



WELCOME TO THE MULTIVERSE



Language learning through
real-life tasks in virtual reality



THE BEST OUT THERE

Meet the team



Angelica Willis

HCI, AI & Design



Glenn Davis

Education & VR



Joyce He

Education & Design



Nathan Dass

VR & NLP

OUTLINE

- **Understanding the problem and target users**
- **Introducing MultiVRse**
- **Research opportunity**
- **Current prototype**
- **Results and next steps**





MEET KENNY

- Immigrated from China to Bay Area 4 years ago.
- Works in a Chinese restaurant.
- Studied English for 12 years in school.



Going to the mechanic in this new country made me feel like a baby... it's like what they say I assume it's right. If they are asking more money I would accept and just assume it is correct.

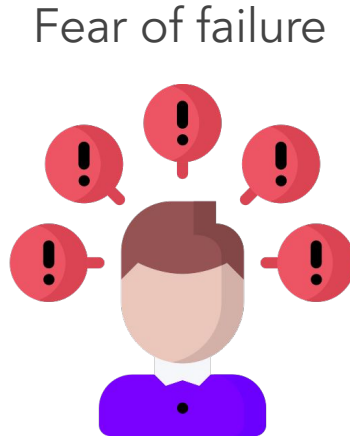
MEET KENNY

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- Works in a Chinese restaurant.
- Studied English for 12 years in school.

TEXTBOOK LANGUAGE ≠ REAL-LIFE LANGUAGE

Traditional language learning methods focus on the **means to an end, not the end goal itself.**

Differing
unspoken cultural
expectations



Fear of impoliteness
and embarrassment



CAN WE CREATE SAFE SCENARIOS WHERE USERS CAN
PRACTICE IMPORTANT INTERACTIONS?

MULTIVERSE




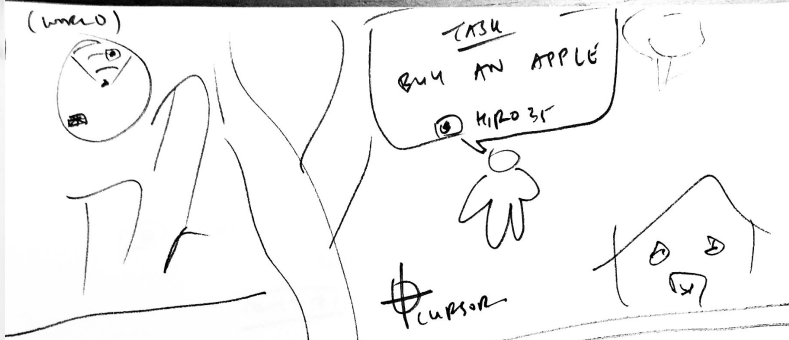
- Immerses user in **realistic, culturally aware** scenarios
- **AI-powered** language support tools for goal-oriented language learning



(MENU)

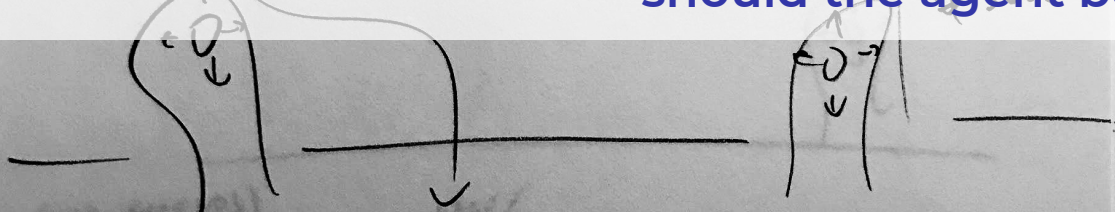
- AVAILABLE QUESTS TO TAKE
- AVAILABLE QUESTS TO LIVE
- MY FRIENDS

USER 4053
 LEVEL 3
 ACTIVITY LEVEL

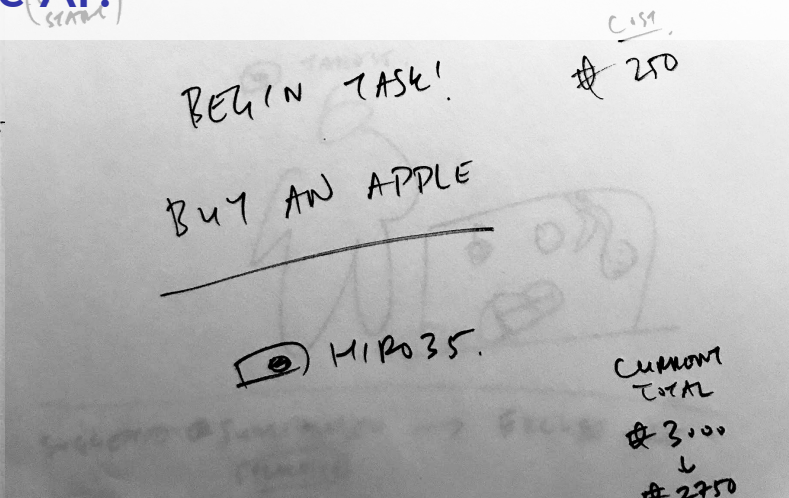



DESIGN EVOLUTION: UI Sketches

Key question: Should this be a multiplayer experience, or should the agent be AI?



