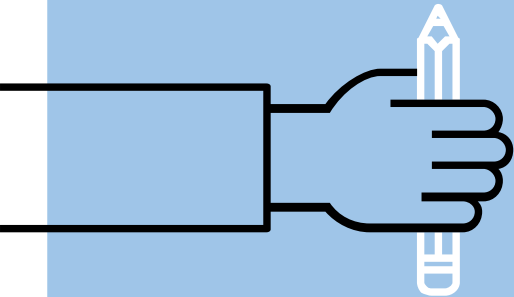
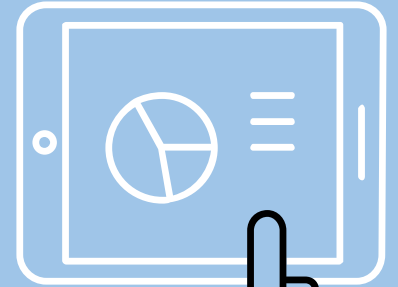


HCI AND AGING

*Improving Technology Adoption
Among Older Adults*



Kirk Thelen

HELLO!

I'm a first-year Computer Science PhD student.

Research Interests:

- ▶ computer science education
- ▶ software usability and accessibility
- ▶ web application/API security.



TERMINOLOGY

OLDER ADULT

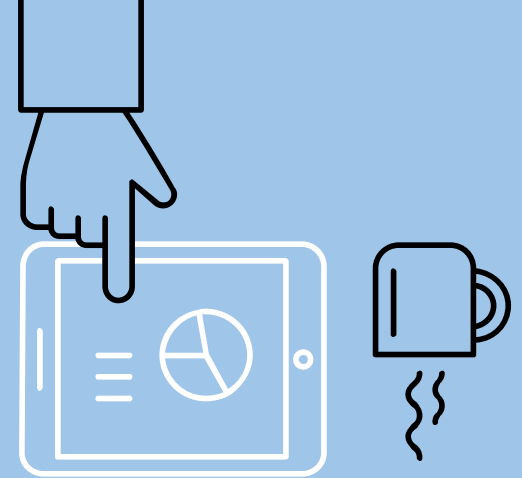
Any adult age 65 or older.

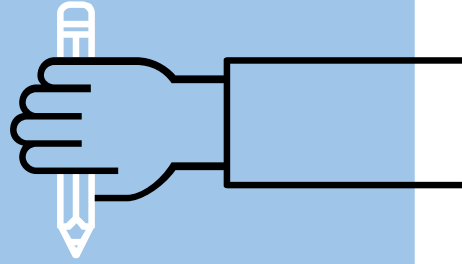
TECHNOPHOBIA

Anxiety around using technology, often associated with a fear of “doing something wrong.”

VUI

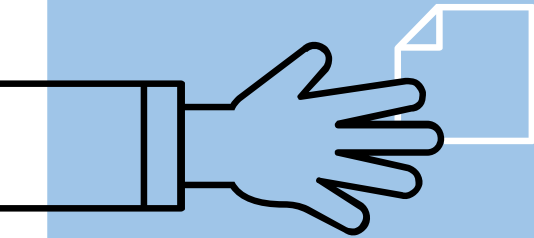
Voice-user interface. Alternatively called “voice assistants.” Examples include Alexa, Siri, Google Assistant, and Bixby.





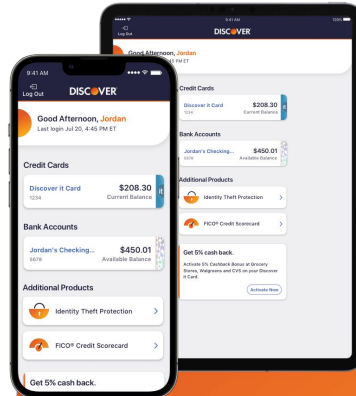
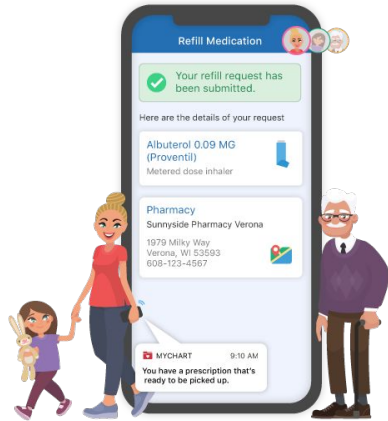
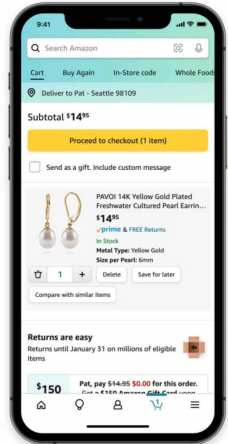
ICEBREAKER

How many people know an older adult who struggles to use technology?



DIGITAL GOODS AND SERVICES ARE EVERYWHERE

- ▶ Shopping
- ▶ Healthcare (MyChart, Telehealth, etc.)
- ▶ Banking

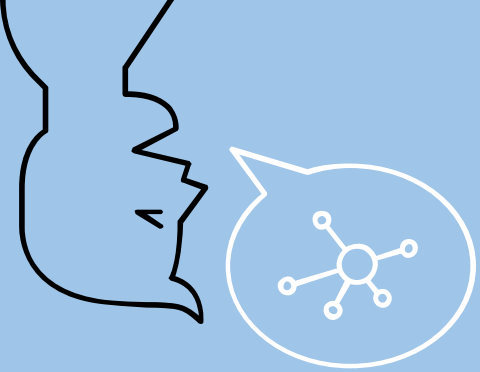


Images: [1], [9], [10], [11]

DIGITAL GOODS AND SERVICES ARE EVERYWHERE

- ▶ 90% of **all** adults are online^[2]
- ▶ 67% of **older** adults are online^[2]





"I am not fluent enough with the language [of search engines] to know where to look."

- Peter^[3]

“

"I have learned that you **need to know about computers** nowadays: to pay bills, look at bank statements; even depositing a check by taking a photo of it."

- Kanak^[3]

"I really do not want to get myself into trouble with computers and the Internet."

