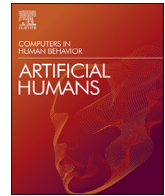




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## AI4PCR: Artificial intelligence for practicing conflict resolution

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### ABSTRACT

The ability to resolve conflict while preserving relationships is ever more vital in our divisive, global society. Traditional conflict-resolution training is mostly delivered in one-off sessions with practice opportunities limited to a fixed number of pre-defined role play scenarios. This is insufficient for acquiring the notoriously difficult skill of communicating effectively amidst conflict. We present a new web application that teaches relationship-preserving language for conflict resolution. Our system uses artificial intelligence (AI) to provide automated feedback to open text, natural language input, alerting users to language that may sound judgmental or be otherwise ineffective for resolving conflict. Our application prompts users to respond to scenarios of workplace conflict while receiving feedback from the AI. We conducted qualitative interviews with 13 participants and explore a range of themes relevant to our users' experiences. We discuss design implications of our results through the cognitive, active, affective and relational dimensions of experiential design.

### 1. Introduction

Giving people the skills for building and sustaining relationships is one of our most important societal challenges. The ability to communicate in a way that transforms conflict and interpersonal differences into opportunities for connection and understanding is a skill that everyone can learn. However, as with all complex skills, learning effective communication skills for conflict resolution requires continued practice while being able to receive feedback on mistakes. We've developed an application that uses Artificial Intelligence (AI) to teach users how to avoid language that may trigger a defensive response in others, and thus be unhelpful for resolving conflict. While the communication principles being taught are applicable to all interpersonal conflict contexts, the examples we use in our training are based on scenarios relating to workplace conflict. Previous work has examined applications for well-being and general socio-emotional skills, but ours is the first study to investigate the experiences of users participating in AI-assisted conflict resolution training. We used qualitative methods to extract themes capturing users' responses to this training, including their thoughts and feelings when using the application and their reactions to AI feedback. We synthesize these results into design implications through the lens of the cognitive, active, affective, and relational dimensions of experiential design (Chertoff et al., 2010; D. Kim & Perdue, 2013; B. J. Pine & Gilmore, 2013; Savolainen, 2020). The next sections comprise of a brief overview of the importance of conflict resolution skills, the use of

relationship-preserving language, traditional conflict resolution training, related work on technologies for interpersonal skill training and background on experience design.

#### 1.1. Importance of conflict resolution skills

Interpersonal skills are powerful predictors of mental health, achievement, labour market success, and lifetime health (Attanasio et al., 2020; Belfield et al., 2015; Gutman & Schoon, 2013; Smithers et al., 2018). Social skills have been recently highlighted as vital to wellbeing in our growingly uncertain world (Clarke et al., 2020). The ability to maintain inclusivity across differences is imperative in our increasingly global and diverse society (Garimella et al., 2018).

One of the most ubiquitous domains where conflict commonly occurs is the workplace (Guzmán et al., 2020; Phiri et al., 2019). While disagreements over task characteristics such as aims, scope and procedures are often required for productive teamwork (Witherspoon et al., 2013), task conflict can lead to relationship conflict (Jimmieson et al., 2017). Both task and relationship conflicts have been linked to worsened stress and wellbeing (De Dreu & Gelfand, 2012; Sonnentag et al., 2013). On the flip side, a workplace culture where people feel safe to speak up about differences, failures and feedback without suffering interpersonal costs is crucial for employee satisfaction and organisational success (Carmeli & Gittel, 2009).

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### 1.2. Conflict resolution through relationship-preserving language

At the heart of conflict resolution is the ability to communicate in a more collaborative way. Much of conflict training is founded in the principles of restorative practice, i.e., turning the focus away from judgment and blame and towards needs and values of individuals and communities (Littlejohn & Domenici, 2012; Singh, 2020). A significant part of restorative practice is the use of relationship-preserving language (RPL) that avoids blame or judgment and promotes understanding of the personal values underlying negative emotions (Katz et al., 2020a; Singh, 2020; Stevahn et al., 2002a). The mechanisms behind the positive impacts of RPL is supported by a large body of neuroscience and psychology research demonstrating that the language that we use to think to ourselves and communicate with others greatly affects our ability to regulate our emotions and manage our social responses. For example, exposure to caring words has been shown to increase prosocial values, self-regulation, compassion and altruism, and reduce negative affect (Rowe et al., 2020). The use of neutral language and avoiding words that evoke blame and judgment when describing situations reduces severity of perceived need for punishment and the longevity of memories around perceived blame (Fausay & Boroditsky, 2010). Use of I-language (e.g. ‘I understand why you might feel that way, but I feel this way’) were found to reduce perceptions of hostility (Rogers et al., 2018). Finding words for emotions and using language to reframe the meaning behind negative emotions decrease feelings of distress (Ford & Gross, 2018; Torre & Lieberman, 2018).

### 1.3. Traditional conflict resolution training

Traditional conflict resolution training is typically delivered through courses that focus on a broad set of conflict strategies. Courses usually include teaching the principles of RPL, and allowing learners to engage in a limited number of group role play sessions using pre-defined scenarios, followed by a debrief from trainers (Bonell et al., 2018; Museux et al., 2016; Stevahn et al., 2002b). Live workshops are typically costly and time-consuming. Opportunities for continued practice and training can be limited. In online conflict resolution training programs, practice is often limited to pre-defined scenarios and learners interact via multiple choice options (Greif Green et al., 2020; Kron et al., 2017). Thus, learners may not have the opportunity to engage in ongoing practice and receive the continued feedback and support needed to master RPL during conflict. Learning RPL is the process of learning to respond and communicate in a different way. Continued practice with feedback in natural scenario-based settings is important for learning new responses and new types of communication (Bardach et al., 2021; Lee et al., 2020).

### 1.4. Related work: technology for interpersonal skills training

As technology advances, machines are increasingly involved in creating and facilitating social-emotional interactions with and among people. This opens up opportunities for new modes of delivering interpersonal skills training (Poria et al., 2017). Recent developments in computer-based social-emotional learning include computer simulations and virtual environments for training teachers to handle classrooms (Greif Green et al., 2020; Theelen et al., 2019), virtual detection of body language in communication for healthcare professionals (Kron et al., 2017) and smart-glasses that teach social-emotional skills (Keshav et al., 2018). Artificial agents are increasingly used for mental health coaching (Moore & Caudill, 2019). Agents have also been used to teach job-interview skills (Porayska-Pomsta & Chryssafidou, 2018).

Sentiment analysis and its variants has long been a key task for making sense of subjective language using a combination of machine learning and natural language processing methods. Machine learning is the use of general statistical models to draw inferences and make predictions from patterns in data. Natural language processing is a computational field that uses both machine learning and other computational

techniques to analyse patterns in natural language. Sentiment analysis models are able to identify and categorizing opinions expressed in a piece of text, identify attitude towards a particular topic is positive, negative, or neutral (Mäntylä et al., 2018), and emotions within interpersonal communication (Himanshu et al., 2018). Recent work also has focused on detecting the psycholinguistic features relevant to communication for conflict-resolution. For example, models detect causes of emotional reactions (Li & Xu, 2014), receptiveness amidst conflicting viewpoints (Yeomans et al., 2020), and politeness in negotiations (Yeomans et al., n.d.).