AVAILABLE QUESTS	GIVER	TASK	COST	DISP.
<input type="checkbox"/>	7AP0453	VISIT THE DOCTOR	\$ 1000	↑ 5000
<input checked="" type="checkbox"/>	7000031	BUY AN APPLE	\$ 200	← 260



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

What **language**
support tools
would they use?



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?

What **language support tools** would they use?



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



Would they **try harder** or less hard to communicate well?

Would they feel **less embarrassed** about making mistakes?

What **language support tools** would they use?



**Cool
Idea**



Cool Idea + Unanswered HCI Questions



**Cool
Idea** + **Unanswered
HCI Questions** = **Research
Opportunity**



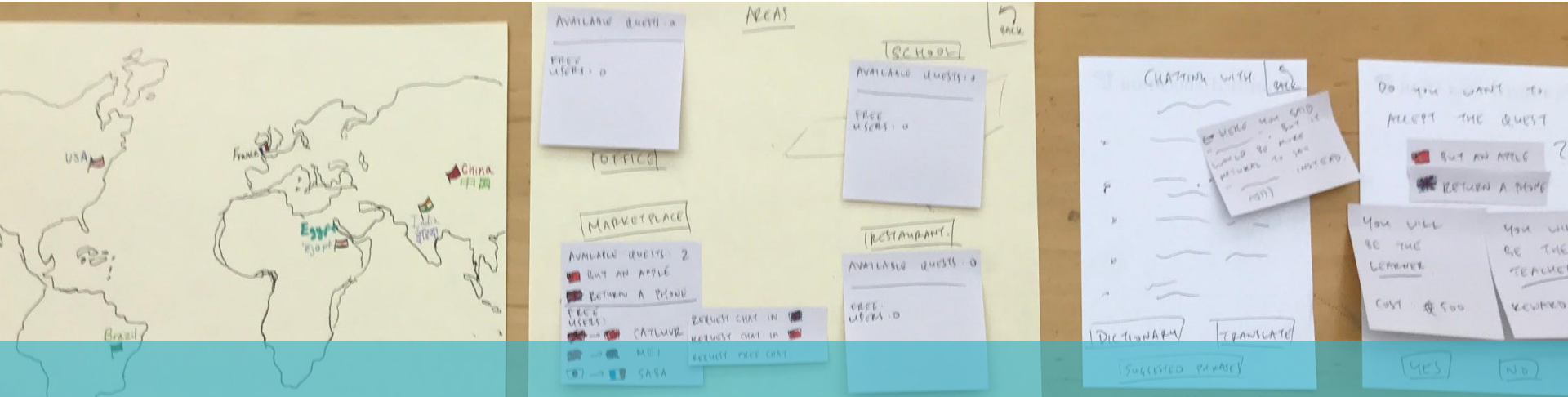
Cool Idea + Unanswered HCI Questions = Research Opportunity

