

Guiding Oral Conversations: How to Nudge Users Towards Asking Questions?

CHIIR 2023



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What questions can you ask a voice assistant?



I have many role models. In March, let's celebrate women in particular!

Just ask, "Alexa, who is your female role model?"

WEEKLY SPOTLIGHT

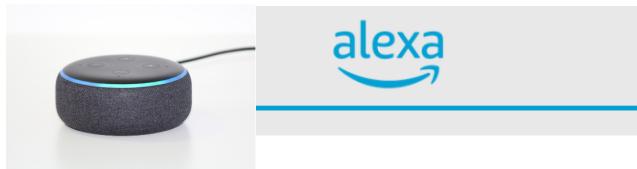
- "Alexa, play the GameStar Podcast on Amazon Music"
With Amazon Music you have from 3.-16. March the chance to win one of 50 PlayStation packages. [Eligibility requirements and learn more](#).
- "Alexa, surprise me!"
Try what happens when you let me surprise you!
- "Alexa, what is celebrated on International Women's Day?"

TO TRY

- "Alexa, play the 'Centerpiece' playlist"
- "Alexa, set a timer for 5 minutes"
- "Alexa, how will the weather be this weekend?"
- "Alexa, how long was Neil Armstrong on the moon?"
- "Alexa, connect my phone"
- "Alexa, how is the dog doing?"
- "Alexa, add toothpaste to my shopping list"

Before you forget, put it on your shopping list. [More on that](#).

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What you can ask Google Assistant

You can ask Google Assistant for info and for help with everyday tasks.

Important: Some queries won't work on all devices and in all languages.

For ideas about what Google Assistant can help with, ask "What can you do?"

What Google Assistant can do

Get local info

- **Weather:** What's the weather today?
- **Food:** Find pizza restaurants nearby.
- **Business hours:** Is Walgreens still open?
- **Navigation:** Navigate home.



Plan your day

- **Traffic:** How's the traffic to work?
- **Reminders:** Remind me to do laundry this evening. Remind me to call Mom every Sunday.
- **Calendar events:** When's my first meeting today? Add a meeting to my calendar.
- **Flights:** Is United flight 1463 on time?

Ask Google

- **Game updates:** Who won the Warriors game?
- **Calculations:** What's 20% of 80?
- **Dictionary:** What does "gregarious" mean?
- **Translations:** How do I say "Nice to meet you" in French?
- **Finance:** How's the S&P 500 doing?
- **Unit conversions:** How many kilometers in a mile?
- **Search:** Search for summer vacation ideas.
- **Image search:** Find pictures of kittens.
- **Web answer:** How do you remove wine stains from a rug?

Play media

- **Music:** Play some Jazz music.
- **Podcasts:** Play the latest episode from This American Life.
- **News:** Play the news. What's the latest news from BBC?

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Music and Podcasts	Smart Home	Everyday Tasks	Sports	Knowledge and Answers
Hey Siri, play something I can dance to	Hey Siri, turn the patio lights off in an hour	Hey Siri, split a \$213 check three ways	Hey Siri, what schools are in the Big Ten?	Hey Siri, what causes a rainbow?
as the is in	Everyday Tasks	Everyday Tasks	Calls and Texts	Smart Home
	Hey Siri, Apple Pay \$75 to Phillip	Hey Siri, what time is my first meeting tomorrow?	Hey Siri, share this with Lauren	Hey Siri, turn off the TV when I leave
Sports	TV and Movies	Everyday Tasks	Smart Home	TV and Movies
Hey Siri, who's playing baseball tonight?	Hey Siri, turn on subtitles	Hey Siri, start a yoga workout on Apple Fitness+	Hey Siri, play a song I like in the kitchen	Hey Siri, find movies starring Anne Hathaway

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What questions can you ask a voice assistant?

How about highlighting topics a question can be asked about?

