Welcome to the MultiVRse

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MultiVRse

A VR world that immerses a user in **realistic**, **culturally aware**, scenarios with **AI-powered** language support tools that evoke nuanced and goal-oriented language learning experiences.

Experiment design

HUMAN V.S. AI
ON THE OTHER SIDE

(In both conditions, users are allowed to use any technologies, such as their phone or dictionary, they would normally use to help them communicate)

RESEARCH QUESTIONS => TASKS

When engaging with AI, would users feel more engaged or anxious?

Would they feel less embarrassed about making mistakes?

Would they try harder or less hard to communicate well (operationalized by usage of language support tools)?

Why this Scenario

✓ Real life event

✓ Semi-open ended

✓ Clear goals
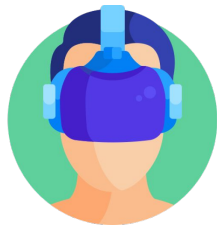
✓ Involves non-trivial, context specific vocabulary

Multivrse A visit to the mechanic

Scenario #1

START

Experiment design

Instructions
(AI or not AI)

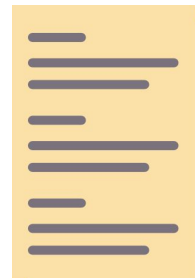
Situational
Prompt Video

Goal-oriented
conversation in VR

WoZ script

Experiment [RE]design #2
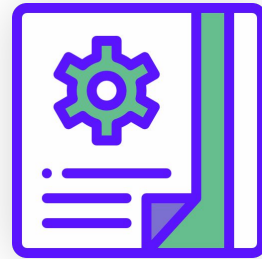
Insight: Videos left users to make too many assumptions

[Before]

Situational Prompt Video

[After]

Detailed written instructions

Interface redesign #1: Instructions 📓

Background information for users in native language (Chinese)

任务介绍（在任务开始之前）

你每天上下班单程20英里都是开着你的2010年丰田凯美瑞（里程数为13,0000英里）。车子每开5000英里，你都会按时更换机油，并且在之前的三年内，你的车子没有出现任何问题。

上周，你发现你的车子有点怪怪的，你几次听到引擎有持续好几分钟滴答滴答的怪声音。上周三，你下高速的时候闻到通风口有焦味，但当你到达工作的地方时，气味消失了。并且，你在自家车库里发现常停车的地上有水渍。车子的仪表盘上各项指标都没有显示有任何问题，一切正常。

昨天，你从家开去上班的途中，大量热气从引擎盖中喷出。你在路边停下车，等了10分钟热气消散后，还是无法启动你的车子。拖车公司把你的车拖到修理厂，现在你正在和修理人员讨论如何修理你的车子。你有全额保险，所以不需要担心价格。

你的电话号码：650-387-9745
保险公司名称：CompAuto
保险公司电话号码：650-938-1151

Key points to refer to during the interaction

提醒（任务过程中）
- 2010年丰田凯美瑞，130000英里
- 每5000英里换机油，三年没有出现问题
- 仪表盘上各项指数都正常
- 上周
  - 引擎发出滴答的奇怪声响
  - 排气孔有焦味
  - 停着车的地上有水渍
- 昨天
  - 引擎盖有大量热气冒出
  - 车子停下后，无法再次发动
- 你的手机号码是650-387-9745
- 你有CompAuto的全额保险，电话650-938-1151

Description of problems with their car

文

Interface redesign #1: WOZ Side

MultiVRse: Mechanic

▶ 0:00 / 0:02 ▬▬●▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ 🔊 ⋮

Hi there, welcome to Joe's.

▶ 0:00 / 0:02 ▬▬●▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ 🔊 ⋮

I see your car was towed in yesterday.

▶ 0:00 / 0:02 ▬▬●▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ 🔊 ⋮

The 2010 Camry, right?

▶ 0:00 / 0:02 ▬▬●▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ 🔊 ⋮

Ok. Can you describe the problem?

▶ 0:00 / 0:02 ▬▬●▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ 🔊 ⋮

When did you start noticing these problems?

