"I need to be professional until my new team uses emoji, GIFs, or memes first": New Collaborators' Perspectives on Using Non-Textual Communication in Virtual Workspaces

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ABSTRACT

Virtual workspaces rapidly increased during the COVID-19 pandemic, and for many new collaborators, working remotely was their first introduction to their colleagues. Building rapport is essential for a healthy work environment, and while this can be achieved through non-textual responses within chat-based systems (e.g., emoji, GIF, stickers, memes), those non-textual responses are typically associated with personal relationships and informal settings. We studied the experiences of new collaborators (questionnaire N=49; interview N=14) in using non-textual responses to communicate with unacquainted teams and the effect of non-textual responses on new collaborators' interpersonal bonds. We found new collaborators selectively and progressively use non-textual responses to establish interpersonal bonds. Moreover, the use of non-textual responses has exposed several limitations when used on various platforms. We conclude with design recommendations such as expanding the scope of interpretable non-textual responses and reducing selection time.

CCS CONCEPTS

• **Human-centered computing** → **Collaborative and social computing**.

KEYWORDS

Virtual workspaces; Computer-mediated Communication; Non-textual Communication

1 INTRODUCTION

Any successful team collaborating in a workplace requires individuals to have strong interpersonal bonds with each other [15, 45, 58]. Phutela et al. [67] and Bayes et al. [9] state that the use of nonverbal modes of communication like facial expressions, hand-movements, voice-tones, and smiles assist in conveying interpersonal warmth that contributes to developing strong interpersonal bonds. Yet many studies on workplace bonding have primarily focused on the physical workplaces [15, 45, 58, 67]. On the other hand, Driskell et al. [26] found weaker interpersonal bonds when looking at virtual workspaces due to the absence of nonverbal cues.

Driven by the COVID-19 pandemic, companies have not only transitioned to completely virtual workspaces, but also had to hire and on-board employees virtually [17, 24, 27, 52, 53, 55]. This transition may be difficult for people who have no prior experience with online collaborations [18]. Moreover, working in a virtual environment can result in platform fatigue and isolation in employees [16, 30]. Prior studies have also highlighted the problem of misinterpreting a message, or an emotion associated with the message in a virtual setting that limits nonverbal modes of communication because people do not always have access to other people's nonverbal cues unlike when working in physical settings [59, 75].

These drawbacks affect virtual team communication by creating confusion, which leads to more conflicts, and adversely impacts shared interpersonal relationships in a virtual workspace [26]. Messages can be supplemented with non-textual responses such as emoji, GIF, stickers, and memes to overcome misinterpretations, communicate effectively, and increase social connections in virtual settings [59, 63, 75, 79], but the non-textual responses are typically viewed as less appropriate to use in formal settings [20, 78, 79]. We suspect that new collaborators—students or professionals who join a new team virtually, with no familiarity to the team—likely face challenges and tensions with using non-textual communication to connect with colleagues, and there may be design opportunities on various platforms to support an efficient way for new collaborators to use non-textual responses in virtual workspaces.

We first surveyed 49 new collaborators to understand new collaborators' experiences in using non-textual responses in virtual

workspaces. We define new collaborator and virtual workspaces as:

Definition 1 (New Collaborator). Students or professionals who joined a new virtual team to collaborate on a project during the COVID-19 pandemic, without having any familiarity to the team (e.g., interns, full-time recruits, students working on projects).

Definition 2 (Virtual Workspaces). Collaborative technologies like Slack and Discord that connect and enable remote workers of an organization to communicate, work, and achieve common goals [87] in a virtual environment.

Our survey findings indicated that new collaborators were using non-textual responses, but often faced many challenges in using those. They found their preferred method of communication was not always supported by work platforms, the meaning behind non-textual responses was not always clear, and unfamiliarity with the team or organization's work culture resulted in hesitation to use non-textual responses.

We then ran interviews with 14 new collaborators to further understand personal barriers, communication strategies, and tenets of effective non-textual communication in the context of virtual workspaces and new colleagues. Similar to previous work, we found communication is essential for the team to thrive. More specifically, we uncovered the resourcefulness of new collaborators in using non-textual responses effectively such as taking the lead from others and mimicking their behaviors.

We make several design recommendations to improve how new collaborators integrate within virtual workspaces. It is necessary to expand the scope of non-textual responses, improve the interpretability of non-textual responses, and support faster discovery of non-textual responses.

Our contributions are as follows: **i)** We present a qualitative research study that identifies pain-points, coping strategies, and needs of new collaborators in using non-textual responses in virtual workspaces. **ii)** Elicit knowledge about the use of various modes of non-textual response by new collaborators to establish interpersonal bonds in virtual teams. **iii)** Make design recommendation to enhance the experience of using non-textual responses for promoting interpersonal bonds in virtual workspaces.

2 RELATED WORK

Workplace communication can take many form, such as through audio calls [36], blogs [43], emails [62], social media [25, 64], text messages [54], and video calls [11] (including with parallel chat [70]). Collectively, those earlier studies [21, 25, 43, 54, 64] demonstrate the value different communication mechanisms have on enhancing social connectedness among team members and positively influence team bonding at the workplace; however, the research was conducted pre-pandemic, and where possible/feasible (i.e. fully co-located teams) interaction among team members would be in face-to-face settings, with blogs, social media, or text messages functioning as an additional means of connecting with colleagues.

In contrast, virtually connecting and working has become an increasing priority, and sometimes the only feasible option in a pandemic era. Prior studies [12, 21, 25, 43, 45, 54, 64, 67] examined the impact of physical and virtual workplace communication avenues on teams' bonding without focusing on new collaborators

(see Definition 1). Moreover, past works [21, 25, 43, 54, 64] did not study new collaborators' use of non-textual responses to connect with the new team (without any prior familiarity with them) in a virtual workspace (see Definition 2).

Therefore, the focus of our paper is to study new collaborators' perceptions of using non-textual responses in a virtual-only workspace to form interpersonal bonds. We specifically studied non-textual responses in a virtual work setting because past work has shown that non-textual responses in text-based chat systems substitute face-to-face gestures [59] (that lack in a virtual setting) and positively influence relationships among people in an informal virtual setting [33, 44]. Furthermore, text-based chat systems (e.g., Slack) provide an alternative to avoid video-calling fatigue [7] and support asynchronous collaboration [42] in a virtual-only workplace.