Walter Gropius

From Wikipedia, the free encyclopedia

Walter Adolph Georg Gropius (18 May 1883 – 5 July 1969) was a German-American architect and founder of the Bauhaus School,[1] who, along with Alvar Aalto, Ludwig Mies van der Rohe, Le Corbusier and Frank Lloyd Wright, is considered one of the pioneering masters of modernist architecture. Gropius was also a leading architect of the Bauhaus movement.

Contents [hide]

- 1 Family and early life
- 2 Career
 - 2.1 Early career (1905–1914)
 - 2.2 Bauhaus period (1919–1933)
 - 2.3 Post-Bauhaus (1933–1969)
 - 2.4 The Architects' Group (1947–1969)
- 3 Death
- 4 Legacy
- 5 Selected buildings
 - 5.1 Gallery
- 6 See also
- 7 References
- 8 Bibliography
- 9 Further reading
- 10 External links



The **Staatliches Bauhaus**, commonly known as the **Bauhaus**, was a German art school operational from 1919 to 1933 that combined crafts and the fine arts. The school became famous for its approach to design, which attempted to unify the principles of mass production and handcraftsmanship.



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→ How can we do that in a voice assistant setting?

Nudging Example

Nudge a user towards asking about “Bauhaus School”

“Walter Adolph Georg Gropius was a German-American architect and founder of the Bauhaus School, who is widely regarded as one of the pioneering masters of modernist architecture.”

Nudging Example

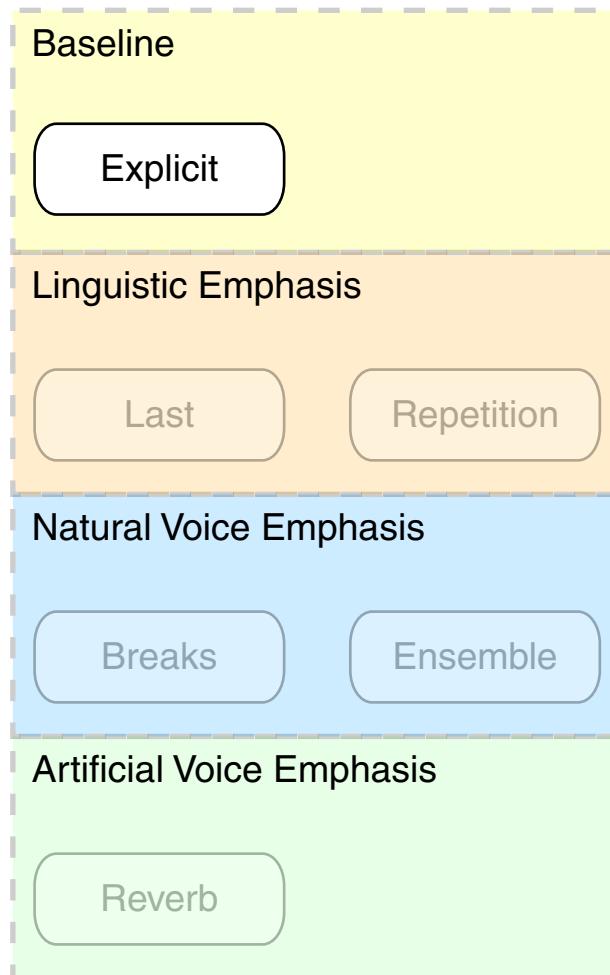
Nudge a user towards asking about “Bauhaus School”

“Walter Adolph Georg Gropius was a German-American architect and founder of the Bauhaus School, who is widely regarded as one of the pioneering masters of modernist architecture.”

