

Extending human intelligence for optimal performance

Pattie Maes





Today's devices put
the world's information
at our finger tips

But they do not help with:

- attention
- motivation & grit
- informed decision making
- creativity
- memory
- emotional wellbeing
- ...

Smartphones may be changing the way we think

Those attention-grabbing digital devices are like a new appendage. How are they changing us?

BY LAURA SANDERS 12:21PM, MARCH 17, 2017

They have negative impact on performance

REPORT

Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips

Betsy Sparrow^{1,*}, Jenny Liu², Daniel M. Wegner³

+ See all authors and affiliations

Science 05 Aug 2011:
Vol. 333, Issue 6043, pp. 776-778
DOI: 10.1126/science.1207745

Is Your Smart Phone Killing Your Creativity?

Sure, your beloved gadget allows you to work during every spare moment, but is the price of increased productivity dramatically lower creativity?

in f 



By Jessica Stillman *Contributor, Inc.com*  [@EntryLevelRebel](#)

TECHNOLOGY

Your Smartphone Reduces Your Brainpower, Even If It's Just Sitting There

A silent, powered-off phone can still distract the most dependent users.

ROBINSON MEYER AUG 2, 2017



Can we design
personal devices
that are minimally
disruptive and support
optimal functioning?

3 technologies will radically change
our relationship and interaction
with personal devices

Technology #1:
sensors that collect data about the user and their context
have become small, wearable, and can be processed in real-time



Google
Clips

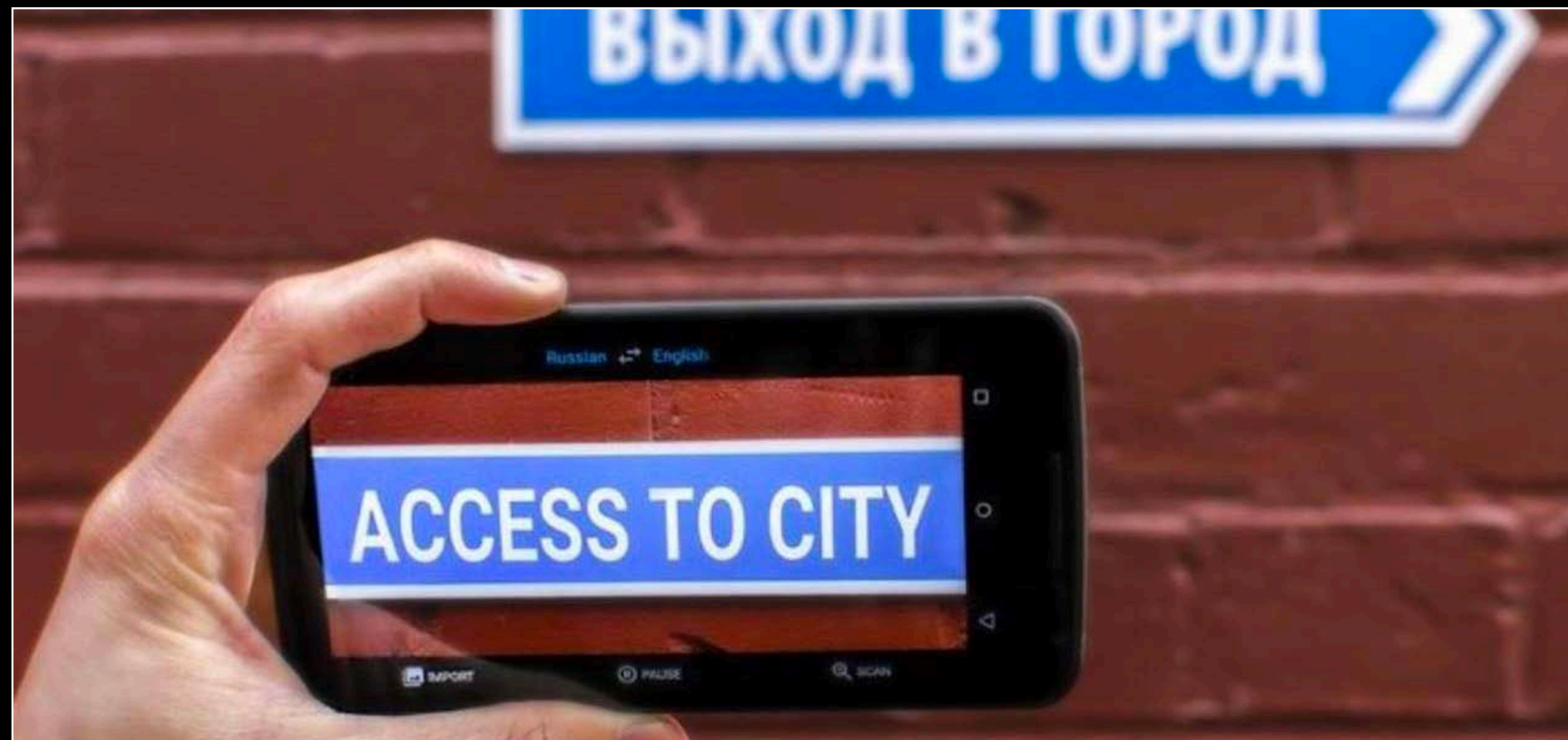


Muse
EEG

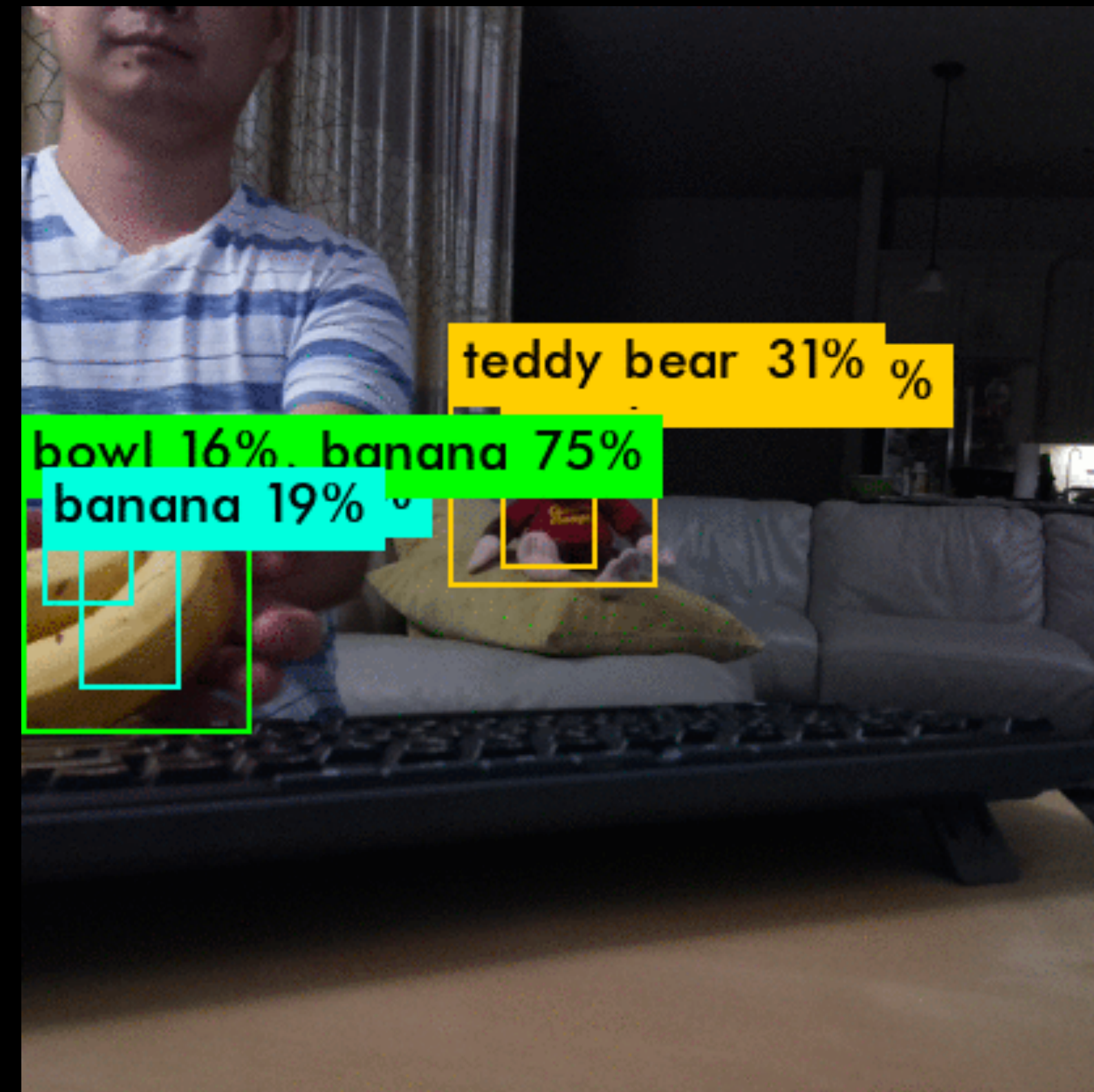


Emphatica E4

Technology #2:
artificial intelligence technology can
analyze sensor data in real-time,
modeling the user, understanding
their context and providing relevant
information



Google LENS real-time translation



Yolo real-time object recognition



Brightbeat: real time tracking and
influencing of breathing rate
through modulation of sound and
display brightness

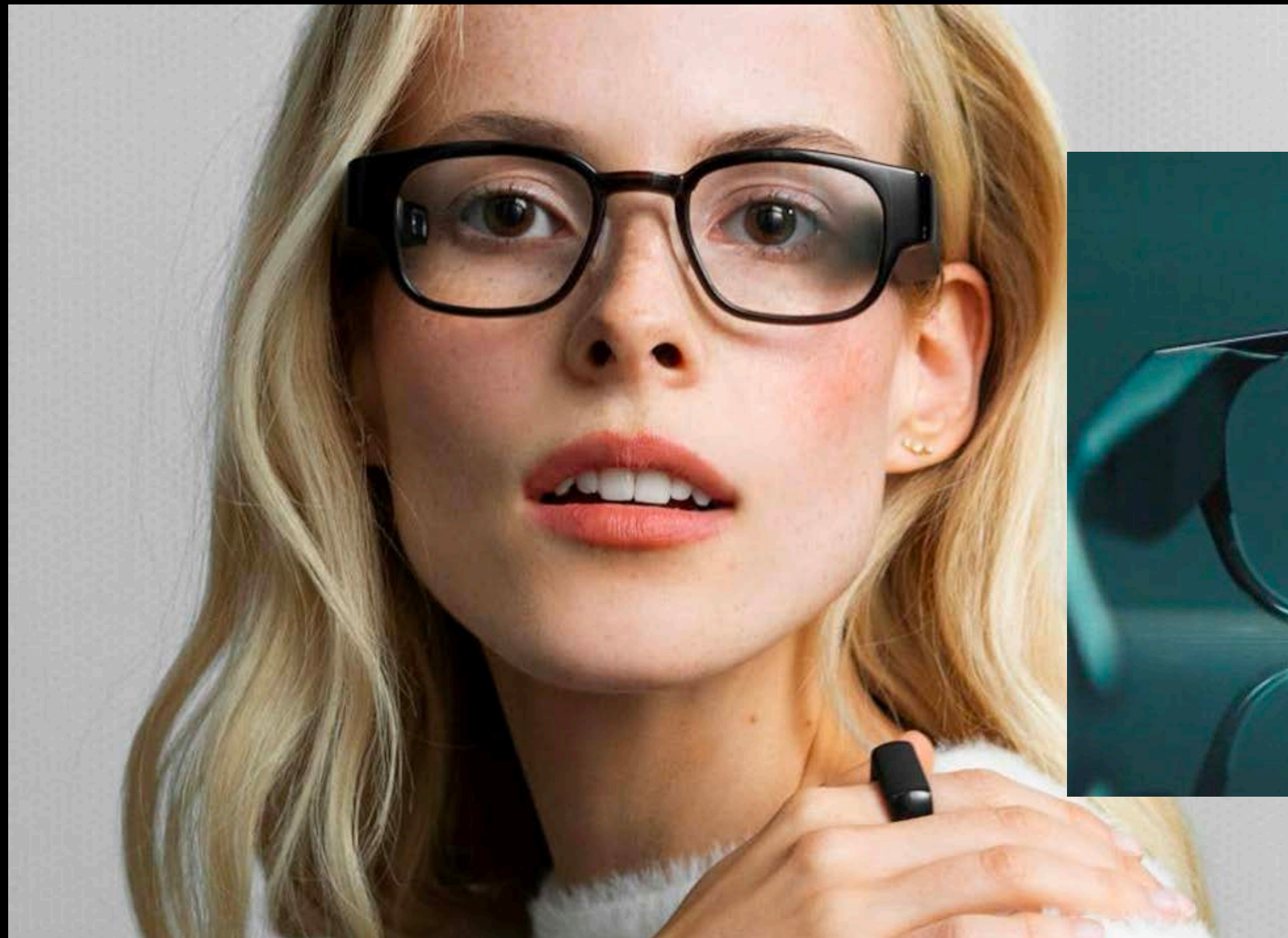
Technology #3:
new display
technologies can
provide real-time
information in minimally
disruptive ways
(audio, visual, haptic,
scent)



