Rawal: A Reflection Assistant with Active Listening for Peer Support Chats

RYAN LOUIE, Northwestern University, USA
TAEWOOK KIM, Northwestern University, USA
ZHENHUI PENG, Sun Yat-sen University, China

People often chat with peers to discuss their challenging situations and receive support from them. These peer-support chats commonly happen online via text messaging. Reflection is key for a successful peer-support chat. Support seekers should reflect upon their concerns and goals, while providers should introspect on whether their dialog behaviors are appropriate during the chats. In this paper, we consider promoting the reflection of both groups in peer-support chats with just-in-time adaptive assistance for providers. After summarizing the design goals from the literature, we present Rawal, a technical prototype that extends the Slack messaging interface for assisting providers to 1) encourage seekers' reflections and 2) self-examine their enactment of active listening skills during the peer support conversation. We call for future work on how individual and social factors could impact the design and usage of reflection assistants like Rawal in peer-support chats.

Additional Key Words and Phrases: Emotional support, Peer support, Real-time suggestion, Self-reflection

1 INTRODUCTION

People commonly turn to their peers, such as friends and colleagues, to discuss their concerns regarding various subjects like research, family, and relationships. This is done in an effort to receive social support that includes emotional support or advice aimed at enhancing their overall well-being [4, 19]. In this study, we focus on the text-based peer-chat sessions that serve as a source of social support on messaging platforms.

For successful social support from peers in peer-chat sessions, both support seekers and providers need careful reflection during the peer-chat session. For one thing, seekers should reflect upon their problems, feelings, concerns, goals, etc. [16]. For another, providers should consider their choice of words to provide effective support [17]. In doing so, support providers can better shape their responses to facilitate seekers' reflection and promote positive cognitive change [3]. Support providers may refer to several therapeutical approaches (*e.g.,* active listening [20], problem solving [8]) for better shaping their responses during the peer-chat session. However, even when support providers receive prior training, such as guides on using active listening skills, they can struggle to effectively apply these skills during real chats [3].

Hence, we explore designing a just-in-time adaptive assistant for support providers to encourage seekers to reflect and self-examine their dialog behaviors during the peer-chat session in real-time. We aim to leverage AI-powered technology to enhance human-human communication, specifically by enabling humans to become better emotional support providers. This is a distinction from previous research that focused on improving conversational agents to substitute for human support providers [22]. Also, our work is inspired by the effectiveness of adaptive writing support

Authors' addresses: Ryan Louie, Northwestern University, Evanston, IL, USA, ryanlouie2021@u.northwestern.edu; Taewook Kim, Northwestern University, Evanston, IL, USA, taewook@u.northwestern.edu; Zhenhui Peng, Sun Yat-sen University, Guangzhou, China, pengzhh29@mail.sysu.edu.cn.

