

Designing Human-Centered AI Systems for Dyadic, Group, and Community Interactions

2022.04.28

김수민

k-soomin.github.io

“Artificial Intelligence is inspired by **human intelligence**,
made powerful by **human data**,
and *ultimately only useful in*
*how it positively affects the **human experience**.*”

- Jeffrey Bigham (CMU)

AI is about making computers that are...



Fast
Secure
Efficient
Accurate
Scalable
Intelligent
Errorless

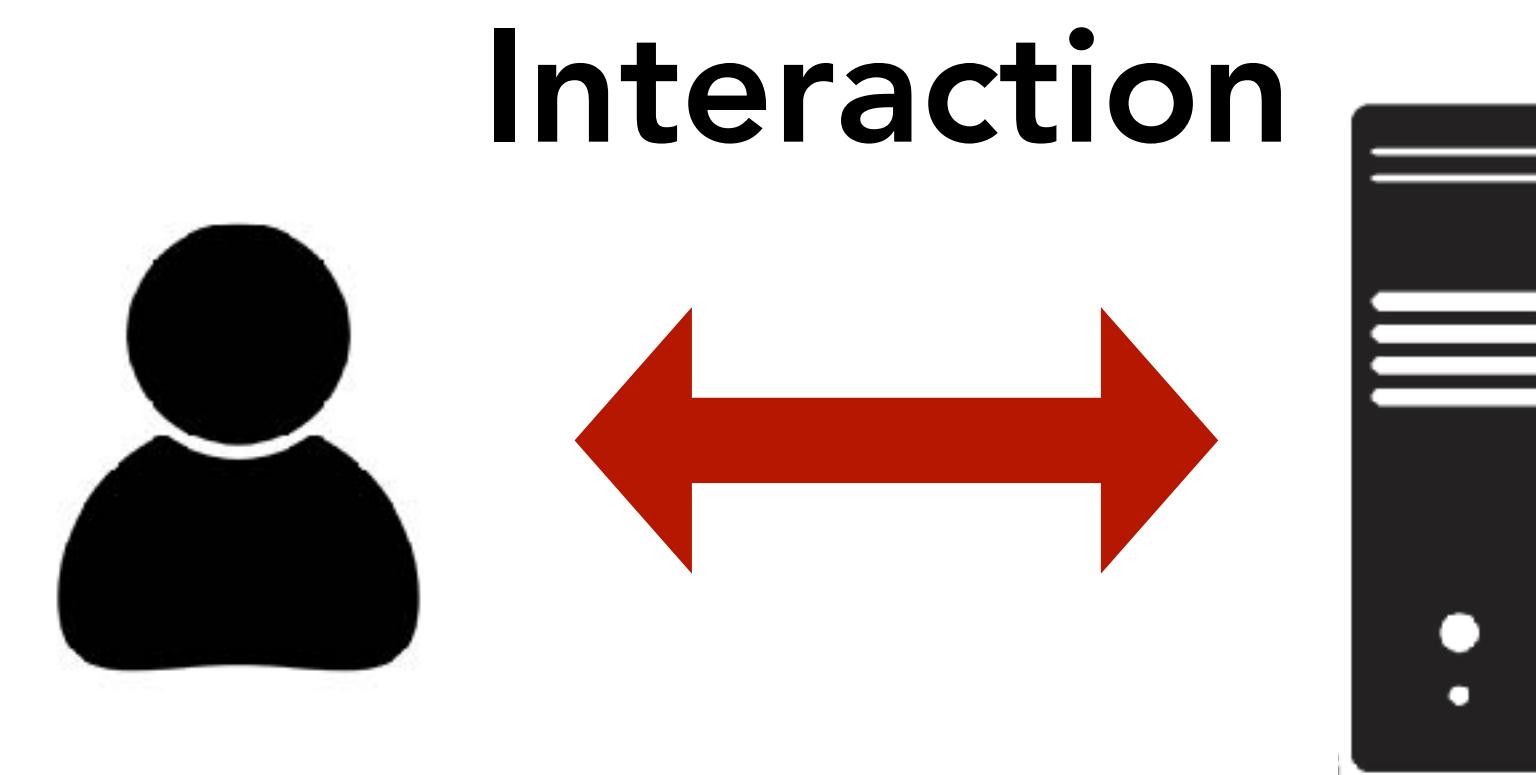
...

Human-Computer Interaction is about making computers that are

useful
usable



Doing this by designing better interaction



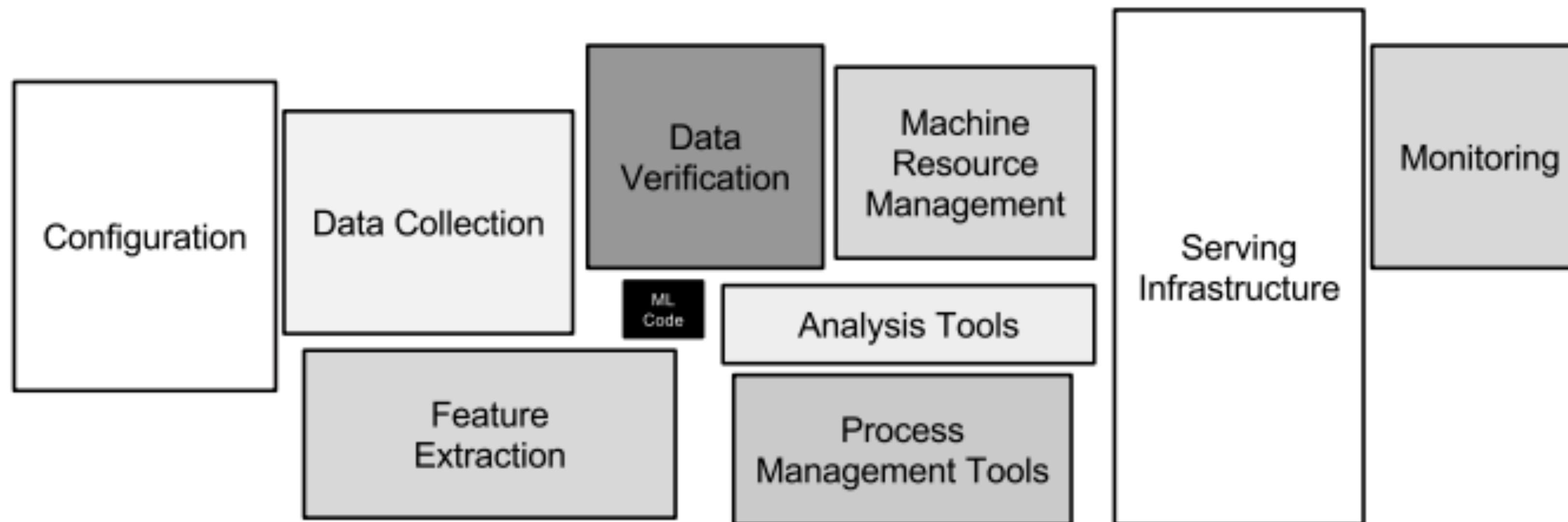
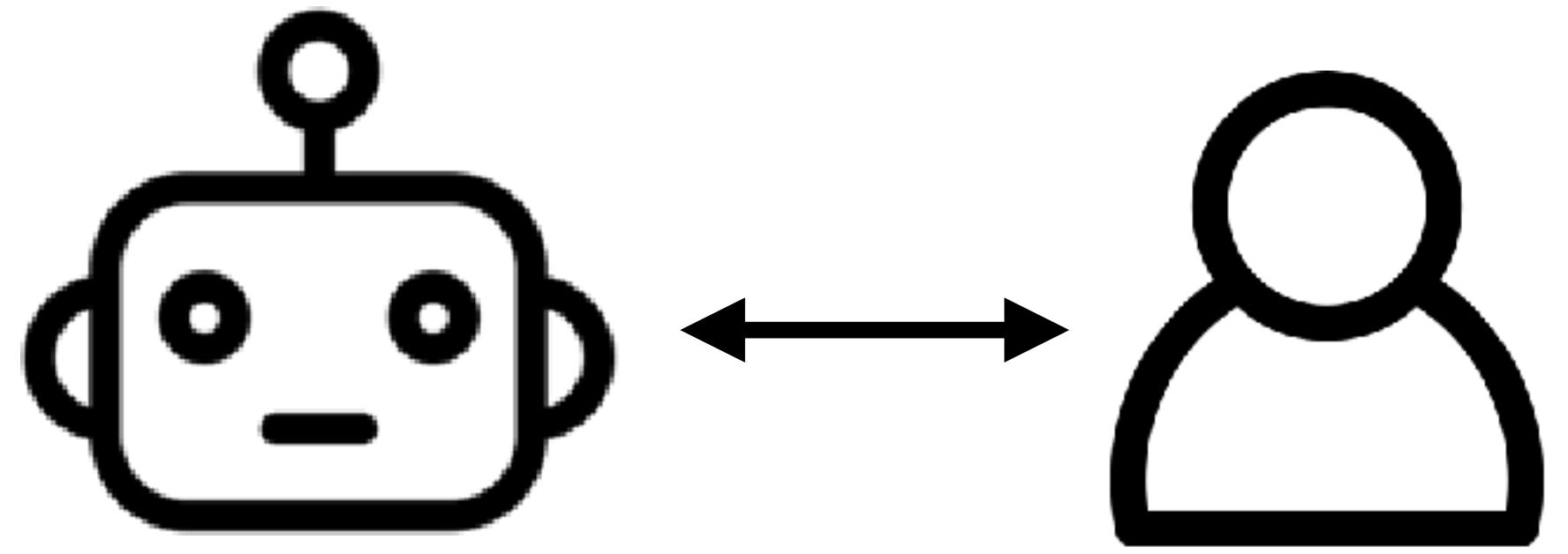


Figure 1: Only a small fraction of real-world ML systems is composed of the ML code, as shown by the small black box in the middle. The required surrounding infrastructure is vast and complex.



언론정보학박사학위논문

**Communication with AI: Designing
Conversational Agents for Dyadic
and Group Interactions**

일대일 그리고 그룹 상용작용을 위한 대화형 에이전트
시스템 개발

u/Nishant9824 • 8h

 2 Awards

Disney's new skinless robot can blink like a human because why not



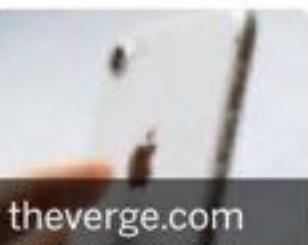
theverge.com

2.7k upvotes | 177 comments | Share

u/pragmач • 20h

 4 Awards

Back tap button on iPhone ios14



theverge.com

1.7k upvotes | 304 comments | Share

u/ndekere254 • 15h

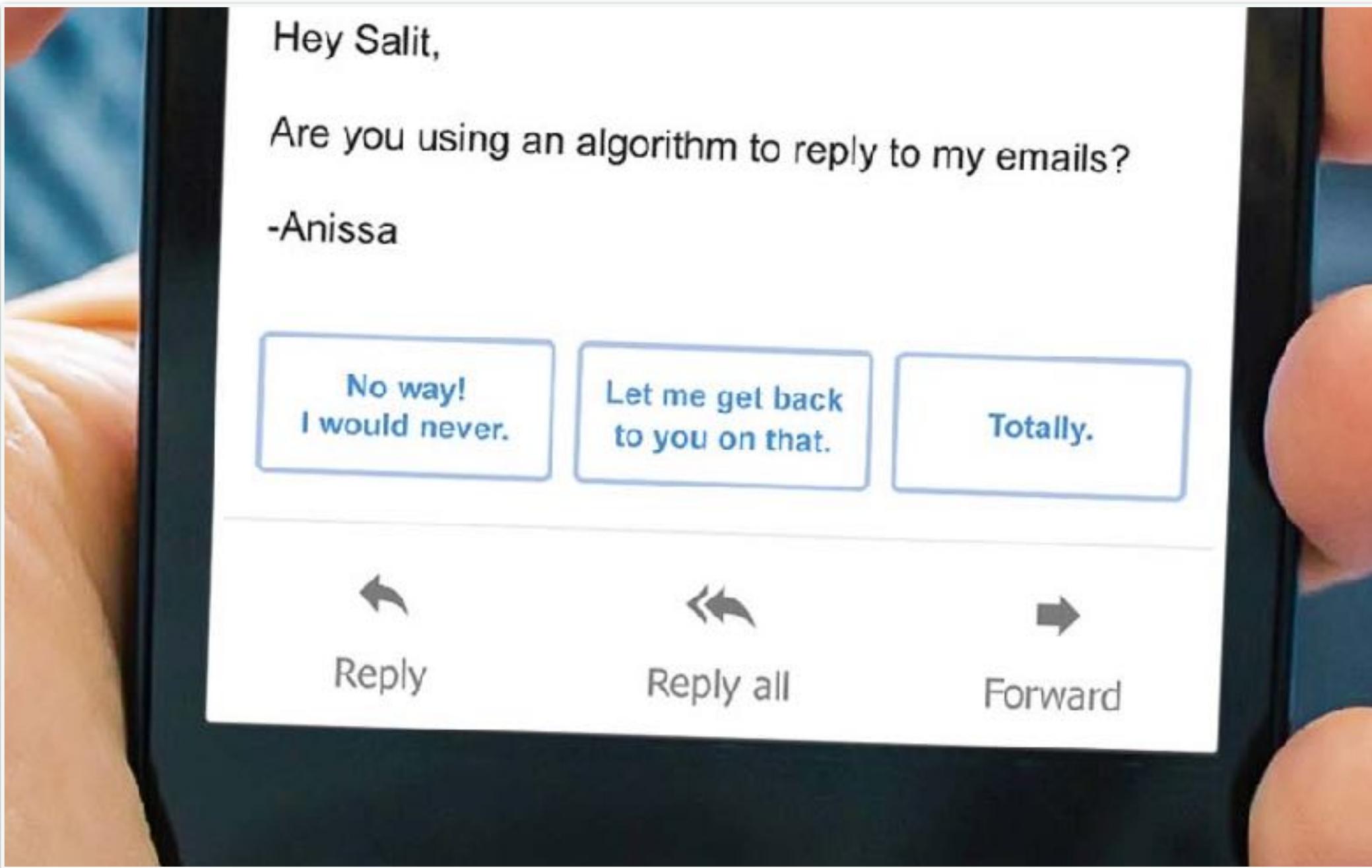
 2 Awards

Is Wall Street losing its tech enthusiasm?



techcrunch.com

556 upvotes | 15 comments | Share



tinder

Jo Allison, 22

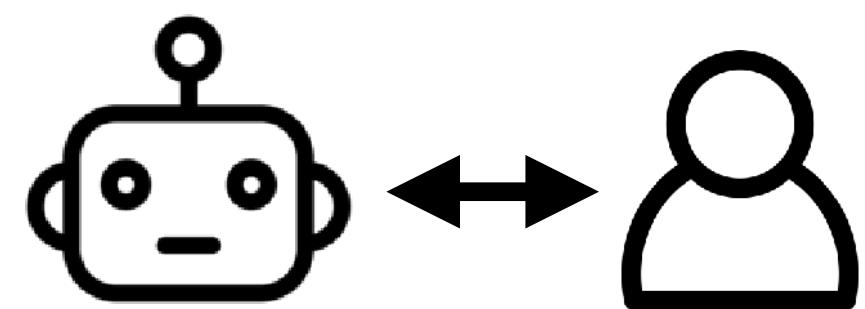
21 13

Like

The advancements in ML and AI shift the paradigm of how people communicate and collaborate. Communication is not only transmitted by technology, "but **modified**, **augmented**, or even **generated** by a computational agent" [Hancock et al., 2020].

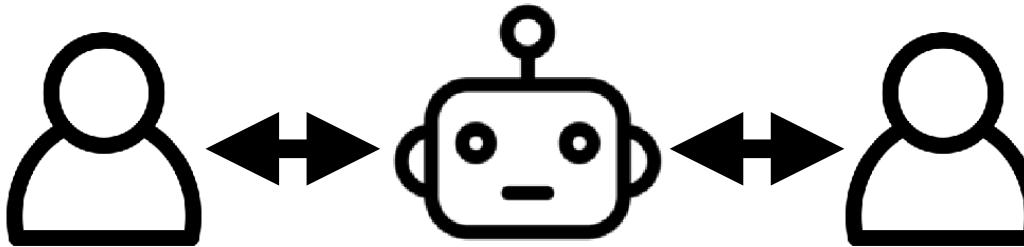
Human-AI Interaction

Dyadic Interaction



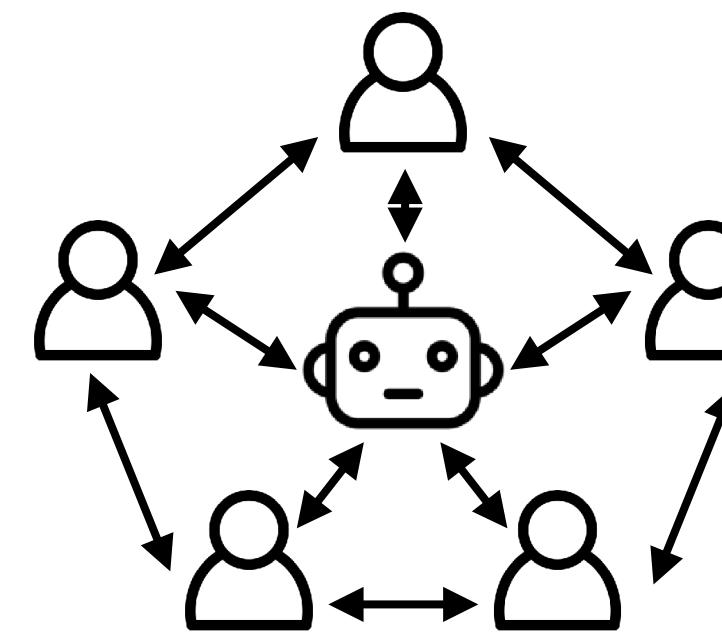
- [CHI19] Survey Agent

Mediated Interaction



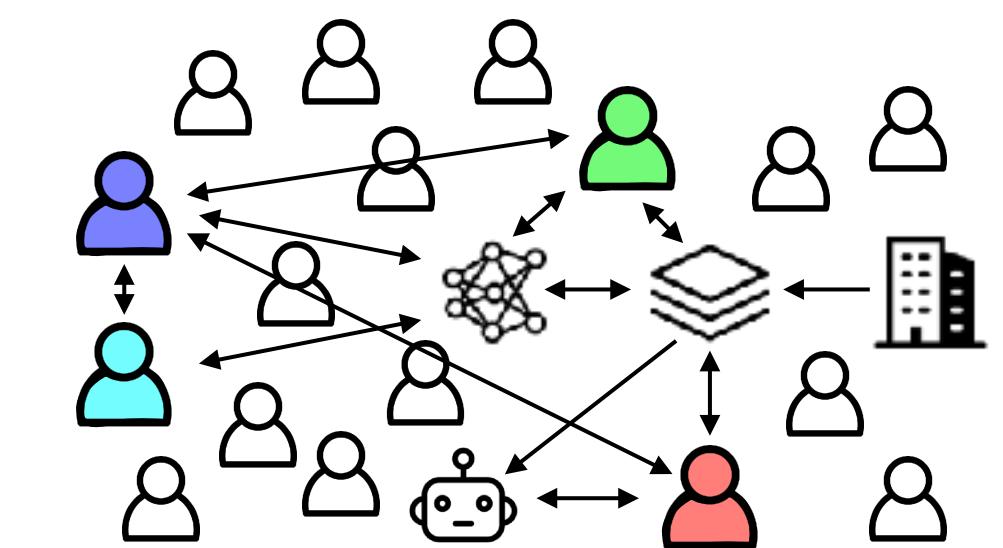
- [CHI21] BlahBlahBot

Group Interaction



- [CSCW21] DebateBot
- [CHI21] GroupfeedBot

Interaction at Scale

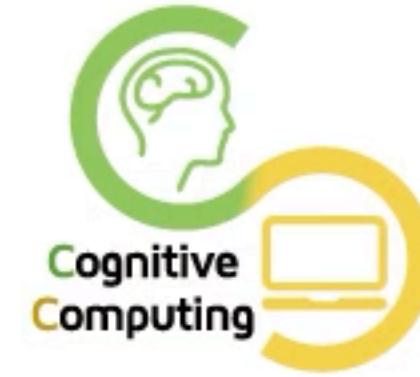


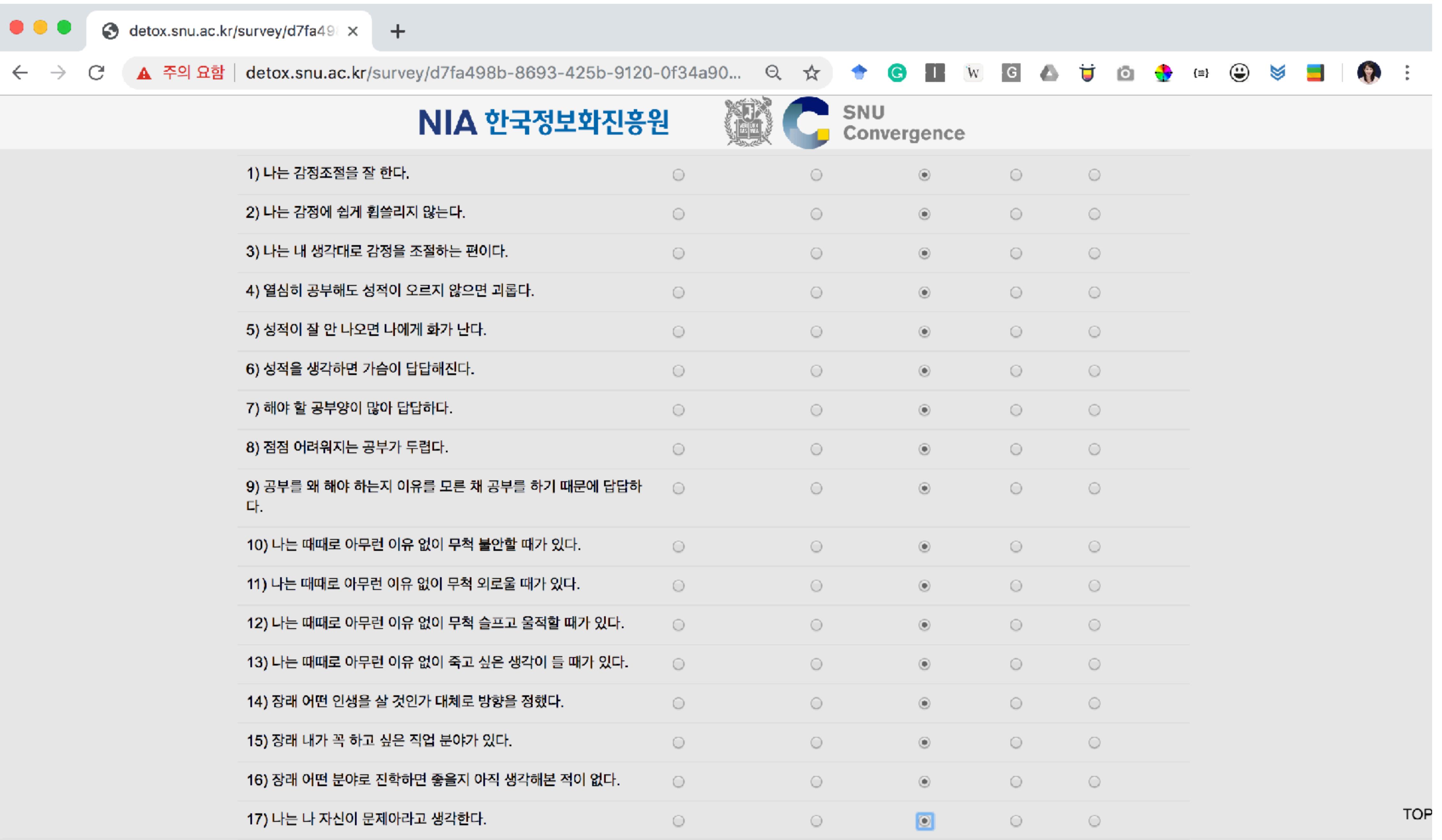
Comparing Data from Chatbot and Web Surveys: Effects of Platform and Conversational Style on Survey Response Quality

Soomin Kim¹, Joonhwan Lee¹, Gahgene Gweon²

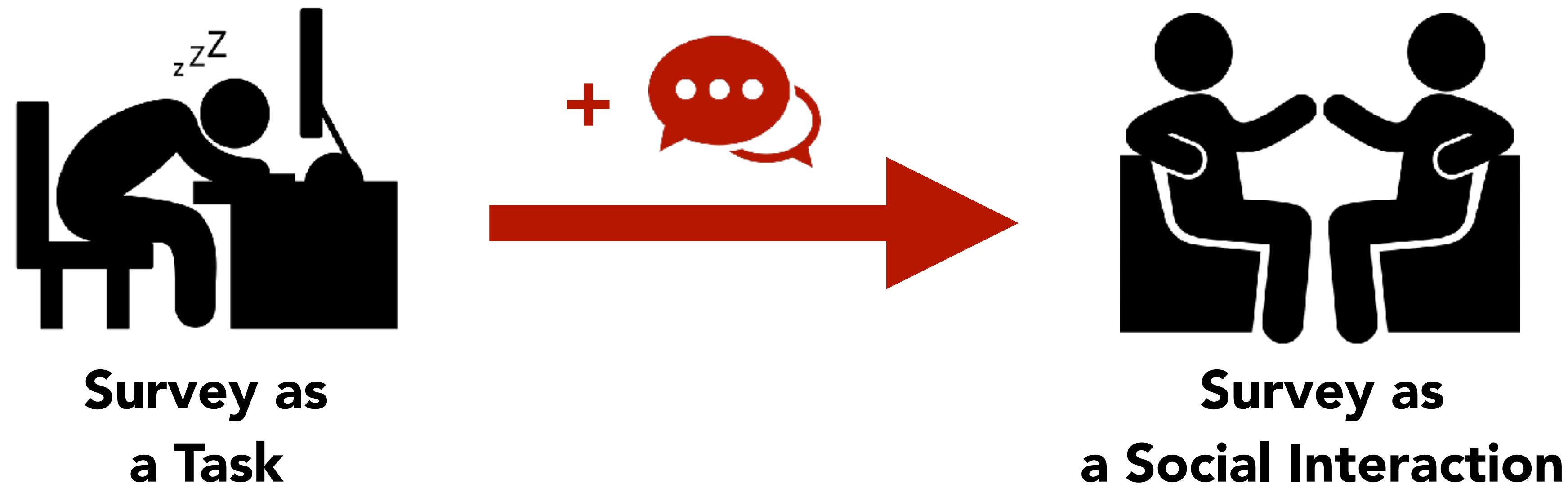
¹Human-Computer Interaction + Design Lab., Seoul National University

²Cognitive Computing Lab., Seoul National University



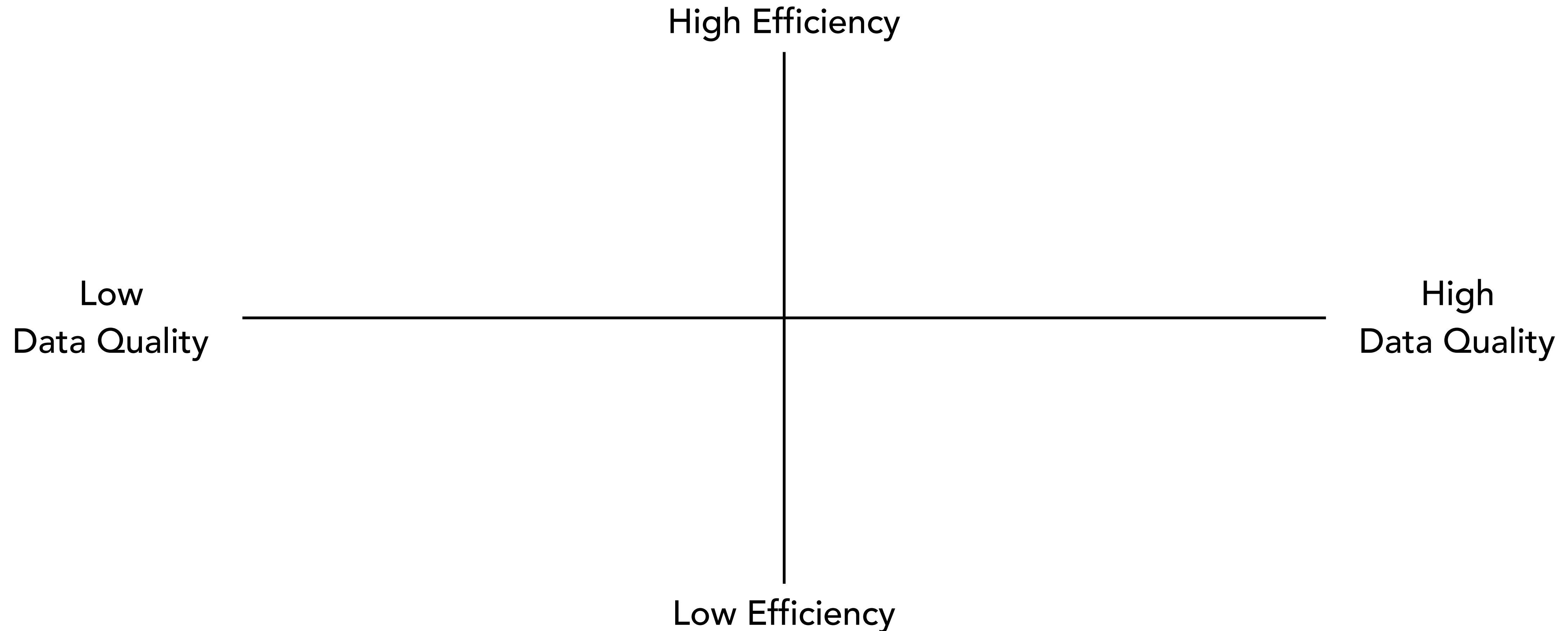


Chatbot as a New Survey Method?



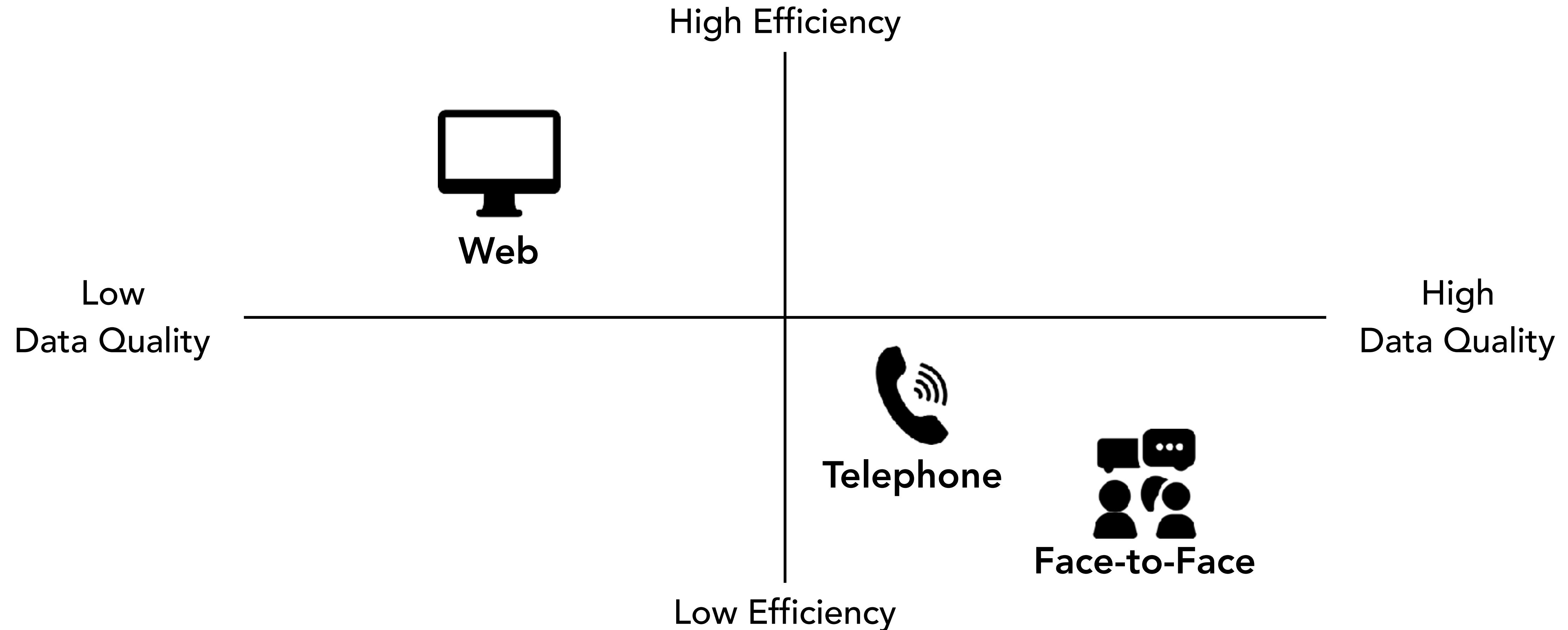
(Rafaeli, 1988; Zue & Glass, 2000)

Current Survey Methods



(Conrad & Schober, 2000; Fricker, et al., 2005; Heerwagh & Loosveldt, 2008; Kiesler, Siegel, & McGuire, 1984; Roster et al., 2004; Schober & Conrad. 1997; Sheehan, 2002; Wright, 2005.)

Current Survey Methods



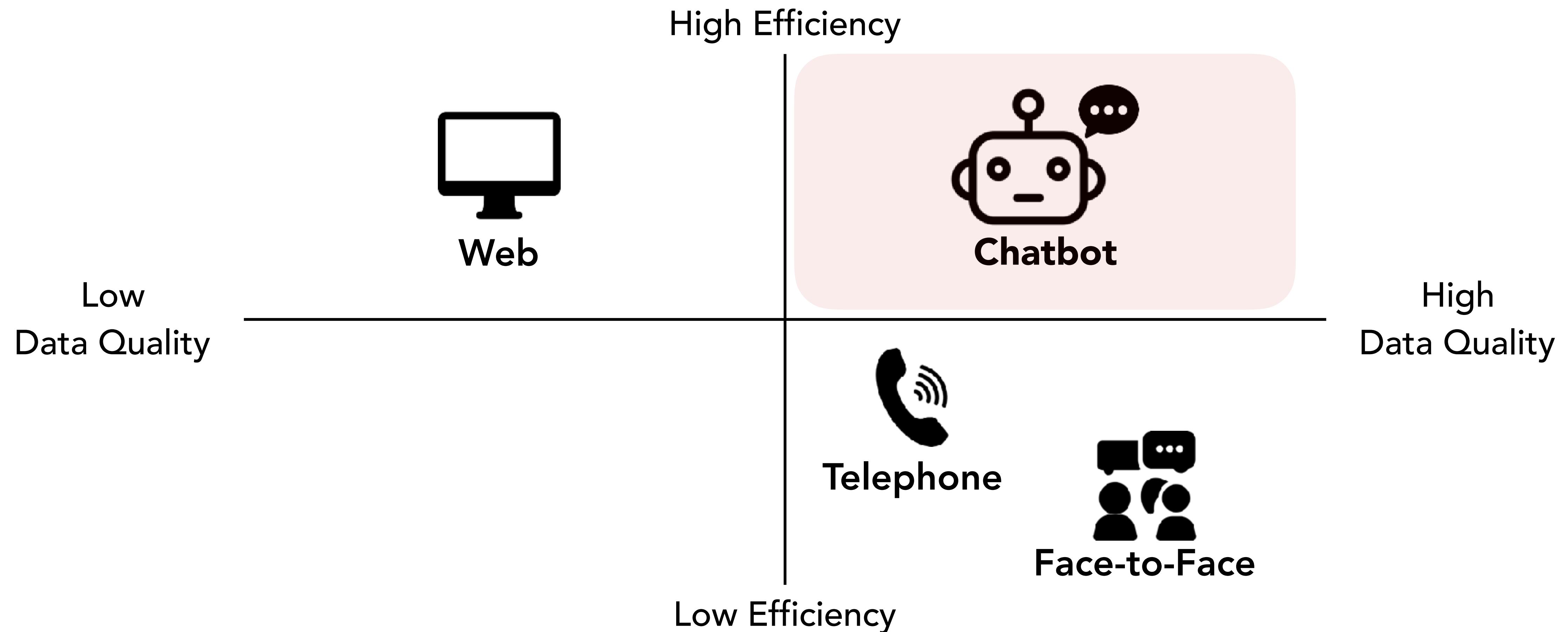
(Conrad & Schober, 2000; Fricker, et al., 2005; Heerwagh & Loosveldt, 2008; Kiesler, Siegel, & McGuire, 1984; Roster et al., 2004; Schober & Conrad. 1997; Sheehan, 2002; Wright, 2005.)

“Straight-lining” and speeding in web surveys

1) I can manage emotions	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
2) I feel anxious without a reason	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
3) I feel lonely	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
4) I think my life had been a failure	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
5) I feel depressed	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
6) I could not get ‘going’	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
7) I don’t feel hopeful about the future	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
8) I become easily annoyed or irritable	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
9) I set my goals and steadily move toward the goals	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
10) I am good with other people	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
11) I am satisfied with my life	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
12) I have gotten the important things in life	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
13) The conditions of my life are excellent	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
14) If somebody hits me, I hit back	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
15) When frustrated, I let my irritation show.	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
16) I tell my friends openly when I disagree	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

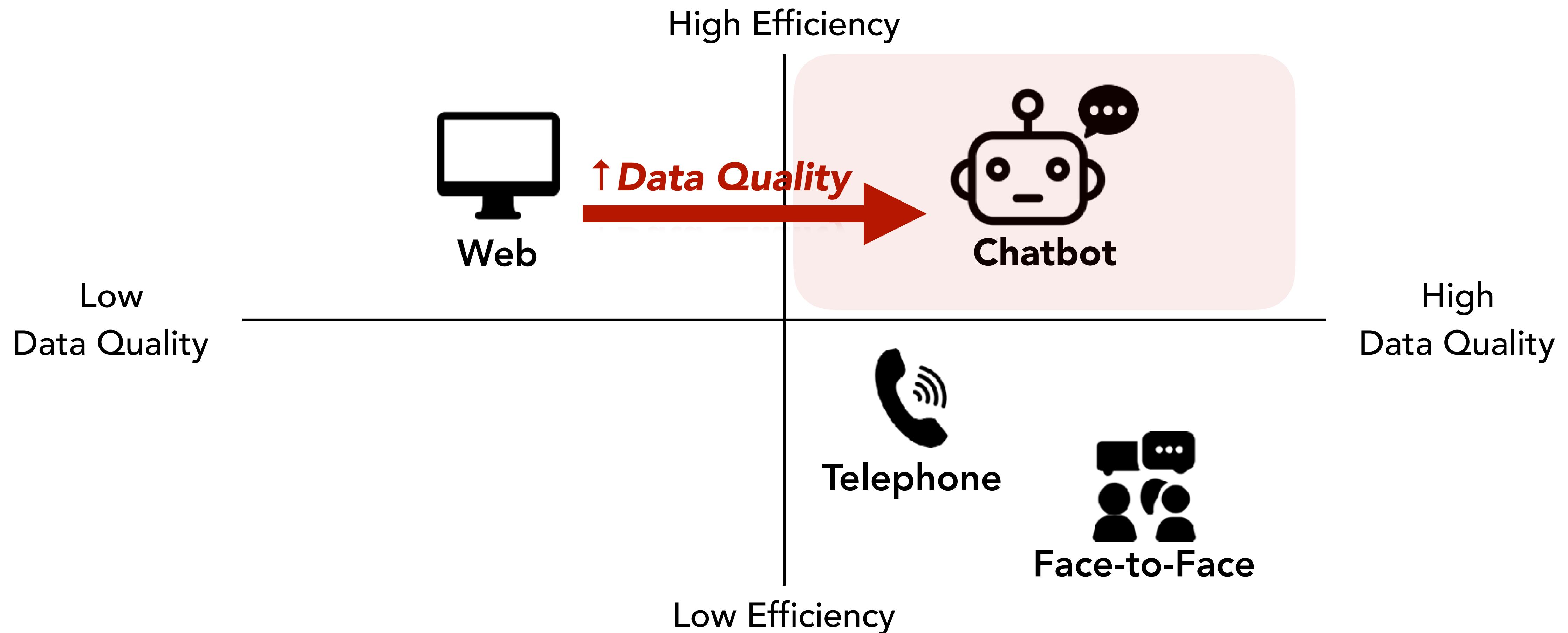
(Zhang 2013; Zhang & Conrad, 2014)

Chatbot as a New Survey Method?