Bose audio AR Frames



Essence scent delivery



North Focals



Google Glass Enterprise edition 2

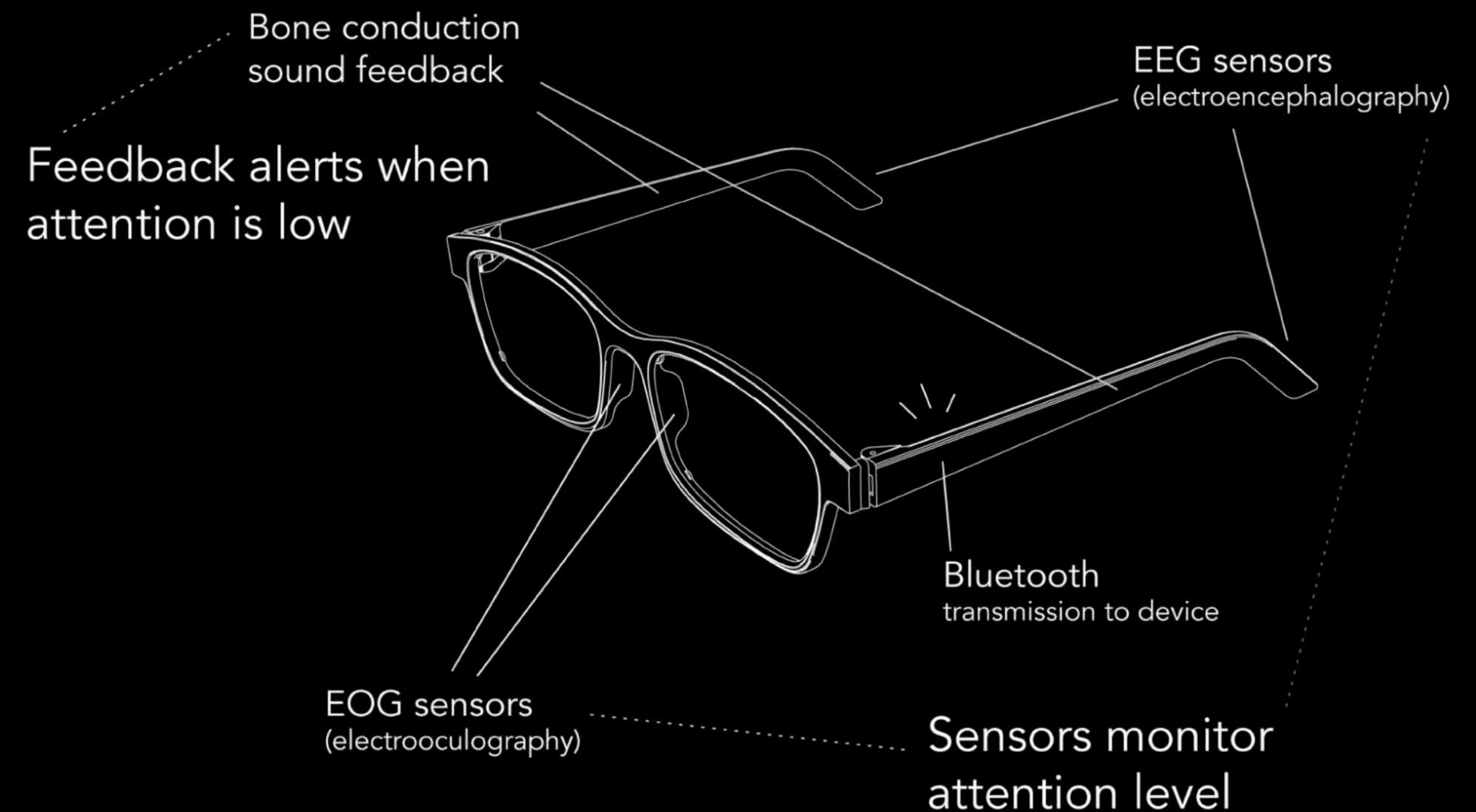
Smart, better integrated devices will offer opportunities to support people with optimal performance, including



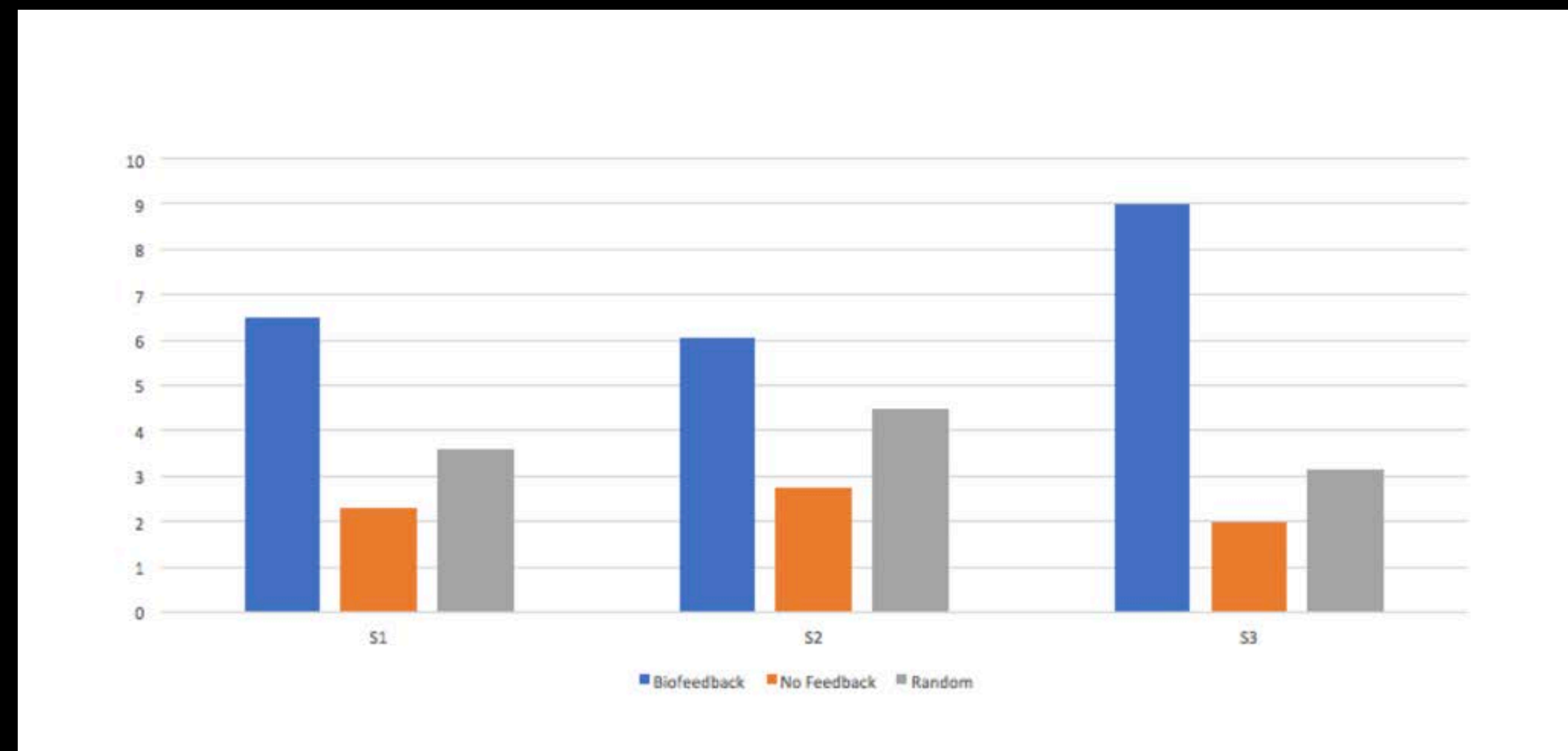
improved attention, decision making, memory, learning, creativity, motivation, and emotion regulation

