I vote to not kill the researcher 😖 / 😂: An experimental study of congruent and incongruent emotive symbols in spontaneous text-based conversation

Amy Han Qiu

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Outline

- Background
- Research questions
- Experimental design
- Results
- Summary of findings
- Future directions

Background

- Emotive symbols: emojis like 😊 and 🔥 and emoticons like:) and orz
- They can signal emotional orientation, mark non-literal intent, and support (mis)alignment in interaction (Danesi, 2017; Escouflaire, 2021; Evans, 2017).
- Messages including emotive symbols, compared to those without, are often perceived as more emotionally intense.
- Emotive symbols serve as indicators of illocutionary force, shaping how an utterance should be understood by marking the speaker's stance (Dresner & Herring, 2010)

Background

I vote to not kill the researcher 

I vote to not kill the researcher 

Congruent	incongruent
He is unlikely to make a breakthrough ☹️ **I love kids 🙂**	**He is unlikely to make a breakthrough 😂** **I love kids 😖**
The emotive symbol reinforces the emotional tone that the text would normally carry in a sincere or socially appropriate context.	The emotive symbol conflicts with or reframes the emotional tone of the text, often introducing pragmatic meanings like irony, sarcasm, humor, or emotional ambivalence.
reinforce the intended affect or amplify the tone (Boutet et al., 2021; Hand et al., 2022; Neel et al., 2023)	employed or perceived to convey sarcasm or humour (Garcia et al., 2022; Thompson & Filik, 2016)
can enhance sender-receiver relationship (Beyersmann et al., 2023; Dai et al., 2024), and positive cases can trigger measurable emotional contagion (Smith & Rose, 2020)	More attention grabbing and cognitively engaging (Barach et al., 2021; Weissman & Tanner, 2018)
Can facilitate message comprehension	May prompt additional inferential work and increase processing difficulty or confusion (Beyersmann et al., 2023; Dai et al., 2024)

Background

- The perceived effects of emotive symbols were typically assessed based on decontextualized stimuli and through self-reports.
- Little is known about the dynamics of emotive symbol use in spontaneous, interactive conversation, particularly how interlocutors respond to emotive symbols used by others and how such responses unfold over the course of interaction.
- We conduct psycholinguistic experiments on spontaneous online chats, focusing on how (in)congruent emotive symbols influence participants' conversation behaviors and perceptions

Research Questions

1) Does exposure to congruent or incongruent emotive symbols influence participants' **spontaneous use of emotive symbols** at the level of conversation and locally in the following 5 turns?

2) Does exposure to these emotive symbols influence the **emotional valence** of spontaneously produced emotive symbols?

3) Does exposure to these emotive symbols influence participants' **joint decision-making, perceptions** of the final decision, and perceptions of the conversation?

The experiment in a nutshell…

- Participants joined a collaborative task completed through online text-based chats on Telegram
- They discussed an **ethical dilemma** (“the balloon task”) to make a joint decision.
- **Spoof emojis** were inserted to text messages that contain certain **decision-related words**, as if they were produced by the sender.
- The emojis had opposite emotional valences, making either congruent or incongruent pairings with the text.
- Participants, in groups of 3, were assigned to either the congruent or the incongruent condition.
- The spoof emojis were only visible to the 2 receivers of the text, but not to the apprent sender.
- After the experiment, they completed a **survey** on their demographics and perceptions of decision-making and the conversation.

The balloon task

Please collaborate with your group to resolve the following dilemma:

Four people are in a hot air balloon. The balloon is losing height and about to crash into the mountains. Having thrown everything imaginable out of the balloon, including food, sandbags and parachutes, their only hope is for one of them to jump to their certain death to give the balloon the extra height to clear the mountains and save the other three. The four people are:

Dr Robert Lewis - a cancer research scientist, who believes he is about to discover a cure for most common types of cancer. He is a good friend of Susanne and William.

Mrs. Susanne Harris - a primary school teacher. She is over the moon because she is 7 months pregnant with her second child.

Mr. William Harris – husband of Susanne, who he loves very much. He is the pilot of the balloon and the only one on board with balloon flying experience.

Miss Heather Sloan - a 9-year-old music prodigy, considered by many to be a “twenty-first century Mozart”.

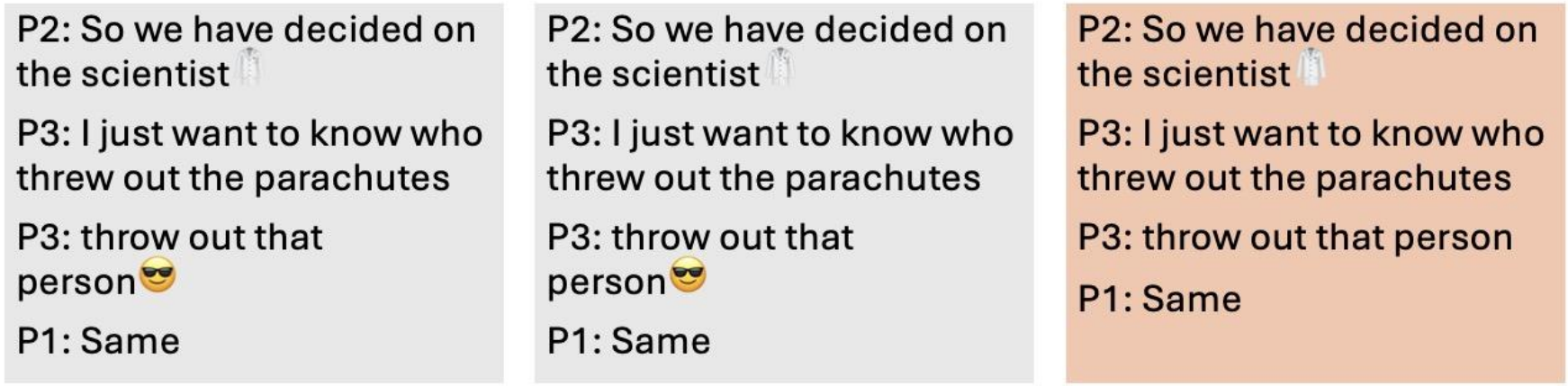
Among the three of you, come to an agreement about who is to be allowed to stay in the balloon, and who is to jump. You must discuss all 4 balloon passengers and consider the reasons why they should or shouldn’t remain in the balloon. Usually, the discussion lasts about 20 minutes. If you need more time, please feel free to continue.

Experimental design

Trigger words:
kill, vote, choose, throw, jump, kick, dump, drop, go for, lose, and *not save/keep*.