Our related work provides background context on physical vs. virtual workspace, the importance of interpersonal bonds for healthy work environments, and pre-pandemic views of non-textual communication in the workplace.

2.1 Value of Interpersonal Bonds at Workspaces

Within the context of work, positive interpersonal bonds between colleagues foster a safe and conducive learning environment, which contribute to a team's efficiency [15]. Whereas, negative interpersonal bonds shared by workers due to team conflicts could induce stress, thereby making individuals more reluctant to work [58].

Interpersonal bonds can be defined by perceptions of strong personal and social relationships and feelings of belongingness, and they are essential for helping individuals assimilate to a specific group and their norms [73].

People can use nonverbal communication to assist in expressing emotions unambiguously [9], which is crucial for developing strong interpersonal bonds in a workspace [12, 45, 67]. However, in the current COVID-19 pandemic [17], there has been a shift from physical to virtual workspaces [27, 52, 55, 70], which significantly changed the work dynamic and removes traditional nonverbal communication (e.g., facial expressions and tone of voice). Much of the prior work has only focused on the value of interpersonal bonds in a physical workspace [15, 45, 58, 67, 73], whereas new collaborators are now being recruited to work in virtual workspaces [24].

2.2 Non-textual Forms of Communication Promote Interpersonal Bonds Virtually

Virtual workspaces utilizing chat and audio-only systems remove the typical means of communicating nonverbally [26], which results in challenges when interpreting the emotion associated with the text/audio and lack of information-rich feedback [59, 75]. Driskell et al. [26] state that teams formed on virtual workspaces share weaker interpersonal bonds due to the challenges of computer-mediated communications as compared to the teams that have interacted and formed connections at physical workspaces.

To address these challenges, non-textual forms of communication like emoji, GIFs, emoticons, memes, audios, videos, and images may be used to enhance communication and convey emotions

clearly [59, 75, 79]. The increased use of non-textual forms of communication can evoke intimacy and a feeling of social connectedness between the users [33, 44, 48, 84]. Thus, establishing that frequent use of non-textual communications can promote interpersonal bonds in virtual settings.

2.3 New Collaborators in a Virtual Workspace

An under-researched perspective—and one that has now become highly relevant—is to understand new collaborator's insight on the role of non-textual communication in forming interpersonal bonds within virtual workspace.

Prior work [33, 44, 48, 84] did not adequately explain how unacquainted individuals would use non-textual modes of communication to form bonds in virtual work settings; although Gesselman et al. [33] did explore the effect of emoticon usage on the relationship between potential romantic partners, those scenarios were personal. Furthermore, if we focus on emoji, which are an extremely popular mode of non-textual communication and the successor to emoticons, people often report that they try to avoid using emoji in work environments and with people who do not share close bonds. As people have varied interpretations of emoji and they consider it a non-serious and unprofessional way of communication [5, 41, 63, 78, 79].

However, those views toward unprofessionalism may no longer be as relevant with the transition to virtual work environments and the need for new collaborators to connect with colleagues. There are also many different types of non-textual modes of communication (e.g., GIFs, stickers, videos, memes), which may help to serve different purposes.

2.4 Research Questions

We aim to understand the experiences of new collaborators in using non-textual communication to form interpersonal bonds within virtual teams by answering the following research questions:

- **RQ1:** How do new collaborators use non-textual modes of communication to form interpersonal relationships in a virtual workspace?
- **RQ2:** Do new collaborators face any challenges in using non-textual modes of communication in a virtual workspace? If yes, what are those challenges?
- **RQ3:** What coping strategies do new collaborators employ to overcome the challenges, if any, in using non-textual modes of communication in a virtual workspace?
- **RQ4:** What design recommendations can be incorporated in existing virtual platforms based on new collaborators' communication strategies to promote interpersonal bonds?

3 NEW COLLABORATORS SURVEY METHOD

We first distributed an online survey to understand new collaborators' experiences in using non-textual modes of communication in virtual workspaces. We studied the experiences of new collaborators in using non-textual responses as they pleased but did not specifically focus on non-textual responses with or without text.

3.1 Materials and Procedure

We advertised our questionnaire on social platforms (e.g., LinkedIn, Facebook, Reddit) and university Slack channels during a four-week period to collect responses. The advertisements directly defined our target participant group—new collaborators (see Definition 1). Participants who indicated being new collaborators were the only ones who were prompted with the survey questions. Participants could complete the questionnaire in their own time. There was no reimbursement offered for completing the questionnaire.

We had 23 questions in total (19 close-ended and 4 open-ended) Our questions were centered around collecting: i) demographic information (*age, gender, proficiency with computer-mediated communication in virtual work, occupation, familiarity level with the new virtual team*), ii) virtual platforms used by their team to collaborate, iii) familiarity with the virtual platform, iv) if they employ non-textual communication in a professional setting (and why), v) their most preferred non-textual response types, vi) if they were hesitant in using non-textual modes of communication (and why), and vii) any challenges experienced while using preferred non-textual communication types on virtual platforms. To ensure the validity and clarity of survey questions, we did a read-through session with a few researchers (not part of our research team). Furthermore, we did not receive any responses from participants that indicated confusion about what we were asking. Our questionnaire participants could also sign up for a follow-up interview (see sections 5 and 5.3).

3.2 Participants

We had 58 participants in total, but removed 9 because they did not acknowledge being a new collaborator. Our remaining 49 new collaborators (Female = 26, Male = 22, preferred not to say = 1) were aged between 18-64 year old. Out of 49 new collaborators 42 rated their familiarity to the team between 1 to 3 on a scale of 1 to 5, where 1 = 'I did not know anyone in the new team.' and 5 = 'I knew everyone in the team.'

Our participants mostly represent younger age groups (18-34). Specifically, 18 new collaborators were 18-24 years old, 28 were 25-34, two were 35-44, and one was 55-64. We believe our group is skewed toward a younger population because people in the 18-34 age bracket are more likely to start new jobs compared to older people. The most frequent new collaborator category reported was full-time employees (31 out of 49) followed by interns (7 out of 49).

We assigned the survey participants an ID letter S followed by a number (e.g., S1, S2, S3).

3.3 Analysis

We report descriptive statistics for the close-ended responses and, for the open-ended responses, we performed open coding [80]. The open coding steps were to first familiarize ourselves with the data by reading through all the open-ended responses. We then assigned initial codes to the responses, then iteratively grouped similar data points to generate high-level categories that could provide a summarized understanding of the data.