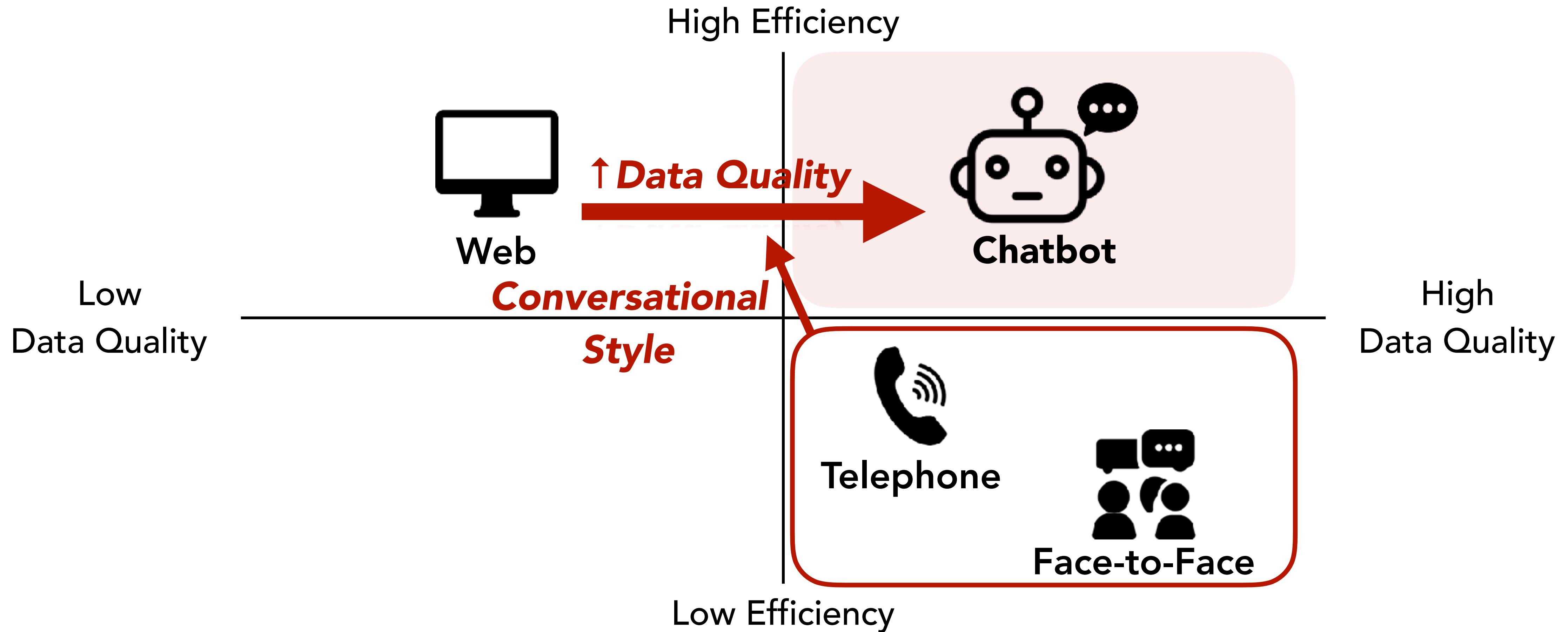
(Conrad & Schober, 2000; Fricker, et al., 2005; Heerwagh & Loosveldt, 2008; Kiesler, Siegel, & McGuire, 1984; Roster et al., 2004; Schober & Conrad. 1997; Sheehan, 2002; Wright, 2005.)

Chatbot as a New Survey Method?



(Conrad & Schober, 2000; Fricker, et al., 2005; Heerwagh & Loosveldt, 2008; Kiesler, Siegel, & McGuire, 1984; Roster et al., 2004; Schober & Conrad. 1997; Sheehan, 2002; Wright, 2005.)

Chatbot as a New Survey Method?

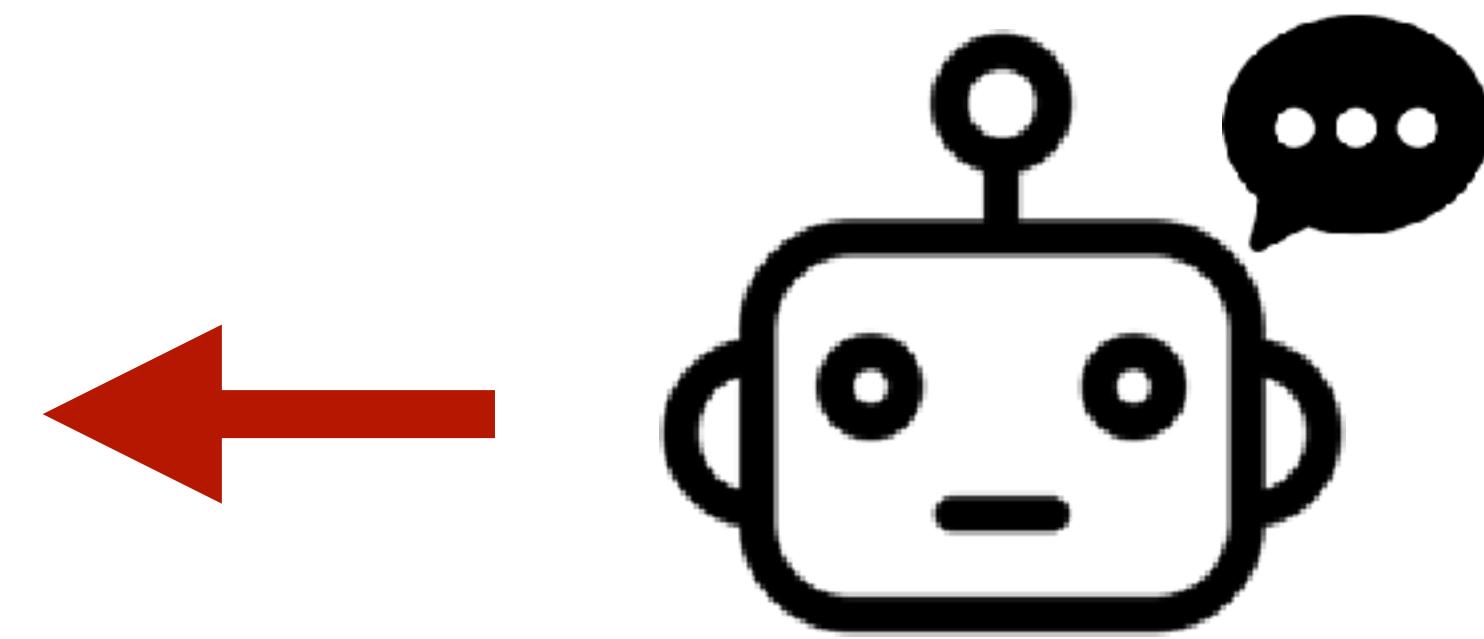


(Conrad & Schober, 2000; Fricker, et al., 2005; Heerwagh & Loosveldt, 2008; Kiesler, Siegel, & McGuire, 1984; Roster et al., 2004; Schober & Conrad. 1997; Sheehan, 2002; Wright, 2005.)

Research Goal

I use live mobile quiz show application...

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Because the app is simple	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because it is easy to participate and play	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because it takes a short time to participate	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because the rule is simple	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
To win a prize money	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
For an expectation to win a prize money	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
To get an extra life	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
To feel a sense of accomplishment	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because of a confidence of being better than others	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
To win and brag	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
To compete with other users	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
To accumulate and acquire knowledge or information	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>



To verify the feasibility of a text-based chatbot as a new survey method
to overcome the web survey's common response quality problems

Chatbot Survey

사이버지킴이 에티봇

Messenger에서 활동



I am Ettybot 😊

I am trying to make a healthy internet world!

Let's take a survey about your internet and smartphone usage behaviors!



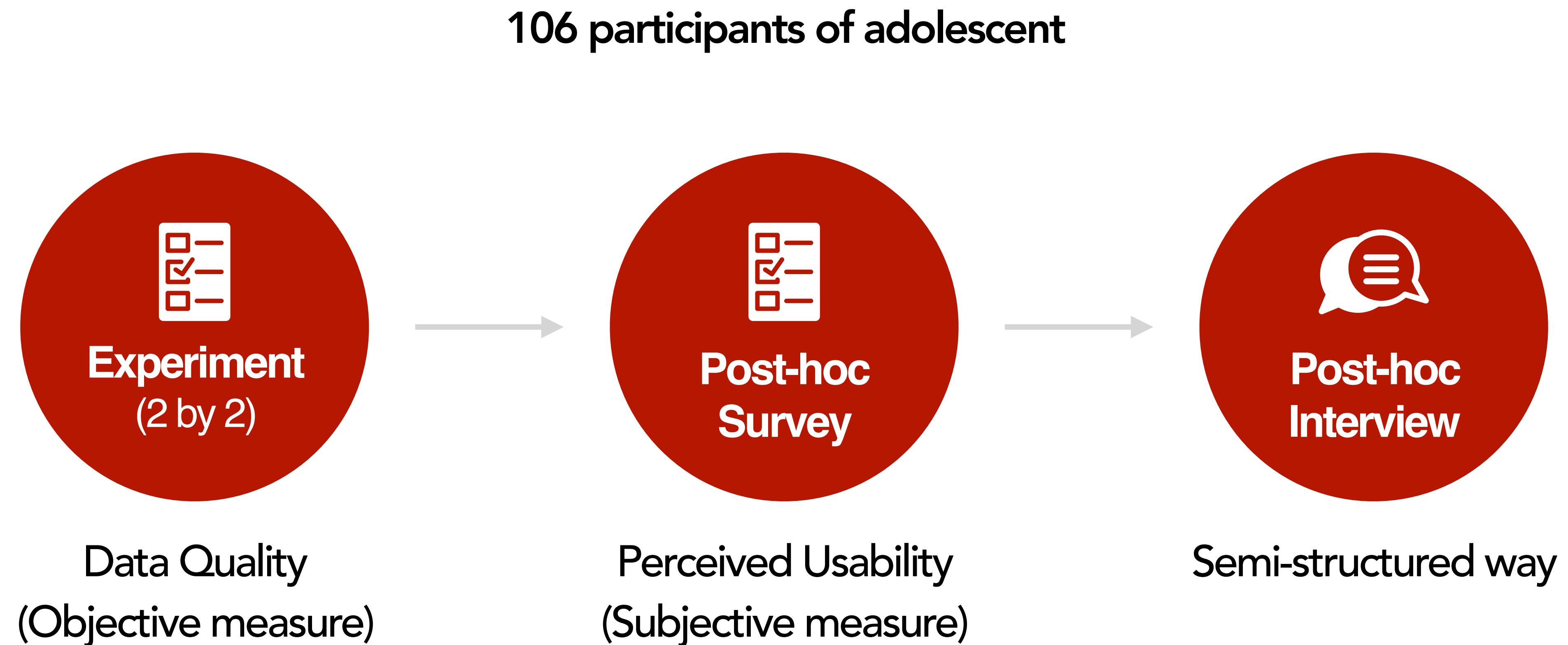
... 😊

Let's Go!



이 대화에서 작성 도구가 비활성화되었습니다.

Procedure



Experimental Conditions

		PLATFORM	
		Web	Chatbot
CONVERSATIONAL STYLE	Formal	(A) Formal Web Survey	(B) Formal Chatbot Survey
	Casual	(C) Casual Web Survey	(D) Casual Chatbot Survey

2 × 2 between-subjects design (N=106)

Lessons Learned! CSCW

Measure for Response Data Quality

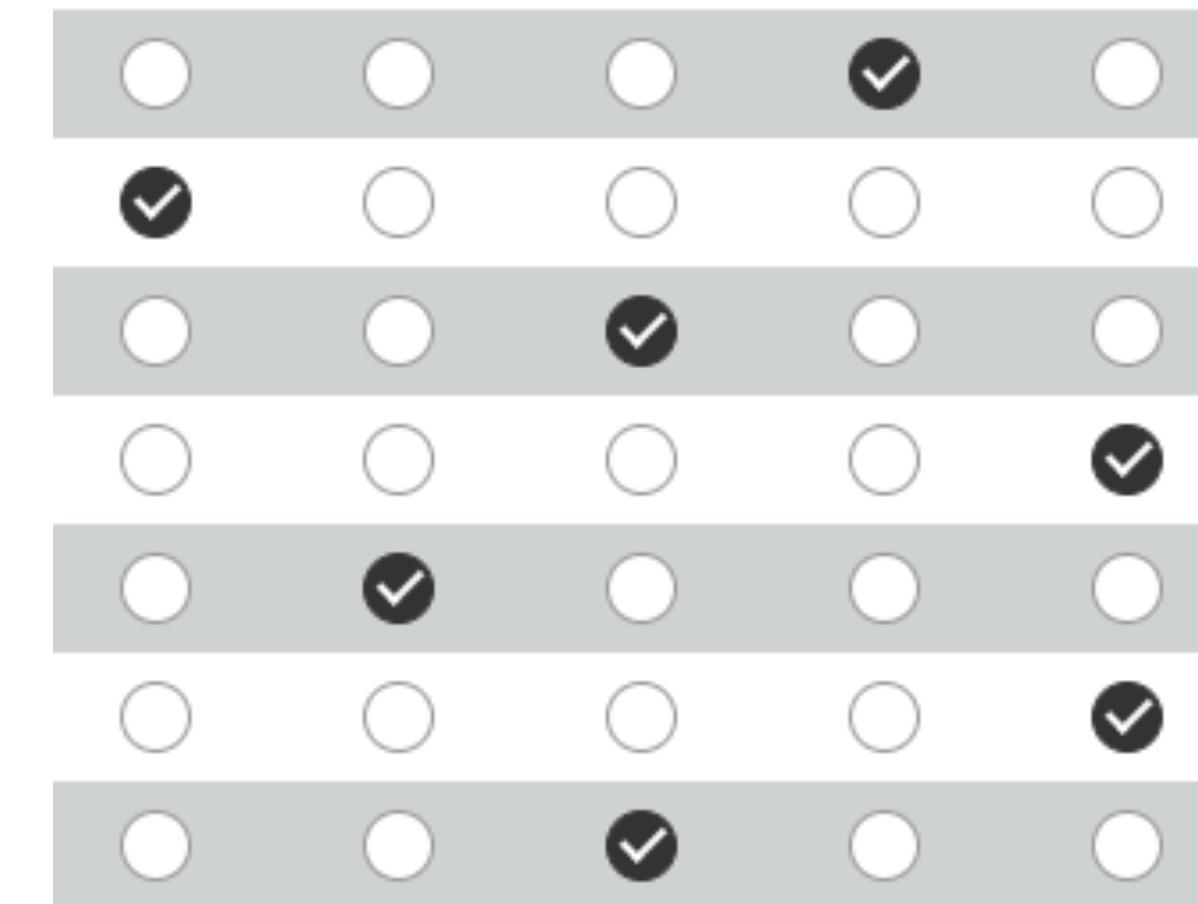
- Differentiation ratio as an index of the data quality
- Based on “Satisficing Theory” (Simon, 1957; Krosnick, 1991)

Low Ratio, Low Data Quality



satisficing ↑
↓
data quality ↓

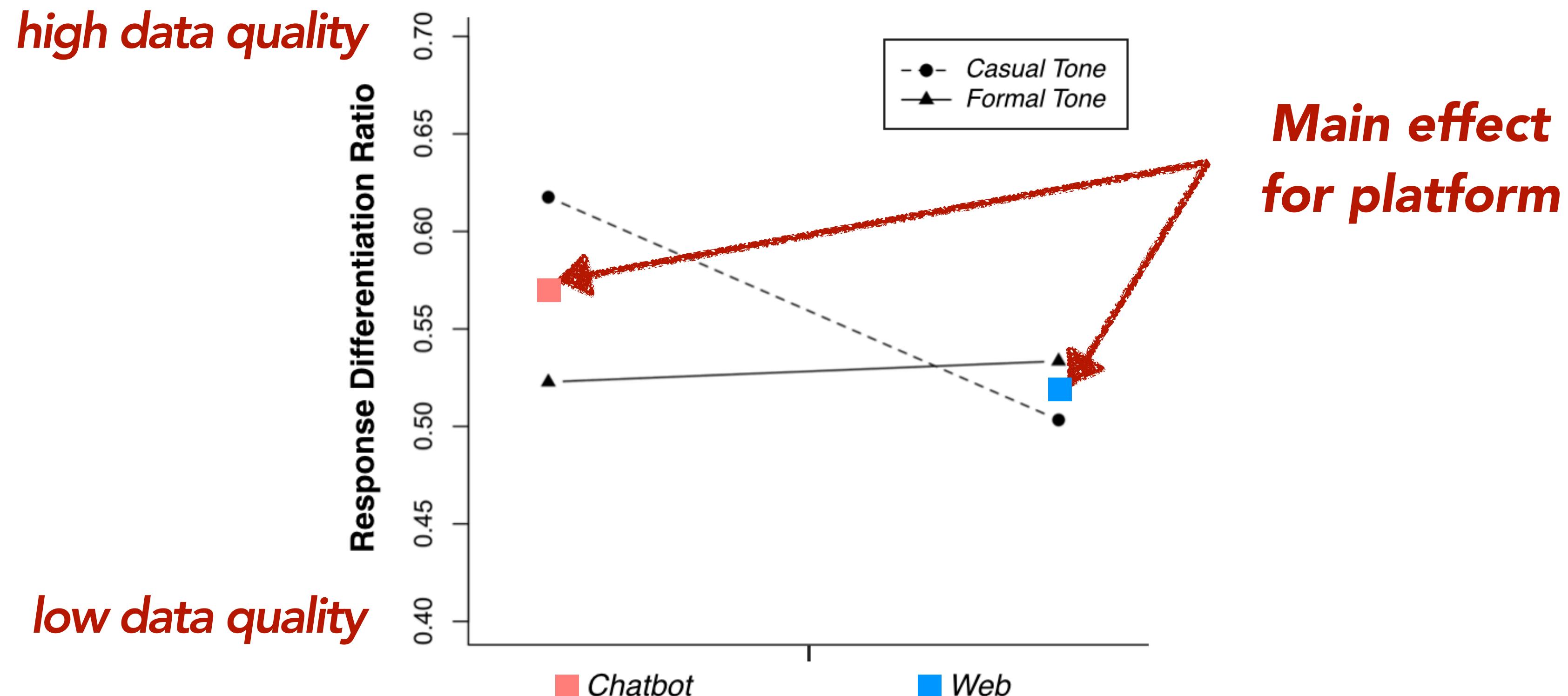
High Ratio, High Data Quality



satisficing ↓
↓
data quality ↑

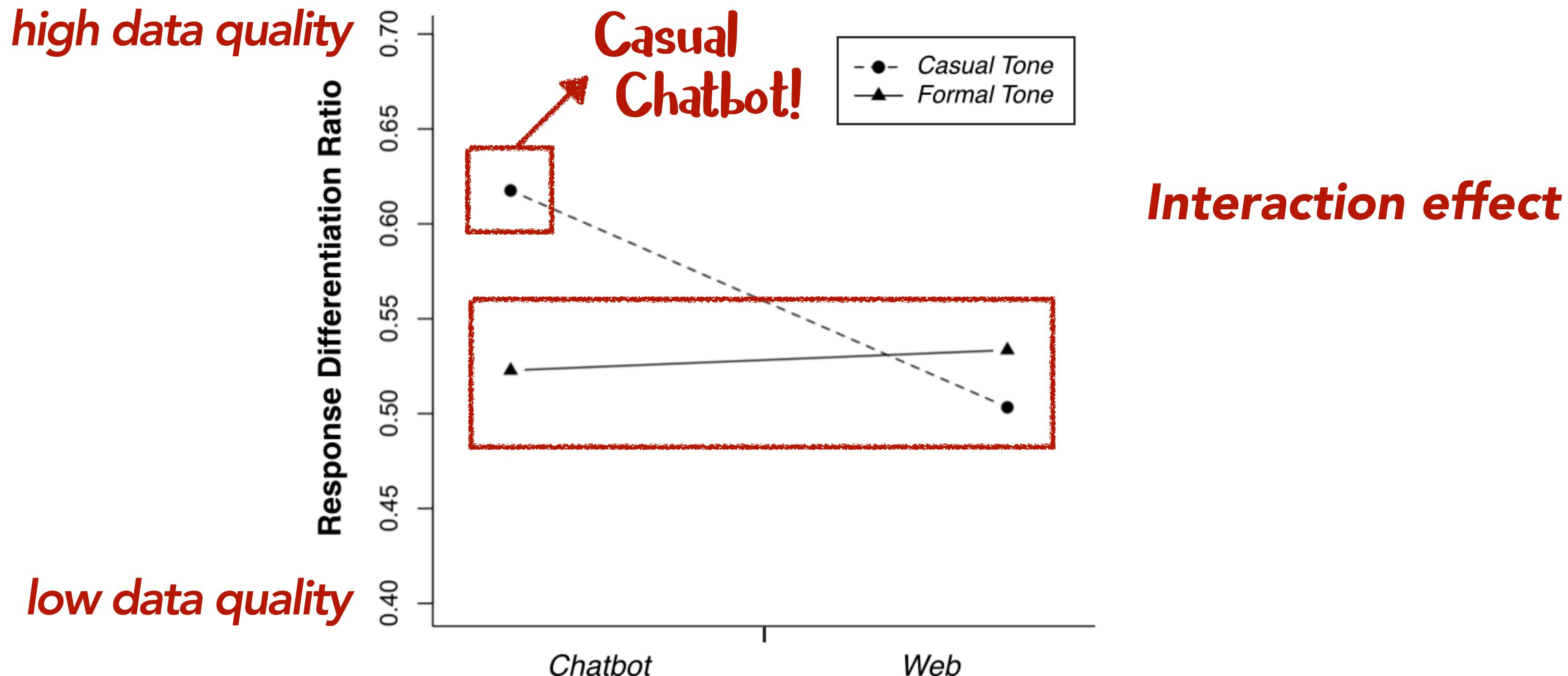
Results of Data Quality

Chatbot survey resulted in higher-quality data.



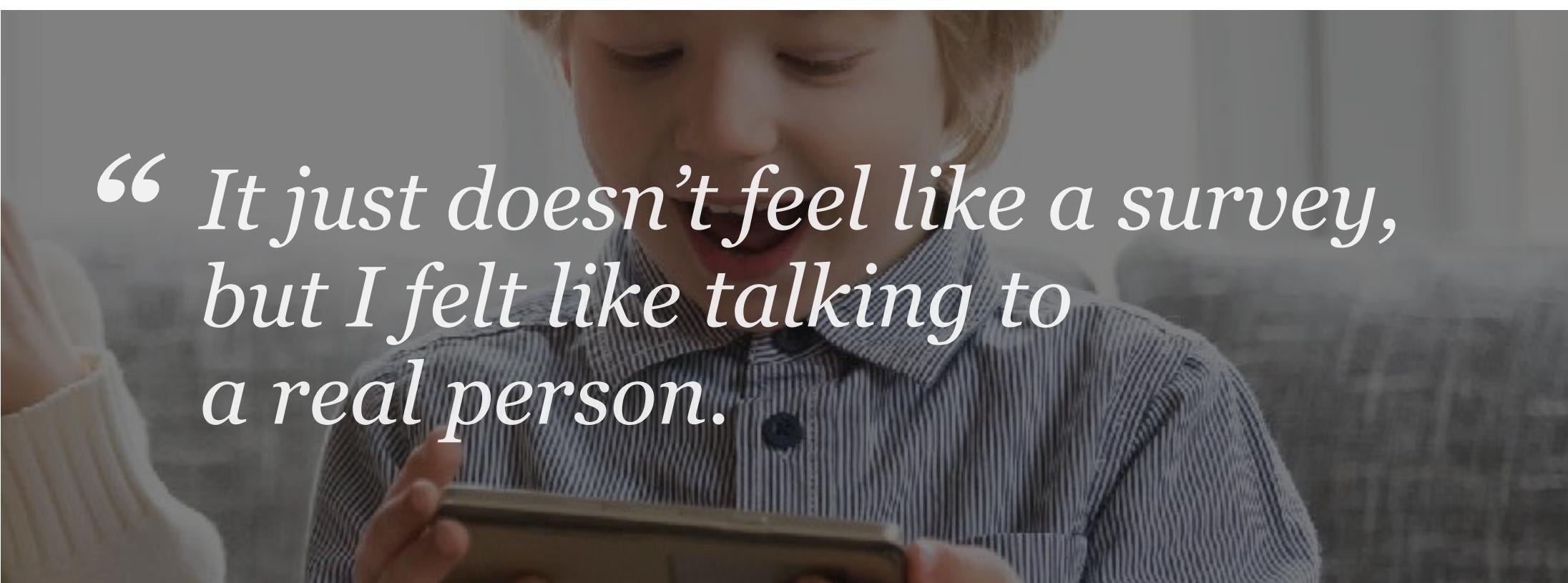
Results of Data Quality

Chatbot survey is effective only with casual conversational style.



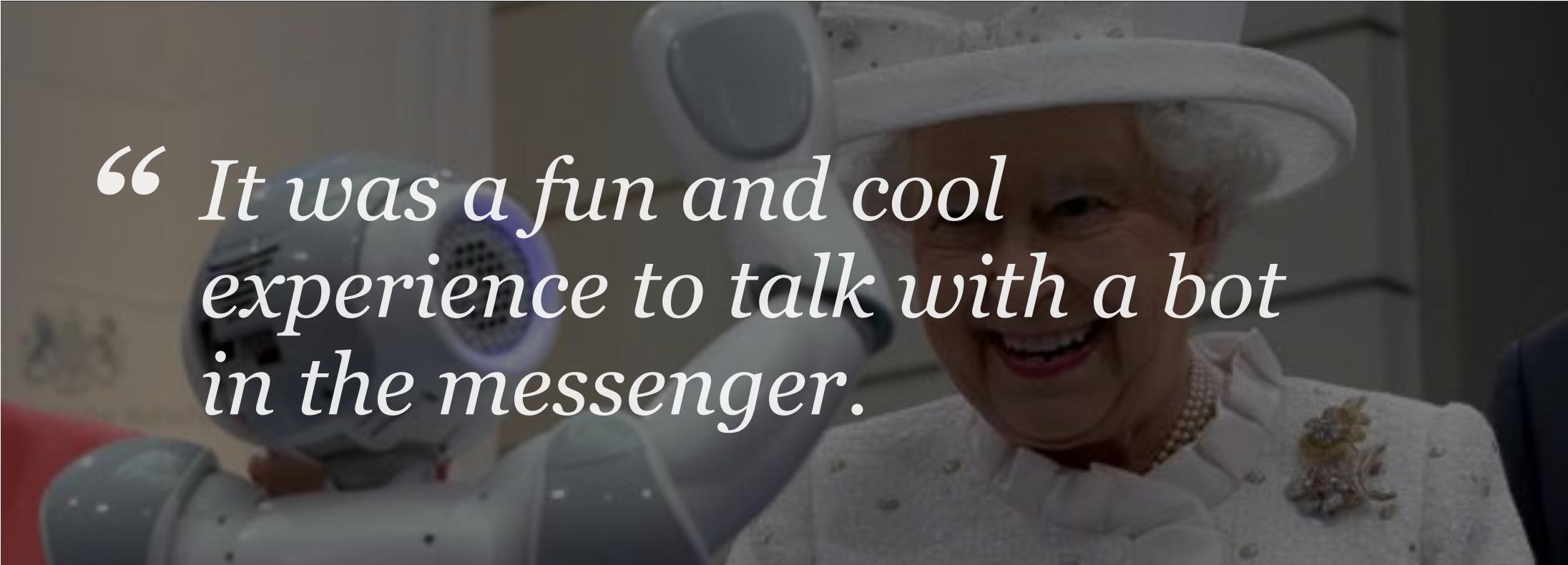
Qualitative Results

Not a Task but an Interaction



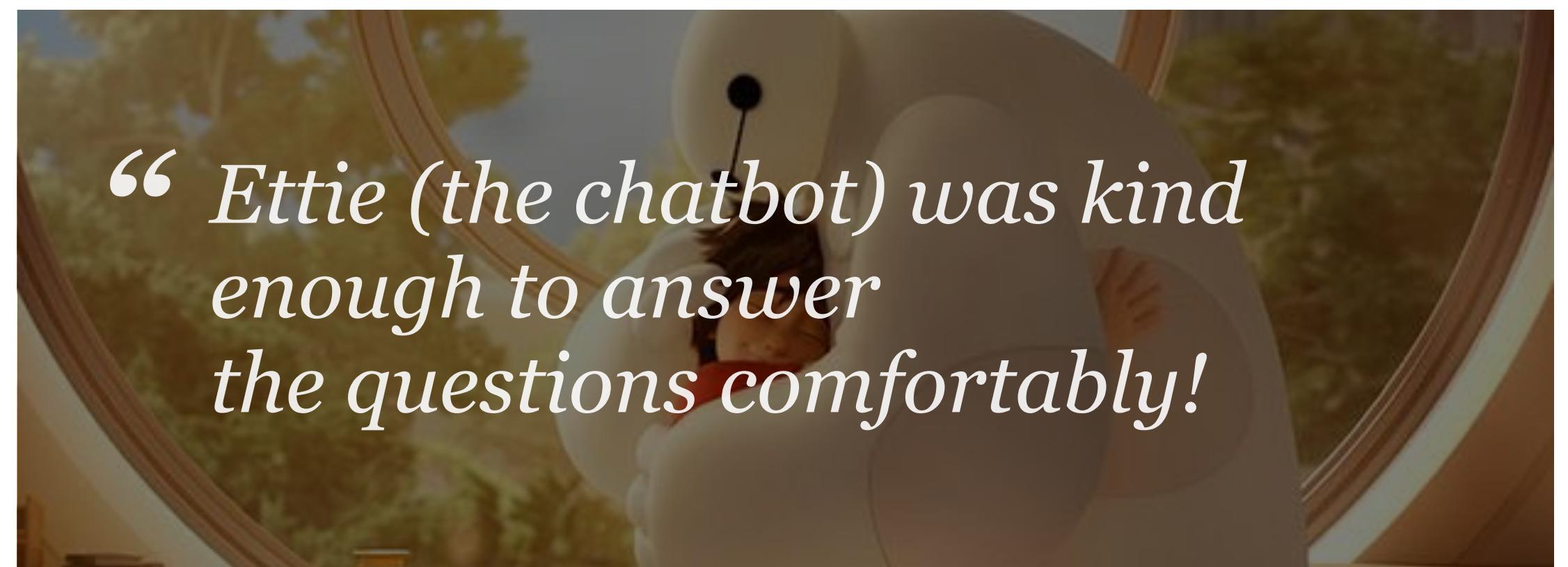
***“ It just doesn’t feel like a survey,
but I felt like talking to
a real person. ”***

Playful Interaction Creates Engagement



***“ It was a fun and cool
experience to talk with a bot
in the messenger. ”***

Casual Tone Heightens Intimacy



***“ Ettie (the chatbot) was kind
enough to answer
the questions comfortably! ”***

Easy Access through Mobile

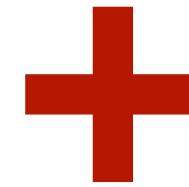


***“ I felt convenience because
I can do it my spare time
over several times with mobile. ”***

Achieve Both Functional and Social Goals



**Survey as
a Task**

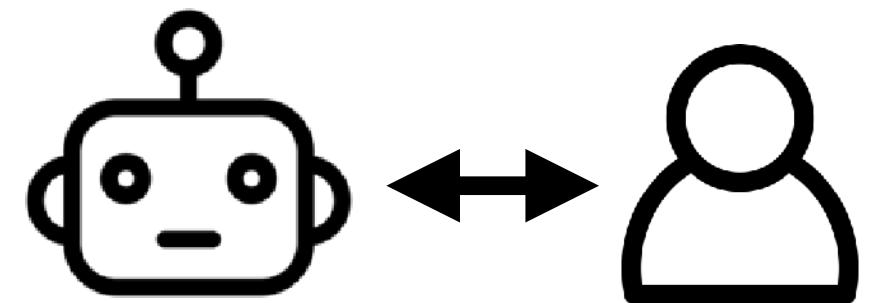


**Survey as
a Social Interaction**

*“ It just doesn’t feel like a survey.
It was like having a conversation with a friend! ”*