### 1.5. Background on experience design

We derive design implications from our work through the lens of the cognitive, active, affective, and relational dimensions of experiential design (Chertoff et al., 2010; D. Kim & Perdue, 2013; B. J. Pine & Gilmore, 2013; Savolainen, 2020). Experiential design had its roots in marketing and has since been used to more generally to evaluate user experiences in response to products in interaction design (Chertoff et al., 2010; D. Kim & Perdue, 2013; B. J. Pine & Gilmore, 2013; Savolainen, 2020) and is rooted strongly in ideas of user centred design (Buxton, 2007; Norman, 1990). Cognitive experience refers to the users’ cognitive or task engagement while engaging with the application. This includes the effort, cognitive load, and active anticipation of outcomes in a task. Active experience refers to the degree of personal connection to the experience, including experiences of empathy and self-identification. Affective experience refers to the depth and breadth of users’ emotional experiences while using an application. Relational experience refers to the social aspects of the users’ experience and the degree to which meaning may be created through collaborative experiences.

## 2. System design

The current work presents a web application, AI4PCR, that uses Artificial Intelligence (AI) as a feedback tool to help users practice RPL during interpersonal conflict or difficult situations. The goal is to encourage the use of neutral language that does not imply blame or judgment. In addition to reducing the risk of social provocation, neutral, impersonal language has also been shown to reduce discrimination and bias (Cecchi-Dimeglio, 2017; Correll, 2017). Our system also encourages users to say what they want using a positive frame and to mention their needs, values and aspirations (Katz et al., 2020b; Museux et al., 2016; Stevahn et al., 2002b). Our system enables deliberate practice around RPL. Deliberate practice is one of the most effective approaches for mastering complex skills. It involves, focused, practice directed towards achieving a specific goal, and the ability to obtain immediate feedback towards that goal (Ericsson, 2012). AI4PCR allows for continued, deliberate communication practice in response to any situation (including current, personal situations), and provides learners with immediate, automated feedback.

### 2.1. AI functionality

The AI algorithm behind AI4PCR combines machine learning (ML) and natural language processing (NLP) to detect the following linguistic patterns: 1) words or phrases implying judgment or blame, e.g., “you belittled me” 2) negative, personal characterisations, e.g., “meek”, “hypercritical”, “obnoxious” 3) exaggerations, e.g., “you always interrupt me” 4) commanding, language, e.g., “please stop interrupting me” 5) blaming people instead of people’s actions, e.g., “you caused our meeting to overrun” vs. “your arriving late caused our meeting to overrun”. 6) Positive vs. negative framing, e.g., “I want you to stop shouting” vs. “Could you speak more quietly”. If the AI does not detect anything to comment on, it responds with “Looks good”. In contrast to tone-meters and sentiment analysis systems, which assign valences (e.g., sad, angry, friendly) for an overall message, AI4PCR is designed to detect specific

psycholinguistic patterns. Thus it provides users feedback on the specific words or phrases that could be improved upon. AI4PCR only provides feedback on language input and is not a chatbot.

### 2.2. Scenarios and Message Makeovers

When users initially sign up to the web application, they are presented with introductory text explaining principles of RPL. These included: describing situations using neutral language without blame, judgment, or exaggeration; stating what you wanted (not what you did not want); not blaming others for negative feelings; attributing negative feelings to personal values, needs, and aspirations that were not met. Good vs. bad example sentences illustrating each principle of diplomacy were also provided. Users then proceeded to the application’s main screen, which showed two types of activities: Scenarios and Message Makeovers (Fig. 1).

Scenario activities prompt users to remember a time when they experienced a particular conflict situation (Fig. 2a). Message Makeover activities posed hypothetical scenarios to the user and showed specific sentences that users were asked to re-phrase (Fig. 2b). There were five Scenarios: being misunderstood, opposing points of view, problem with peer, self-sabotaging friend, and own scenario, which allows participants create their own scenario of choice. There were also five Message Makeovers: dismissive boss, boss who only criticizes, idea stomper, long-winded colleague, ungrounded intern. For all activities, users were prompted to type what they would say in a text box. A ‘Diplomatize!’ button allows user to receive feedback from the AI on what they had written. The AI provides feedback alerting the user to possibly judgmental or otherwise less effective language, along with a related message for how to improve, e.g., ‘better to focus on objective observations’ or ‘better to make reference to universal wants and needs’. The original text input is also returned, highlighting the corresponding phrases that each item of feedback corresponds to (see Fig. 2a and Fig. 2b). Users could continue to refine their responses, receive feedback from the AI, as many times as they liked. Completed or partially completed activities could be saved in user accounts to view or resume later.

### 2.3. User feedback on the AI feedback

A key consideration in our system’s design is the fact that AI cannot be relied on as an infallible judge of communication. At best, the AI will still miss many subtleties of natural language input compared to a human. Furthermore, due to the subjectivity in interpersonal communication, it is impossible to predict with certainty how any message will be received by someone else. Thus a key aspect of our system design is that the interaction with the AI should be a collaborative one. The AI should

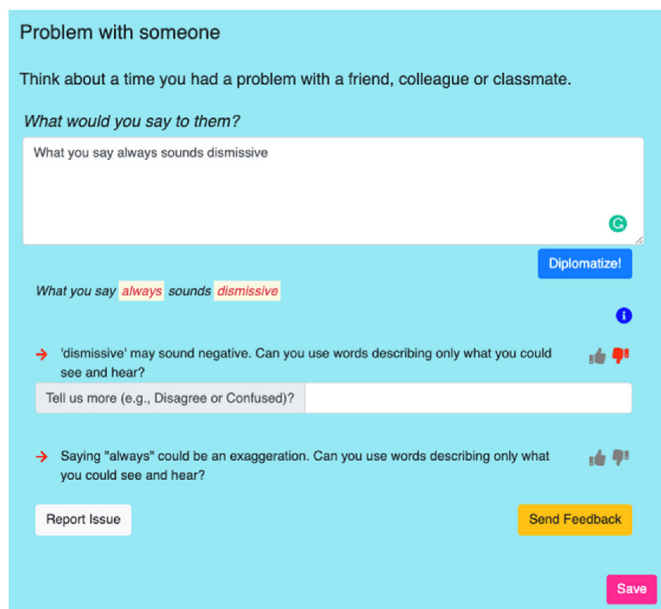


Fig. 2a. Example Scenario activity. The user is provided a prompt to think about a time they personally experienced a difficult/conflict situation and asked what they would say to the other person. A text box allows the user to type in free text input and a ‘Diplomatize!’ button allows user to get feedback on what they wrote from the AI. The original text input is also returned highlighting the corresponding phrases that each item of feedback corresponds to. For each individual item of feedback from the AI, users are able to indicate whether they found the feedback helpful or not via thumbs up or down icons. If thumbs down is selected an optional comment box also appears. The user can repeat this process (i.e., type in text and get AI feedback) as many times as they wish.

