruency with text only (X1) and low congruency with text only (X2) conditions. The bootstrapping technique for indirect effects confirmed mediation, as the 95% confidence interval (CI) for perceived competence excluded zero for both the high congruency vs. text only condition (indirect effect=1.0331, BootSE=0.1577; 95%CI: 0.7215, 1.3452) and low congruency vs. text only (indirect effect=-1.4411, BootSE=0.2059; 95%CI: -1.8430, -1.0482) comparisons, providing preliminary support for H_2 .

3 Study 2

To replicate and extend the findings from Study 1, Study 2 examines the effects of emoji-text congruence in a different context and with a more diverse and rigorously screened sample. This follow-up study addresses limitations related to snowball sampling by recruiting participants through Prolific and enhances generalizability by shifting the interaction from a travel assistant to a healthcare chatbot. These two service domains were intentionally selected to reflect contrasting dimensions of service encounters. Travel represents a low-risk, hedonic service context, where friendliness and a light, engaging tone are typically appreciated (Ponsignon, 2023). In contrast, healthcare involves high-risk, sensitive interactions, where formality and professionalism are critical (Longoni & Cian, 2022). By comparing these sectors, we aim to examine whether the impact of emoji-text congruency generalizes across different contexts (hedonic vs. utilitarian) characterized by varying levels of perceived

risk and user expectations about communication style, where even the mere presence of emojis may be seen as (in)appropriate for the user experience (Barrett et al., 2024; Cox & Ooi, 2022). Alongside the congruent, incongruent, and no-emoji conditions, we include a fourth condition aimed at generating preliminary insights into how informal, vernacular text may interact with congruent emojis. The results are intended as tentative evidence and require further empirical validation.

3.1 Sample, method and procedure

Study 2 includes three-hundred forty-seven participants ($M_{\text{age}}=35.01$, $SD=6.49$; 49.57% female). They were recruited via Prolific. We preselected UK residents with at least a 95% acceptance rate, who completed at least 500 human intelligence tasks and who are between 18 and 65 years of age. Participants were randomly assigned to one of four conditions (high congruency emojis vs. text only vs. low congruency emojis vs. high congruency emojis with formal language) between-subjects design. As in Study 1, participants interacted with a virtual health assistant tasked with providing support for booking specialist appointments or addressing symptom-related inquiries. Examples of the stimuli for the four conditions can be found in Fig. 4.

We measured satisfaction using the same items as in Study 1. Additionally, a control measure was introduced to account for potential covariates. Participants were asked about their chatbot usage frequency with the question: “How often do you use chatbots for assistance?”, measured with a 7-point scale (1 = never and 7 = always).

A pre-test with one-hundred twenty-one respondents confirms that the text style manipulation is successful. A pre-test was conducted to confirm the effectiveness of the text style manipulation. Participants were randomly assigned to one of two conditions: one displaying a screenshot of a chatbot conversation containing text-only messages later used in the informal condition of the main study, and the other displaying text-only messages used in the formal condition. After viewing the stimulus, participants rated the conversations on two items: “Rate the extent to which these conversations seem” (1 = formal/professional, 7 = informal/colloquial; $r=0.613$, $p<0.001$). Respondents indicated that the manipulation of text style was successful. An independent t-test showed a significant difference between the two groups ($M_{\text{formal}}=5.93$, $SD_{\text{formal}}=1.09$; $M_{\text{informal}}=2.87$, $SD_{\text{informal}}=1.24$; $t_{(119)}=14.37$, $p<0.001$).

What type of appointment would you like to schedule? 🚩

I would need a general check-up

I would need a specialist's visit

What type of appointment would you like to schedule? 🚩

I would need a general check-up

I would need a specialist's visit

What type of appointment would you like to schedule?