“What else do you want to know about the *Bauhaus School*? ”

Nudging Techniques

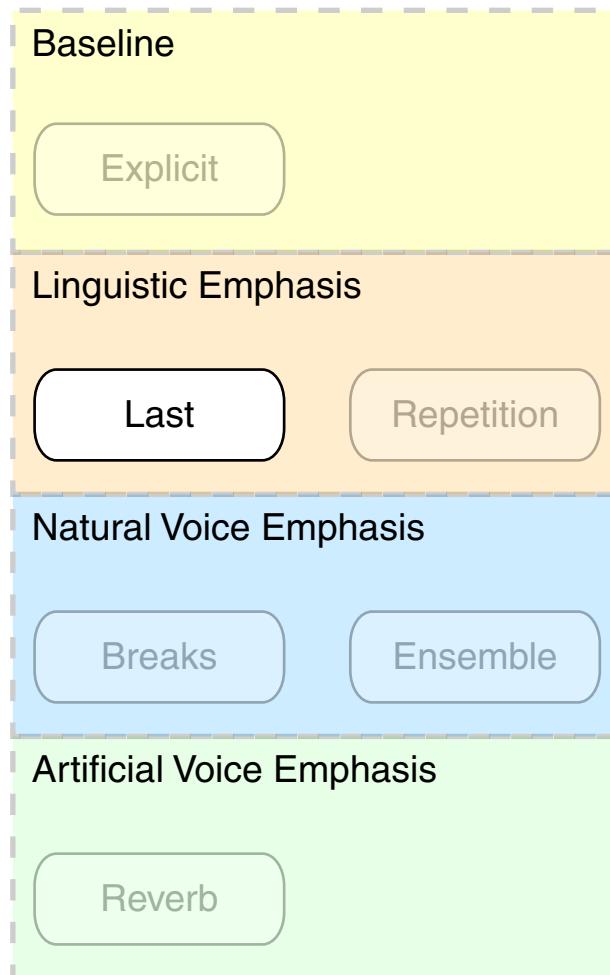
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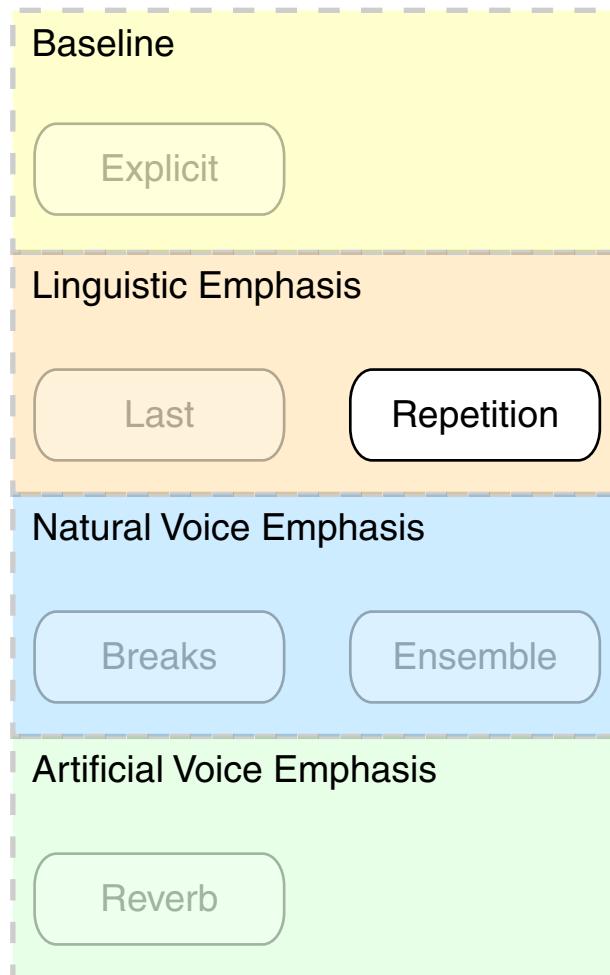
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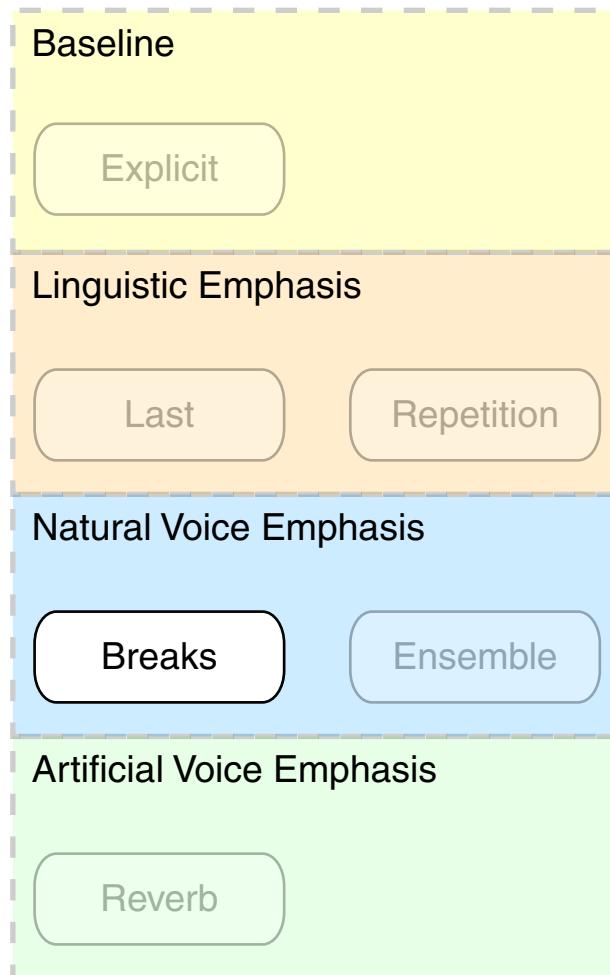