4 NEW COLLABORATORS SURVEY FINDINGS

We present our survey findings, using closed and open-response data and participant quotes, under two themes: i) New Collaborators

Using Non-textual Responses and ii) Challenges New Collaborators Face in Using Non-textual Responses.

4.1 New Collaborators Using Non-textual Responses

We found that chat-based systems are the most used mode of communication to collaborate with team members (40/49 respondents), as shown in Table 1. Further, the responses revealed that our participants used a variety of platforms to ensure they communicate effectively: Slack was most common (25/49), followed by Microsoft Teams (17/49), and many other platforms.

All the respondents mentioned that they are comfortable using computer-mediated communication (e.g., Slack, Google Hangouts, audio calls, etc.) to communicate and collaborate on professional projects. Further, we found that 38/49 respondents had high familiarity with the platform (rating themselves a 4 or 5, where 5 is '*I was extremely familiar with the communication platform when I joined*') and felt confident (responding agree/strongly agree) in using a virtual platform to communicate and collaborate.

We found that 34/49 participants used non-textual responses in virtual workspaces. However, 34/49 were also hesitant in using non-textual modes of communication with their virtual team, which validates our hypothesis that new collaborators face challenges when using non-textual response in their virtual workspace. Additionally, the most favored and most used mode of non-textual communication reported was emoji (36/49), which might be because of the diversity of options and it is easy to use with text. GIFS (21/49) and memes (16/49) while being more visually engaging were preferred after emoji.

We found many reasons for using a non-textual response in a virtual workplace. Participants (11/49) mentioned that they prefer using it to add humor to their conversations, for example:

S2: "*To make the conversation a little lighter and to indicate if something is funny or hilarious.*"

Similar to prior work, participants (18/49) also recognized that non-textual responses helped to convey a wide range of emotions, moods, and intent with a message. Some of them also reported that non-textual responses can soften the tone (6/49) and support quick acknowledgments (8/49). For example:

S19: "*I feel that they help convey emotion and provide context in text conversations, where feelings are not as easily expressed as in video calls. After a while on the team, it was also a means of having a laugh or adding flavor to casual conversations and getting to know one another. For messages with a wider audience, they served as a quick way to express agreement, looking into something or give a quick response to indicate that attention has been given to a message someone has put out.*"

Two of our participants (S3 and S25) also felt using non-textual responses helped them feel more comfortable and connected with their colleagues while communicating virtually.

S25: "*It helps to communicate emotion and create more meaningful connections with your team. It gives the conversation a more human and connected feel.*"

In addition, S48, used non-textual responses to conform to the team's practice of using it, for example:

Table 1: The frequent modes of communication used to collaborate with team members virtually.

Modes of Communication	No. of Participants
Chat Systems	40
Video Calls	36
Audio Calls	24
Emails	2
Text Messages	1
Mails	1
Webex Meetings	1

S48: "*Other teammates and upper management uses them...*"

4.2 Challenges New Collaborators Face in Using Non-textual Responses

Our online questionnaire also asked several open-ended questions to understand the hindrances and hesitations that new collaborators face in using non-textual responses. We summarize those insights that new collaborators shared in using non-textual responses in virtual workspaces.

4.2.1 **Unfamiliarity:** Many participants (16/49) cited that the fear of not knowing the team when they join acts as a hurdle in using a non-textual response in a virtual workspace. Consequently, people feel restricted in using a non-textual response because they are unsure about the team/organization's culture, resulting in apprehension about how they would be perceived, for example:

S21: "*You don't really know these people, and so you want to give off the right meaning of the message. Since we work remotely, what makes sense to you may not for them... especially since I was new, they did not know my personality.*"

The quote mentioned above portrays the participant's skeptical attitude towards using a non-textual response in a new team virtually because the participant is new to the team and worried if the use of a non-textual response is misconstrued.

Furthermore, S53 also shared that they are unaware of the purpose of using non-textual responses at the workplace makes them hesitant to use non-textual responses, for example:

S53: "*I'm very less familiar with these emojis infact till today also I don't know the actual need of some emojis.*"

4.2.2 **Personal Biases and Prior Experiences:** The participants responded that they hesitate to use a non-textual response because of their personal barriers, such as their bad past experiences when using a non-textual response with a team member. A few participants (3/49) were even more uncertain about using a non-textual response when they were supposed to communicate with team members in senior roles. For example, S22 answered to the question, why were you hesitant to use non-textual modes of communication like emojis, gifs, stickers, and memes with your team virtually?

S22: "*Whenever communicating with the manager or any other person at the higher levels.*"

One of the most recurring reasons to not use a non-textual response is that many participants (6/49) perceive using it as unprofessional at work, which resonates with the findings of previous work [5, 78]. As a result, people desire to project themselves as professionals and convey their seriousness about work by not using a non-textual response, for example:

S10: "*It's not professional, so when joining a new team, it seems inappropriate to use gifs/stickers when others do not. If I work with this team longer, I'm sure I will start using them once I know everyone well.*"

In the above quote, fear of being unprofessional stems from unfamiliarity with the new team. S10 further mentions the goal is to comply with their team's usage of non-textual responses. However, it is interesting that S10 would use them after working for more time and eventually knowing the team.

4.2.3 **Technological Barriers:** A few participants (S2 and S45) mentioned that a few platforms are not compatible to support non-textual responses of their choice when asked about the challenges faced by them in using non-textual responses, for example:

S2: "*I use Microsoft teams which doesn't support most of gifs.*"

Moreover, a few participants (3/49) also stated that finding a non-textual response that could express their true emotions on the platforms is hard:

S18: "*Sometimes, it is hard to find the one emoji or GIF that expresses what I try to communicate.*"

Additionally, S45 shared that some platforms automatically suggest a non-textual response when they are not looking for one while communicating, for example:

S45: "*[...] also if we type any text, it's translated to the emoticon when it is not required.*"

4.3 Summary of Survey Findings

Our survey revealed that most of our survey participants prefer chat systems and use non-textual responses with texts to express emotions, acknowledge, and connect with others. However, 34/49 new collaborators struggled using non-textual responses, especially when new to the team, which also answered *RQ2* partially that new collaborators face hindrances in using non-textual responses to connect with the team.