VR APPLICATION



HCI RESEARCH PROJECT

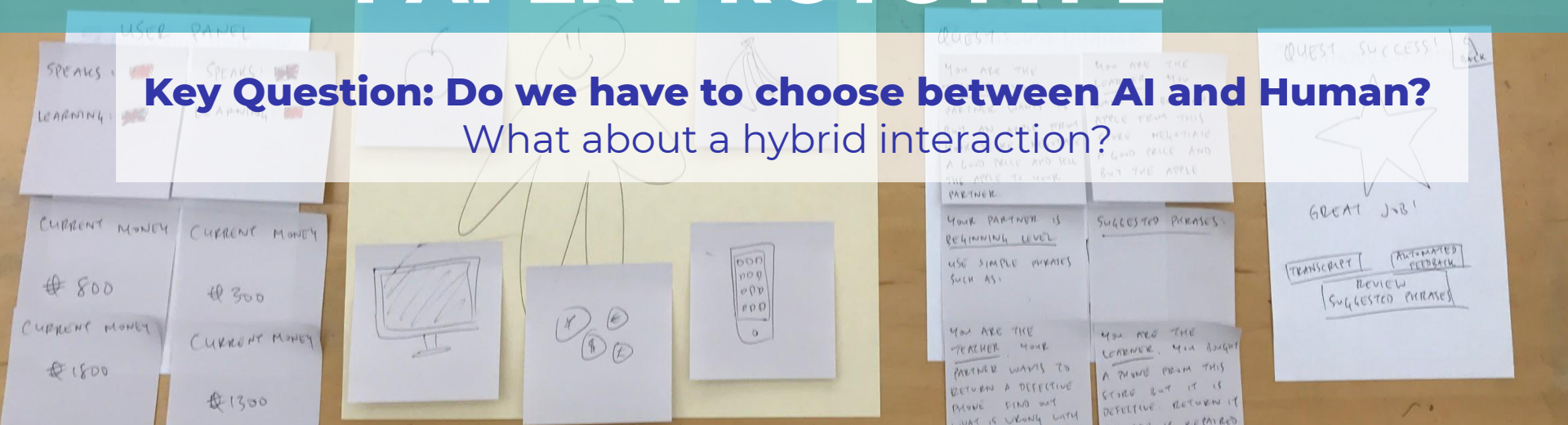


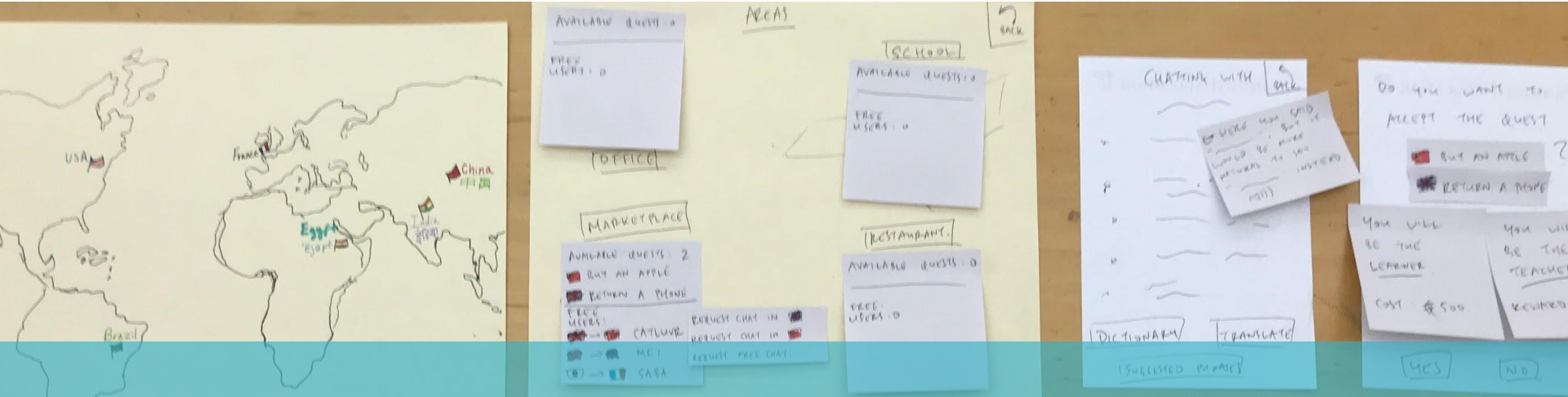


PAPER PROTOTYPE

Key Question: Do we have to choose between AI and Human?

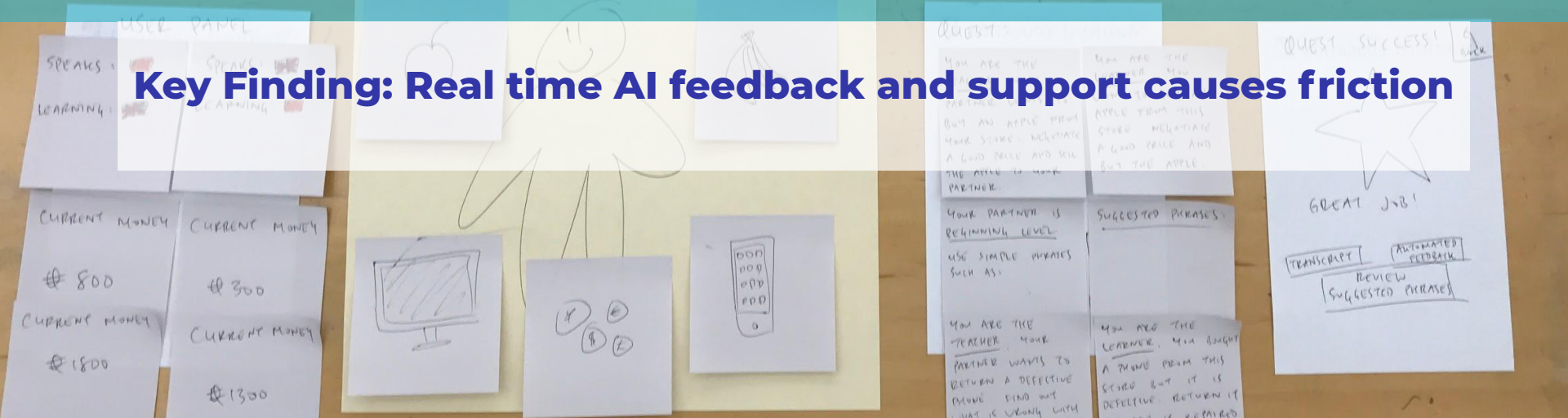
What about a hybrid interaction?





PAPER PROTOTYPE

Key Finding: Real time AI feedback and support causes friction



EXPERIMENT DESIGN



HUMAN VS. AI
ON THE OTHER SIDE



SCENARIO

MULTIVRSE

A visit to the mechanic

START



SCENARIO



- ✓ Real life event
- ✓ Semi-open ended
- ✓ Clear goals
- ✓ Involves non-trivial, context specific vocabulary

RESEARCH QUESTIONS => TASKS



Do users feel more engaged or anxious?