- Judy^[3]



TECH IS USEFUL FOR OLDER ADULTS^[8]

- ▶ Entertainment, Healthcare, Accessibility
- ▶ Older adults are resistant to IoT^[1]



Smart Camera



Smart Bulb



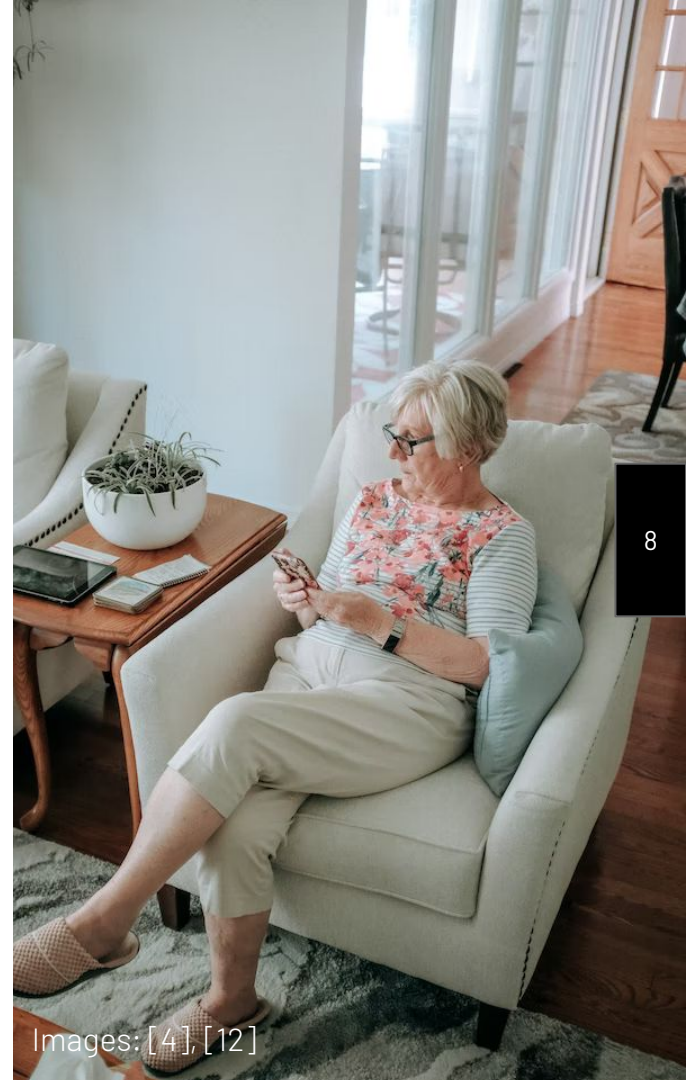
Smart Plug



Home Assistant

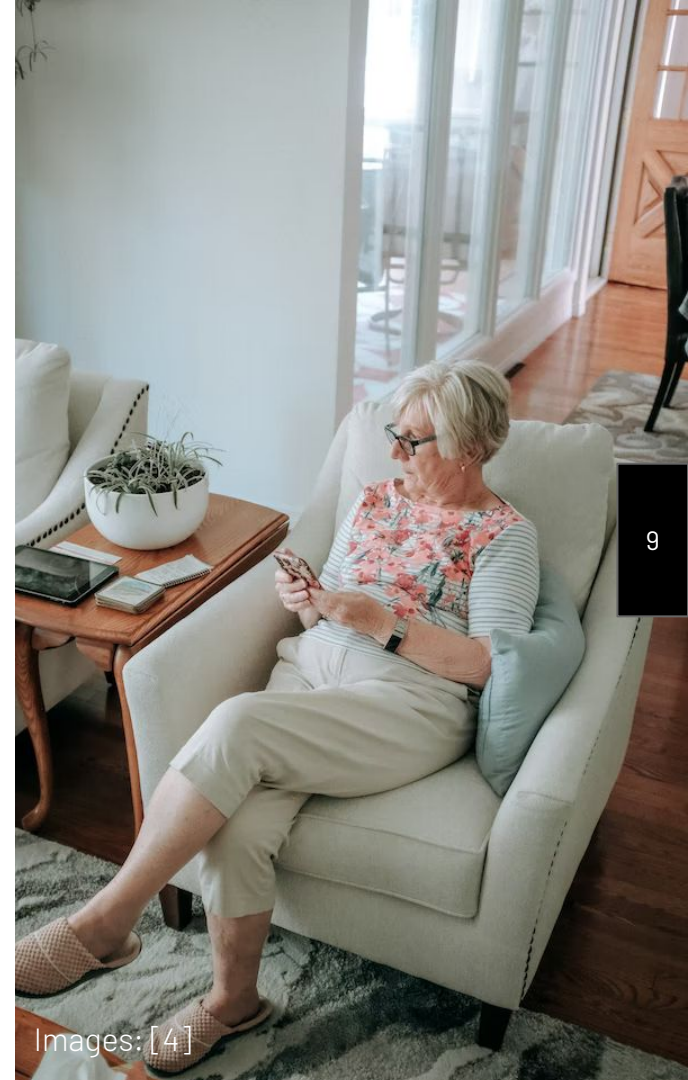


Smart Sensors



TECH IS USEFUL FOR OLDER ADULTS^[8]

- ▶ Many older adults do believe tech is useful
- ▶ 58% (N = 1037) “could not imagine” life without tech^[9]



TECH IS USEFUL FOR OLDER ADULTS^[8]

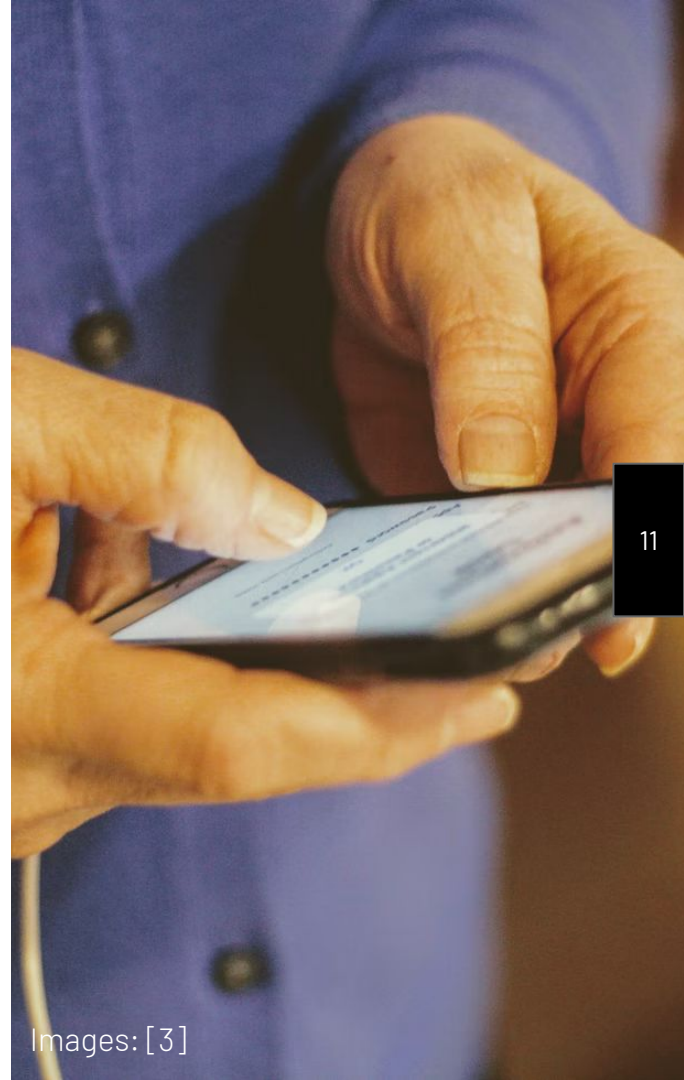
Statements ^a	All respondents Percentage who agree ^b
A: General attitude	
I do not fear becoming addicted to the Internet	70.9
The older generation should use the Internet	63.5
The Internet is not a waste of time	58.3
The Internet saves a lot of legwork	56.1
If the Internet were better suited to the elderly, they would use it more	53.3
The Internet is stimulating and fascinating	52.3
The Internet facilitates contact with other people	47.3
You have to use the Internet to have a say	26.6
B: Coping with everyday life (in old age)	
The Internet allows me to stay independent longer into old age	42.6
The use of the Internet gives me more freedom in shaping my own life	28.7
The use of the Internet gives me more control over my own life	26.0
The use of the Internet gives me more security	21.4

