Designing for Older Adults

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Gerontech I - Fall 2017

Today's Class Outline

44% - Designing for Older Adults

50% - Presentations

5% - IT issues

1% - Wandering off topic

Sections of Today's Lecture

- Aging and Physical Changes
- Technology uptake among groups
- User Experience Design Processes

Aging Physiology

Endorcrine function
The body's system of glands, which secrete helpful chemicals into the blood, becomes less efficient with time.

Brain function
Many changes occur in brain cells and function over time.

Cardiovascular health
The heart weakens with age and the network of arteries can accumulate deposits.

Glucose regulation
With age, some people develop diabetes, a disease involving an insulin deficiency and a loss of ability to regulate sugar.

Muscle and skeletal health
Muscles atrophy and bones weaken with age.

The immune system
The natural system of defenses mounted by the body to combat foreign organisms begins to let down its guard as we grow old.

Oxidative stress
Life-giving oxygen, paradoxically, can be bad for health. Oxygen sometimes manifests itself as free radicals, toxic ionized oxygen molecules that roam the body.
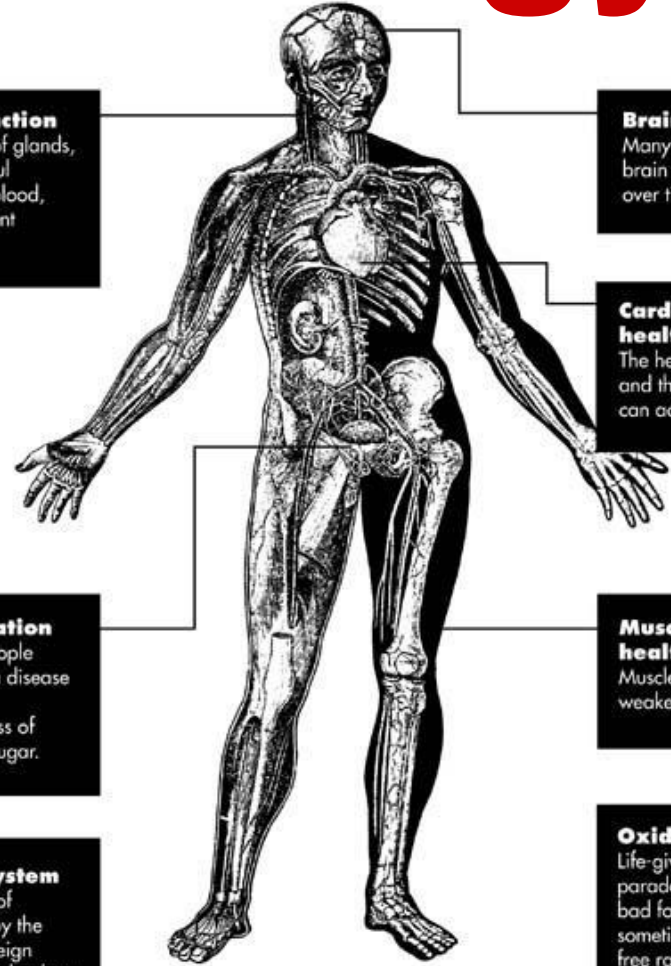
What Changes as We Age?

As we age there are quite a number of physiological and psychological changes

Taking these into account is invaluable for design with older adults

How we age impacts both our ability to perceive the world, and how we can manipulate it