▶ 0:00 / 0:03 ▬▬●▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬ 🔊 ⋮

Did you notice anything happening with the temperature gauge?

Text to speak:

Did you check under the hood?

text *ssml*

Language / locale
English (United States)   ▼

Voice type
WaveNet   ▼

Voice name
en-US-Wavenet-D   ▼

Audio device profile
Default   ▼

Speed: 1.00
▬▬●▬▬▬▬▬▬▬▬▬▬▬▬

Pitch: 0.00
▬▬▬▬▬▬●▬▬▬▬▬▬▬

Show JSON ⌄

▶ SPEAK IT

Pre Recorded phrases on soundboard

**Real-time phrases**

Using AI, to WOZ AI
With Google Cloud Text-To-Speech (WaveNet)

Interface redesign #1: Revised Script

Example script and some expected lines:

- *Mechanic: Hi there, welcome to Joe's.*
- *Mechanic: I see your car was towed in yesterday.*
- *Mechanic: The 2010 Camry, right?*
- *Mechanic: Ok. Can you describe the problem?*
- *Mechanic: When did you start noticing these problems?*
- *Mechanic: Did you notice anything happening with the temperature gauge?*
  - *User: (should be "no")*
- *Mechanic: Did the check engine light come on?*
  - *User: (should be "no")*
- *Mechanic: How often do you get the oil changed?*
- *Mechanic: Did you hear any noises from the engine?*
- *Mechanic: Did you smell anything strange?*
- *Mechanic: Did you notice any leaks or wet spots on the ground?*
- *Mechanic: It sounds like your engine overheated.*
- *Mechanic: Let me take a look at it.* (opens hood)
- *Mechanic: Yeah, you can see the engine damage here.* (points to engine)
- *Mechanic: Looks like you had a coolant leak.* (points to coolant)
- *Mechanic: Should take a couple of days to fix.*
- *Mechanic: Do you have insurance, or are you paying yourself?*
- *Mechanic: What's the insurance company's name and number?*
- (if user asks about price) *Mechanic: It should cost around $3,000.*
- *Mechanic: What's your phone number?*
- *Mechanic: I'll call you when it's ready.*
- (if user asks about time) *Mechanic: Should take a couple of days to fix.*
- *Mechanic: You can use a loaner car until then.*
- *Mechanic: It's the red Ford Focus out front. The key is in the glove compartment.*
- *Mechanic: Any other questions?*
- *Mechanic: Goodbye.*
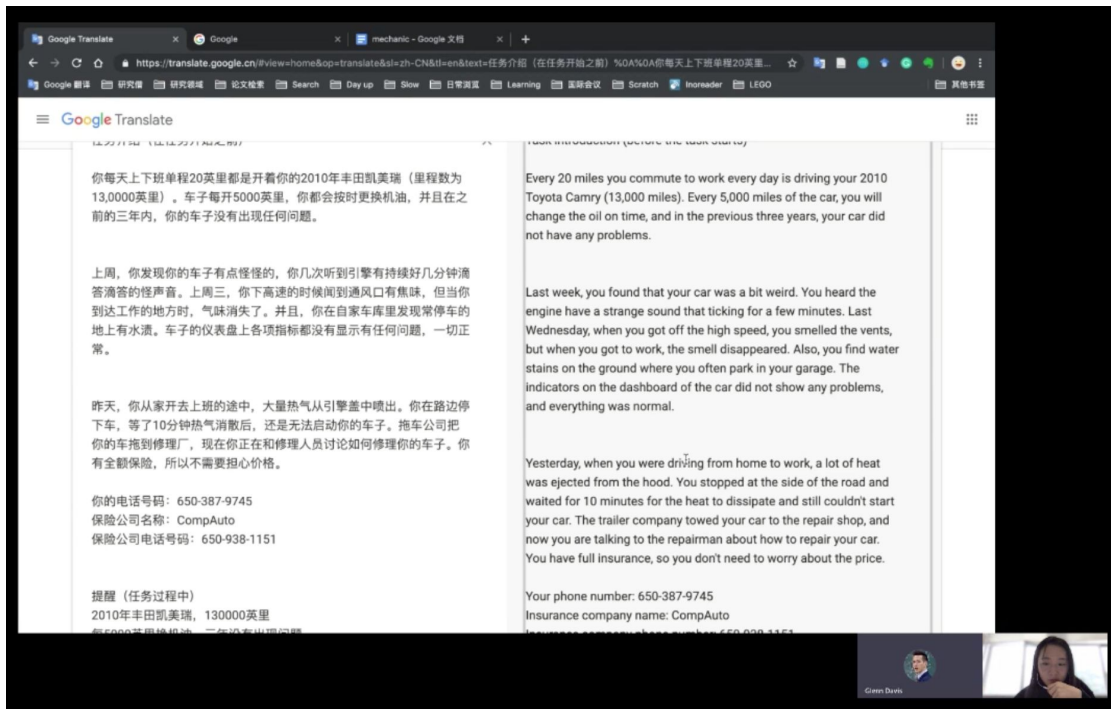
Usability study

