

```
mirror_mod = modifier_ob...
set mirror object to mirror...
mirror_mod.mirror_object =...
operation == "MIRROR_X":
mirror_mod.use_x = True
mirror_mod.use_y = False
mirror_mod.use_z = False
operation == "MIRROR_Y":
mirror_mod.use_x = False
mirror_mod.use_y = True
mirror_mod.use_z = False
operation == "MIRROR_Z":
mirror_mod.use_x = False
mirror_mod.use_y = False
mirror_mod.use_z = True
```

# LANGUAGE IN THE HUMAN-MACHINE ERA

## WHAT HAPPENS WHEN WE'RE ALL CYBORGS?



[HTTPS://LITHME.EU/INTRO/](https://lithme.eu/intro/)



```
types.Operator):
X mirror to the selected
object.mirror_mirror_x"
error X"
```

```
context):
context.active_object is not
```

# THE CHALLENGE

- “Within the next 10 years, many millions of people will ... walk around wearing relatively unobtrusive AR devices that offer an immersive and high-resolution view of a visually augmented world” (Perlin 2016: 85).



Behind Mark Zuckerberg big plans for #AR glasses 🕶️  
The Verge

[bit.ly/38RhhIW](https://bit.ly/38RhhIW) #VR #futureofwork #Wearables  
#AugmentedReality #AI #IoT #5G [OBJ] #meta  
#Metaverse



4:03 PM · Apr 14, 2022 · Buffer

<https://twitter.com/GlenGilmore/status/1514590144505991169>

More detailed forecast:

<https://lithme.eu/publications/>

# VARIOUS ADVANCES IN AUGMENTED REALITY TO APPEAR IN THE COMING YEARS, E.G. FACEBOOK'S *PROJECT NAZARE*



<https://youtu.be/BRJigpPrAe4?t=196>

<https://theverge.com/23022611/meta-facebook-nazare-ar-glasses-roadmap-2024>

<https://fastcompany.com/90741172/mark-zuckerberg-meta-ar-glasses-nazere-hypernova>

<https://protocol.com/entertainment/amazon-ar-xr-product-hires>

# A WIDE FIELD OF RESEARCH TO MIMIC HUMAN MOUTH/FACE MOVEMENTS...



<https://youtu.be/PJs3rICBk1E?t=115>

- Gimmicky for now, but longer term potential for interactive virtual characters
- And of course, deception and fraud

# ...INCLUDING SPECIFICALLY FOR LANGUAGE, AND INDIVIDUAL SOUNDS



audio-based lipsync

& some quick viseme tips

as told by the real

<https://youtu.be/3MaVemww5iU>

- ‘Visemes’ = visual facial movement for each phoneme
- AI enables an adaptive library of visemes
- Can then be mapped onto either virtual characters, or human faces in real time.