Physiological Changes
Notably, Mobility and Interaction

- Mobility - Getting about, reaching
- Hands - Arthritis, other span, sensitivity
- Endurance - Holding position
- Muscle strength - Grip, standing
- Stability/Balance - Gait, walking, reach
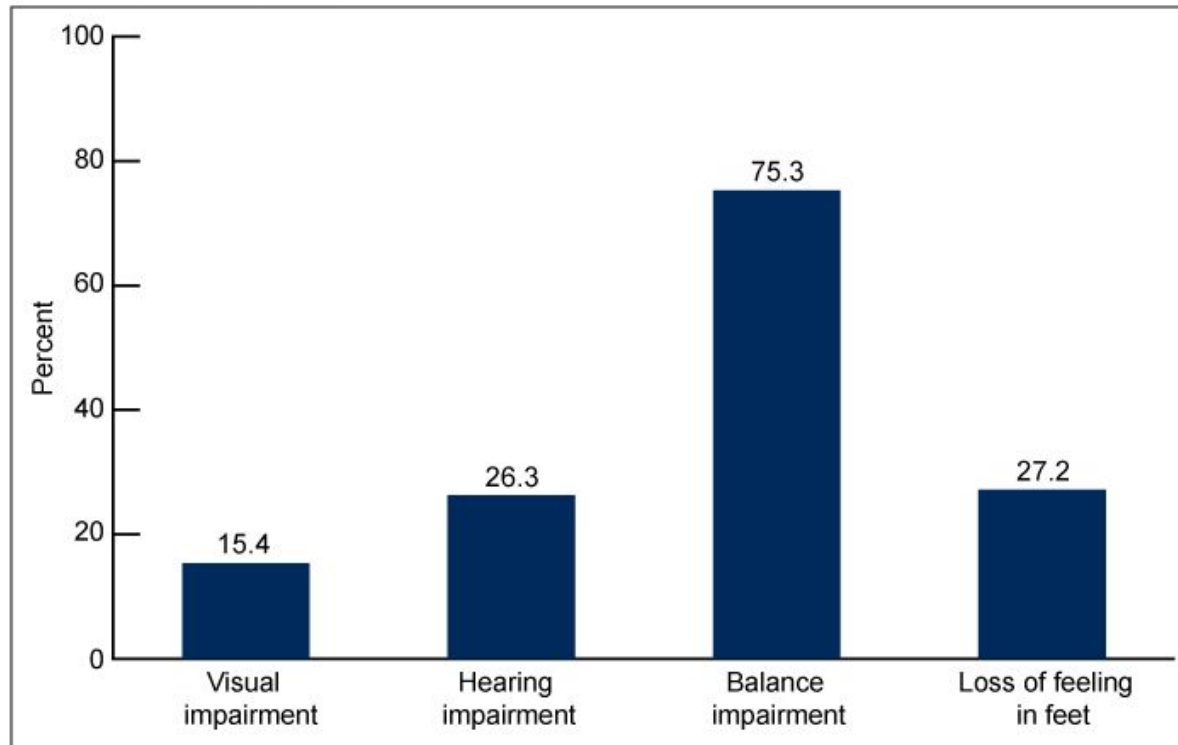- Shakiness - Palsy

Changes to the Senses

- Vision - contrast, cataracts
- Hearing - frequence range, "mushy"
- Taste - need more contrast
- Smell - lost to subtle changes
- Touch - not as receptive to detail

Physical Loss for 70+

Figure 1. The prevalence of sensory impairments among persons aged 70 years and over: United States, 1999–2006