Attitudes Toward the Internet Among Older Adults (N = 1,037)^[9]



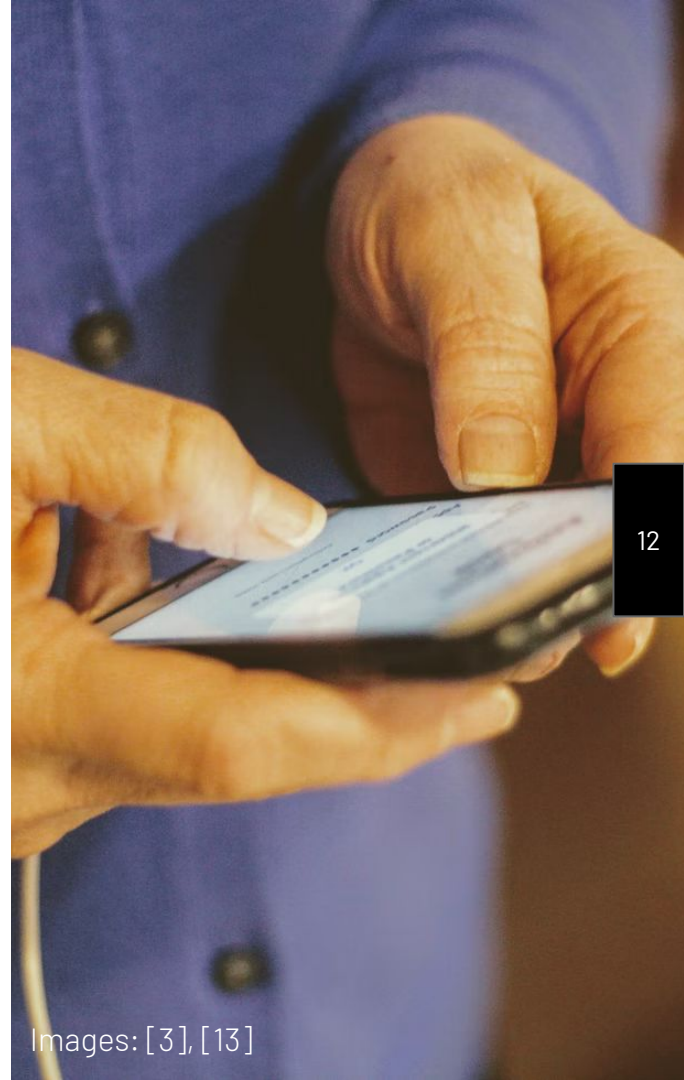
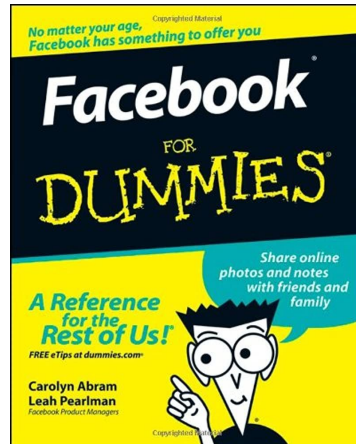
OLDER ADULTS USE TECH WITH LIMITS^[8]

- ▷ Use of technology up in last 20 years
- ▷ Resistant to trying the unfamiliar
 - Technophobia



OLDER ADULTS USE TECH WITH LIMITS^[8]

- ▶ Familiar functions
- ▶ Internet “shortcuts”
- ▶ Memorization (interfaces, steps to achieve desired result, etc.)



BARRIERS TO ADOPTION^[6, 7]

- ▷ Not a lack of interest^[4, 5]
- ▷ Technophobia
- ▷ Self-actualization



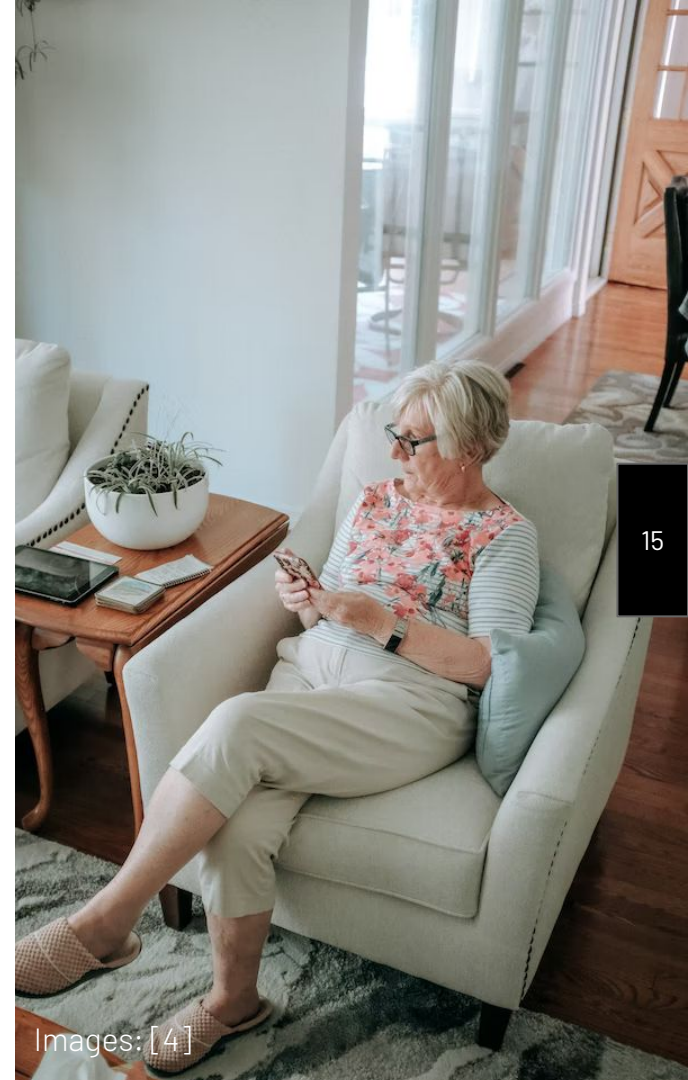
BARRIERS TO ADOPTION^[6, 7]