ATTENTION

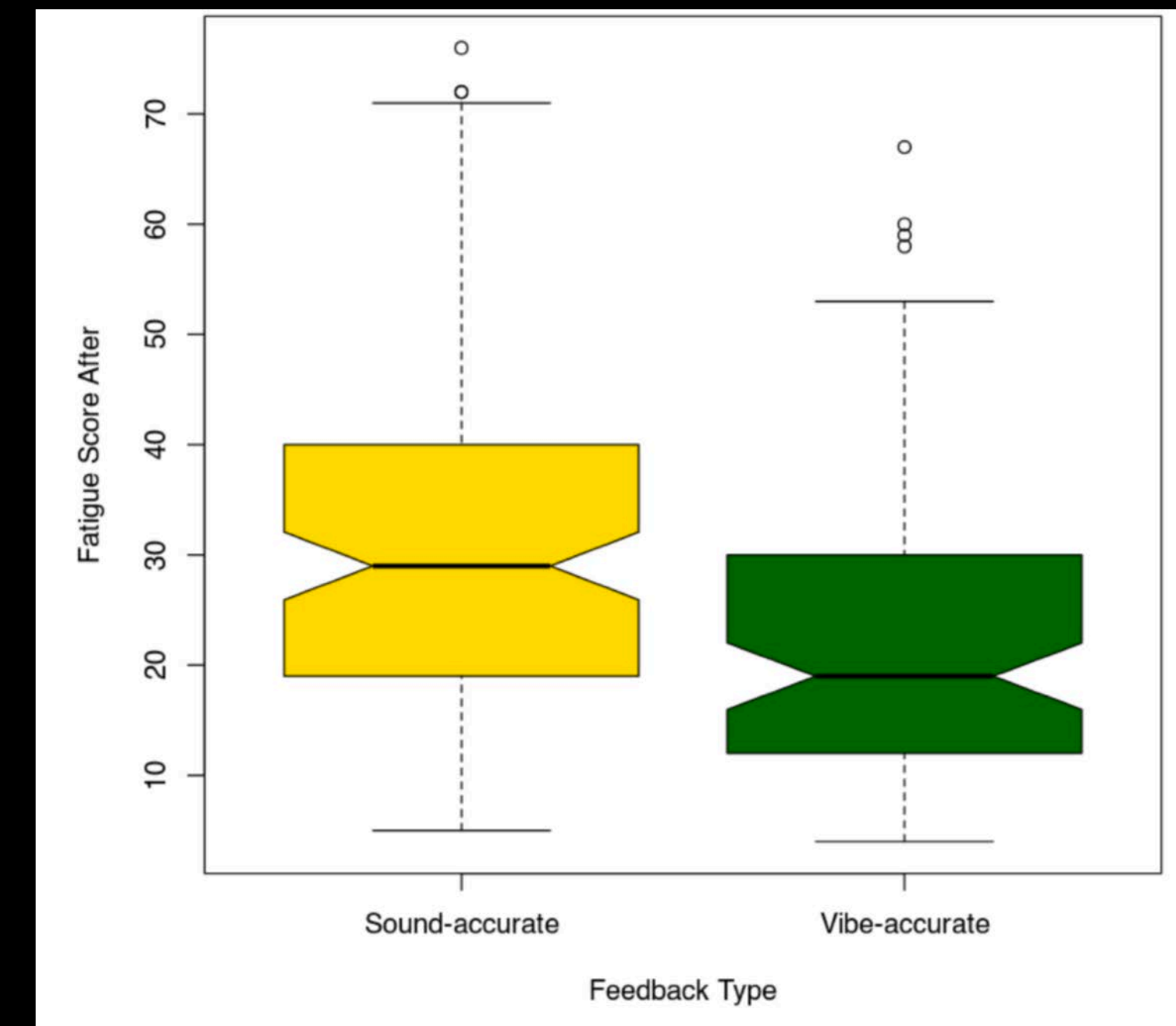
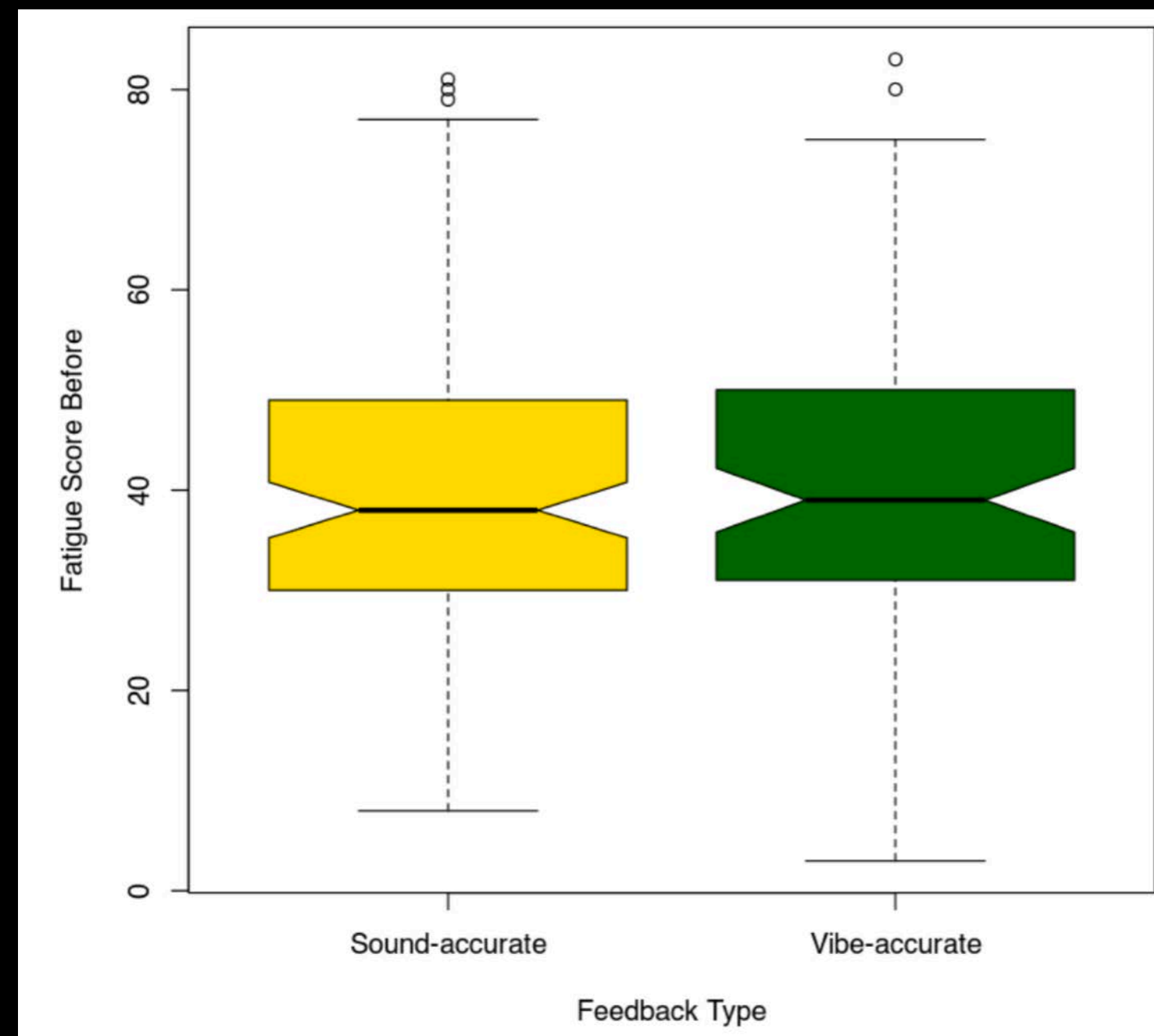
AttentivU: a biofeedback system for real-time monitoring and improvement of attention