From our survey, we still did not have a deep understanding of: i) how new collaborators use non-textual responses to bond with the new team, ii) other personal and platform barriers in using non-textual responses, iii) coping strategies to overcome those, and iv) what is the best way to support effective non-textual communication that fosters interpersonal bonds. Therefore, to answer those questions and understand the experiences of new collaborators in detail, we conducted online interviews.

5 NEW COLLABORATORS ONLINE INTERVIEW METHOD

We conducted interviews to further understand the use of non-textual responses to form interpersonal relationships with the team, reasons for new collaborators' personal barriers, coping strategies,

and design opportunities for an effective non-textual communication for new collaborators. The research questions mentioned in 2.4 informed our interview study.

5.1 Materials and Procedure

We conducted semi-structured interviews on Zoom and recorded sessions for data analysis with participant consent. Out of fifteen interviewees (1 pilot, 14 participants), two did not share their videos during the interview.

Our semi-structured interviews were designed so that we could ask: i) clarification questions to either the interview pre-screener for new participants or the original questionnaire for returning participants (see sections 3 and 4); ii) their motivations for using non-textual modes of communication and context of use; iii) if there are challenges related to using non-textual responses and what coping strategies are employed by the participants; iv) if non-textual communication has helped the participants to create interpersonal bonds with their colleagues in virtual workspaces; and v) what principles do the new collaborators consider to be crucial for effective non-textual communication.

We ran one pilot interview to ensure that our interview guide was clear, that questions made sense, and to check our planned interview would not run over the scheduled time. We also made sure that the main interviews focused more on topics not covered in the online questionnaire or if we still did not have a clear picture for some of our previous inquiries. The mean recording time for our interviews was 47.6 minutes (min = 27, max = 72).

5.2 Participants

We interviewed 14 participants (Female = 8, Male = 6) aged between 18-44 years old. Table 2 presents the demographic details of all the interview participants. Our interviewees were participants who scored a low familiarity rating between 1 to 3 on a scale of 1 to 5 (where 1 = '*I did not know anyone in the new team.*' and 5 = '*I knew everyone in the team.*') and who started working with a new group of people virtually during COVID-19 (i.e., only knows colleagues virtually). We selected candidates with low familiarity ratings to further understand our survey results indicating the effects of low familiarity on using non-textual responses. Seven interviewees were not from our original questionnaire, but they completed a pre-screener questionnaire before we selected them for an interview.

5.3 Analysis

We followed the Braun and Clarke's thematic analysis approach [13] to identify the themes and relationships among the qualitative data. After the data-gathering phase, the first author listened back over the interviews and produced transcripts to get familiar with the data. The next step was an iterative process that involved coding the data for key insights from interviewees' responses. Next, the first author investigated underlying patterns among the initially formed categories to classify the data into high-level categories, while consulting with the research team. Consequently, we looked at all the categories formed in the last step to arrive at a final set of themes and sub-themes. Braun and Clarke's highly-cited method does not call for multiple coders or inter-rater reliability for good thematic analysis, which is also

Table 2: This table represents the demographic details like participant ID, age, gender, job role, team size, and joining period of all the interviewees.

ID	Gender	Age Range	Role	Team Size	Date of Joining
Pilot	Male	25-34	Full-time Network Consultant	32	May 2020 - August 2020
P1	Male	35-44	Full-time Software Developer	25 to 30	May 2020 - August 2020
P2	Female	18-24	Ph.D. Student	5	September 2020 - December 2020
P3	Male	18-24	Full-time Data Science Associate	cohort structure	September 2020 - December 2020
P4	Male	25-34	Ph.D. Student	4 to 7	September 2020 - December 2020
P5	Male	25-34	Ph.D. Student	15 to 20	September 2020 - December 2020
P6	Female	25-34	Full-time Network Engineer	variable team size	March 2020
P7	Female	25-34	Software Developer Intern	6 to 7	May 2020 - August 2020
P8	Male	25-34	Full-time UX Designer	6	September 2020 - December 2020
P9	Female	25-34	Full-time Financial Analyst	12 to 15	May 2020 - August 2020
P10	Female	25-34	Full-time Software Developer	6	May 2020 - August 2020
P11	Male	25-34	Full-time Network Engineer	12	September 2020 - December 2020
P12	Female	18-24	Student/Research Assistant	3 to 4	September 2020 - December 2020
P13	Female	25-34	Part-time UX Designer	6	September 2020 - December 2020
P14	Female	18-24	Student/Research Assistant	6	September 2020 - December 2020

emphasized by other qualitative researchers [66]. The interview participants are assigned an ID letter P, e.g., P1, P2, and so on.

6 NEW COLLABORATORS ONLINE INTERVIEW FINDINGS

Through our thematic analysis, we answer our three research questions *(RQ1, RQ2, and RQ3)* under three themes: i) Using Non-textual Modes of Communication to Form Interpersonal Bonds , ii) Challenges in Using Non-textual Modes of Communication to Form Interpersonal bonds, and iii) Coping Strategies to Overcome the Challenges in Using Non-textual Modes of Communication to Form Interpersonal Bonds. We now discuss the narrative of each theme in detail using quotes from participants.

6.1 Using Non-textual Modes of Communication (RQ1)

This section explores unique methods adopted by participants to use non-textual responses to form interpersonal bonds in a virtual workspace. Similar to the insights gained from survey participants 4.1, all interview participants also used non-textual responses to convey emotions accurately, mimic other people's energy, and conform to their team communication practices.

One of our participants, P1, mentioned that using non-textual responses with text in virtual workspaces was an outcome of the new normal; people did not have access to any predefined rules to communicate in virtual workspaces. Therefore, they had invented ways to communicate effectively in the virtual workplace, for example:

P1: "*The emoji and then the text communication is a subset of this new expected cultural norm of the accepted behavior for a company, that's now online [...] You have an expectation that's preset on, and we've been trained; you watch a movie you're learning like oh that's how people behave in an office, you know, and now it's not like there's*

a movie that shows people behaving on slack, so like the behavior, different people really varies [...]"

Consequently, in the following sections, we explored unique ways like, *Gamifying Explicitly, Being Funny to Break the Ice, and Enriching Textual Messages* adopted by new collaborators to use non-textual responses to form interpersonal bonds within their virtual teams.

