

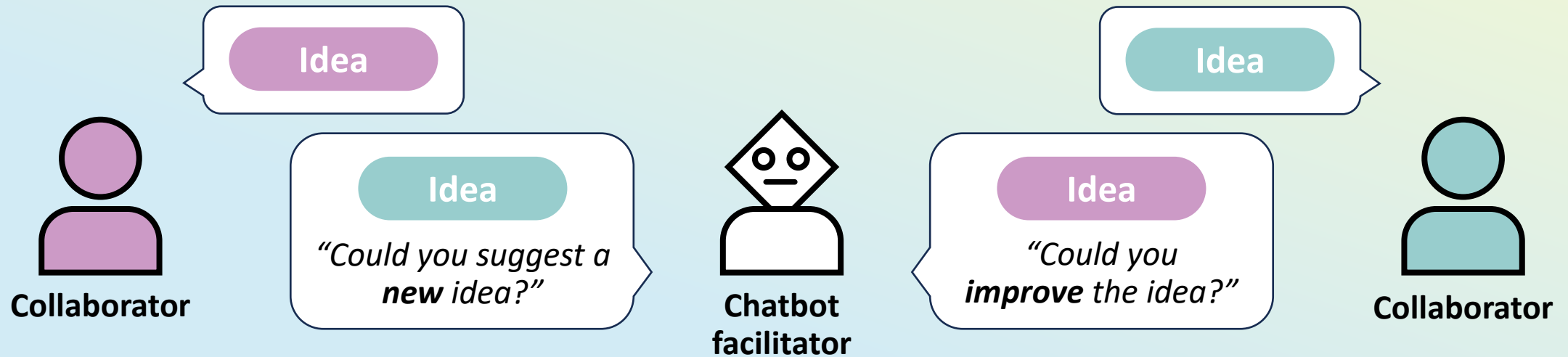
# Facilitating Asynchronous Idea Generation and Selection with Chatbots

Joongi Shin<sup>1</sup>, Ankit Khatri<sup>1</sup>, Michael A. Hedderich<sup>2</sup>,  
Andrés Lucero<sup>1</sup>, Antti Oulasvirta<sup>1</sup>



*Key takeaway*

# Chatbots can facilitate collaborators to effectively build on each other's ideas in asynchronous ideation



## Background



# What is asynchronous ideation?

- Collaborators generate ideas individually at their own time and method.
- Build each other's ideas on a shared platform.

## Synchronous ideation



## Asynchronous ideation

ooo CHANNELS ⊕	
# _____	 AURORA   2 DAYS AGO _____ _____
# _____	 KATE   1 DAY AGO _____ _____
# _____	 GREG   3 HOURS AGO _____ _____
# _____	
# _____	
# _____	

<https://www.nngroup.com/articles/synchronous-asynchronous-ideation/>

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*Background*

# Facilitators are essential for effective idea exchange

Guide individuals' ideation process to help improve ideas as a group.

- a. Highlight inspirational ideas.
- b. Provide effective ideation methods.



## *Problem*

# Facilitating asynchronous ideation is challenging

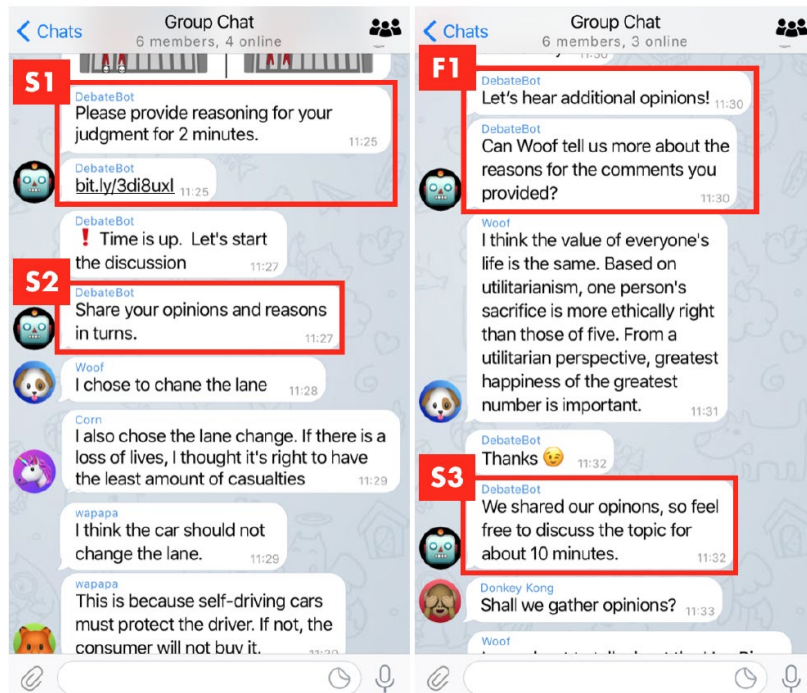
- Facilitators cannot be available all the time.
- Difficult to guide individuals' ideation process.
- Difficult to manage a large number of ideas.



## Related work

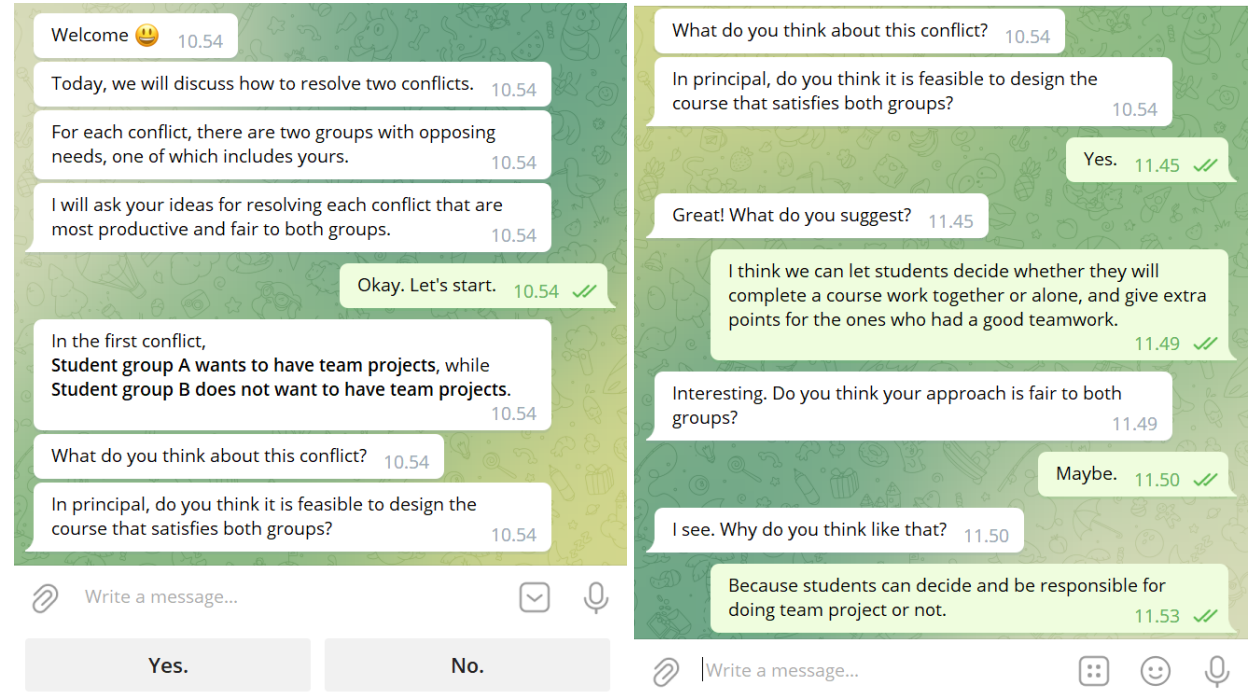
# Conversational agents could be promising facilitators of collaborative ideation

### Synchronous group discussion



Kim, Soomin, et al. "Moderator chatbot for deliberative discussion: Effects of discussion structure and discussant facilitation." Proceedings of the ACM on Human-Computer Interaction 5.CSCW1 (2021): 1-26.