provide feedback that serves to prompt reflection and should not be viewed as a faultless arbiter of communication quality. We encourage collaboration by allowing users to provide their own feedback back to the system. For each item of AI feedback received, users can provide their feedback via thumbs up/down buttons and an optional comments text-box (see Fig. 2a and Fig. 2b). There was also a “Report Problem” button for users to report anything the AI missed or any other problems with the application. The language used in our AI feedback also conveys the subjective nature of its feedback through the use of qualifying language such as *may*, *could* and *seems to*, e.g., “‘bullied’ *may* be an interpretation. Better to describe things in terms of what you can see and hear” and “‘I don’t want to argue’ *seems* to say what you do not want. Better to say what you want instead”.

### 2.4. Extended step-by-step guide

For scenario activities there was an option to use an extended step-by-step guide that helped users work through the conflict. This guide consisted of a series of prompts that began with multiple-choice questions asking users for their judgments, feelings and needs as well as possible feelings and needs of the other party in the conflict. Next, users were guided through a series of open-ended text box questions, which helped them think through different aspects of the situation and compose different parts of their message. Specifically they were prompted to describe the situation using neutral language, acknowledge the other’s point of view, state their own needs and aspirations, brainstorm strategies, and make any requests they had of others. The final step involved composing a final message. A “Generate Final Message” button automatically combined inputs from previous steps, which the user could further edit if they wished (see Fig. 3). At each step of this extended guided process, including the final message, users could receive feedback from and give feedback to the AI (see Fig. 4).



Fig. 1. The application main screen showed options for two types of activities: Scenarios and Message Makeovers. Scenario activities contained prompts for reflections on past personal experiences and include the option for users to create their own scenario. Message Makeovers presented hypothetical situations along with specific judgmental or otherwise undiplomatic sentences that users were asked to rephrase.

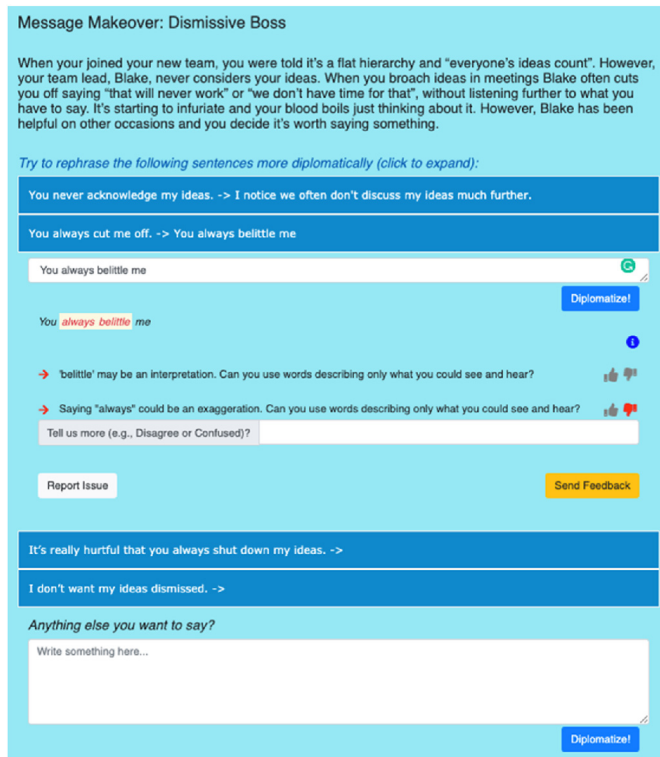


Fig. 2b. Example Message Makeover activity. Message Makeovers pose a hypothetical scenario, along with specific judgmentally-phrased sentences for the user to rephrase more diplomatically. Each sentence to be rephrased is shown in expandable/collapsible tabs. When expanded, a text box is shown in which users can type their rephrased sentence and receive AI feedback. The user's previous answers for rephrased sentences are shown on the collapsed tabs. As with the Scenario activities, if a user disagrees with the feedback, they can send a thumbs-down with an additional comment. At the end, users could add additional text input of their own.

### 3. Methodology

The system was developed through iterated cycles of testing and development. An initial lite prototype system was developed and evaluated before developing the final system. To evaluate our final system we conducted semi-structured interviews of users' experiences interacting with the application.

#### 3.1. Iterative development and lite prototype evaluation

We initially developed a lite prototype system, achieved through multiple iterations of user testing and development. The lite prototype allowed users to receive feedback from and give feedback back to the AI-assistant in response to five brief personal scenario prompts that users could choose from. There were no Message Makeovers. The prototype did not include user account capabilities. Six participants were interviewed for 30 min on their responses to the prototype. Their responses indicated they found the app helpful: "It was like confessing or reviewing your own thoughts whether we have said it right or wrong", "Yes, taking time to write this will provide insight into what thoughts were helpful" "This will help me in future to answer some situations, to know how to deal with it" Given the overall positive results, we concluded that our prototype evaluation verified the basic usability of our design and warranted the implementation of our full application.

Our full application extended the lite prototype with the following additional features: Message Makeovers, which presented hypothetical scenarios along with sentences to re-phrase, were added as a second type of activity alongside scenarios. The extended step-by-step guide was