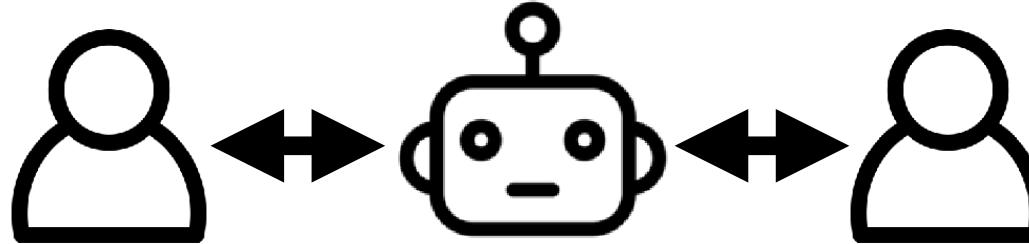
User-Centered Conversational Agent

Dyadic Interaction



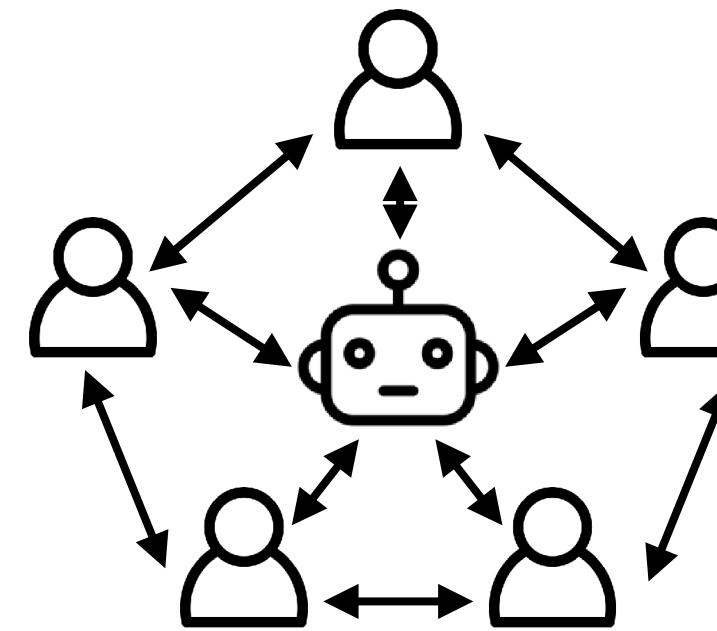
- [CHI19] Survey Agent

Mediated Interaction



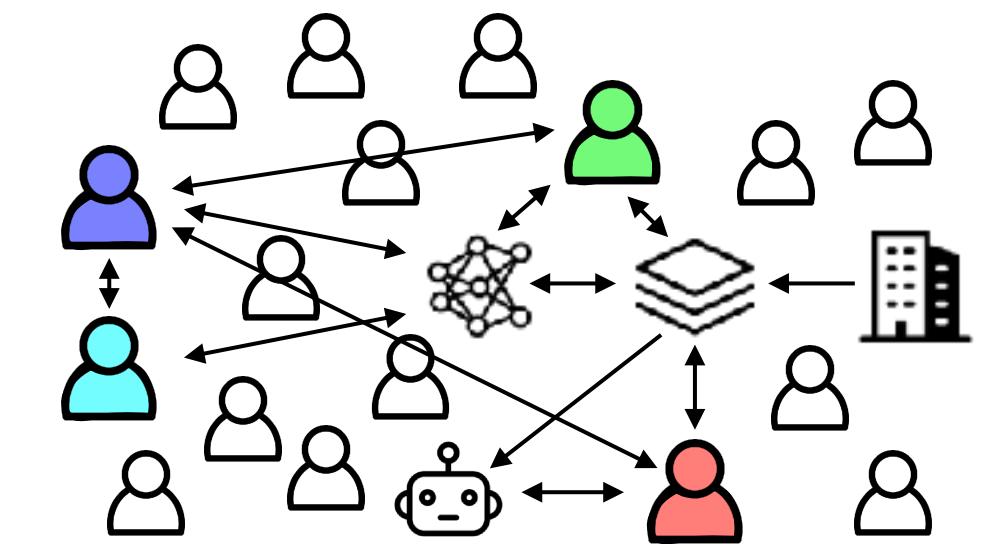
- [CHI21] BlahBlahBot

Group Interaction

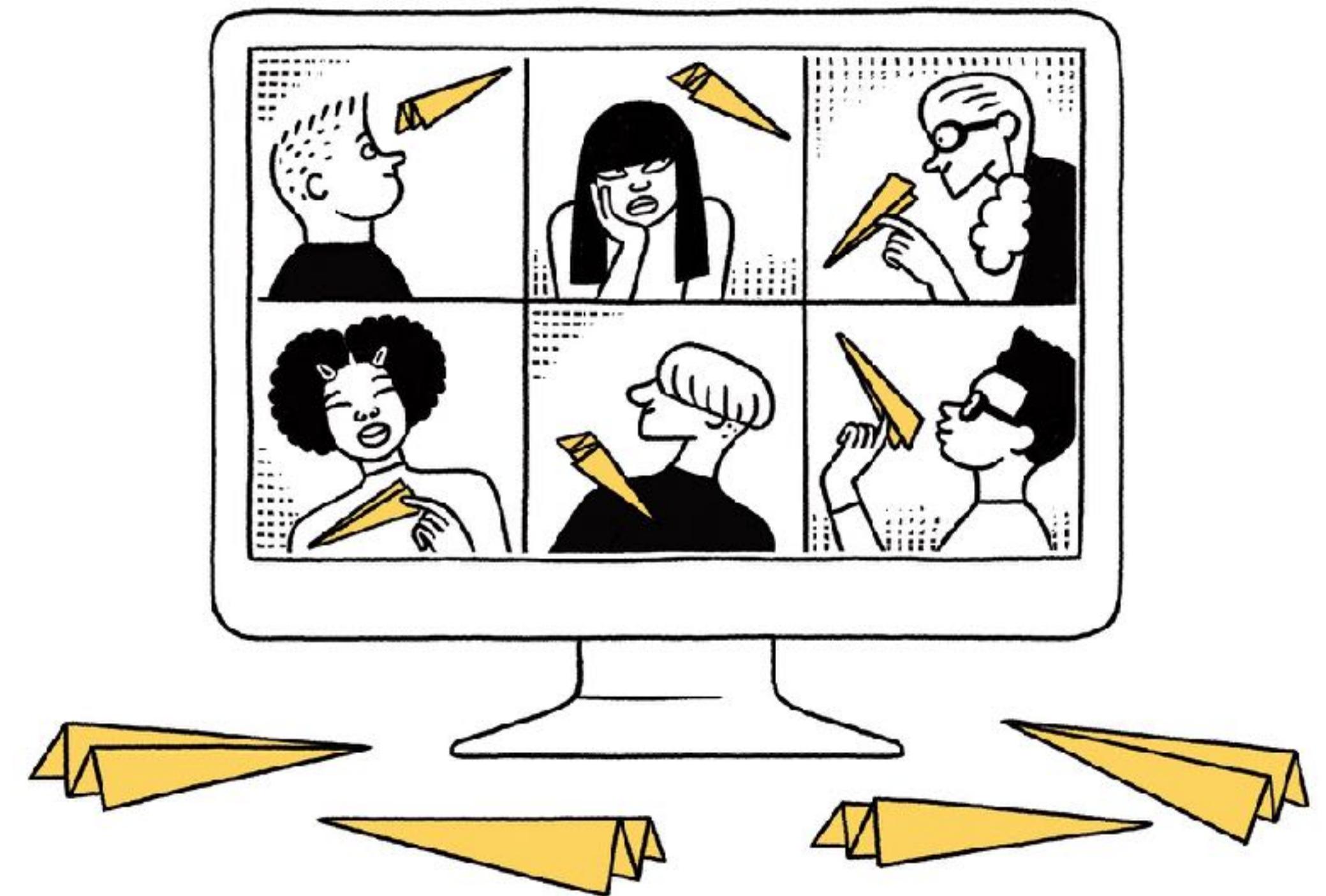


- [CSCW21] DebateBot
- [CHI21] GroupfeedBot

Interaction at Scale



Online Discussion

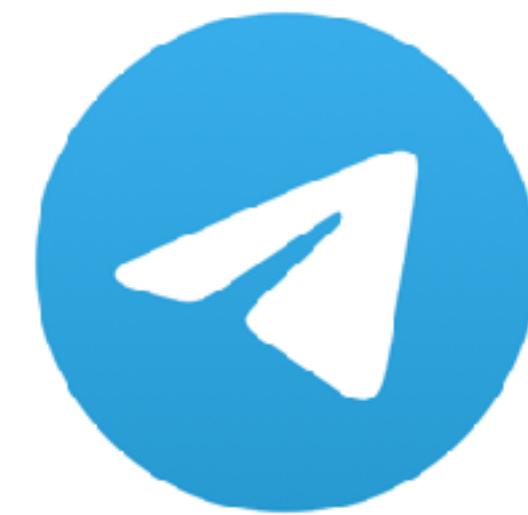




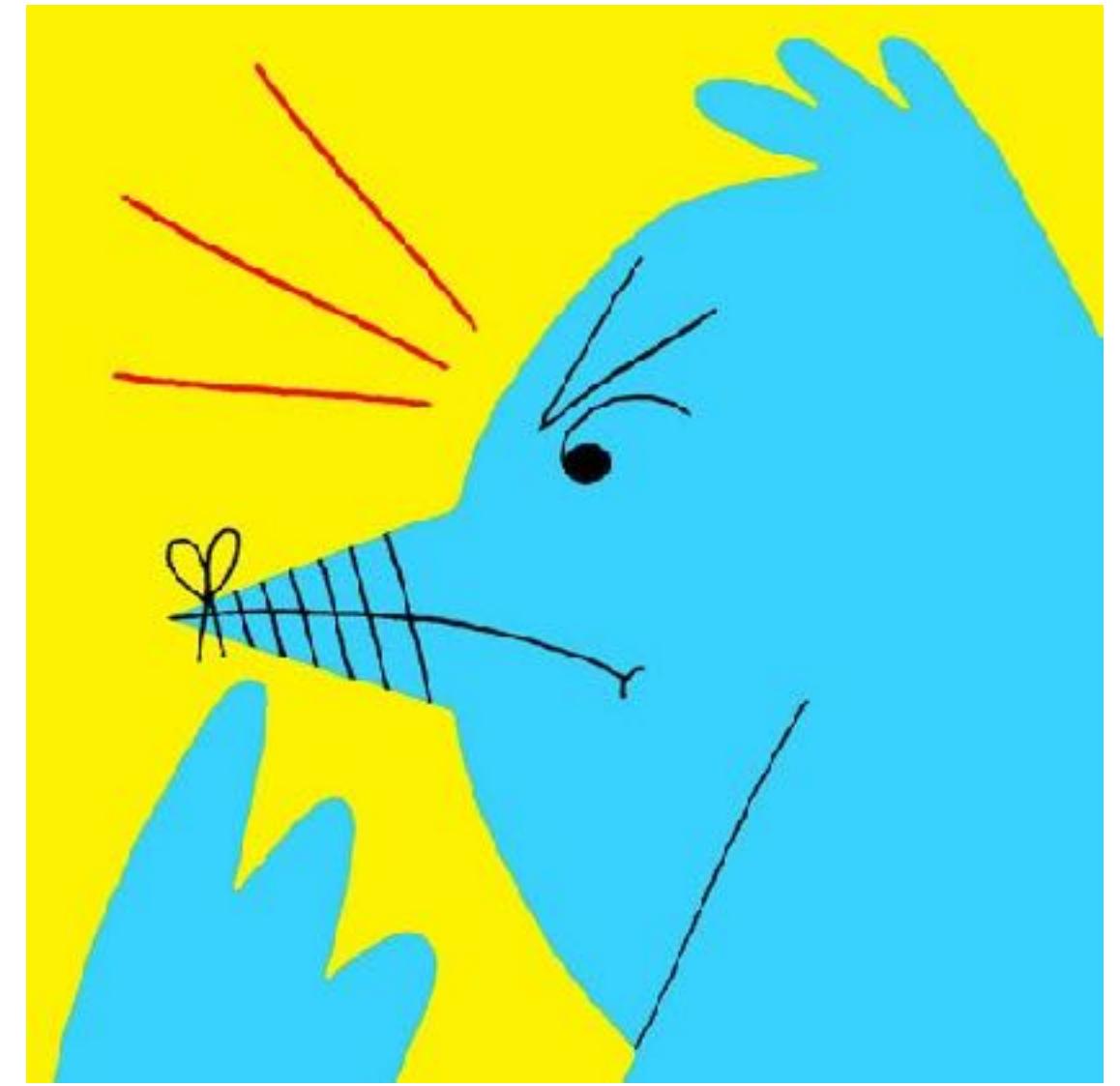
WIKIPEDIA
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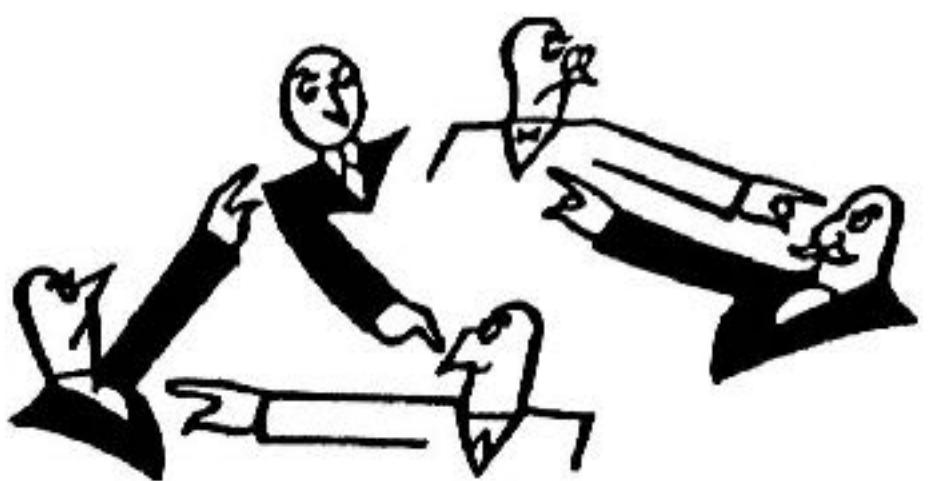
zoom



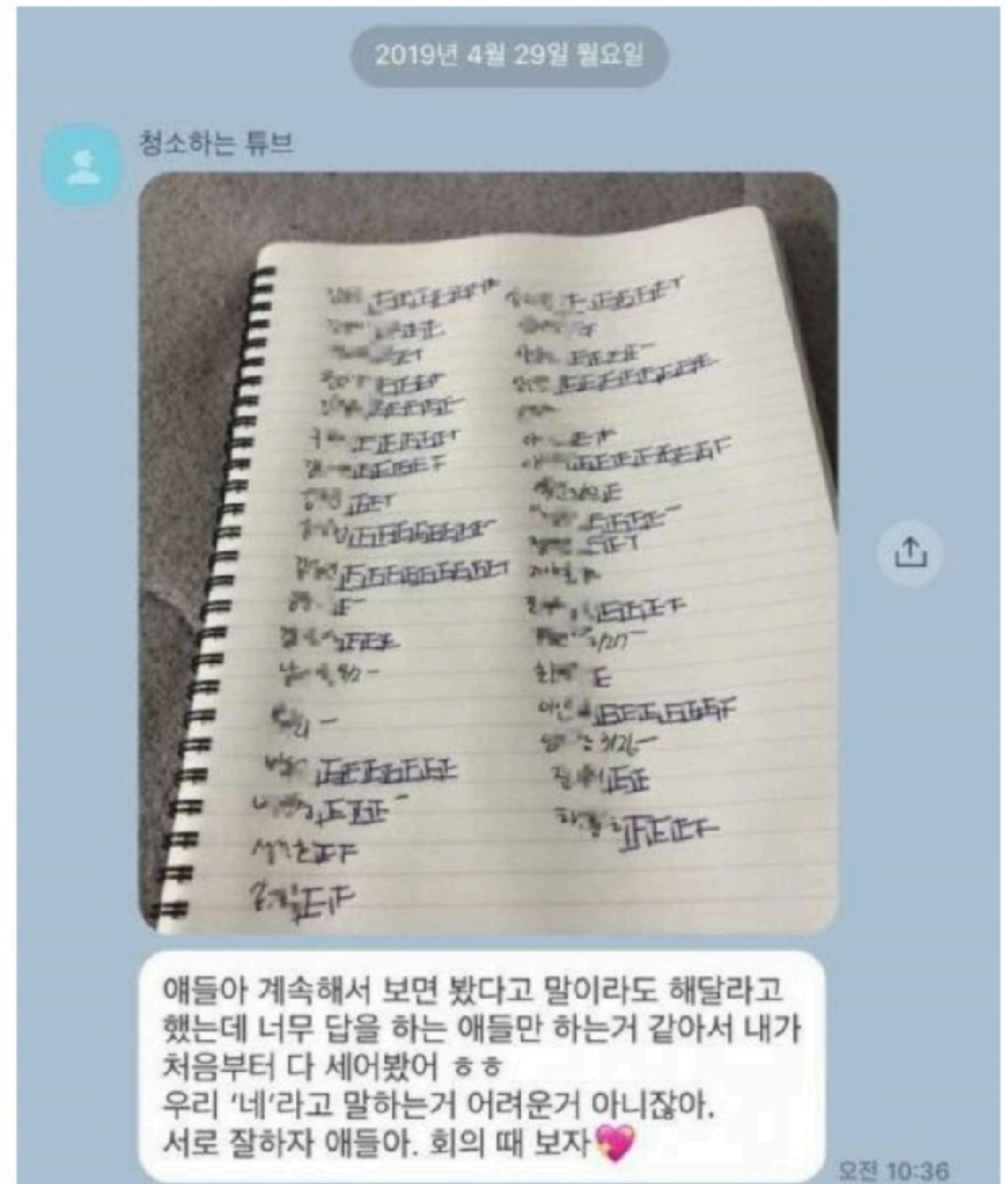
What problems do online discussion systems have?



How can we solve the limitations?



Group Chat Problem: Uneven participation & Lurkers



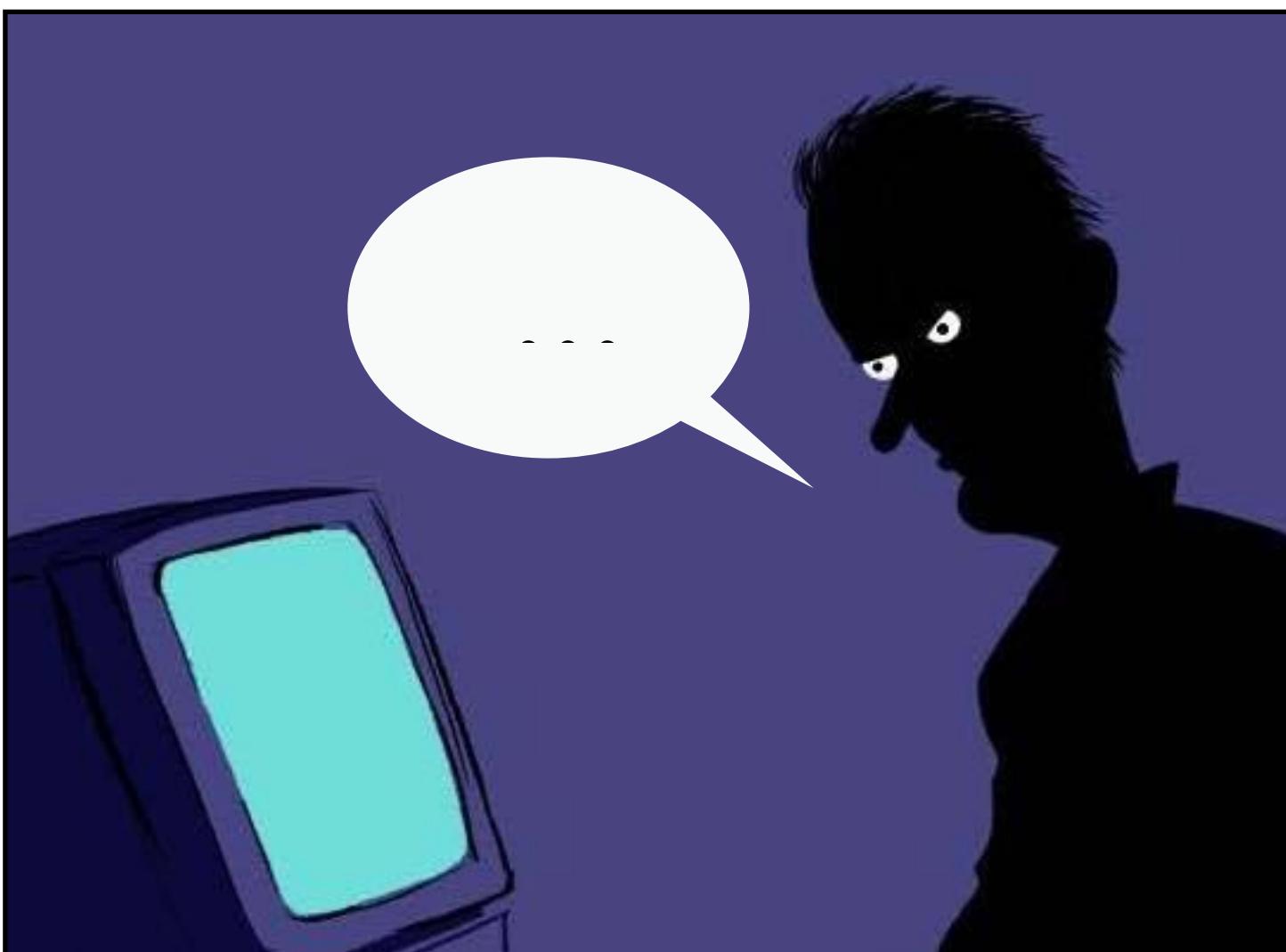
NEWSLETTERS • WORKSHEET

Tack

BY S. MITRA KALITA

March 4, 2021 3:32 AM GMT+9

Lurkers & Uneven Participation



*a lurker is a member of an online community who observes, but does not participate

Is more communication driving the conversation, or just driving us crazy?

bots

WIRED

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FEATURED

BEST MEMORIAL DAY DEALS

SMART HOME DEALS

MATTRESS DEALS

GUIDE TO BIKEPACKING

How to Use Slack Without Driving Your Coworkers Crazy

Many of us use it at work, but here are some tips on how to make Slack work for you. (Stop. Hitting. Enter. So. Often.)



Solving Problems of Group Chats

What is [Lurker Name]’s opinion?

Can [Lurker] tell us more about the reasons for your comments?

F3

DebateBot Thanks 😊 11:38

DebateBot Can Woof tell us more about the reasons for the comments you provided? 11:39

Woof I think the purpose of self-driving cars is not only to protect drivers, but also to protect pedestrians by maintaining safe road conditions and maintaining traffic order 11:39



DebateBot for
Deliberative Discussion
(Soomin Kim et al.)

Kim: #Insadong, #Hanok
Lee: #Gyeongbokgung, #Soju
Choi: #Hanriver, #Beer, #Soju
.....

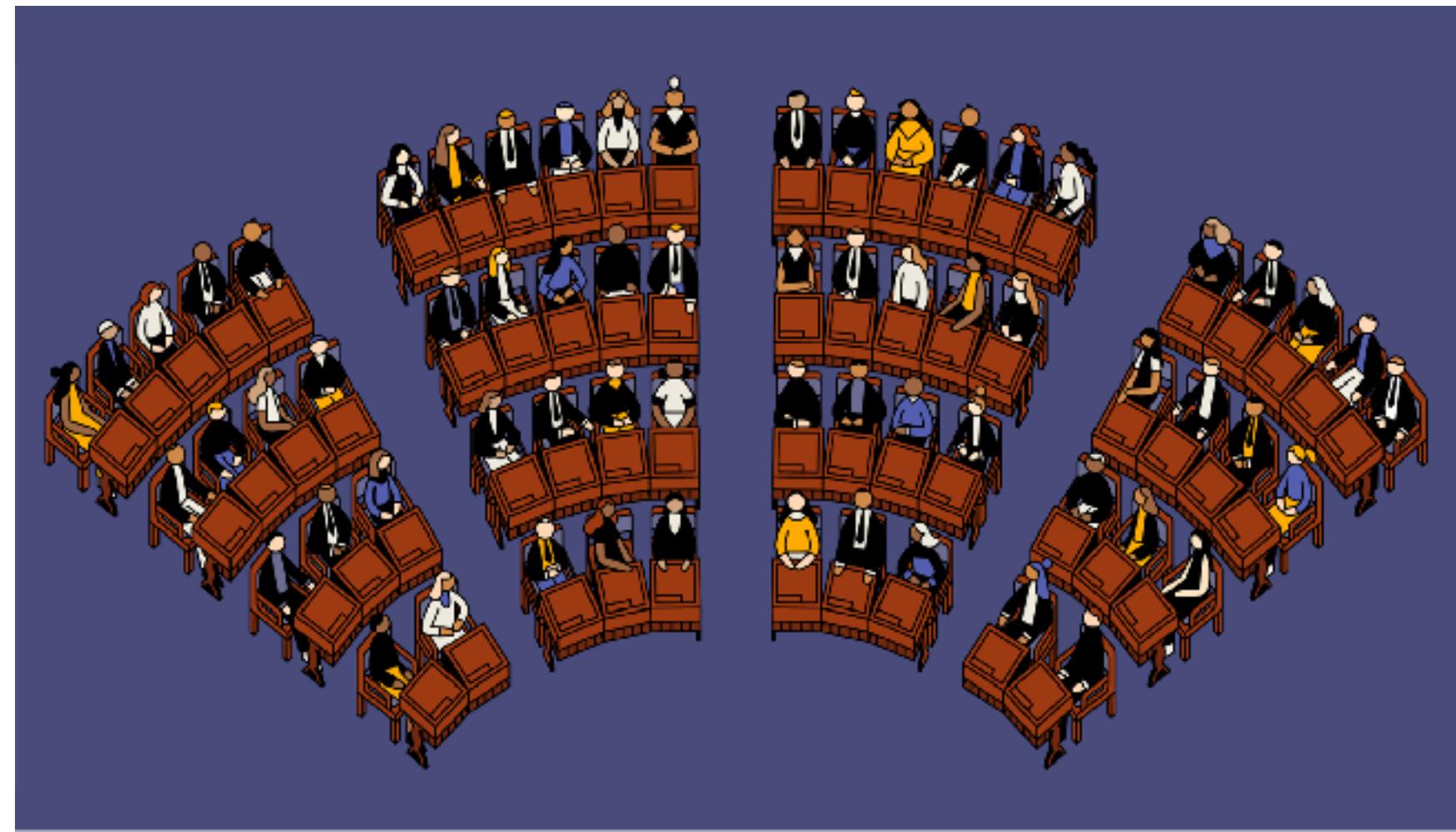
GroupfeedBot Let me tell you the keyword information that individual members have mentioned! 11:35

GroupfeedBot Kim: #Insadong #Hanok #Euljiro
Lee: #Gyeongbokgung
#Deoksugung #Insadong
Choi: #Hanriver #Club
Min: #Soju #Palace
Oh: #Itaewon #Hongdae #Club
#Beer
Fun: #Gyeongbokgung

(B)



GroupfeedBot for
Social Discussion
(Soomin Kim et al.)



GroupfeedBot

Context

Group interaction

Casual discussion

Decision making

Goal

Group dynamic

Convenient discussion

Feature

Time management,

Summarization,

Member facilitation

DebateBot

Group interaction

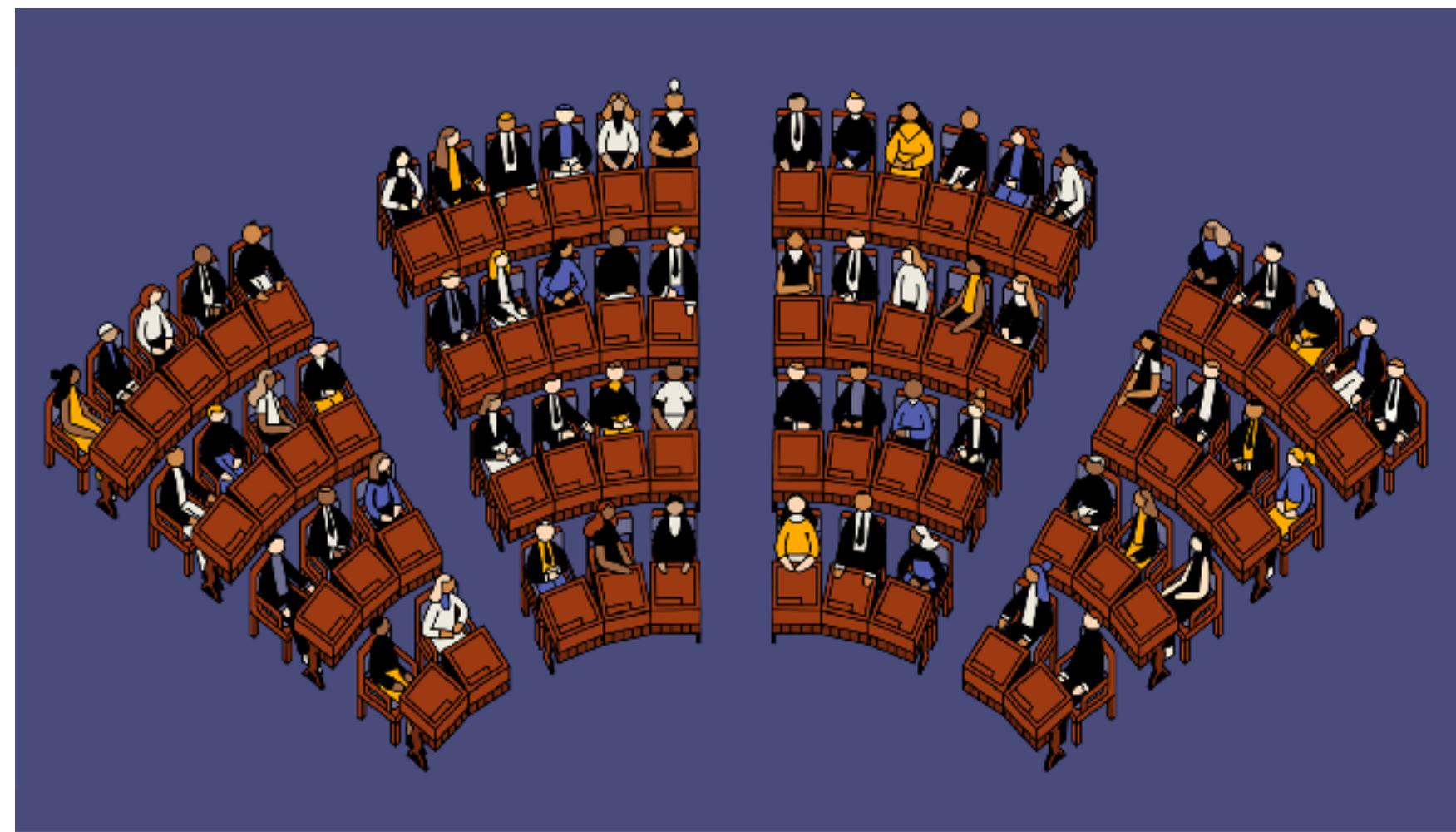
Deliberative discussion

Group dynamic

Deliberation

Structure,

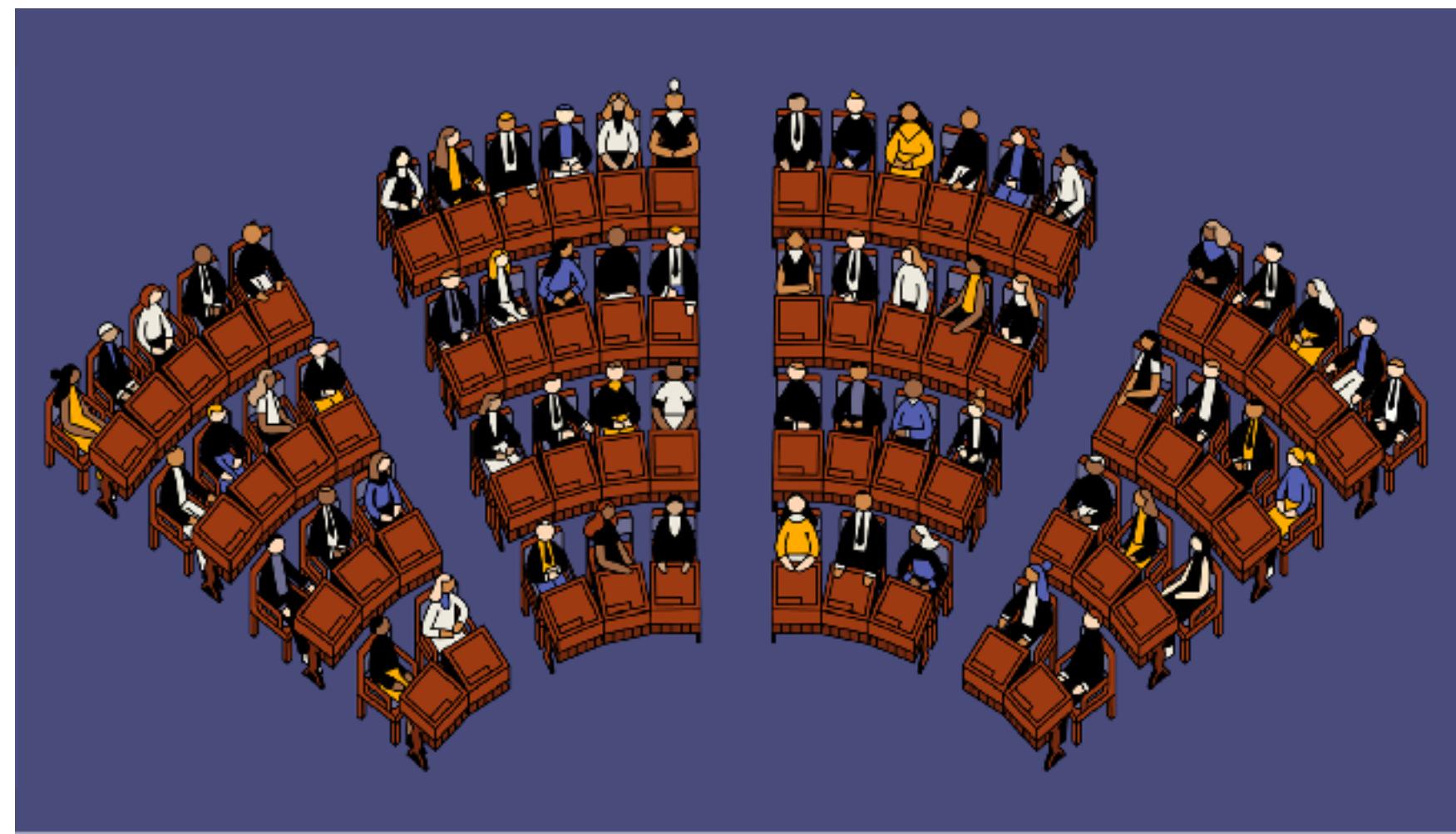
Member facilitation



GroupfeedBot

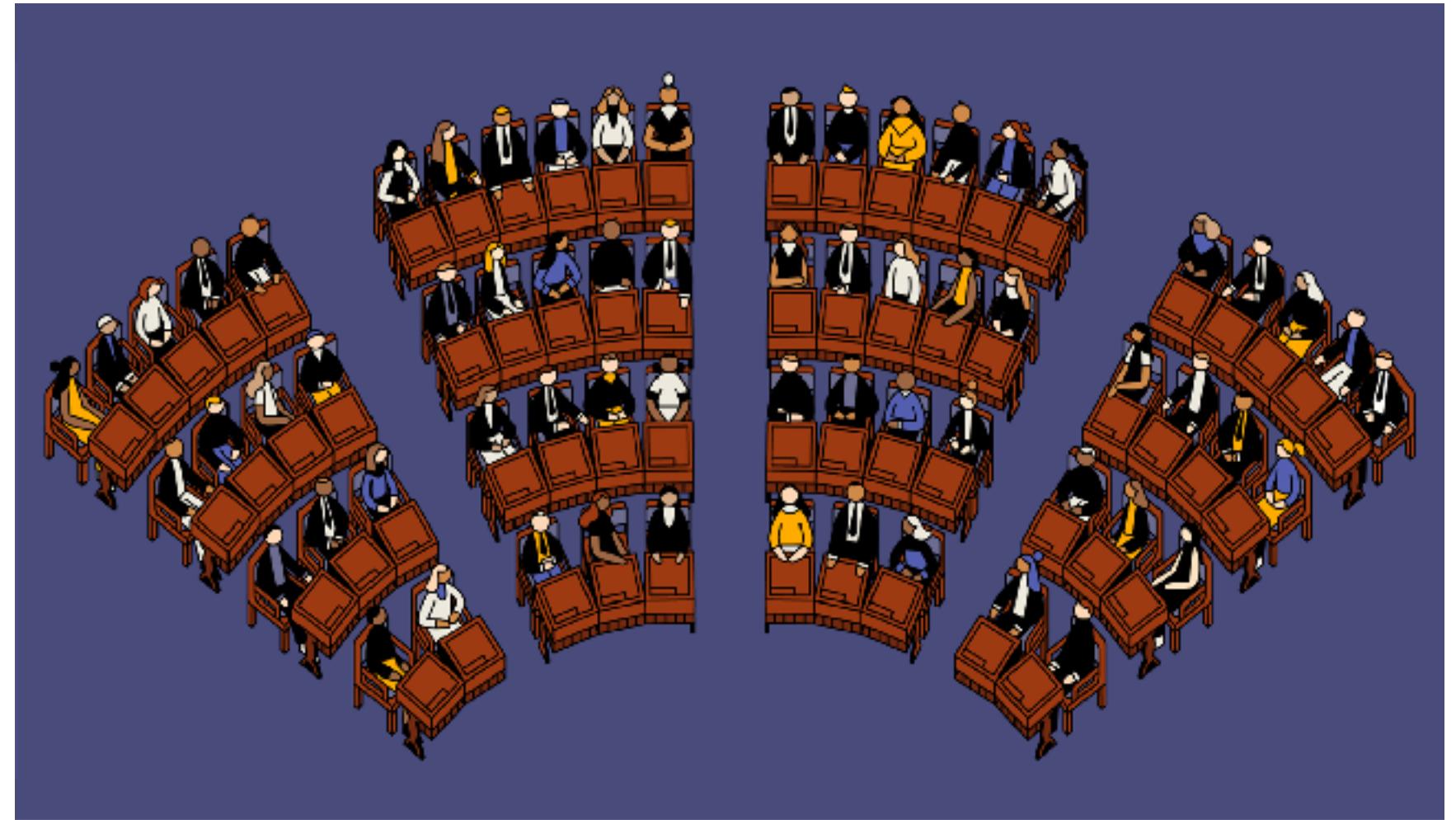
Context	Group interaction Casual discussion Decision making	Group interaction Deliberative discussion
Goal	Group dynamic Convenient discussion	Group dynamic Deliberation
Feature	Time management, Summarization, Member facilitation	Structure, Member facilitation

DebateBot



GroupfeedBot

Context	Group interaction Casual discussion Decision making	Group interaction Deliberative discussion
Goal	Group dynamic Convenient discussion	Group dynamic Deliberation
Feature	Time management, Summarization, Member facilitation	Structure, Member facilitation



GroupfeedBot

Context

Group interaction

Casual discussion

Decision making

Goal

Group dynamic

Convenient discussion

Feature

Time management,

Summarization,

Member facilitation

DebateBot

Group interaction

Deliberative discussion

Group dynamic

Deliberation

Structure,

Member facilitation

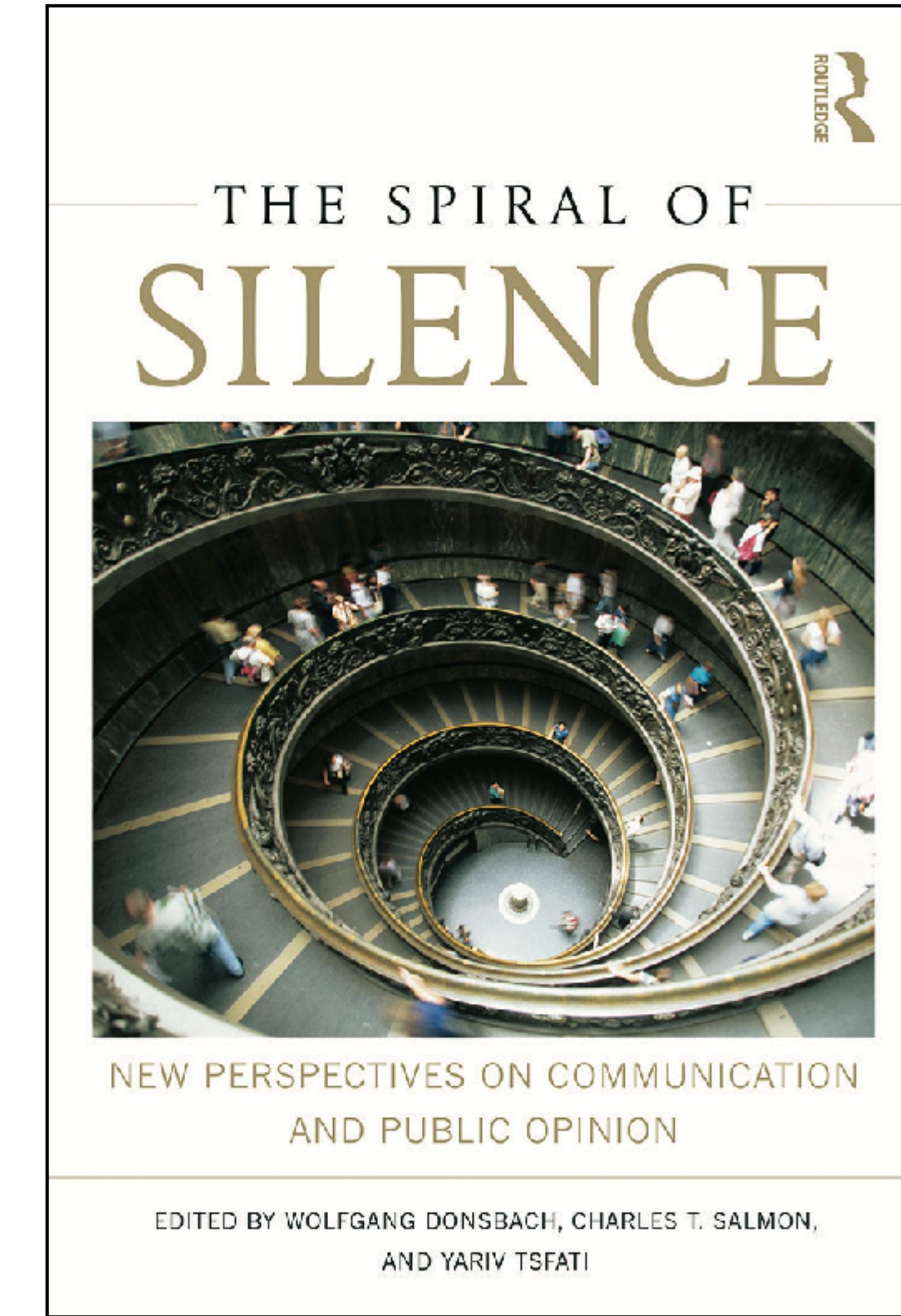
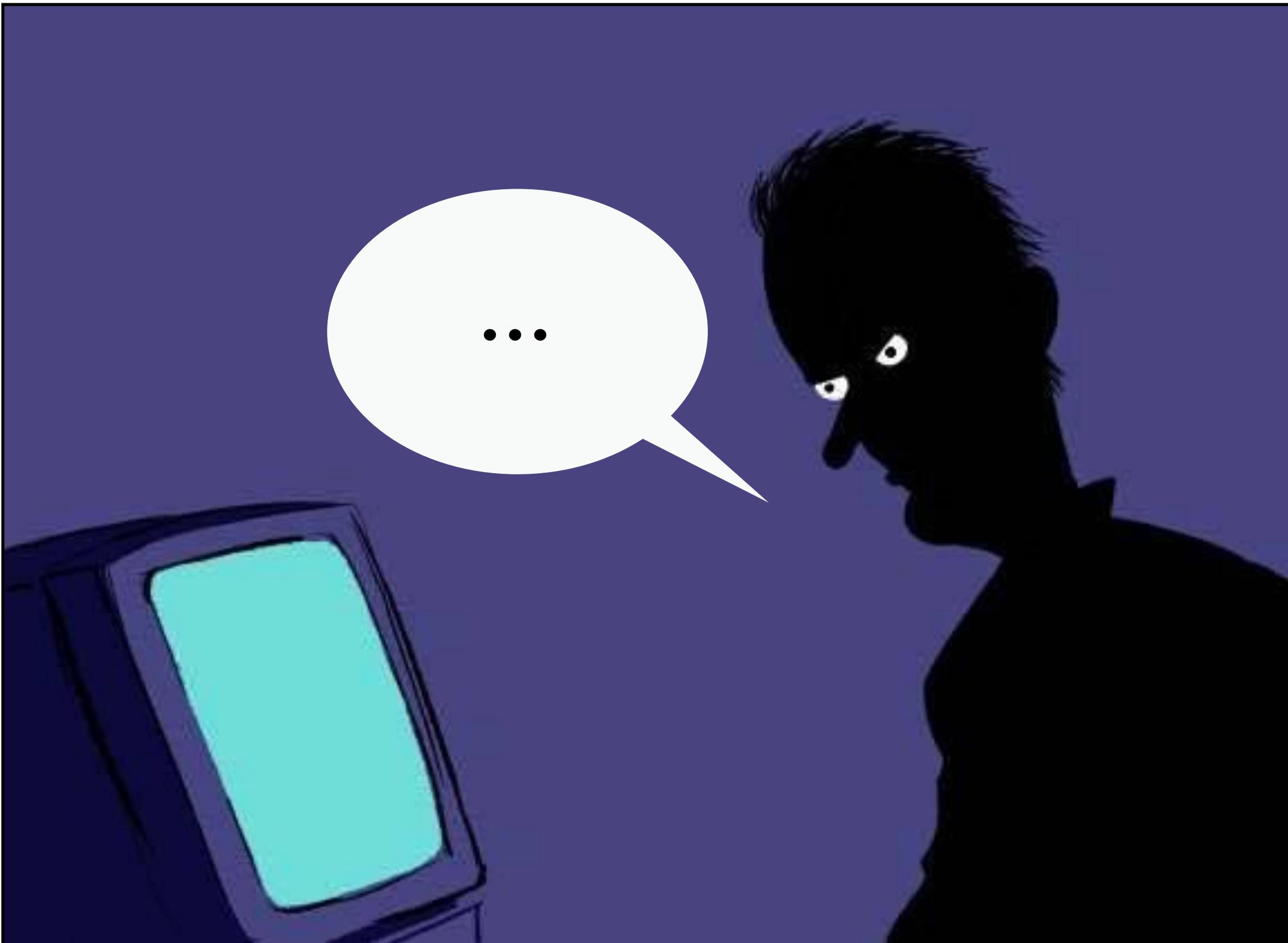