### Asynchronous consensus-building



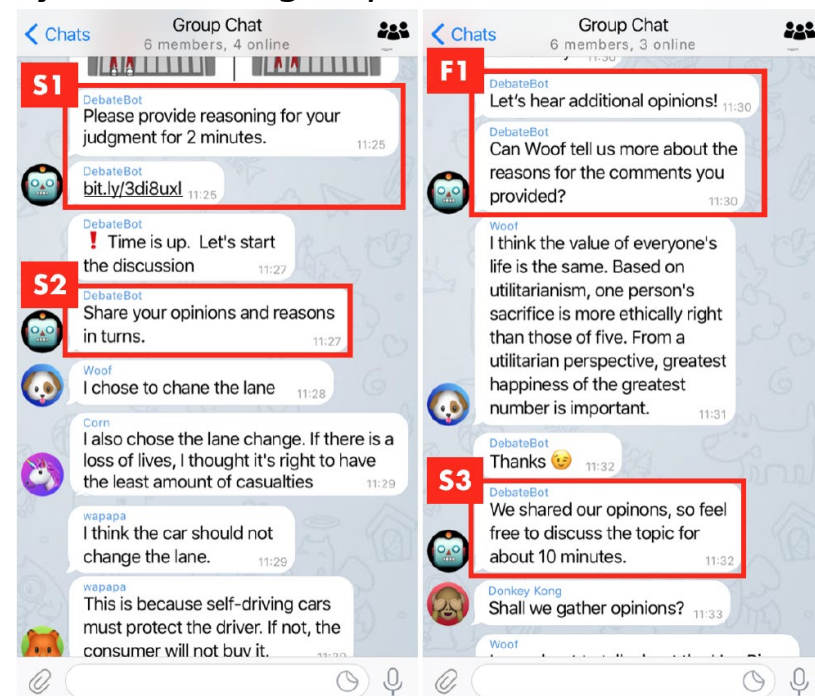
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## Related work

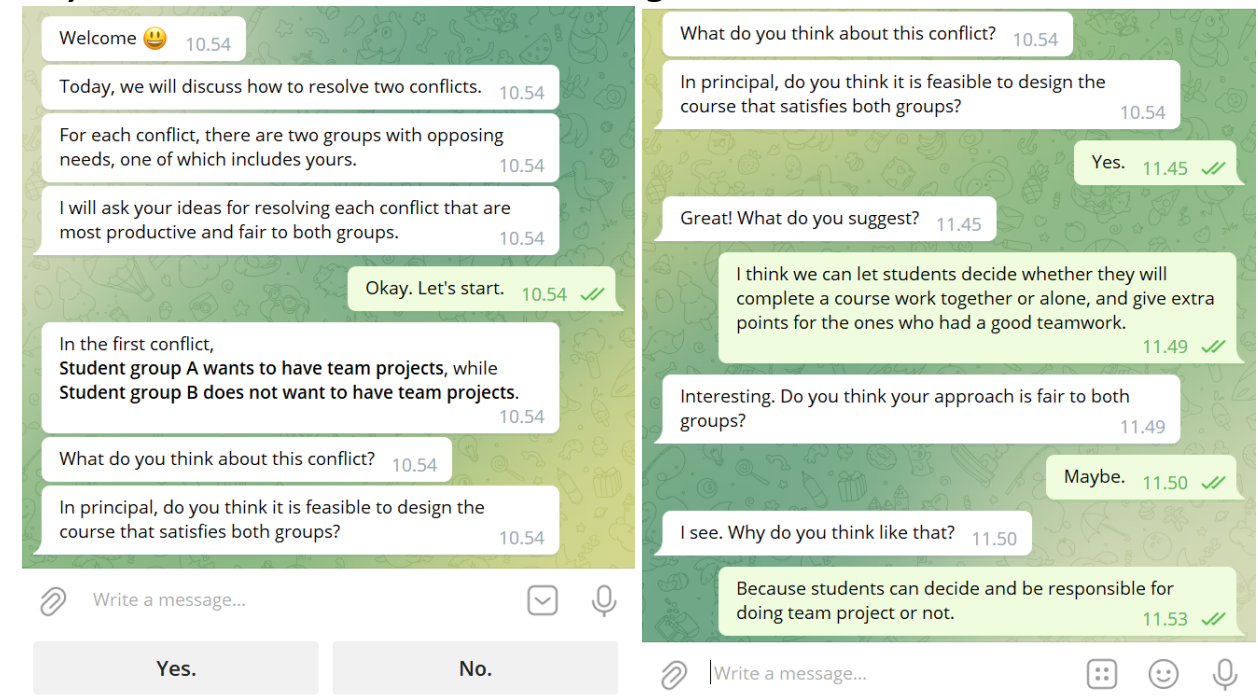
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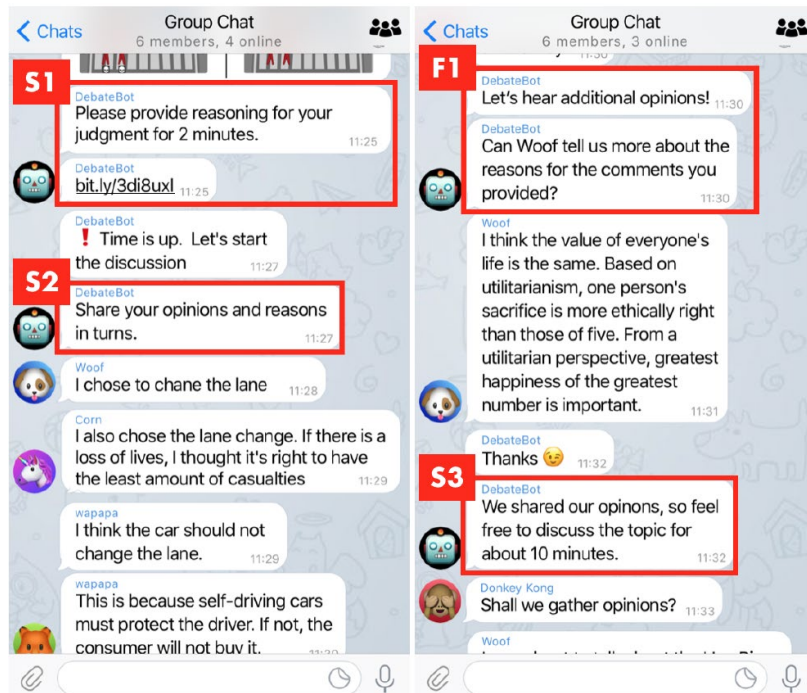