Manuscript submitted to ACM

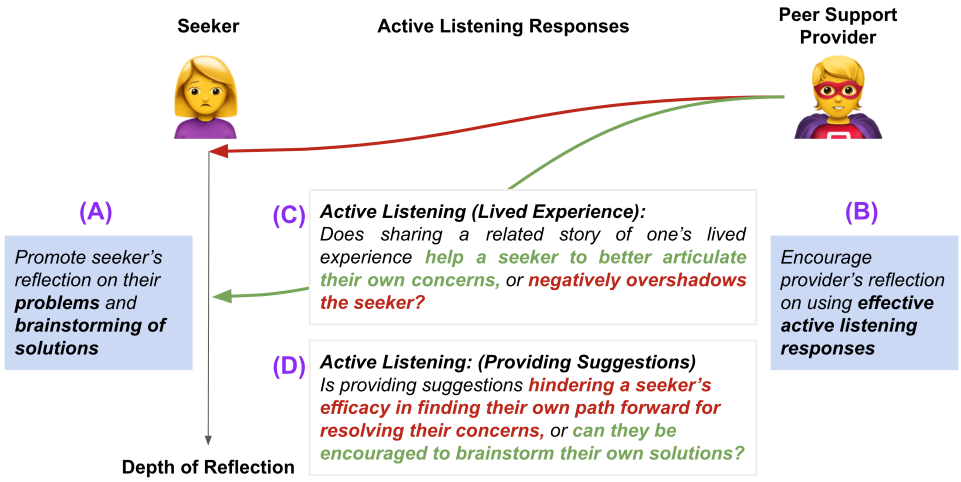


Fig. 1. The success of peer support chats depends on reflection from the seeker's and provider's perspectives. Seekers should use the chat to reflect deeper on their problems and potential solutions (A). While providers can promote this by using effective active listening responses, doing so is difficult. Thus, peer support providers need to reflect on how they improve their active listening responses (B) when they are *sharing their lived experience* (C) and *providing suggestions* (D).

tools in online communities (*e.g., MepsBot* [17]) and text messaging platforms (*e.g., Lily* [10]) for better human-human communication. However, previous adaptive writing support tools in the mental health context usually neither focus on synchronous conversations with short messages nor offer adaptive guidance on applying therapeutical methods. For example, O'Leary *et al.* designed guided peer support chats with fixed prompts on problem-solving skills and found it more effective for reducing seekers' anxiety compared to the unguided chats [16]. Nevertheless, they drive the chat sessions in a structured way, and the prompts could not adapt to the conversational context, which may not be applicable to the natural peer support chats where the members have flexibility in deciding how the chats should flow. Besides, they do not focus on promoting the reflections of the seekers and providers.

To this end, we propose *Rawal* (**R**eflection **a**ssistant **w**ith **a**ctive **l**istening), a prototype to navigate support providers' conversational behaviors during online peer-chat for social support. To promote support seekers' reflections, we choose a set of active listening skills (*e.g.,* sharing one's lived experience, providing suggestions) which when used correctly, promote a seeker's own reflection on their problems and brainstorming of solutions [20]. We first derive the design goals of Rawal from the literature on human-computer interaction and psychology. Then, we develop Rawal as a browser extension to the Slack messaging app interface. Rawal facilitates peer support providers to promote seekers' reflection on their problems and brainstorming of solutions, by improving their use of active listening skills (Fig.1). To assist providers' self-reflection on their dialog acts, we build text classifiers so providers recognize and reflect upon their effective use of active listening skills when drafting a response. In the end, we discuss how individual and social factors like culture and peer relationships could affect the usage of Rawal and call for future work to improve it.

2 DESIGN GOALS OF RAWAL

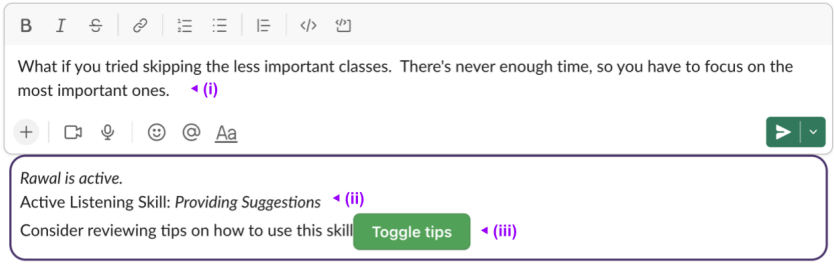
We derive four design goals of Rawal from previous works on the challenges and intervention in peer support.