AttentivU in the Classroom



AttentivU in the car: fatigue level before and after feedback




INFORMED DECISION MAKING

AlterEgo - Silent speech interface

Publications: Kapur et.al. IUI 2017, NeurIPS 2019

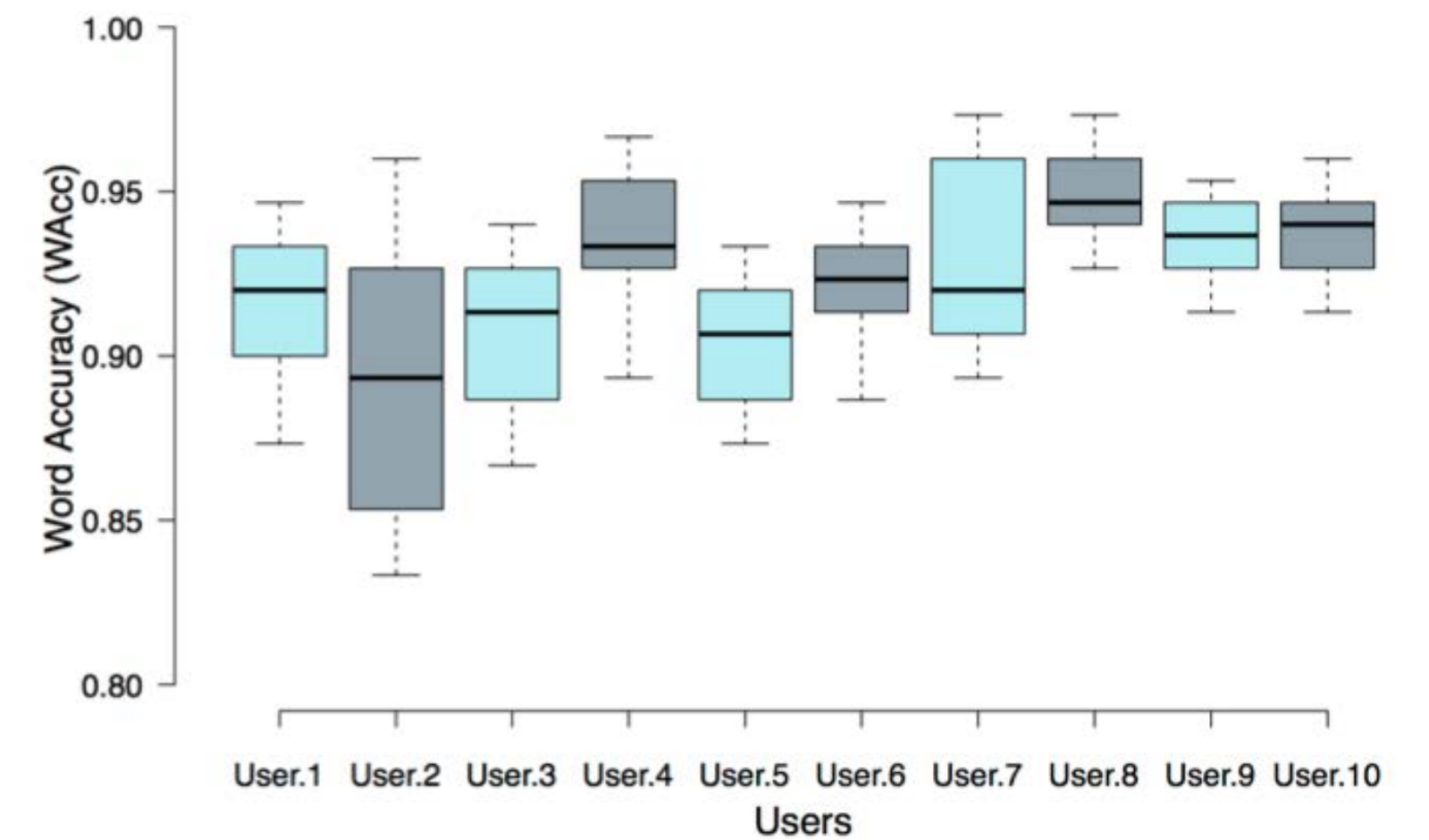
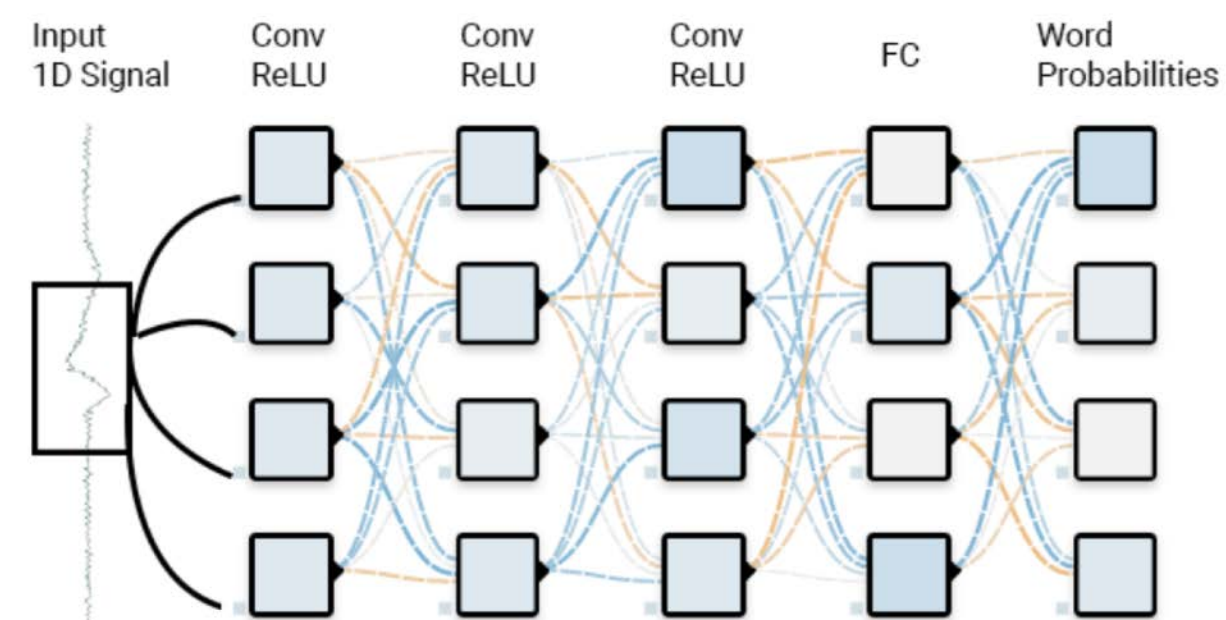
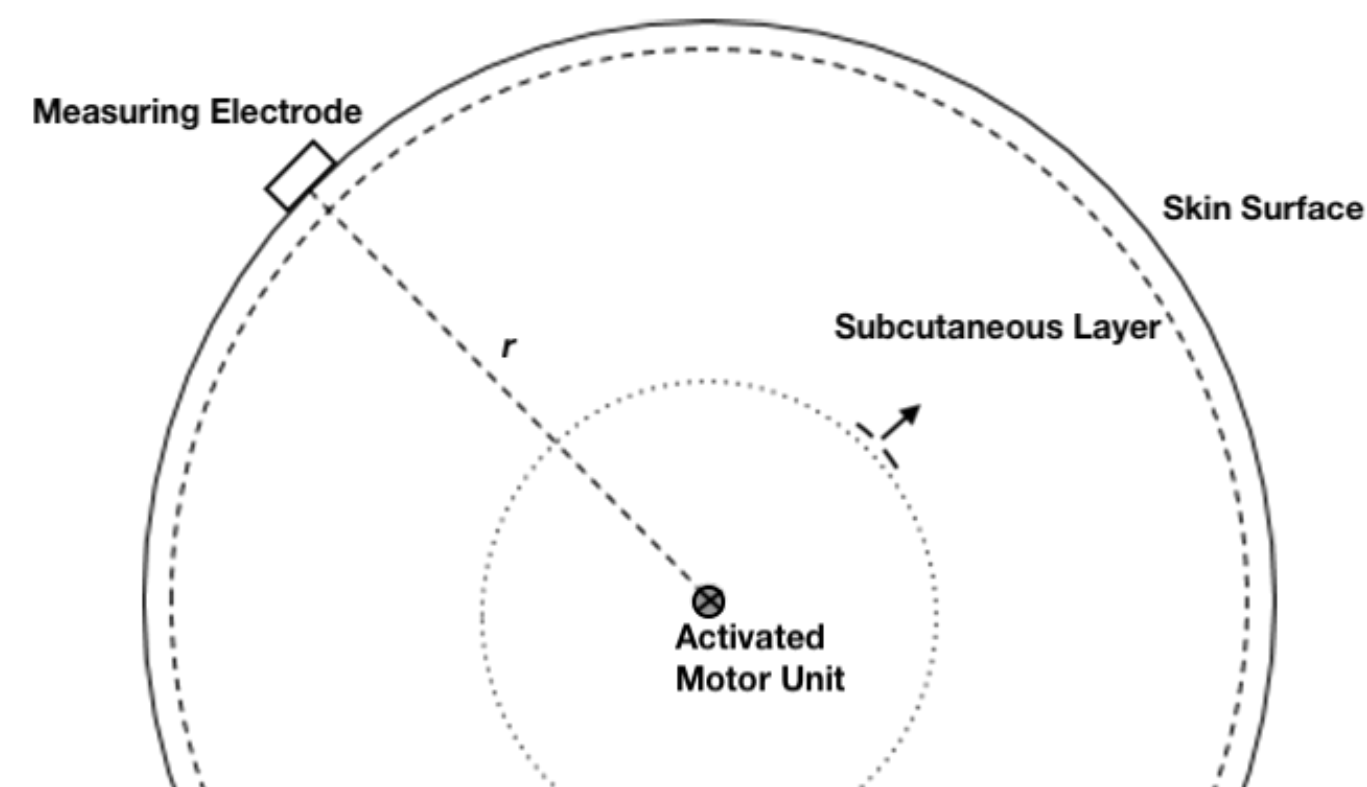
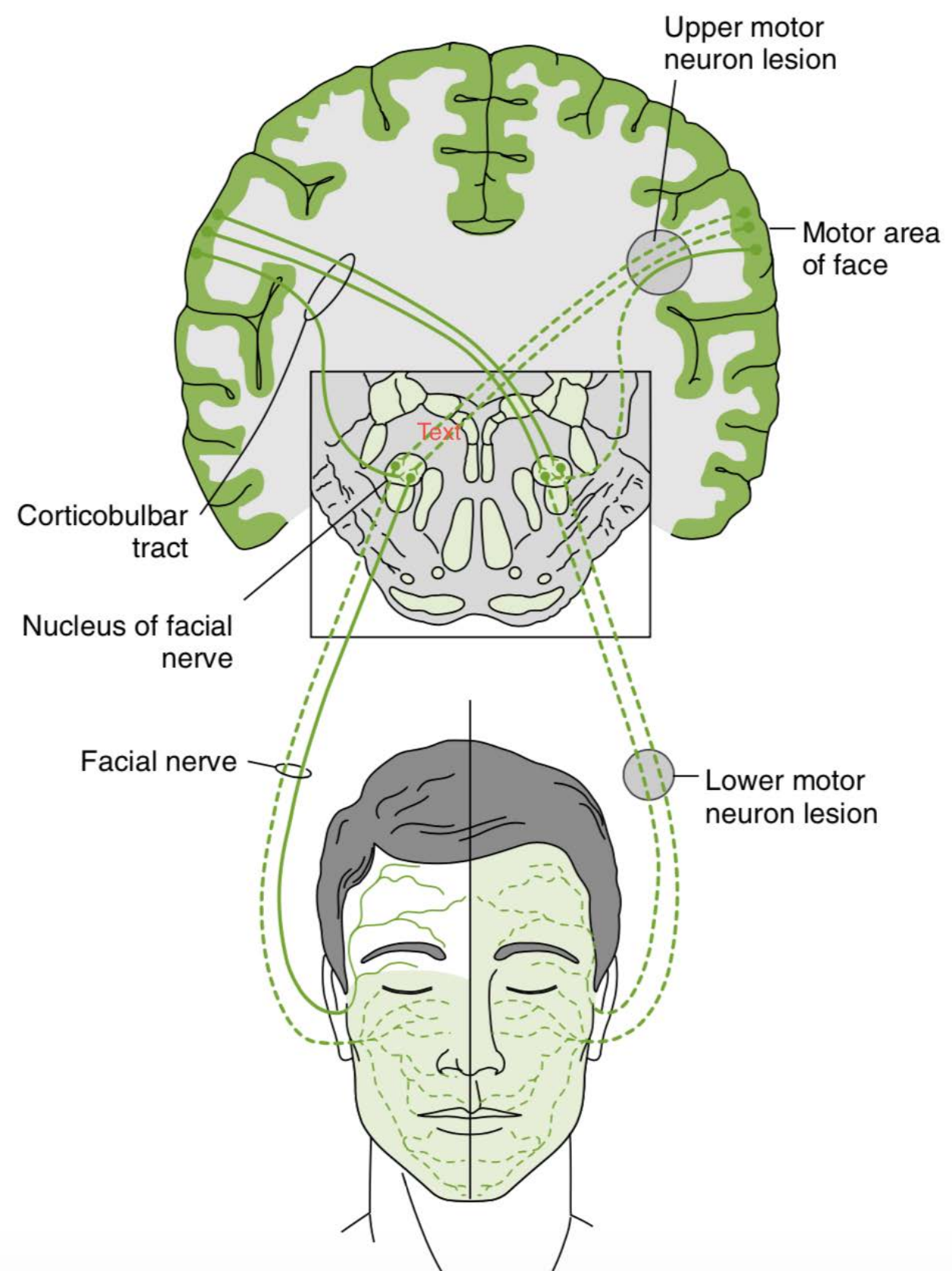




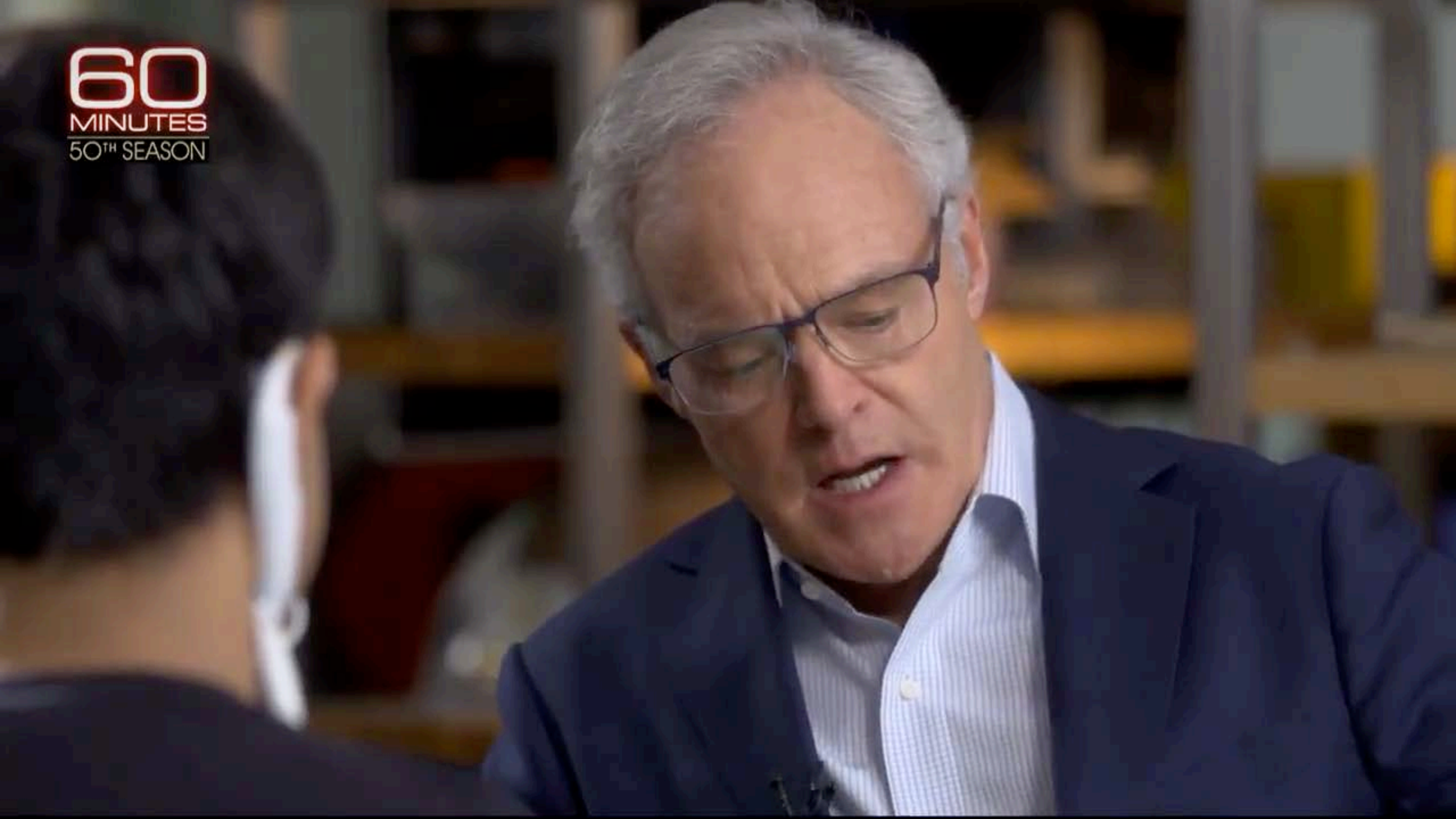
**without any voice or discernible movements,
enabling the user to communicate with devices,**