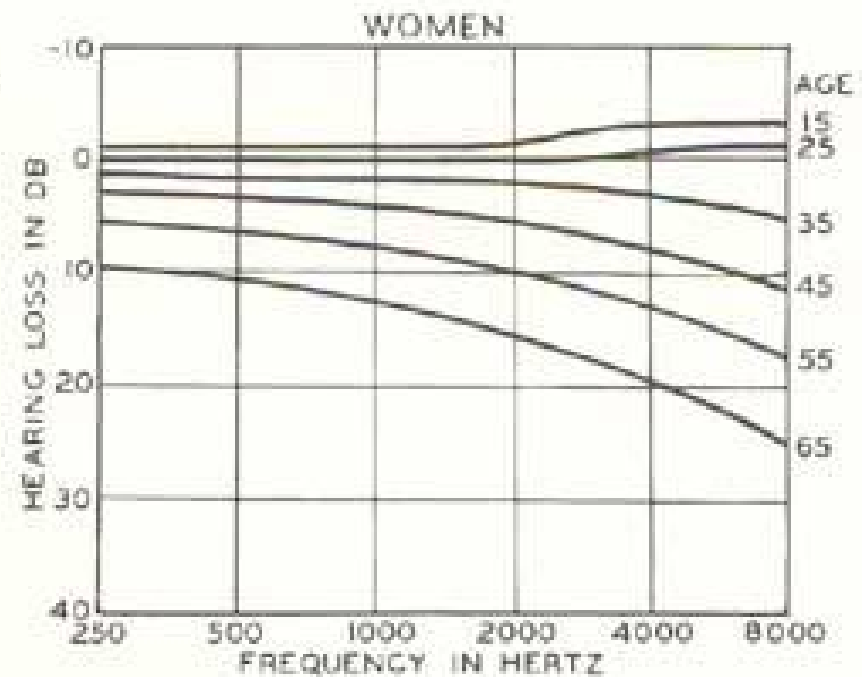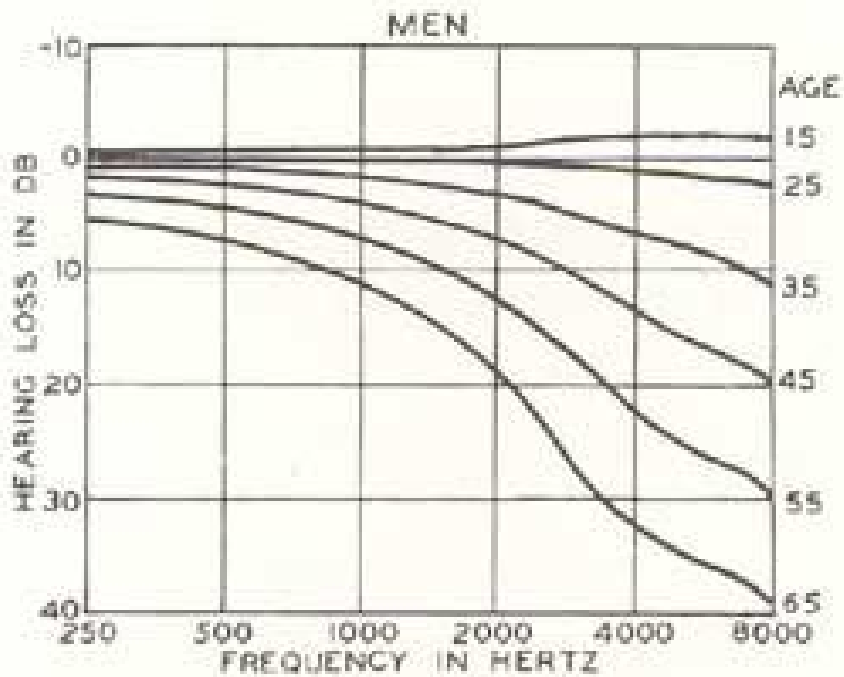# Hearing Loss over Age

… and the rest of the senses?

- Balance
- Direction
- Humor
- Body Position
- Heat
- Danger
- Circadian Rhythms
- Hunger
- Bodily Needs
- Time

- Pain
- Fatigue
- Pressure
- Empathy
- Fear
- Tiredness
- Thirst
- Satiation

There's about 20-ish

The Other Senses

- Pressure - On skin, which effects UX tools
- Direction - In rooms or during navigation
- Time - Time of day and passing
- Proprioception
  - the ability to tell where your body parts are, relative to other body parts
- Equilibrioception
  - the ability to keep your balance and sense body moves in terms of acceleration and direction change

Cognitive Changes

- Memory depth - number of items
- Neural plasticity - long and short retention
- Processing Speed - quickness
  - Also related to slower senses

How Do These Change Our Interaction With Technology?

- Consider a keyboard and it's size
- Screen & fonts
- Color Contrast
- Touchscreens
- Icon size

# Technology Uptake Among Various Groups

Aspects of Acceptance

- Different age groups have varying approaches to technology
- Who designs the tools?
- Costs and ongoing maintenance
- Inertia in execution
  - learning new things in life - Old dog, new tricks?
- Advertising methodology
- Expectations in social interaction