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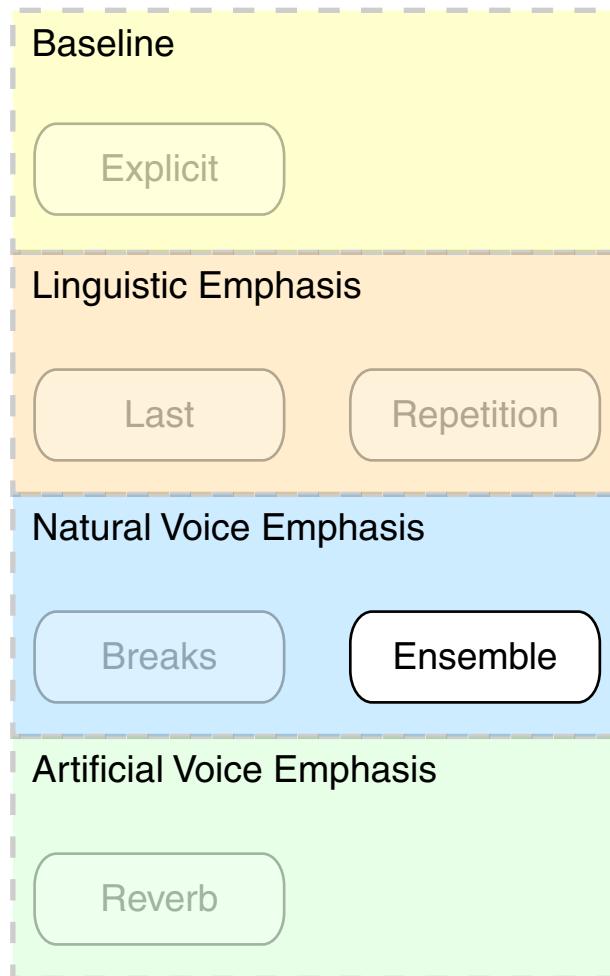
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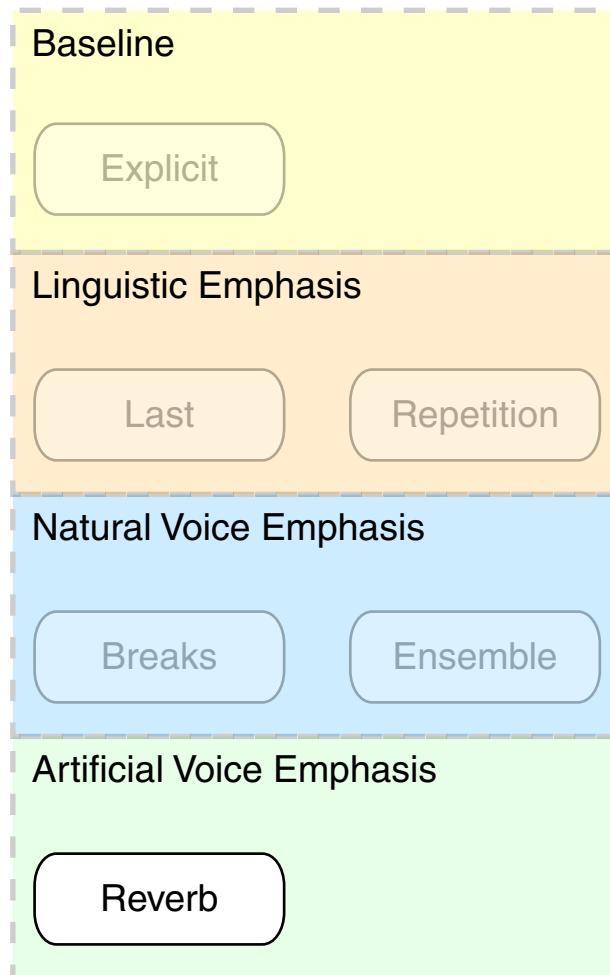
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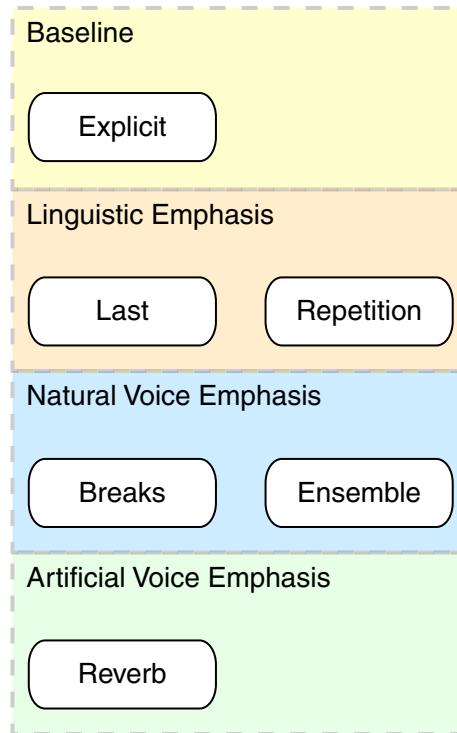
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Research Questions