RESEARCH QUESTIONS => TASKS



Do users feel more engaged or anxious?

Would they feel less embarrassed about making mistakes?

RESEARCH QUESTIONS => TASKS



Do users feel more engaged or anxious?

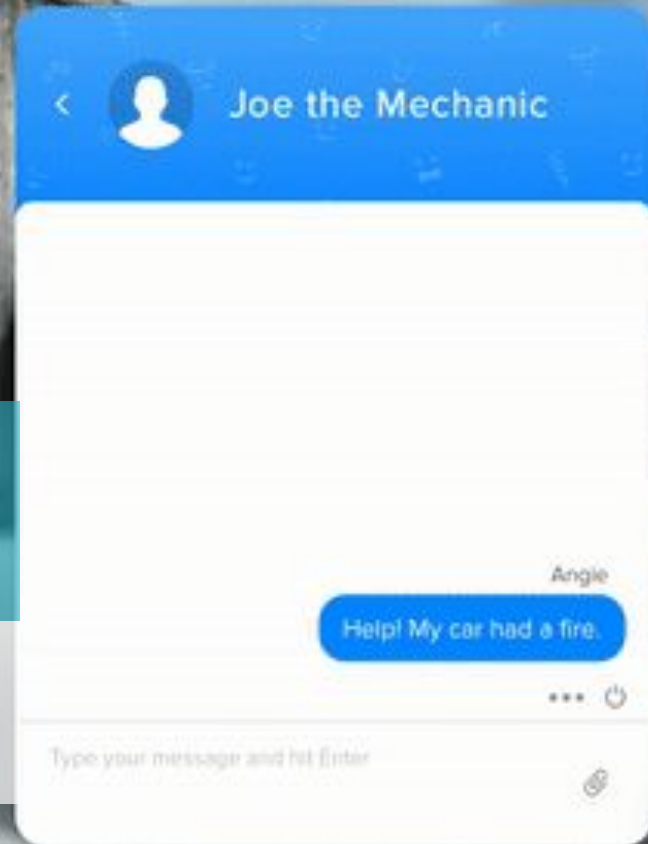
Would they feel less embarrassed about making mistakes?

Would they try harder or less hard to communicate well?

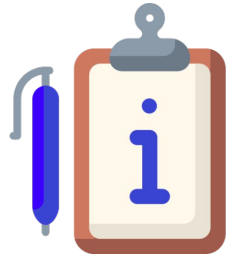


Wizard of Oz Med-Fi

Key Findings: The importance of **adaptiveness** and **non-verbal feedback**



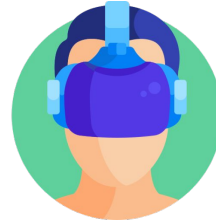
EXPERIMENTAL TASK FLOW



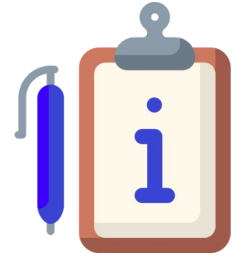
Pre-survey and
consent form



Experimental
manipulation
(Intro text)



Goal-oriented
conversation in VR



Post-survey

[BEHIND THE SCENES]



Adaptive WoZ script,
text-to-speech



USER'S
PERSPECTIVE

- 2018 年丰田凯美瑞
25,000 英里
- 每5000英里换机油
- 仪表盘上各项指数
- 上周

-- 引擎发出滴答的奇
-- 排气孔有焦味
-- 停着车的地上有水
- 昨天

-- 引擎盖有大量热气
-- 车子停下后，无法
- 在 30,000 里程前
- 你的手机号码是650

你的目标:

- 成功安排车辆修理。
- 今天是星期六。星期
车上班。

- 你的保修在几个月后
了，确保他们检

MultiVRse control panel

LISTENING

Sorry, I didn't understand that. Can you say it again?

Hi there, welcome to Joe's Toyota dealership. Can I have your name please?

I see your car was towed in yesterday. The 2005 Camry, right?

We towed you, right?

Are you sure? I can't find that car.

Ok. Can you describe the problem?

When did you start noticing these problems?

Was the temperature of the car higher than normal?

Did the check engine light come on?

Was anything illuminated on the dash?

Did you hear any noises from the engine?

Where was the smell coming from?

Where were the wet spots?

Yeah, you can see the engine damage here.

Do you want a full replacement of your engine? It will cost \$5,000.

Yes, you have full warranty with us, so everything is covered.

WOI DASHBOARD

Intro 1 (AI)

THINKING

Yes.

Got it.

I see.

No.

OK, let me look it up.

Your car was brought into the garage yesterday. The 2005 Camry, right?

The '05 Camry, right?

Oh my mistake. The 2018 Camry, right?

Did you notice any problems before yesterday?

Did you notice anything happening with the temperature gauge?

Was anything illuminated on the dash?

Were there any lights visible on the car's dashboard?

How often do you get the oil changed?

Did you smell anything strange?

Did you notice any leaks or wet spots on the ground?