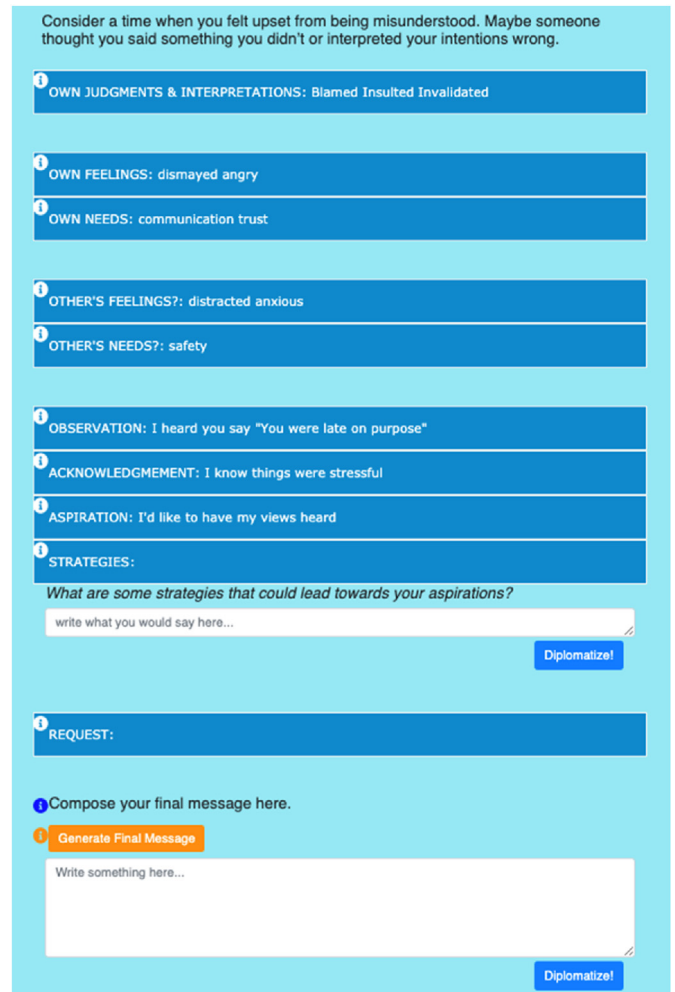


Fig. 3. Optional extended step-by-step guide through Scenario activity. Each step is completed by expanding a collapsible tab. Multiple-choice questions asked users for their judgments, feelings and needs as well as possible feelings and needs of the other party in the conflict. Open-ended text prompts asked users to describe the situation using neutral language, acknowledge the other's point of view, state their own needs and aspirations, brainstorm strategies, and make any requests they would like of others. Responses from previous steps are shown on the label of the collapsible tab.

added as an option for the Scenario. Users were also able to create user accounts where they could save their responses to any activities.

#### 3.2. Participants

Participants for our main study were recruited with the following advert: "Looking for test-users for a website using artificial intelligence that helps people practice communicating in interpersonal conflict situations". Ethics approval was obtained via the Queen Mary, University of London's Ethics of Research Committee. We recruited 13 adult participants (age-range 24-50+, 10 females, 3 males) to use our application and be interviewed about their experience. Participants were not compensated and, instead, were given opportunity to use the system in exchange for being interviewed about their experience along with a post-interview debrief answering any further questions they had about the study or any personal communication challenges they've had. Participants were given an instruction sheet with a link to the web application, which was publicly accessible. They were asked to interact with the website application in their own homes at a time of their choosing within a week before their scheduled phone or video call interview. Participants were told that the site had two types of activities, Scenarios and Message Makeovers and

Appreciated Aspects:	Frustrations and Areas for Improvement
Overall trust in the AI feedback Ability to feedback when participant disagreed with AI feedback Prompted reflection Personal identification with scenarios Emotions and vulnerability Potential to increase awareness, calm and confidence Safe rehearsal space Motivation through understanding RPL was a learnable skill	<b>Frustrations:</b> Confusion when feedback was unclear Frustration when participants didn't know how to improve  <b>Areas for Improvement:</b> More support for learning from mistakes Suggest specific examples of RPL More encouragement from AI Progress tracking

Fig. 4. Summary of user reactions. Appreciated aspects of the system, frustrations, and suggestions for improvement.

were asked to explore at least one activity from each type. They otherwise were allowed to explore the site as they wished. Participants were not required to use the extended step-by-step guide for the Scenarios but could do so if they wished. Semi-structured interviews were performed lasting 45–60 min. Questions were centred around initial reactions when first entering the application, thoughts and feelings when using the application, experiences with AI feedback, what they felt could improve their experience, and any other thoughts they had around the application.

### 3.3. Qualitative study analysis

Each interview was audio recorded and transcribed. We employed inductive thematic analysis as described by Braun and Clarke [36]. Thematic coding underwent multiple iterations to ensure the richness of the content was fully explored. All stages of analysis were conducted by the first author, and method and findings were discussed with the co-author at intervals. Transcripts were initially analyzed for patterns across all interviews to extract themes. The data was repeatedly revisited to consolidate the main themes that were present across interviews. Once consistent themes were identified, all transcripts were re-analyzed, and all data extracts relevant to each theme were coded.

## 4. Main evaluation results

We present the resulting themes from our interviews within two sections: 1) Reactions to AI feedback 2) General thoughts and experiences with application.

### 4.1. Reactions to AI feedback

Our first set of themes relate to participants' experiences when receiving feedback about their inputs from the AI. These included *Trust in the feedback*; *Evaluation and reconsideration*, *Confusion and frustration*; *Wanting positive suggestions*; *Trying to understand AI limits*; *Allowing for AI limitations*.

#### 4.1.1. Trust in the feedback

Participants appeared to trust the AI's feedback, sometimes even beyond what was warranted. All participants had experiences with AI feedback as helpful. Four participants reported always agreeing with the AI feedback. "No I didn't notice any (inaccurate feedback)" (P4). The other nine participants felt the feedback was accurate most of the time. "Most of the time I thought the feedback was correct. I like the fact that the app is catching a lot of stuff it's really smart" (P6). Some participants even demonstrated trust in the AI when the AI was incorrect (as determined by the researcher upon examining the details for the specific

example). They instead questioned themselves. "I don't think it was the feedback that wasn't clear—I might not have been clear on how I was supposed to rephrase it in a diplomatic way" (P11). Another indicator of trust was the expressed motivation to pass the approval of the AI. Most participants described adjusting their inputs until they could receive a "looks good" from the AI. "I would repeat it until it would say 'looks good' and then I would move on" (P2). "It said looks good and I was like YAY! I mean the satisfaction I got from that was amazing" (P7). No participants reported instances where they felt the AI missed something that was clearly judgmental or negative. This may reflect participants' bias towards thinking what they wrote was acceptable as well as trusting the AI. "If it's telling me it looks good then (I'll think) ok great I'm on the right path" (P13).

#### 4.1.2. Evaluation and reconsideration

Participants actively evaluated whether they agreed with the feedback. When they decided to accept the feedback, participants often used conceding-sounding language such as "ok, good point", "fair enough", "yeah, I can see that", e.g., "Whenever I went with maybe it's better this way, and I still got (negative feedback) ... I was like ok fair enough" (P2). Participants described how the feedback prompted them to consider new perspectives on what they had written. "It was really helpful to just kind of rethink okay well how could I say that differently. It certainly made me think twice about what I was saying" (P6). The AI feedback also prompted participants to realise times where they could be making assumptions about what the other party might be experiencing. "I wrote 'I think you are stressed' and it (the AI) told me I was speaking for someone else's feelings. It actually made me think about my interpretation of stress and maybe my interpretation of stress is different to theirs. So I changed it to say 'things are busy' because that's more neutral and 'times are testing' because times are testing for everyone at the moment. So it actually made me use more neutral language because I'm assuming someone is very stressed (when they may not be). (P10). "There were a few that I got (as feedback) 'that's an interpretation it's better not to assume' and I liked that" (P7). One participant mentioned that they found the feedback helpful even when they didn't completely agree with it. "Even when it's not quite right, it made me think and come up with a better way of saying things" (P8). Another participant mentioned that simply knowing they would be receiving feedback made them consider what they wrote more carefully. "Even just doing this makes you think, even before it comes up with feedback" (P13).