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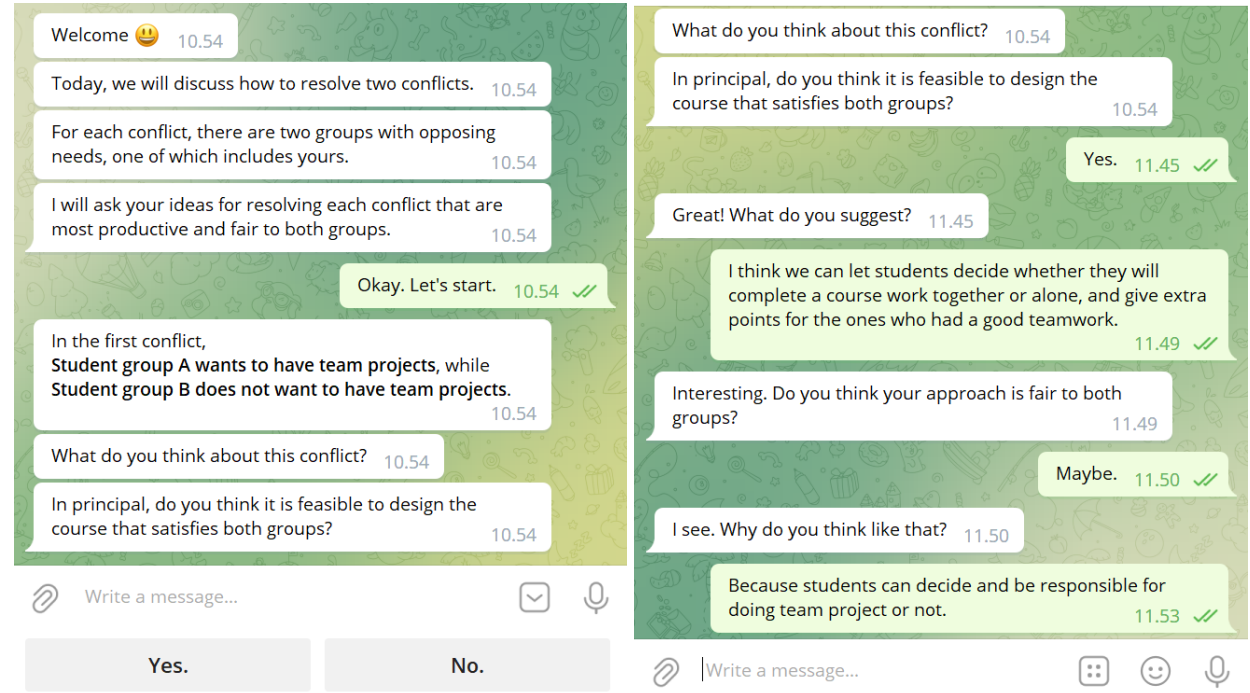
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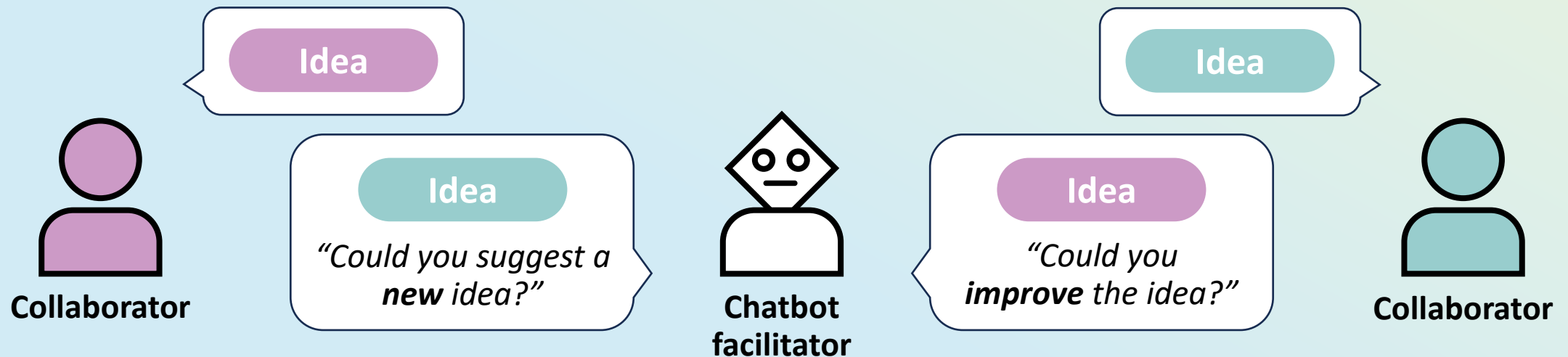
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*Research questions*

# How to design chatbots to help collaborators build on each other's ideas asynchronously?



*Our solution*

# Chatbot facilitators for asynchronous idea generation and selection

## Idea generation

Can you propose a new idea that **improves** one of the ideas?

22.24

Show me other ideas.

22.24



Here are other members' ideas **similar** to yours:

1. "Items that can automatically sanitize itself after people touch it."
2. "A public space that can automatically sanitize all visitors at the entrance"
3. "Furniture that can automatically sanitize its surface after people touching it."

22.24

Can you share **any** idea inspired by them?

How about a drone flying around to spray sanitizer all over the places?

22.25



Nice idea.

22.25

How helpful do you think your idea is for supporting people's daily life during pandemic?

22.25



Scroll down for more opinions.



Very helpful

Helpful



*Our solution*

# Chatbot facilitators for asynchronous idea generation and selection

## Idea selection

Here is idea 18 out of 311 ideas:

Program to match people with rescued animals 22.52

What do you think about this idea and why do you think like that?

22.52

Heart-warming idea, but what does it have to do with the pandemic?

22.52 ✓✓

Thank you for sharing. 22.52

Here are other members' opinions on this idea:

### SUPPORT

"Very interesting idea. As people can adopt the rescued pets and that can help them to not feel lonely during lockdown days"

### NEUTRAL

(There are no opinions in this category yet)

### AGAINST

"I like the idea, but I don't see the point how this can be helpful for the daily life during covid."

22.52

Based on their opinions, what do you think about the idea

why do you think like that?

(Please write your opinion in a way that others can understand only by reading your opinion.)

22.52



Scroll down for more options



*Our solution*

# Chatbot facilitators for asynchronous idea generation and selection

## Idea generation

The screenshot shows a chatbot interface with a green background featuring faint, colorful icons of various objects like a banana, a pizza slice, a lightbulb, and a robot. The chat history includes:

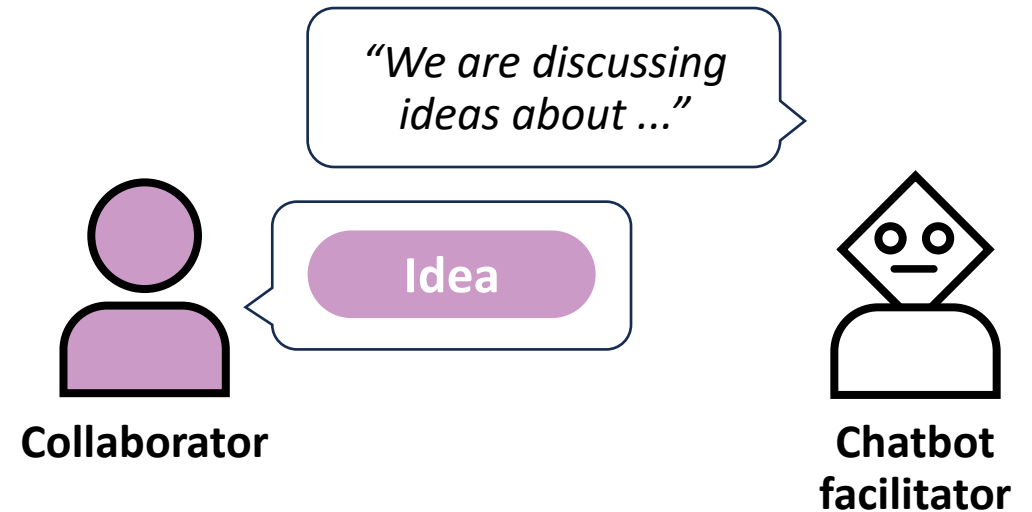
- A white bubble from the user: "Can you propose a new idea that **improves** one of the ideas?" with a timestamp of 22.24.
- A green bubble from the chatbot: "Show me other ideas." with a timestamp of 22.24 and two green checkmarks.
- A white bubble from the chatbot: "Here are other members' ideas **similar** to yours:" followed by a list of three ideas:
  1. "Items that can automatically sanitize itself after people touch it."
  2. "A public space that can automatically sanitize all visitors at the entrance"
  3. "Furniture that can automatically sanitize its surface after people touching it."The timestamp 22.24 is at the bottom right of this bubble.
- A white bubble from the user: "Can you share **any** idea inspired by them?" with a timestamp of 22.24.
- A green bubble from the chatbot: "How about a drone flying around to spray sanitizer all over the places?" with a timestamp of 22.25 and two green checkmarks.
- A white bubble from the user: "Nice idea." with a timestamp of 22.25.
- A white bubble from the chatbot: "How helpful do you think your idea is for supporting people's daily life during pandemic?" with a timestamp of 22.25.