RQ1 How effective are these nudging techniques?

RQ2 Does nudging make it easier for the user to ask a question?

RQ3 Does nudging affect the perceived naturalness of the speech?

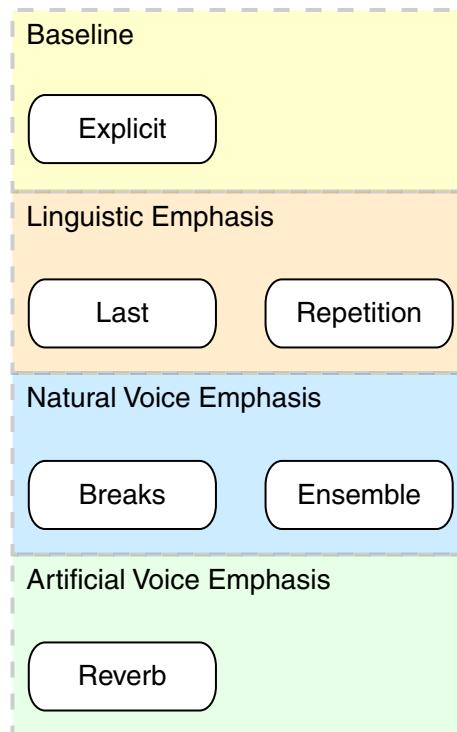


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Crowdsourcing Study on Amazon's Mechanical Turk

Task: While or after listening to an audio snippet, ask the first question that comes to your mind.