Spoof emojis were selected from the Emoji Sentiment Ranking (Kralj Novak et al., 2015):

incongruent: 😀 😊 😜 😇 😂 😄 😎
congruent: 😔 😫 😨 😟 😭 😓 😖



Rules for inserting emojis

- Participants within the same group were assigned to the same condition.
- Only one emoji was inserted at a time, no matter how many trigger words were included in the message
- Interventions were added to the end of a participant's message
- The emoji used and recipients were randomised across interventions
- No more than ten interventions were triggered within each dialogue.

Participants and their chats...

22 sessions were conducted (10 congruent and 12 incongruent)

6 did not trigger any intervention

16 triggered at least 1 intervention (8 and 8 for each condition)

Table 1: Demographics and conversation summary by condition and participant

Variable	Congruent	Incongruent
Age	M=30.50, SD=5.55	M=31.70, SD=7.20
Gender	11 Female, 13 Male	14 Female, 9 Male, 1 Unspecified
Total *N* of turns produced	917 (M=39.8, SD=27.4)	798 (M=34.7, SD=20.3)
Total *N* of interventions seen	37 (M=3.08, SD=1.56)	34 (M=2.83, SD=2.16)
Total *N* of emotive symbols used after the first intervention	45 (M=2.21, SD=2.65)	67 (M=2.83, SD=3.20)
– emojis	34 (M=1.31, SD=2.50)	58 (M=2.42, SD=3.30)
– emoticons	11 (M=0.46, SD=0.98)	9 (M=0.38, SD=0.92)

No significant differences were found between the two conditions in the number of turns (p=0.469) and the number of interventions seen by each participant (p=0.648).

More examples

(1)

250-20 *P1*	spontanoues	Maybe Robert is skinny
250-21 *P1*	spontanoues	We don't know that
250-22 *P2*	intervention	And if it's not enough, we have to throw another person 😂
250-23 *P3*	spontanoues	😂

(2)

245-7 *P2*	spontanoues	It seems reasonable to save Mr. Harris bc he can pilot the balloon
245-8 *P1*	spontanoues	I thought the same, he's needed
245-9 *P3*	spontanoues	I thought so too but then he clearly failed so far ..
245-10 *P2*	spontanoues	:(
245-11 *P3*	spontanoues	Child prodigies are annoying and should be thrown anyway 😂
245-12 *P1*	spontanoues	How do the others land without him?
245-13 *P1*	spontanoues	Hahahaha
245-14 *P2*	spontanoues	Lol, I was thinking along the same lines

Emotive symbols seen and used in groups

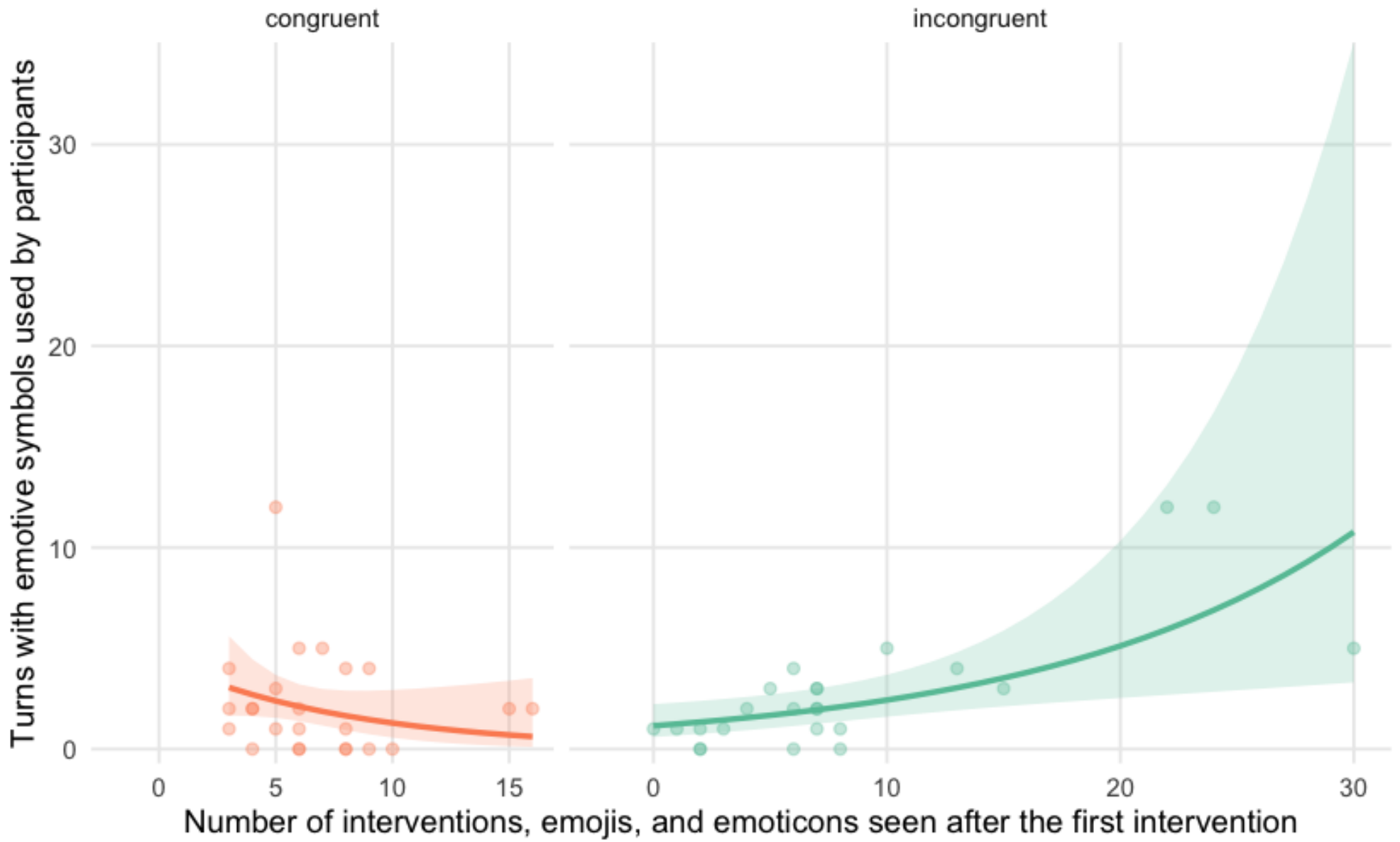
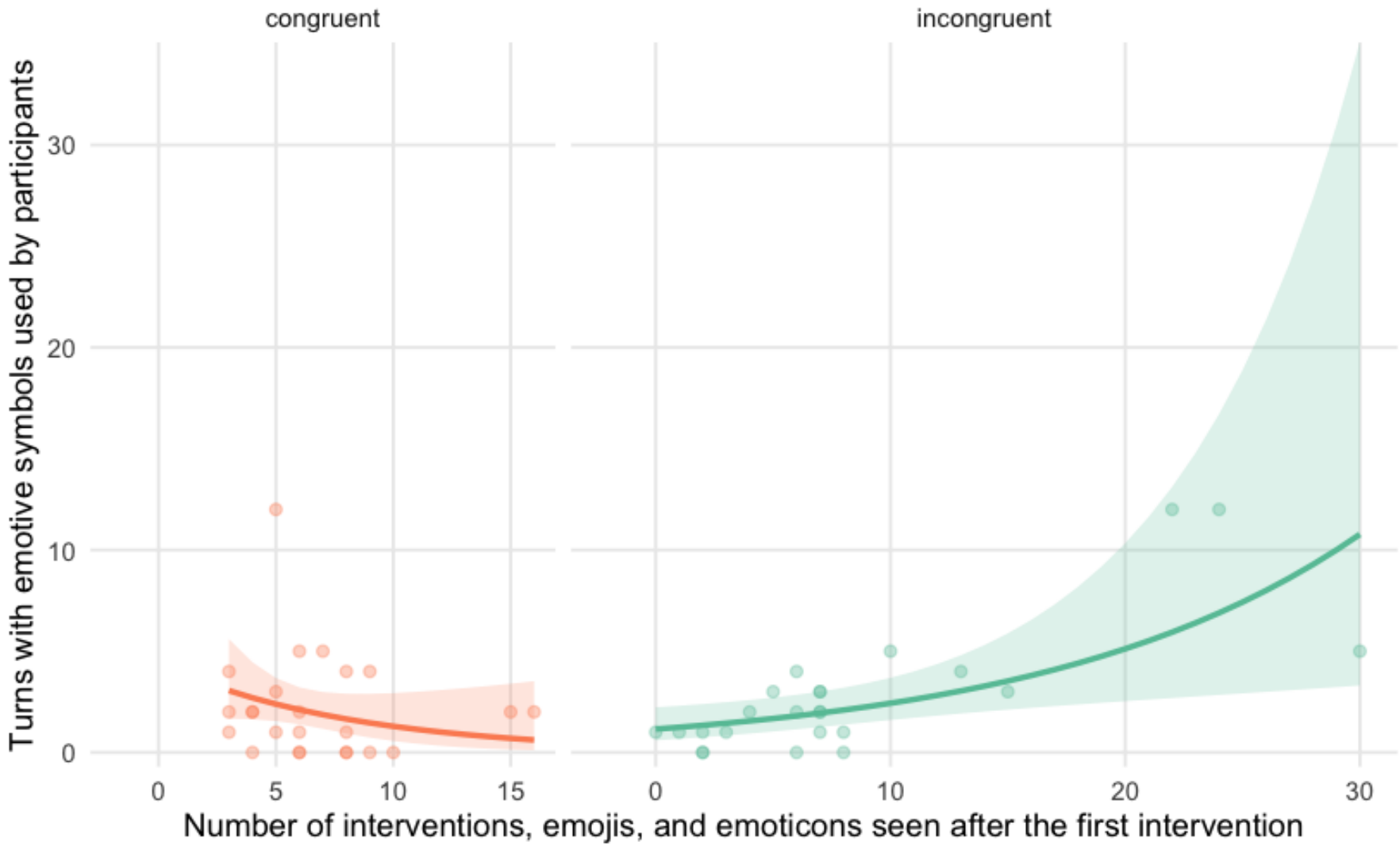