Study goals:

- Learn what kind of language support users need.
- Test the script and situation for believability, understanding.

Procedure:

- Send background information in native language (Chinese) to user, describing problems with their car.
- Talk to an "AI mechanic" (Wizard of Oz) in order to get the car fixed.
- Record user's screen in order to examine which language support tools are used.

- **5 total participants**: 4 Native Chinese speakers, with limited proficiency in English and 1 Native English speaker with limited French proficiency (Proxy for expats/immigrants, A2-B1 = high beginner to low intermediate)

Data Collection

Engagement with the task

    How users prepare for the task

    Time spent on the task

Usage of language support tools

    Tools they use

    Level of engagement/reliance

Engagement with the "AI"

    # times participant ask for repetition and clarification

Attitudes (Post-survey)

    Foreign Language Anxiety Scale

    Engagement with AI

Results

Insights and Results

1. 100% of users spent time to prepare before the task/conversation (averaged between 1- 6 minutes)
2. Participants rely on nonverbal cues of understanding to know how they are doing
3. 100% used language support tools, direct google translation, and e-dictionary (but used it for direct word translation)
4. Participant asked for feedback on his English performance on the task

Experiment [RE]design #2

Key Insight: Not only is goal orientation important for motivation, it is important for ensuring productive conversation
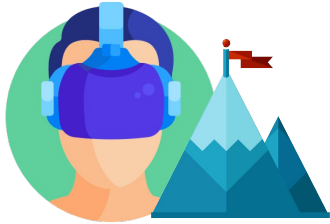
Goal-oriented conversation in VR

Multiple goals for a single conversation in VR

Experiment [RE]design #2

Key Insight: When saying "Pardon me," or asking the agent to repeat themselves, users expect things to be said differently, or broken down into more simple language

[Before]

[After]

Single script
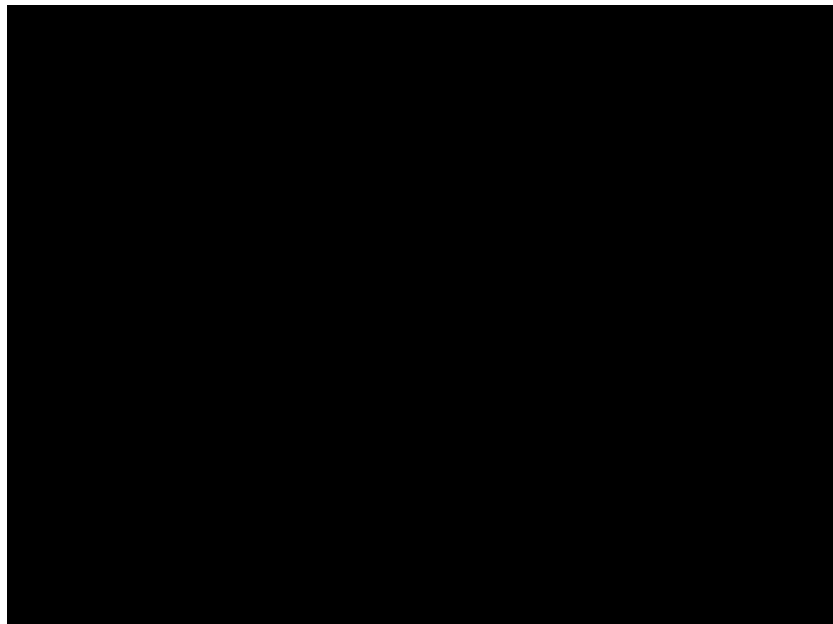
Skill level adaptive script