I would need a general check-up

I would need a specialist's visit

So, what's your plan, champ? 🚩

Time for a general check-up

Gotta see a specialist

Fig. 4 Screenshot of stimuli used in Study 2. Source: Author's elaboration

3.2 Results

Manipulation checks. Two independent t-tests were performed to check the successful manipulation of emoji-text congruency between the high congruency conditions and the low congruency condition. The results of the first analysis showed a significant difference in emoji-text congruency between the high congruency condition and the low congruency condition ($M_{\text{high}}=4.67$, $SD_{\text{high}}=1.67$; $M_{\text{low}}=3.40$, $SD_{\text{low}}=1.65$; $t_{(167)}=4.95$, $p<0.001$). The second analysis revealed a significant difference in emoji-text congruency between the two groups ($M_{\text{informalhigh}}=4.44$, $SD_{\text{informalhigh}}=1.62$; $M_{\text{low}}=3.40$, $SD_{\text{low}}=1.65$; $t_{(170)}=4.12$, $p<0.001$).

User satisfaction with the chatbot. A one-way ANCOVA was conducted to examine the effect of emoji-text congruency on user satisfaction with the virtual health assistant, controlling for chatbot usage frequency. The analysis revealed a significant main effect of emoji-text congruency on satisfaction ($F_{(3, 342)}=2.974$, $p=0.032$) (Fig. 5).

Planned contrasts indicated that the high congruency condition ($M=4.54$, $SD=1.66$) led to significantly higher satisfaction compared to the low congruency condition ($M=4.04$, $SD=1.64$, $p=0.028$) and the informal high congruency condition ($M=3.89$, $SD=1.79$, $p=0.005$). Satisfaction in the high congruency condition did marginally differ from text-only condition ($M=4.15$, $SD=1.87$, $p=0.056$). Interestingly, the *informal* high congruency condition did not outperform the text-only ($p=0.371$) or the low-congruency condition ($p=0.561$). A possible explanation is that, in a professional and high-stakes context such as healthcare, the negative impact of excessive informality may be counterbalanced by the communicative clarity provided by congruent NF emojis. This compensatory effect may have neutralized the difference between informal high congruency and text-only, returning satisfaction levels to those observed in the neutral, text-only baseline.

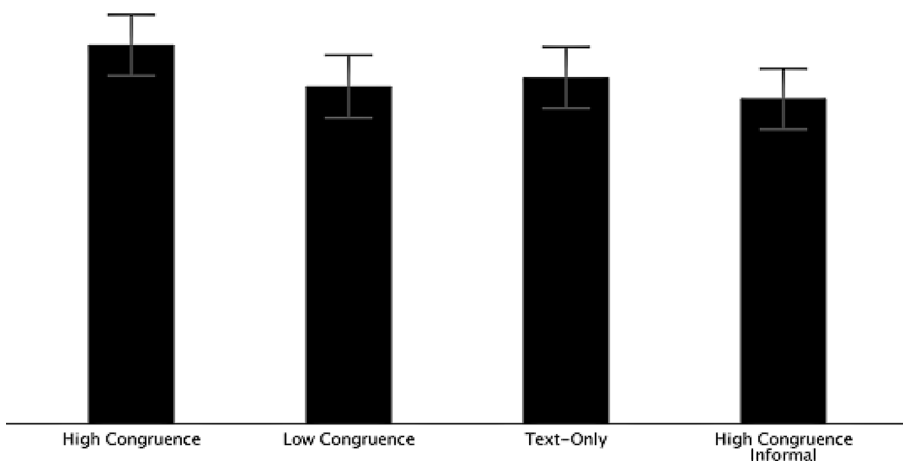


Fig. 5 User satisfaction with the chatbot depending on emoji-text congruence, Study 2. Source: Author's elaboration