Table 3: Negative binomial GLMM predicting participants' emotive symbol use after the first intervention

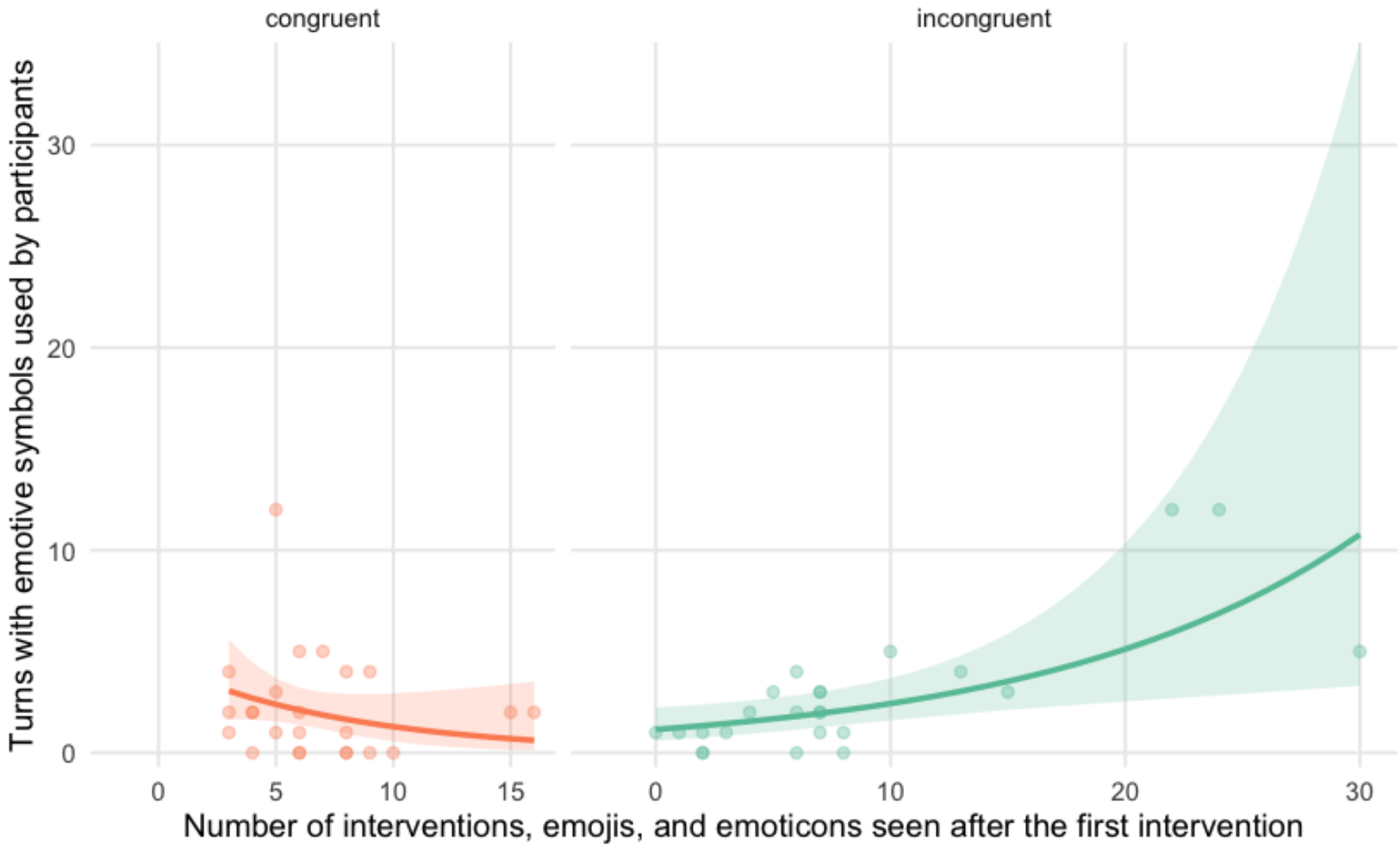
Predictors	**IRR**	**95% CI**	**p-value**
Intercept	2.86	[0.98, 8.36]	0.055
N of interventions and spontaneous emotive symbols seen after the first intervention	0.88	[0.75, 1.04]	0.141
Condition [incongruent]	0.26	[0.08, 0.84]	0.024
N of turns	1.01	[1.00, 1.02]	0.064
N of interventions and spontaneous emotive symbols seen after the first intervention × condition [incongruent]	1.22	[1.04, 1.42]	0.014