AlterEgo Signal capture, processing, results

current prototype

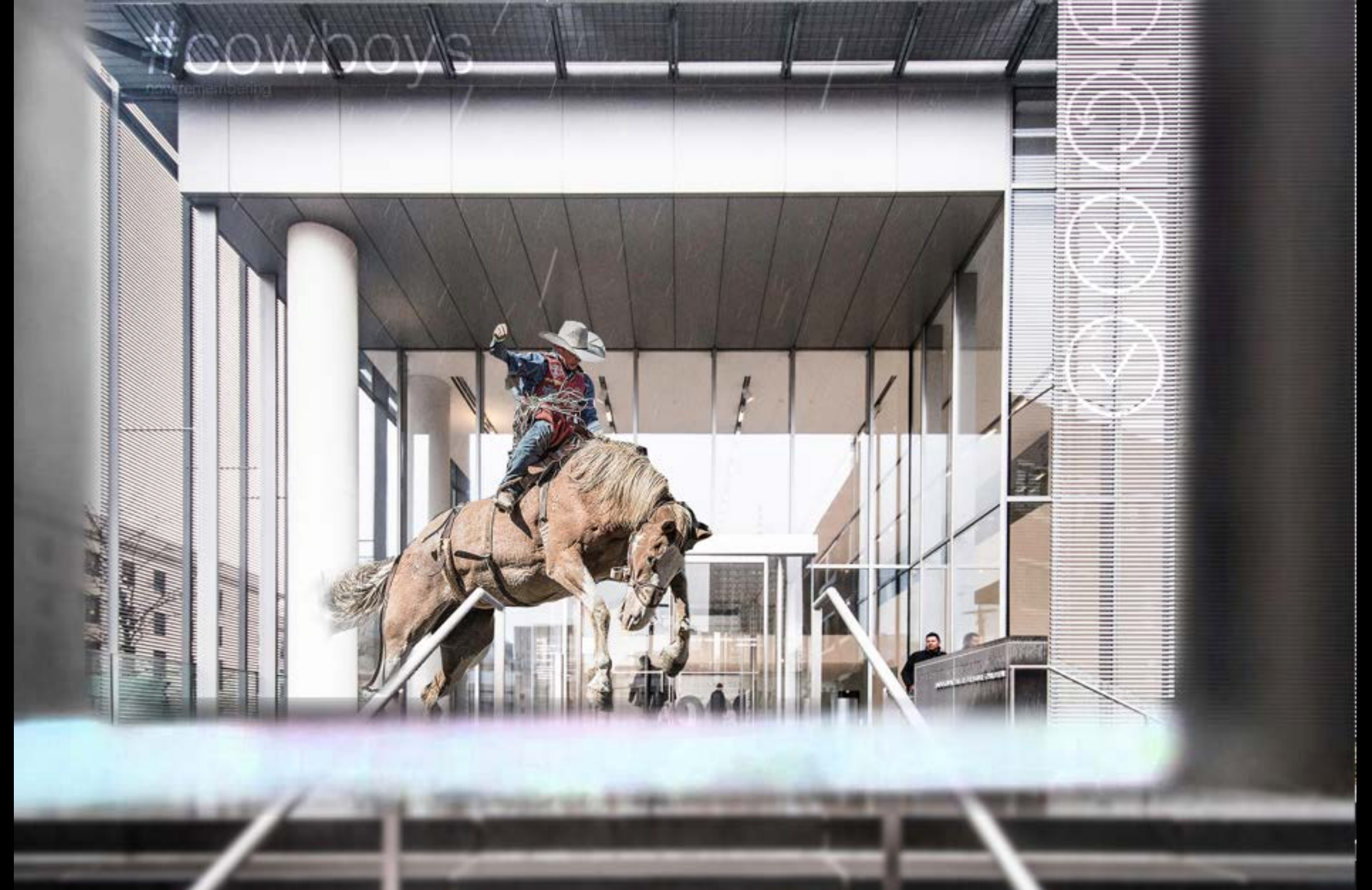


60
MINUTES
50TH SEASON



MEMORY & LEARNING

NeverMind: Using augmented reality glasses to facilitate encoding of memory





1967 Green Bay Packers



1968 Green Bay Packers



1969 New York Jets



1970 Kansas City Chiefs



1971 Baltimore Colts



1972 Dallas Cowboys



1973 Miami Dolphins



1974 Miami Dolphins



1975 Pittsburgh Steelers



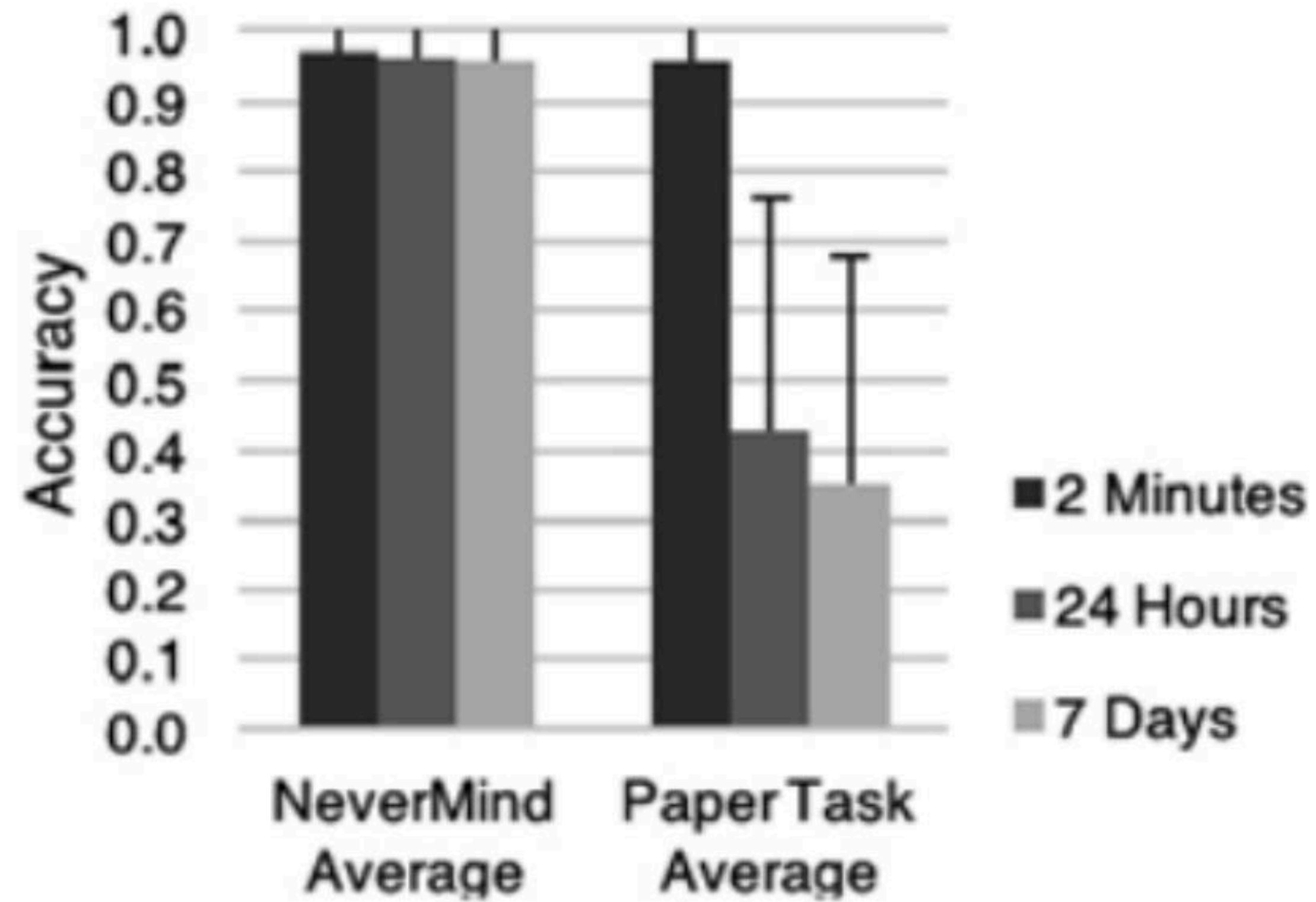


Figure 29: Recall accuracy for the experiment task using NeverMind compared to the paper based task.