At the bottom of the interface, there is a white input area with a paperclip icon on the left, a text prompt "Scroll down for more opinions." in the center, and a checkmark icon and a microphone icon on the right. Below the input area are two large, light-gray buttons: "Very helpful" and "Helpful".

*Our solution*

# Adopt human facilitators' behaviors to design chatbot facilitators

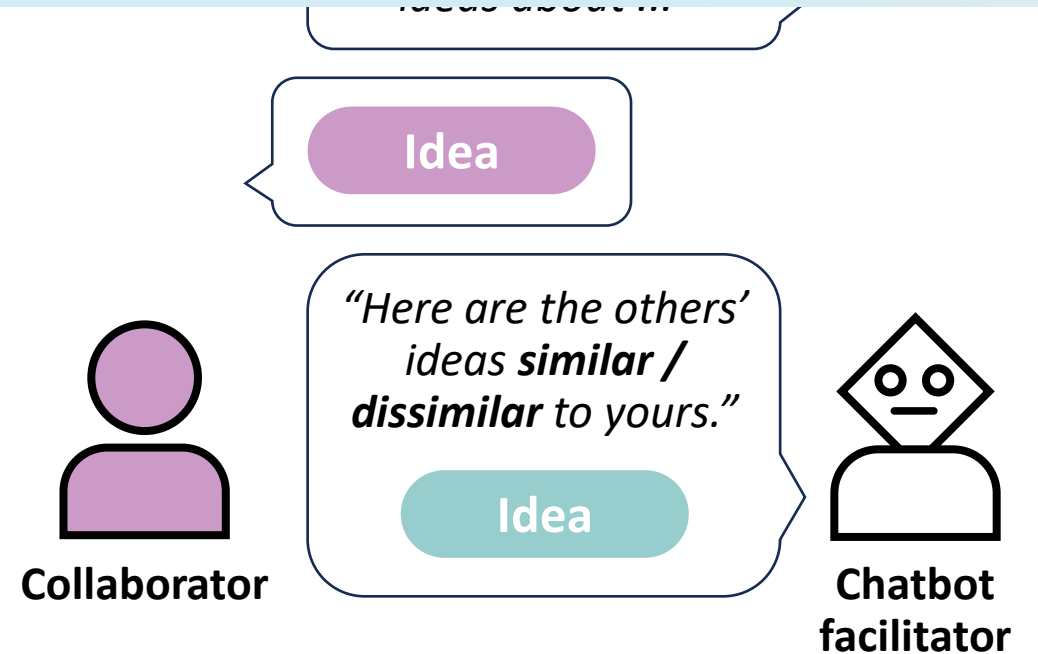
- a. Engage with individual collaborators.
- b. Provide other collaborators' ideas as inspiration by their similarity.
- c. Suggest ideation methods.
- d. Request collaborators to rate their ideas to form group opinions.



*Our solution*

# Adopt human facilitators' behaviors to design chatbot facilitators

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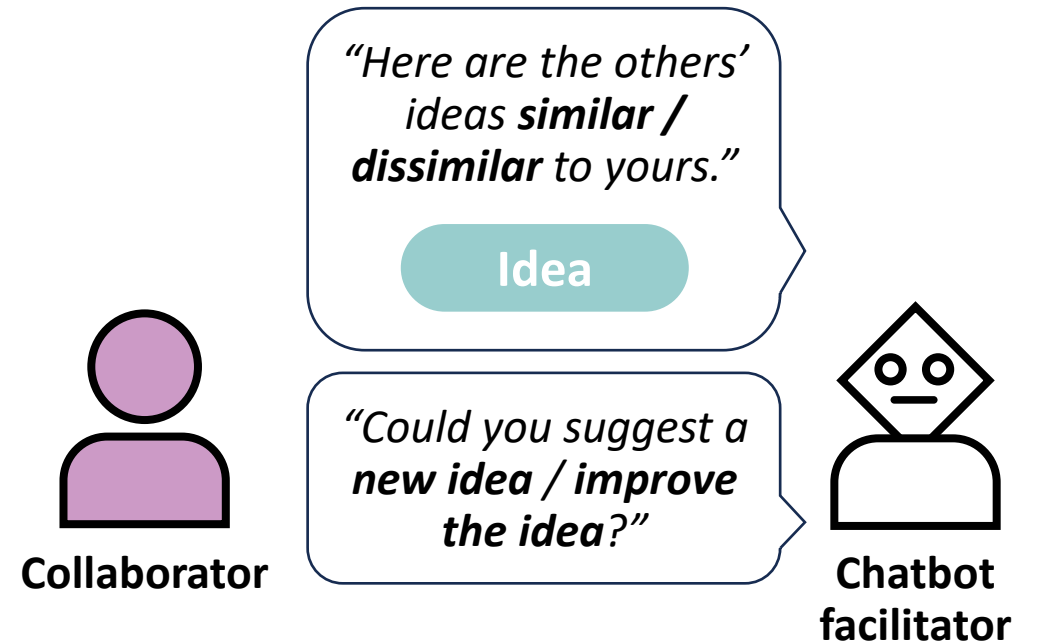