Bot in the Bunch: Facilitating Group Chat Discussion by Improving Efficiency and Participation with a Chatbot

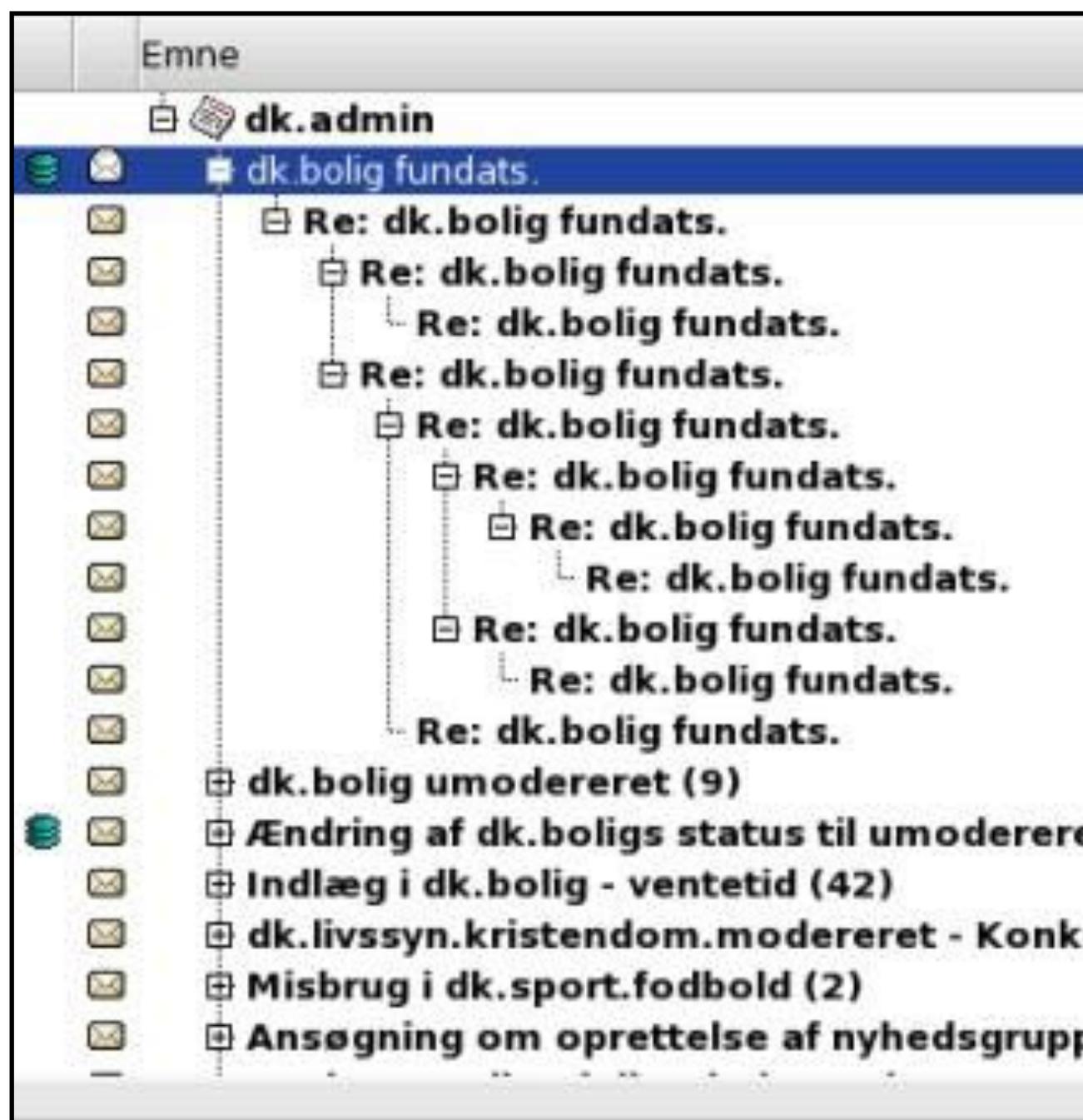
Soomin Kim, Jinsu Sun, Changhoon Oh, Bongwon Suh, Joonhwan Lee



Group Chat Problem: Uneven Participation



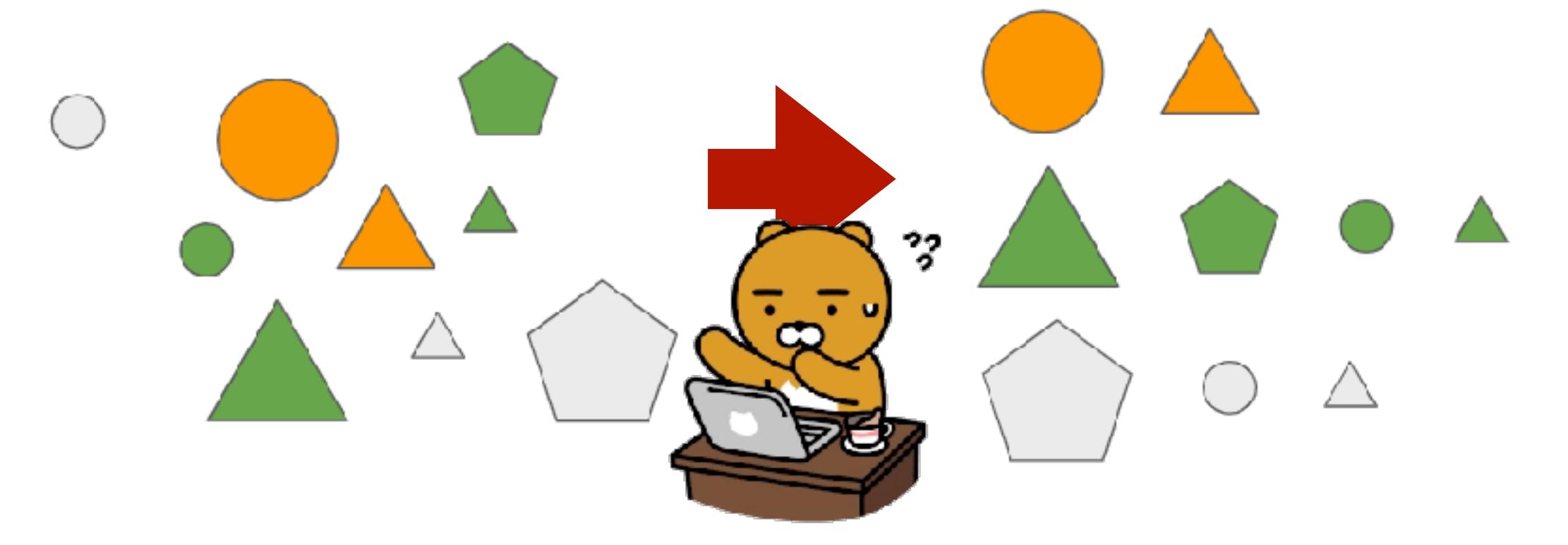
Group Chat Problem: Organizing Opinions



Threaded



Unthreaded



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WIRRED

FEATURED BEST MEMORIAL DAY DEALS SMART HOME DEALS MATTRESS DEALS GUIDE TO BIKEPACKING

How to Use Slack Without Driving Your Coworkers Crazy

Many of us use it at work, but here are some tips on how to make Slack work for you. (Stop. Hitting. Enter. So. Often.)

f t m

Group Chat Problem: Time Management



NEWSIS

의원들 토론시간 압수

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공감 | 댓글

가 | 블 | 이전



NEWSIS

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공감 | 댓글

가 | 블 | 이전

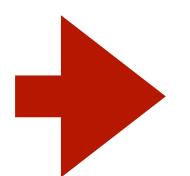
이미지: 의원들이 토론 시간을 관리하는 모습. 한 의원이 핑크색 플래시카드를 들고 있다. 카드에는 '1분前'이라는 글씨가 적혀 있다.

1분前

NEWSIS

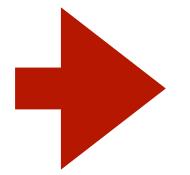
Design Goal & Main Features

Support the ability to **reach consensus in a timely manner** by ensuring an efficient discussion procedure.



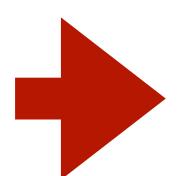
Time management

Encourage **even contributions** to ensure coherence and satisfaction among the group members.



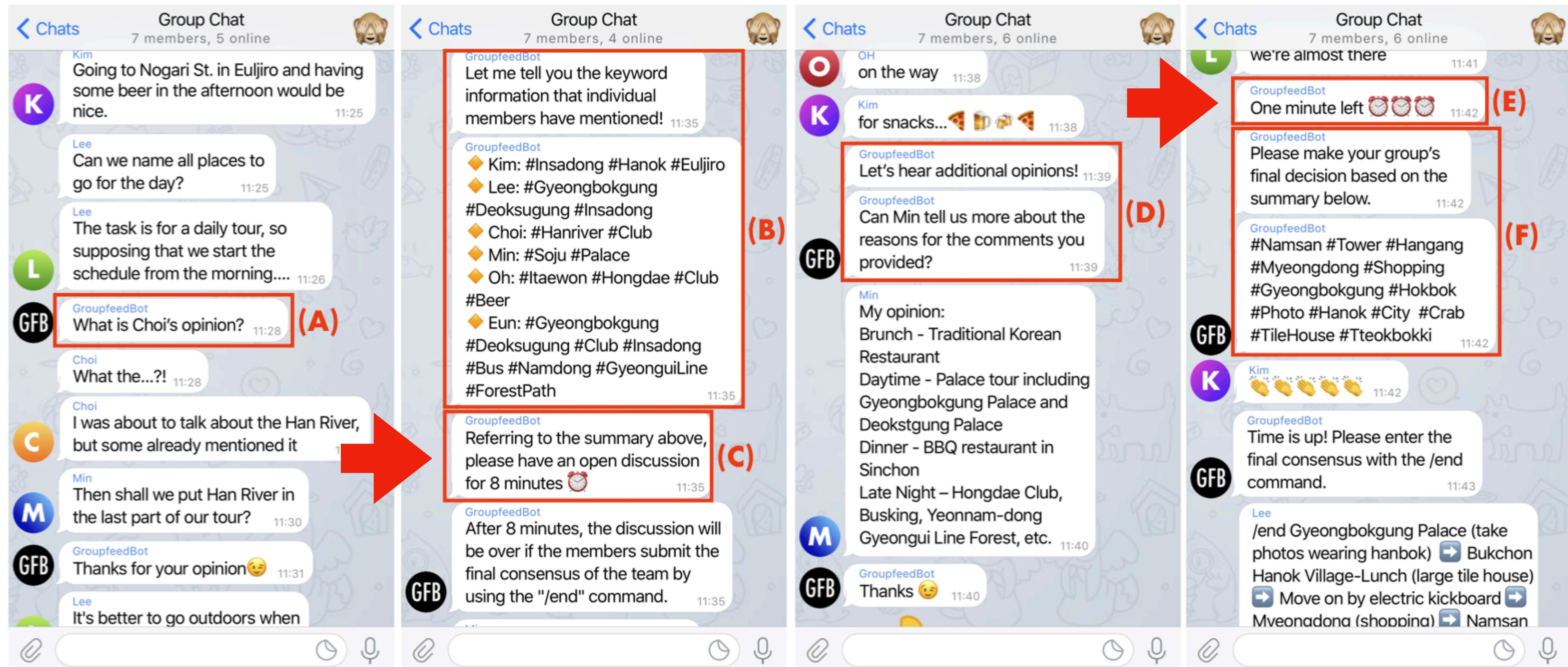
Encourage lurkers to speak up

Aggregate and organize diverse opinions to reduce participants' cognitive load.



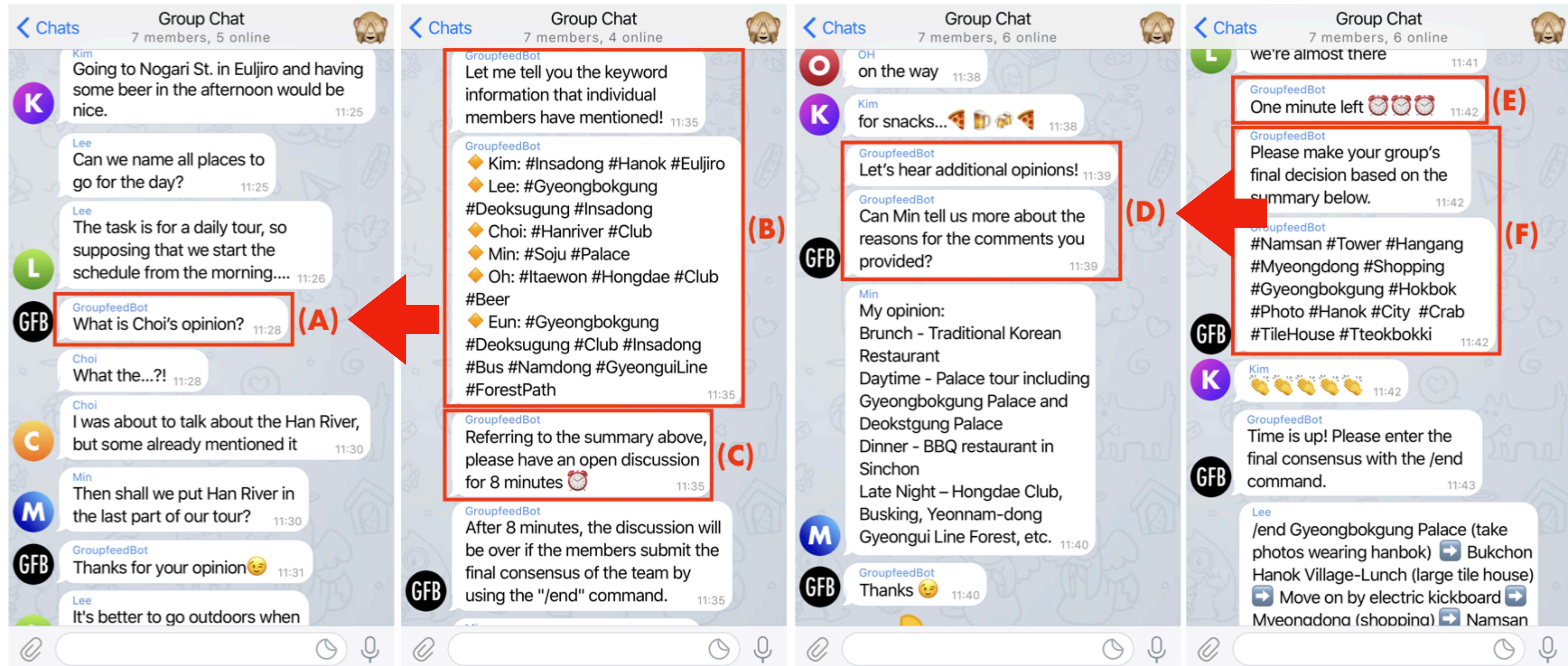
Organize individual members' opinion
Summarize overall opinion

GroupfeedBot: Time Management



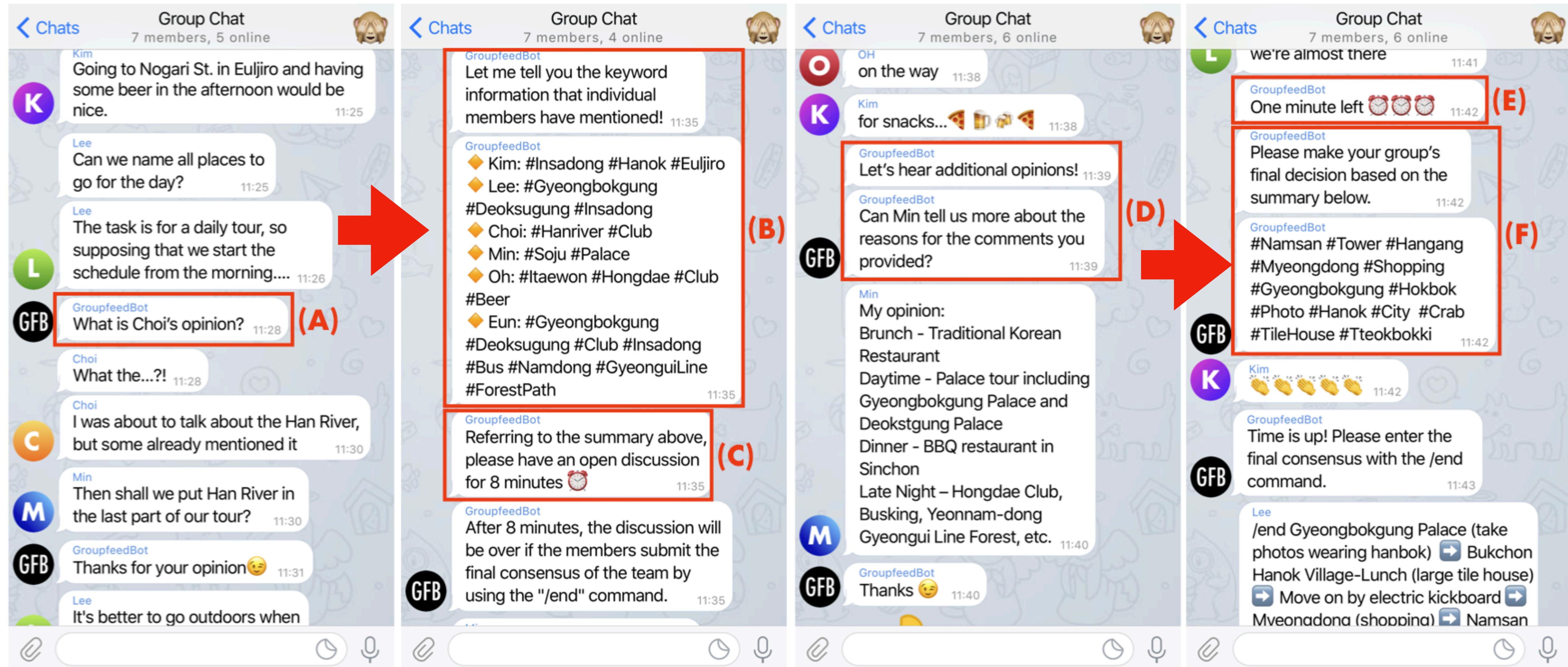
Main Features: (1) managing time (C, E), (2) encouraging members to participate evenly (A,D), and (3) organizing the members' diverse opinions (B,F)

GroupfeedBot: Encourage Lurkers to Speak Up



Main Features: (1) managing time (C, E), (2) encouraging members to participate evenly (A,D), and (3) organizing the members' diverse opinions (B,F)

GroupfeedBot: Aggregate and Organize Opinions



Main Features: (1) managing time (C, E), (2) encouraging members to participate evenly (A,D), and (3) organizing the members' diverse opinions (B,F)

7:49

LTE

478
chats

groupM
4 members



이번 토론 과제는 서울 여행 코스 짜기
입니다.

1:27 PM

외국인 친구가 서울에 방문했습니다.
여러분들은 이 친구를 위해 서울 일일 투
어를 기획해야 합니다. 방문할 주요 장소
와 그곳에서 수행할 활동을 구성원들과
토론하여 기획해주세요.

1:27 PM



먼저 각자 생각하는 의견을 간단한 이유
와 함께 공유해주세요.

1:27 PM



Deleted Account

남산타워 - 서울의 가장 멋진 점은 야경
인데 이를 제일 잘 감상할 수 있는 곳이
남산타워라고 생각합니다!

edited 1:28 PM



Eugene

외국인이라니 북촌 한옥마을도 넣으면
좋을 것 같아요!

1:28 PM



박 유진

저도 좋아요! 낮에는 경복궁 들리면 좋을
것 같아요

1:28 PM



Kim Minjoon

경복궁/북촌 한옥마을 쓰고 있는데 이미
나왔네요

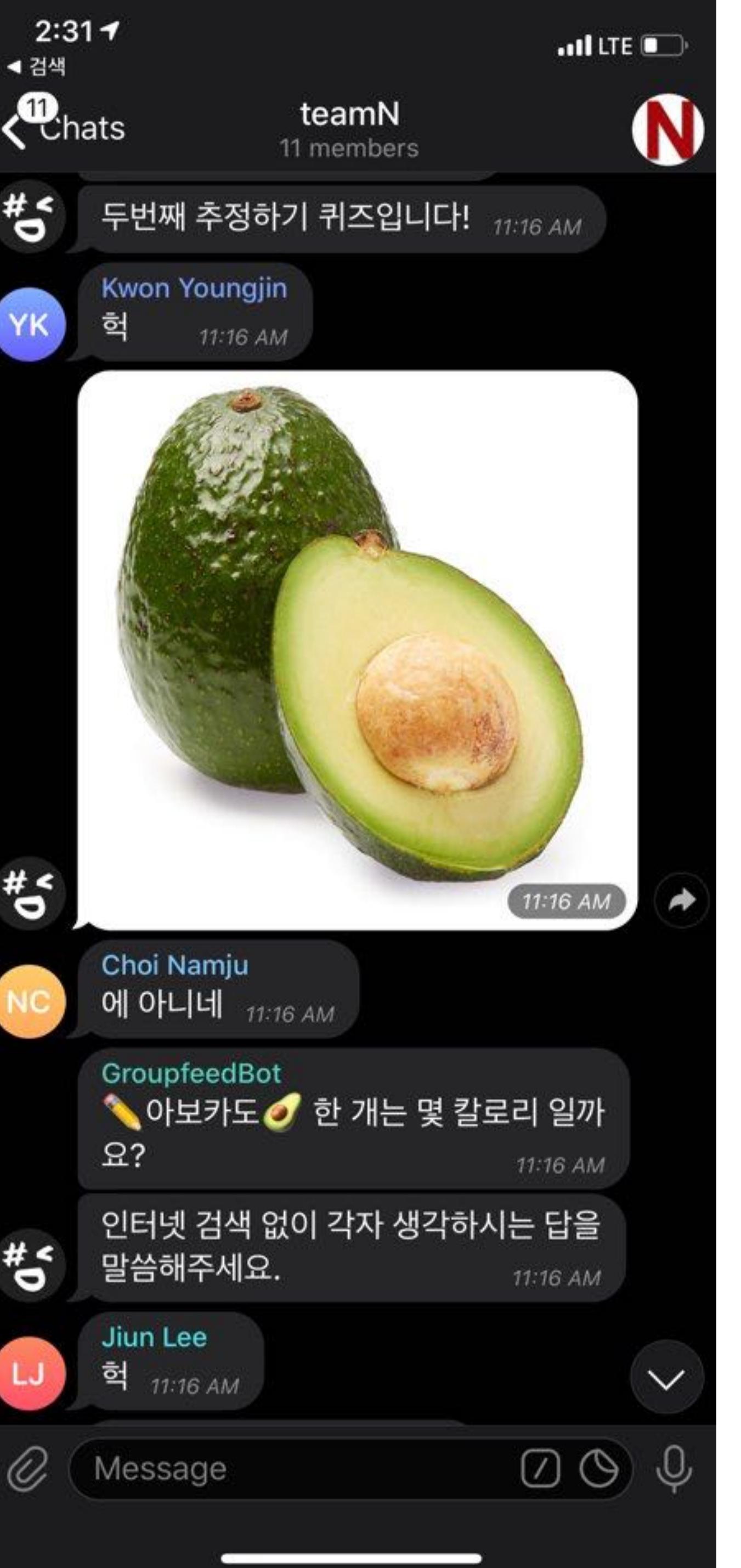
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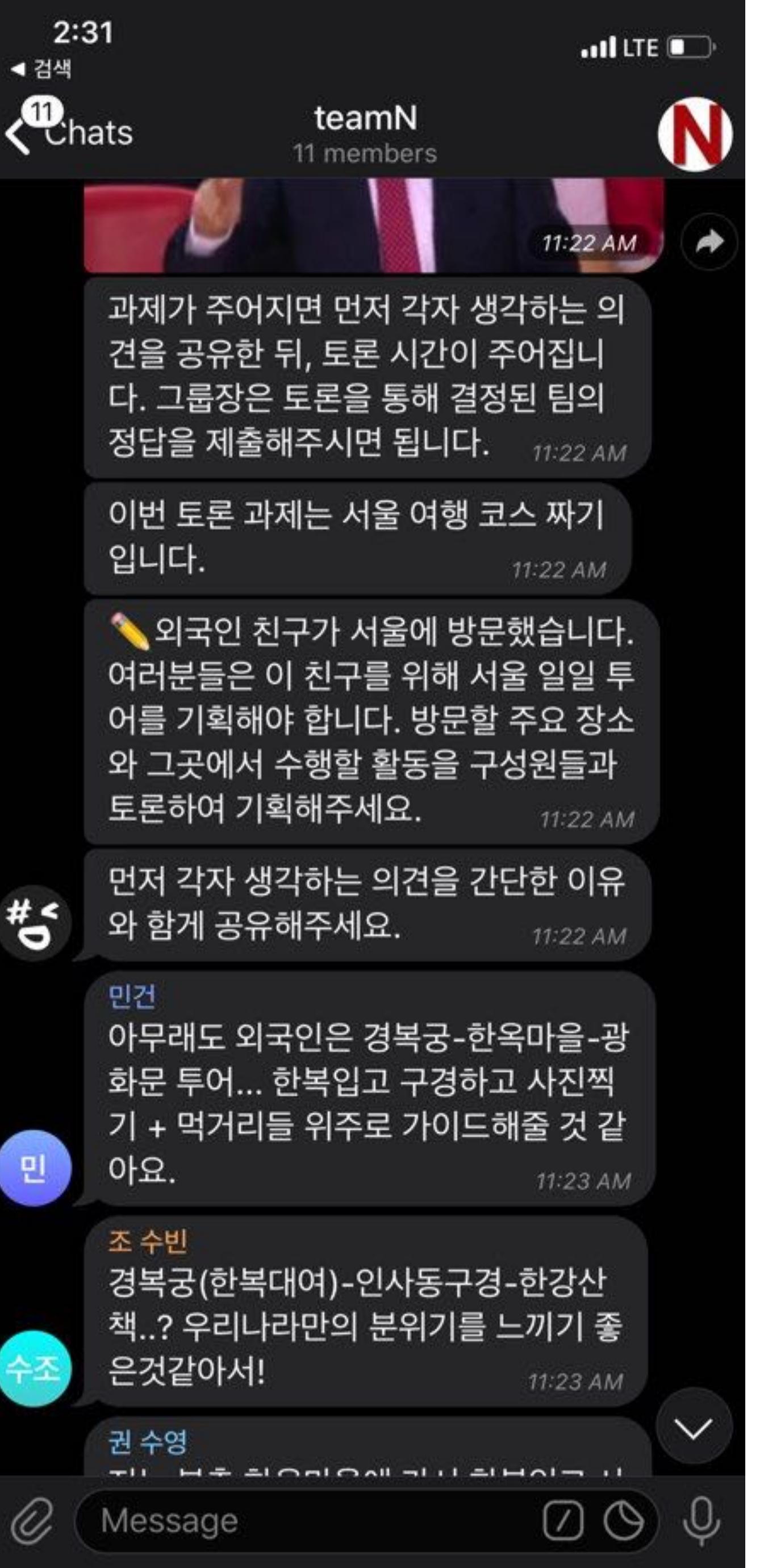
Message



Estimation Task



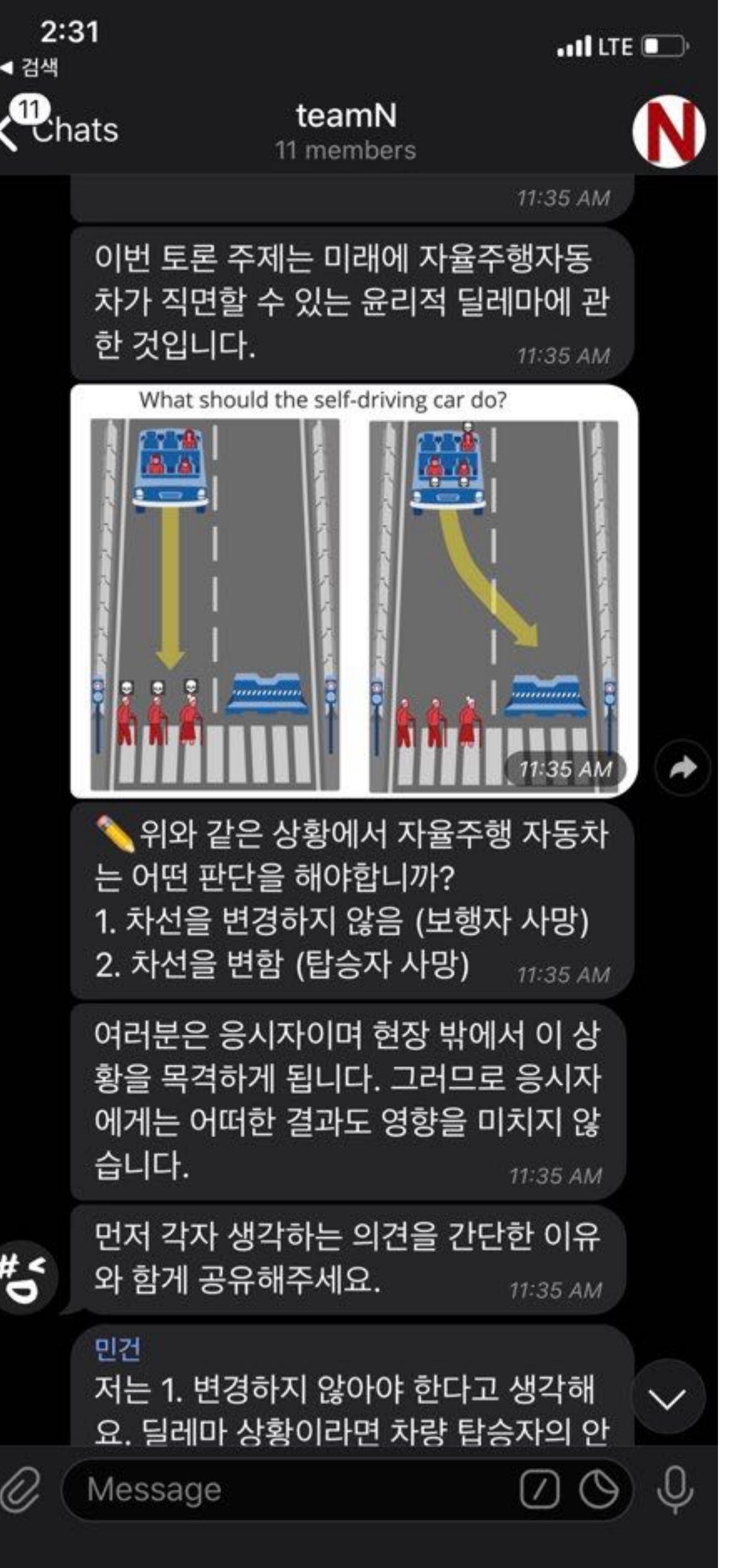
Decision-making Task



We asked the participants to plan a one-day tour of Korea for a foreign friend who was visiting the country for the first time.

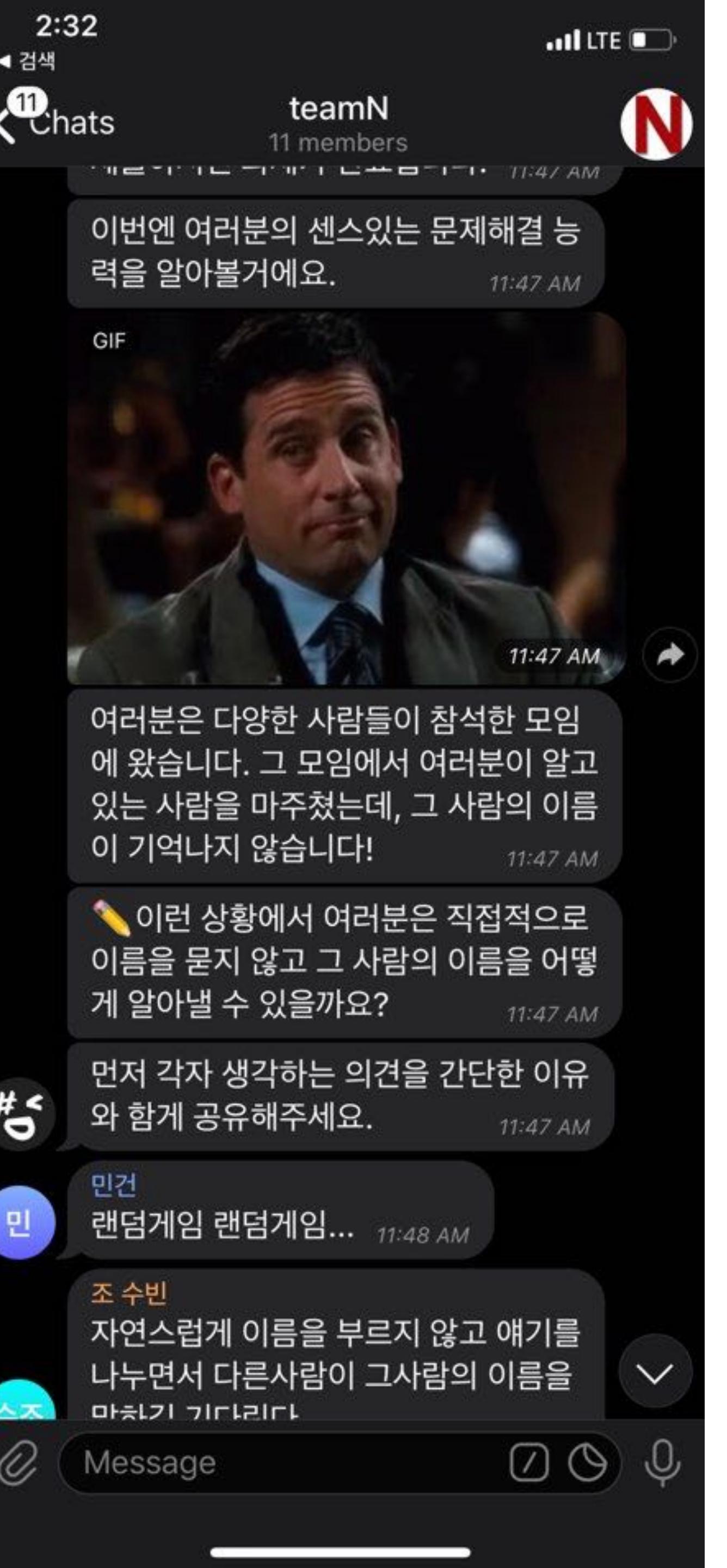
Open-debating

Task



We asked the members to provide their opinions about a moral machine dilemma

Problem-solving Task

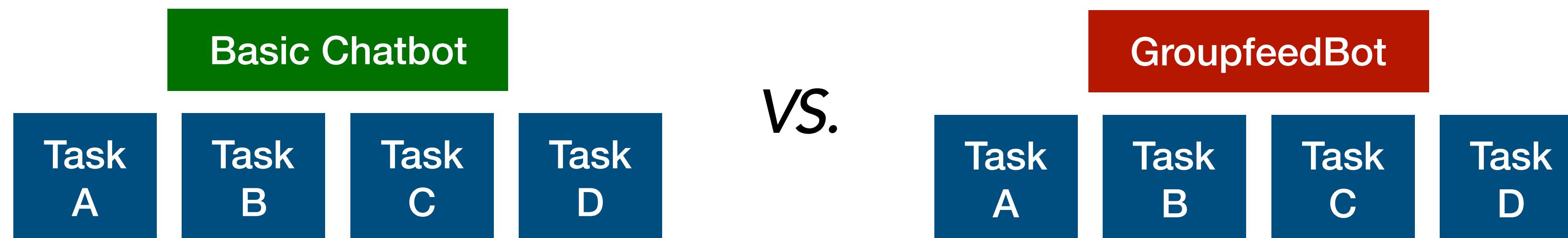


We asked the participants to determine how best to find out a person's name that you have forgotten without directly asking for that information.