Varying Approaches to Technology

- Motivations in technology acceptance
    - Money
    - Time
    - Social circles
    - Work needs
    - Curiosity
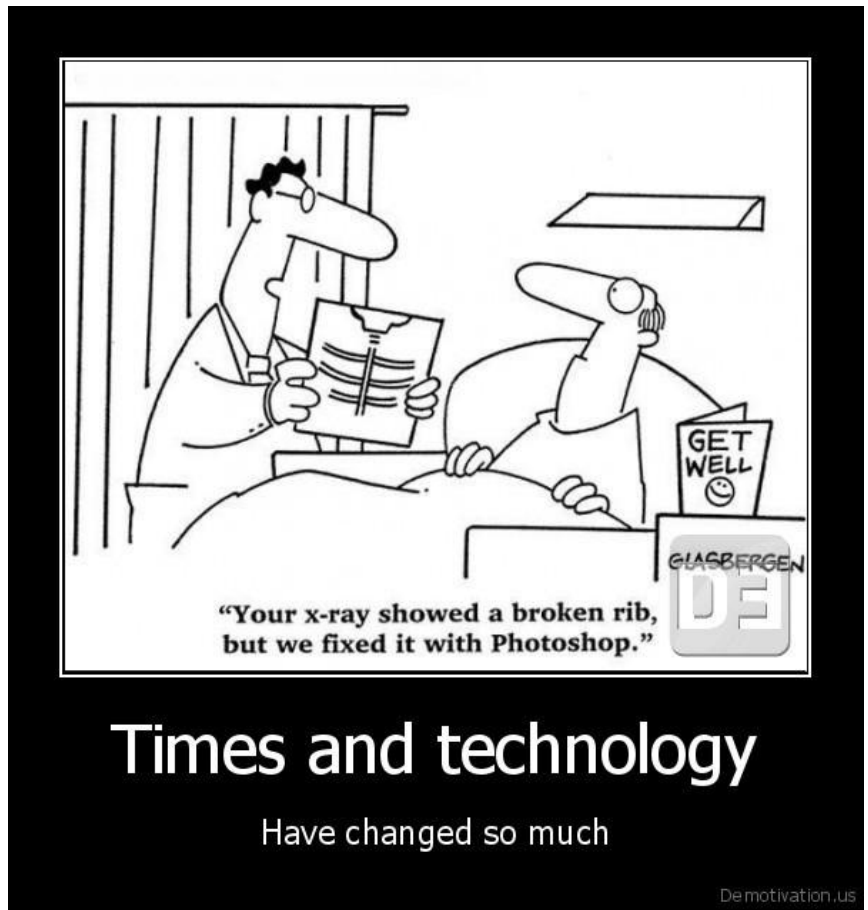
Who Designs the Tools?

- Classic engineering problem
  - Designer naturally tries to reflect their interests into the product when decisions will be made
  - User experience design process
    - (later in presentation)
  - Review age groups in engineering field
    - Younger is more common in tech fields
- Older adults aren't often represented in the design field as workers, and reaching out to them is difficult

Trust Me, I'm An ENGINEER

Costs and ongoing maintenance

Up front monetary costs + maintenance

- Compare to social security income
  - $1,180/month
  - iPhone: $650-$850 (more?)
  - In-home automation:
    - $50/sensor
    - $30/light
    - $100 for the bridge
    - $350 for a popular smart watch
- Monthly service prices
  - Cell service: $50-150/month
  - Monitoring service: $100-300/month

Inertia in execution - learning new things in life

- Inertia in daily activities is real
- Expectation of "it used to work, so it will keep working, right?"
- Leaves little cognitive room for new devices
- New tool needs to be demonstrable better
- Successful approaches:
  - Enabling independence
  - Connecting with family
  - Fixing notably annoyances (remotes!)

Advertising methodology

- Making the sale:
  - Old methodologies of advertising
    - Newsprint
    - Billboards
    - TV ads
  - Related to communities of 15-30 years ago
  - Visibly easier/simpler/designed for older adults
- New generations of companies eschew these routes to customers
  - The web isn't the end all be all, but it feels like it now

Expectations in social interaction when your equipment is in place

- How visible or socially stigmatic is the device?
- Can it be integrated into home or clothing?
- Will it enable more social discussion?
- Less of an issue all the time.

This is just the topics for general design and community uptake

- Designing properly
- Cost effective
- Connected to daily needs
- Social considerations

User Experience Design Processes

Stakeholders in Design

- Engineers (of various sorts)
- Industrial design
- User experience design
- Quite a few more:
  - Supply chain handling
  - Health issues for cleanliness
  - Marketing and branding
  - Capability expectations by customers
    - What do they think it can do vs. what does it do?
    - Can that toaster make a phone call?
  - Tech support post sale - serviceability

Engineers (of various sorts)

- Mechanical engineers
  - Shape, weight, moving parts
- Software engineers
  - Behavior of system
  - Interaction with hardware
- Wireless, civil, electrical
- Material science
  - Especially antibacterial materials today

Industrial Design (engineers)