It sounds like your engine overheated. Let me take a look at it.

Looks like you had a coolant leak. The engine is completely destroyed.

Oh I'm sorry. Let me check ...

What's your phone number? I'll call you when it's ready to pick up, it may take a while to fix.

Intro 2 (Human)

Sorry, I didn't understand that. Can you say it again?

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I see your car was towed in yesterday. The 2005 Camry, right?

We towed you, right?

Are you sure? I can't find that car.

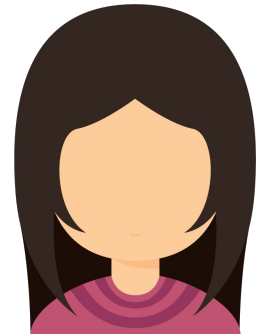
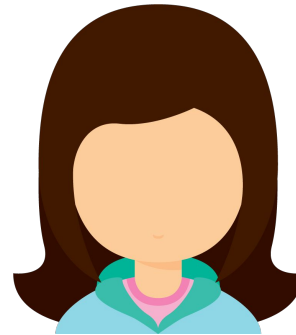
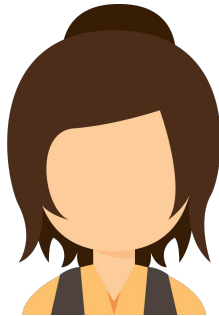
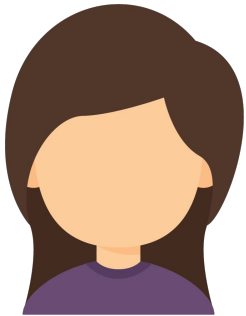
WOZ DASHBOARD



TESTING

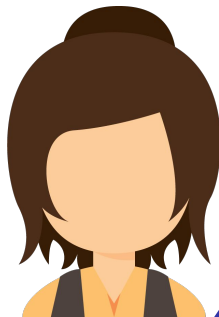
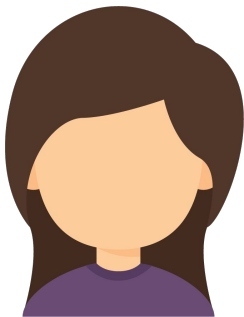
RECRUITMENT

- English Proficiency: Beginner - High Intermediate
- Age range: 30-45
- Time lived in the US: 3 months - 2.75 years



EXPERIMENT SETUP

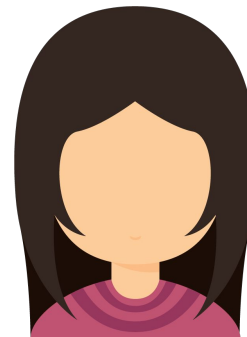
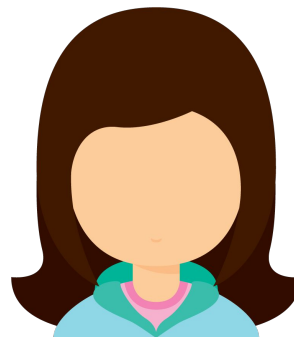
AI