- **Promote Help Seeker's Reflection on their own Problems and Solutions (Fig. 1 A).** Peer support conversation should encourage seeker's own reflection on their problems and brainstorming of solutions. This goal is based on psychotherapeutic frameworks like active listening [20], cognitive behavioral therapy [7], and motivational interviewing [21], which advise the help-seeker or patient to better understand the root causes of their concerns, and to find an optimistic path forward. Thus, our tool is designed to support providers responding in conversation to encourage a seeker's reflection on their own concerns and solutions, and discourages providers from giving advice.
- **Encourage Provider's Reflection on Effective Active Listening Responses (Fig. 1 B).** Providers can struggle to use active listening skills in their chat responses, which is important for the seeker's deeper reflection. Chen *et al.* found that providers are often unaware when they are dominating the conversation when sharing their lived experience, or providing advice when it's not appropriate [3]. To solve this, our goal is to assist a provider's reflection on how they are adopting effective active listening skills during the conversation, specifically when sharing their lived experience (Fig 1C) and providing suggestions (Fig 1D).
- **Assistance during the conversation (Fig 2)**. Since our work seeks to assist peer support providers in their reflection on active listening skills, we considered whether to provide this assistance pre-conversation, during-conversation, or post-conversation. While assistance can be provided pre-conversation or post-conversation, these types of assistance can have their limitations. Pre-conversation instructions like online psychotherapeutic techniques training [9, 12, 15] (*e.g.,* cognitive reappraisal) usually require additional time and effort and could suffer from a high attrition rate [1, 9]. Post-conversation interventions like flagging a bad dialog act by the moderators or algorithms is a kind of delayed feedback that may impair providers' confidence, interest, and reputation [11, 14, 23]. Accounting for these limitations, our work instead focuses on assisting support providers during the peer-support chat, with just-in-time reflections of their responses while they are writing them.
- **Natural conversations, but with encouragement, awareness, and reflection**. Unlike other guided chat tools which instruct pairs to follow a series of prompts [16], our tool should allow users to have flexibility in deciding how the conversation should flow, while still providing just-in-time awareness and reflection on how they are using specific psychotherapy skills. We anticipate this can help a wider variety of peer-support text-based conversations that occur in a natural way.

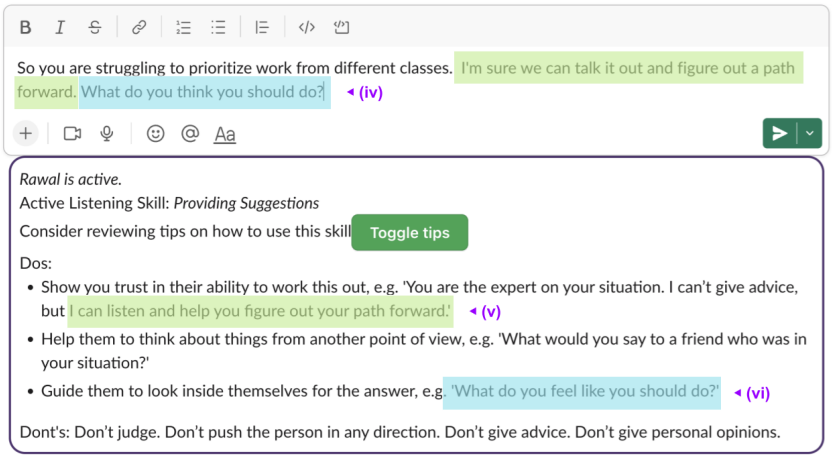
3 RAWAL SYSTEM DESIGN

Informed by these design goals, we developed Rawal (**R**eflection **a**ssistant **w**ith **a**ctive **l**istening), a browser extension to the Slack messaging app interface for identifying the use of active listening skill and providing relevant tips on how to use the skills. Rawal monitors a provider's real-time text input (Fig.2a-i); classifies the likely active listening skill a provider attempts to use with a machine learning model (Fig.2a-ii); encourages them to review tips on how to use the skill (Fig.2a-iii); and provides tips to self-examine how they are effectively using the active listening skill (Fig.2b-v&vi). We explain the details of the classifier training process in Section 3.1.

The tips that Rawal presents can be from the active listening training guide on peer-support platforms such as 7 cups [5]. We chose 7 cups as a source of tips because i) it provides guides for reflection that aligns well with our design goals, and ii) previous work also utilized the platform [21]. Rawal exposes the tips only at the moment the provider is drafting a response associated with the active listening skill. In this way, we argue that tips that would have been hard to remember from a training guide, will be more easily accessible for providers through just-in-time reflection.