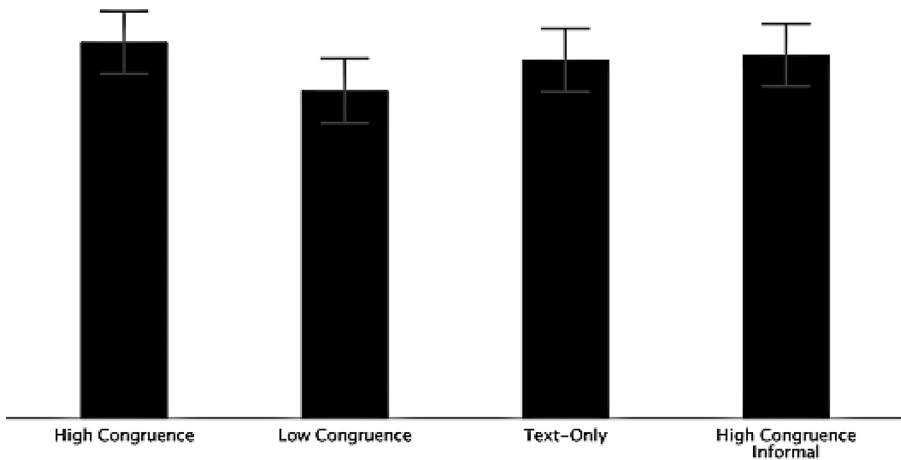


Fig. 6 Chatbot's perceived competence depending on emoji-text congruence, Study 2. Source: Author's elaboration

Perceived competence. A one-way ANCOVA was performed to explore the effect of NF emoji-text congruency on perceived competence of the virtual health assistant, controlling for chatbot usage frequency. The analysis showed a marginally significant main effect of NF emoji-text congruency on perceived competence ($F_{(3, 342)}=2.228$, $p=0.085$) (Fig. 6).

Planned comparisons revealed that the high congruency condition ($M=4.33$, $SD=1.73$) resulted in significantly higher competence compared to the low congruency condition ($M=3.77$, $SD=1.63$, $p=0.011$). However, perceived competence in the high congruency condition did not significantly differ from the text-only condition ($p=0.186$) or the informal high congruency condition ($p=0.322$). Additionally, no significant differences were found between the informal high congruency condition and the low congruency condition ($p=0.112$). To our surprise, these results provide partial support to our expectations and, therefore, together with Study 1 represent a preliminary rather than conclusive attempt to explain the psychological mechanism of NF emojis-text congruence on user satisfaction with the chatbot.

3.3 Summary of findings

In two studies we show that highly congruent text-emojis increase user satisfaction (H_1). We explain that the positive effect of congruent text-emojis is driven by heightened perceived competence (H_2). This effect emerges consistently across two distinct service sectors, travel and healthcare, demonstrating that even in high-stakes, professional-oriented contexts, NF emojis that are semantically aligned with the text can improve the user experience, even compared to text-only communication. We then show preliminary evidence of the role played by the language style of the chatbot in the congruent text-emojis condition. Specifically, we find a weakening effect of emoji-text congruency on user satisfaction when the chatbot uses an overly informal language style (H_3). This points to the potential

relevance of balancing visual, textual, and stylistic cues for improving user–chatbot interactions, though further research is needed to confirm these effects.

4 General discussion

4.1 Theoretical implications

This study contributes to literature on chatbot design effectiveness (e.g., Cronic et al., 2022). First, our study investigates a largely overlooked form of textual paralanguage (TPL): non-facial emojis (NF emojis). While prior work has primarily focused on facial emojis and their emotional signaling in human–computer interaction (Orazi et al., 2023), we shed light on how NF emojis, because of their literal, non-anthropomorphic representations, function as critical communicative tools in chatbot contexts. These emojis serve to compensate for the absence of traditional nonverbal cues such as tone, gesture, and facial expression, which are otherwise essential in human interaction for conveying intent and emotional nuance. Our findings provide preliminary support that when NF emojis are congruent with the accompanying text, they enhance message clarity and user satisfaction by signaling perceived chatbot competence. This emphasizes that even in the absence of anthropomorphism, visual elements can play a significant role in establishing functional and effective communication between users and AI-driven agents.