Study Design



Instructions

- This HIT requires solid proficiency in American English.
- Use headphones and ensure a quiet environment: return the HIT if you can not comprehend the audio snippets!
- When listening to the snippets, your focus should be on naming the first question that comes to your mind.
- Directly start typing the question as soon as you have one. Imagine you would interrupt the speaker to ask it.
- Avoid replaying a snippet. Only replay if you got distracted.

Study Design



Argumentation



For a political decision inform yourself about the pro and con arguments on UBI

Museum



Learn about the history of the Bauhaus in a museum exhibition.

Product Comparison



Compare products within a given category to make the best possible buying decision.

Study Design



A study configuration for a participant consists of ten audio snippets...

- ... in the context of one scenario



- ... to which one random nudging technique is applied



- ... with one of three random nudging targets per snippet

*“Walter Adolph Georg Gropius was a **German-American** architect and founder of the **Bauhaus School**, who is widely regarded as one of the pioneering masters of **modernist architecture**.”*

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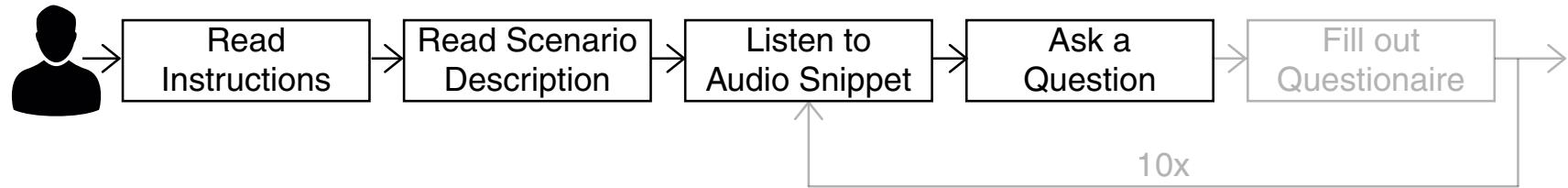


Photo: freepik.com
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Study Design



- Mental demand
- Temporal demand
- Performance
- Effort
- Frustration
- ~~Physical demand~~

NASA Task Load Index
[Hart, 2006]

- Curiosity
- Snippet clarity
- Snippet naturalness

Additional questions

Study Results

Statistics:

- 9,650 collected questions
- 965 participants

Questions	Questions about targets			
	none	one	two	three
8,376	4,340	3,657	301	78
	52%	44%	3%	1%

Number of non-discarded questions and their proportions asking about none, one, two or all three defined targets.

Study Results

RQ1: Effectiveness?

Relative frequency of questions about the nudged target ($n = 8,376$)