# SHAKE IT UP BY CHANGING YOUR VOICE IN REAL TIME WITH 'RESPEECHER'



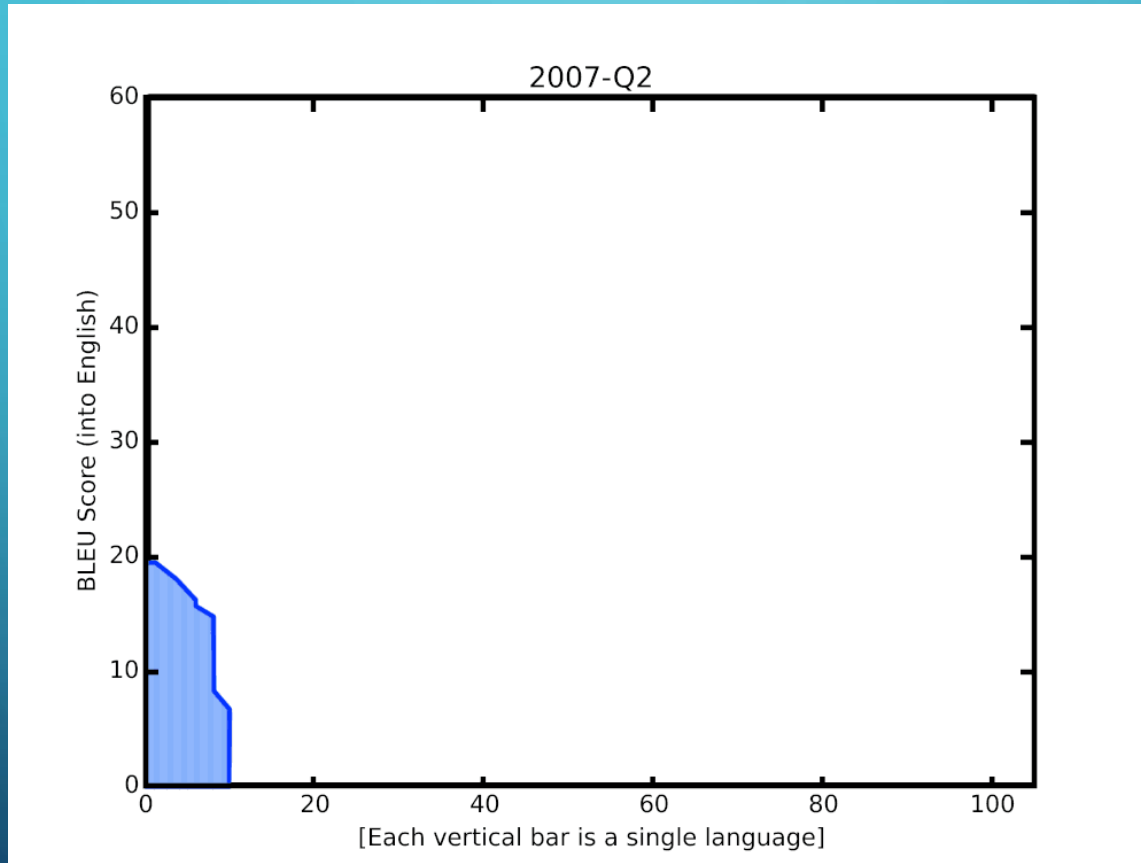
[https://www.youtube.com/watch?v=B78TE\\_zxx8w](https://www.youtube.com/watch?v=B78TE_zxx8w)

# BUT WHY TALK TO A HUMAN?



<https://youtu.be/DAMg14P6u8c?t=13>

# MEANWHILE, MACHINE TRANSLATION IS IMPROVING STEADILY



Reliability of Google Translate from 2006. English + ~100 other languages.

<https://ai.googleblog.com/2020/06/recent-advances-in-google-translate.html>



## BACK TO RESPEECHER

- “The startup’s voice cloning technology enables Respeecher to recreate someone’s voice and have that voice speak languages its originator may not know.”



- <https://voicebot.ai/2022/03/29/respeecher-offers-celebrities-ukrainian-speaking-voice-clones-for-video-messages-supporting-ukraine/>

## BRING IT ALL TOGETHER

- Real-time translation of *your voice, in your voice* (or in any voice!)
- ...while also augmenting your facial movements to match that language
- Interacting with virtual characters in any language, at any speed
- Imagine you have access to this right now. How might this change your interactions? At work? At home? On holiday?

Hey Siri,

# SPEAKING TO TECHNOLOGY

# SPEAKING THROUGH TECHNOLOGY



- Currently, tech mainly supplements or passively mediates our interactions  
e.g. checking something on your phone      e.g. conversing via social media
- The human-machine era = substantive conversation with machines (speaking to tech), and tech fully augmenting interactions (speaking through tech)



“The main focus for Amazon in the near future is on making Alexa’s ... language more natural and tailored to us. That could mean infinitely smarter conversational skills.”

<https://techradar.com/news/alex-a-what-will-you-be-able-to-do-in-2030>

See also: Yu et al. 2019. Gunrock: A Social Bot for Complex and Engaging Long Conversations. <https://arxiv.org/abs/1910.03042>

Google: “One of our brilliant designers... noticed in user studies that the most awkward part of the interaction was the beginning of the conversation. He made a visual screen with a standard message that the user could just show to the other person to break the ice.”

<https://medium.com/google-design/a-fish-in-your-ear-134deed70268>

# SPEAKING TO TECHNOLOGY

Substantial, complex conversation & interaction entirely with machines, for example:

- A language learning partner (or virtual worlds of them), using improved real-time translation and conversational AI
- Robot lawyers (even judges) interpreting law and legal cases, including interacting directly with clients
- Virtual assistants helping with more complicated decision-making, problem-solving, tailored to your cognitive capacity

# SPEAKING THROUGH TECHNOLOGY

## Human-machine collaboration

Not just a passive medium to carry messages, but fully augmenting our talk, e.g

- Translating your speech into another language, in your voice (in an earpiece)
- ...while changing your facial movements to match the language (AR glasses)
- Checking facts & details with AR during a conversation, in real time

Fundamental questions arise:

- How many 'interlocutors' are there now?
- Might "machine translationese" simplify language structures?
- Could this reduce incentives to learn languages at all?
- ...but also reduce inequality in terms of basic access to services?