(a) As the support provider is drafting a response in their conversation (i), Rawal has identified they are using the "Providing Suggestions" skill (ii) and encourages the provider to review tips on how to effectively use the skill (iii).



(b) Upon pressing the button to toggle the tips view, the provider can reflect on how their dialogue behaviors follow the "dos" and "donts" for this skill. After reflecting, the provider has revised their response (iv) to encourage the seeker to self-introspect about a path forward on their own accord, rather than the provider directly giving advice. They improved their response via the tips about trusting in seekers' ability (v) and guiding seekers to look inside of themselves for the answer (vi).

Fig. 2. Rawal's augments Slack, an existing text-based message app, with AI capabilities for a provider to recognize and reflect upon their use of active listening skills when drafting a response in peer support conversations.

As an example scenario, imagine a seeker has shared their concern about struggling in the past week to prioritize all the work they have in different classes. Fig.2a shows a provider responding to them by directly providing suggestions about what they could do about this problem. However, this type of dialogue response goes against the ethos of active listening where seekers should come to their own solutions. After using Rawal to reflect on their dialogue act, the provider revises their response to show they trust in the seeker's abilities to work problems out, and to guide them to brainstorm their own solution; see Fig.2b.

Rawal's system implementation works by processing what providers are typing, and sending the current draft response to a text classification microservice. If a classifier infers from their response that they are *Sharing their lived experience* or *Providing suggestions*, Rawal will display the predicted active listening skill and its associated tips.

3.1 Support Strategy Text Classifiers

Creating reflection assistants like Rawal requires AI-capabilities for inferring the support strategies being used by the support provider. To our knowledge, pretrained models for support strategies are not available through public research code repositories or APIs. Shah *et al.* did train models to classify 17 different support strategies, but their models are not publicly available [21]. Thus, we trained our own text classification models used by Rawal.

Our training data comes from a dataset collected by Liu *et al.* [13], consisting of 18376 dialogue acts across 1300 emotional support conversations. This dataset has labels for 7 different support skills. Two of them match the active listening skills we prompt users about, which include "Self-disclosure" (*e.g.,* sharing one's lived experience as it relates to what a help seeker shared) and "Providing Suggestions" (*e.g.,* giving advice based on the problems a person shared).

We trained a multi-label classifier for the 7 support strategies by fine-tuning a BERT model [6] to this dataset. For the "Self-disclosure" strategy, our classifier obtains a 0.55 precision score and 0.50 recall score on the training dataset; For the "Providing suggestions" strategy, our classifier obtains a 0.49 precision score and 0.66 recall score on the training dataset. While these numbers are far from the strong performance needed for a production system, our own testing of Rawal has given us confidence that the active listening skill identification is still usable for pilot testing of the system.

4 DISCUSSION AND CONCLUSION

To facilitate support providers to encourage seekers' reflections and self-examine their dialog acts during peer support chats, we propose an assistant prototype called Rawal, which augments the Slack messaging interface with AI-enabled identification and tips for active listening skills. We should consider several ethical issues. For example, Rawal should anonymize the sensitive data from users' chats. Regarding users' perceptions, the authenticity of the chat could be compromised, if support-providers heavily rely on Rawal's suggestions. Likewise, Rawal may enhance the users' overreliance on AI systems. Thus, we should consider how to address these issues. To improve Rawal in the future, we should further take into account the following individual and social factors.

Cultural background of the support seekers and providers could affect Rawal's classification performance and intervention design. Culture is the set of beliefs, values, practices, and norms that characterize a group or society. Pruksachatkun *et al.* investigated the cognitive change in online mental health forums and found that their text classification model trained on an Indian train set performs poorly on a non-Indian test set [18]. Chancellor *et al.* studied online weight loss communities and found that even two communities have similar linguistic patterns, their members have dramatically different behaviors around the seemingly common goal of weight loss [2]. These findings imply that to reach the full value of Rawal for peer support chats, we should develop its backend model using data that matches the peers' cultural background and tailor its interaction design based on the peers' behavioral norms.