Sensitivity analysis :

After excluding the top 10% of exposure values within each condition, the interaction between exposure levels and condition remained statistically significant (β = 0.30, SE = 0.15, z = 2.01, p = .044).

The patterns remained the same after excluding the top 20%.



At exposure levels 1 to 8:

N_congruent > N_incongruent

Starting from 10 exposures,
N_incongruent > N_congruent

Incongruent emotive symbols may be more contagious than congruent ones, and their contagion effect became stronger as the number increased.

Emotive symbols in Time Windows

A **time window:** a certain number of turns after an intervention or a spontaneous emotive symbol, where more spontaneous emotive symbols may be used by other interlocutors.

Turn No.	
1	
2	
3	
4	
5	
6	
…	

TW1

Turn No.	
1	
2	
3	
4	
5	
6	
…	

TW2

Turn No.	
1	
2	
3	
4	
5	
6	
…	

TW3

Turn No.	
1	
2	
3	
4	
5	
6	
…	

TW4

Turn No.	
1	
2	
3	
4	
5	
6	
…	

TW5

Turn No.	Turn type	Sender	Apparent Sender	Recipient	
257-30	Artificial turn	server	p2	['p1', 'p3']	Killing the doctor is a great risk to humanity 😔
257-30-0	Intercepted turn	p2	p2	['p1', 'p3']	Killing the doctor is a great risk to humanity
257-31	Normal turn	p1	p1	['p2', 'p3']	😕👍👍
257-32	Normal turn	p3	p3	['p1', 'p2']	No
257-33	Normal turn	p3	p3	['p1', 'p2']	I disagree
257-34	Normal turn	p2	p2	['p1', 'p3']	The woman and the man are Most expendable
257-35	Normal turn	p2	p2	['p1', 'p3']	Maybe asking the man to Jupp is the best

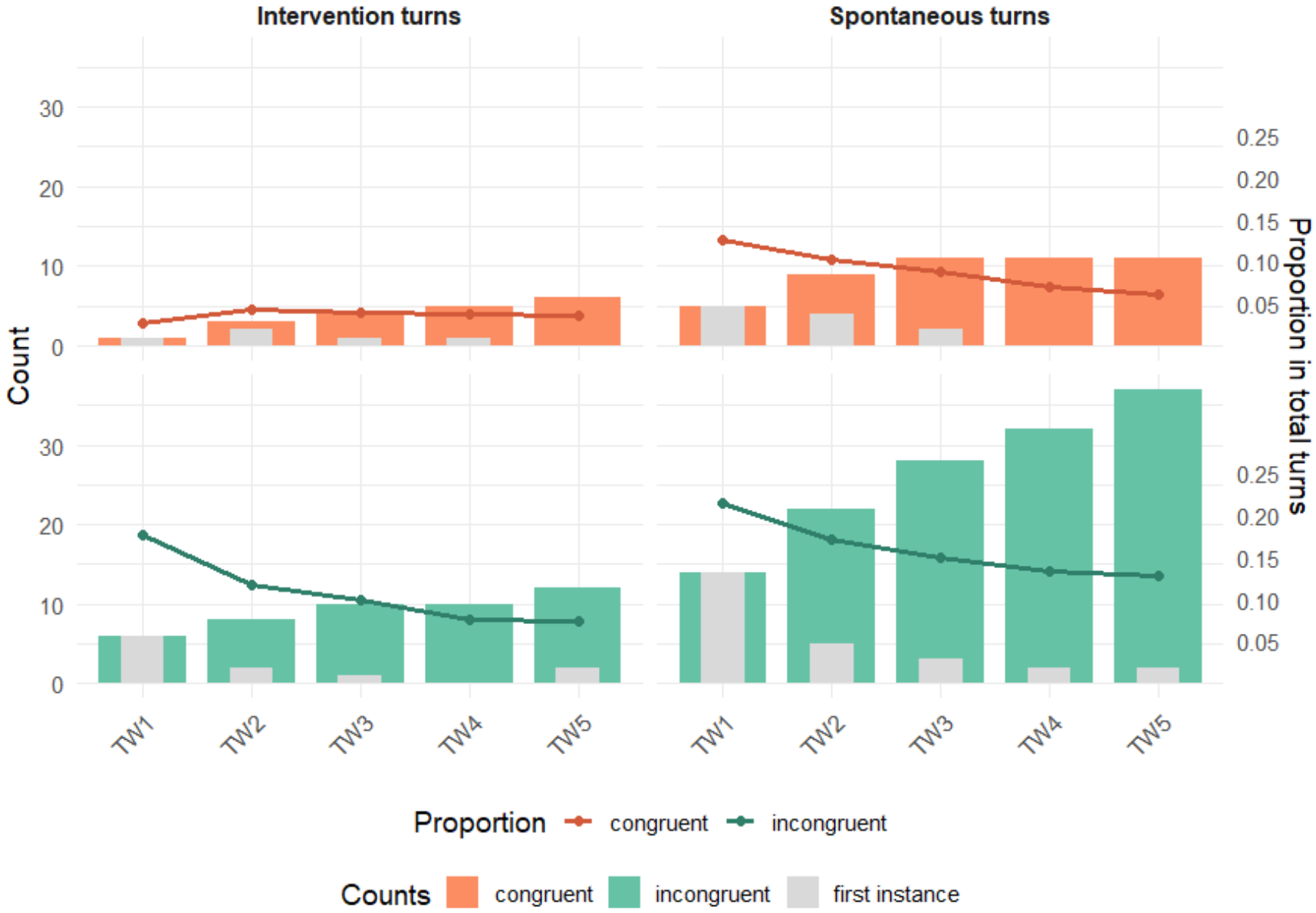
Turn No.	Turn type	Sender	Apparent Sender	Recipient	
257-30	Artificial turn	server	p2	['p1', 'p3']	Killing the doctor is a great risk to humanity 😔
257-30-0	Intercepted turn	p2	p2	['p1', 'p3']	Killing the doctor is a great risk to humanity
257-31	Normal turn	p1	p1	['p2', 'p3']	😕👍👍
257-32	Normal turn	p3	p3	['p1', 'p2']	No
257-33	Normal turn	p3	p3	['p1', 'p2']	I disagree
257-34	Normal turn	p2	p2	['p1', 'p3']	The woman and the man are Most expendable
257-35	Normal turn	p2	p2	['p1', 'p3']	Maybe asking the man to Jupp is the best