- ▷ Perceived usefulness
- ▷ Perceived ease of use
- ▷ Perceived trustworthiness



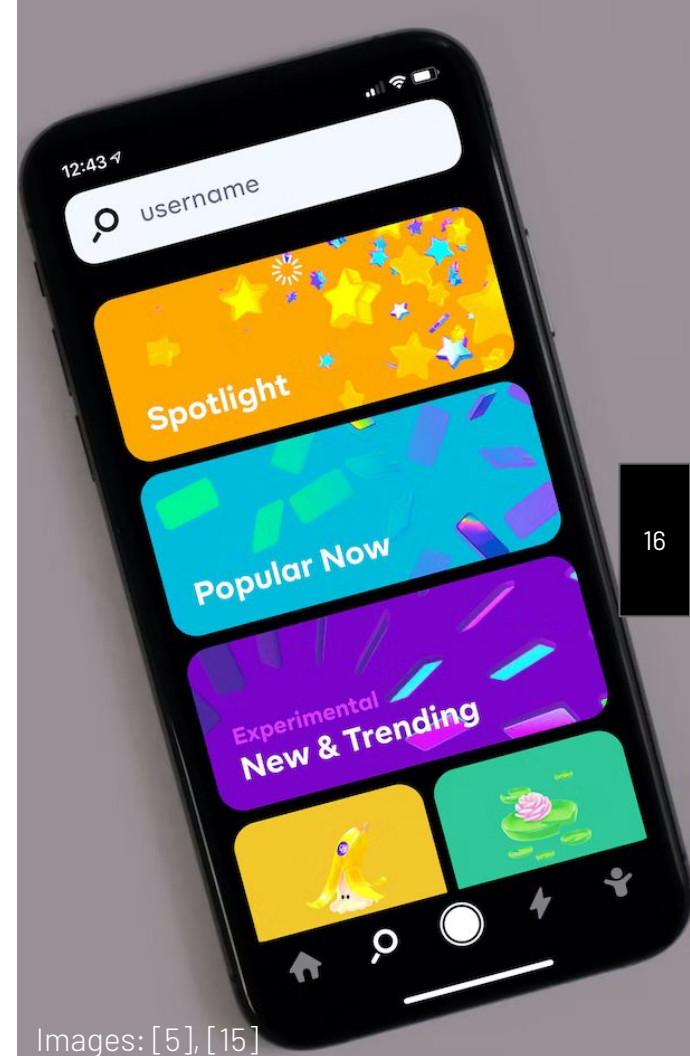
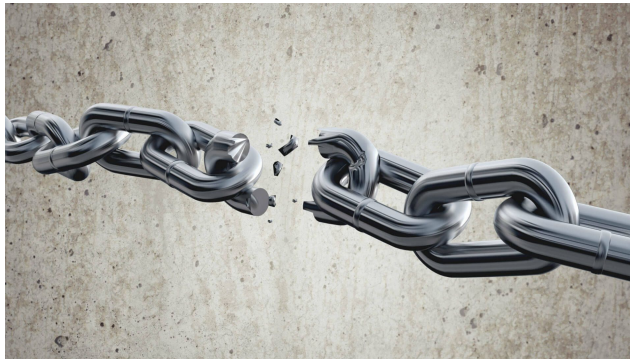
PERCEIVED USEFULNESS^[8]

- ▷ Tied to other barriers^[10]
- ▷ Useful if it is easy to use
- ▷ Useful if it is trustworthy



TECH IS CONSTANTLY CHANGING

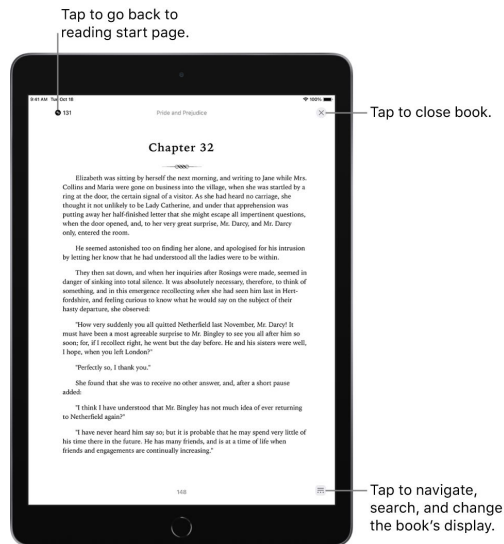
- ▶ Navigation changing places between updates
- ▶ Link rot
- ▶ Other style/design changes (minimalism trend)



Images: [5], [15]

EASY TO USE OR HARD TO USE?

- ▶ “Simple” VUI with confusing commands^[11]
- ▶ E-readers that do not behave like physical books^[12]



amazon echo (Alexa) unofficial Simple Voice Commands List



see more at: removeandreplace.com

COMMON ECHO COMMANDS

Alexa, stop.
Alexa, volume six. (0-10)
Alexa, mute.
Alexa, unmute.
Alexa, repeat.
Alexa, cancel.
Alexa, louder.
Alexa, turn it down.
Alexa, help.

CLOCK AND TIMER

Alexa, wake me up at 5 in the morning.
Alexa, set the alarm for 7:45 a.m.
Alexa, set the timer for 15 minutes.
Alexa, what time is it?
Alexa, what's the date?
Alexa, when's my alarm set for?
Alexa, stop. (when alarm or timer is sounding)
Alexa, snooze. (when alarm is sounding)

MUSIC COMMANDS

Alexa, what's playing?
Alexa, turn it up.
Alexa, softer.
Alexa, volume 6.
Alexa, mute.
Alexa, stop the music.
Alexa, pause.
Alexa, resume.
Alexa, next song.
Alexa, loop.

TRAFFIC

Alexa, how is traffic?
Alexa, what's my commute?
Alexa, what's traffic like right now?

WEATHER

Alexa, what's the weather?
Alexa, will it rain tomorrow?
Alexa, what's the forecast this weekend?
Alexa, what's the weather in Phoenix?
Alexa, what is the weather in New York?
Alexa, what's the weather in Cleveland, Ohio?
Alexa, is it going to rain on Monday?

FLASH BRIEFING NEWS

Alexa, what's my Flash Briefing?
Alexa, what's in the news?
Alexa, next.
Alexa, pause.