Next, we contribute to the digital service communication literature (Grewal et al., 2022) by showing that the impact of emoji–text congruence is robust across different service domains. Specifically, the positive effect of matching NF emojis with text persists across two markedly distinct sectors (travel and healthcare), where users hold different expectations regarding formality and professionalism and face varying levels of perceived risk (Barrett et al., 2024). However, we also find that this relationship is sensitive to the linguistic tone adopted by the chatbot. While congruent NF emojis enhance perceived competence and user satisfaction in both settings, their positive effect is significantly attenuated when paired with excessively informal or colloquial language. This suggests that message congruence must be evaluated holistically, not only at the level of emoji–text alignment but also in terms of fit with the broader verbal style and service context. Informal language, typically associated with anthropomorphic or human-like interactions, may clash with the more objective tone conveyed by NF emojis and chatbot interfaces, ultimately weakening the overall perception of coherence. This underscores the importance of ensuring that the language style is appropriately calibrated to both the emoji use and the broader communicative context.

4.2 Managerial implications

The findings of this study carry significant implications for practical application. Many top brands, including Nike, Kia, and Uber, have increasingly adopted chatbots to provide customer assistance (Krishnan et al., 2022). Despite the benefits offered by these virtual assistants (Meuter et al., 2005; Scherer et al., 2015), their effectiveness is

often undermined by challenges related to user perceptions of competence (Nguyen et al., 2023). Therefore, designing chatbots to positively shape consumer perceptions becomes essential in ensuring meaningful and effective interactions.

The results of the present work suggest that the content conveyed by chatbots significantly impacts user satisfaction. Specifically, incorporating NF emojis that align semantically with the accompanying text can enhance the perception of chatbot competence, subsequently increasing user satisfaction. This finding underscores the potential of NF emojis as a practical solution to address challenges associated with chatbot usage, mitigating those factors that may discourage customer engagement and lead to negative brand perceptions (e.g., Altay & Cetinturk, 2024; Shahzad et al., 2024; van der Goot et al., 2020).

The decision to prioritize NF emojis over other cues is partly due to its simplicity in real-world applications. Emojis offer an uncomplicated and cost-effective solution compared to alternative tools such as images or videos. Despite the rapid evolution of technology and the advent of new tools (e.g., social media platforms), not all countries progress at the same pace (Chinn et al., 2020). For instance, as highlighted by Istat (2023), some European countries such as Italy, still face significant levels of digital illiteracy, meaning that users may not be able to understand the meaning of textual paralinguistic cues, including emojis, in business settings. This is particularly relevant considering that it may happen that people send emojis with the wrong or opposite meaning, leading to embarrassment or negative emotions (Liu et al., 2020). We discuss this aspect further in the limitations and future research section.

4.3 Limitations and future research directions

Our research presents some limitations that can trigger future research directions related to the understanding of chatbot's effectiveness. First, the online experiment conducted in this study involved a simulated conversation with a virtual assistant on a travel website. However, the scope of the questions presented was limited, predominantly consisting of closed-ended queries for users. While efforts were made to make the simulation as realistic as possible, there are inherent differences compared to real interactions with live chatbots. Therefore, it would be valuable to investigate whether the findings of this research hold true in field experiments, where users engage with real chatbots on actual websites.

Second, while Study 1 demonstrates that chatbots using non-facial emojis congruent with the accompanying text enhance user satisfaction compared to text-only messages, Study 2 reveals only a marginally significant effect. One possible explanation for this discrepancy lies in the differing service contexts. In the leisure-oriented travel setting of Study 1, users may have been more receptive to visually enriched communication. In contrast, the health-related context of Study 2 likely prompted expectations of a more serious, professional tone, making the text-only interaction equally acceptable. Furthermore, although prior research suggests that congruent paralinguistic cues can improve message fluency and comprehension (e.g., Barach et al., 2021), such enhancements may not always translate into stronger user evaluations, particularly in domains where anthropomorphic or informal cues may seem inappropriate. Importantly, our findings regarding perceived competence should be

interpreted as preliminary rather than conclusive, given the weaker mediation results in Study 2. Future research could more systematically investigate the boundary conditions under which non-facial emoji use—and the mechanisms through which it operates—enhances or undermines chatbot effectiveness.