WordSense -
learning a second
language in
everyday life

increased
engagement and
increased recall

CUP



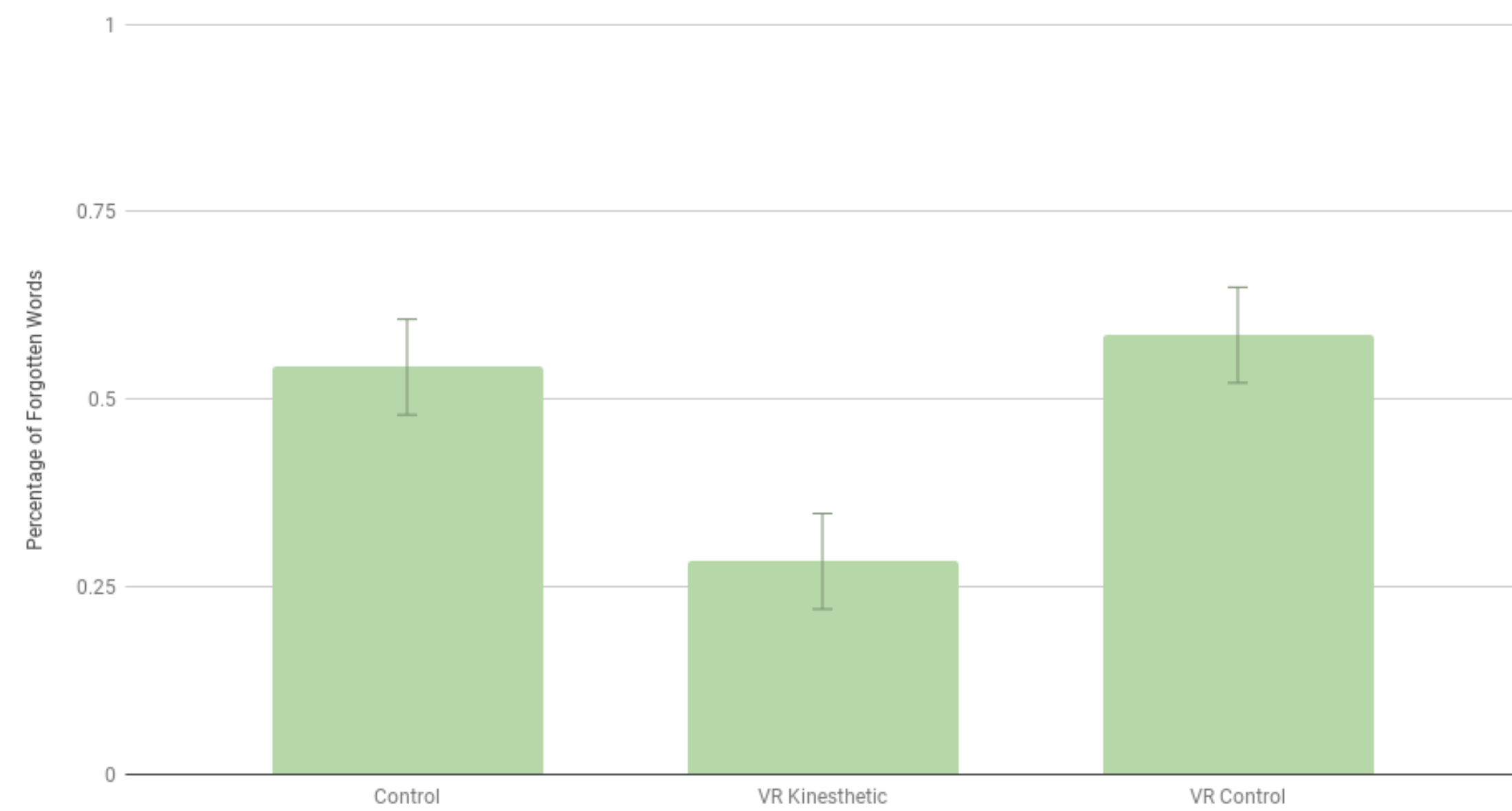


Words in Motion

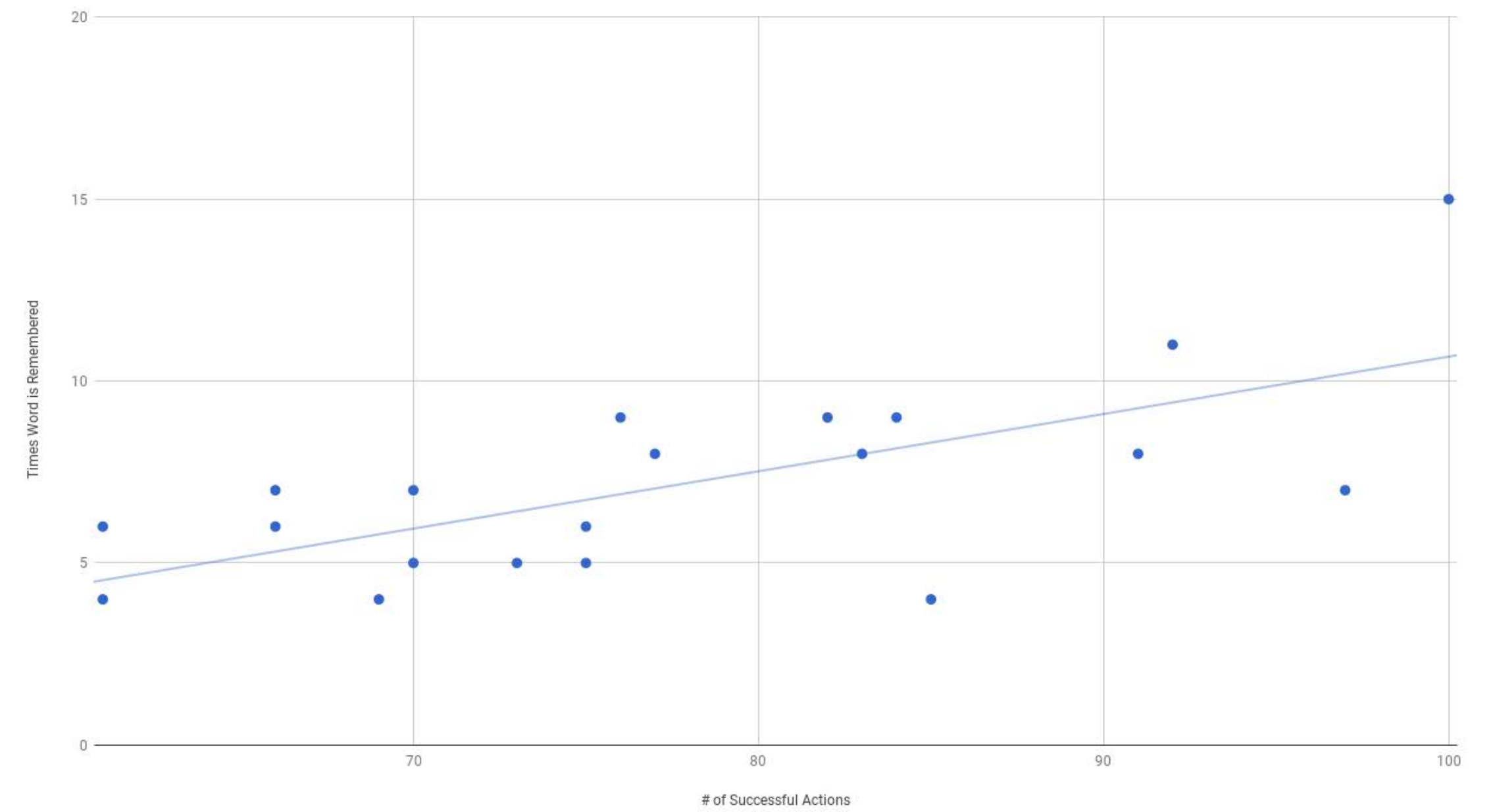
learning action verbs while performing the gestures

Kinesthetic Word Learning in MR - Christian Vazquez

Average Percentage of Words Lost



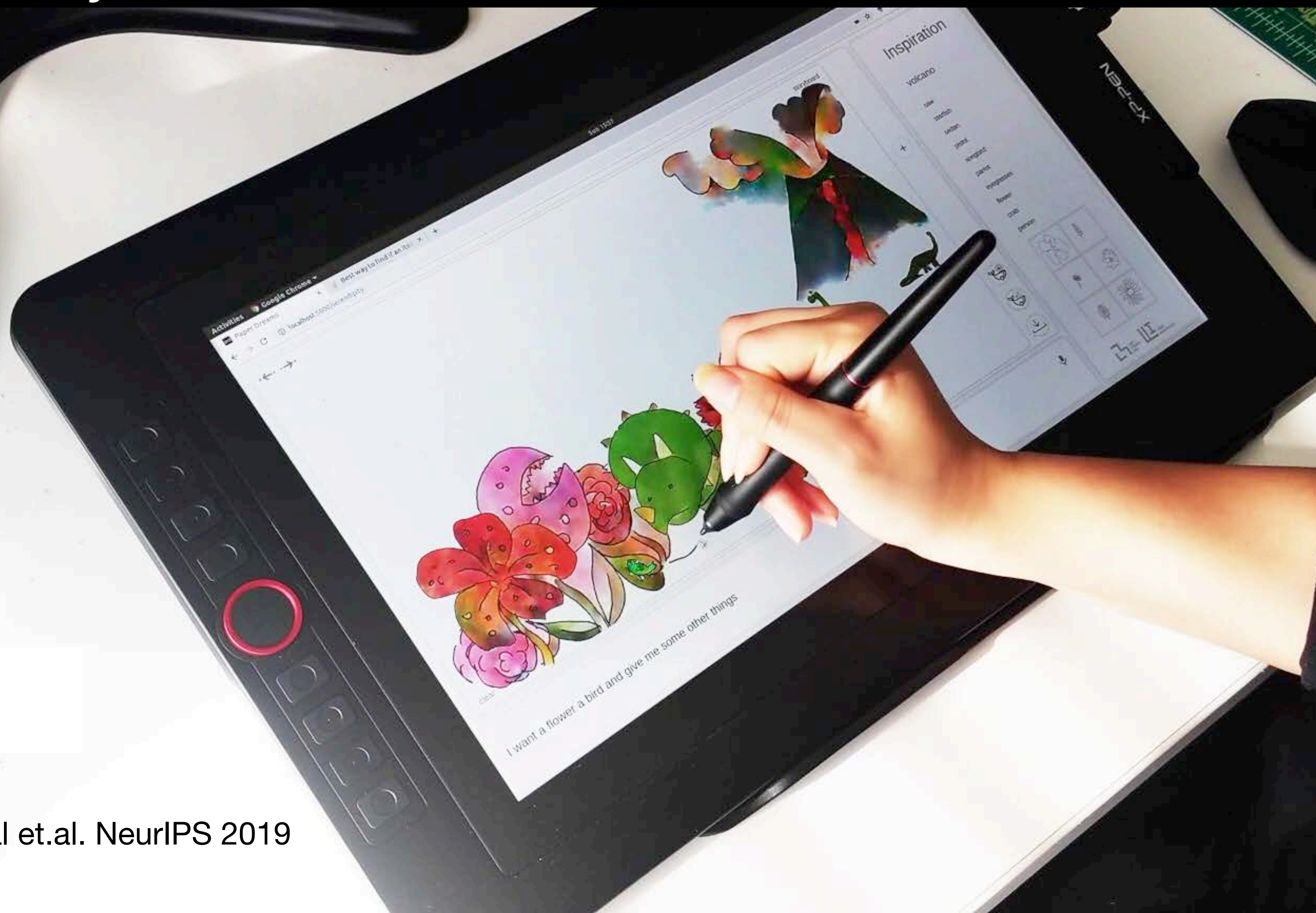
Number of Successful Actions Versus Times Word is Remembered a Week After

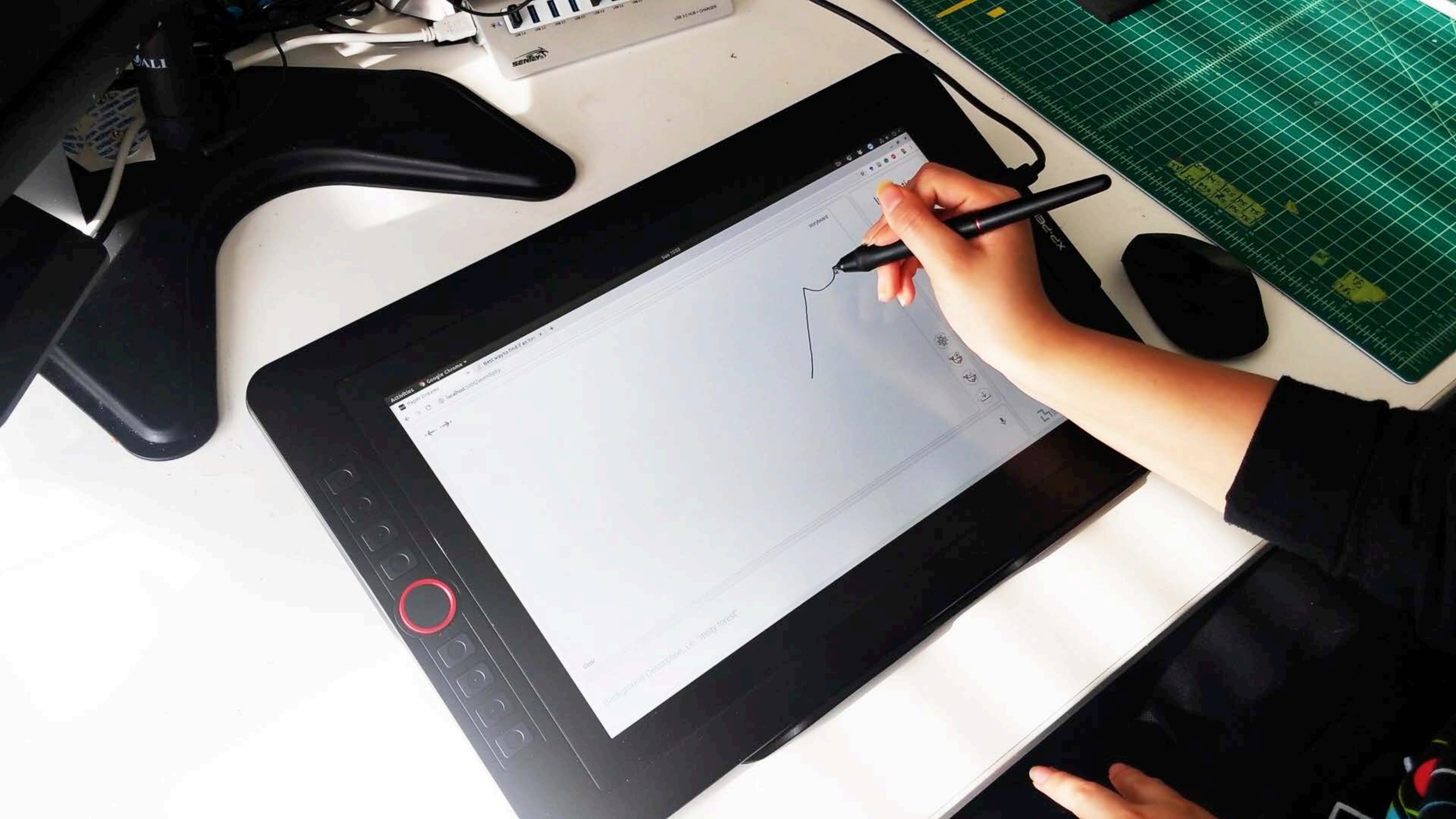


Kinesthetic learning is more “sticky”