The relationship between the support seekers and providers could affect Rawal's user experience. People usually have varying conversation patterns when facing different chat partners. Yang *et al.* explored online cancer support groups and found that the peers' self-disclosure, reciprocity, and social support differ when they chat in public and private channels [24]. We suspect that whether and how well the peers know each other and whether they are in a romantic, school, or work relationship could influence how they perceive and use Rawal during the chats. For example, if the support provider knows the seeker well, they may converse in a more casual way with joys the seeker likes. In this case, Rawal's prompts about using active listening skills could be a disturbance. In any case, the writing assistant should not force the providers to change their messages if they do not feel like doing so. Therefore, future work should evaluate how might peer relationships affect the usage of Rawal to better inform future peer support assistants.

In conclusion, we propose an adaptive writing assistant prototype for providers to promote both seekers' and providers' reflections during peer support chats. With this prototype, we sought to bring attention to better incorporating individual and social factors into the design of peer support assistants.

REFERENCES

[1] Gerhard Andersson and Nickolai Titov. 2014. Advantages and limitations of Internet-based interventions for common mental disorders. *World psychiatry : official journal of the World Psychiatric Association (WPA)* 13 (02 2014), 4–11. https://doi.org/10.1002/wps.20083

[2] Stevie Chancellor, Andrea Hu, and Munmun De Choudhury. 2018. Norms matter: contrasting social support around behavior change in online weight loss communities. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 1–14.

[3] Tianying Chen, Kristy Zhang, Robert E. Kraut, and Laura Dabbish. 2021. Scaffolding the Online Peer-Support Experience: Novice Supporters' Strategies and Challenges. *Proc. ACM Hum.-Comput. Interact.* 5, CSCW2, Article 366 (oct 2021), 30 pages. https://doi.org/10.1145/3479510

[4] Sheldon Cohen and Thomas Wills. 1985. Stress, Social Support, and the Buffering Hypothesis. *Psychological bulletin* 98 (10 1985), 310–57. https://doi.org/10.1037/0033-2909.98.2.310

[5] 7 Cups. 2023. 7 Cups: Free Online Therapist & Counseling. https://www.7cups.com/about/

[6] Jacob Devlin, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova. 2018. Bert: Pre-training of deep bidirectional transformers for language understanding. *arXiv preprint arXiv:1810.04805* (2018).

[7] Keith S. Dobson. 2010. *Handbook of cognitive-behavioral therapies, 3rd ed.* Guilford Press, New York, NY, US. xiv, 481–xiv, 481 pages.

[8] T. J. D'Zurilla and A. M. Nezu. 2010. Problem-solving therapy. *Handbook of cognitive-behavioral therapies* (2010), 197–225.

[9] Anna Geraedts, Annet Kleiboer, Jos Twisk, Noortje Wiezer, Willem van Mechelen, and Pim Cuijpers. 2014. Long-Term Results of a Web-Based Guided Self-Help Intervention for Employees With Depressive Symptoms: Randomized Controlled Trial. *Journal of Medical Internet Research* (07 2014). https://doi.org/10.2196/jmir.3539

[10] Taewook Kim, Jung Soo Lee, Zhenhui Peng, and Xiaojuan Ma. 2019. Love in Lyrics: An Exploration of Supporting Textual Manifestation of Affection in Social Messaging. *Proc. ACM Hum.-Comput. Interact.* 3, CSCW, Article 79 (nov 2019), 27 pages. https://doi.org/10.1145/3359181

[11] Joseph Lampel and Ajay Bhalla. 2007. The Role of Status Seeking in Online Communities: Giving the Gift of Experience. *Journal of Computer-Mediated Communication* 12, 2 (2007).