#### 4.1.3. Confusion and frustration

Participants also experienced confusion and frustration in response to the AI feedback. Sometimes the feedback was unclear because sentences were not processed correctly by the AI. Other times the wording of the feedback itself was unclear. In both cases, participants expressed

confusion and frustration over moments when they could not understand the feedback. “Sometimes I didn’t understand it and that was frustrating ...and I didn’t even know what I was doing wrong, that was demoralising” (P8). While the AI does provide general principles for how language could be improved along with its feedback, it does not make specific suggestions of words or phrases to use as replacement. Many participants expressed frustration over not knowing how to improve their messages after receiving the AI feedback. “You know there is this emotional reaction like what am I supposed to do now? How am I supposed to do this better?” (P07) “You are giving me feedback like ‘killing ideas’ is very strong. But what do I do with this?” (P12). Some participants described feeling frustrated after continuing to receive critical AI feedback despite multiple attempts to improve and being unable to come up with more neutral language themselves. “I wrote ‘bad attitude’. (Then) I replace ‘bad’ with ‘cheesy’ and (then) I replace ‘cheesy’ with ‘unpleasant’ and everything shows me as like (that’s a) strongly negative word. I found it difficult” (P1).

#### 4.1.4. Wanting positive suggestions

Many participants wanted to receive specific suggestions of what words or phrases they could use instead. “Instead of just telling me the negative strongly negative words, suggest what words to use instead. I just needed some suggestions” (P1). “It says this is problematic, but it didn’t seem to help you then think about how to rephrase it. What I needed was probably something to say okay if you go in this way the response could this” (P3). “My expectation is that you’re going to give me a better way of saying something” (P12). Participants spoke of wanting to see more examples like the ones shown in the introductory text. “If there is just a breakdown of model answers I could look it you know like the one that you provided in the introduction” (P8).

#### 4.1.5. Trying to understand AI limits

Participants tried to understand what the AI would and would not pick up on. They spoke about testing out different phrases to see what the AI was responding to. “In the first few ones kind of just playing it by changing certain words to see what the outcome would be” (P06). “Some of them I put in quite deliberately to be inflammatory and it did say ‘this here is problematic or this here is a bit of an issue’ and so it was quite good” (P3). They spoke of wondering if the AI would be able to understand them. “I was thinking, ‘will it understand what I’m talking about?’—and it did” (P10) When they disagreed with the AI feedback they would try to understand what caused the AI to respond the way it did. “I don’t think it was taking into account both words but only one of them” (P2).

#### 4.1.6. Allowing for AI limitations

Participants spoke of making allowances for mistakes in the AI feedback. They acknowledged that an AI may have limitations compared to a person. “Obviously like bots can’t be human and human can’t be bots ... even Grammarly makes some mistakes. (When disagreed with AI feedback) I ignore it. I think it’s not a big deal” (P1). “I didn’t take it personally ... If a person had told me the same thing I would be both annoyed and kind of thought well they’re not very clever are they. But because it was in an algorithm I just thought okay well it just needs to be tweaked” (P5). Participants mentioned that being able to give feedback on AI feedback they disagreed with was helpful, and could even be a positive experience. “The fact that you can at least give feedback of why you don’t think something’s right is helpful so you don’t have to let it go unaddressed. You’re able to get off your chest” (P6). “I could feel energized, you know, over the curiosity of why aren’t we in agreement. What is it (that’s causing this)?” (P9).

### 4.2. General thoughts and experiences

Many themes arose surrounding general thoughts and experiences from interacting with the application. *Personal identification with situations; Heightened emotions and vulnerability; Awareness, calm and*

*confidence; Safe rehearsals; A skill to learn; Wanting encouragement and to see progress; Wanting to learn from mistakes; Limits of diplomatic language.* In the following results, participants’ use of the word ‘scenario’ referred to both the Message Makeovers as well as the Scenario activities.

#### 4.2.1. Personal identification with situations

Most participants expressed highly identifying with the situations depicted in the Scenarios and Message Makeovers, based both on their own and others’ experiences. “All the examples I could I think at least of someone who has done (experienced) it. So it’s like okay yeah I’ve definitely been present in situations like this” (P2). “Bless you—you found every single thing appropriate for me ... it’s good for me to do this because you know I often feel like this” (P4). Participants expressed appreciation for having these recognizable conflict situations explicitly addressed as they felt they often occur but are not as often spoken about. They spoke about how it felt normalising for them to realise they were not alone in their struggles in dealing with these difficult situations. “I have to say the scenarios are amazing. I was fascinated just reading about them and so they do occur! They are definitely things that you know happened and also things that are taboo that people don’t talk about. Everybody has the assumption that people deal with this easily and it’s not an issue so it was very nice to feel like yeah this is a challenge and see how we do it” (P7). They also appreciated that the scenarios generated awareness around how common such conflicts were. “Ooh you know this stuff really happens. This actually happens and people really go through this. (This) might help you realise that people have these situations and it’s quite common in the workplace” (P10). Many participants described wanting to engage with more examples of such scenarios. “I was thinking this will be really useful for me to keep reflecting on engaging with, those kind of questions and situation” (P11).

#### 4.2.2. Heightened emotions and vulnerability

Participants spoke of experiencing heightened emotional states and vulnerability while interacting with the application because of the intensity of the conflict situations they were being asked to consider. “These are powerful situations” (P12). They mentioned the emotive language used in the activity descriptions contributed to eliciting more intense emotional responses. “The vocabulary that is used is more personalized and it’s more emotional ... it says ‘meetings are excruciating’ not just ‘difficult’” (P4). Our application had a loading screen showing a smiley face when waiting for the AI to process the feedback. In response to this, one participant said, “to be honest I struggled with the smiley face when it says ‘giving you your feedback’ ... some of these issues are quite sensitive I was feeling a bit nervous and (thinking) ‘is this the right thing to say’ so I really wasn’t feeling smiley” (P10). Participants spoke of feeling vulnerable because it made them reflect on their personal experiences with interpersonal conflicts. “It makes me reflect upon that time ... so that then is loaded so I think the kind of emotions that were related to it ... it’s kind of you are stirring a Hornet’s nest aren’t you?” (P4). “Because you are thinking about something that can personally be stressful ... so you really want to get it right. Or if you get it wrong you want to understand how to fix it because it’s really emotionally involved ... they are very high stakes scenarios” (P7). One participant even likened the experience to being thrown immediately into a late-stage therapy session. “It kind of hoodwinked me. I thought it was going to be about helping me use vocabulary more effectively but actually it’s about therapy. But normally (in therapy) they spend some time getting to know you ... this kind of goes straight into the jugular” (P4). Another participant spoke of wanting more caring and supportiveness than the application provided. “the first impression was that it was going to be quite a serious thing— I was staring at it and didn’t necessarily feel like it’s going to be supportive” (P3). One participant spoke of their negative, self-critical inner dialog as they were completing an activity. “(I’m thinking) I’ve got loads wrong, I’m rubbish, and I don’t know how to do this ... maybe some encouragement as you’re going through it (would be nice)” (P8). Even though the Scenario activities had directly personal

situational prompts (e.g., “Consider a time when ...”) whereas Message Makeover activities were designed as hypothetical situational prompts (e.g., “Imagine that you were ...”), participants had heightened emotions in response to both activities. “It talks about YOUR boss so the Message Makeover is still not about what someone else did, it's still about me” (P4). Using the application for addressing current personal situations was described as a difficult task requiring courage. “(At first) I was thinking I'm not quite ready for this yet. (So) I did a few of the made up scenarios and then I was brave enough to do my own scenario where I was giving difficult feedback to someone” (P10). “It's quite taxing” (P8).