- Primary focused on the physical shape
- Works on how the object will be held/used
- Desires looks that 'fit' in environment
- Considers form of the object
- Integrated with manufacturing and supply chain development for cost considerations
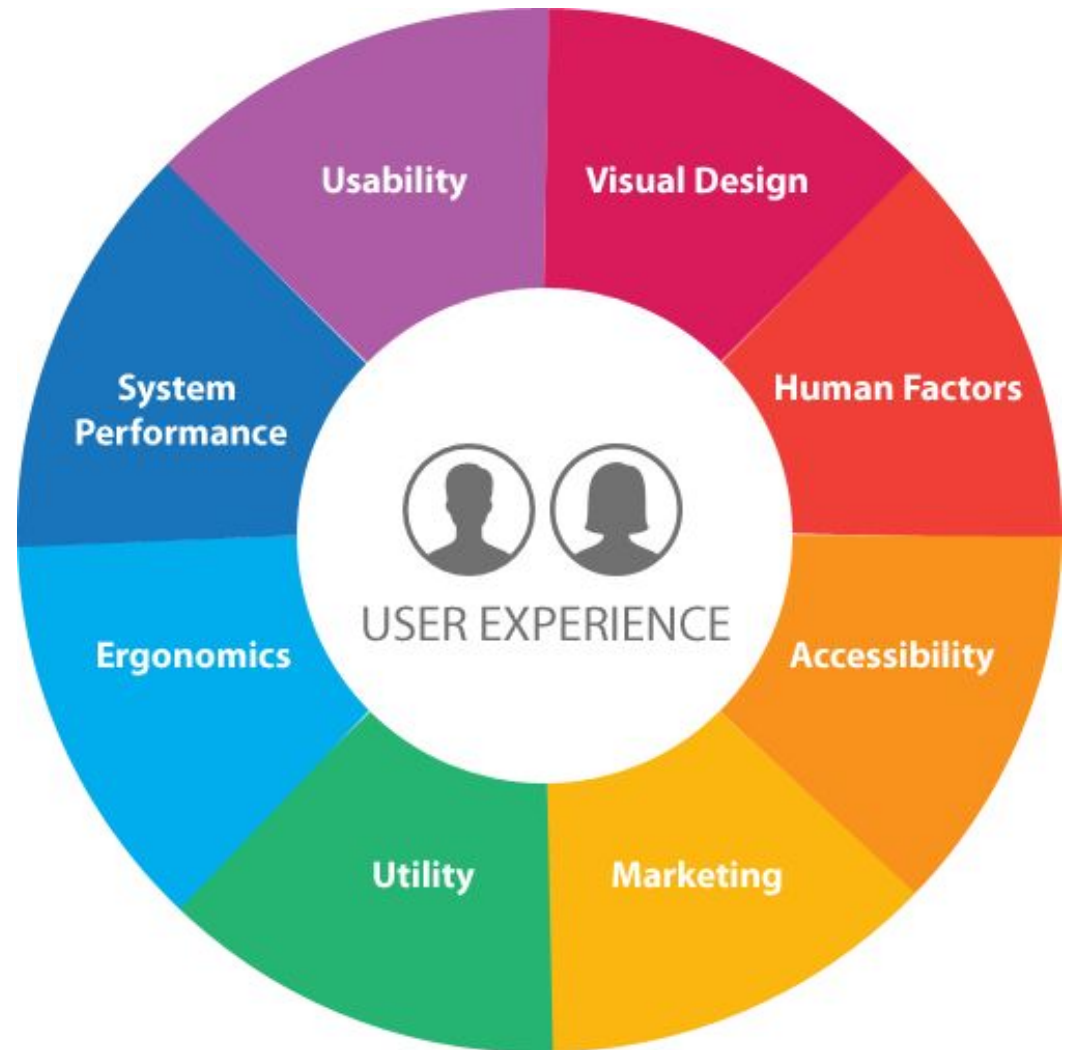
User Experience specialists

- Cross of engineering and psychology
- Drives interface needs vs. design
- Should feed specs to engineering team
- Reaches out to potential users

- Takes longer than expected because connecting with significant numbers of potential customers takes time