*Our solution*

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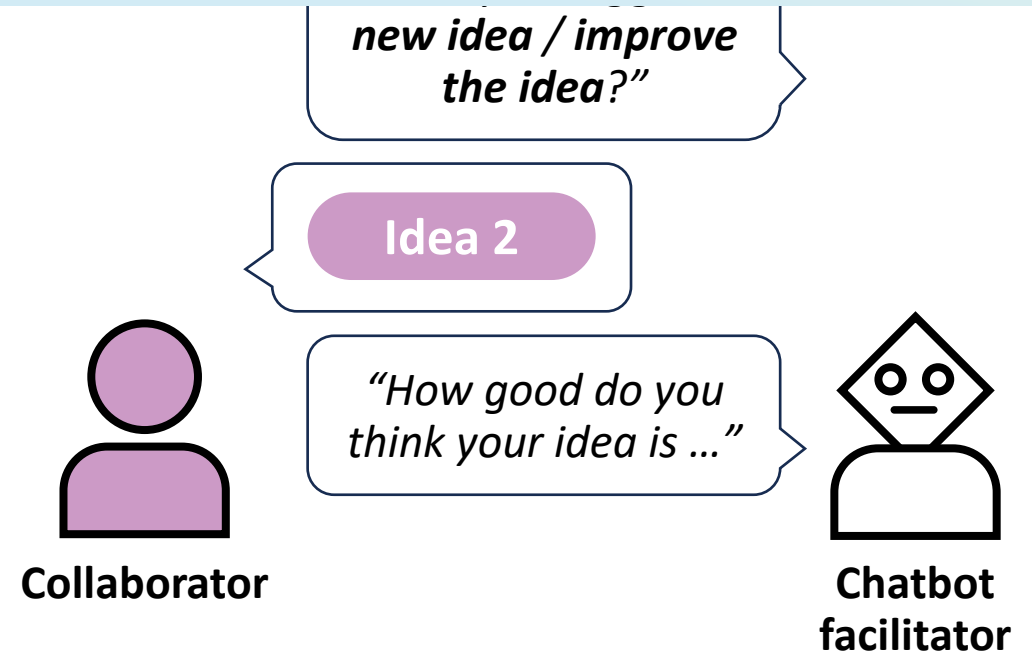
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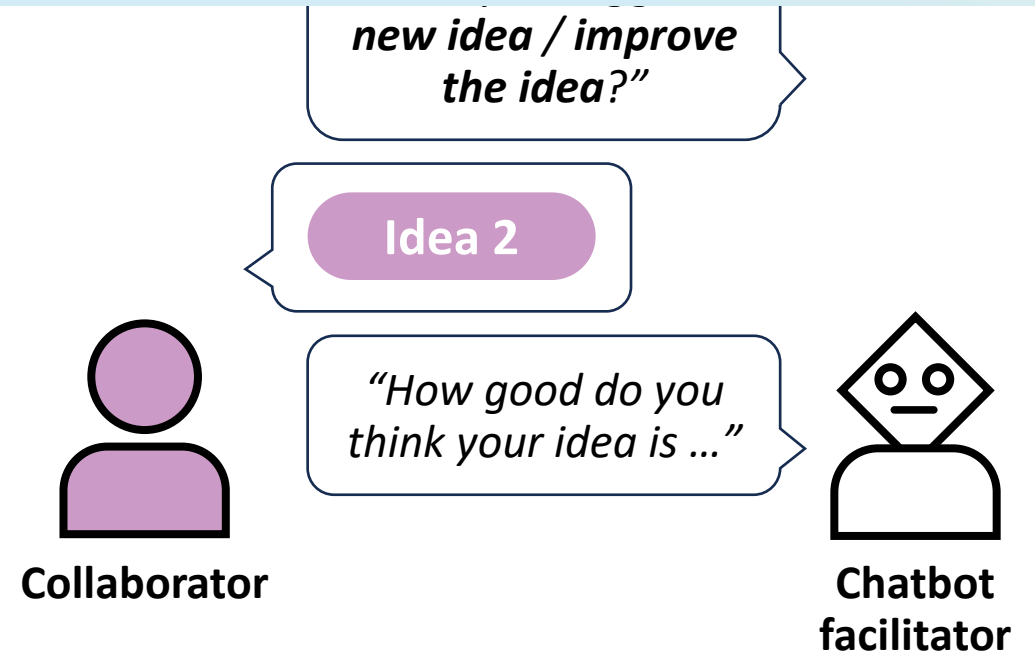
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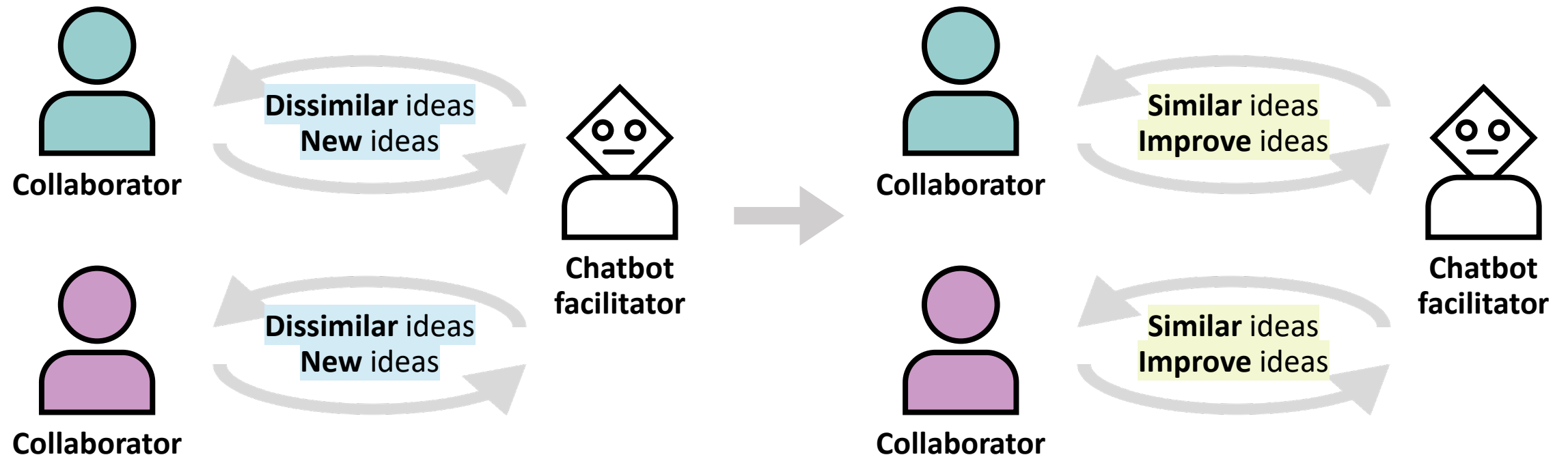
- a. Engage with individual collaborators.
- b. Provide other collaborators' ideas as inspiration by their similarity.
- c. Suggest ideation methods.
- d. Request collaborators to rate their ideas to form group opinions.



*Our solution*

# Structured facilitator

- Provides the same structured guidance to all collaborators.
- First diversify ideas and then improve ideas.

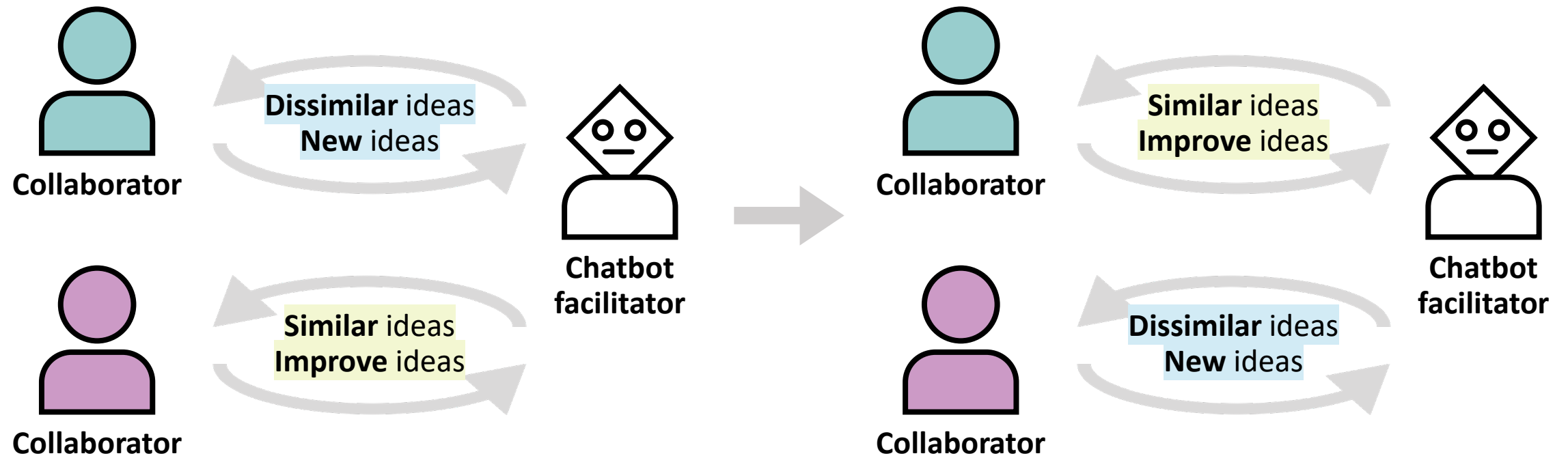




*Our solution*

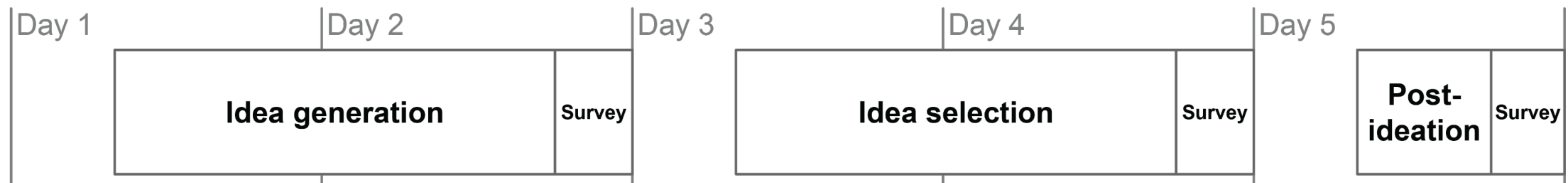
# Adaptive facilitator

- Adapts its guidance to individuals' idea generation performance over time.