HUMAN



DROP OUT



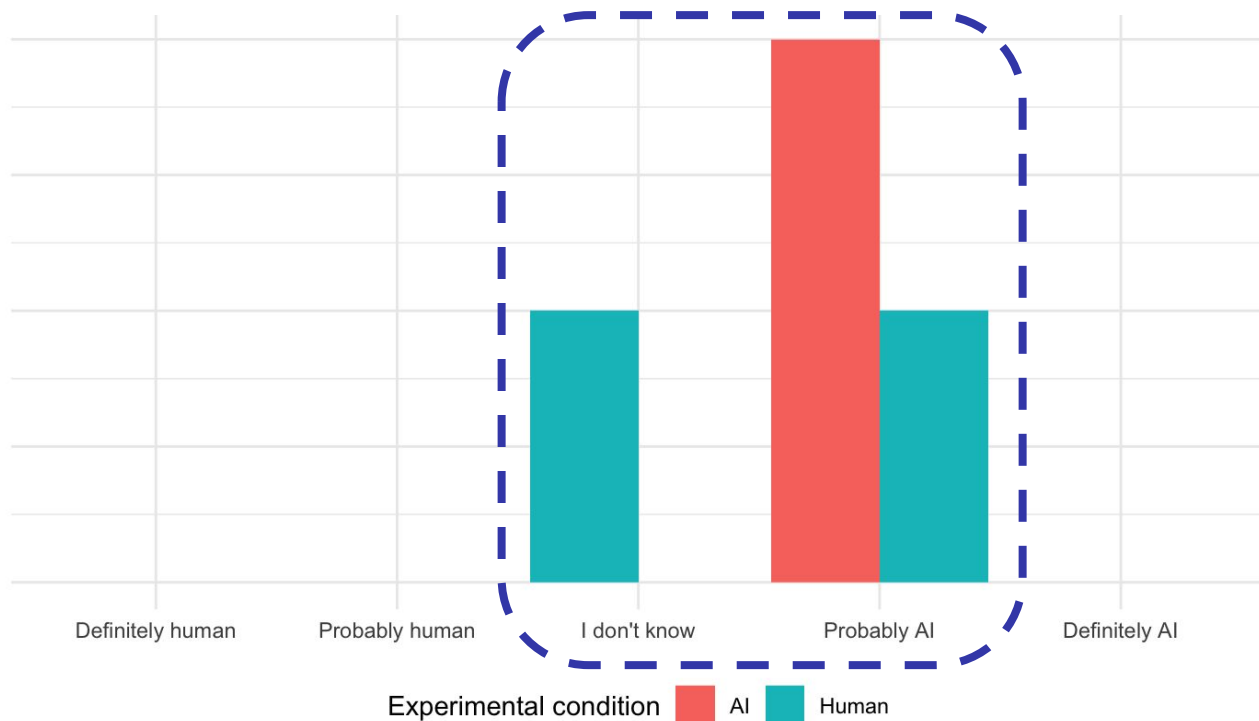


INSIGHTS & RESULTS

WE NEED BETTER STORIES!



Q: I believe the mechanic was controlled by ...



OBSERVATIONS

Q10 - How did you feel about speaking English with the mechanic in this scenario?

GREAT

The responses from the other person were very real. It's great for learning English.

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I was slightly nervous so I want to get it done quickly.

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I was slightly nervous so I want to get it done quickly.

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I didn't know to what extent I should answer his questions and give my answers.

CAUTIOUS

I tried to use words I'm familiar with to express myself.

OBSERVATIONS

Q10 - How did you feel about speaking English with the mechanic in this scenario?

GREAT

The r
from
perso
very
great
learning English.

NERVOUS

CONFUSED

and give my
answers.

CAUTIOUS

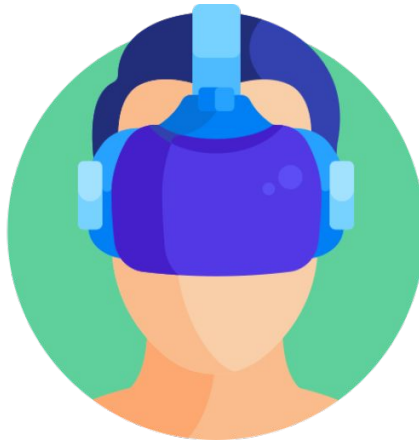
myself.

Key Findings:

Not a one size fits all solution

VR EXPERIENCE

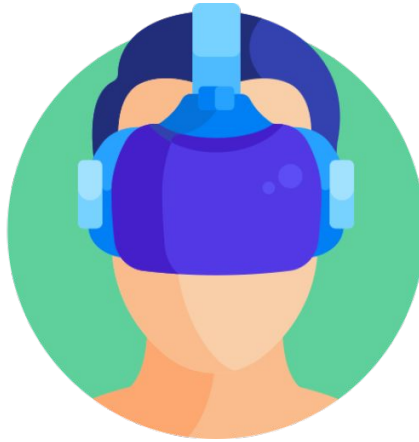
It was **fun**. I want
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VR EXPERIENCE

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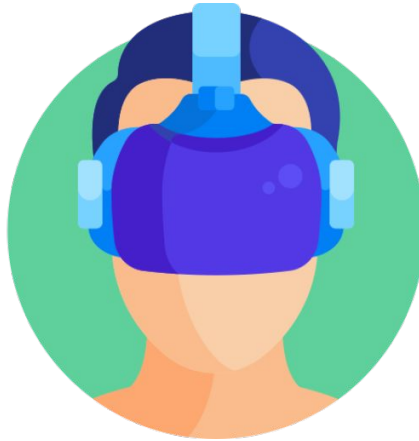
Very interesting. I don't have to feel embarrassed about my mistakes.



VR EXPERIENCE

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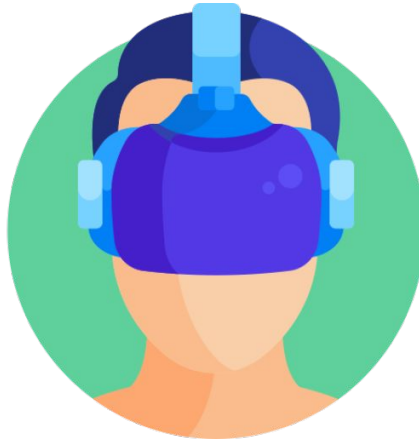


The VR looks **VERY REAL**

VR EXPERIENCE

It was **fun**. I want to have my kids try it.

It was **strange**. But it's okay if it's just for practice purposes.



Very interesting. I don't have to feel **embarrassed** about my mistakes.

The VR looks **VERY REAL**

VR EXPERIENCE

It was fun. I want

Very interesting.
I don't have to feel
embarrassed about

Key Findings:

**VR's affordances in recruiting interests
and engagement in language learning**

It was

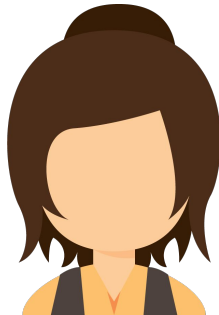
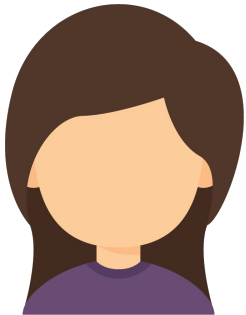
But it's okay it's
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purposes.