# ETHICAL QUERIES

- Lots of breathless enthusiasm about new language tech
- But calm scrutiny is important
- For example, access to new and potentially liberating technology will follow familiar limits of social disadvantage
- Unintended consequences, e.g. reducing incentives for states to provide higher quality translation if machine translation is good enough
- Subtle new inequalities, e.g. tech better in some languages than others, and for sign languages noticeably poorer for the foreseeable future...
- <https://theatlantic.com/technology/archive/2017/11/why-sign-language-gloves-dont-help-deaf-people/545441/>



LANGUAGE IN THE HUMAN-MACHINE ERA  
[WWW.LITHME.EU](http://WWW.LITHME.EU)

*FOUR YEARS TO REINVENT LINGUISTICS!*

A NETWORK FUNDED BY THE EU 'COST' PROGRAMME (2020-24)

# OVERALL STRUCTURE

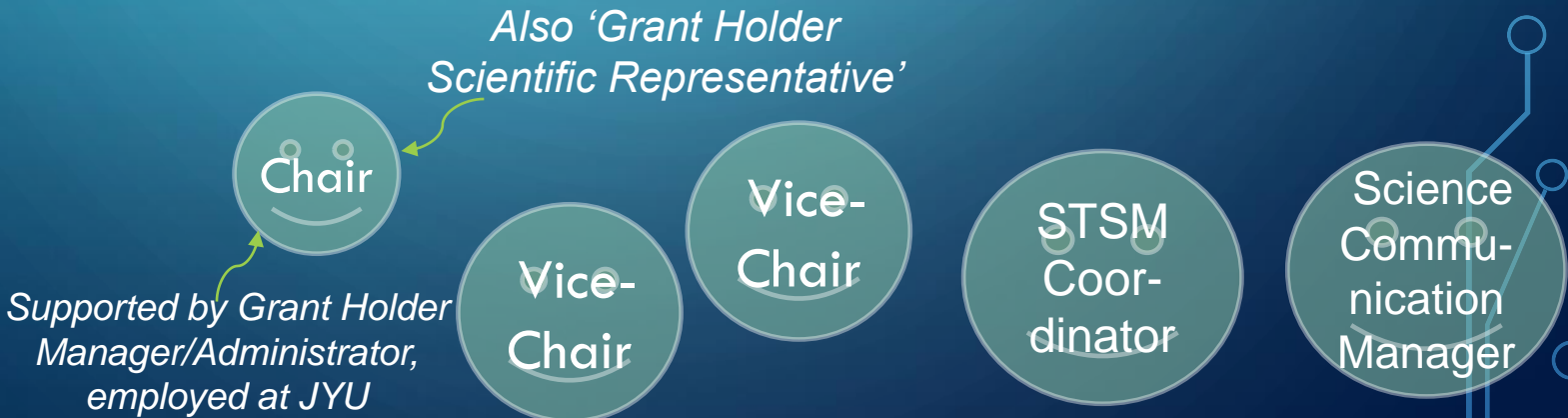
8 Working Groups, to represent different sub-disciplinary areas



Receive WG1 forecast

Report practical/ethical implications for developers

Key leadership positions





# WG1: COMPUTATIONAL LINGUISTICS

- Computational linguists, AI scientists, User Interface specialists, etc.
- Main task: forecast future language tech, how we'll be speaking to & through technology
  - e.g. text summarisation algorithms; topic modelling; context summarisation; automatic speech recognition; information extraction (including question-answering); text-to-speech; natural language understanding; cross-lingual information extraction.
- Chair & Vice-Chairs oversee a periodically updated, accessible forecast of future lang tech, 'The dawn of the human-machine era'

## WG2: LANGUAGE AND LAW

- International law: might future machine translation help with incongruencies between different language versions?
- Legal informatics: automated processing of legal texts
- New crimes: AI voices imitating other people (fraud, identity theft, phishing, cyberwarfare)
- Copyright: can AI output be copyrighted?
- Etc...