# Understanding the strengths and limitations of chatbot facilitators

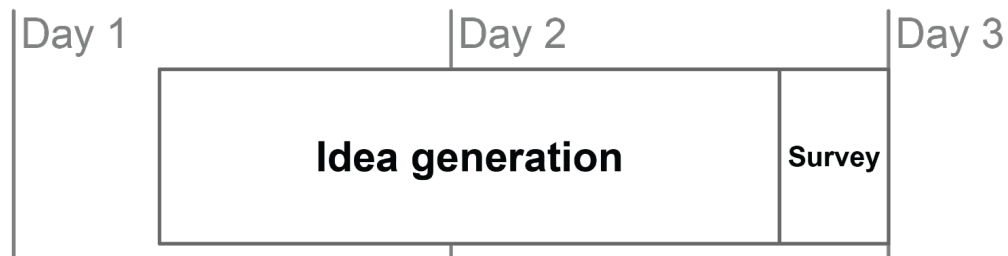
- 5-day online ideation event with 48 participants.
- Participants interacted with one of the chatbots only.
- Measured participants' satisfaction with chatbot and final ideas.



*Empirical study*

# Understanding the strengths and limitations of chatbot facilitators

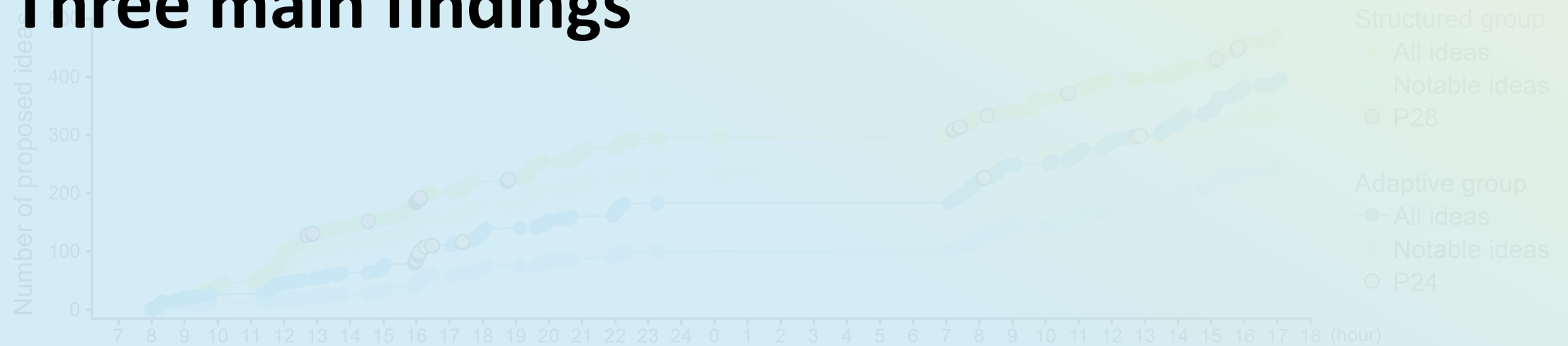
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Results 1 out of 3

Both chatbot facilitators can help increase the diversity of ideas in the asynchronous setting.