SIMPLE QUESTIONS

Alexa, who wrote The Bible?
Alexa, tell me a joke.
Alexa, Simon says, "Jump."
Alexa, how many ounces are in a liter?
Alexa, how tall is The Eiffel Tower?
Alexa, what's the capital of France?
Alexa, how far is the moon?
Alexa, what was Devo's first album?
Alexa, what's the square root of 32?
Alexa, who is the lead singer of Rolling Stones?
Alexa, Simon says + words you want Echo to repeat.
Alexa, how far is it from here to Paris?
Alexa, what's the definition of death?
Alexa, how many people live in China?
Alexa, what is 9 miles in kilometers?
Alexa, when is Thanksgiving this year?
Alexa, how old is Santa Claus?
Alexa, Wikipedia: Fantasy Baseball.
Alexa, Wikipedia: Boardwalk Casino.

MUSIC AND NEWS

Alexa, play
Alexa, pause
Alexa, previous
Alexa, next
Alexa, stop
Alexa, resume
Alexa, restart

MUSIC REQUESTS

Alexa, play music by The DOORS.
Alexa, shuffle my lounge playlist.
Alexa, play my new music by Beyonce.
Alexa, play Skillset.
Alexa, play the song Jump by Van Halen.
Alexa, play the album Elvis Greatest Hits.
Alexa, play some jazz.
Alexa, shuffle my new music.
Alexa, play the song I just bought.
Alexa, play some music.

SHOPPING AND TO DO LISTS

Alexa, add garbage bags to my shopping list.
Alexa, I need to make a eye appointment.
Alexa, put rotate tires on my to-do list.
Alexa, I need to buy toilet paper.
Alexa, create a to-do.

SPORTS

Alexa, what was the score of the Phoenix Suns game?
Alexa, did the Dallas Cowboys win?
Alexa, when do the Arizona Cardinals play next?

Images: [16], [17]

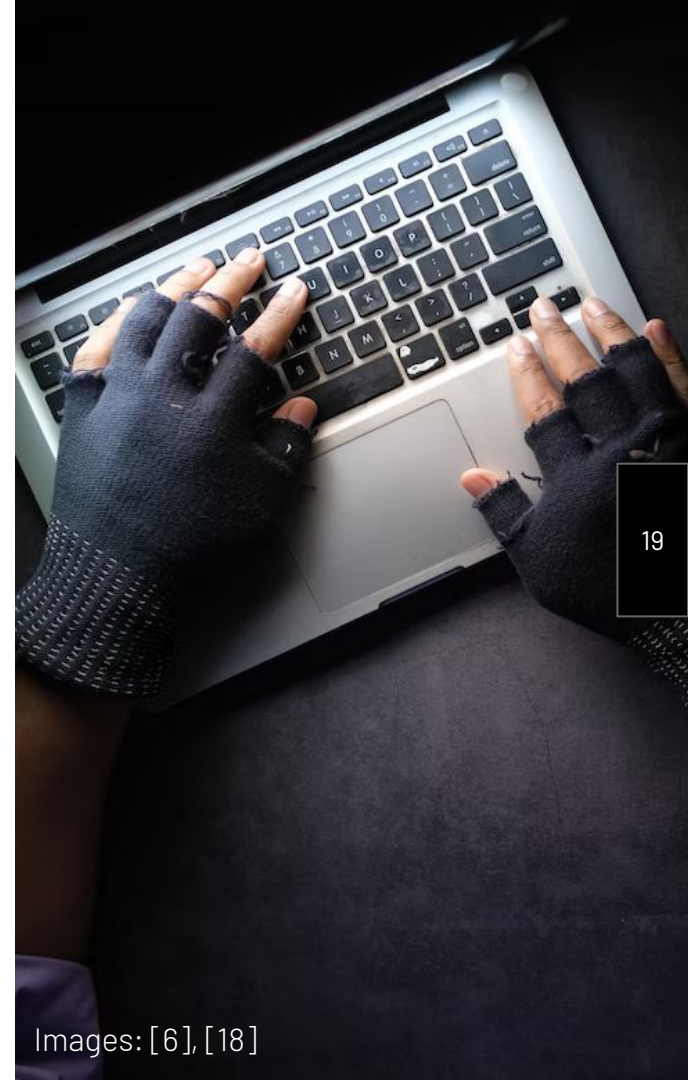
TRUST IS INFLUENCED BY MANY FACTORS

- ▷ Past experiences
- ▷ Opinions of companies
- ▷ Technophobia



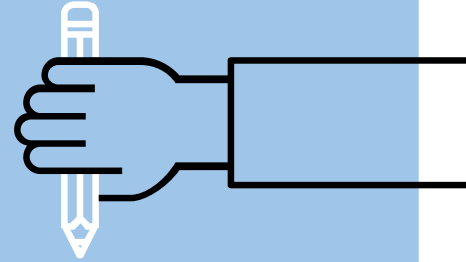
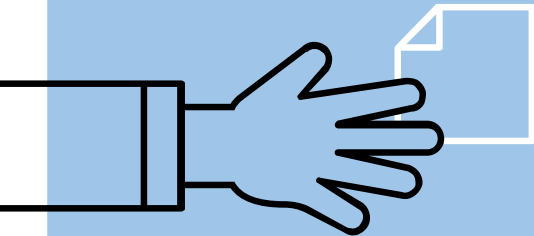
TRUST IS INFLUENCED BY MANY FACTORS

- ▶ Improving trust is important, but challenging
 - Security, privacy, data breaches, etc.
 - Bad actors (online scams)