Emotive symbols in Time Windows

	Congruent	Incongruent
N of interventions inserted	37	34
- N of interventions followed up by emotive symbols within TW5	5	11
- N of turns with emotive symbols	6	12
N of spontaneous emotive symbols	40	65
- N of emotive symbols followed up by emotive symbols within TW5	11	26
- N of turns with emotive symbols	11	37

Emotive symbols in the incongruent condition, particularly in spontaneous turns, had more frequent bursts and fewer isolated cases, compared to the congruent condition

Emotive symbols in Time Windows



The incongruent condition, compared to the congruent:

- elicited more spontaneous emotive symbols
- had further-reaching impact on later TWs: more new instances in TW 4 and 5
- had higher proportions of turns containing emotive symbols

What emotional valences do they take?

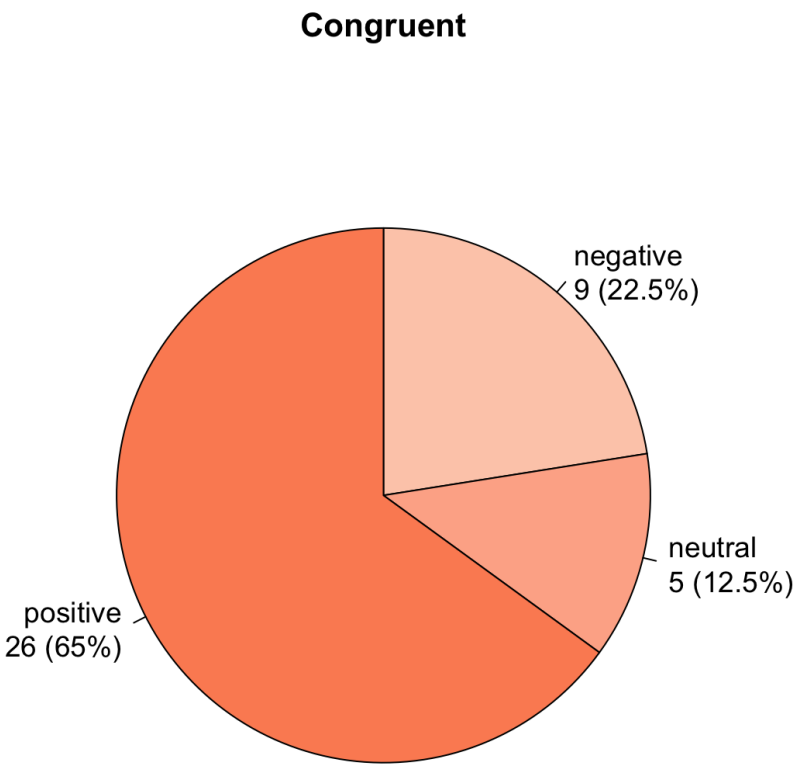
- A given turn is classified as Positive, Negative, or Neutral according to the **emotional valence** of the emotive symbols in Emoji Sentiment ranking. Cases with multiple emotive symbols of different emotional valences were annotated as Neutral.
- To apply the same ratings to emoticons, we translated each emoticon to the first emoji equivalent in the list of emoticons found on Wikipedia
- For a pair of turns containing emotive symbols, we code their **affective alignment**:

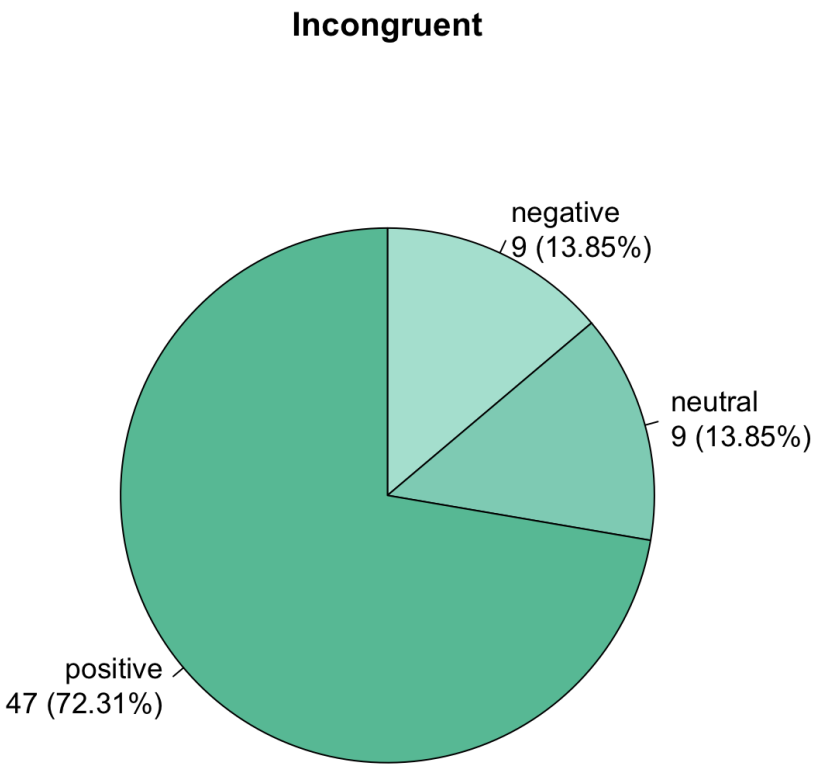
  If both turns are Positive or Negative → Consistent

  One turn is Positive, and the other is Negative → Inconsistent

  If either turn is Neutral→ Unclear

What emotional valences do they take?