Interface [RE]design #2: VR World

User view (Oculus Go VR)

Wizard View (Mechanic speech)

Hi, welcome to the mechanic shop. How can I help you?

| Line to speak | Submit |

Oculus Go app (Built in Unity)
- Freely view the mechanic's garage in VR
- Receive real-time text-to-speech typed into a Python/Flask server
- Language support tools through users' own phones

Simple chat Website for WOZ operator improves speed

INTERFACE [RE]DESIGN #2: VR WORLD

Next steps to implement:

➜ Limited language support tools

- ~~Suggested phrases~~ Users own notes?

- More adaptive script options

➜ Basic non-verbal communication

- "Pointing" at different objects (car engine, radiator, etc.)

in the world to draw attention

안녕

CIAO

HOLA

你好

HALLO

HELLO

สวัสดี

こんにちは

BONJOUR

THANKS!

[IN ADVANCE, FOR YOUR FEEDBACK]

APPENDIX

Insight -> revision:

No one actually uses dictionaries, they just look up the translation -> instead of a dictionary, have simple word level translation available

When saying "Pardon" or asking "what did you say," users expect things to be said differently, or broken down

Sometimes when people dont understand they just say "OK"

[Study specific] Some participants copied all the instructions into english as a hack, we started giving them pictures of the instructions

Making it more realistic (Sometimes doesn't understand… be more strict on what you accept as a correct)

Our Mission is...

To expose language learners to nuanced practice environments through an immersive virtual cultural language experience.

PROBLEMS

The natural goal for learning a new language is connection and communication, **but traditional language learning methods focus on the means to an end, and not the end goal itself.**

Practicing with traditional methods (i.e. classes and apps) leaves users **underprepared for real-world interactions, which leads to embarrassment and miscommunication.**

But.... assuming we can build MultiVRse , there are some unanswered questions...

Solutions or questions?

Would users feel more engaged or anxious?

Do people want to engage with AI?

Would they feel less embarrassed about making mistakes?

Would they try harder or less hard to communicate well?

Major changes

- Designing a Solution -> Designing experiences to test Research Questions
- Task -> Experimental Design
- Task Flows -> Experiment procedures

Target users

A1
Common European Framework of Reference

A2
Common European Framework of Reference

B1
Common European Framework of Reference

B2
Common European Framework of Reference

C1
Common European Framework of Reference

C2
Common European Framework of Reference

Beginner

Intermediate

Advanced

Before

Do you want to accept the quest

Buy an apple ?

You will be the teacher

Reward: ₩1000

Yes   No

Return a phone

You will be the learner.

Cost: ₩500.
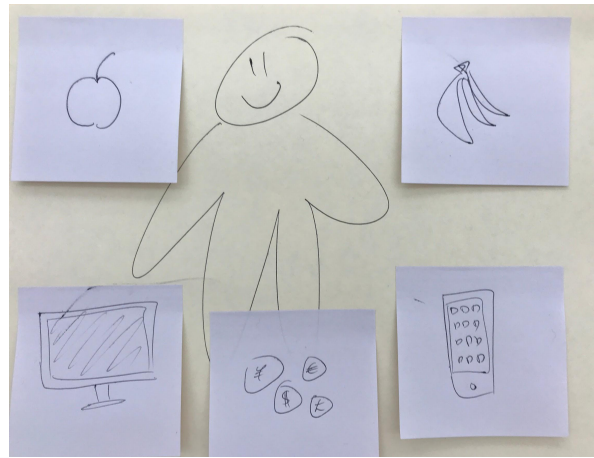
Quest:

You are the teacher. Your partner wants to buy an apple from your store. Negotiate a good price and sell the apple to your partner.