User Experience Pieces

- Complex
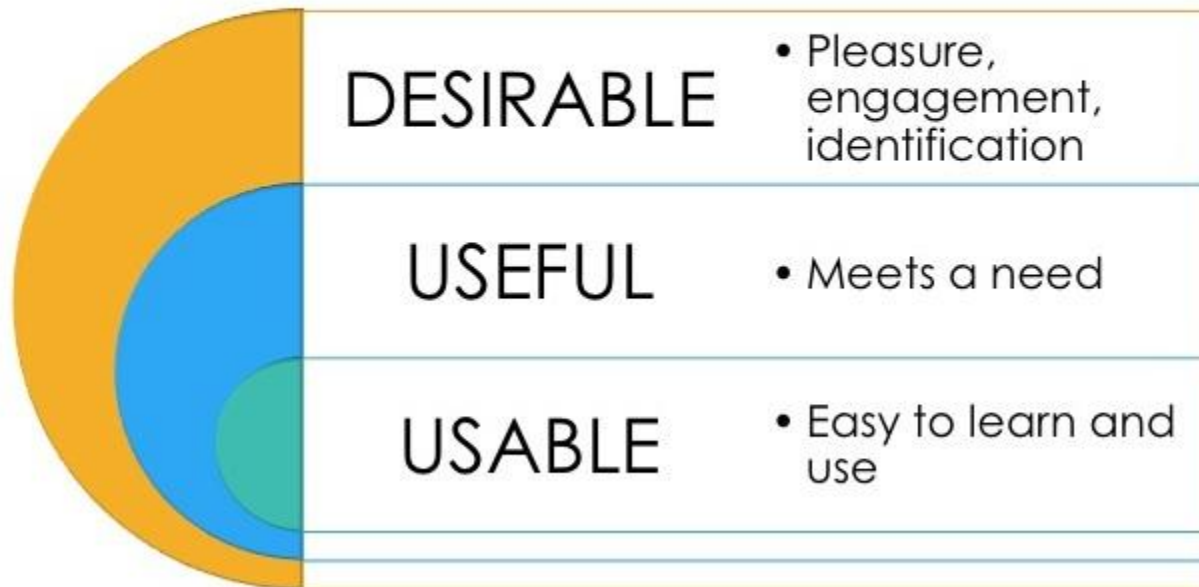- Iterative Process
- "Unicorns" in the engineering field
- Interacts will all aspects of the organization

Designing for Older Adults

Elderly UX

DESIRABLE	• Pleasure, engagement, identification
USEFUL	• Meets a need
USABLE	• Easy to learn and use

How to balance all of this?

Stages in Iteration

- Establishing need
- Reaching out to refine
- Initial design
- Simplify design
- Survey and new input
- Social feedback
- Simplify design
- Repeat

Design Aspects To Focus On

- *Bigger*, simpler fonts
  - Bigger and cleaner every time
- Fewer items per interface
  - No more than 4, if possible
- Higher color contrast
  - Subtle colors are nice, but tough to see as we age
- Mid-range frequencies for sound
  - Higher range is lost
  - Lower range carries too far
- Swiping on a touchscreen is hard
  - Single touch tiles are best