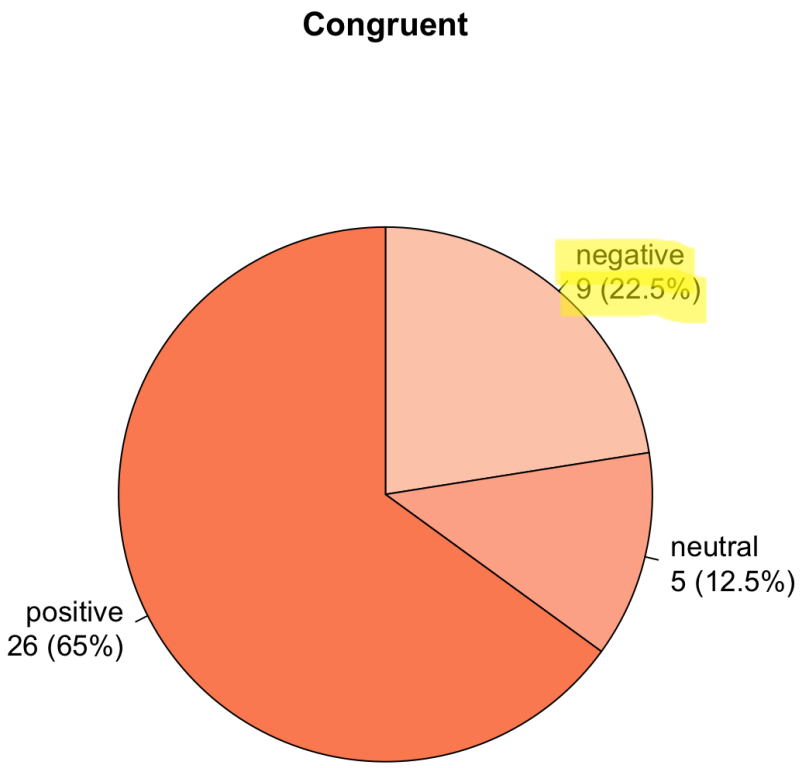


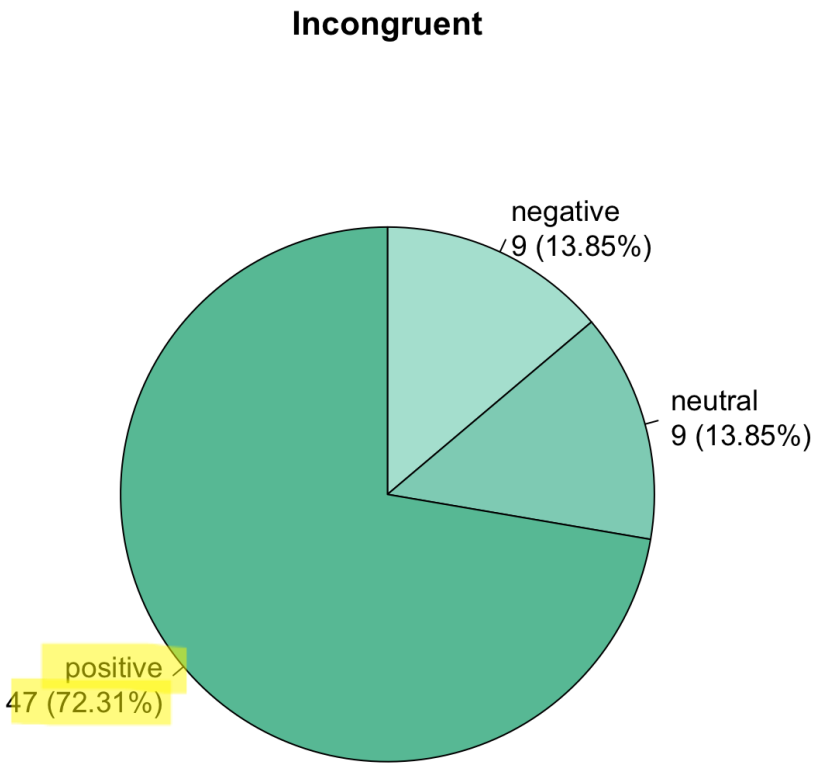
The association between emotional valence and condition was not significant ($\chi^2(2)=1.31$, $p=.521$, $N=105$).

In the incongruent condition, positive emotive symbols occurred slightly more often than expected (Std. Residual=1.69). In the congruent condition, negative emotive symbols occurred slightly more often (Std. Residual=1.76).

Still, the majority was positive.