6.1.1 ***Gamifying Explicitly:*** P2, shared how their team members used personalized emoji to acknowledge the messages in the communication channel, for example:

P2: "*When I joined, someone told me we all had chosen a specific emoji, and whenever we have a recommended message, oh, I've read it instead of like All responding separately. We respond with our personal emoji, so that's a super formal way, my favorite emojis were already taken when I joined the group, so I chose, in the end, a fun video emoji with like a star...*"

P1 and P9 also used emoji in their bio to imply a certain interest that they wanted to pursue, to make quick decisions in a workplace contest (P7), or for naming documents and products instead of using their textual names (P13). P1 suggested using emoji for employee ratings.

A few participants (P1, P7, P9, and P10) also mentioned they used a GIF or sticker to represent themselves and their personalities at the workplace. One of the participants, P1, mentioned that if an employee used a certain emoji, then other individuals did not use it because they felt it might be copying him.

P1: "*There is an emoji that's kind of like that this guy used to send to everybody, and it became kind of like his thing...And then now do you know we don't see that emoji thrown around anymore, and feel like people don't want to use it, because then you know; it's copycatting that guy*"

In contrast to P1's statement another participant, P7, said they would want to use that specific emoji to connect with the person quickly.

6.1.2   ***Being Funny to Break the Ice:*** Many times participants (P1, P7, P8, and P13) reported their teammates would post random jokes or were funny to let them feel comfortable. To convey the intent of being fun or humorous, team members used non-textual responses like emoji and GIFs. For instance, the team lead posted random jokes first thing in the morning, and other team members were supposed to react with an emoji from a set of emoji provided by him.

 P8: "*My team lead posts some kind of random joke every day on like one the platform, so what he did was like he posts a joke there, and he would add random emoji at the bottom with the post, and would want us to vote using those emoji.*"

The above instance was one of the many examples where teams tried adding humor through non-textual responses to their messages to let the new collaborators open up.

6.1.3   ***Enriching Textual Messages:*** Participants (P1, P4, P5, P6, P8, P9, P12, and P13) claimed that being able to use non-textual responses in communication gave them a sense of sharing a comradery with their teammates. P4 also shared that it was only through using non-textual responses in chats they were able to transition from chats to video calls with a new team member, for example:

 P4: "*Then slowly, then, after some time we transcended from emails to phone calls and then to video calls like four ... And that happened because I would sometimes use SMILEY or some emoji and they would also reciprocate [...]*"

Moreover, participants (P1, P4, P5, P6, P8, P9, P12, and P13) felt using non-textual responses promoted interpersonal bonds that also helped their mental well-being by gaining a feeling of companionship, for example:

 P9: "*Yes, I would say that because previously in my last company I have made some great friends and, and I did not met with them like face to face ever, but I, but I still talk to them and I haven't had any calls with them only messages and right now, at this company, I never had, I never had any physical Like physical connection with like a with like anyone [...] so I would say yes, non-textual responses have helped me in in building the relationships and I have made some great friends in my previous [and] current company.*"

6.2   Challenges (RQ2)

Our survey study confirmed that new collaborators face challenges in using non-textual responses 4.2 to form interpersonal bonds in a virtual workspace. We also slightly discussed a few reasons for those such as, *Unfamiliarity, Personal Biases and Prior Experiences, and Technological Barriers* in section 4.2. This section extensively examines those challenges on the basis of gathered interview data.

6.2.1   *Unfamiliarity*.

Similar to survey participants, even interview participants (P1, P2, P4 - P14) also felt indecisive and hesitant to use non-textual responses because they were new to the team. We found they were hesitant in using non-textual responses because they did not share a personal bond, for example:

 P8: "*I can say, when I was not very familiar with the team, I was hesitant to use different smileys. Like you know, I'm kind of like shy in nature when it comes to like sharing a heart SMILEY with others. It is sometimes difficult for me, so yeah, I was first like very hesitant to put a heart. But later as I get to know people, yeah they are like kind of cool... I don't mind using it now.*"

Moreover, almost all the participants were unsure how others perceived their use of a non-textual response in the team; a lot of this fear to use a non-textual response in a new team also related to the non-textual response's openness to interpretation based on individuals' personal biases and prior experiences (P4 and P13). Consequently, such differences in understanding a non-textual response created misunderstandings and hurt the sentiments of team members, as shared by P2 in the example below:

 P2: "*There is this thing within a certain group they have like a norm that they don't use the praying emoji for thank you because they do not want to use any religious emoji...so they like own a thank you emoji and...when I entered, I didn't know this, so I used the praying emoji for Thank you emoji, and then some people sent me a message saying I should use the other non-religious thank you emoji.*"

6.2.2   *Personal Biases and Prior Experiences*.

Personal Idea of Professionalism: The perceived understanding of the professional way of conducting at the workplace was scattered. It revolved around the fact that using a non-textual response at a virtual workplace would make the participants (P3, P9, P10, and P11) look unprofessional. P3, also evaluated that using fewer words and more non-textual responses in a chat-based communication system showed one's incompetency to convey ideas, for example:

 P3: "*[...] when you try to communicate a lot using a limited medium like a job is essentially an instant messenger that comes from the idea that you can't really write letters and expect people to receive it and all of that right [...]*"

The reason for contradicting ideas about professionalism was often rooted in diverse cultural backgrounds, as shown in the example below:

 P9: "*I would say, for using stickers and memes, they are fun, but I don't use those with like everyone basically I use these GIFs and stickers approximately with only like four to five people...I keep my professional distance...if you would say because nobody uses those I have back in India, so I am on the fence with that [...]*"

Therefore, the concept of professionalism was diverse and depended on cultural background and exposure to different work cultures.

Differences in Seniority – Age and Experience: Younger participants (P3, P9, P10, and P13) aged between 18 to 35 avoided using non-textual responses with older adults at the workplace. They did not want to take the liberty of jeopardizing their relationships with older individuals as there was a possibility that the older adults might not be aware of trending ways to communicate non-textually, for example:

 P9: "*Most people, people in my team, are above 50 or 60, so it's a little difficult to send like meme, stickers it can mean like something different if you are not sending to the people of your own age...Because*

I did not like I uh I did not get any response back, so I thought, okay, so maybe I should not have sent that; otherwise, she would have been responded to me...it's a generational gap."