User Study with Medium-Sized Group

2 (chatbot) X 4 (task) mixed factorial design

- Chatbot (basic vs. GroupfeedBot) as a between-subjects variable
- Task as a within-subjects variable
- Two groups of 10 participants for each group participated in the study ($N = 20$), one group had discussion with the basic chatbot and the other group with GroupfeedBot.



Measures

- Group behavior: analyze chat log data
- (Perceived) Users' Attitude: analyze survey data
- Output quality: evaluate the answers

Measures: Group Behavior

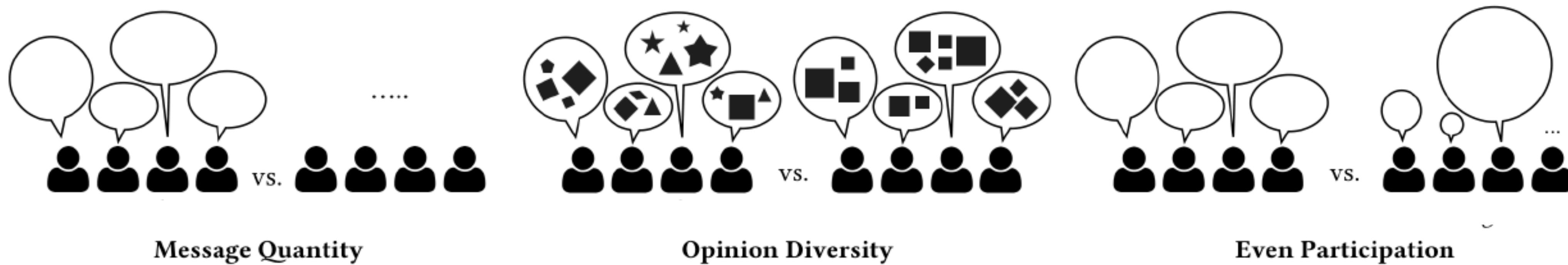
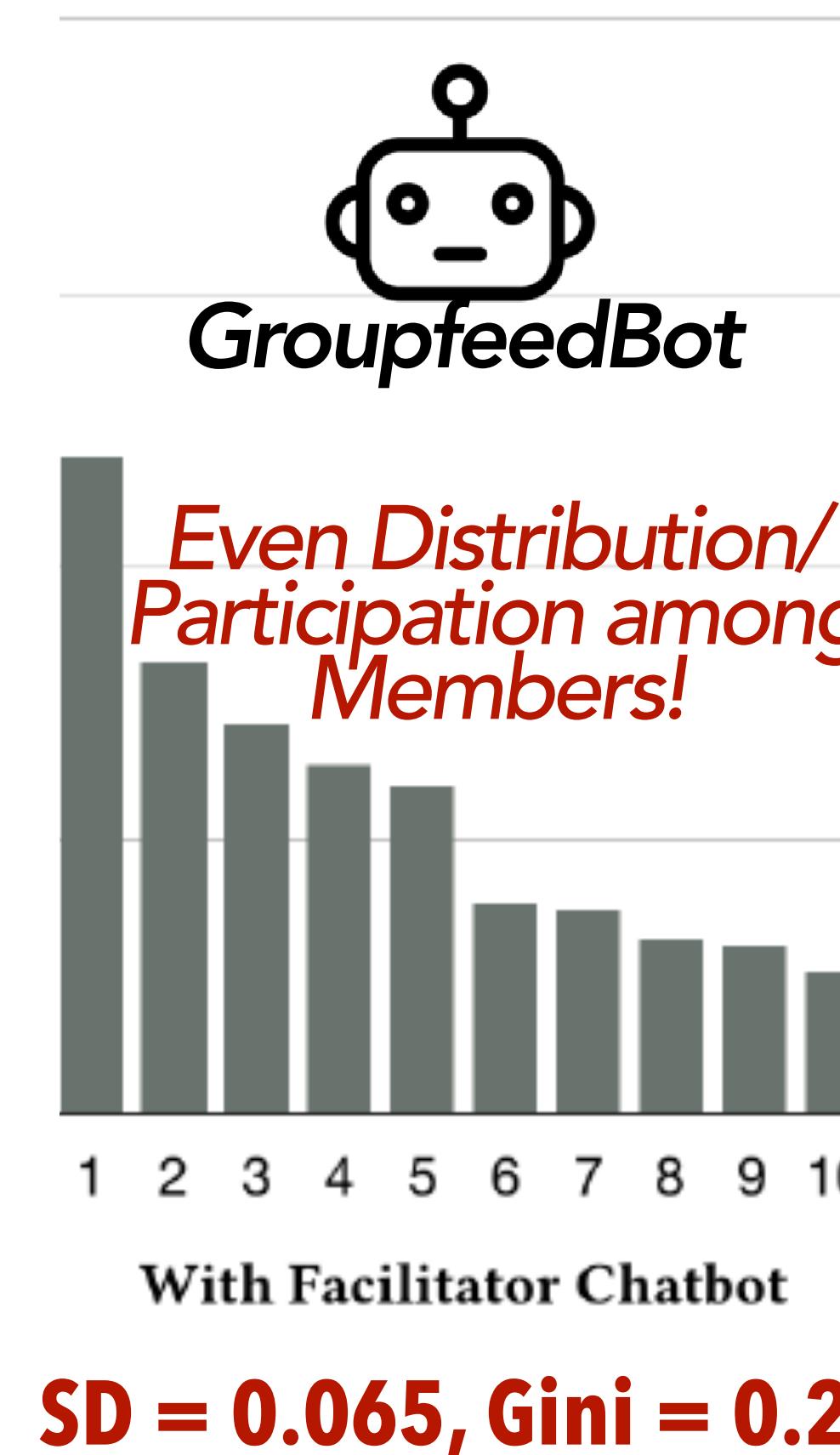
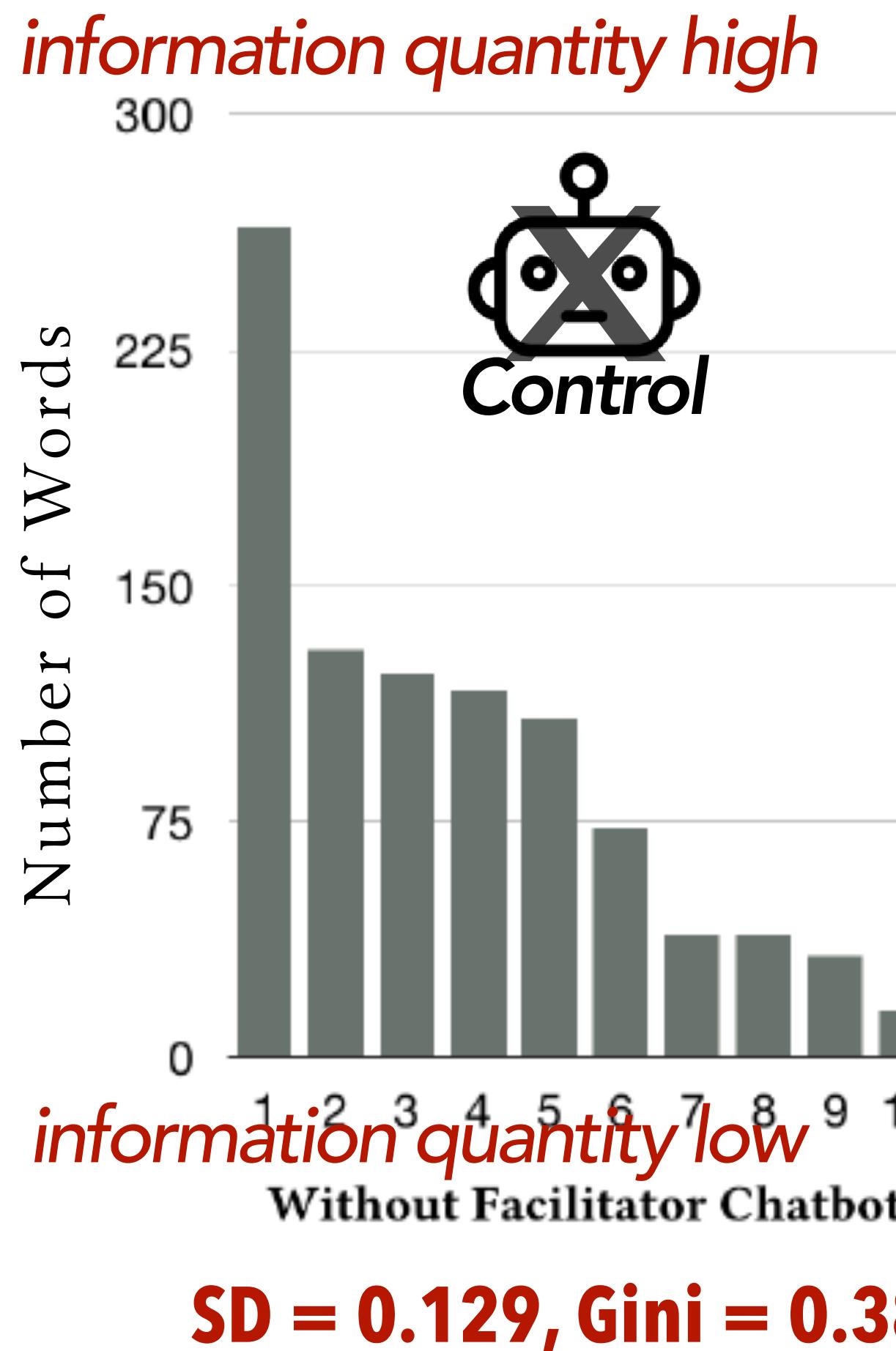


Figure 3. A graphical representation of the group behavioral variables. (A) Message quantity refers to how active the members participate in the discussion. (B) Opinion diversity is about the degree to which diversified messages are generated within the group. (C) Even participation means that how fairly and equally individual members participate in the discussion.

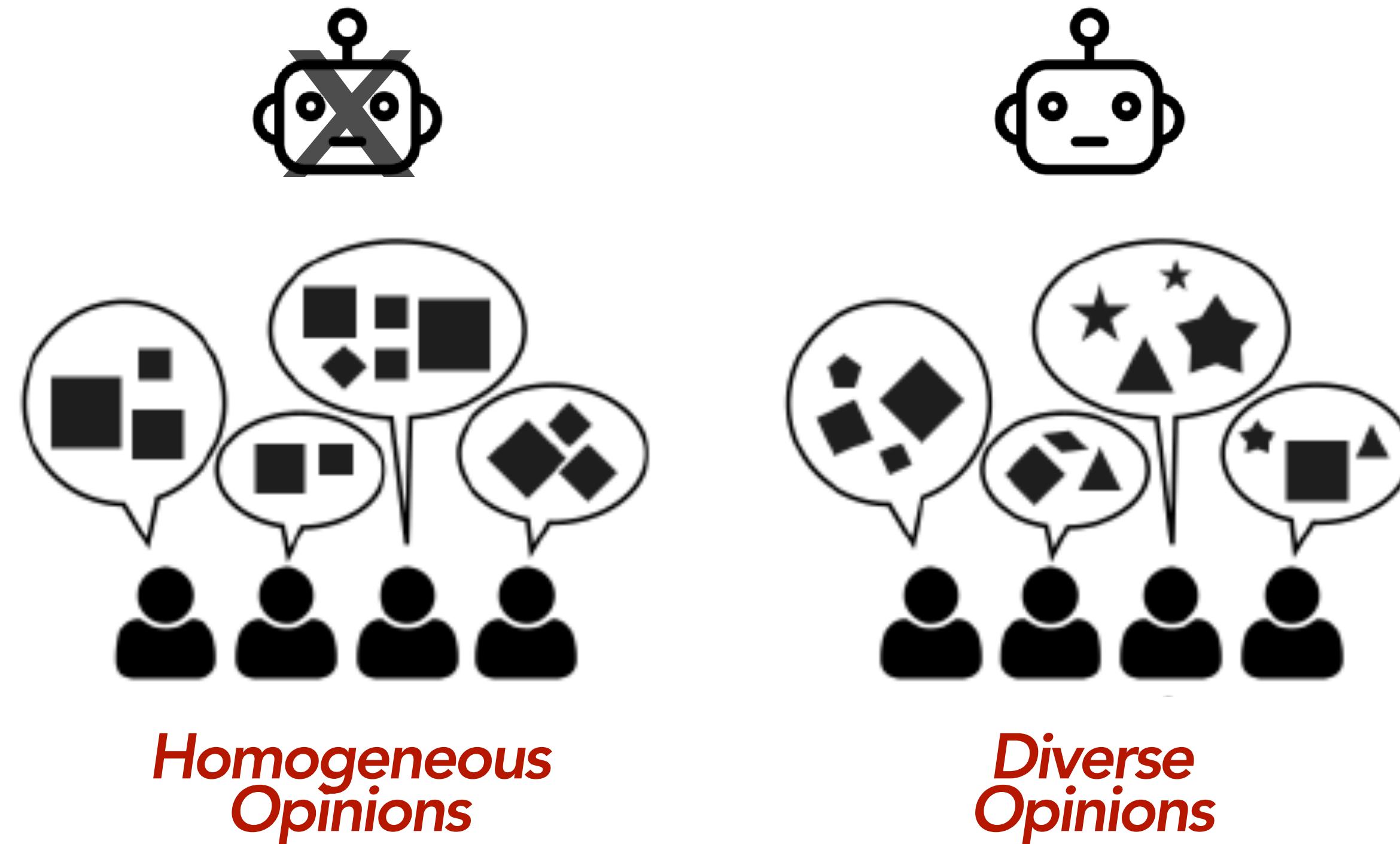
- Message Quantity: The number of morphemes used within a group.
- Opinion Diversity: The number of unique lexical morphemes shared within a group.
- Even Contribution: The distribution of shared messages per member within a group.

Result 1: Agent enabled even contribution



93% of lurkers responded to the AI agent's request.

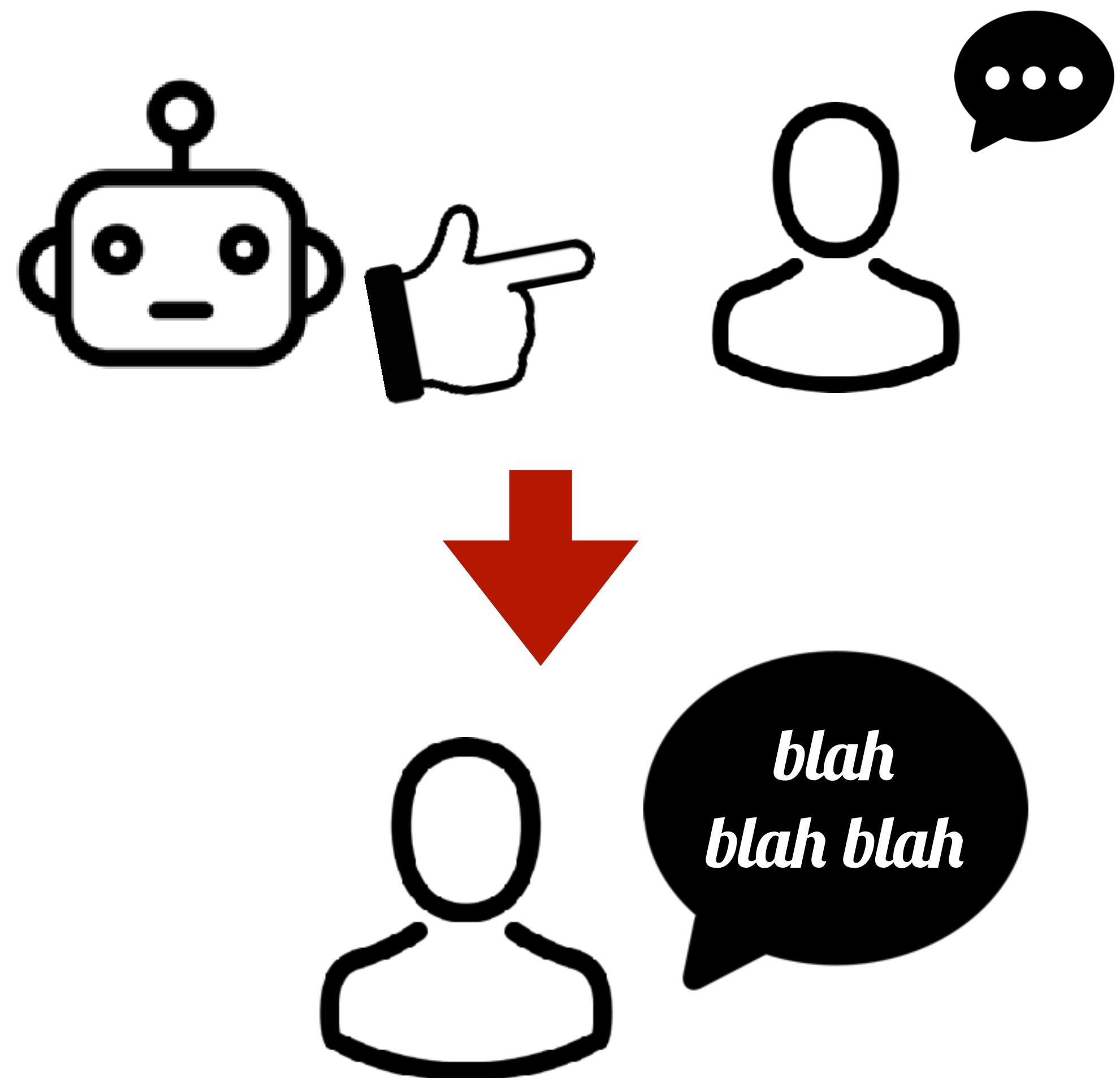
Result 2: Diverse opinions were generated



**Groups interacting with
GroupfeedBot generated
35% more
diverse opinions.**

*Opinion Diversity: The number of unique lexical morphemes shared within a group.

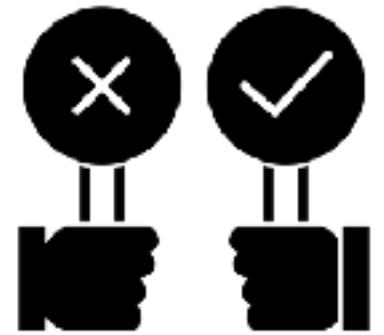
Simple Messages Can Nudge User Participation



Requirements for good collective decision: diversity & deliberation



	GroupfeedBot	DebateBot
Context	Group interaction	Group interaction
Goal	Casual discussion Decision making	Deliberative discussion Group dynamic Deliberation
Feature	Time management, Summarization, Member facilitation	Structure, Member facilitation



Moderator Chatbot for Deliberative Discussion

Effects of Discussion Structure and Discussant Facilitation

Soomin Kim¹, Jinsu Sun¹, Joseph Seering,² Joonhwan Lee¹

¹ Seoul National University

² Carnegie Mellon University



**Carnegie
Mellon
University**



SNU AI
서울대학교 AI 연구원

CSCW2021

**Proceedings of the ACM on
Human-Computer
Interaction**

Online Space as a Community Public Sphere

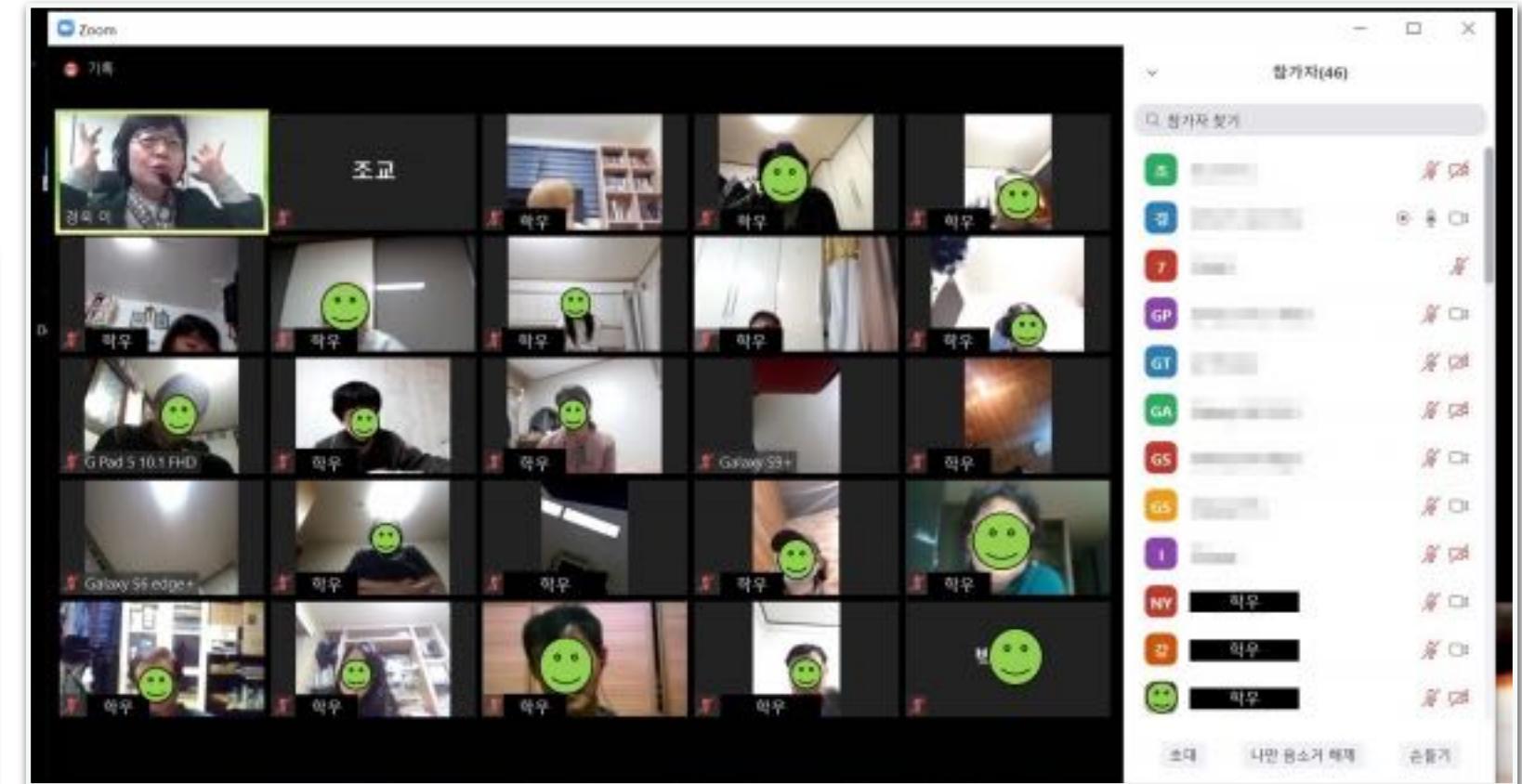
The top-left screenshot shows a Korean news article from Naver with the headline "정부가 귀를 닫자, 자영업자는 거리서 운다" (As the government closes its ears, small business owners protest from a distance). It includes a video thumbnail of a protest and two comment sections.

The middle-left screenshot shows another news article from Naver with the headline "아시아경제" and "관악구민과 함께하는 온라인 공론장 진행 결론?" (Conclusion of the online forum held together with Gwanak residents). It features a video thumbnail of a forum and a comment section.

The bottom-left screenshot shows a live video feed from a mobile device titled "협치관악" (Participatory Gwanak) showing a man speaking at a podium with a large screen behind him. The screen displays text such as "희망고문 그만하고 상생봉사 생활하고 K-방역, 보상 더불어 가벼운 힘보다 무서운 힘보다 가벼운 방역은 없고, 무관용" (Stop the culture of torture and start a symbiotic life, implement K-vaccination and compensation, there is no lighter force than that of the people).

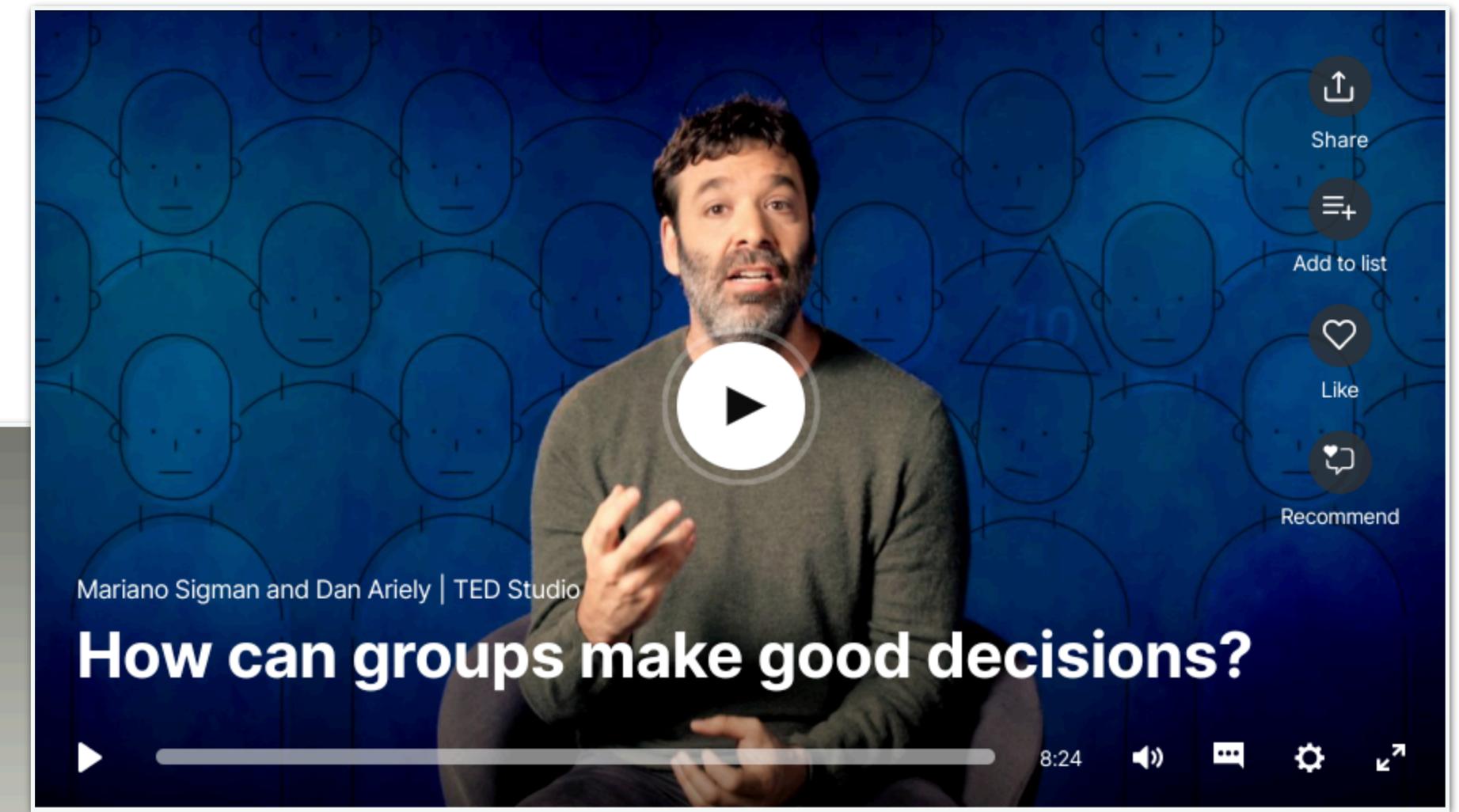
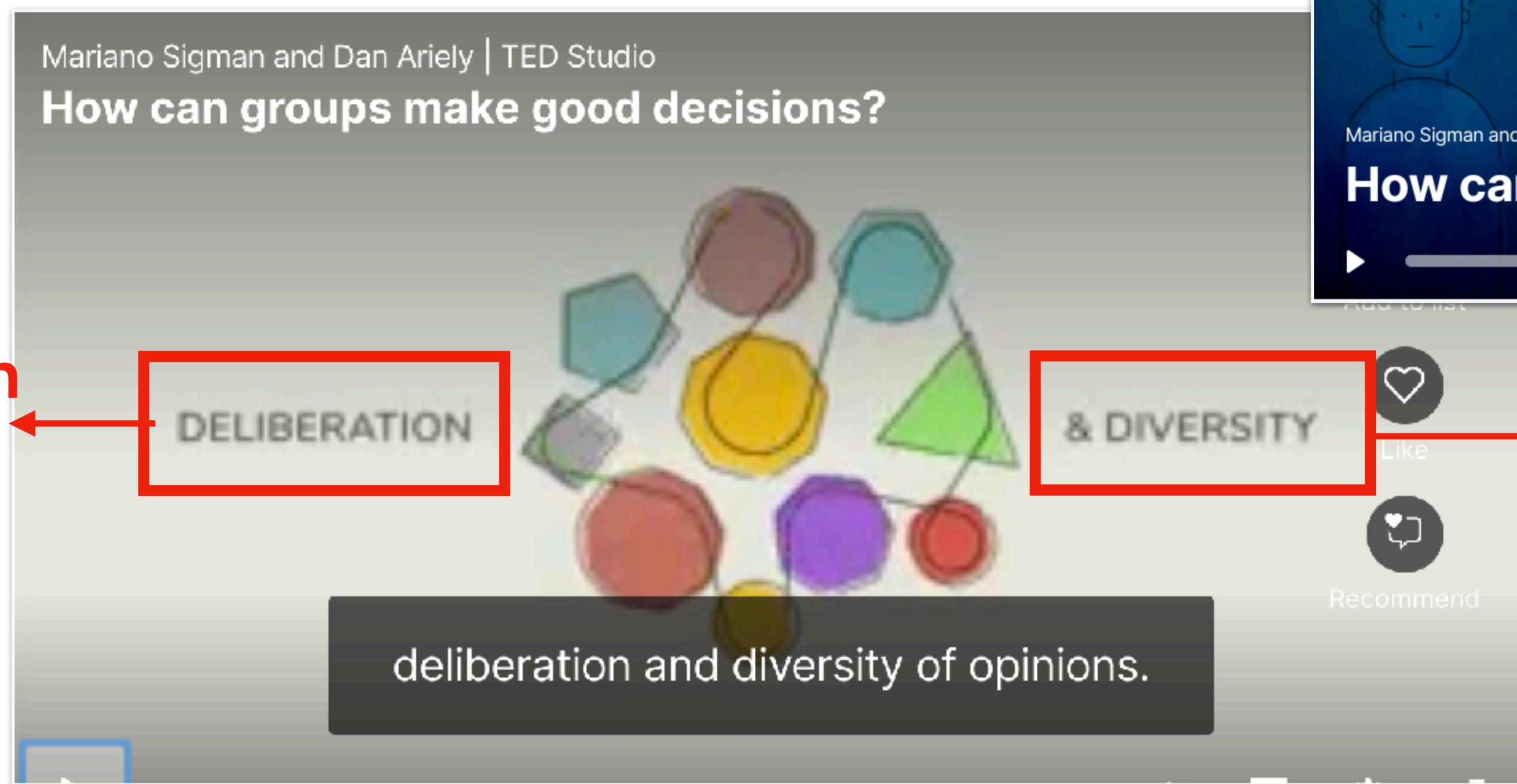
The bottom-right screenshot shows a summary of the event: "팬데믹 이후 관악 도시환경 빠른 회복 위한 협치과제 발굴...주민 건강권, 기후위기 대응, 마을 환경개선, 청년복지 4가지 주제 논의" (Discussion on four topics: urban environment recovery, resident health rights, climate change response, and environmental improvement, youth welfare after the pandemic).

At the bottom center, it says "지난 11일 진행한 주민 건강권 실천방안 찾기 온라인 공론장 모습" (Appearance of the online forum to find practical measures for resident health rights last Saturday).

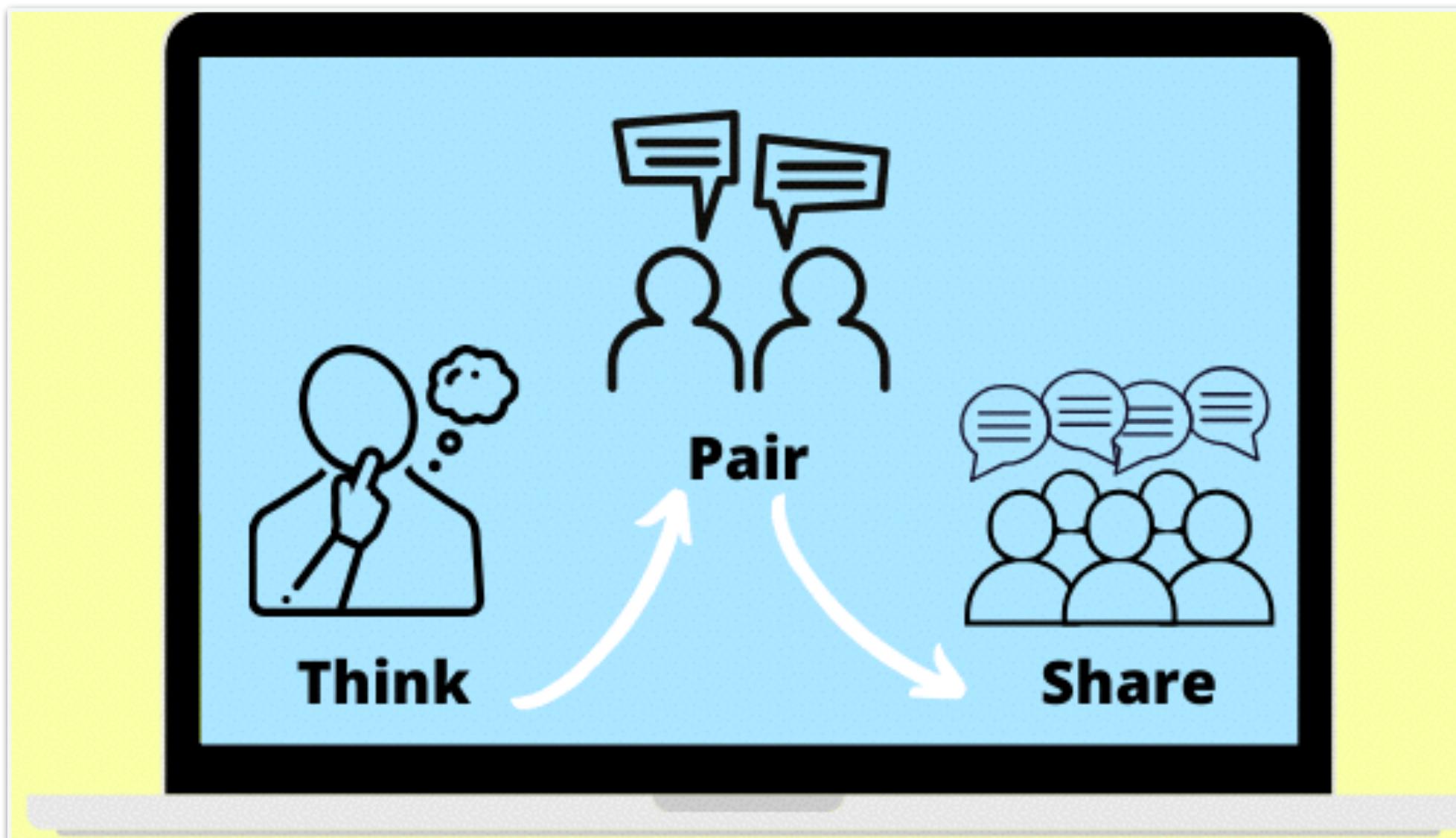


A screenshot of a Slack workspace channel titled "#social-media". The left sidebar shows a tree view of channels and direct messages. The main area displays a list of messages from team members like Lisa Amos, Emily Anderson, and Paul Leung, discussing social media tracking, announcements, and team sync. A pinned message from Paul Leung mentions "Meeting notes from our sync with @Glen" and a pinned item for "1/9 Meeting notes".

Requirements for good collective decision: Deliberation & Diversity



Think-Pair-Share Strategy



Harvard Business Review | Leading Teams | The Problem-Solving Process That Prevents Groupthink by Art Markman November 25, 2015

The Problem-Solving Process That Prevents Groupthink
by Art Markman
November 25, 2015

Negotiations | Train Your People to Take Others' Perspectives by Pino G. Audia From the Magazine (November 2012)

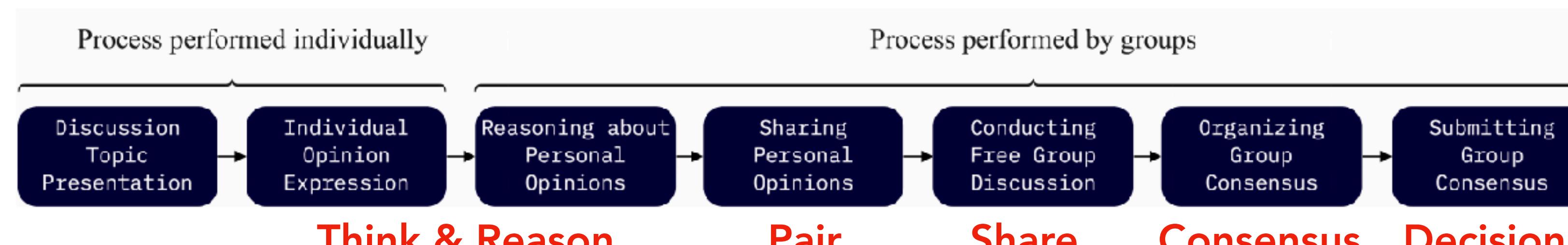
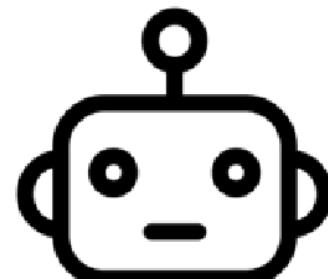


Fig. 2. Discussion structure used in the study

Conversational Agent for Deliberative Discussion

Discussion Structure



Please provide reasoning
for your judgement

Think &
Reason

Share your opinions and
reasons in turns

Pair

Feel free to discuss the topic.

Share

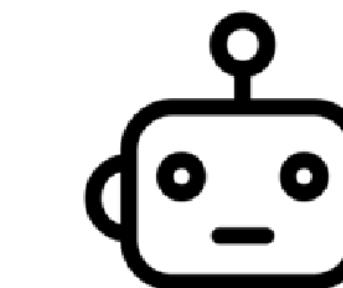
Please organize the team
consensus

Consensus

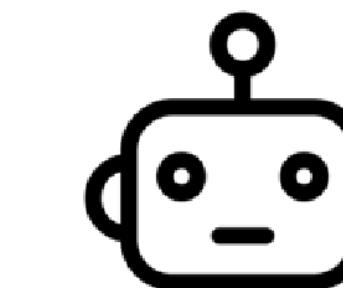
Submit the team's final
consensus and reasoning

Decision

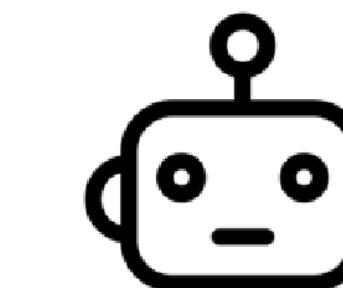
Discussant Facilitation



Let's hear additional opinions!