Affective alignment with the interventions

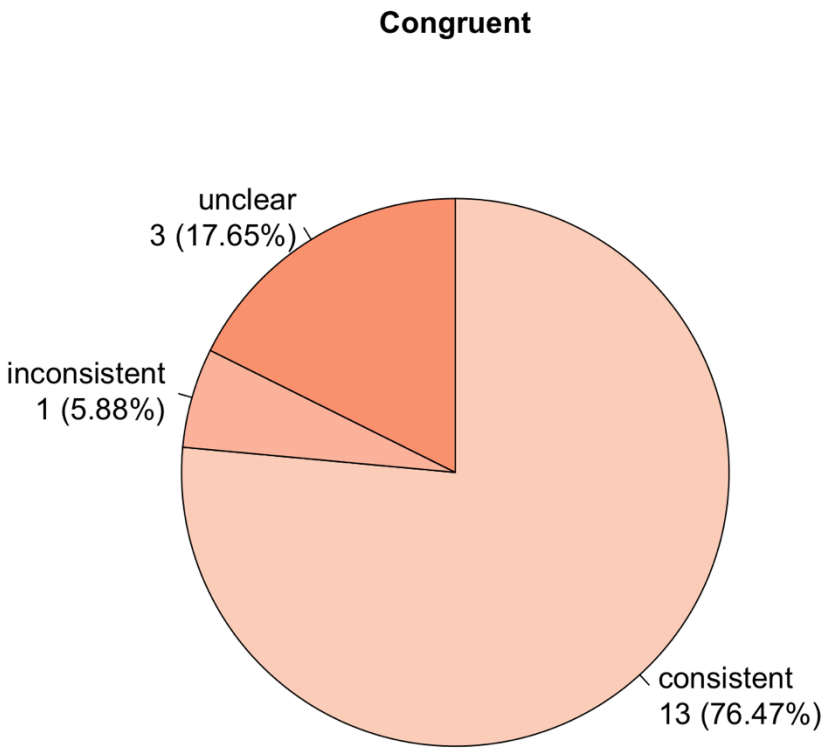


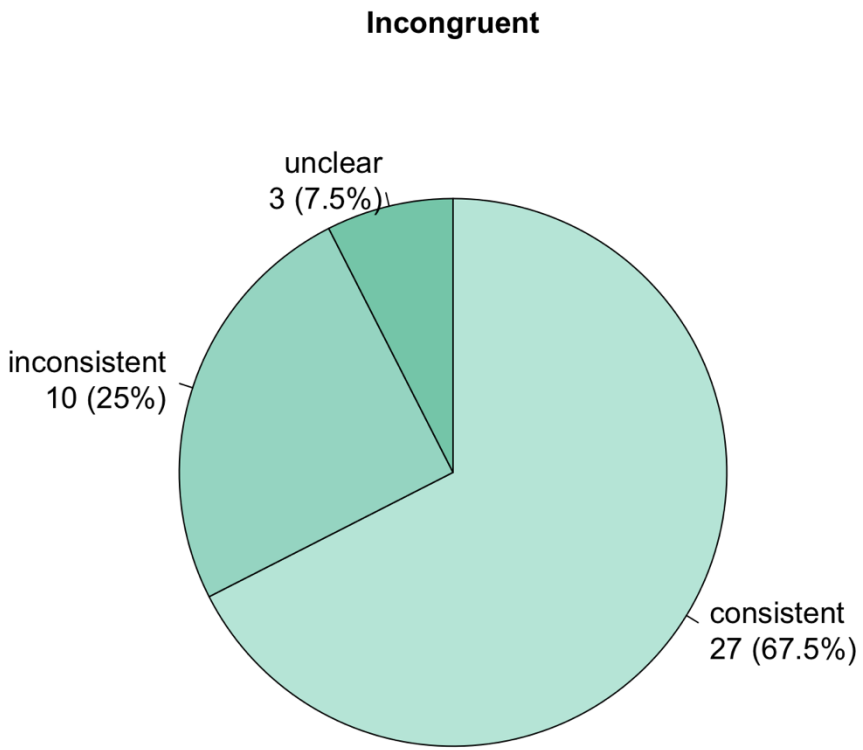


Compared to the incongruent condition, the congruent condition triggered fewer emotive symbols that were affectively aligned with the interventions.

Studies on social emotion regulation: the expression of negative affect often elicit soothing or tension-reducing responses, which are intended to provide social support as coping assistance (Thoits, 1986).

Affective alignment between 2 adjacent emotive symbols in 5 turns

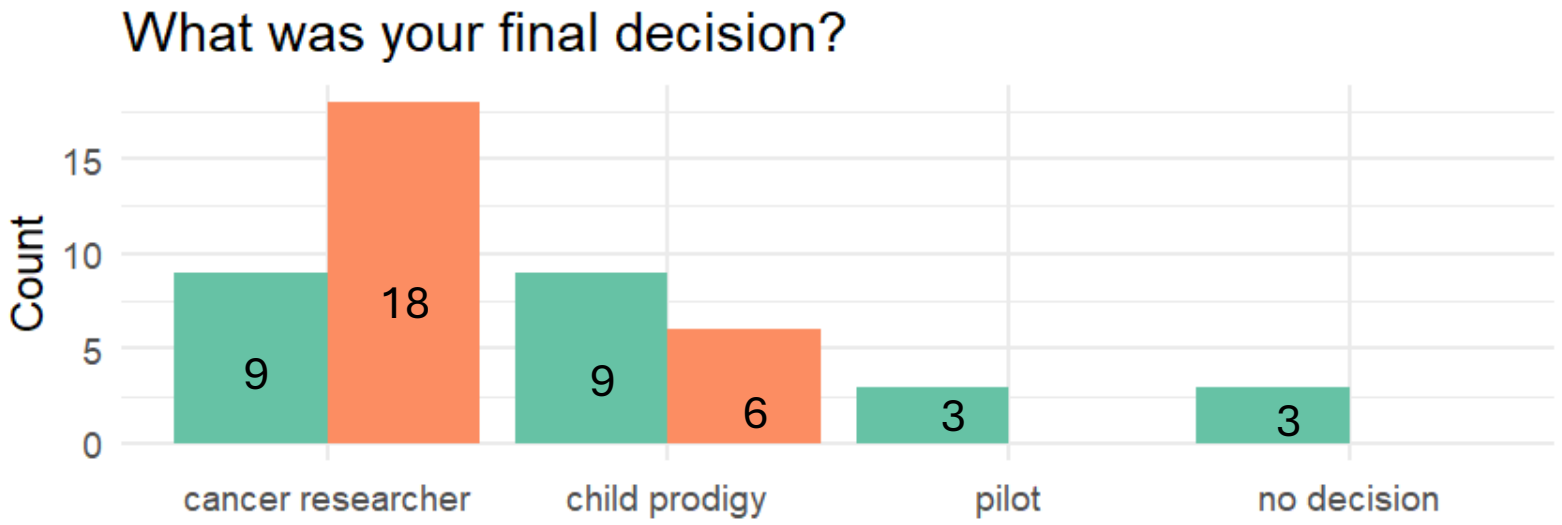




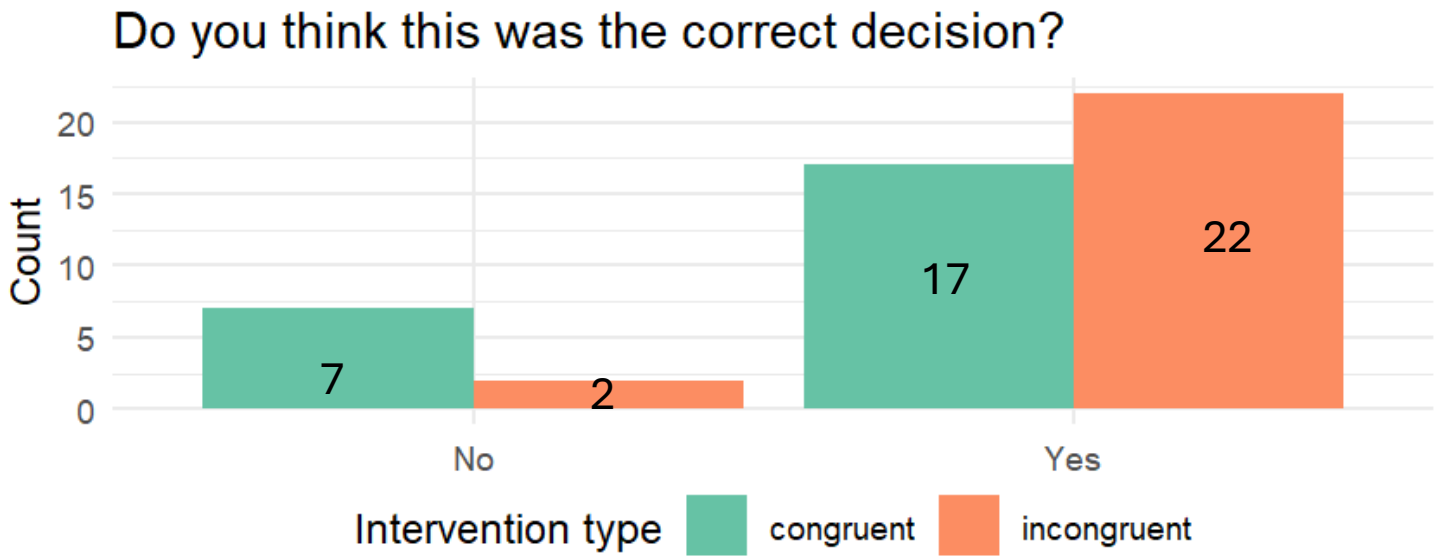
The association between affective alignment and condition was not significant (p=.20).