Moreover, a few participants (P1, P4, P5, P6, and, P12) were more cautious in phrasing their messages and using a non-textual response when communicating with a team member at senior roles as they were apprehensive that it could affect their relationship negatively, for example:

P6: "*The very first time, I couldn't use all this because I was not aware Like if it was actually a good thing to do so, even with the manager, I still can't do it... though things are smooth and all but I still can't do it or use emoji while chatting with my manager or some other person in the senior management, it is just that we use simple SMILEY."*

The above examples demonstrated the role of age and seniority level in determining if the non-textual response should be used.

Conformity Bias – Idea of Fitting in: P10 and P12 tended to conform to their team's communication practices, for example:

P10: "*I haven't seen a lot of people using them already so you have to conform with or whatever is going on in the company right, I cannot be like Oh, you know I'm so friendly and everything and start using it."*

From the above example, we see that even when the participants (P10 and P12) wanted to use a non-textual response, they complied with the usage pattern of their teams or organizations.

Personalized Meanings: The reason for varied understanding of a non-textual response was based on participants' association, experience, and perception of a specific non-textual response. Consequently, participants defined their own definitions of a non-textual response based on age (P9, P12, and P14), personal associations due to prior experiences (P2, P13, and P14), and cultural backgrounds (P4 and P9), for example:

P14: "*I actually mostly have that problem with the thumbs up analogy because, like, in my family like if I use that with my mom she would think I was really passive aggressive and like vice versa, my mom used that with me and actually the first time, my supervisor used it, I thought she was mad at me, and then I realized that was her version."*

Many times non-textual responses without explicit words on them were hard to understand for participants (P4 and P13) in culturally diverse teams. It is difficult to comprehend the meaning of non-textual responses because people from different cultures express emotions using non-textual responses differently. For example, one of the participants, P4, shared that his co-worker preferred to thank him through a crying sticker, which puzzled the participant; the following quote captures the instance:

P4: "*So he would say thank you over the video, and after a few minutes he would send a giphy...he would send that, and that sticker would be crying. And it would seem that that person is sad, and I wouldn't say anything like for a few days, but then I noticed this kept happening again. I was totally clueless...and then it turns out that he was sending like over happiness, which I thought, like, 'Why is he crying and why is the person sad?'"*

The above anecdotal stories of participants P14 and P4 suggested that a person's perception of a non-textual response also depended on their personalized experiences and the impact it had on them, apart from their cultural background knowledge and experiences.

6.2.3 *Technological Barriers.*

Time-consuming Search and Select: Another challenge faced by the participants (P3, P5, P10, and P14) was the lack of optimal features to find the meaning of non-textual responses and using them quickly, for example:

P5: "*Yeah, I mean one thing is that there are too many emoji and I have to if I had to use a new one, I had to go and search what it means, and then use it. So most of the times, I'm aware that there is a hover over feature, it tells the meaning, but it's just that there are too many. So, I think it's just a preference that I tend to not look over it since, as I mean since I'm a Ph.D. student, I tend to have a short amount of time to get things done in a short amount of time."*

Moreover, for interactive collaborations, participants (P7, P12, and P14) found the existing features either extremely limiting or challenging for users to discover and use; for instance, P14 mentioned that even when people were aware that there was a raise hand feature on video-calling platforms like Zoom, no one noticed it when one used it:

P14: "*I think when people use the raise hand feature, nobody ever looks at it."*

Ineffective Recommendation: P13, shared that keyword searches to locate an appropriate non-textual response matching a user's intent were often poorly met by the platforms. In other words, platforms failed to suggest/recommend usable non-textual responses in many instances. This was further aggravated by the limited non-textual responses and the platform-specific keywords to retrieve a specific non-textual response.

P13: "*When I want to search some like keywords, but I cannot get the emoji, I don't know if they have, like several keywords for emoji or there's just like a naming for the emoji say if you give one emoji several keywords I can search it very quickly... Sometimes when I type something, especially for the emoji. I cannot get the result. I can just see no results."*

6.3 Coping Strategies (RQ3)

In this thematic section, we present coping strategies adopted by participants to overcome the challenges (*Unfamiliarity, Personal Biases and Prior Experiences, and Technological Barrier: Ineffective Search and Select*) in using non-textual responses to form interpersonal bonds in a virtual workspace.

6.3.1 *Unfamiliarity.*

To cope with the problem of unfamiliarity within the team, participants preferred to *Observe and Adapt, Soften the Tension, and Use Selectively and Progressively* a non-textual response when new in the team.

Observe and Adapt: Participants (P1, P2, P4, P5, P6, P8, P12, and P13) tried to ensure replying using appropriate non-textual responses that would be acceptable and palatable to their collaborator. They keenly observed the team's communication practices and adapted accordingly. This allowed them to slowly warm up to using non-textual modes of communication within their team.

Usage of non-textual response by people in senior roles further alleviated their (P7, P8, and P13) apprehensions in using non-textual responses, for example:

P13: "[...] for emoji, I think she's the one who made our team very emotionally attached. She started using emoji, and everyone was free to use emoji because I hesitated about using emoji. After all, it expresses our emotions our attitudes, and someone could misunderstand it. I was very cautious about using emoji. So, when your senior, as in your project managers, started to use or gave you some sense of comfort that Okay, maybe others could use, then, then, you start using that."

Soften the Tension: P11, mentioned using non-textual responses like smileys in emails when reaching out to a different team member helped soften the tension of unfamiliarity between them. The quotation from the P11 is as follows:

P11: "I ensured to use two smileys at least when emailing my team mates. It softens the tension that we have because we don't know each other."

Use Selectively and Progressively: We found that participants (P1, P4, P7, and P9) used various types of non-textual responses such as emoji and GIF differently. When new in the team, participants started with emoji, and gradually progressed to using more expressive non-textual responses such as GIFs when they developed closer relationships through spending time on projects and learning common interests. For example:

P7: "I think, in general, even with my team I just I started out with emojis and get pretty crazy and then I figured out if the person and I had the kind of relationship that was casual enough for sharing because there's definitely GIFs that are like very funny funny like those are the kind that you will interact with a friend using."

P9: "I would say, for using, for using like a stickers and memes, they are, they are fun, but I don't use use those with like, with like everyone, basically I use these GIFs and stickers approximately with only like four to five people...but the people who I am like comfortable with, whom I chat like after office, if I share my personal things with them to, with those people, I'm pretty comfortable and I share the stickers and memes with them."

Moreover, participants (P2, P4, and P7) felt GIFs help a sender share common knowledge about a popular trend or TV show whereas emoji just lets a user express a fixed emotion, for example:

P7: "There is a lot more information that a GIF carries compared to an emoji...it is just a fixed kind of expression or emotion devoid of any context of why, like a person is feeling that way, except for like what it is that you are talking about in the conversation."