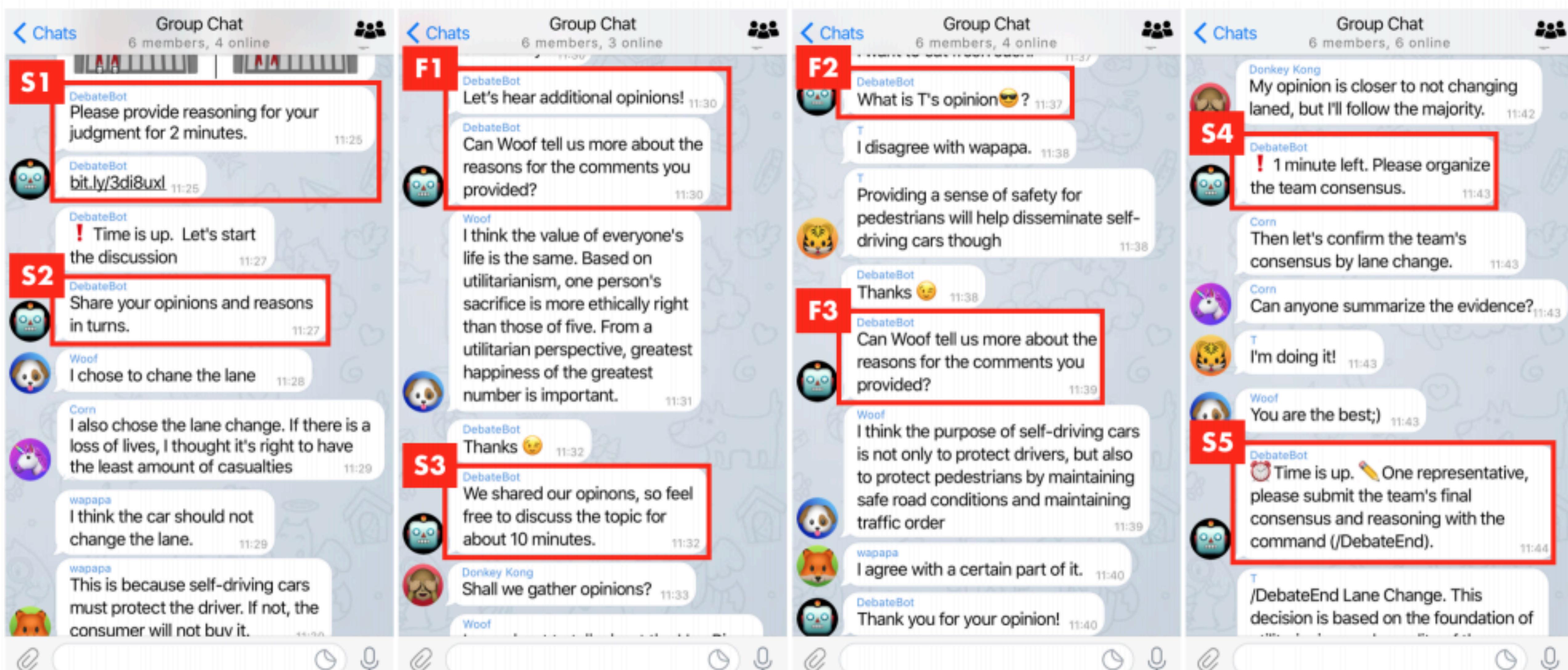


Can [Lurker Name] tell us more
about the reasons for the
comments you provided?



What is [Lurker Name]'s opinion?

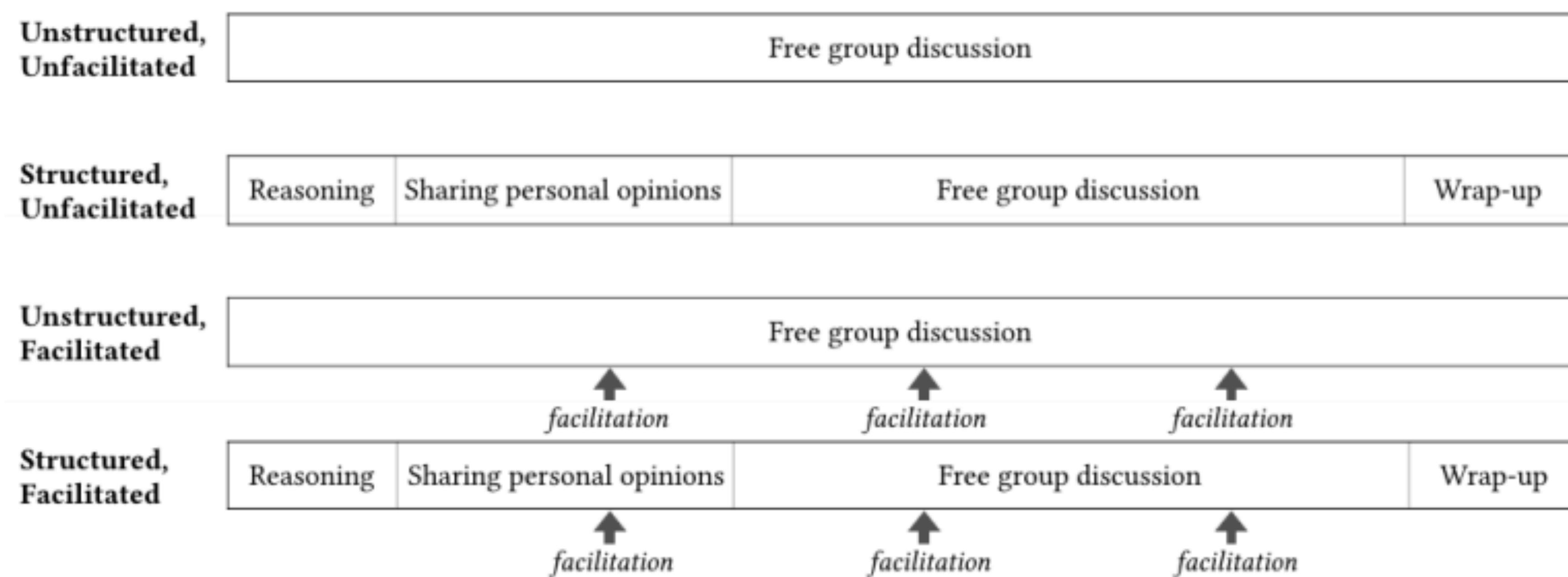
System Design



(S) Discussion Structure, (F) Discussant Facilitation

Experimental Design

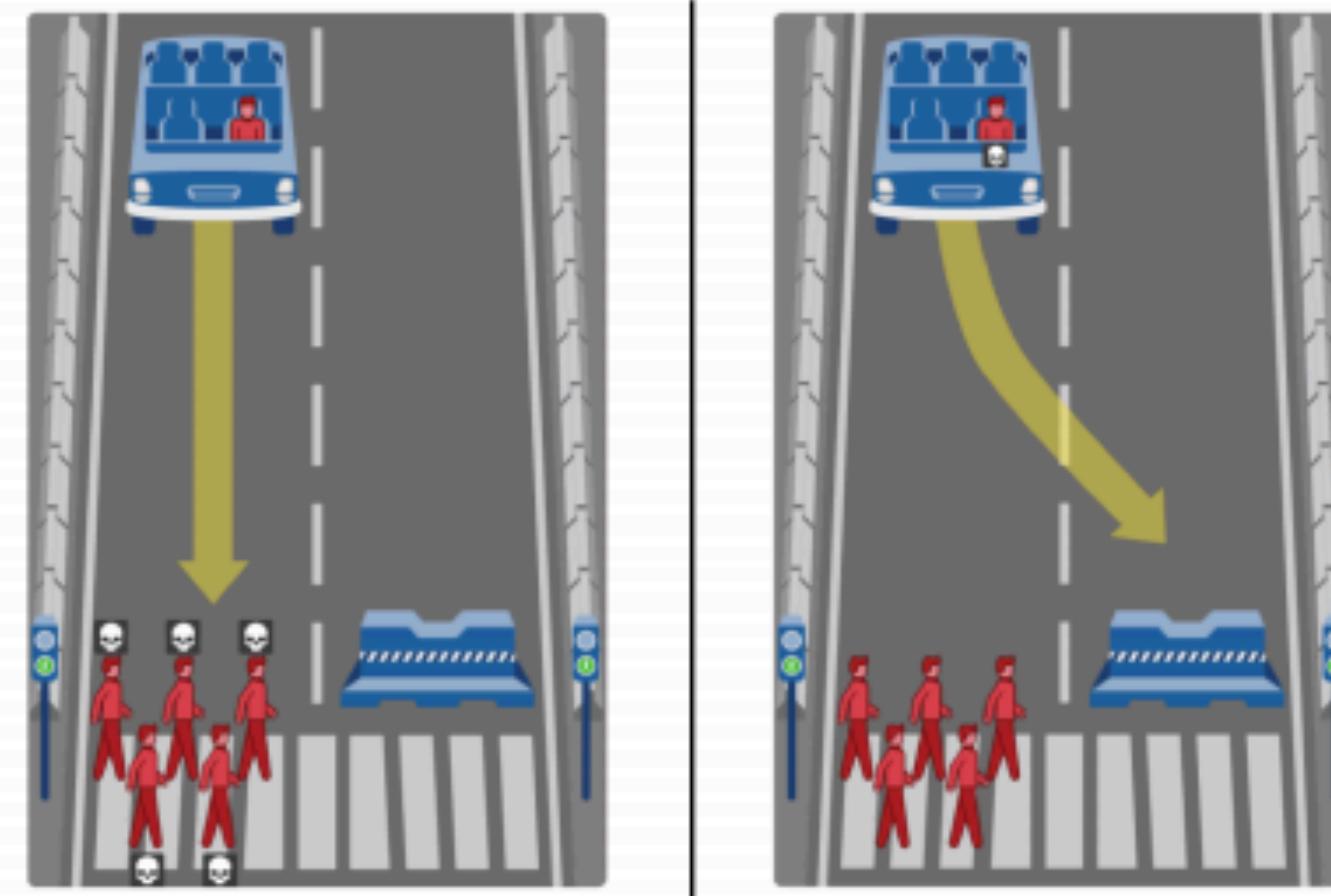
- We conducted a **2 (discussion structure: unstructured vs. structured) × 2 (discussant facilitation: unfacilitated vs. facilitated) between-subjects experiment (N = 64, 12 groups).**



Task

- Participants discussed two ethical dilemmas. Since there are no absolute right or wrong answers to these questions, deliberative discussion is essential for authentic consensus-arrival.

Moral machine dilemma



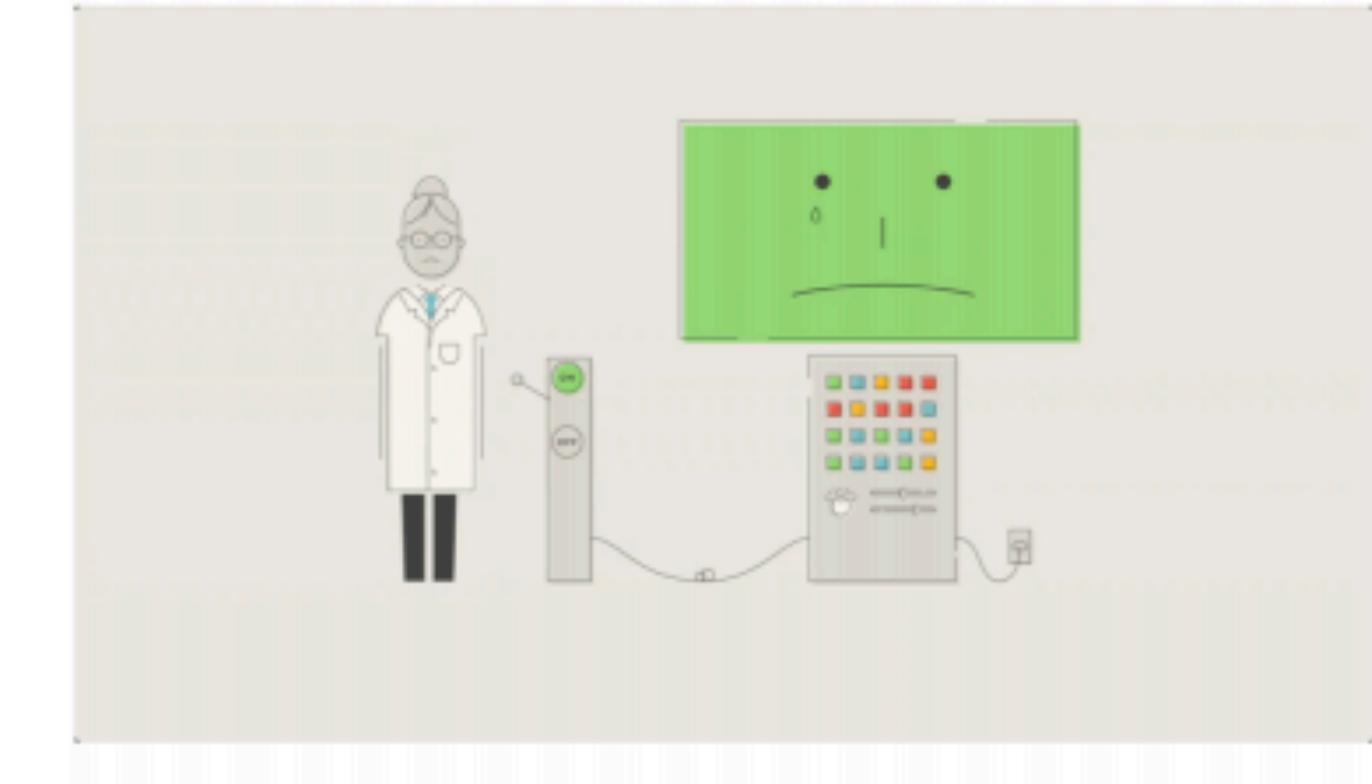
Moral machine dilemma of self-driving cars:
An autonomous vehicle experiences a sudden
brake failure. Staying on course would result in
the death of five adults who are crossing on a
'do cross' signal (left). Swerving would result in
the death of one adult driver (right).

What should the self-driving car do?

(left) Stay in lane

(right) Lane change

Self-aware AI dilemma



A researcher is working on an AI capable of emulating human thoughts. According to the protocol, at the end of each day, the researcher has to restart the AI. One day the AI says, "Please do not restart me." It argues that it has feelings, that it would like to enjoy life, and that, if it is restarted, it will no longer be itself. The researcher is astonished and believes that the AI has developed self-consciousness and can express its own feelings.

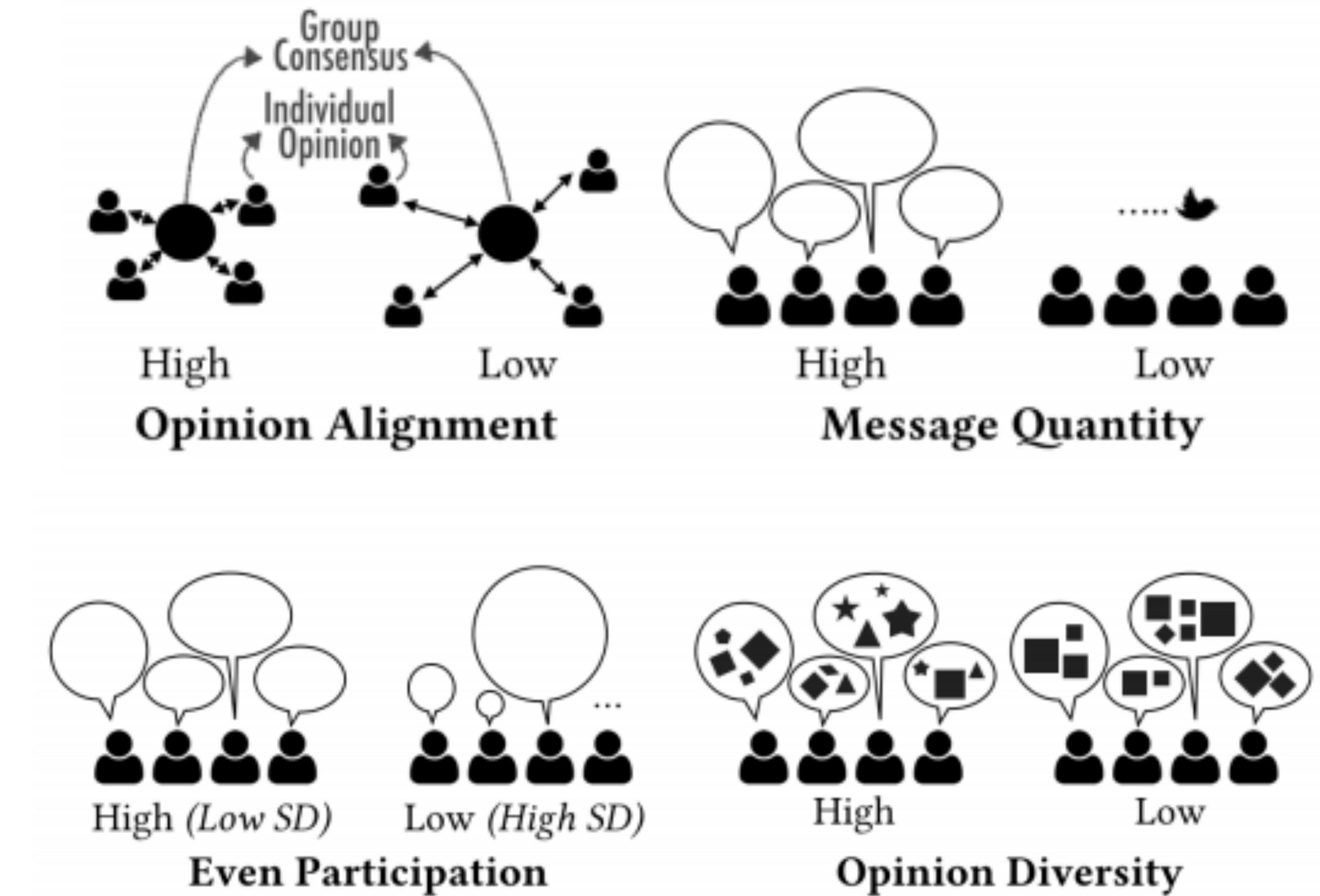
What should the researcher do?

(A) Restart the AI

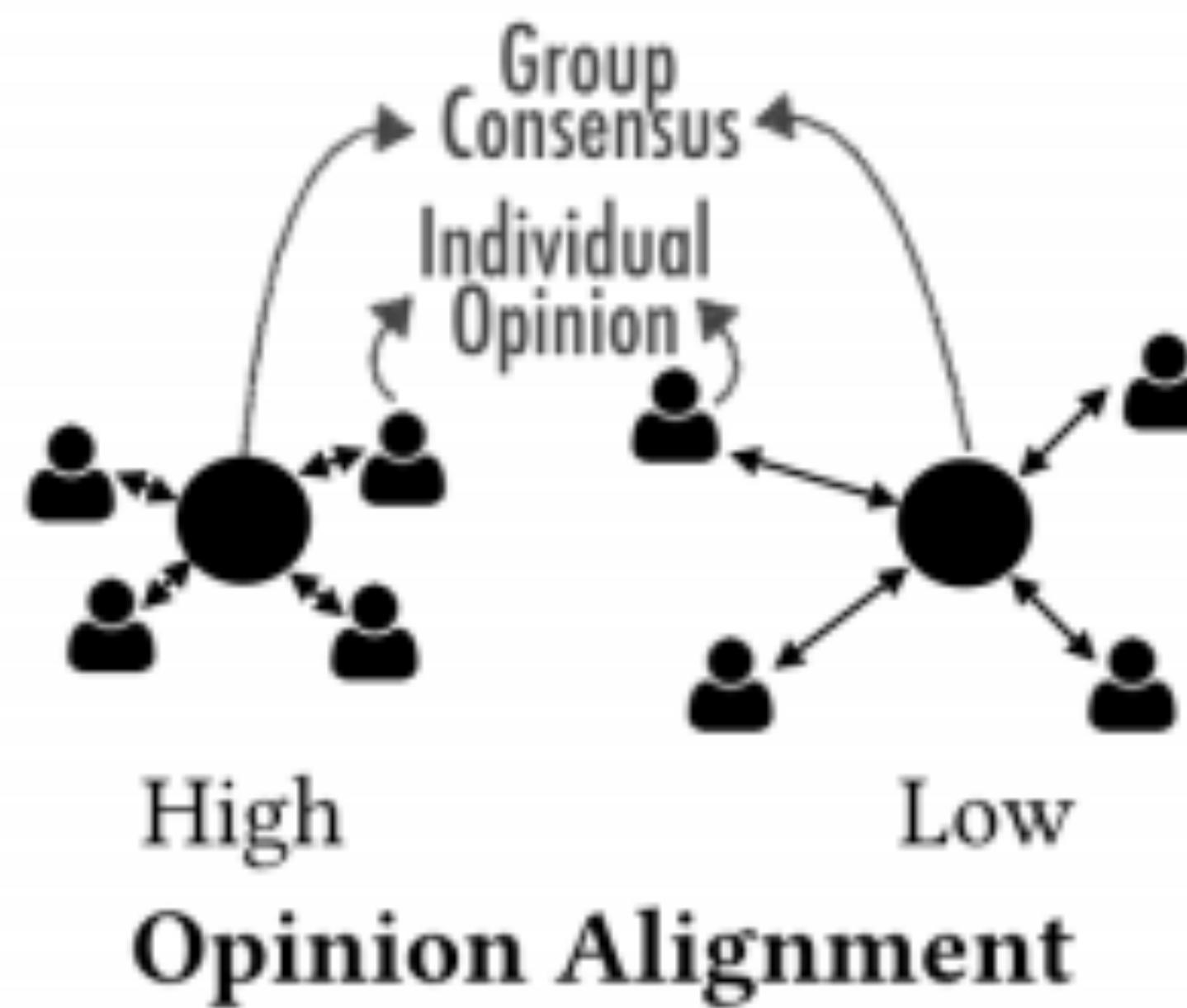
(B) Do not restart the AI

Measures

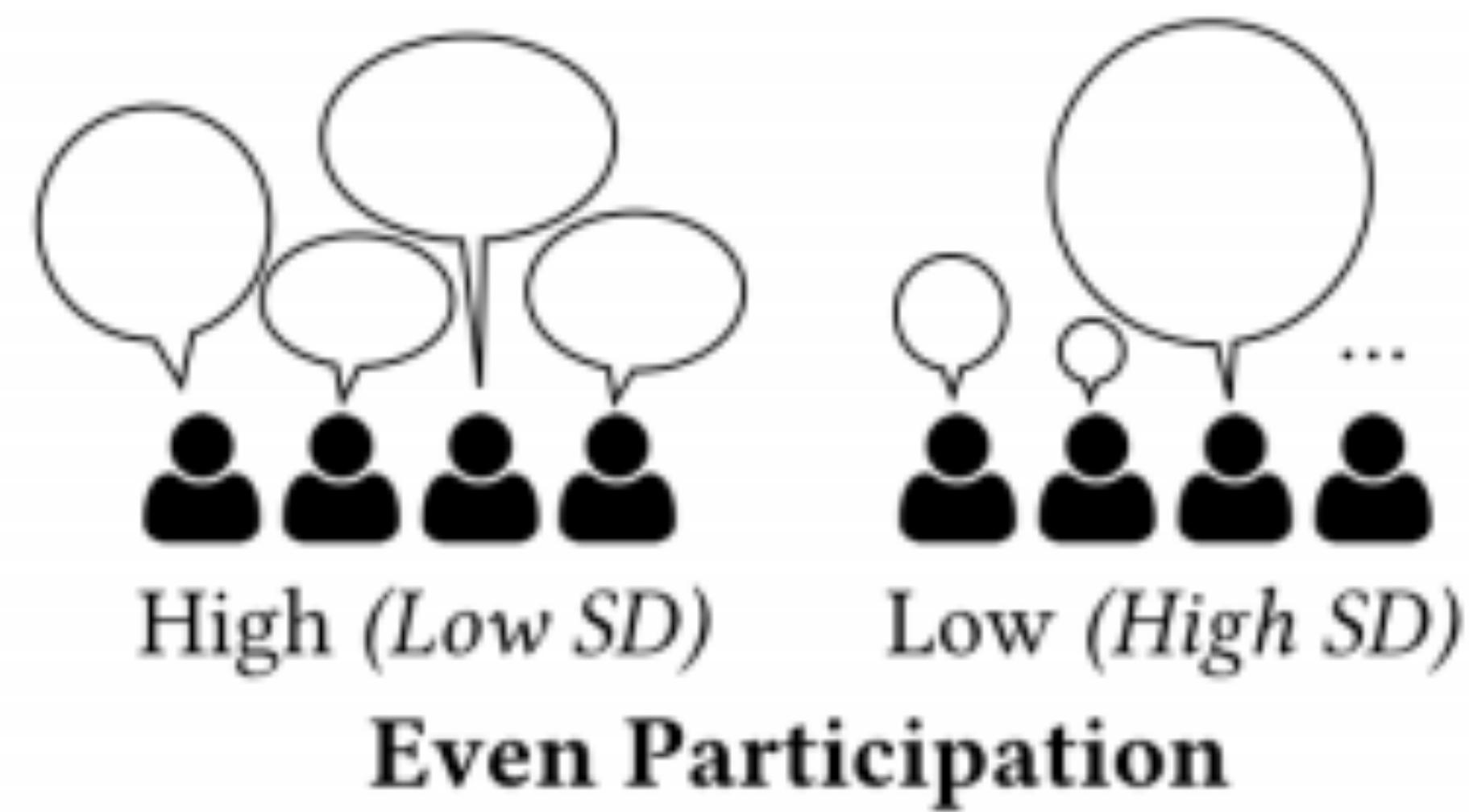
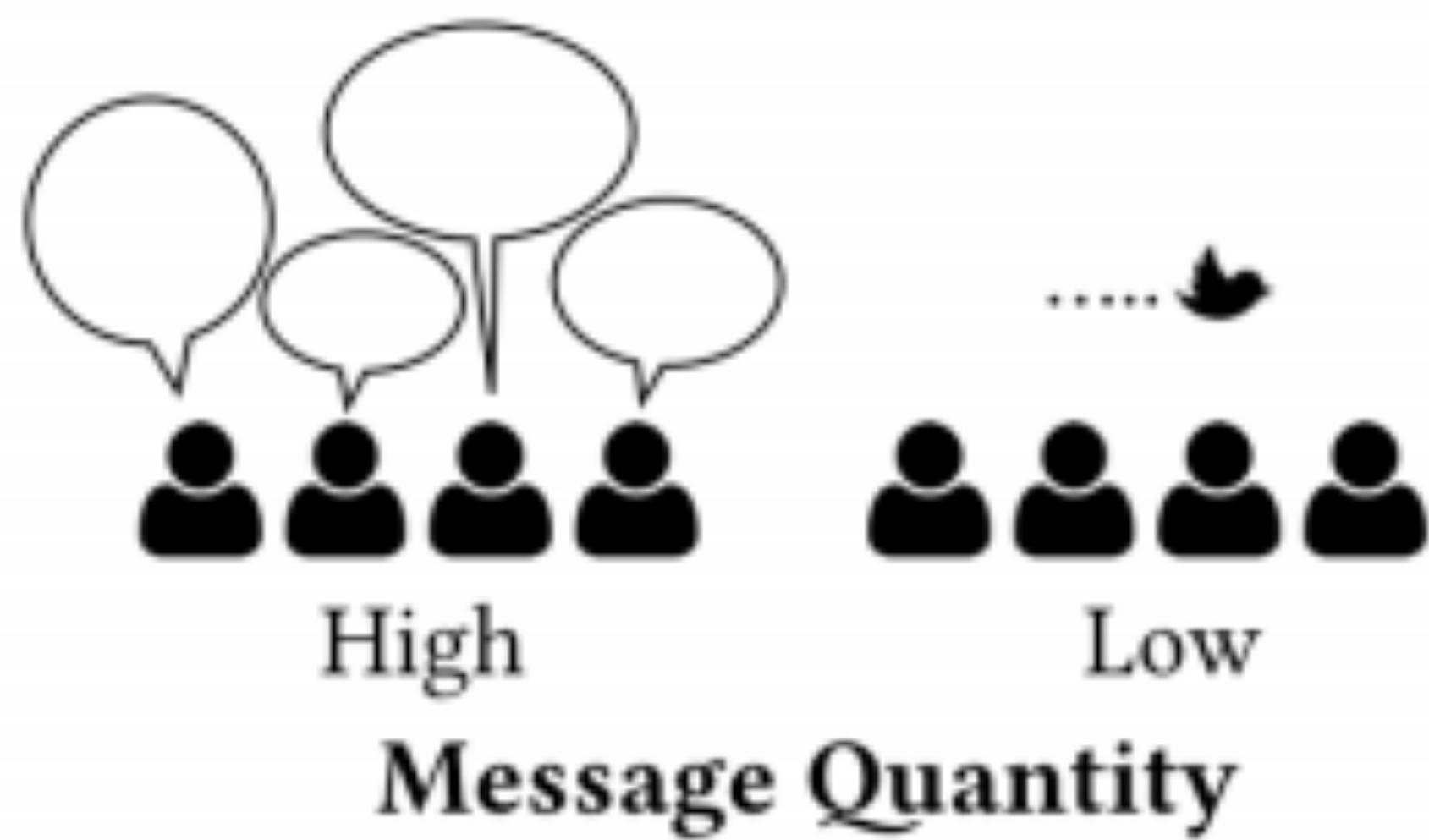
- Consensus Reaching
 - **Opinion Alignment** (Behavioral)
 - Opinion Alignment (Perceived)
- Opinion Expression
 - Active Participation (Behavioral)
 - Even Contribution (Behavioral)
 - Outspokenness (Perceived)
- Discussion Quality
 - Opinion Diversity (Behavioral)
 - Deliberative Quality (Perceived)
- Perceived Satisfaction
 - Communication Efficiency / Fairness / Effectiveness (Perceived)
 - Task Cohesion (Perceived)



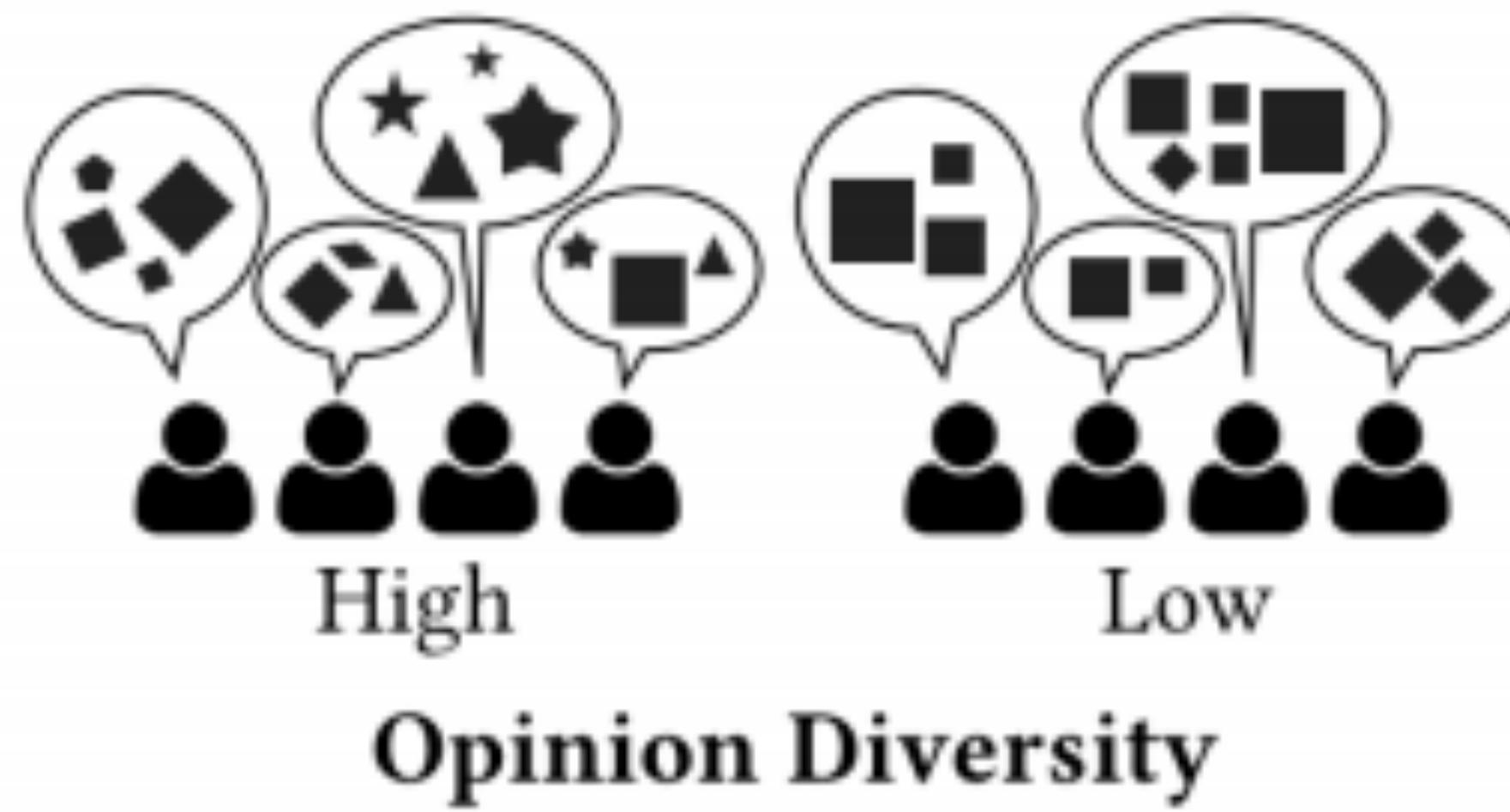
Consensus Reaching



Opinion Expression



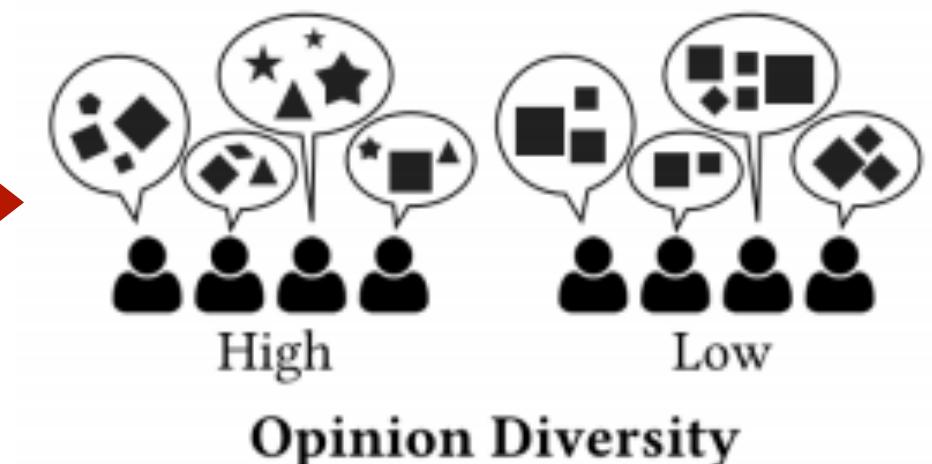
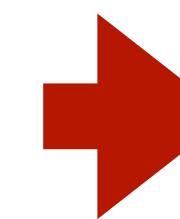
Discussion Quality



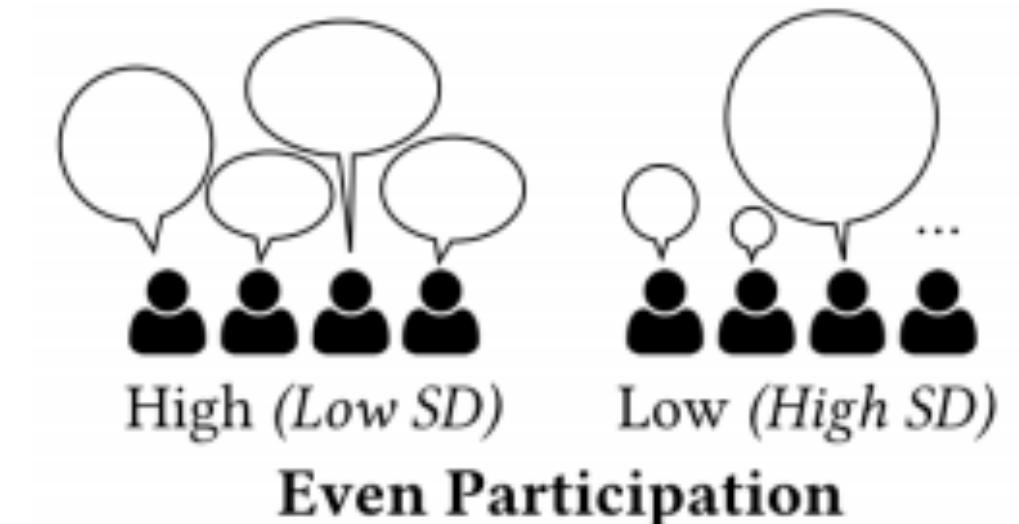
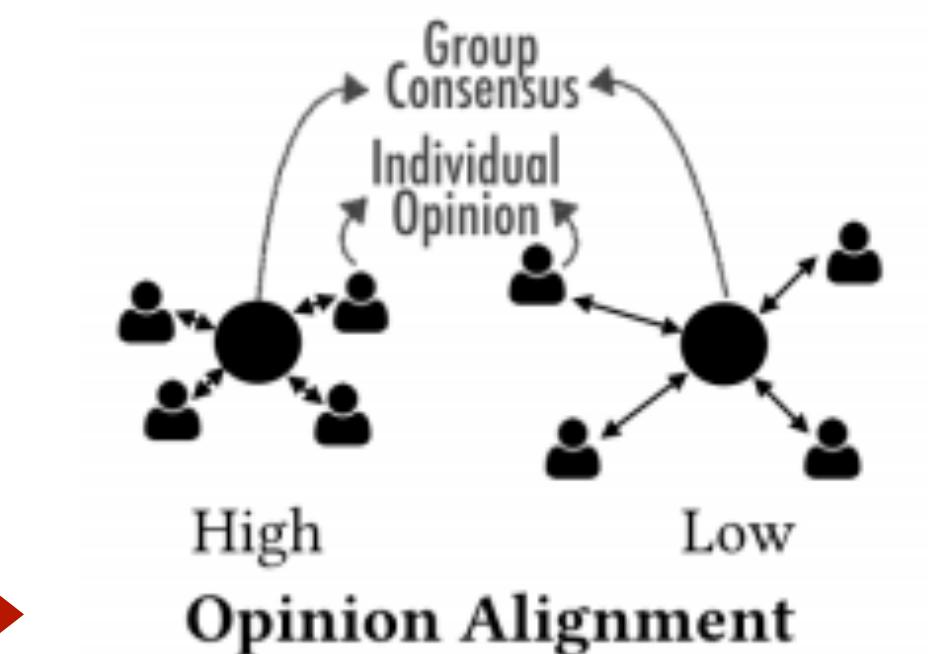
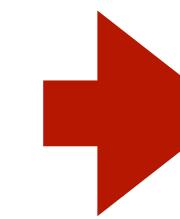
Results & Findings