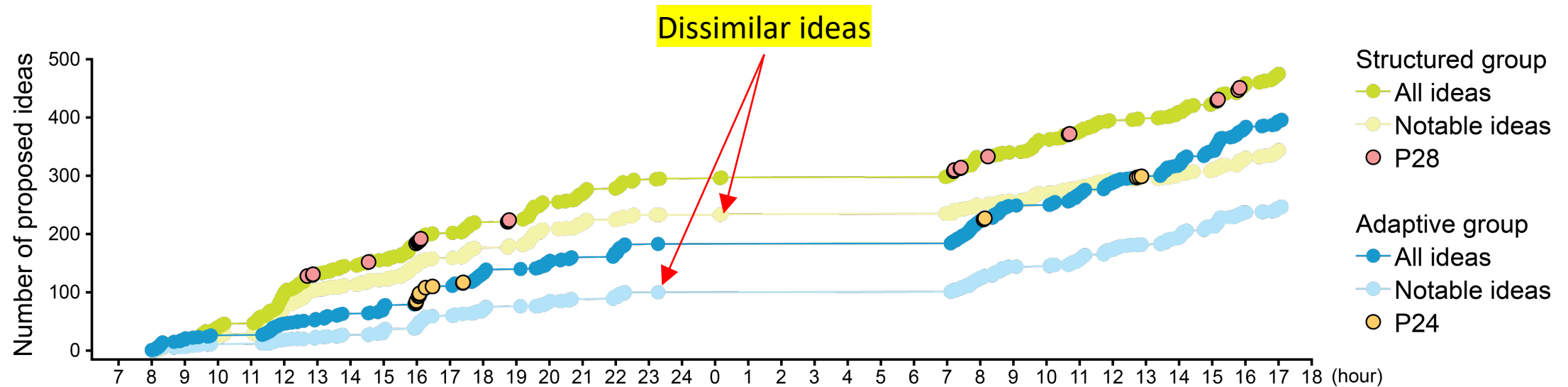
## Three main findings





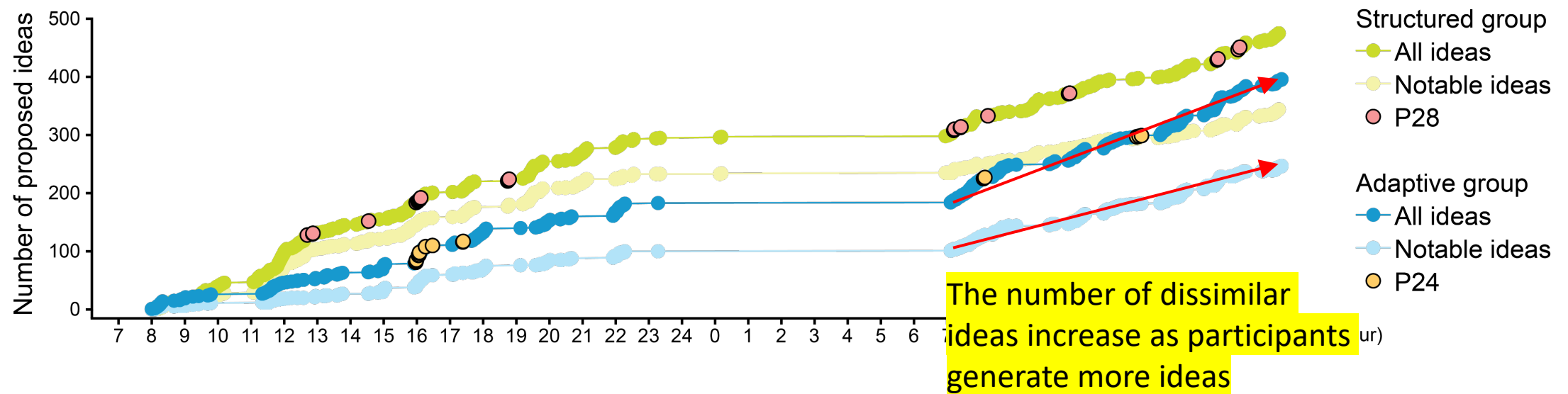
## Results 1

**Both chatbot facilitators can help increase the diversity of ideas in the asynchronous setting.**



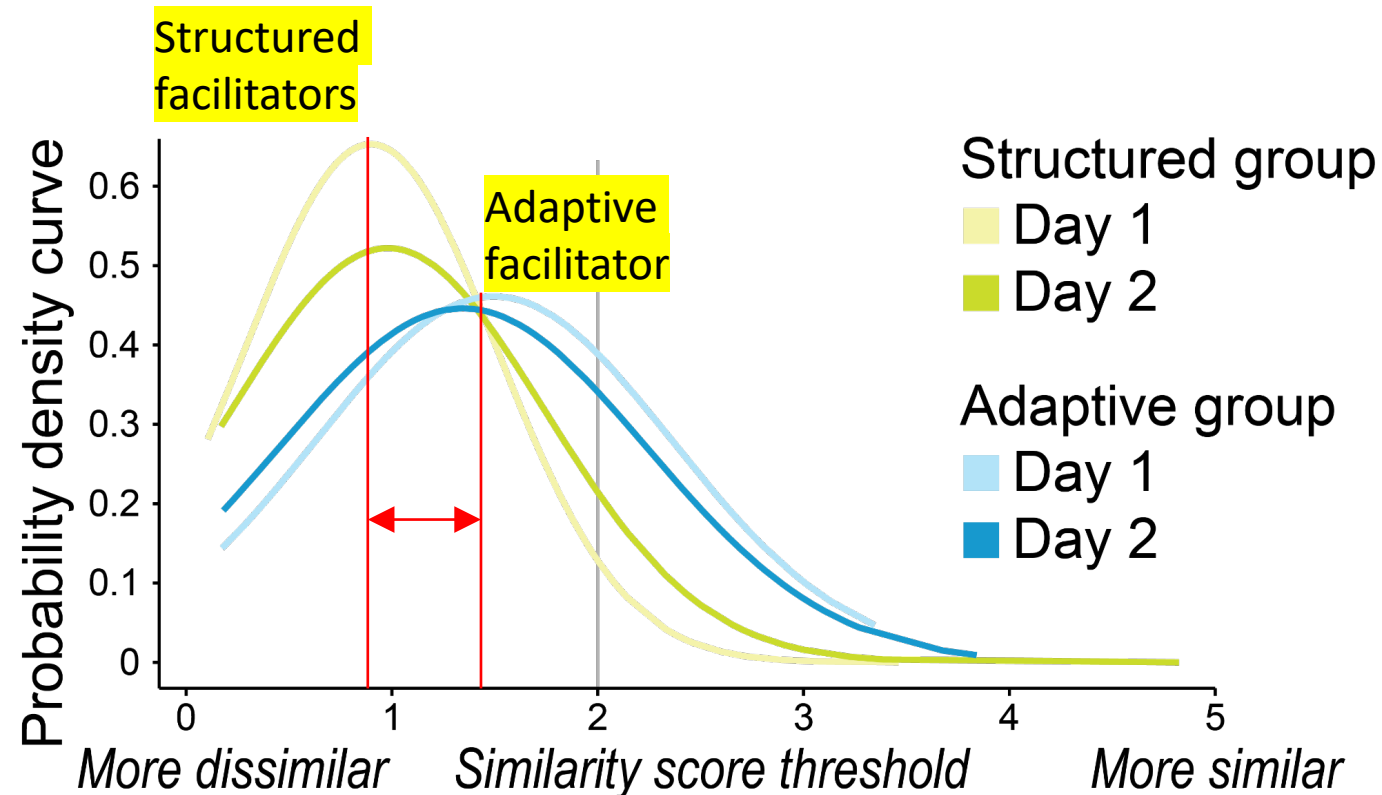
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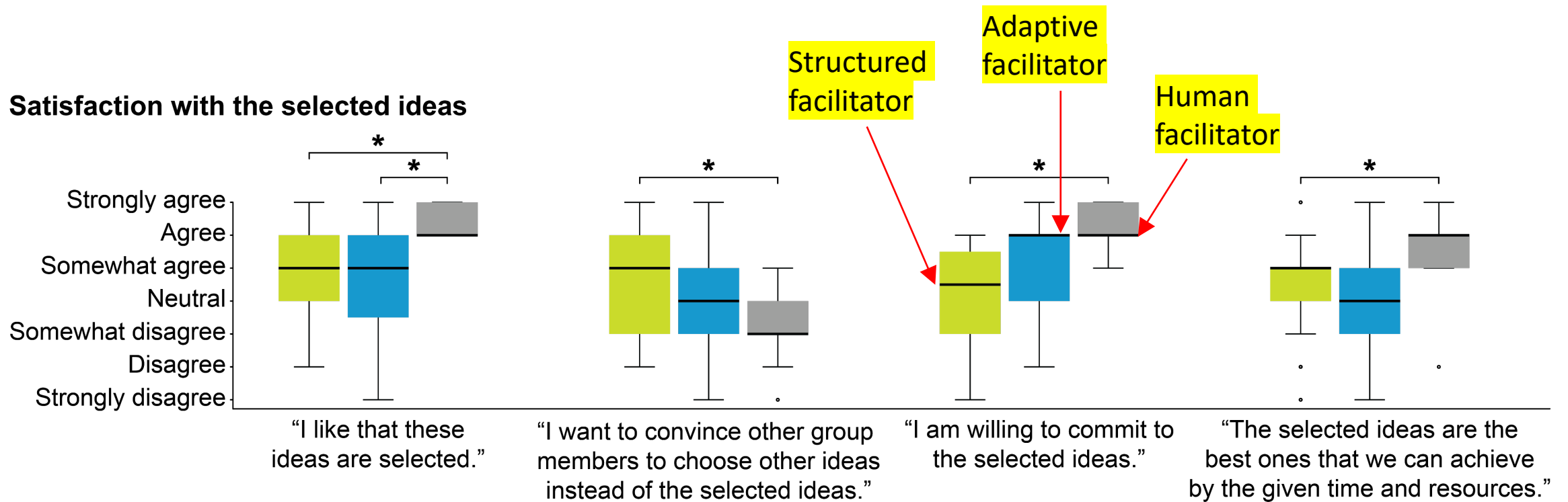
## Results 2

**Structured facilitators** can guide collaborators to generate more diverse ideas.



### Results 3

## Adaptive facilitators can yield similar level of satisfaction on selected ideas as human facilitators



## Discussion 1

# Chatbot facilitators could enable different ways of asynchronous ideation

## Two discussion points

*Having now social interaction helped me share my thoughts whenever it appears to me.*



Collaborator



Chatbot facilitator

*Having now social interaction helped me share my thoughts without being biased.*