CREATIVITY

Paper Dreams - enhancing creativity through interaction with an AI system





Activities

Google Chrome

Best way to find if an item

localhost:5000/learnology

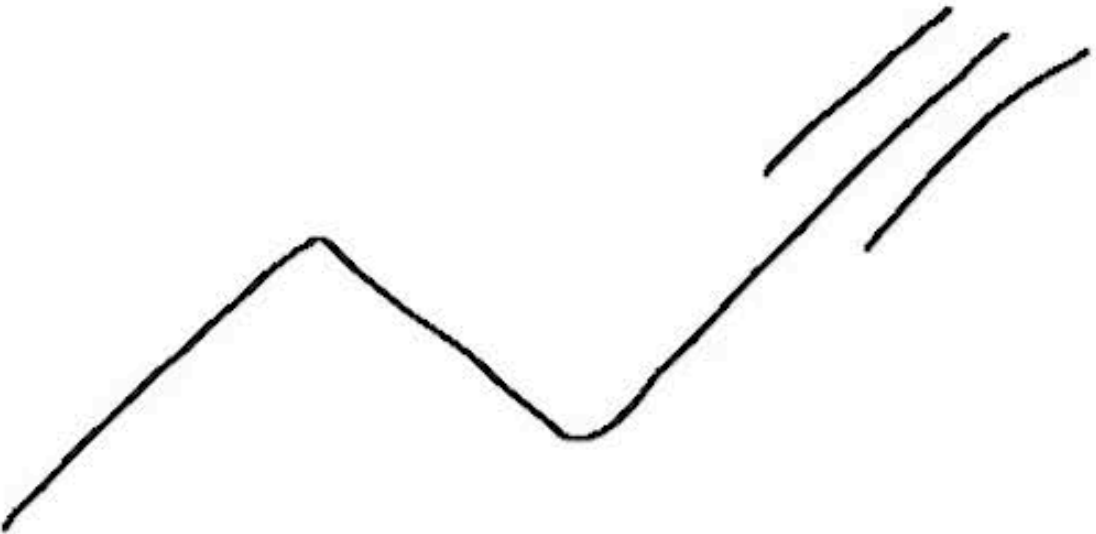
clear

Background description, in "misty forest"


workspace

Paper Dreams for chemists

← · → storyboard









clear



Background Description, i.e. "misty forest" 

Inspiration

1-Pentyne

- 5-Fluoro-1-pentyne
- 5-Cyclhexyl-1-pentyne
- 3-Methyl-1-pentyne
- 3-Methyl-1-pentyne
- 3-Methyl-1-pentyne

User Study N=26

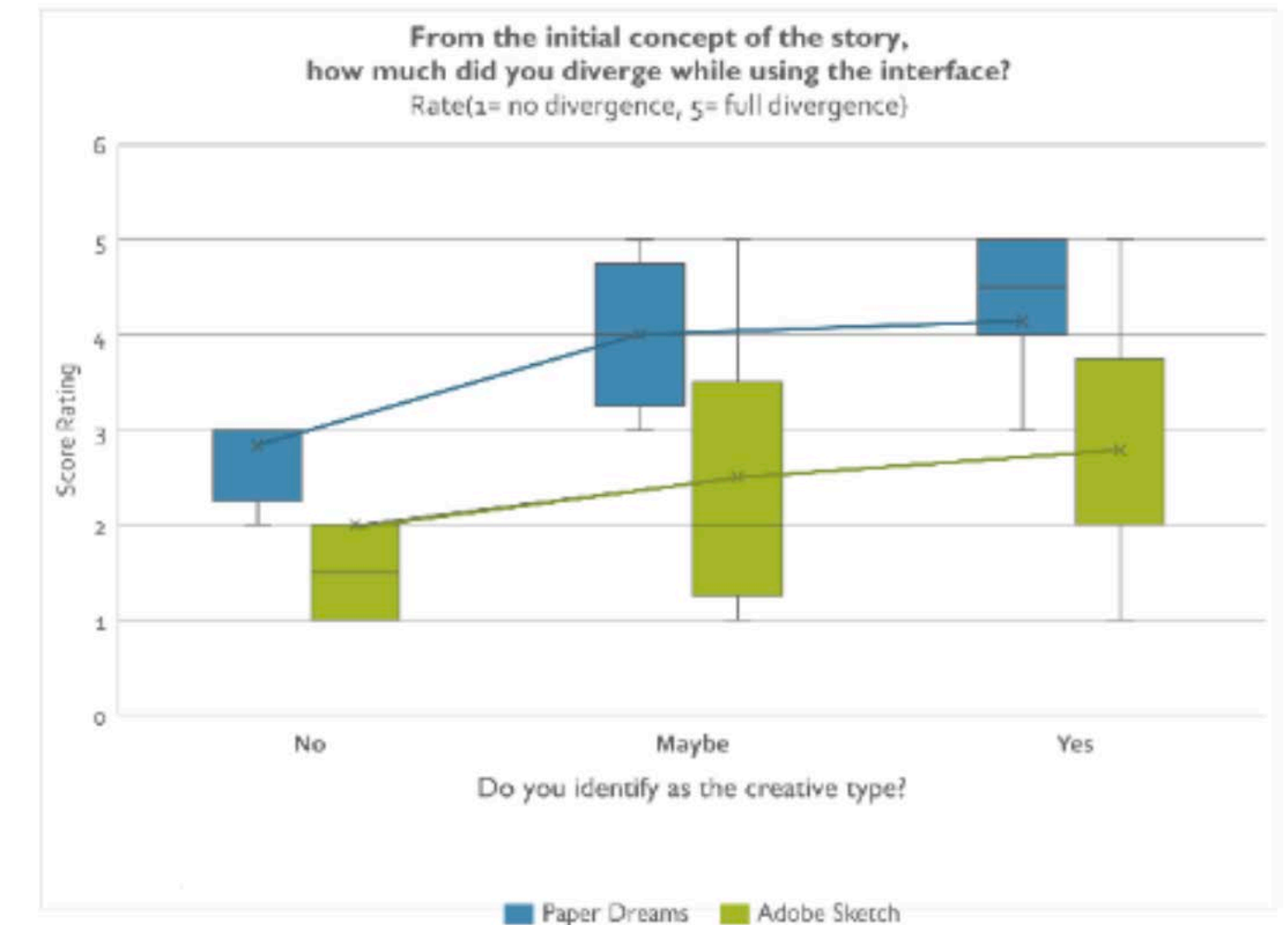


Figure 8. On average, users indicated that the Paper Dreams interface helped them diverge their stories from their original idea more than the digital interface of Adobe Sketch.

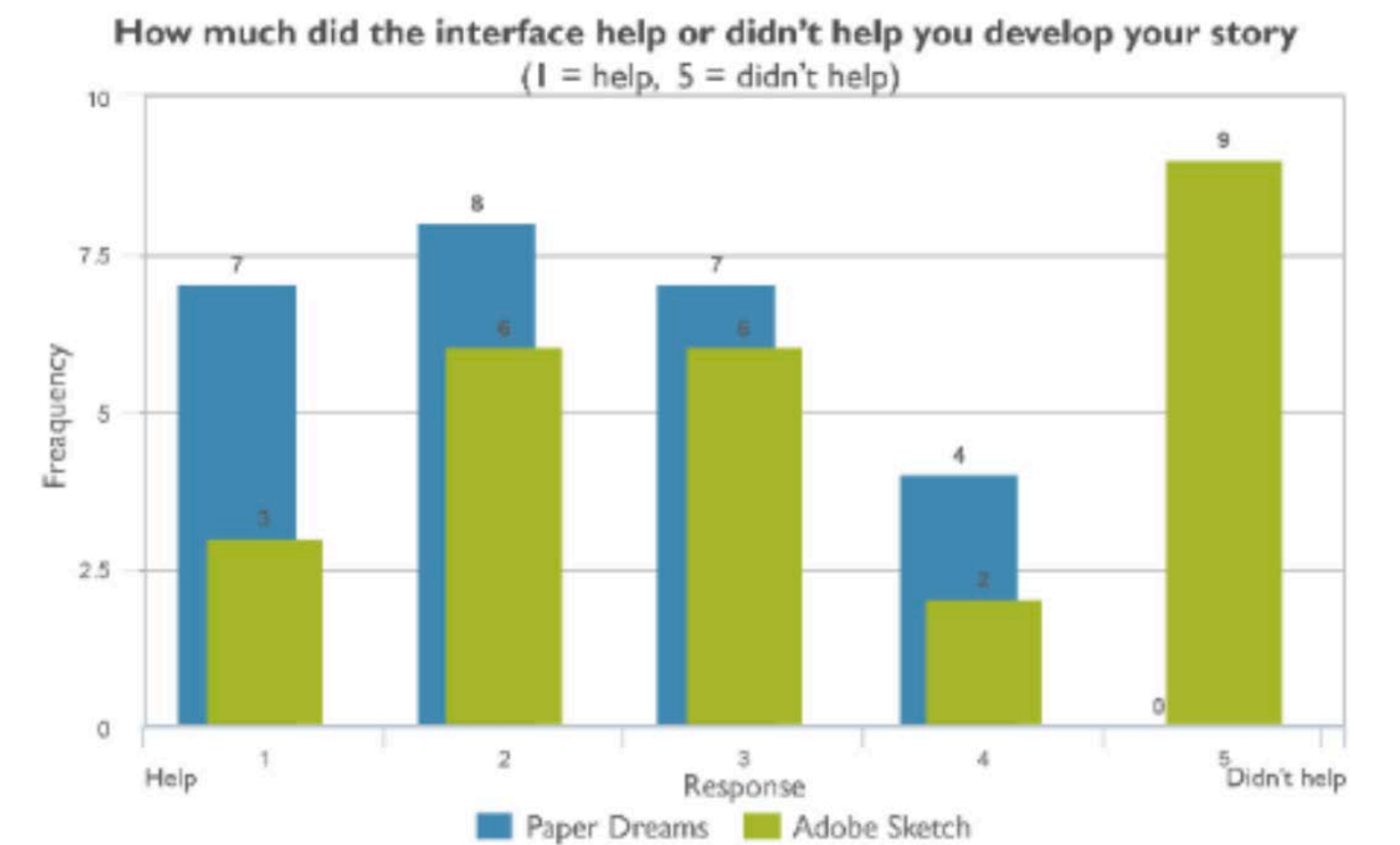


Figure 9. Based on the distribution of the Likert scale survey question "How much did the interface help or didn't help you develop your story?", users indicated that the Paper Dreams interface was more helpful in developing their story than Adobe Sketch.

Bernal, Guillermo. Yuen, Erica. Maes, Pattie. "Paper Dreams: Real-Time Human and Machine Collaboration for Visual Story Development." In GA2019–22nd Generative Art Conference. 2019.