Third, while the focus on non-facial emojis has been relatively underexplored in the literature, it would be interesting to examine how combinations of both facial and non-facial emojis interact in online communication. For instance, Packard et al. (2024) demonstrated that in online interactions, using affective language at the beginning and end of a conversation, with a more cognitive style in the middle, is more effective. Future studies could extend this research to textual paralinguistics by exploring how combinations of facial and non-facial emojis might optimize chat interactions, based on dynamic conversations where different types of emojis are employed in differing stages of the conversation.

Fourth, while we explored age as a covariate, the analyses did not yield statistically meaningful results, suggesting that age may not be a central variable in the specific contexts we examined. However, this does not preclude the possibility that age-related factors may influence how consumers engage with digital communication. We encourage future research to examine how generational cohorts differ in their use of social media and in the expectations they form around digital language. Notably, the interpretation and effectiveness of emojis may vary across different generational cohorts and could be shaped by variables associated with age, such as visual literacy (Chen et al., 2024). Understanding these differences could provide valuable insights into how to tailor digital communication strategies to diverse audiences.

Another limitation of this research lies in the use of brief two-item scales to measure key constructs such as perceived competence and user satisfaction. While these items were adapted from validated scales and selected to maintain respondent engagement, they may not fully capture the multidimensional nature of the constructs. Additionally, the study relies solely on self-reported measures, without incorporating behavioral or objective performance metrics, which limits the depth and ecological validity of the findings. Future research would benefit from employing richer measurement instruments and complementing self-reports with behavioral data (e.g., response times, error rates, or interaction logs) to obtain a more comprehensive understanding of user experiences. We also encourage future studies to test these effects in more diverse and naturalistic settings, using broader demographic samples and real-world chatbot applications, to enhance external validity and generalizability.

Additionally, we highlight study concerns related to the operationalization of informal language, particularly in the healthcare context. While our intention was to examine how NF emoji–text congruence interacts with variations in language formality, some of the informal phrasings may have introduced emotional connotations or expectancy violations that extend beyond a simple formal–informal distinction. Although this does not undermine our core findings, it highlights the need for future research to systematically disentangle different dimensions of linguistic style—such as register intensity, emotional tone, and contextual fit—and examine how they interact with visual cues like emojis. This is particularly relevant in domains where communication expectations are strongly shaped by the nature of the service (e.g., utilitarian vs. hedonic). We view our current design as

an initial step in this direction and encourage further investigation into how more nuanced variations in verbal style influence user perceptions in human–AI interaction.

Moreover, we focused on perceived competence as the key psychological mechanism linking emoji–text congruence to user satisfaction. This choice was motivated by prior evidence that performance-related attributes tend to be more salient than socio-emotional ones when users evaluate AI-based agents (Gelbrich et al., 2025). In addition, while facial emojis have been consistently associated with warmth (e.g., Li et al., 2019), we aimed to explore whether other types of emojis might instead enhance users' perceptions of competence. Nevertheless, we acknowledge that other psychological pathways may also be relevant; future research could investigate whether congruent NF emojis impact dimensions such as perceived empathy or anthropomorphism. Comparing different types of emojis (e.g., facial vs. non-facial) and expanding the range of outcomes assessed could provide a more nuanced understanding of how stylistic coherence influences human–AI communication dynamics.

Finally, the growing predominance of unstructured data in current marketing strategies (Wang et al., 2024) presents new opportunities for designing effective chatbots. By complementing text with audio, images, or video, chatbots are becoming increasingly capable of simulating human-like interactions. For instance, they are beginning to leverage contextual video demonstrations and tailored visual content (Lopes, 2024). A recent example is Zalando, which has developed a virtual assistant capable of supporting customers in their purchases by sending images of potential items based on their needs. Future research should explore how combining these cues with text-based messages might optimize communication effectiveness.

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Data availability The data that support the findings of this study are available from the corresponding author upon request.

Declarations

Competing interest The author(s) declare no competing interests.

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