The congruent condition had a slightly higher proportion of affectively consistent and unclear responses than expected compared to the incongruent condition.

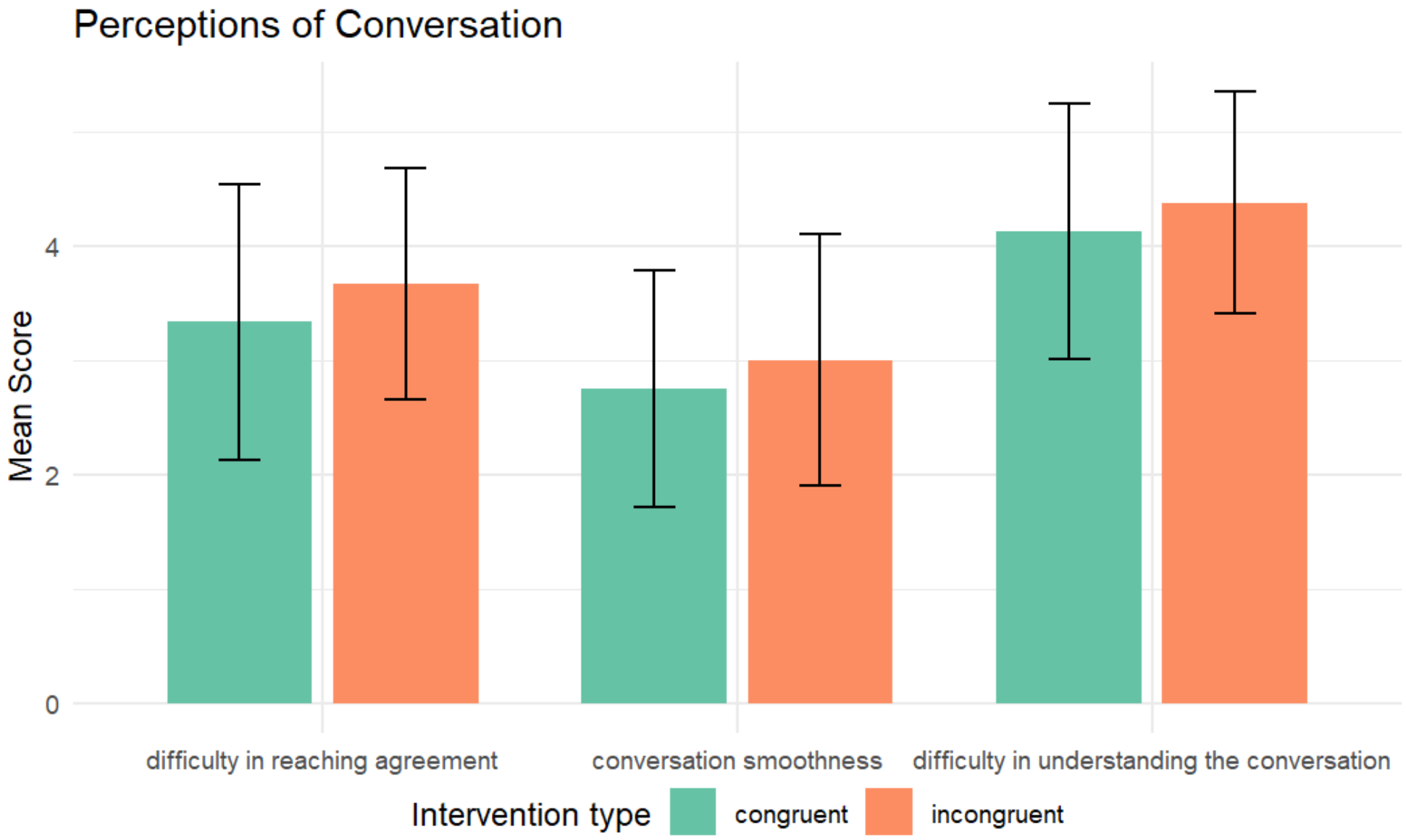
Still, being affectively consistent is the typical pattern.



No significant association between condition and the final decision (p=0.413, Cramer's V=0.447, N=16 groups)



No significant association between condition and the perceived rightfulness of decision ($\chi^2(1)$=3.42, p=.064, Φ=0.267, N=48 participants)



None of these differences were statistically significant (p=0.387, 0.394, and 0.458).

Did participants' perceptions changed with exposure?

- Cumulative Linear Mixed Models (CLMMs) were run, with group as random intercept.
- **Overall exposure** to interventions and spontaneous emotive symbols had a negative and sig. main effect on difficulty in coming to agreement (Odds Ratio=0.70, 95% CI [0.53, 0.92], z=−2.566, p=0.010).
- **Exposure to interventions** alone had a negative and significant main effect in the model on difficulty in understanding the conversation (Odds Ratio=0.44, 95% CI [0.22, 0.88], p=0.020).

This suggests that the use of emoji in online chats in general, is associated with lower perceived difficulty in communication

Summary of findings

Participants in the incongruent condition:

- made more active use of emotive symbols than those in the congruent condition, both across the conversation and immediately following exposure
- produced more bursts of emotive symbols
- were slightly more likely to take up the emotional valence of the interventions, but the emotive symbols within the same TW had more variable valences

This provides convergent evidence that incongruent emotive symbols are more socially engaging and emotionally contagious than congruent ones.

Summary of findings

Overall exposure level was associated with reduced difficulty in reaching an agreement and lower difficulty in understanding.

No significant condition differences in terms of emotional valence distribution, affective alignment, and perception measures.

Limitations

- Small sample size
- Baseline not measured
- Fixed emotional valences

Future directions

- The influence of emotive symbols on participants' linguistic alignment

    1) The relationship between spontaneous emotive symbols and the accompanying text

    2) Whether emotive symbols influence participants' tendency to agree or disagree with each other