MOTIVATION

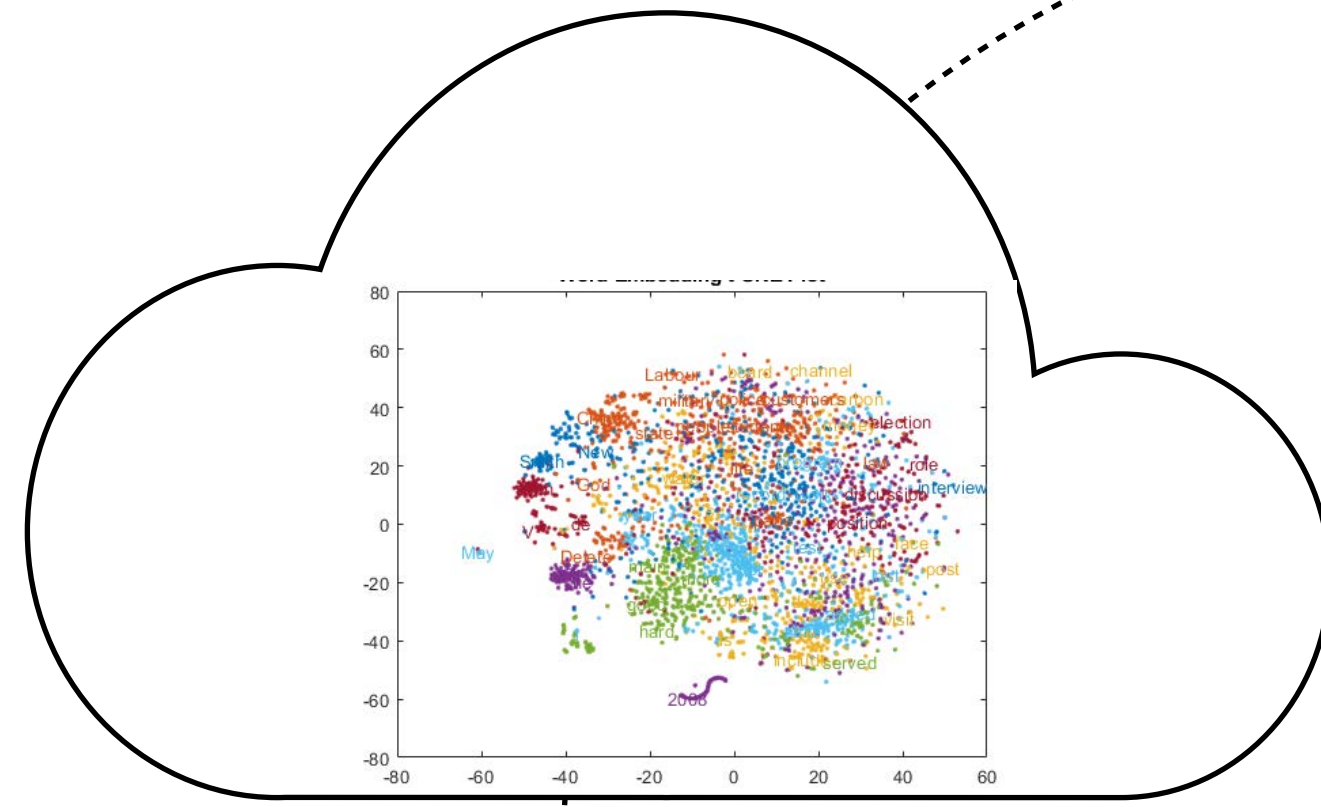
Wearable Wisdom

A context-aware, audio-based system for mediating wisdom from personal mentors to users



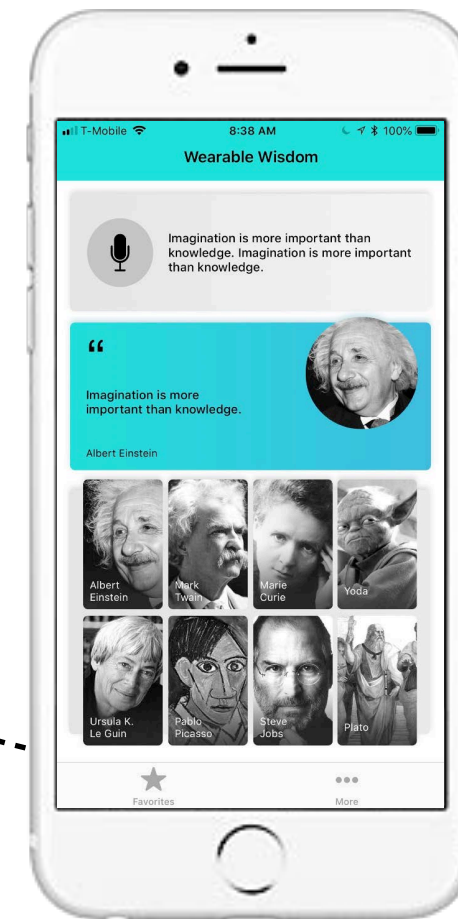


Text to

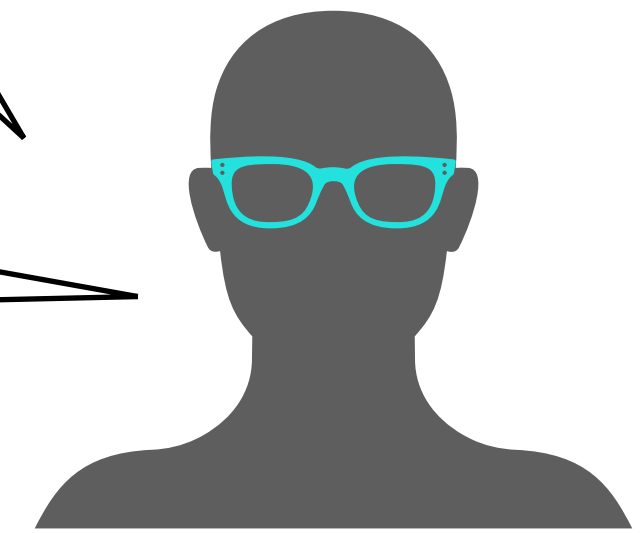
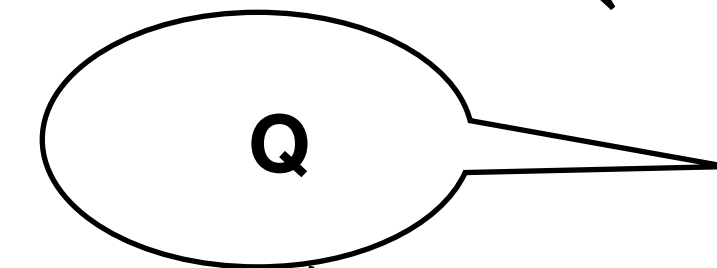
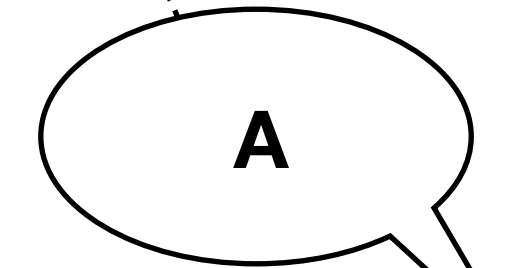


Semantic

Mentor
Wisdom
Database



Mentor



User Input
Processin

Context



WELLBEING

HeartBit

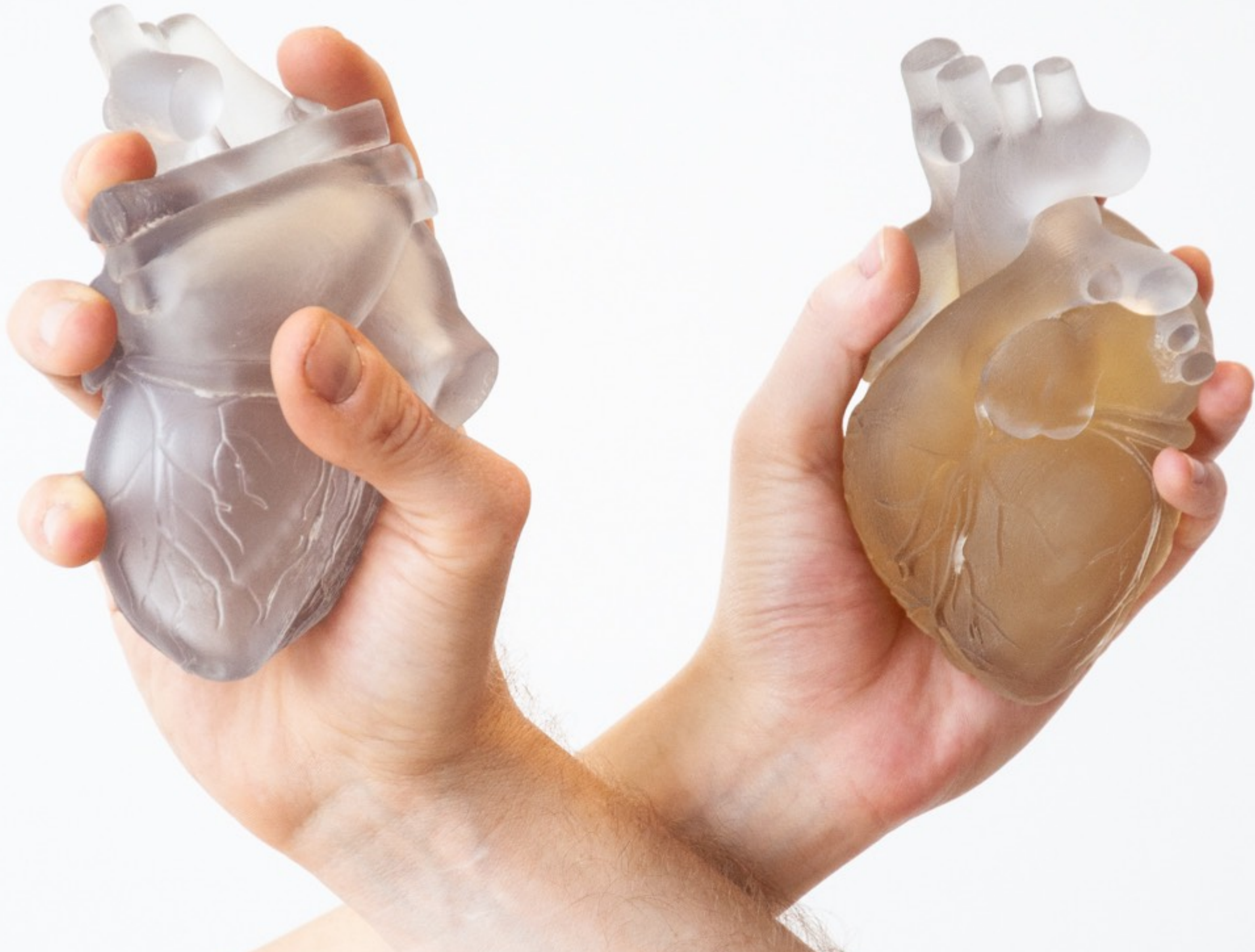
Enhancing emotional regulation



Mindfulness and self-awareness



Building empathy





Next generation
devices will
seamlessly
support
users for optimal
performance

Philosophy

Enhance quality of life

By translating brain & behavioral science for real world use

While engaging in critical conversations

Design guidelines

Design with target users

Enable rather than enforce

Teach rather than make dependent

Keep data private and local

Thank you

@FluidInterfaces

fluid.media.mit.edu