## WG3: LANGUAGE RIGHTS

Three major topics of interest:

- **Disaster response**

- immersive live machine translation allowing safe communication
- But concerns over unequal access, quality in smaller languages

- **Deaf communication, accessibility**

- smart gloves and intelligent bots like signing avatars
- Likely to remain worse than humans for some time

- **Linguistic minorities**

- Improved tech could ease access to services, democracy, etc.
- But inequality between languages may persist

# WG4: LANGUAGE DIVERSITY, VITALITY AND ENDANGERMENT

- Potential to gauge and bolster vitality of minority languages
  - e.g. by future versions of ‘always-on’ devices (like Alexa)
- Enhanced natural language understanding could automate data-banking & analysis
- Imagine a scenario with a mobile app tracking real-time use of different languages, creating personal linguistic profiles, ‘gamifying’ language vitality
- But... privacy & ethical concerns, and unequal access to tech

## WG5: LANGUAGE LEARNING & TEACHING

- Learn a language with VR, entering a world of virtual people speaking at your level, at your pace, with endless patience
- Could this raise confidence in speaking with humans?
- How could it change the profession of language teaching?
- But, meanwhile, more advanced real-time AR translation devices could reduce incentives to learn languages at all

## WG6: IDEOLOGIES, BELIEFS, ATTITUDES

- Evolution of debates about language & tech (see Squires 2010)
  - pessimism vs. optimism (“technology is ruining language” v. “technology will enhance democratic discourse”)
  - ideologies of multi/monolingualism (“technology is a threat/opportunity for linguistic diversity”)
- More fundamentally...
  - Could language come to be seen as a kind of algorithm?
  - Could technology ‘deterritorialise’ languages, making them publicly available codes freed from nationalistic baggage?

Squires,L.2010. Enregistering Internet Language. *Language In Society* 39: 457–492.

## WG7: LANGUAGE WORK, LANGUAGE PROFESSIONALS (INC. TRANSLATORS AND TERMINOLOGISTS)

- Machine translation already drives down wages for human translators, and may do the same for language teachers
- What impact on translation ethics? And how will theories of translation and cognition be expanded/revised?
- What will training for lang professionals look like in the human-machine era?

## WG8: LANG VARIATION/CHANGE/CONTACT, PRAGMATICS, INTERACTION

- Speaking *to* and *through* technology, who/what are the interlocutors?
- Would we adapt our speech to machines? Could that begin to influence community norms? (see Cohn et al. 2019)
- AR influencing turn-taking. New politeness strategies & pausing manoeuvres if we're constantly subtly consulting AR?

Cohn, M. et al. 2019. Imitating Siri: Socially-mediated vocal alignment to device and human voices. *International Congress of Phonetic Sciences (ICPhS)*.



# ACCESS OUR WORK!



- Animations and public survey:
  - [lithme.eu/animations](https://lithme.eu/animations)
- Open access report:
  - [lithme.eu/publications](https://lithme.eu/publications)
- New book! Coming in 2024 (hopefully!) with MIT Press

# FOUR YEARS TO MAKE CONNECTIONS

- WG1 produces periodic reports, forecasting new tech
- WGs 2-8 work out implications for theory, methods, data collection/analysis
- New insights and ways to reinvent linguistics for the human-machine era

## Comments from the COST Scientific Committee:

- “To comply with the COST Excellence and Inclusiveness Policy, in the implementation of the Action: • - the level of involvement of Inclusiveness Target Countries (ITCs) **should be maintained** and the plans described in the proposal for ensuring ITC involvement should be implemented; • - the level of involvement of Early Career Investigators (ECIs) **should be increased** and a plan should be developed and implemented to ensure the **full involvement of ECIs** in all aspects of the Action's implementation (including in Action leadership positions); - the gender balance should be maintained and a plan should be developed and implemented to **ensure gender balance in all aspects** of the Action's implementation (including in Action leadership positions).”

# FOUR YEARS TO MAKE CONNECTIONS

- WG1 also tasked with contacting tech companies
- Years 1-2, inviting them into the network, to learn from them, and for them to learn from everyone else
- Years 3-4, developing a structure for sustainable dialogue between linguists and developers
- Along the way and afterwards, advocacy about ethics, safety, equality in these new technologies
  - <https://www.aies-conference.com/2021/>

# EVERYONE IS WELCOME!

COST allows anyone to join at any time.

A range of fully-funded opportunities:

- Working Group meetings
- Larger annual conference
- ‘Short Term Scientific Missions’
- ITC conference grants
- Summer training school
- <https://lithme.eu/join-us>