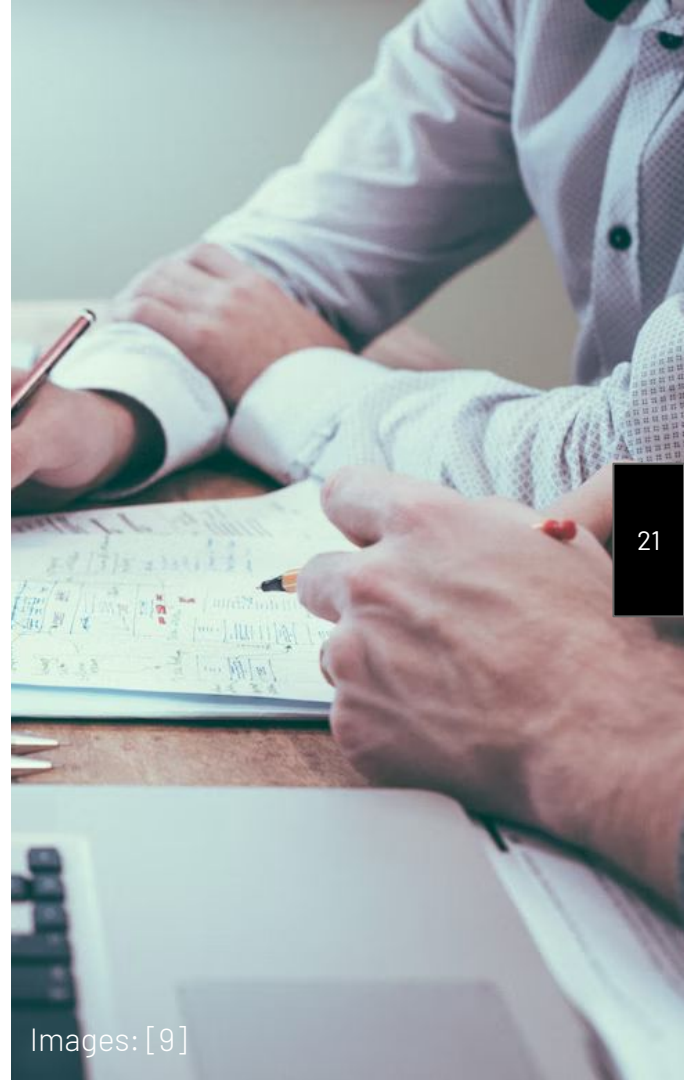
EXPLORATORY IDEAS

Where can we go from here?



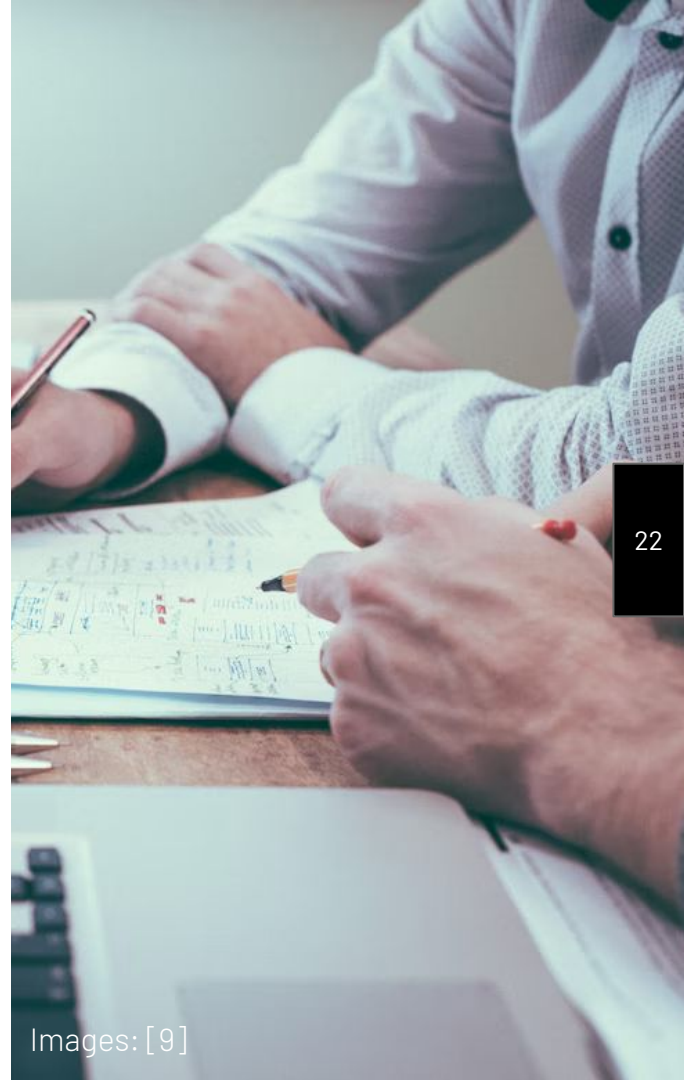
BUILDING TECHNO-CONFIDENCE

- ▶ Digital literacy can be taught
- ▶ Older adults with “high internet literacy” tend to adopt new tech^[10, 13]
- ▶ How to teach digital literacy?



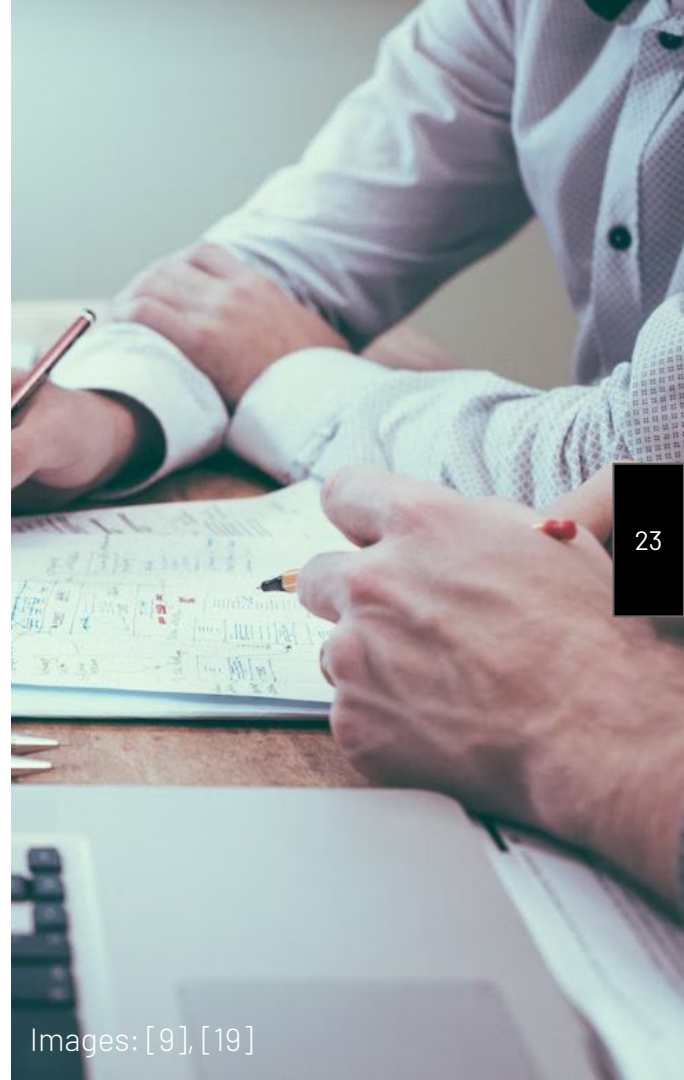
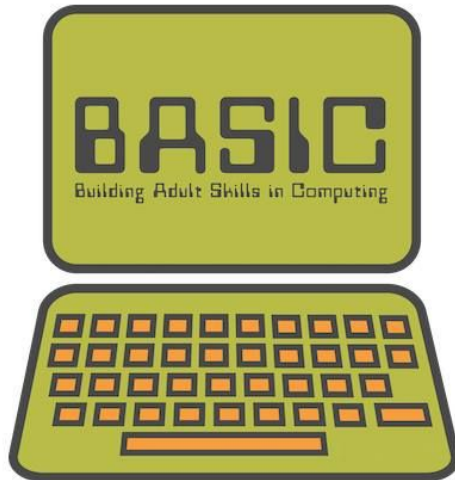
BUILDING TECHNO-CONFIDENCE