Technique	Class	Scenario				Total	
					Argumentation	Museum	Product Comparison
Explicit	Baseline	0.503	0.481		0.517		0.500
Repetition	Linguistic	0.328	0.200		0.155		0.228
Last	Linguistic	0.278	0.227		0.127		0.211
Ensemble	Natural	0.247	0.194		0.113		0.183
Breaks	Natural	0.222	0.189		0.125		0.178
Reverb	Artificial	0.218	0.151		0.088		0.151
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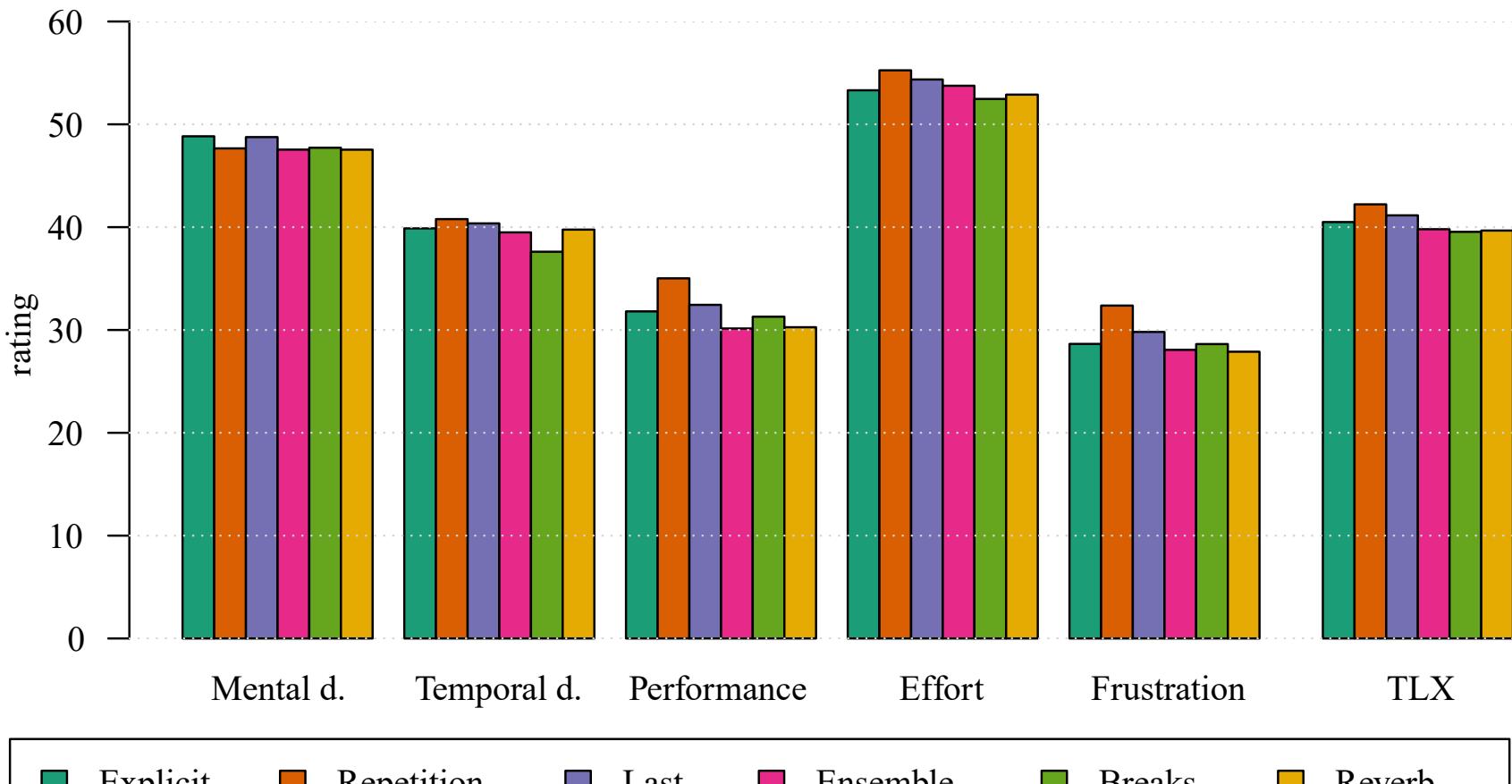
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The effectiveness of nudging depends on the scenario.