Examples
Both good and bad

Examples
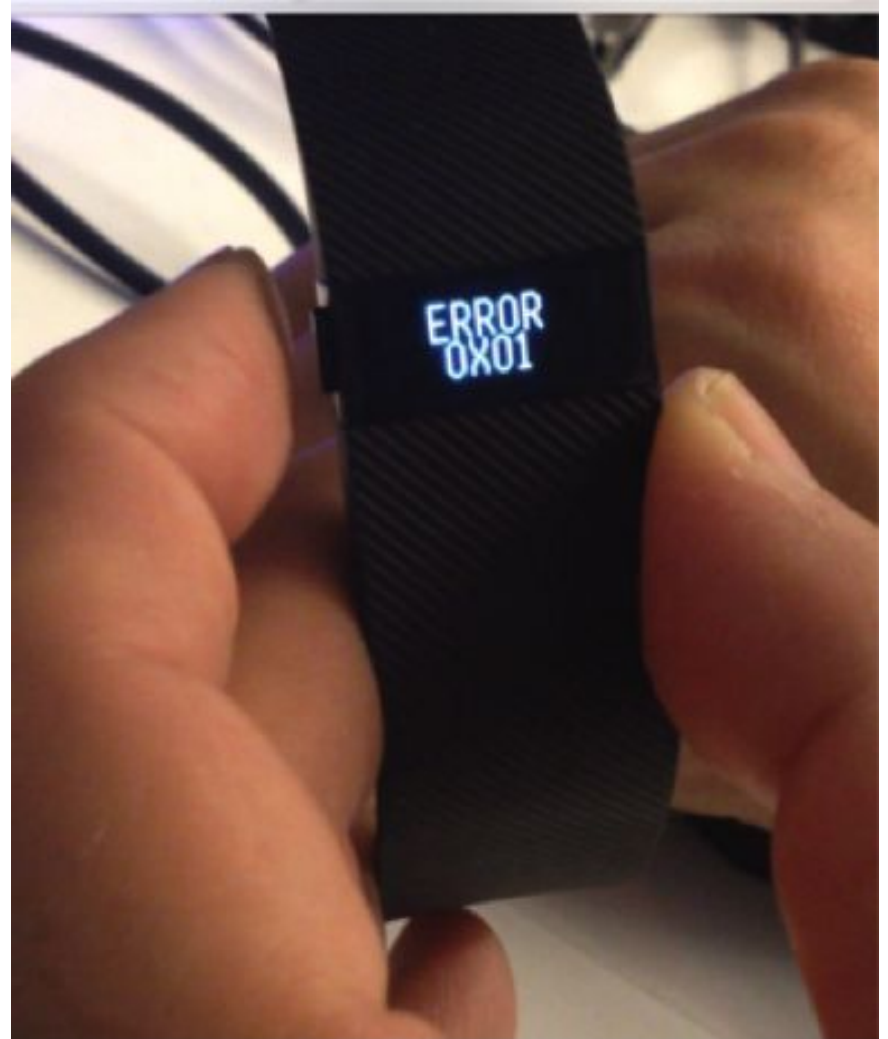
Pillsy vs. Classic design

Tiny Buttons on Tiny Devices

Requires fine control

2 activities at once
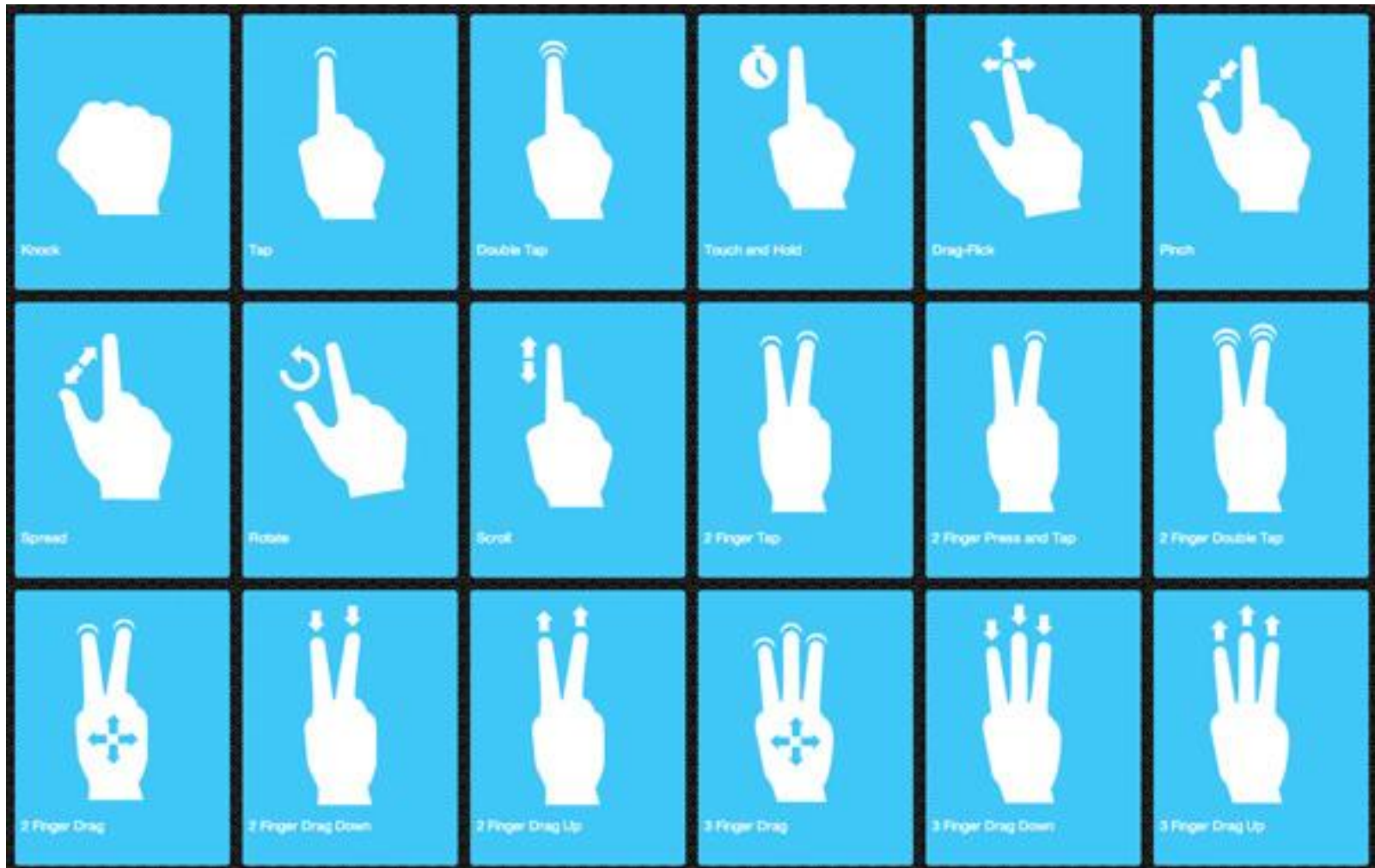
Tiny screens