#### 4.2.3. Awareness, calm and confidence

Participants mentioned the application brought increased awareness and also could promote calm, and confidence in their ability to handle situations. Several participants mentioned realising new things about the way they communicated. “This app actually it actually helps me recognise ... things I've been using for so long ... I never realized they were judgemental” (P1). “I've never seen certain things the way they've been pointed out to me. Until I've done this I have never realized I do that. You know it's good. Now I know I do it” (P2). Participants described how understanding the more effective approach to communication could help them feel more calm when situations arose. “It would be more relaxing when you want to tell someone something that could be in a rude way, not in a rude way like to make them understand” (P1). “I think using this kind of app and having that greater understanding you could probably build up a level of confidence if you go into conflicts that you can de-escalate because of the choice of language you use” (P6). Participants also mentioned that, regardless of the outcome of the conversation, they could feel a sense of confidence in having at least tried their best at communicating effectively. “I can see how this is a lot better in the sense of if I created something that it's impossible to get people to be offended by, if they still are, then it's out of my hands” (P2). The application was also described as offering an outlet that could relieve stress about a difficult situation. “It's relieving stress by being able to do it. It's an outlet for frustration to be able to do it to be able to get it down” (P8).

#### 4.2.4. Safe rehearsals

Participants were not explicitly asked to use the application for current, personal situations. However, six participants described using the application to prepare for upcoming/ongoing conversations or communications in their current life. These participants all engaged in the optional extended step-by-step guided process (Fig. 3). Participants found the opportunity to engage in a safe rehearsal of their live situation alleviated stress and allowed them to feel better about the situation. “I was very happy to be doing a safe run-through and simulating this and feeling good about doing that and feeling like I'm in more control of what I'm going to say” (P8). “I actually felt quite a lot better about that situation that I'd had been thinking about than I had done before. I felt more equipped to speak to the person about that in a real-life setting so that was good” (P11). Many participants mentioned appreciating the option to prepare for upcoming difficult situations in a safe space. “In a sense I also feel like it's a little easier to get this in the system versus being in a regular conversation with the person where you know emotions are will be flowing up and about” (P2). “If you're maybe going into a difficult meeting, the fact you can try out what you want to say is really quite good” (P6). They expressed feelings of relief that could come from being able to make mistakes safely and have the chance to correct them. “You are imagining a conversation and it gives you the opportunity to change it. It's like ideal because in real life you don't get to change the conversation—if you realise how I said this in the wrong way it might be too late. So this is great it's like a game because it's stressful but at the same time you can alleviate the stress by fixing it ... you know it's safe and you know you can change it” (P7). Participants also mentioned appreciating being able to rehearse conversations with a ‘neutral’, non-human system. “The AI is like the perfect recipient in that it's not going to judge me or it's not going to have a meltdown and never speak to you again” (P4).

#### 4.2.5. A skill to learn

Most participants mentioned interpersonal communication was a skill they could see themselves learning and improving upon. “I think the more I do that, if I go back to it, the more I should be able to pick the right words the first time around other than having to rethink what you said already” (P6). Some participants spoke of noticing a feeling of improvement while using the application. “In the first sentence there were four to five strongly negative words, the second sentence I tried it was a bit less. Slowly it was decreasing and I was kind of learning things. I actually (eventually) got a good feedback ... so it actually kind of improved me” (P1). “(I felt) I can get I get it, I'm getting this and it's kind of resonating and it's really nice to get it right and to feel like I'm getting it in a better way” (P8). Many participants spoke of wanting a more guided learning experience. “(I'd like a) learning objective, and then you've got skills and resources and techniques to help you meet that learning objective” (P9). They described wanting more targeted learning goals, resources, and examples. “What I would need to get even more out of it is to have some more explanations before each of the tasks. For example or “here are the key principles that I would want you to apply” and then also maybe some non-examples as well to really demonstrate it” (P11).

#### 4.2.6. Wanting encouragement and to see progress

Participants mentioned that they would appreciate messages of encouragement. “If something just appear on the screen occasionally to say ‘you can do it!’” (P8). “when I get to my final message I'd love to get to some sort of support, like ‘Having difficult conversations at work is really really hard, and if you face it it's a very brave thing to do’” (P10). Many participants mentioned they would like a way to view and track their progress. “It'd be good to see progress, you know, this is how I started, this is how I'm now” (P2).

#### 4.2.7. Wanting to learn from own mistakes

Our system allowed participants to save their responses to activities but it did not record the AI feedback. Several participants wanted a record of the AI feedback so they could learn from past mistakes. “Remind me of why something I said was wrong. Rather than just what I said right, then I might start memorizing it rather than understanding the difference” (P1). “Would be nice to have still some log or some record of the mistakes you've made so that you can track your progress and know exactly what you've learnt to fix” (P7). Some participants also mentioned they would like personalized recommendations for specific areas of improvement. “It could be useful if it pointed out the specific things that I kept getting feedback on” (P11). “If you had something that targets specifically what it is that you seem to not be doing so well and give similar ones so you can keep training to do this instead” (P2).

#### 4.2.8. Limits of diplomatic language

Participants mentioned the limits of what diplomatic language could achieve. One participant pointed out that using diplomatic language could not hide an underlying negative attitude. “You can say really diplomatic stuff in a really mean and passive aggressive way” (P5). There were times when participants questioned whether neutral language was always desirable. “I still don't know whether or not ... maybe I want to say something strongly negative” (P8). “I was thinking ‘do I need to be neutral in this situation?’” (P10). Another participant pointed out that effective conflict resolution requires much more than a mere shift in vocabulary, and that it ultimately requires a change in underlying attitudes and perspectives. “The focus away from judging other people and not making them responsible for your feelings, that's such a big change in view of the world ... the language flows from that change. The language is the outward symptoms of a change of heart literally ... there are deep psychological steps along that journey which then results in someone to be ready to then examine their language” (P9). Finally, a participant pointed out that, no matter how carefully-crafted one's communication was, the other party could still respond in undesirable ways. “There could

be an improvement because of your diplomatic approach, but you can't control what the other person is going to do" (P4).