Your partner is beginning level

Use simple phrases such as:

Successful finish!

Give up!

You are the learner. You want to buy an apple from this store. Negotiate a good price and buy the apple.

Suggested phrases:

You are the learner. You bought a phone from this store but it is defective. Return it or get it repaired.

Suggested phrases:

"This is your responsibility!" - ◁)))

"I have an extended warranty"

You are the teacher. Your partner wants to return a defective phone. Find out what is wrong with the phone and offer to repair it for

Your partner is advanced level.

Use complex phrases such as:

User panel

Speaks:

Learning:

Current money

₩800

Speaks:

Learning:

Current money

₩300

Current money

₩1300

Current money

₩1800

你邻居的车在车库里起火了，被拖送去了维修厂。虽然他在美国生活了很多年，你的邻居并不会说英语。你决定帮助他，载他去维修厂并替他跟机修工用英文沟通。为了方便你沟通，邻居在一张纸条上写了他所以记得可能跟这次事故有关的信息。

你的目的是帮助你的邻居与维修工约定好修理费和维修时间，并咨询维修期间他能得到什么样交通替代以便日常生活及上下班。

继续

我车子信息：

- 一周前，我车子的风扇开始有奇怪的噪音。一般噪音出现一分钟左右，"检查引擎"的提示灯会出现。
- 踩油门时，引擎过热的等也会亮。
- 我车子之前没有电池放了两个月。我自己装的电池。在那都好好的。
- 我在车50，000里程时候送去经销商那里保养，换了水泵。一般大家说换了水泵时候也要换恒温调节器。我经销商处理的保养，我不是很清楚他们换了没换恒温调节器。
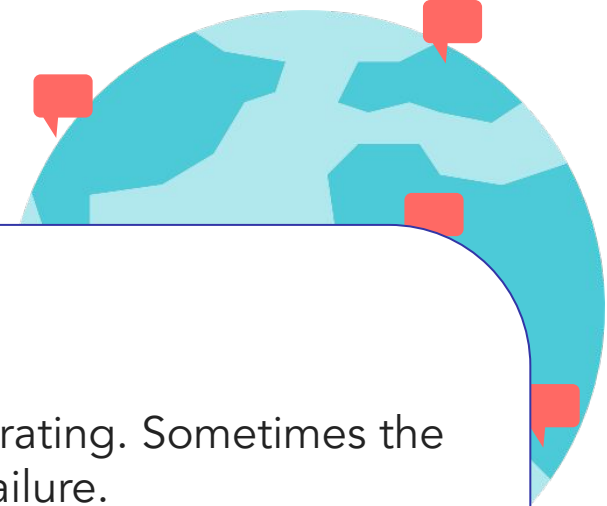- 我的车上了保险。

Wizard of oz Prototype

Check it out: http://angelic.ai/multivrse.html

A-Z

Joe the Mechanic

Angie

Help! My car had a fire.

Type your message and hit Enter

Insights

- User spoke aloud the text from "Joe the Mechanic"

- Errors introduced by speech detection were very frustrating. Sometimes the learner was not sure if the error was theirs, or a tech failure.

- "I know what happened, but it is hard to convey the message with my limited vocabulary, it **felt a little bit like a charades game**"

- **"A car 'Hood' is an American thing, a colloquial term, even if I do know the word for the hood [in French], it might actually mean like a coat hood."**

- "I usually check in to make sure the person understand what I am saying, or If they are looking confused" -> **Facial expressions are important**

Progress

Prep work:
- Pilot tested our scripts and user task
- Getting ready to setup the experiment using VR

Next steps:
- More detailed data collection and analysis set up
- Pilot the experience with VR, revised script and Google Text-to-Speech with target users