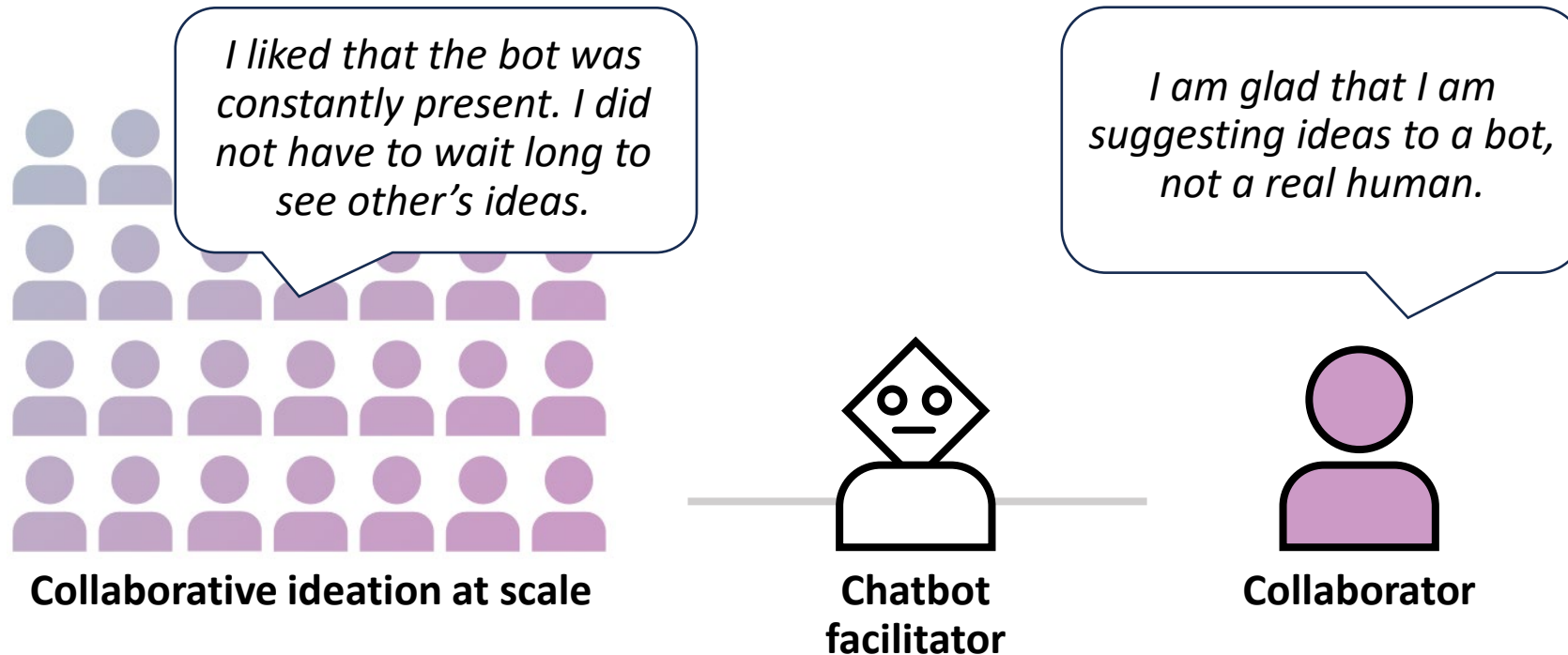
Collaborator



Chatbot facilitator

## Discussion 1

# Chatbot facilitators could benefit asynchronous ideation differently than human facilitators.

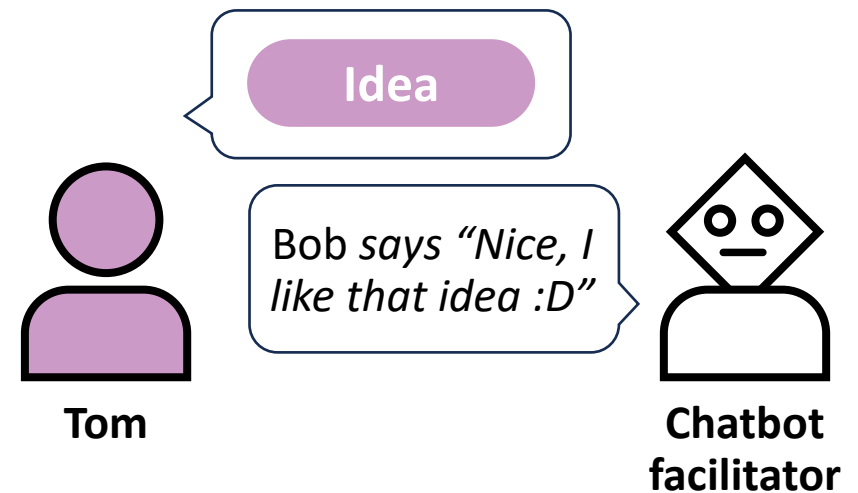
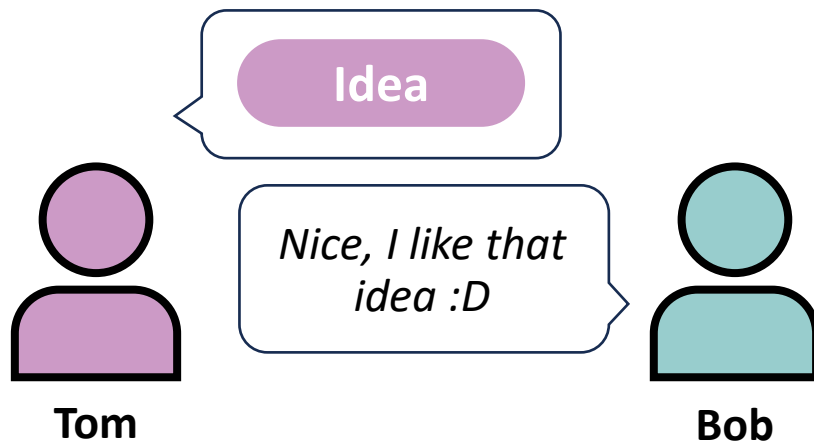




## Discussion 2

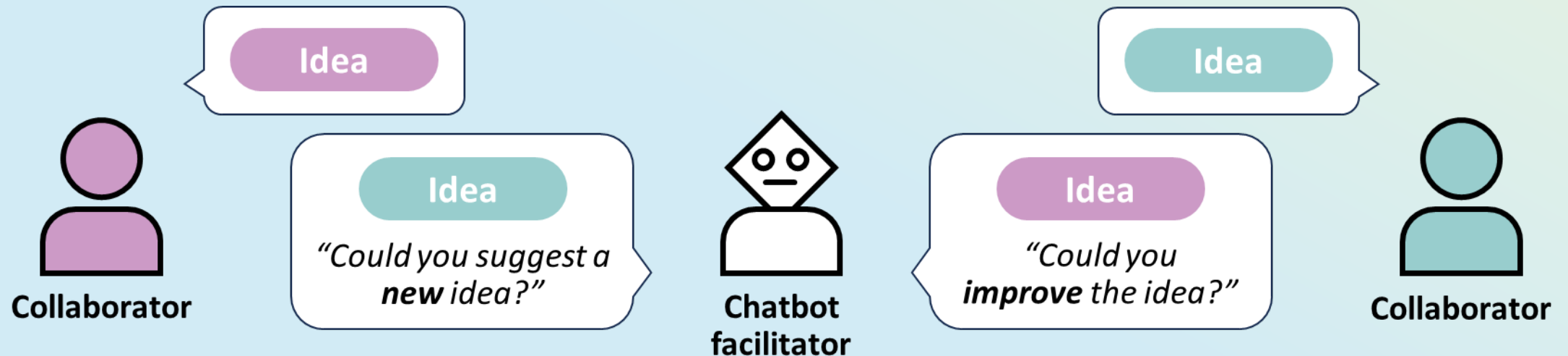
# Could chatbots overcome the limited social interaction in asynchronous ideation?

Exchanging ideas through the chatbot does not suffice sharing experience with the other collaborators in direct conversation.



# Takeaways

- Chatbots can facilitate effective idea exchange in asynchronous settings.
- The structured facilitator can help diversify ideas while the adaptive facilitator can help improve satisfaction on selected ideas.
- Chatbot facilitators can help scale up asynchronous ideation.



# Facilitating Asynchronous Idea Generation and Selection with Chatbots

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