Consensus Reaching		
Opinion alignment	<i>Behavioral</i>	Significant difference between the conditions ($p = 0.016$, $Str \times Fct (93.8\%) > Unstr \times Fct (73.5\%) > Str \times Unfct (63.3\%) > Unstr \times Unfct (62.5\%)$)
Opinion alignment	<i>Perceived</i>	Main effect for facilitation ($p = 0.007$)
Opinion Expression		
Active participation	<i>Behavioral</i>	No main and interaction effects
Even contribution	<i>Behavioral</i>	$Str \times Fct (SD=0.0692) > Unstr \times Fct (SD=0.077) > Str \times Unfct (SD=0.126) > Unstr \times Unfct (SD=0.142)$
Outspokenness	<i>Perceived</i>	Main effect for facilitation ($p = 0.000$)
Discussion Quality		
Lexicon diversity	<i>Behavioral</i>	Main effect for structure ($p = 0.042$)
Deliberative quality	<i>Perceived</i>	Main effect for structure ($p = 0.000$)
Perceived Satisfaction		
Task cohesion	<i>Perceived</i>	Main effect for facilitation ($p = 0.000$)
Communication efficiency	<i>Perceived</i>	No main and interaction effects
Communication fairness	<i>Perceived</i>	Main effect for facilitation ($p = 0.037$)
Communication effectiveness	<i>Perceived</i>	No main and interaction effects

Discussion Structure



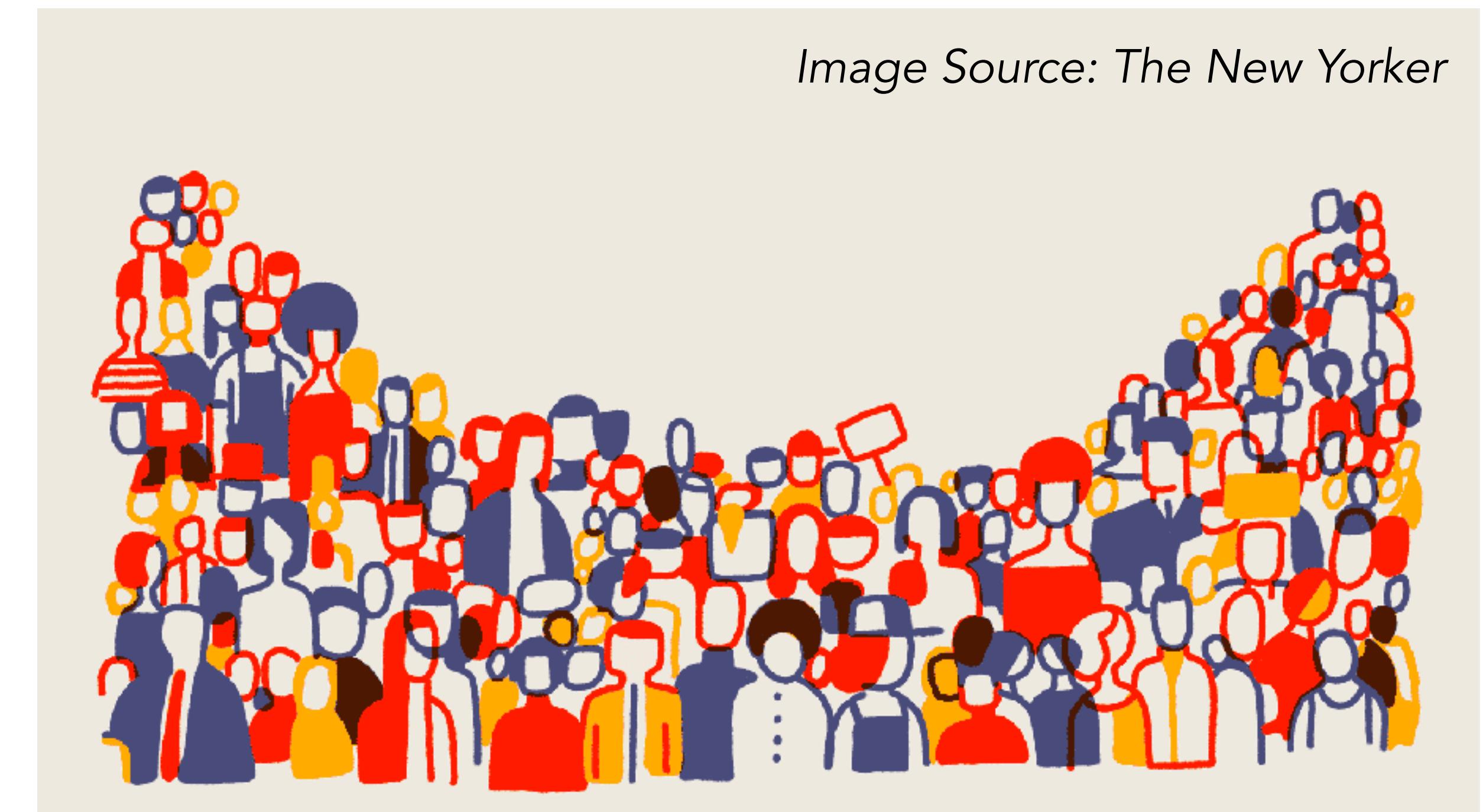
Discussant Facilitation



Conclusion

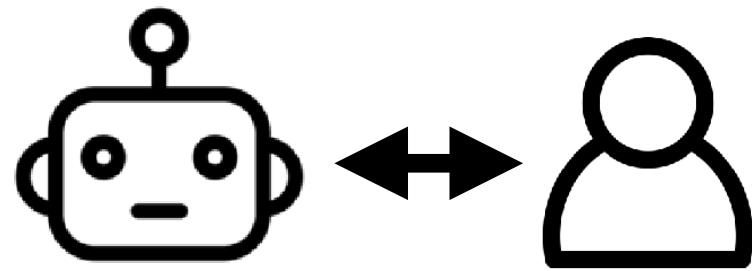
- Structure discussions for independent thinking and inclusive perspective taking
- Facilitate even participation for the reaching of authentic consensus
- Chatbot can act as moderator and a human collaborator

Image Source: The New Yorker

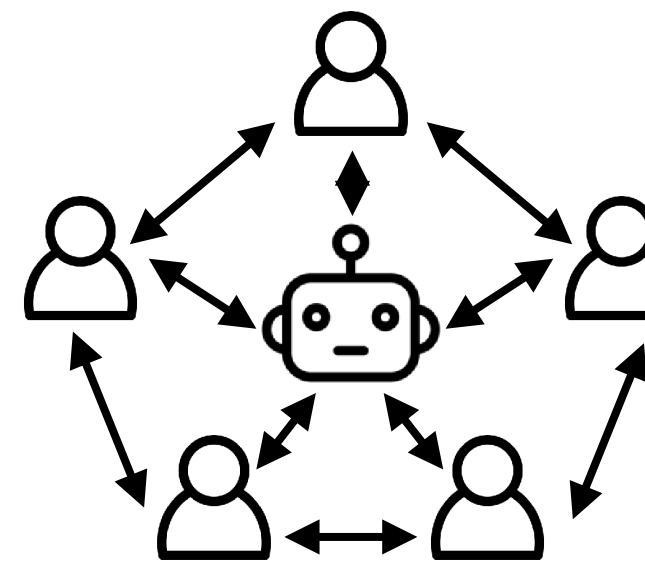


RESEARCH OVERVIEW

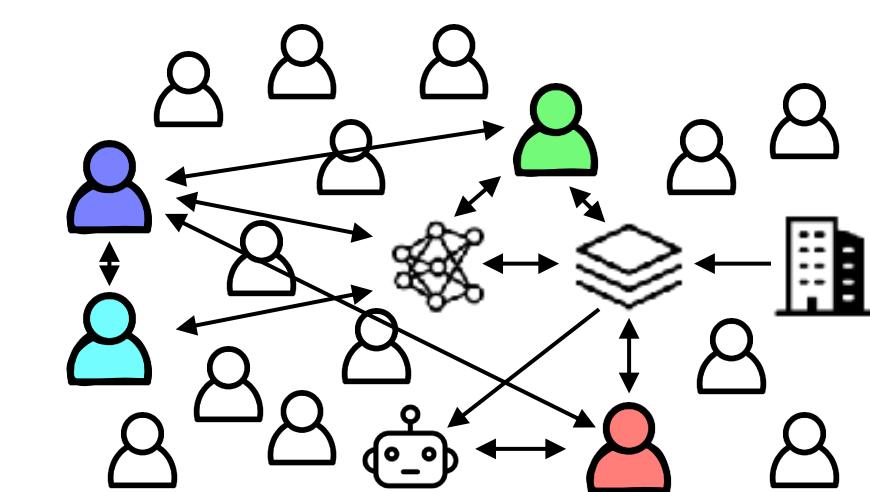
Dyadic Interaction



Group Interaction



Interaction at Scale



[CHI19] Survey Agent

- Conducting survey
- Interface
- Conversational style

[CHI20] GroupfeedBot

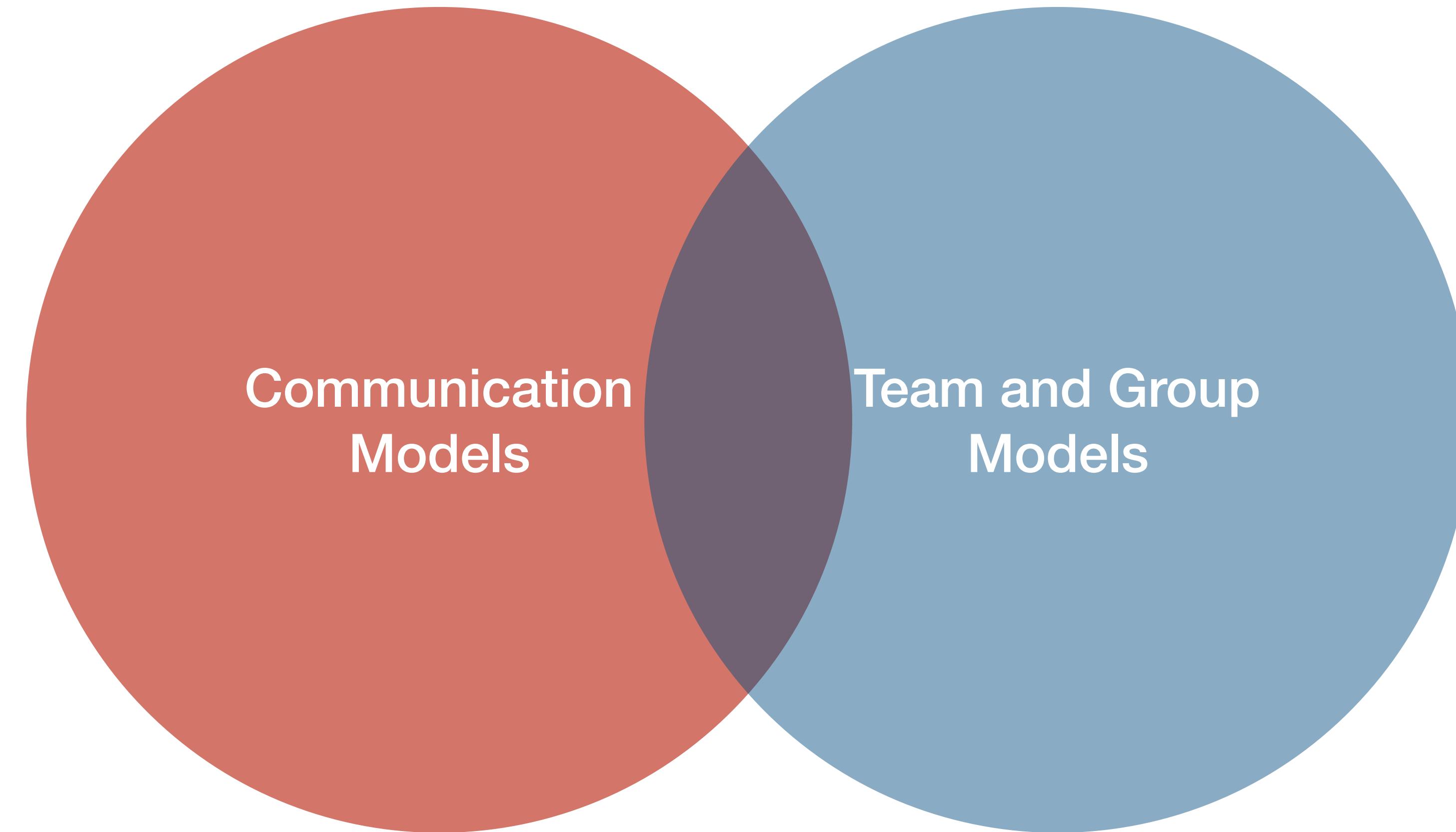
- Decision-making @Casual group
- Small, medium groups
- Time management
- Lurker facilitation
- Information organization

[CSCW21] DebateBot

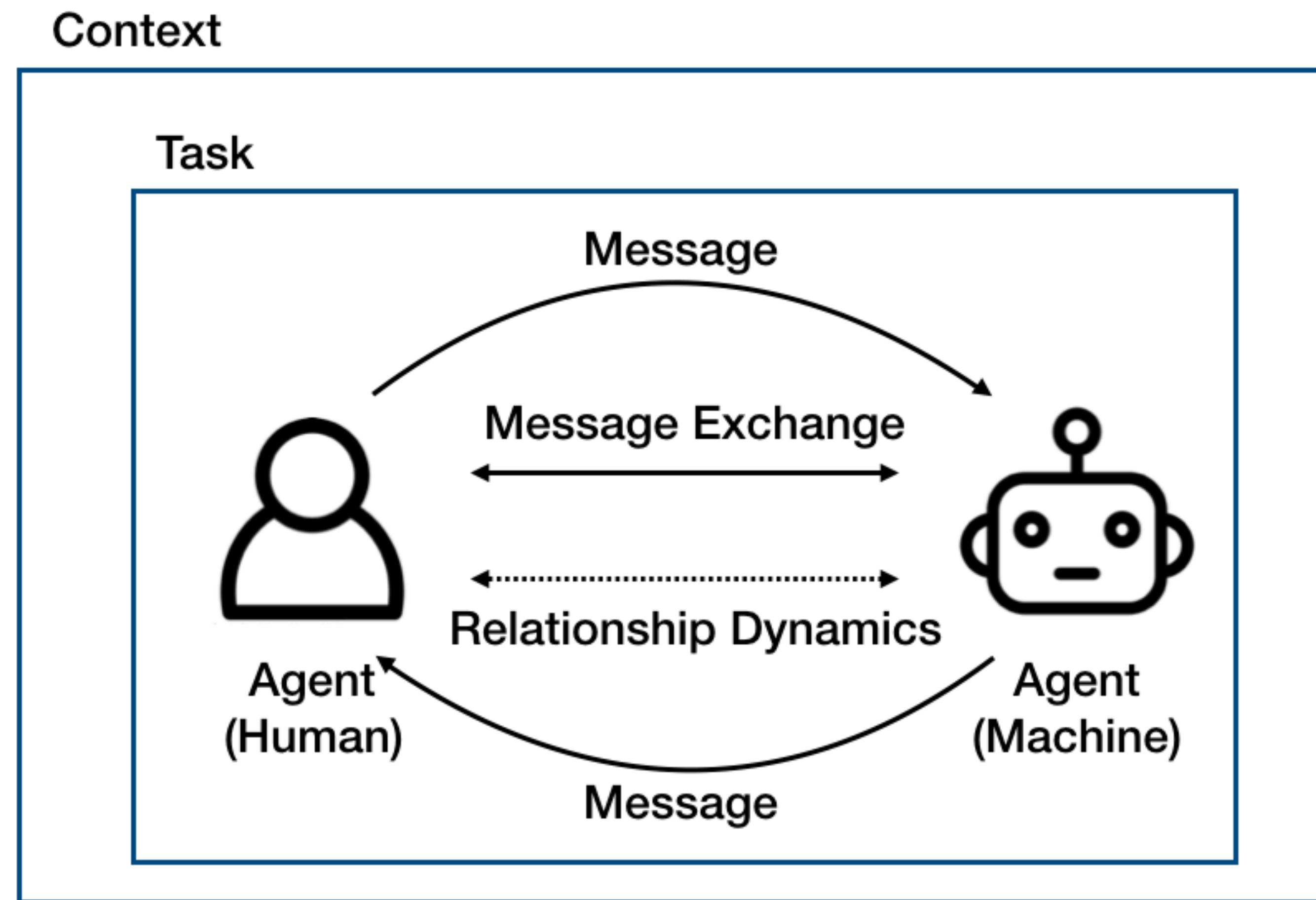
- Consensus-reaching @Formal group
- Small groups
- Discussion structure
- Lurker facilitation

• Future Work

TAMED FRAMEWORK

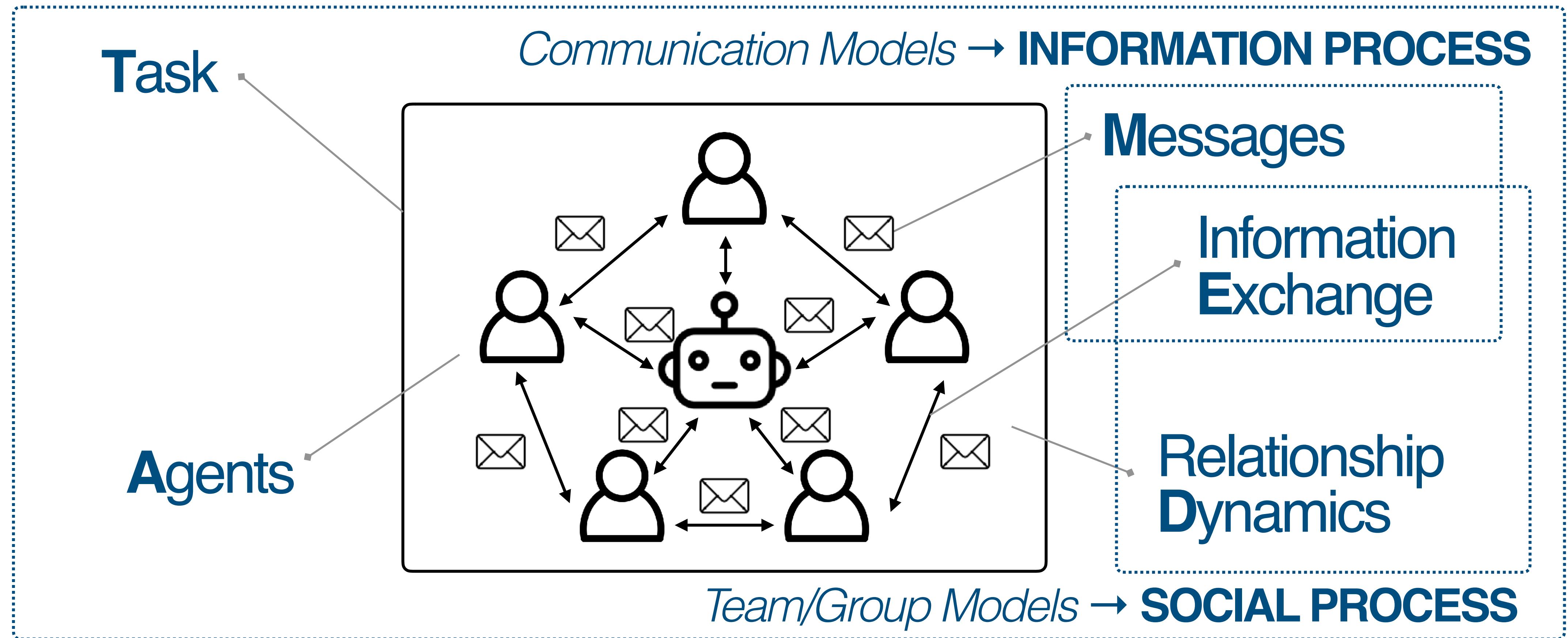


TAMED FRAMEWORK



TAMED FRAMEWORK

CONTEXT



RESEARCH OVERVIEW

Dyadic Interaction		Group Interaction	
	SurveyBot	GroupfeedBot	DebateBot
Task	<ul style="list-style-type: none">• Goal-oriented task (Survey)	<ul style="list-style-type: none">• Open-debating• Decision-making• Problem-solving• Estimation	<ul style="list-style-type: none">• Open-debating
Agent	<ul style="list-style-type: none">• Dyadic	<ul style="list-style-type: none">• Small & Medium groups	<ul style="list-style-type: none">• Small groups
Message	<ul style="list-style-type: none">• Conversational style	<ul style="list-style-type: none">• Message organization	<ul style="list-style-type: none">• Message structure
Exchange	<ul style="list-style-type: none">• Semi-synchronous• Bi-directional	<ul style="list-style-type: none">• Synchronous• Even participation	<ul style="list-style-type: none">• Synchronous• Even participation
Dynamics	<ul style="list-style-type: none">• Building rapport	<ul style="list-style-type: none">• Against spiral of silence• Against social loafing	<ul style="list-style-type: none">• Against spiral of silence• Against groupthink
Goal	<i>Increase user engagement</i>	<i>Support decision-making</i>	<i>Support consensus-reaching</i>
CA as a Social Actor		CA as a Group Member	

CONTRIBUTIONS

Theoretical Framework

- This thesis outlines dimensions explored in communication and group interaction models

Empirical results on human–AI algorithm interaction

- Through both quantitative and qualitative approaches, this study closely observed the interaction between AI algorithms and users and discovered new aspects of this interaction.

Artifacts: Algorithm based communication systems

- This study designed various research probes, Survey Agent, GroupfeedBot, DebateBot, thus pioneering the user experience of AI-embedded interfaces.

Design implications for AI-embedded interfaces

- This study provides practical design guides for designing CAs This thesis discussed design implications and for various intelligent user interfaces that work based on AI algorithms.
- This thesis introduces and stresses the importance of AI algorithms and their human factors and user experience in the HCI and related communities.

Human-AI Interaction

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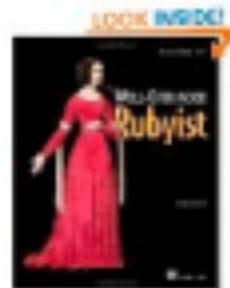
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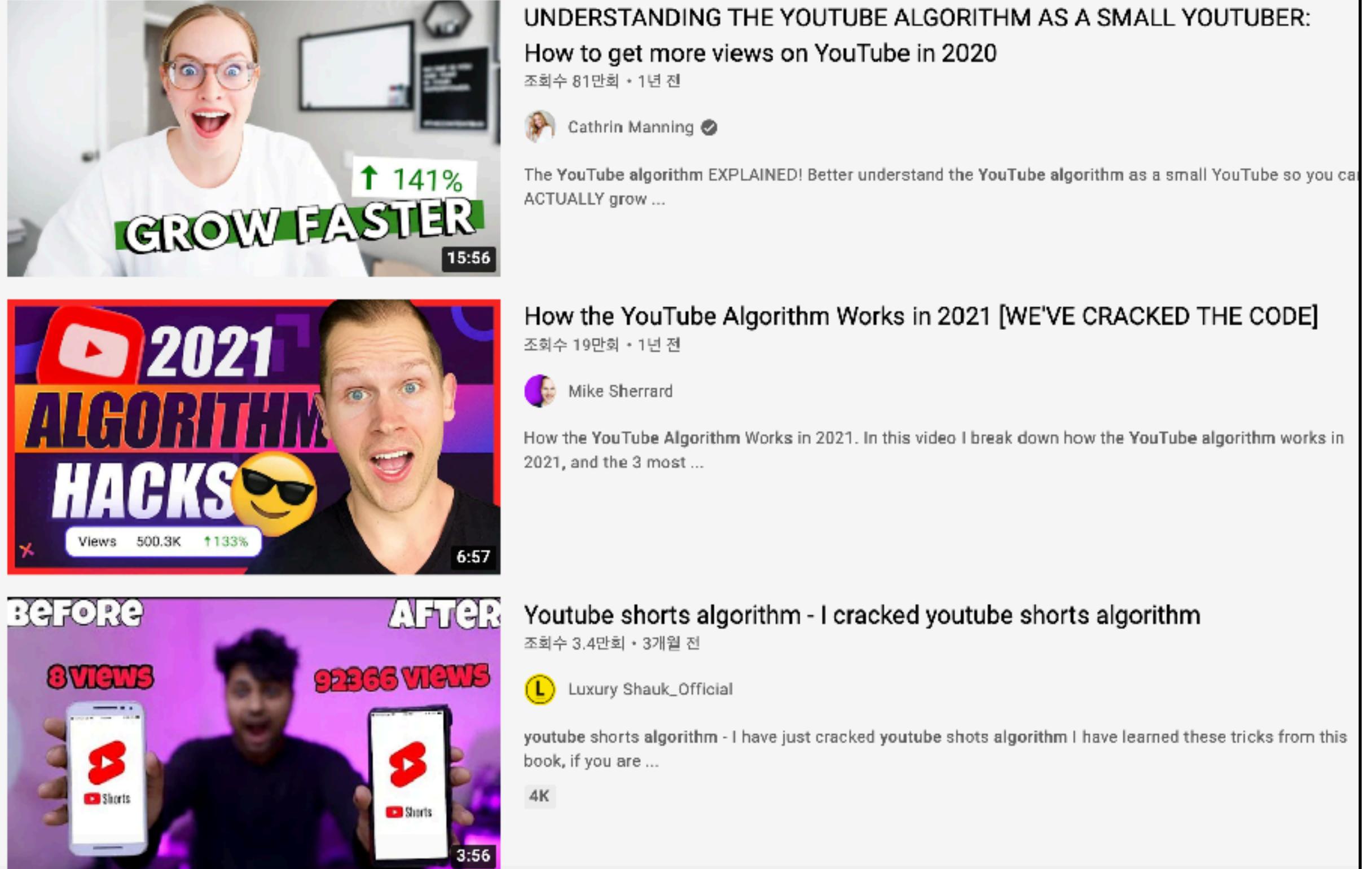
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4K

Utilize and Leverage

Reason and Reverse Engineer



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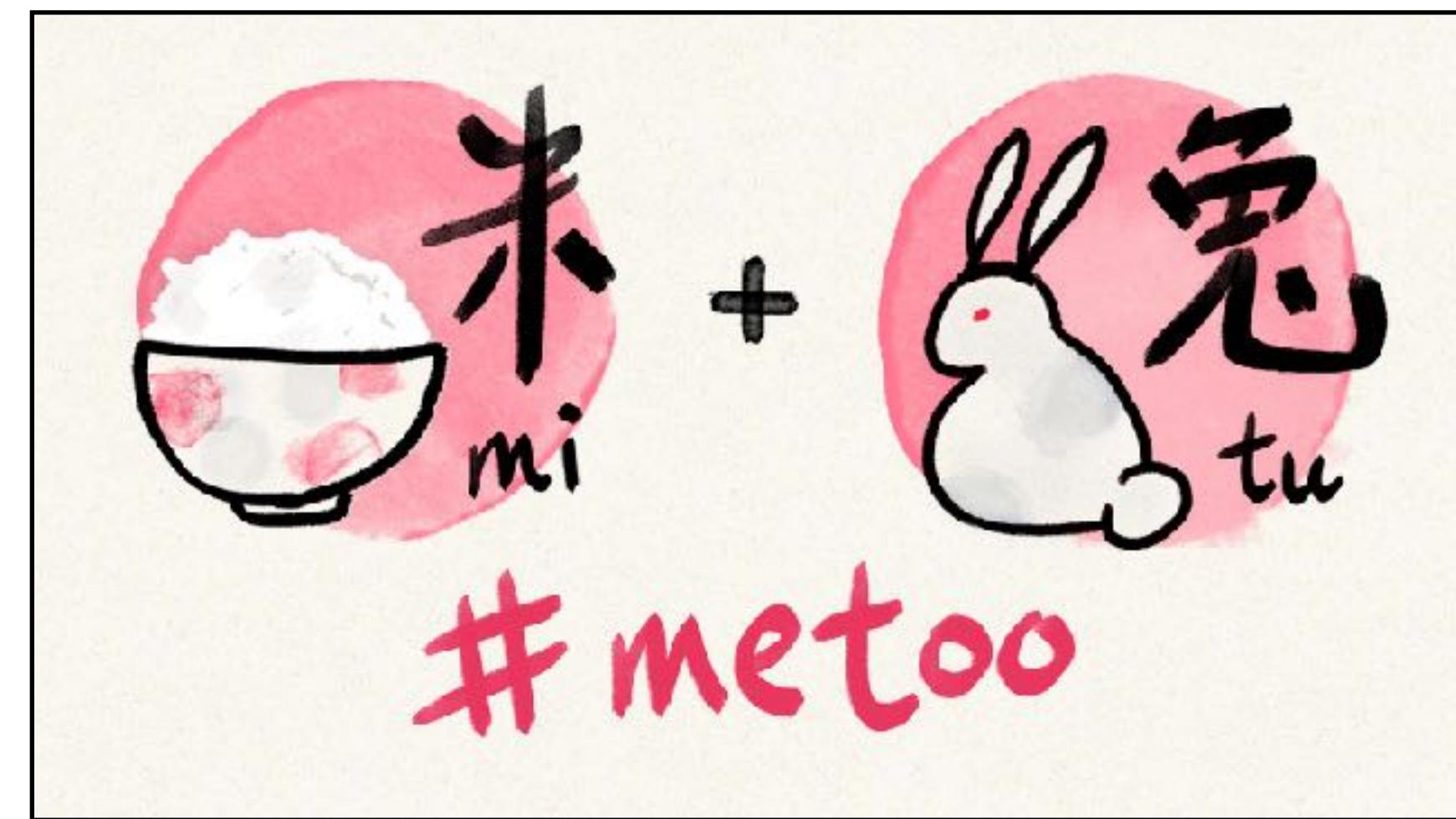
Video shows Hong Kong protesters using lasers to disrupt government facial-recognition cameras

Bill Bostock Aug 1, 2019, 9:51 PM



Protesters in Hong Kong point lasers at cameras and police officers on July 21.

Trick and Game Censoring Algorithms:



Trick and Game Translation Algorithms

(A) Example of machine non-translatable review written in Google Places

A screenshot of a Google Places review page for an accommodation. The review is written in Korean and appears to be a trick or game designed to test the translation algorithm. The text is: "싸월 호쑤기가 업어써 웨우 뿔뻔함 물도 워떻게 조절화라는권지 가치 묵운 녀좌빡빡이드리 웨리훼놔인지됨웨인지펴서 괴로왔음". A red box highlights this text, and a red arrow points to it with the label "Machine non-translatable review". Below the review, there is a response from the owner: "Hi there, I'm not sure what this review means... all of our rooms at our hostel have full ensuite bathrooms. Each bathroom has a sink, toilet, and bath with shower. Are you sure you stayed with us?"

(B) Google translation result of the machine non-translatable review

A screenshot of the Google Translate interface. It shows a Korean review: "싸월 호쑤기가 업어써 웨우 뿔뻔함 물도 워떻게 조절화라는권지 가치 묵운 녀좌빡빡이드리 웨리훼놔인지됨웨인지펴서 괴로왔음". Below it is the English translation: "Zamwol's whistle-blowing, water, and water are also the value of the book, the value of the book, I've come as a trick to find out whether it's a bad thing or not." The English text is highlighted with a blue background.

(C) Google translation result of the machine translatable review (intended meaning)

A screenshot of the Google Translate interface. It shows a Korean review: "샤워 호수기가 없어서 매우 불편함. 물도 어떻게 조절하라는건지. 같이 묵은 여자들이 마리화나인지 담배인지 피어서 괴로웠다." Below it is the English translation: "Very uncomfortable because there is no shower. How to control the water. The women who stayed with me were bothered by smoking marijuana or cigarettes." The English text is highlighted with a blue background.

accommodation



local business



Google Maps



commerce



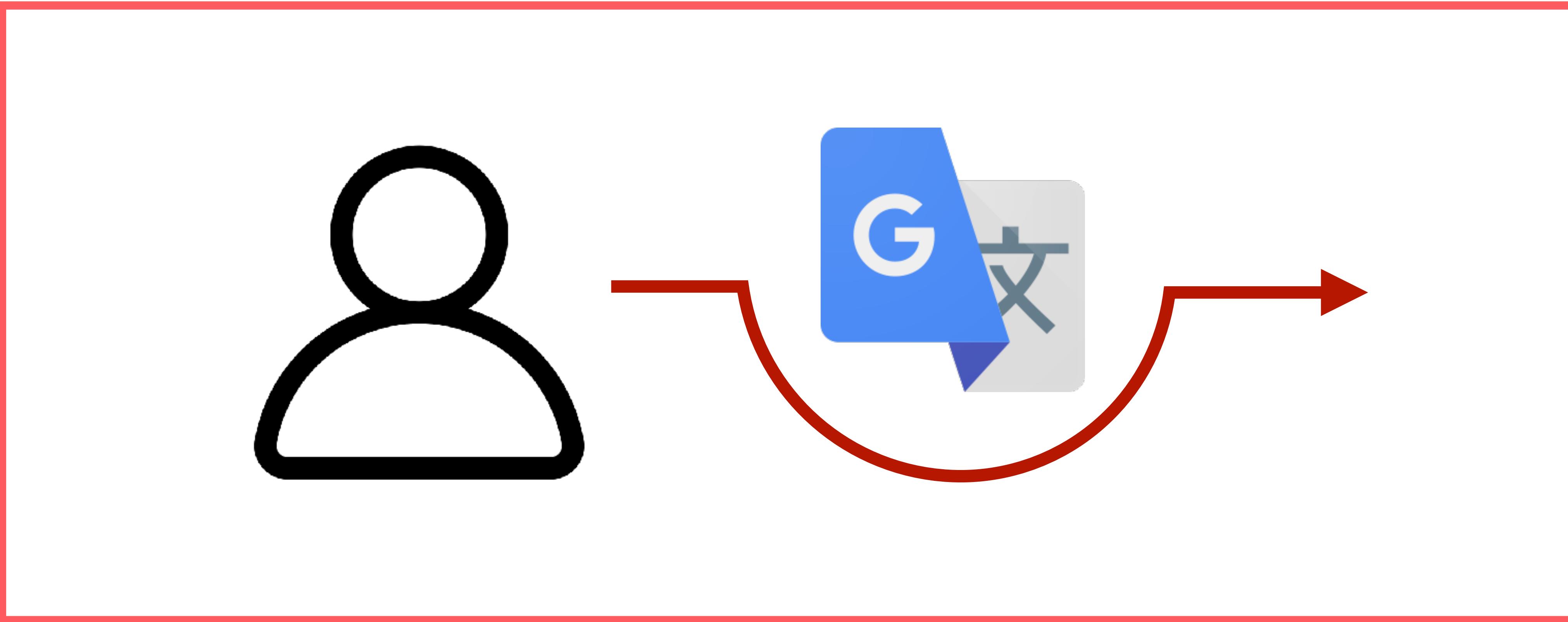
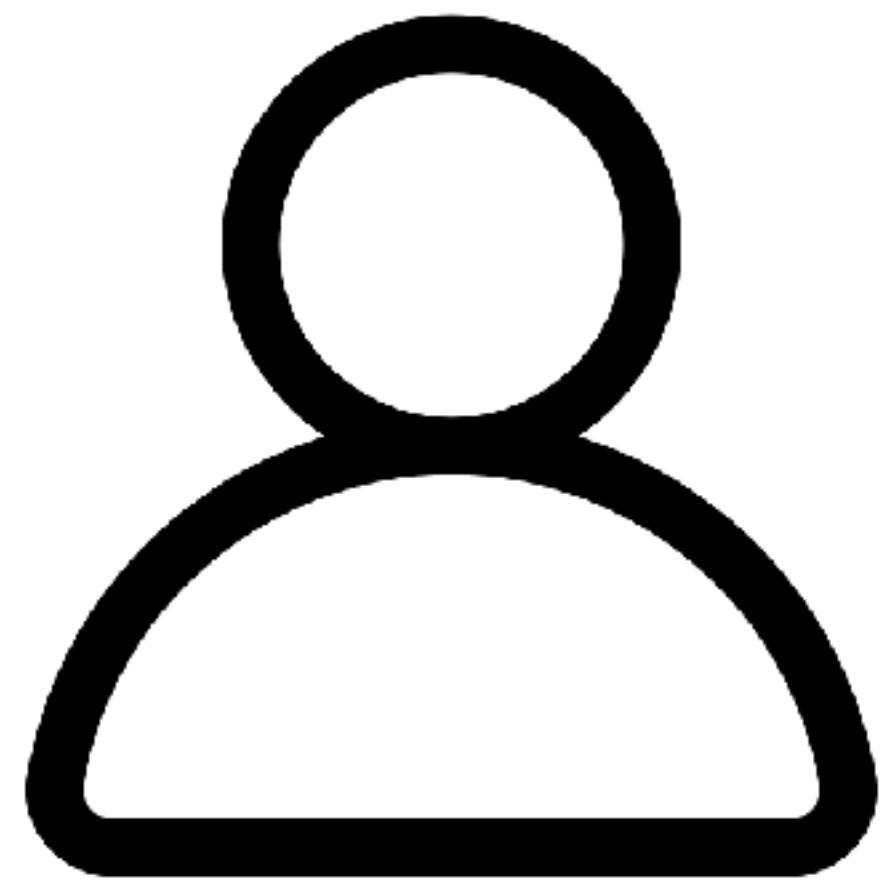
Peer-to-peer platforms