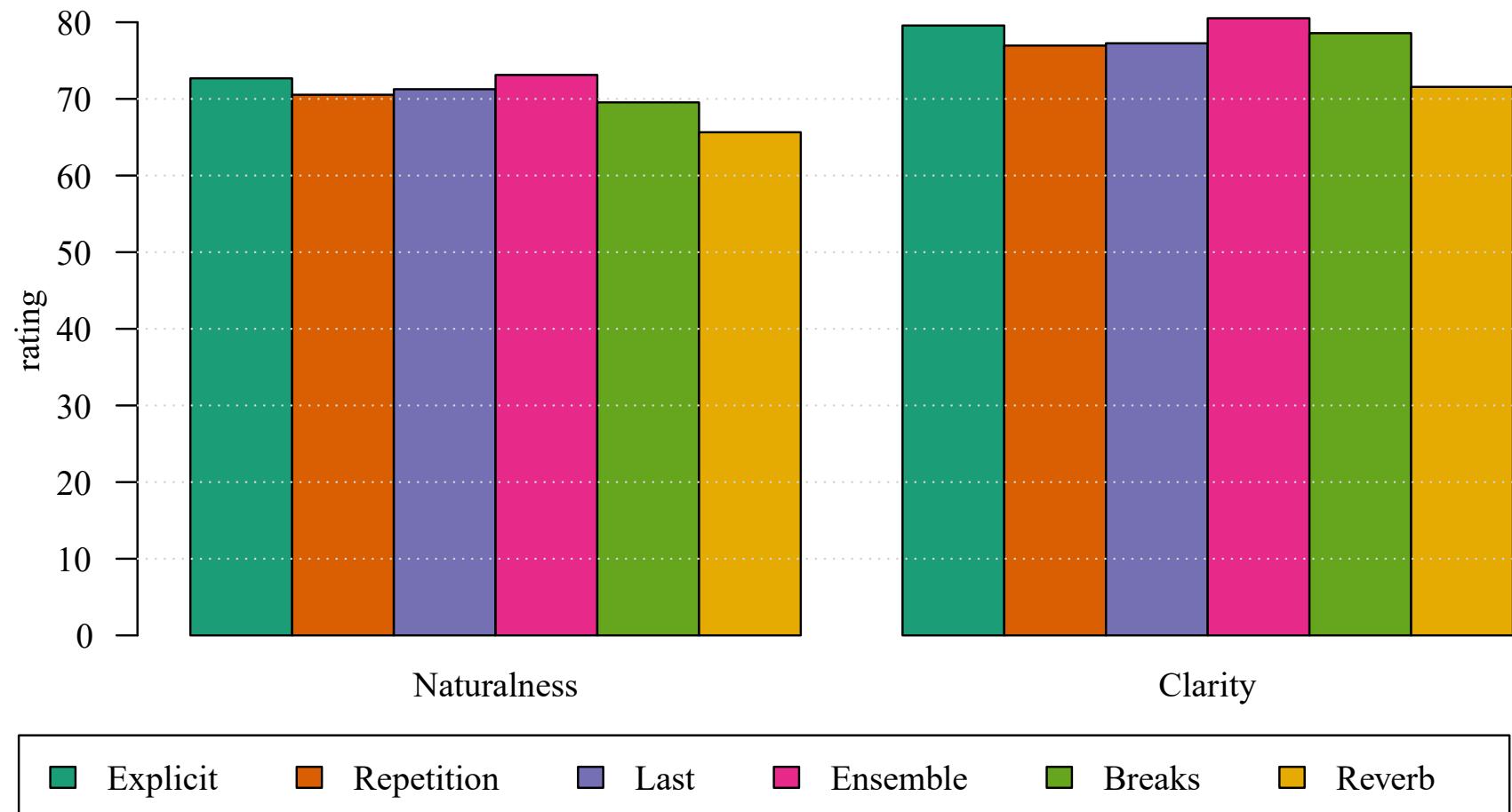
Study Results

RQ2: Nudging makes asking questions easy?



Study Results

RQ3: Effect of nudging on naturalness of speech?



Conclusion

We conducted a large-scale online study...

- ... with 965 participants
- ... which compares six nudging techniques 
- ... in three scenarios 

Study findings:

- RQ1:** All techniques have a certain nudging effect
explicit (50%) > linguistic (22%) > natural (18%) > artificial (15%)
- RQ2:** No significant influence on task load
repetition raises frustration and lowers satisfaction with performance
- RQ3:** Low impact of nudging on naturalness of speech
artificial emphasis affects the naturalness and clarity the most

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Code and Data:

<https://webis.de/data/webis-nudged-questions-23.html>

Thank you!