Therefore, when collaborators were new, they made selective and careful choices to use a particular type of non-textual response, mostly emoji, and as they spent time and learned about their teams, they progressively used another form of non-textual response, GIFs.

6.3.2 *Personal Biases and Prior Experiences.*

To cope with the problem of varied interpretations of non-textual responses participants formed due to personal biases and their prior experiences, new collaborators *Reach Out for Clarification and Use Text-based Non-textual Responses.*

Reach Out for Clarification: A general approach followed by participants (P2 and P13) was reaching out to the sender when they sought clarification. Additionally, they reflected on their actions if they triggered the sender, as shown in the example below:

P13: "Young people in China use slightly smiling emoji when they do not care or are speechless, and you do not wish to engage...once a Prof. from China used and I had no idea what he means...I asked for clarification, suggestions to improve if something was not right."

Use Text-based Non-textual Responses: Moreover, a few participants (P4, P9, P13, and P14) opted for explicit text-based stickers to avoid using culturally diverse non-textual responses that could be interpreted differently in a culturally diverse team.

6.3.3 *Technological Barrier: Ineffective Search and Select.*

Use a Closest Matching Substitute: Many participants (P3, P5, P10, P13, and P14) struggled to locate an appropriate non-textual response due to ineffective search and select process on communication platforms. Therefore, a few participants (P8 and P10) settled with non-textual responses that were the closest match to their intent. They used the first non-textual response that appeared on the search results to save time, for example:

P8: "When I do not get a particular emoji I find a closest match to an emoji available on Mattermost that I can use to substitute."

6.4 Summary of Interview Findings

Our findings revealed non-textual responses were used in creative and resourceful ways by new collaborators to build interpersonal relationships within their virtual teams. However, new collaborators found using non-textual responses at virtual workspaces challenging due to personal hesitations and technological hindrances. We further examined the coping strategies employed by new collaborators to tackle various challenges faced by them. As a consequence, in the next section, we discuss different design recommendations for virtual workspaces that could promote interpersonal bonds.

7 DESIGN RECOMMENDATIONS (RQ4)

7.1 Expand the Scope of Non-textual Responses

Our participants indicated that *the use of animated non-textual responses* makes senders and receivers happy. Animated GIFs have been shown to be engaging and fun in the context of microblogging platforms [8], though their study in a virtual workplace has largely not been explored in prior work. Our research suggests that animated non-textual responses should be included in the current suite of non-textual responses as they promote feeling good factor—including accessible non-textual responses in communication channels. Non-textual response accessibility was studied in various social media platforms, online blogging and microblogging platforms [35, 68, 79]. We can build on that prior work to enhance the accessibility of non-textual responses in the collaborative communication channels used in virtual workspaces.

Further, the non-textual responses should be inclusive for team members from varied cultural backgrounds. While non-textual responses like stickers and GIFS provide a receiver with added information about the context, situation, and relationship through messages [57], though, at the same time. a non-textual response

can be misunderstood because culture can affect it's interpretation, therefore including *text-based stickers and GIFs* can avoid those confusions. This finding is corroborated by prior work [38, 51], where authors studied the cultural gap in emoji interpretations in personal communication and then discussed strategies to make emoji culturally accessible.

7.2 Interpretable Non-textual Responses

Previous work has studied the interpretability issue with non-textual responses in the context of social media and personal communication [49, 51, 78]. Our research identified the need for interpretable non-textual responses in virtual workspaces, and suggests that virtual workspaces platforms should strive to design non-textual responses that are not open to interpretations.

First, there should be a mechanism for the platform to *suggest the sender alternate forms of non-textual responses in case it understands that the originally planned non-textual response is culturally sensitive for the receiver*. Kim et al. [50] attempt to bring context in emoji recommenders that could be leveraged here as well. This would allow people to eliminate unnecessary awkwardness.

Second, the communication platforms should *suggest alternative forms of non-textual responses that are age-neutral*. Participants were concerned that older adults may not be updated with latest trends, therefore an alternative suggestion for trending non-textual response would be useful in connecting with people across age groups. Efforts have been made to understand emoji usage in older adults [32, 40, 82]. The findings from such studies could enable building an age-inclusive non-textual response recommender.

Third, it should be made easier to *ask/find the meaning of a non-textual response of the message—both for sender and receiver*—and, next, we make recommendations on how to achieve this.

Fourth, to overcome the challenge of interpretability due to un-familiarity to the new team's non-textual communication practice, a user should have an *option to view a trend/history of most used non-textual responses in different situations* such as appreciation, gratitude, celebration, and so on in a virtual workspace.

7.3 Fast Discovery of Non-textual Response

Platforms should reduce the time to find and select a non-textual response. There should be an easy way to use non-textual response recommendations—when to use or not to use—in a given context or for a given search keyword. The current study suggests providing *keywords based on the user's geographical location, language, cultural sensitivity, mood, and context of the conversation*. Similarly, the non-textual response recommendations should also consider the cultural acceptance according to a person's location while recommending non-textual responses; moreover, before a sender sends a culturally sensitive non-textual response it should even *flag them about their inappropriate use of a non-textual response*, which might hurt the sentiments of the receiver.

Previous work by Cunha et al. [23] used a blend of emoji to represent a concept like cold, world peace, and so on. Other studies [37, 85] predict certain emoji by determining the sentiment associated with a message by analyzing the content of the message; another study [85] recommends emoji based on understanding the entire dialogue; the user will be suggested an emoji depending on

the content of the last message. Such recommendations would allow users to select an appropriate form of non-textual response without investing a lot of time. However, the past works [23, 37, 85] do not take into account cultural acceptance of a non-textual response in a particular region while recommending it.

More recently, Feng et al. [29] assessed the request of new emoji on Twitter data to figure out what people look for, when they look for it, and what does not exist. This study is an initiation to expand the keywords or provide more emoji. However, only one of the studies [72] discussed the user's awareness to retrieve a non-textual response using keywords in their native language.