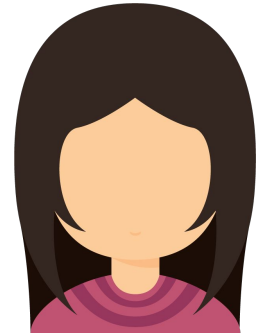
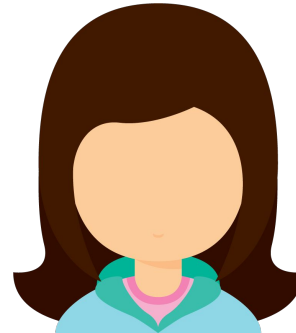
The VR looks VERY
REAL

IT UNDERSTOOD ME!

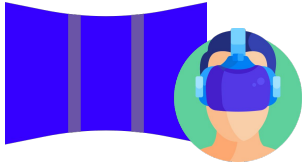
**It can understand
my English!**



If that is a real ai, I
would really like it!
The current ones can't
recognize me very well



IF WE WERE TO CONTINUE...

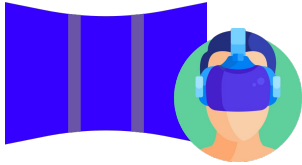


Splash screen before
starting the scenario



Language support tools
within the scenario

IF WE WERE TO CONTINUE...



Splash screen before starting the scenario

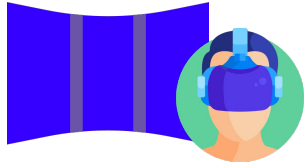


Convincing stories for experimental conditions



Language support tools within the scenario

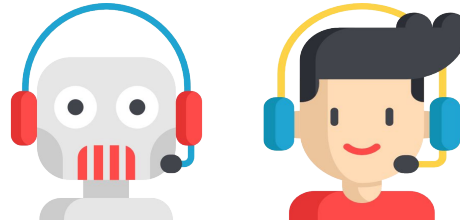
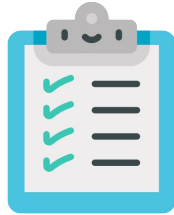
IF WE WERE TO CONTINUE...



Splash screen before starting the scenario



Control for noise, e.g. experimenter effect and language proficiency



Convincing stories for experimental conditions



Language support tools within the scenario



Collect more data!

안녕

CIAO

HOLA

HALLO

HELLO

你好

สวัสดี

BONJOUR

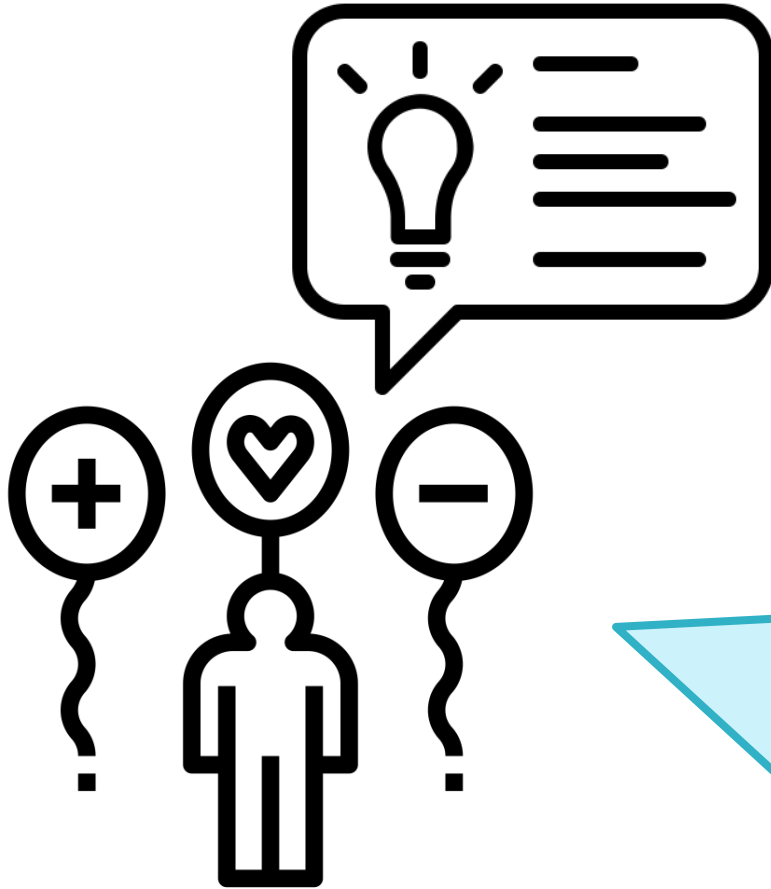
こんにちは



THANKS!