[12] Reeva Lederman, Greg Wadley, John Gleeson, Sarah Bendall, and Mario Alvarez-Jimenez. 2014. Moderated Online Social Therapy: Designing and Evaluating Technology for Mental Health. *ACM Transactions on Computer-Human Interaction (TOCHI)* 21 (02 2014). https://doi.org/10.1145/2513179

[13] Siyang Liu, Chujie Zheng, Orianna Demasi, Sahand Sabour, Yu Li, Zhou Yu, Yong Jiang, and Minlie Huang. 2021. Towards Emotional Support Dialog Systems. In *Proceedings of the 59th annual meeting of the Association for Computational Linguistics*.

[14] Anne Moorhead, Diane Hazlett, Laura Harrison, Jennifer K Carroll, Anthea Irwin, and Ciska Hoving. 2013. A New Dimension of Health Care: Systematic Review of the Uses, Benefits, and Limitations of Social Media for Health Communication. *Journal of medical Internet research* 15 (04 2013), e85. https://doi.org/10.2196/jmir.1933

[15] Robert Morris, Stephen Schueller, and Rosalind Picard. 2015. Efficacy of a Web-Based, Crowdsourced Peer-To-Peer Cognitive Reappraisal Platform for Depression: Randomized Controlled Trial. *Journal of Medical Internet Research* 17 (03 2015), e72. https://doi.org/10.2196/jmir.4167

[16] Kathleen O'Leary, Stephen M. Schueller, Jacob O. Wobbrock, and Wanda Pratt. 2018. "Suddenly, We Got to Become Therapists for Each Other": Designing Peer Support Chats for Mental Health. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (Montreal QC, Canada) *(CHI '18)*. Association for Computing Machinery, New York, NY, USA, 1–14. https://doi.org/10.1145/3173574.3173905

[17] Zhenhui Peng, Qingyu Guo, Ka Wing Tsang, and Xiaojuan Ma. 2020. Exploring the Effects of Technological Writing Assistance for Support Providers in Online Mental Health Community. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–15. https://doi.org/10.1145/3313831.3376695

[18] Yada Pruksachatkun, Sachin R Pendse, and Amit Sharma. 2019. Moments of change: Analyzing peer-based cognitive support in online mental health forums. In *Proceedings of the 2019 CHI conference on human factors in computing systems*. 1–13.

[19] Maija Reblin and Bert N. Uchino. 2008. Social and emotional support and its implication for health. *Current Opinion in Psychiatry* 21, 2 (2008).

[20] C.R. Rogers and R.E. Farson. 2021. *Active Listening*. MOCKINGBIRD Press. https://books.google.com/books?id=OXZTzgEACAAJ

[21] Raj Sanjay Shah, Faye Holt, Shirley Anugrah Hayati, Aastha Agarwal, Yi-Chia Wang, Robert E. Kraut, and Diyi Yang. 2022. Modeling Motivational Interviewing Strategies on an Online Peer-to-Peer Counseling Platform. *Proc. ACM Hum.-Comput. Interact.* 6, CSCW2, Article 527 (nov 2022), 24 pages. https://doi.org/10.1145/3555640

[22] Ziang Xiao, Michelle X. Zhou, Wenxi Chen, Huahai Yang, and Changyan Chi. 2020. If I Hear You Correctly: Building and Evaluating Interview Chatbots with Active Listening Skills *(CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–14. https://doi.org/10.1145/3313831.3376131

[23] Diyi Yang, Robert E. Kraut, Tenbroeck Smith, Elijah Mayfield, and Dan Jurafsky. 2019. Seekers, Providers, Welcomers, and Storytellers: Modeling Social Roles in Online Health Communities. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland Uk) *(CHI '19)*. ACM, New York, NY, USA, Article 344, 14 pages. https://doi.org/10.1145/3290605.3300574

[24] Diyi Yang, Zheng Yao, Joseph Seering, and Robert Kraut. 2019. The channel matters: Self-disclosure, reciprocity and social support in online cancer support groups. In *Proceedings of the 2019 chi conference on human factors in computing systems*. 1–15.