- ▶ Family-to-family, friend-to-friend
- ▶ Physical resources (*Windows 10 For Dummies*)
- ▶ Community outreach programs



BUILDING TECHNO-CONFIDENCE

- ▶ Case study: BASIC^[3, 6]
 - **B**uilding **A**dult **S**kills **I**n **C**omputing^[3, 6]
- ▶ Michigan Tech/Portage Lake Library program



BREAKING DIGITAL BARRIERS: BASIC

- ▶ Answering questions vs. teaching problem-solving skills
- ▶ Older adults' resource vs. skilled tutors' resources
- ▶ Judgment-free learning environment



BDB: SOCIOECONOMIC FACTORS

- ▶ Library access
- ▶ Library resources (trained staff, accessible facilities, funding)^[14]
- ▶ Illuminated Devices

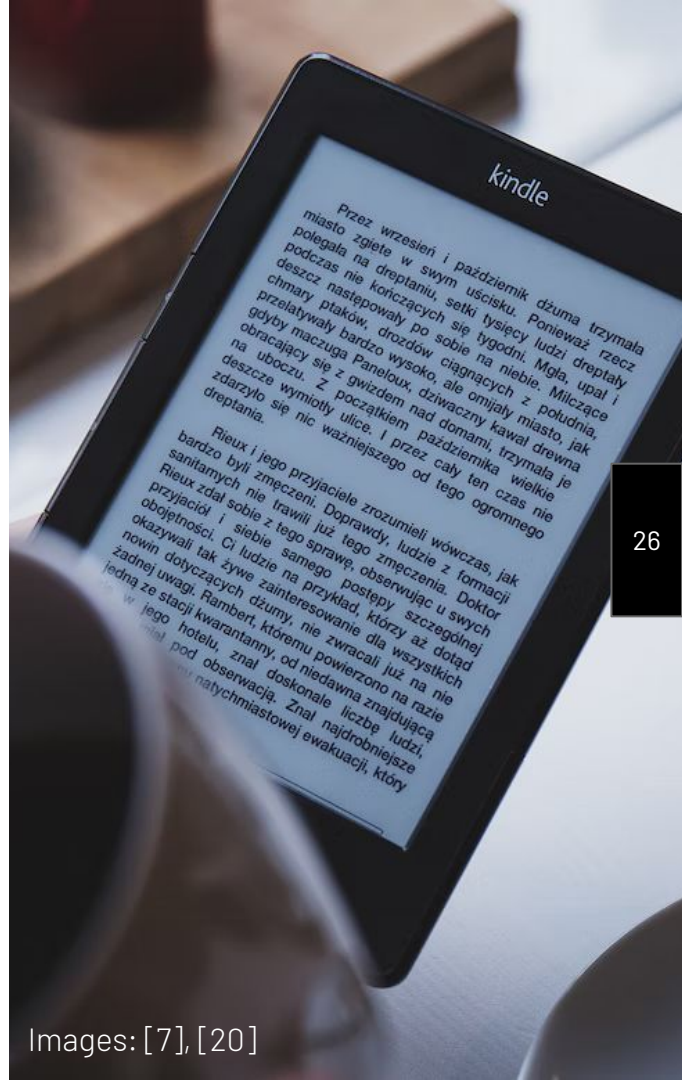


OTHER FUTURE STUDY IDEAS

- ▶ Device anthropomorphization vs. trustworthiness

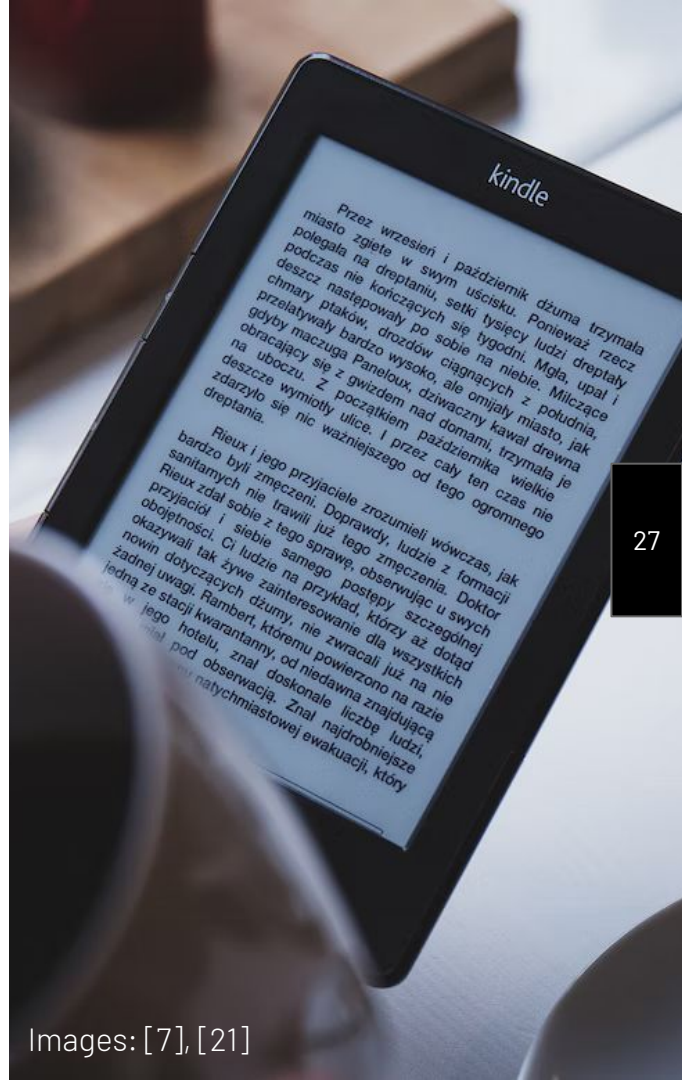
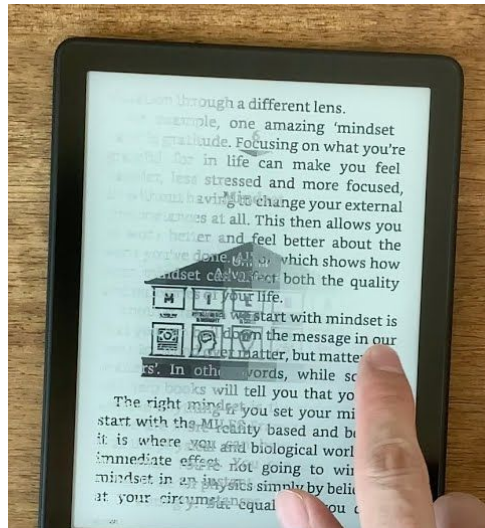