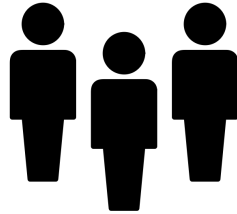
COME BY OUR POSTER FOR A LIVE VR DEMO!

USER POV



Jessie moved from China to the US 4 years ago, and has been working at a Chinese restaurant. She studied English in school for 12 years and can handle everyday tasks but struggles when she needs to **spea on the phone** with customer service or to deal with **situations out of her ordinary routine**.

This is like the most painful thing while traveling abroad... **there are all these cultural traditions, norms that people don't talk about. They just assume that you know things. And if you don't, it is just embarrassing.** Nobody is gonna tell you ... like ... everything



Going to the mechanic in this new country made me feel like a baby... it's like what they say I assume it's right. If they are asking more money I would accept assuming it is correct

1. **Glenn Project title & team** (*introduce yourselves*) [1 slide]
 - a. Title your pitch as the **opportunity rather than just the title of the project**
 - b. An anecdote to hook them in (**tell a story** from your needfinding about a real person)
2. **Glenn Outline** (*briefly* tell us what you are gonna tell us in the rest of the talk – tell a story)
 - a. **Problem** (**Problem, existing solutions** & why inadequate)
 - b. **Our Solution** (**Solution overview, user interface, implementation**)
3. **Glenn Problem**
 - a. Introduction to the overall problem (great place for a story, describe needfinding) (**w/ images**)
 - b. Your final POV-statement
4. **Angelica Solution** [1 slide]
 - a. Brief **mission** statement or **value proposition**
 - b. High-level **solution** description (w/ image of design)
5. **Angelica Design Evolution** [multiple slides]
 - a. Show **major steps** (including, sketches, prototypes, etc.)
 - b. Explain **reasoning/evidence** behind design changes (i.e., evaluation technique & 1-2 key findings that lead to a design change)
6. **Nathan User Interface**
 - a. Tasks & Interface Description [**multiple slides for each task**]
 - i. Explain the **reasoning** behind the choice of each of the tasks
 - ii. Present **walkthrough** of each task
 - iii. Explain what it does & how it works
7. **Nathan Demo**
 - a. Should include a **live demo or video** (video backup good idea)
8. **Joyce RESULTS**
9. **Joyce Next steps** [1 slide]
 - a. If you were continuing this project, what would the **next steps** be?
 - b. What **resources and partnerships** are required to succeed?
10. **Joyce Summary**
 - a. What is your **key innovation**?
 - b. What will your **key impact** on the world be?
 - c. What will be the long-term impact of your product?

EXPERIMENTER TASK FLOW

One experimenter (facilitator) in room with participant to explain in native language (Chinese)

One experimenter (controller) hiding in another room, controlling the mechanic's actions and speech through the control panel

Zoom video conferencing to send user video and audio (including both user's and mechanic's speech) to the controller in the other room

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

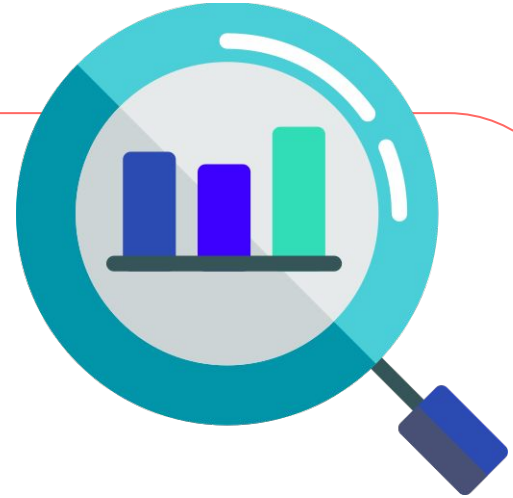
Engagement with the "AI"

times participant ask for repetition and clarification

Attitudes (Post-survey)

Foreign Language Anxiety Scale

Engagement with AI





USER 1

Chinese Visiting Scholar recruited from
Chinese Students WeChat groups

Female Chinese ESL student at a community college; moved
here from China with her husband.

Recruited from a gatekeeper from local Chinese community

USER 2



FREE RESPONSES



Q11 - How did you feel about making mistakes while speaking English in this scenario?



I feel great ...
because I know it's
software, so I was more
relaxed during the practice
... It lessens the fear and
panic for a future
encounter of this situation
in real life.



It's normal
when English
is not your
first language



I worry that
he may not
understand
me.



It's okay to
make
mistakes as
long as he can
understand
me

Q12 - How did you feel about speaking English in a VR environment in this scenario?

文

A

Very good. I'm interested in practicing for more scenarios.

A: **very good.** I can familiar myself with common words associated with certain scenarios.

It was strange. But it is ok if it's just for practice purposes.

A: **very interesting.** I don't have to feel embarrassed about my mistakes.



FOREIGN LANGUAGE ANXIETY SCALE

(ADAPTED FROM HORWITZ ET AL., 1986)

Participants felt equally anxious with perceived AI or human partner
Adapted foreign language classroom anxiety scale (Horwitz et al., 1986)