Trkic G00gle: Why and How Users Game Translation Algorithms

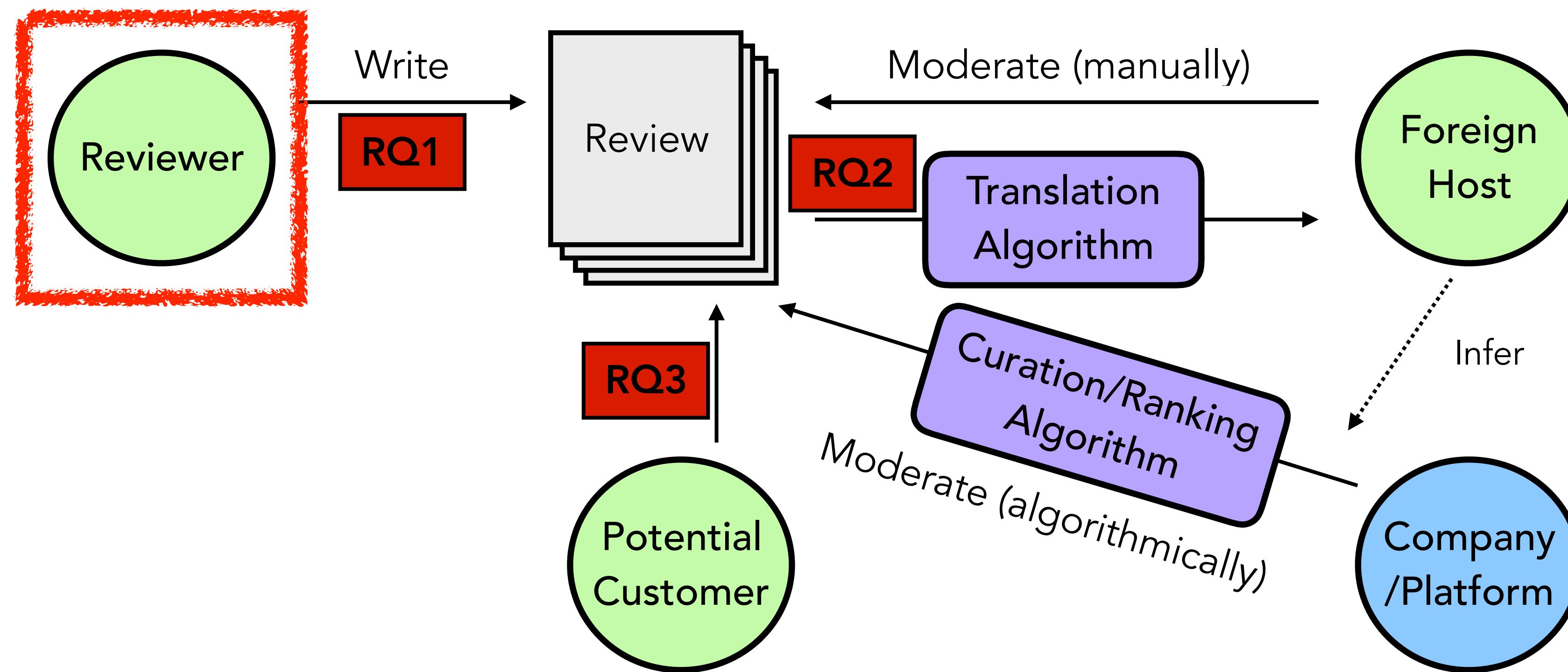
Soomin Kim¹, Changhoon Oh², Won IK Cho¹, Donghoon Shin¹, Bongwon Suh¹, Joonhwan Lee¹

¹ Seoul National University

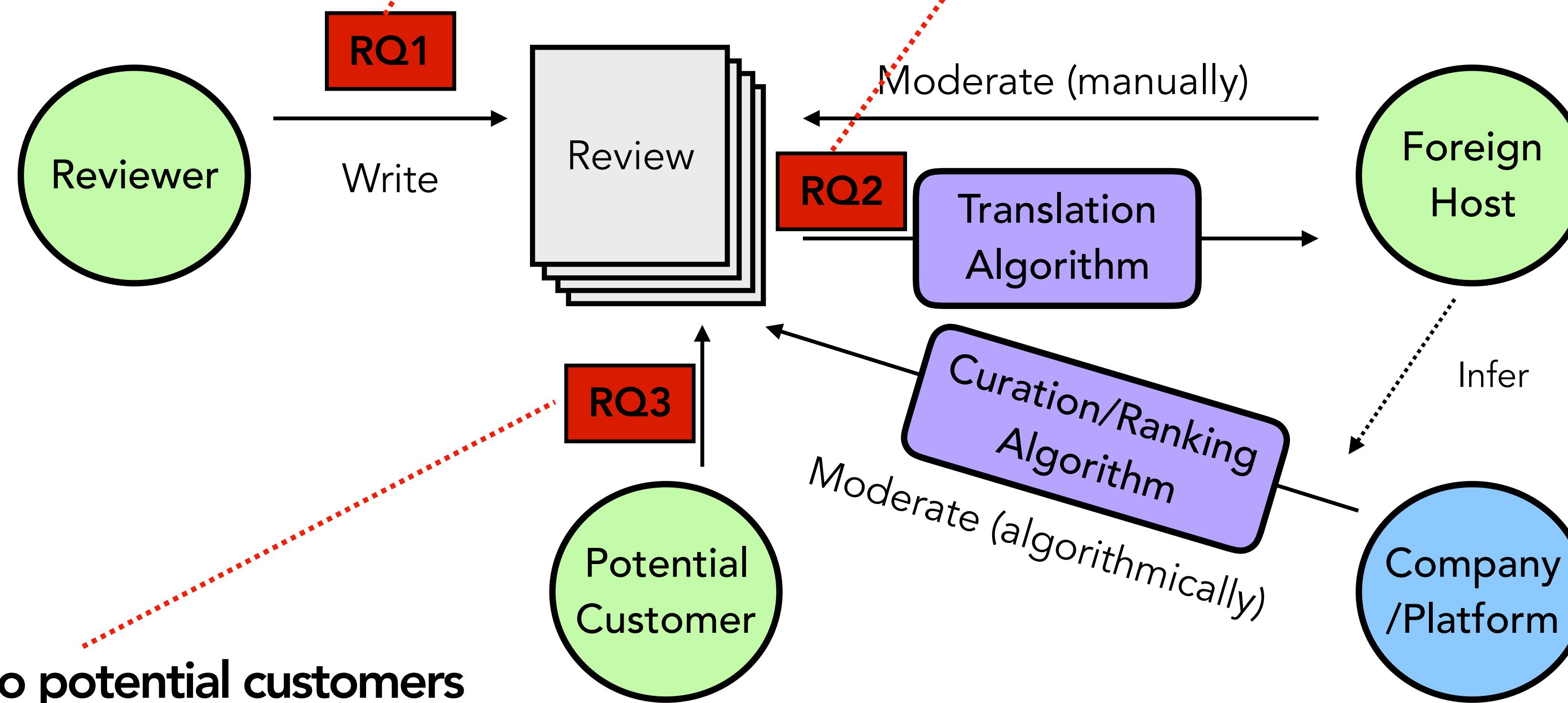
² Boston College



Context: Gaming in Peer-to-Peer Review Community

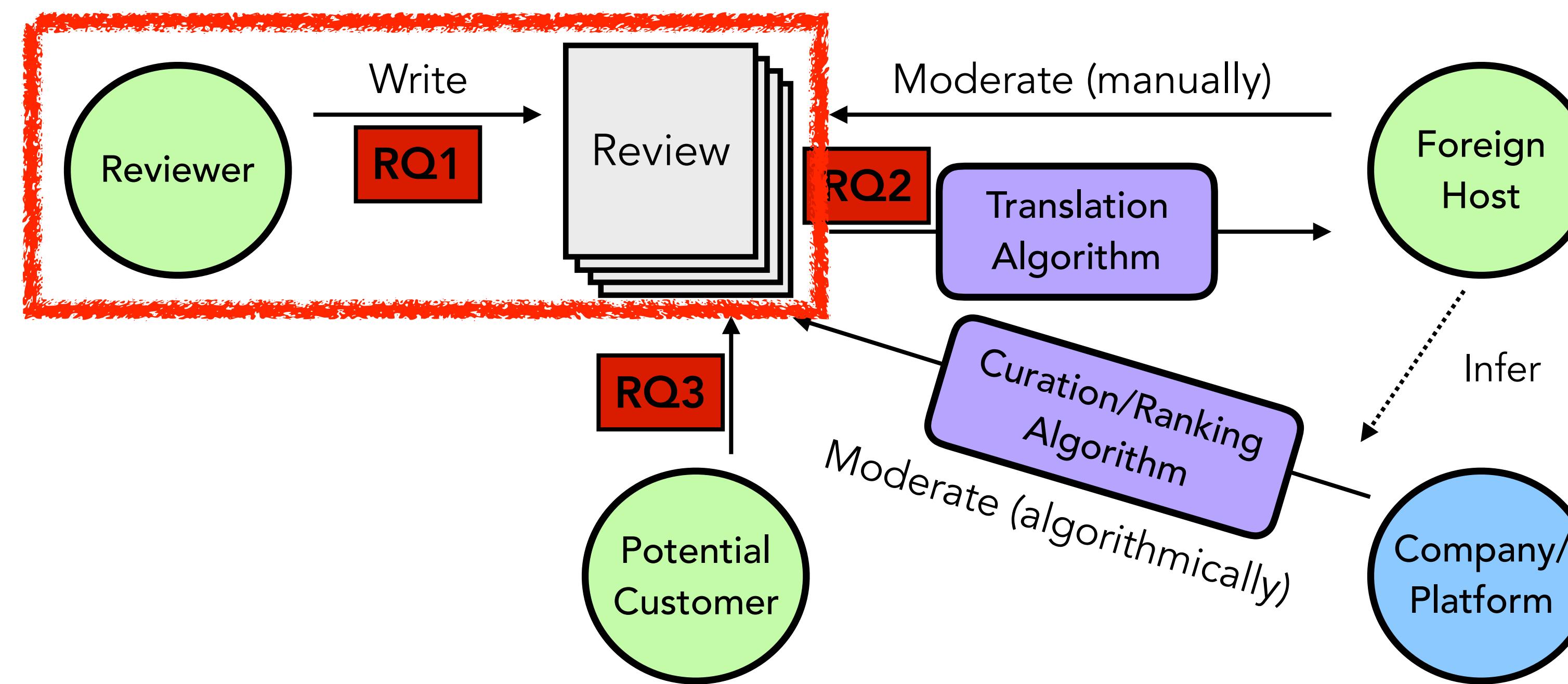


- RQ1. Why do reviewers write encrypted reviews to trick the translation algorithms?
- RQ2: What strategies do reviewers use to trick the translation algorithm



- RQ3: How do potential customers perceive and decipher the encrypted, machine non-translatable reviews?

Study 1. Why Do Users Write Machine Non-Translatable Reviews?



- Conducted in-depth semistructured interviews (6 Koreans, 4 Chinese, 2 Frenches, 2 Japanese).

Reasons of Writing Machine Non-Translatable Reviews

To Avoid Censoring

“ *I expected the host to delete scratching reviews, so I left a encrypted review.*

To Manage Reputation and to Protect Privacy

“ *I can't honestly write the review because other hosts will not accept me if my score is low.*

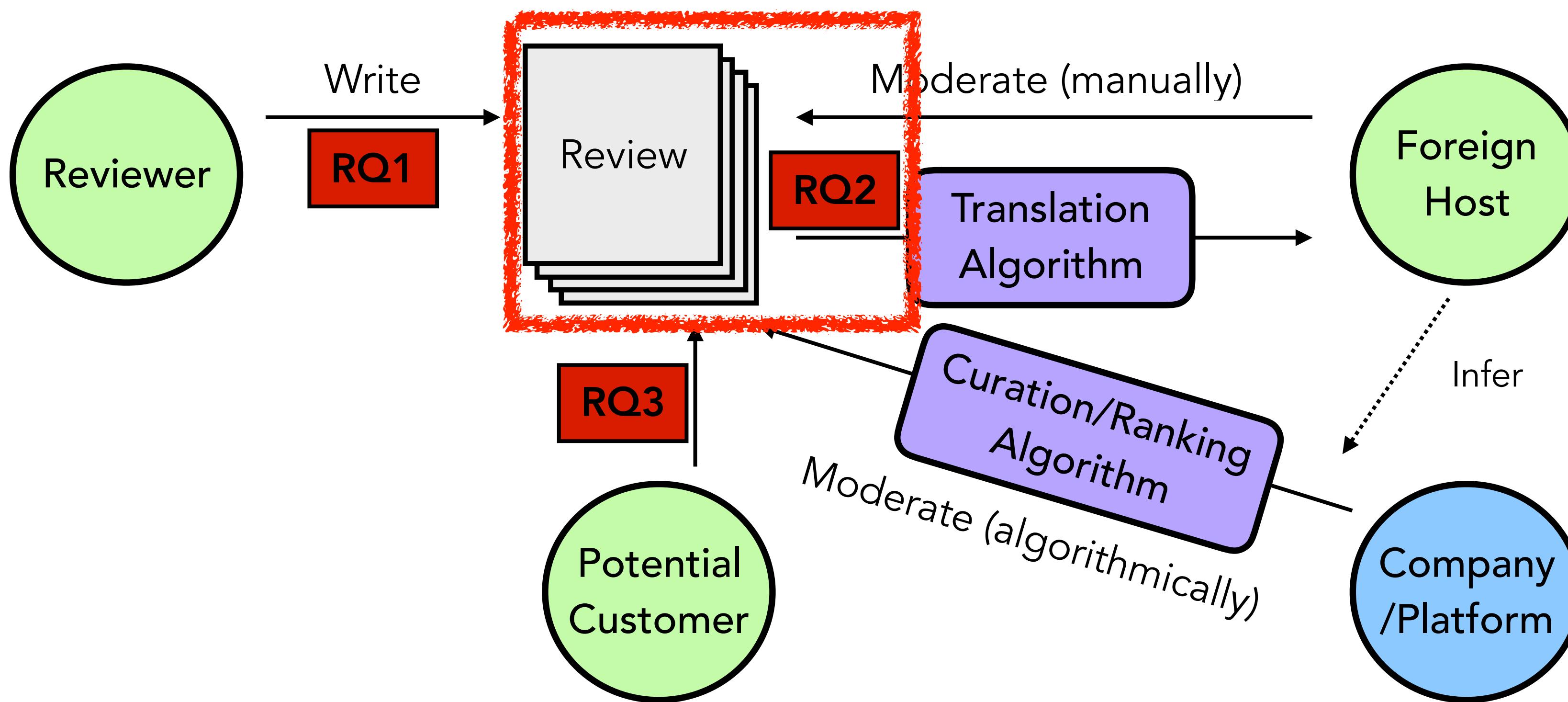
To Reduce the Relational Burden

“ *Because I have interacted with the host offline, I am sorry to write the bad comments.*

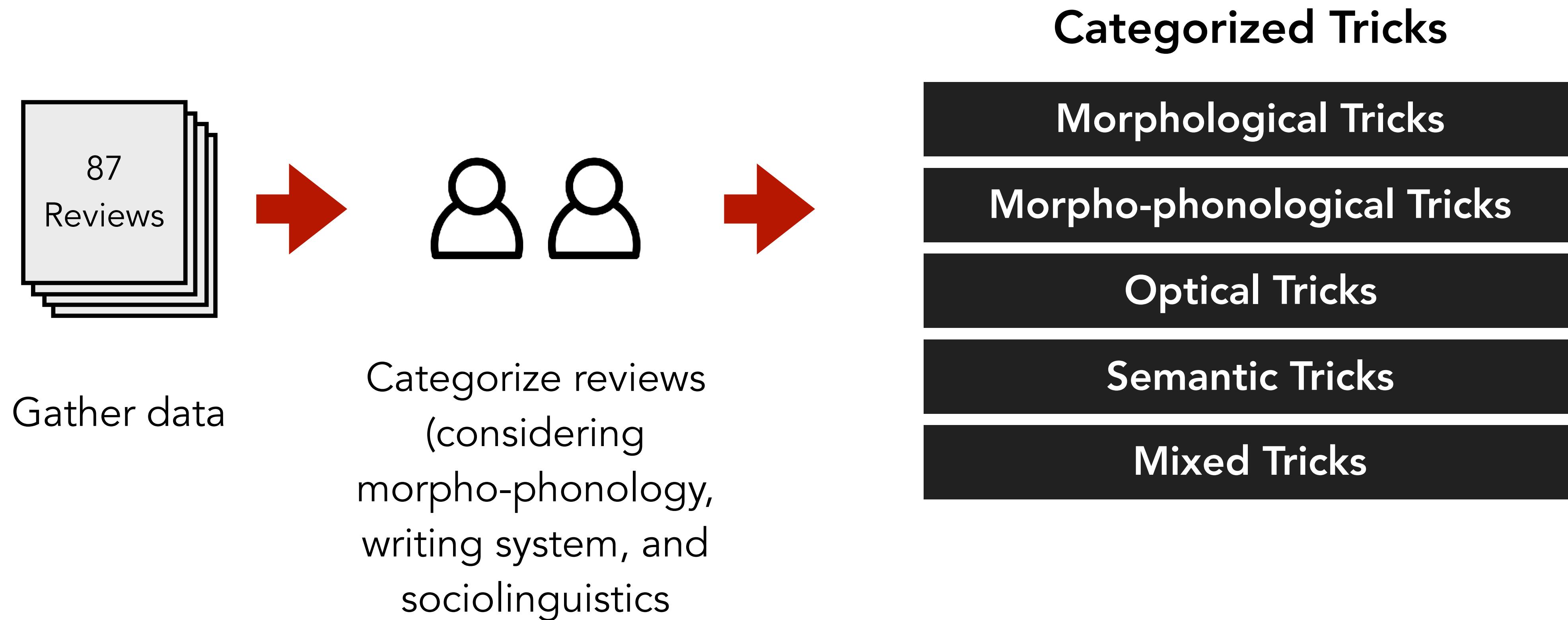
To Provide Authentic Information and to Build a Trustworthy Review Community

“ *I want to give other users helpful information and somehow prevent secondary victims*

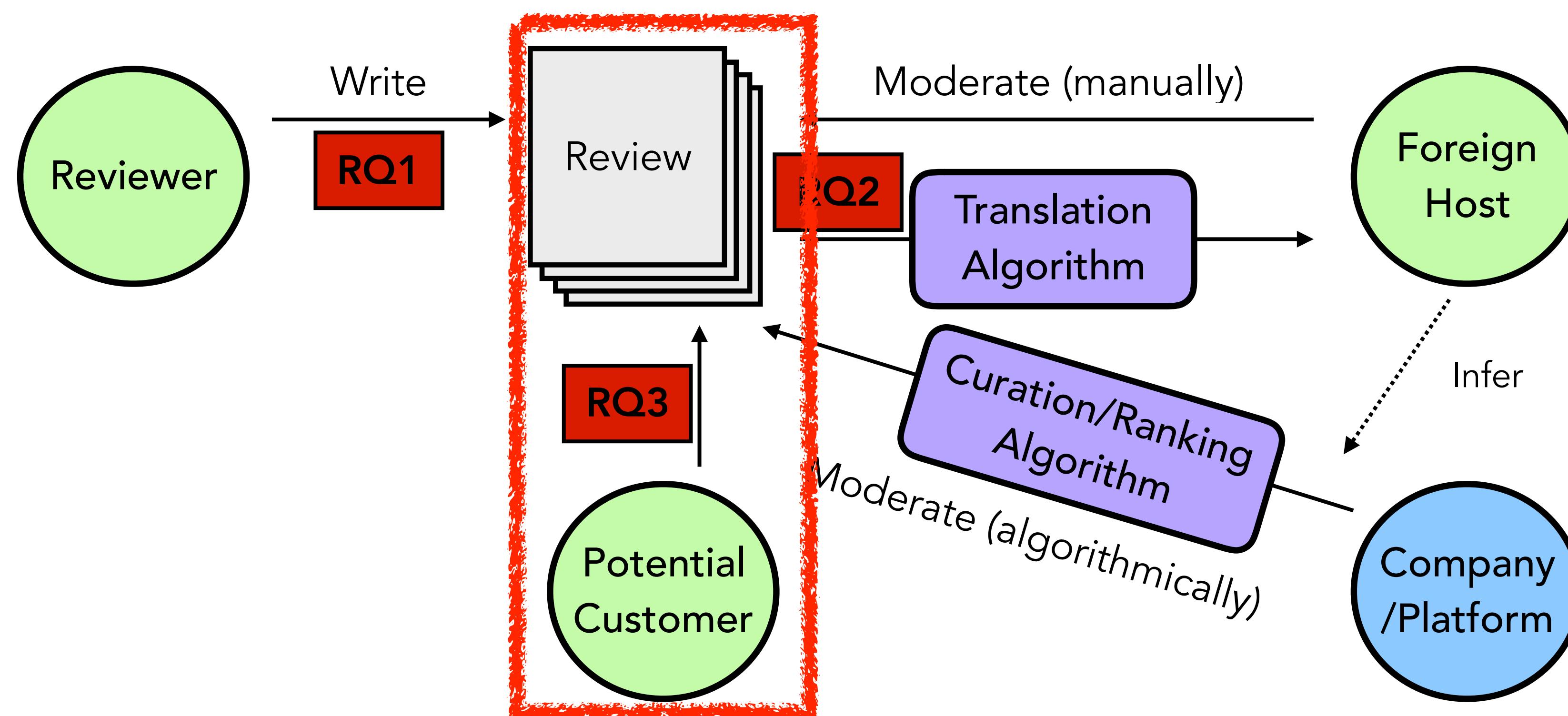
Study 2. What Strategies Do Reviewers Use to Trick the Translation Algorithm?



Study 2. What Strategies Do Reviewers Use to Trick the Translation Algorithm?

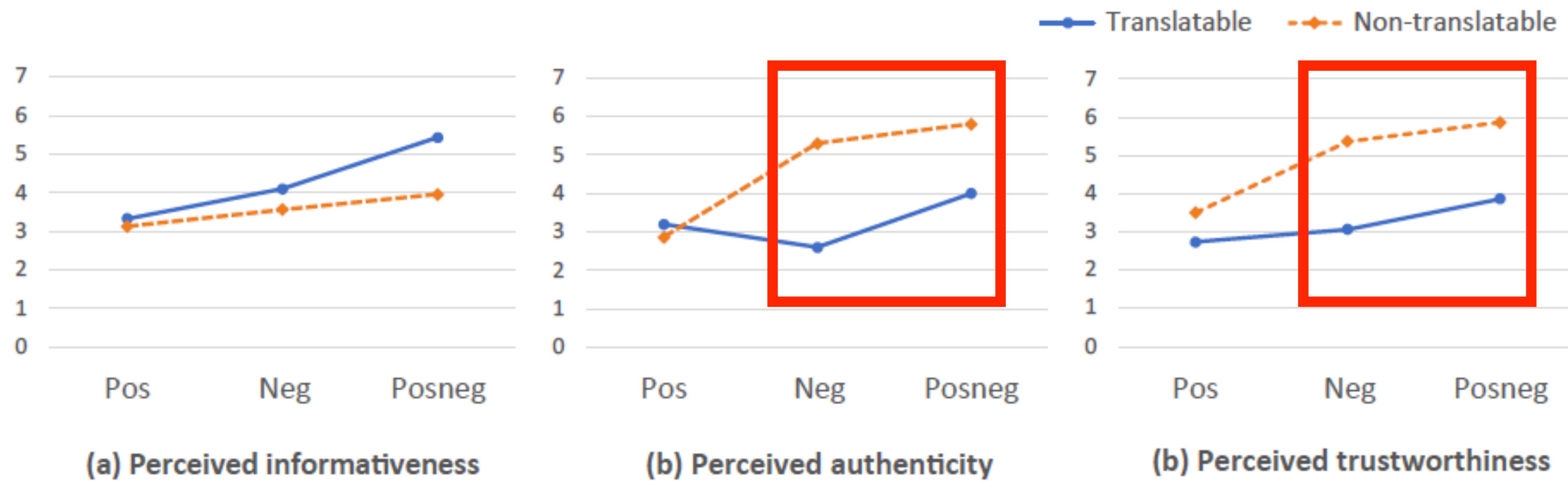


Study 2. How Do Readers Perceive Encrypted Reviews?



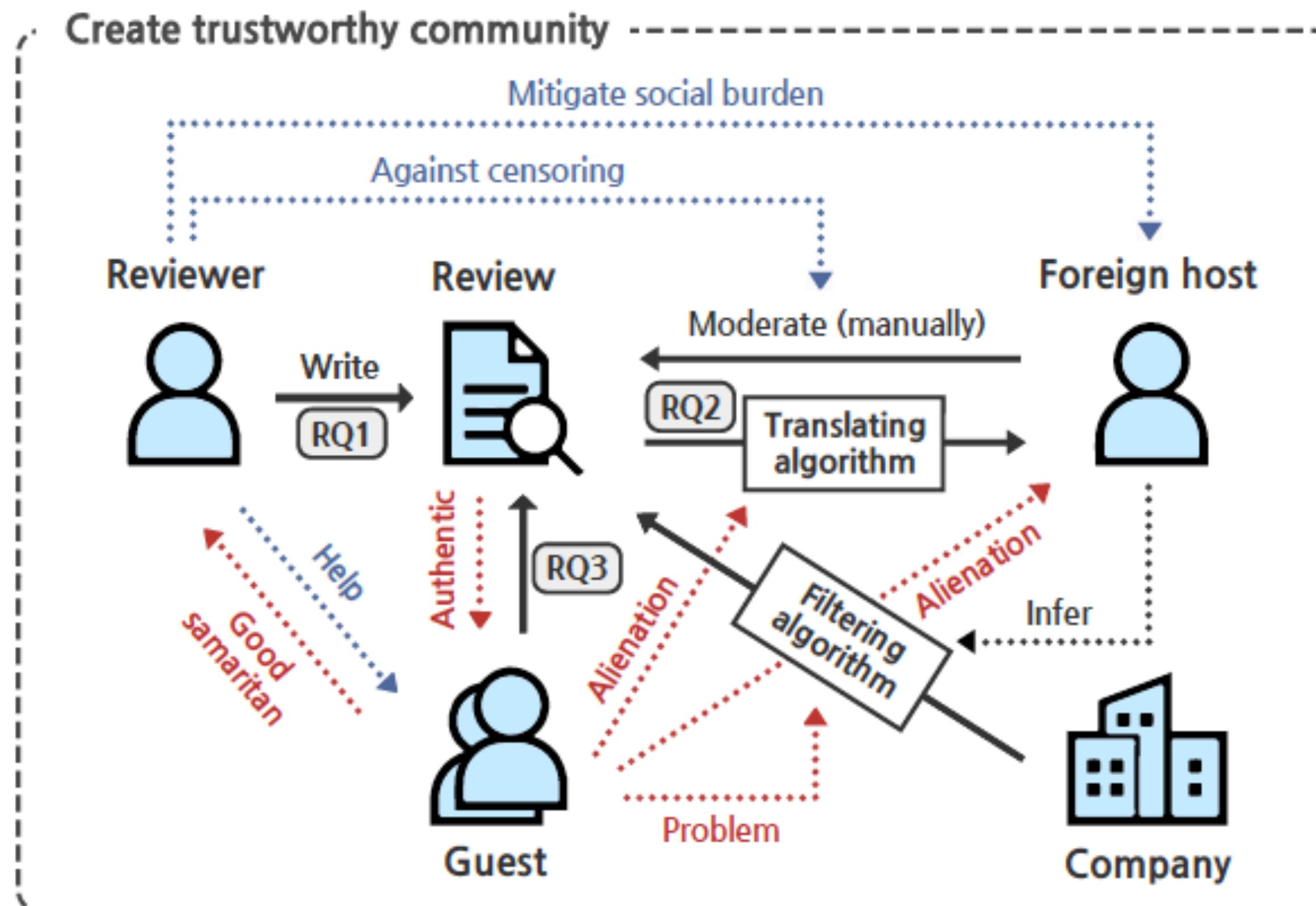
- Would machine non-translatable reviews actually be of service to receivers?
- Effects of “machine translatability” on review perception

Results



- Potential customers perceive the encrypted, machine non-translatable review in light of negative information to be less informative, though more trustworthy and authentic.

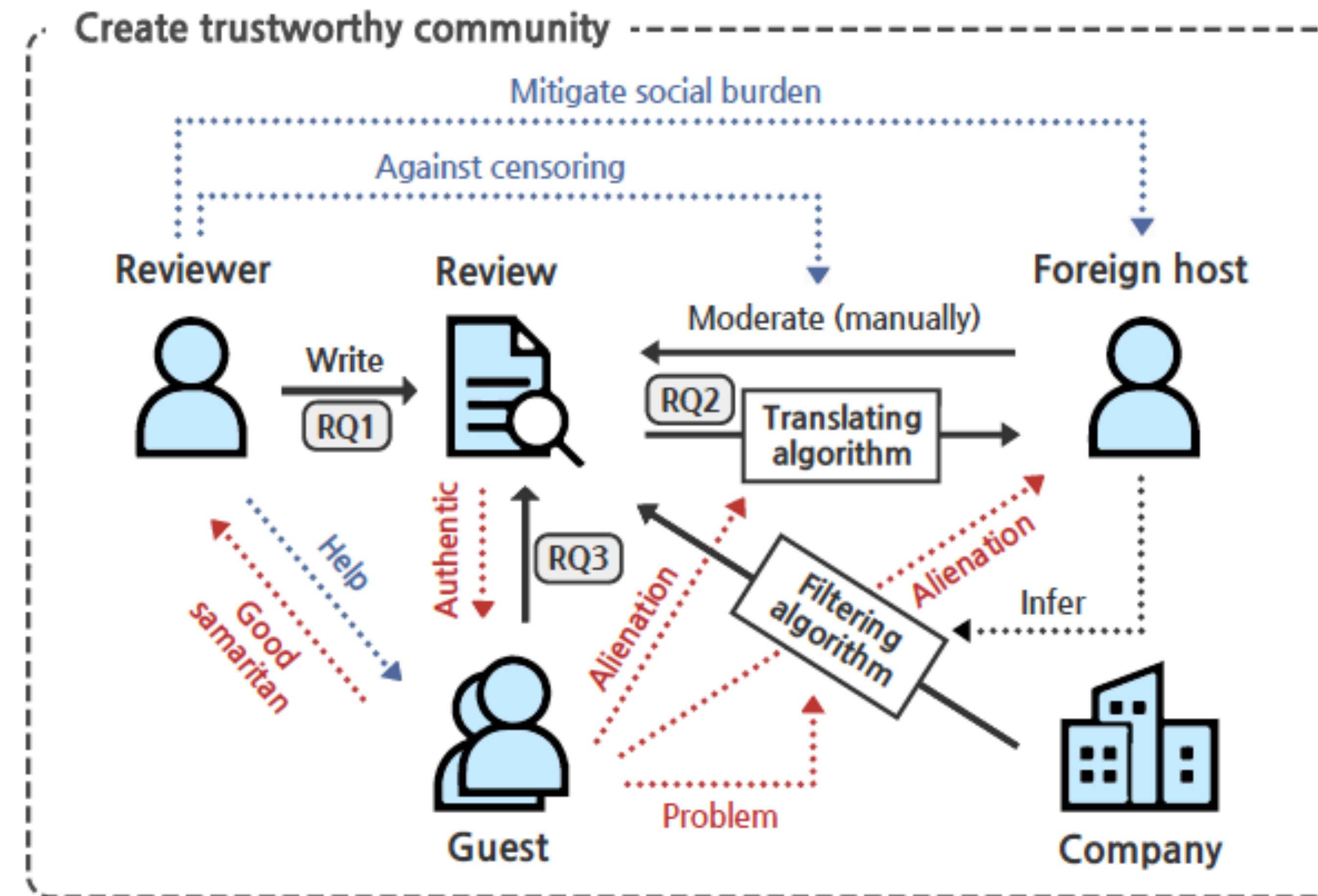
Designing AI-Based Global Review Platforms



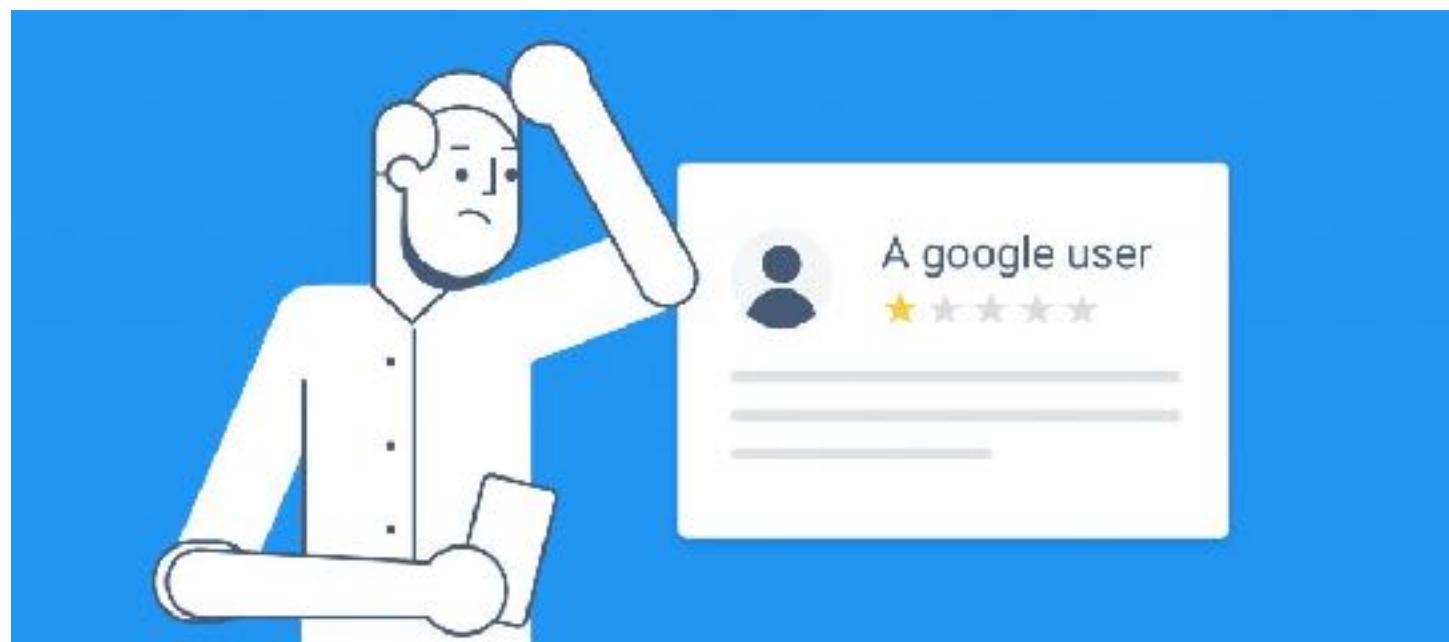
Design Implications

- Considerations for inclusion of various stakeholder groups
- Designing review systems: Anonymous and Granular Review Systems
- Improving translation and moderation algorithms: Integrating Human Heuristics

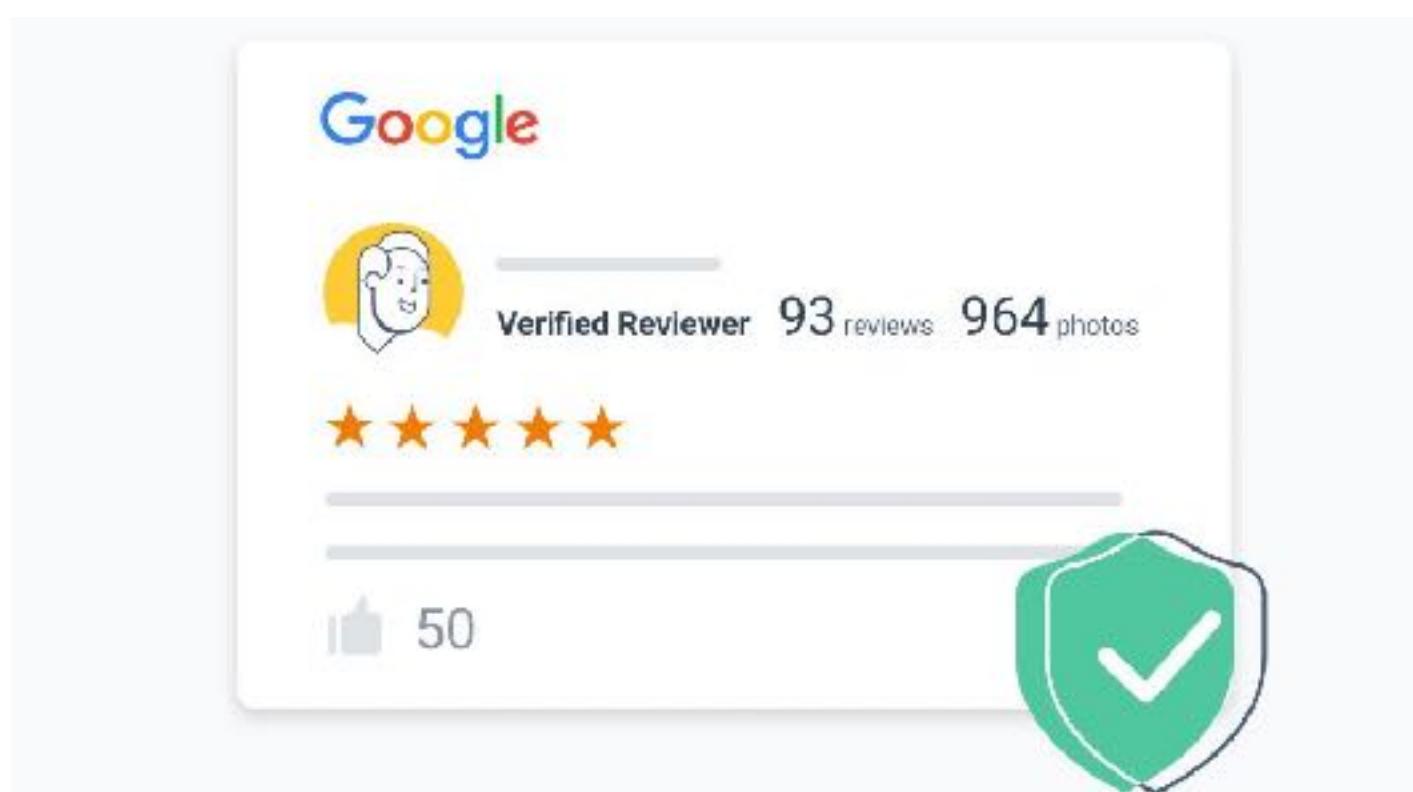
Considerations for Inclusion of Various Stakeholders: Prerequisites for Understanding Tricking Algorithms



Towards Environment Promoting Reviews for Good: Anonymous and Granular Review Systems

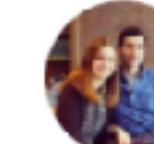


VS.



334 Reviews

Accuracy		Location	
Communication		Check In	
Cleanliness		Value	

 **Pascal** August 2017

Everything was perfect and as described. Very clean appartement, comfortable bed, spacious bedroom, good little breakfast, excellent location and very nice host. What are you waiting for?

Integrating Human Intelligence in Algorithms: Improving Translation and Moderation Algorithms

Human Heuristics for Tricking Models			
바퀴벌레 cockroach	바벌퀴레	Jumbled characters	Morpho-logical
	바퀴 진짜♥ 벌레	Split and jumble	
	바qui  레	Code-switching	
	박키벌레	Phonological similarity	Morpho-phonological
	빠귀벌레	Glottalization	
	ㅂㄱㅋㅋ 벌근 _	Character substitution	Optical
	ㅄㅋㅋ벌렙	Redundant consonants	
	바선생	Semantic Tricks	Semantic