## 5. Discussion and design implications

We synthesize our study results by discussing design implications for our application along four dimensions of experiential design: cognitive, active, affective, and relational. While these design implications are centred around our specific application, some aspects of this discussion may extend to general interpersonal skills training applications, as well as systems that use AI-assisted training.

### 5.1. Cognitive experience

Our users reported high levels of cognitive engagement when using our application. Active mental engagement, anticipation of outcomes, critical thinking and information comprehension were required to produce messages and contemplate the AI feedback. These all are dimensions of cognitive experience (Adams, 2015; B. J. Pine & Gilmore, 2013). Many users suggested various pedagogical methods that could enhance their experience. Thus, we suggest that designs for enhancing cognitive experience should focus on lessening the cognitive load for activities and offset the cost of cognitive effort through the rewards of learning and improving. We propose the following key aspects for enhancing the cognitive experience with our application: *accommodate different skill levels, focused learning objectives and sense of progress*.

#### 5.1.1. Accommodate different skill levels

There were individual differences in our participants' abilities to make use of the AI feedback. Some were readily able to improve their use of language based on the feedback while others became stuck and frustrated. In retrospect, we realise our current system is best suited for native English speakers who also are already reasonably skilled in diplomatic use of language. While skill levels are intrinsically embedded within traditional education, skill levels are less commonly delineated within interpersonal skills training. In live learning contexts a teacher or trainer may instinctively adjust their training to meet learners where they are at. Also, in live contexts, students who may otherwise feel stuck, can learn from listening to and interacting with other classmates. Offering adaptive learning experiences catered to an individual learner's skill and style has been an ongoing field of research for automated online learning systems (Ennouamani & Mahani, 2018; Shute & Towle, 2018; Truong, 2016). Future iterations of our system would benefit from offering activities with different levels of difficulty, clearly sign-posted. For example, simpler activities could be less open-ended and only require the user to come up with single neutral word replacements instead of asking for completely open-ended text input.

#### 5.1.2. Focused learning objectives

Alongside activities with different skill levels, our system could benefit from providing users with more focused learning objectives and allowing users to practice one component of communication at a time. Previous work has shown the benefits of focused learning objectives, especially in e-learning environments (Mitchell & Manzo, 2018; Soulié & Cosson, 2021). Users mentioned that they would benefit from having more focused learning objectives. Interpersonal skills training courses tend to have less rigorously defined learning objectives compared to traditional education topics. Additionally, e-learning environments require more rigorously defined learning objectives than in-person learning environments to sustain engagement (Dykman & Davis, 2008). Thus, our application could be improved by adding more educational content catalogued by the specific communication principles they demonstrate and accompanied by examples. Users could have the option to work through these progressively. In addition, links to the relevant materials and examples could be surfaced alongside relevant AI feedback should a user need more support.

### 5.1.3. Sense of progress

Our users spoke of wanting to see progress. Progress can be conveyed through personalized dashboards tracking completion of activities associated with particular skill levels and learning objectives. The usefulness of such dashboards has been highlighted in previous work in learning and e-learning design (Kokoç & Altun, 2019; Santoso et al., 2018; Verbert et al., 2013). Additionally, the dashboard could summarize the numbers and types of situations users have practiced responding to. This could allow users to view their completed activities as a portfolio of rehearsed experiences which help them be prepared for life situations. Users also mentioned wanting direction for personal areas of improvement. Records could be kept of how often different types of undiplomatic language patterns were detected so users can see their usage of various linguistic patterns over time. Users could be shown the less effective language patterns that they tend to use more often and be pointed to exercises or examples that target that particular pattern.

### 5.2. Active experience

Our users had a high level of active experience, i.e., personal identification and empathy, when using our application (Chertoff et al., 2010; J. Pine & Gilmore, 1999b). The intensity of active experience was directly related to the level of realism of the conflict scenarios being addressed. This applied both to the hypothetical situations presented in activity prompts as well as occasions where users were addressing their personal situations. We discuss how active experience is supported by enhancing the *realism of practice scenarios* and helping users address personal scenarios with *encouraging, motivated, step-by-step guidance*.

#### 5.2.1. Realism of practice scenarios

A significant contributor to active experience while using our application was the degree to which users resonated with the situations described in the Scenarios and Message Makeovers activities. Despite being brief (several sentences at most), the prompts in our Scenario and Message Makeover activities were perceived as highly recognizable from both personal and others' experiences. Furthermore, the situations were described as being 'high stakes' and using 'personalized emotional language'. Thus, we note, as has been shown in other training domains (Bardach et al., 2021; Lee et al., 2020), that it is important to use relevant scenarios described using psychologically and emotionally vivid language. Situations can be made more personally relevant by providing specialised modules for certain domains, e.g., school teachers, nurses, parents.

#### 5.2.2. Encouraging, motivated, step-by-step guidance

Six of our participants had used our application to help them prepare for current personal situations. Without being specifically told to, these users all chose to use the extended guide (Fig. 3) to help them work through their real life situation. Thus, it was important to help users through what may be an overwhelming experience by breaking down the steps of thinking through the situation and coaching them through with a step-by-step guide. The process was emotionally difficult and some users reported that the process felt overwhelming. Thus, it may help to simplify the layout, and breaking down the guide into even simpler steps with more encouragement and motivation for each step. Reducing the complexity and length of learning steps has been found to be especially important in e-learning platforms (Jomah et al., 2016; Salge & Vera, 2013).

### 5.3. Affective experience

Our users experienced strong emotions when using our application. These included negative emotions of vulnerability and tension due to the personally difficult nature of conflict experiences. There were also feelings of calm and confidence in being able to have a safe space to rehearse difficult situations. The key aspects for enhancing the affective



experience for our application would be to support *emotional vulnerability* and use visuals, language and interactions that evoke *kindness and encouragement*.

### 5.3.1. Support emotional vulnerability

Most of our users reported feeling heightened emotions while using our application. This ranged from mild tension to significant vulnerability. These feelings arose in response to imagining hypothetical situations, remembering past situations, and reflecting on current, ongoing personal situations. The ability of to elicit heightened emotions reflects the level of realism simulated by our application, which can increase its effectiveness for training (Theelen et al., 2019). However, this simultaneously generates a need for increased emotional support and safe-guarding compared to what is typically provided by online skills learning platforms. As technological advances enhance our ability to simulate more realistic learning contexts, the risk of triggering negative emotional or psychological responses also increases. During in-person sessions, an educator can look out for learners who might be negatively triggered and respond appropriately to those who may need additional support. However, this is not available in automated online learning. Thus, designers must be aware of the potential for triggering negative emotions. Sign-posting for additional resources for support should be provided. There should be clear messaging about the limitations of the application, and reminders for users struggling with serious situations to seek professional help. These considerations echo those discussed in research on mental-health support applications where users are being supported on potentially emotionally vulnerable topics and sign-posting access to expert human support is considered best practice (Mehrotra et al., 2017; Tal & Torous, 2017).