“GOOD NIGHT”



OTHER FUTURE STUDY IDEAS

- ▶ Skeuomorphic user interfaces vs. ease of use
 - LCD iPad e-readers vs. E-ink Kindle e-readers



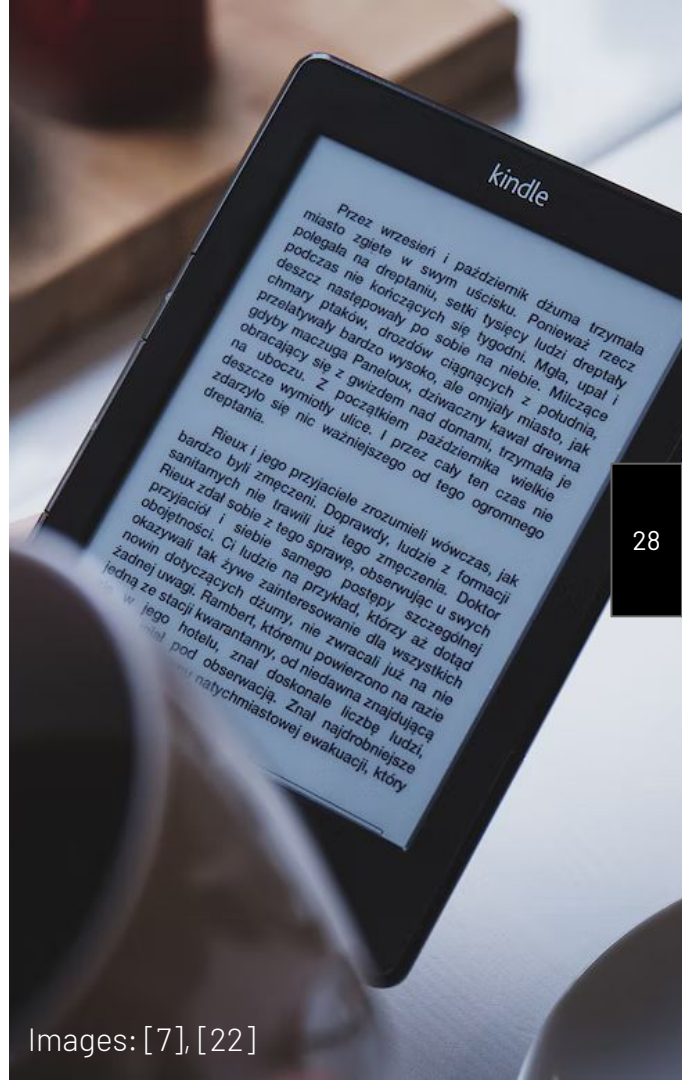
OTHER FUTURE STUDY IDEAS

- ▶ Redesigned VUI for older adults
 - More voice options
 - Alternative, simplified, or otherwise modified commands



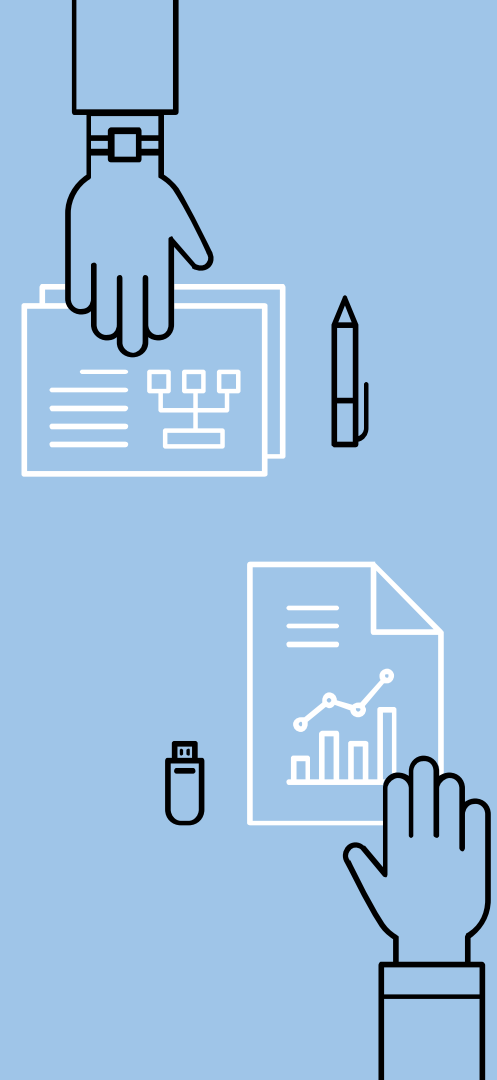
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They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Machines Sounding like Older People: Investigating how older adults perceive an emphatic voice assistant in their first interactions



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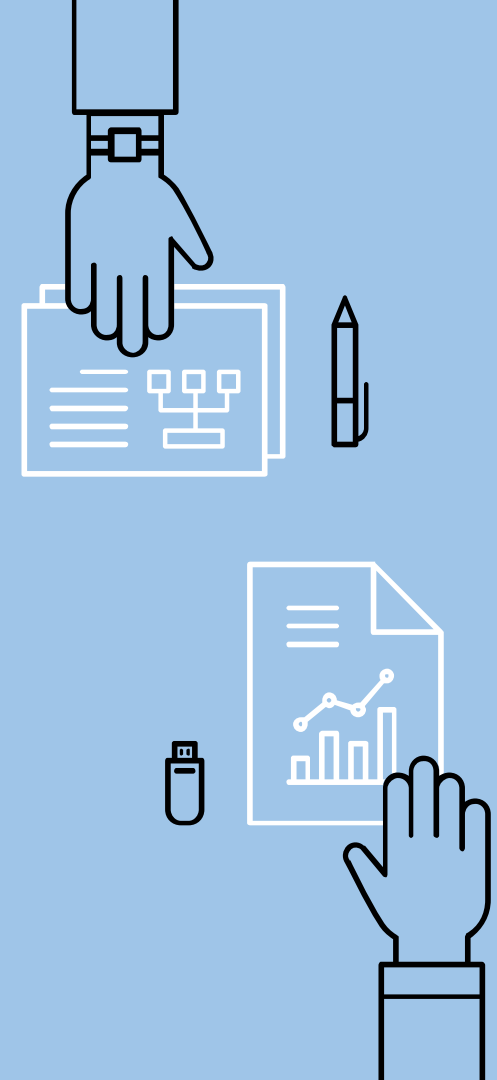


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