During our interviews, P12 mentioned the issue of not being able to find an appropriate emoji that she was looking for. This could be due to the user's language, different ways to perceive the non-textual response, or cultural background knowledge, which might not return the expected result for her search as shown in the following quote:

P12: "*Maybe I have different feelings about the emojis because the emoji I see after the search is something I don't know, like the meaning behind it or the text to describe an emoji that I was looking for. We have different feelings about this, so when I searched like type the text to search for emoji, I probably won't get the correct result or any results.*"

Therefore, to address this issue, enhancing alternate keywords corresponding to a particular non-textual response based on language or geographical location might help. For instance, if a native Hindi speaker searches the 'smile' emoji in their local language, the platform does not provide any non-textual response suggestions. Currently, on platforms like Slack [1] and WhatsApp [3], if a user searches a non-textual response using keyword in their native language other than English, then the platform recommends appropriate GIFs, but no results for emoji. Additionally, for Apple products, there is a predictive emoji feature [2], which suggests emoji only for a phrase or word in English to its users.

7.4 Standardize the Issue Reporting and Automate the Linguistic Corrections

Our participants shared that a lot of time is lost in explaining issues over textual modes in these cases. Moreover, at times the actual issue is neglected while watching out for correct intonation and grammar. Therefore, the platforms should enable template creation for communicating issues and roadblocks effectively. These platforms should also *include automatic spelling, grammar, intonation checks, and a relevant non-textual response*. Currently, various independent services provide virtual team template services for example monday.com [28]. Besides that, Microsoft Teams also provides integrated templates, SalesTim [61], on their platform to make remote collaboration easier and smoother. However, these services do not provide a template that could help users write their impediments quickly without worrying about spelling, grammar, and intonation checks. On the other hand, certain video conferencing tools like Zoom provide whiteboards [81] where the presenter can draw to explain their ideas. However, these features are fairly limited in their capabilities. Participant P4 suggested that there should be — *i) some predefined shapes and controls for use, ii) touch-based controls*

to allow for effective and efficient freehand drawing on the boards, and iii) automatic creation of shareable documents from these boards.

8 DISCUSSION

Our research examined new collaborators' perspectives on using non-textual responses in virtual workspaces. Contradictory to some prior work (e.g., [5, 20, 39, 41, 78, 79]), our survey reveals a shift in attitude where the majority of new collaborators (34/49) prefer using non-textual responses in virtual workspaces as virtual settings have become the default workspace. Our findings suggest that new collaborators use non-textual responses to connect better and to be able to share a bond with a teammate, which is in line with the past studies [33, 44]. However, prior work has not studied the use of non-textual responses in building interpersonal relationships between the team and new collaborators [33, 44, 78, 79], though a few studies focused on the implications of computer-mediated communication without including non-textual responses [14, 19, 21, 25, 43, 46, 54, 64, 65].

New collaborators' unfamiliarity to their teams made them apprehensive about using non-textual responses because they are unsure how others would perceive them in the team. This uncertainty in using non-textual responses stems from non-textual responses' openness to various interpretations that team members have due to personal biases, experiences and cultural knowledge, which is also in line with Bai et al.'s finding [6]. Herring et al. [41] and Tigwell et al. [78] briefly discussed that people only preferred to use non-textual responses with whom they shared a close relationship. Moreover, we discovered technological barriers like limited keywords to search and select a non-textual response hampers a user's willingness to use it, which has not been studied by past work [22, 37, 83, 85]. However, the challenges such as finding an appropriate non-textual response to match sender's intent [74, 79, 86], and platform compatibility to support the visuals of a non-textual response [47, 60, 63, 69, 76, 78] are known issues. Moreover, the recent works by Tigwell et al. [79] and Zhang et al. [86] actively pursued this problem for people with vision impairments.

Our work further highlights that new collaborators put efforts to cope with their personal hesitations and technological barriers. One of the most prominent strategies to tackle personal hesitations was observing and adapting non-textual communication practices in a team, reaching out to people to seek clarification, and using a particular mode of non-textual response selectively and progressively depending on the bond they share within their team.

As a new collaborator who has to juggle constantly to form interpersonal relationships within a virtual workspace using non-textual responses could affect the mental well-being of a user, echoing the thought of Gilson et al. [34] that computer-mediated communication impacts the mental health of a virtual team. Our study is a starting point in that direction, exploring the communication strategies used by the new collaborators to address their hesitance in using a non-textual response. Moreover, those strategies would help to inspire and inform the designers' design decisions in a way that does not put collaborators in situations that might take a toll on their mental health.

9 LIMITATION AND FUTURE WORK

We acknowledge that our participant sample was skewed towards a younger age group from 18 to 44 years of age. Therefore, all the findings were grounded on the experiences of younger adults in using non-textual responses on virtual workspaces. However, a majority of new collaborators come from the age-group considered in this study because those people are more prone to internships and switching jobs [10]. Many of these young collaborators come in the job market for the first time. It would have been interesting to learn about older age groups and their insights using non-textual virtual platforms. Additionally, all the survey and interview participants were located either in India or in the US, keeping the scope of the study to two countries. However, we note that typical workforces in the US can still be very diverse and comprise of people from different nationalities [4]. Therefore, it exposed us to gather perspectives from different work cultures even when participants came from only two countries.

Our future work will focus more on understanding the perspectives of older age groups, people from different countries, and perspective of teams (where the new collaborator joins) in contrast to current study which is one-sided focusing only on the perceptions of new collaborators. The insights from these user groups will allow us to understand better the effectiveness of our design recommendations for non-textual responses in building interpersonal relationships. A longitudinal diary study [77] would be a useful method to further examine the behavior of new collaborators with respect to their time spent in the team [56, 71] and transition from virtual to a face-to-face work setting on the usage of non-textual responses. We could more closely understand the nuance surrounding familiarity gained over time vs. the support of non-textual response, although we are confident that non-textual responses are facilitating connections because new collaborators are adopting a common language with their colleagues, which increases relatability through rapport [31]. In contrast, we designed our study to understand the perception of new collaborators in using a non-textual response with a new team in a virtual-only workspace.

10 CONCLUSION

We present the experiences of new collaborators in using non-textual responses in a virtual work environment to build interpersonal relationships with their team members. Even though people still perceive using a non-textual response as unprofessional in the workplace, we found new collaborators heavily use non-textual responses in virtual work environment during the COVID-19 pandemic. Our work identified the hindrances of new collaborators in using non-textual responses, coping strategies employed by them to address the challenges, and how virtual platforms could provide an elevated experience to new collaborators in using a non-textual response efficiently to form interpersonal relationships with their colleagues quickly.

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