### 5.3.2. Kindness and encouragement

Given the difficult emotional nature of addressing conflict, the visuals, language and interactions within the application should be kind and encouraging. One possibility is that conflict resolution practice could be interleaved with the option to engage in more uplifting activities, e.g., prompting the user to reflect on their personal strengths and values. Future iterations of our system could offer periodic check-in's for how the user may be feeling, and offer links to additional resources that might offer inspiration or stories from others to reassure them that they are not alone in their experiences. Encouraging messages could tell users they are doing a good job by trying, that conflict is difficult, and remind users of the benefits of confidence, calm, and improved interpersonal relationships that come with practicing diplomatic communication. Previous work has demonstrated greater effectiveness and engagement from systems with automated tutors that responded empathically in response to student levels of frustration (Aist et al., 2002; Lubold et al., 2018; Yang & Dorneich, 2018). Such automated empathic responses may be especially useful here in the context of automated conflict-resolution training.

## 5.4. Relational experience

We analyse two aspects of the relational experience of our users: the relation to the AI feedback provider and the relation to the 'other party' whom our users are in conflict with. Both of these deviate from traditional conceptualizations of relational experience which typically examine how users relate to other users within the system. The first aspect deviates because the AI is not another user. However we analyse our users' relational experience to the AI because it is an active agent that our participants interact with. The second aspect examines users' relation to the 'other party' in the conflict. This deviates from traditional relational experience because our users are not interacting with the other party directly (i.e., our application does not support mediation between parties). However due to the nature of conflict resolution, formulating communication requires shaping the relational experience of the user to the recipient of their messages. The principle design implications along the relational experience dimension for our application are *emphasis on*

*AI as collaborator and shifting internal attitudes about the conflict.*

### 5.4.1. Emphasis on AI as collaborator

Traditional learning models position the educator as the expert. In contrast, social-emotional learning tends to be more collaborative. In collaborative learning, educators function primarily as coaches and guides and learners take more responsibility for their learning journey and outcomes. In social-emotional education, trainers are typically not arbiters of what is 'correct' vs. 'incorrect'. Instead, they are vehicles for prompting reflection and awareness. Recent work on AI in education has also emphasized the role of the AI as both pedagogue and collaborator in the learning process (J. Kim et al., 2022). The AI in our application serves as both expert and collaborator. There is a slight irony in the teaching of RP in that RP is, at its core, trying to help people see beyond judgments of right and wrong about a situation, and instead, seek to understand the human needs underneath the situations. Yet, our system is undeniably passing judgment on the use of language as being more vs. less potentially effective. Despite our attempts to mitigate our AI's position as an 'expert judge' through the use of qualifying language and providing users the opportunity to give feedback on the AI feedback, there were indications that users did view of the AI as an (admittedly imperfect) arbiter of 'correct' vs. 'incorrect' language. Several users referred to times when they were "told off" by the AI, suggesting they did view the AI at least somewhat as an expert authority. This is also demonstrated in users' expressed and observed motivation to keep updating their inputs until they received the approval of 'looks good' from the AI. Furthermore, some of our users tended to trust the AI more than warranted. For example, there were times where AI had processed the text incorrectly and a user thought it was their own lack of understanding.

On the other hand, users also were actively and critically engaged in evaluating whether they agreed with the AI feedback. They were readily willing to point out times when they did not agree with the feedback. This was not only for occasions when the AI had clearly made a mistake, but also when users could see the validity in the feedback but still had their own ideas of what would be appropriate, despite the feedback given. Users found it satisfying to be able to give their own feedback on the AI feedback. Thus, our interviews do indicate that users are actively collaborating in their learning experience through reflection and awareness. However, not all users will have the same level of personal confidence or agency. It is important to account for users who will tend towards relying on the AI as an ultimate judge, by highlighting the imperfect nature of the AI feedback and emphasising that the role of the AI is to prompt reflection and users should also actively engage in making their own assessments. Future iterations of our application should further emphasise the goal of *learning via collaboration with the AI*. Finally, no users reported noticing occasions where the AI missed problematic language, i.e., said 'looks good' when it clearly wasn't. Users also said that they would tend to assume their responses were fine if the AI said so. Our AI certainly could miss potentially problematic language. Thus, our application would benefit from putting more emphasis on the possibility that problems could go undetected. For example, the AI's current message of 'looks good' could be replaced with a more qualified 'I didn't notice anything'. Future iterations of our system could also provide incentives for reporting undetected problems.

### 5.4.2. Shifting internal attitudes towards the conflict

The exact language used is actually of secondary importance in conflict resolution: the most essential factor for preserving relationships amidst conflict is to adopt a compassionate attitude where one is seeking understanding with non-judgmental curiosity. While use of language is a key component of conflict resolution training, it is impossible to prescribe with certainty how any specific communication will be received due to the subjective nature of interpersonal communication. This fact was also pointed out by many of our users in the interviews. Thus, in addition to placing greater emphasis on the imperfect nature of the AI feedback, future iterations of our system should emphasise the fact that

successful conflict resolution relies primarily on shifting one's underlying attitude towards seeking understanding, and remind users that diplomatic language is merely a tool for outward expression of this inner attitude. To some extent, the extended step-by-step guide that was optionally available for Scenario activities was designed to help shift underlying attitudes. Participants who used the detailed guide did report having new perspectives on their conflict. However, the importance of finding a compassionately-motivated internal frame could be emphasized further in future versions of our application.

### 5.5. Study limitations

Limitations of our current study include the small sample size and the lack of information about the participant sample. In future work, information about the line of work, education level, native language, digital literacy and conflict resolution styles and skill levels could have provided more insight on the interpretation of the results. Personal attitudes towards relationships and how often conflict appears in life may influence how people respond to such an application, which need to be examined in future work. The evaluation in our work was based on qualitative measures. More objective measurements of the efficacy of our system to improve conflict resolution skills will require a quantitative evaluation that evaluated capabilities before and after training as well as evaluations of whether there are longer term impacts on real-life behaviour.

### 6. Conclusion

We present a new web application that uses AI to help people learn to use more relationship-preserving language during interpersonal conflict. Our application provides users with immediate, automated feedback on language that may sound judgmental or be otherwise less effective when discussing difficult situations. It is the first application to use AI to help people practice relationship preserving language for handling interpersonal conflict. We reported a range of themes extracted from qualitative interviews with users and discussed design implications along dimensions of experiential design. Our users experienced heightened emotions and reported that our application was able to simulate some of the emotional stakes involved in interpersonal conflict. Overall, our users found the AI feedback helpful and they could envision learning and improving through further engagement with the application.

### Declarations of interest

None.

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