Remembering menus

Touchscreen Swiping

Better Approach to Touchscreens

Single finger

Single knuckle

Tiles not slide

Slow navigation is okay here!

Accuracy with gross movements

Smartwatch Limitations

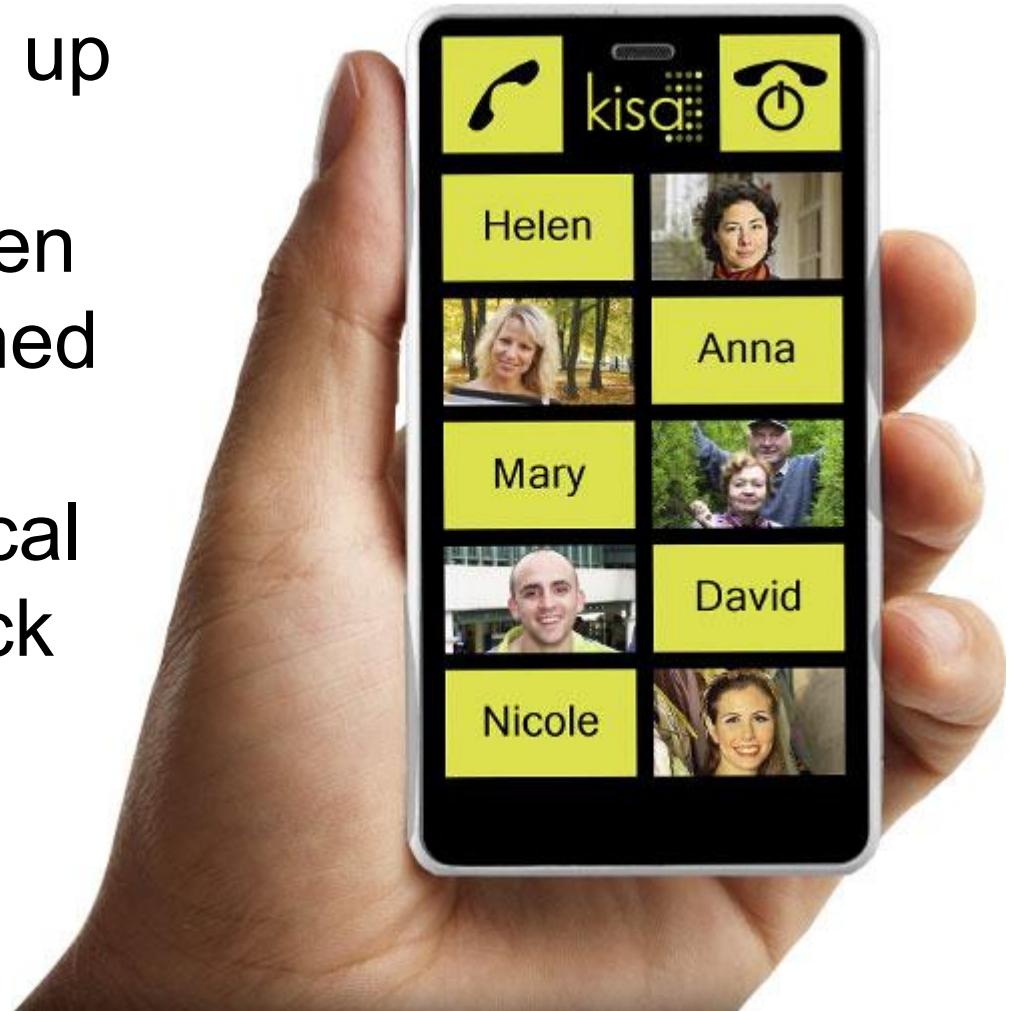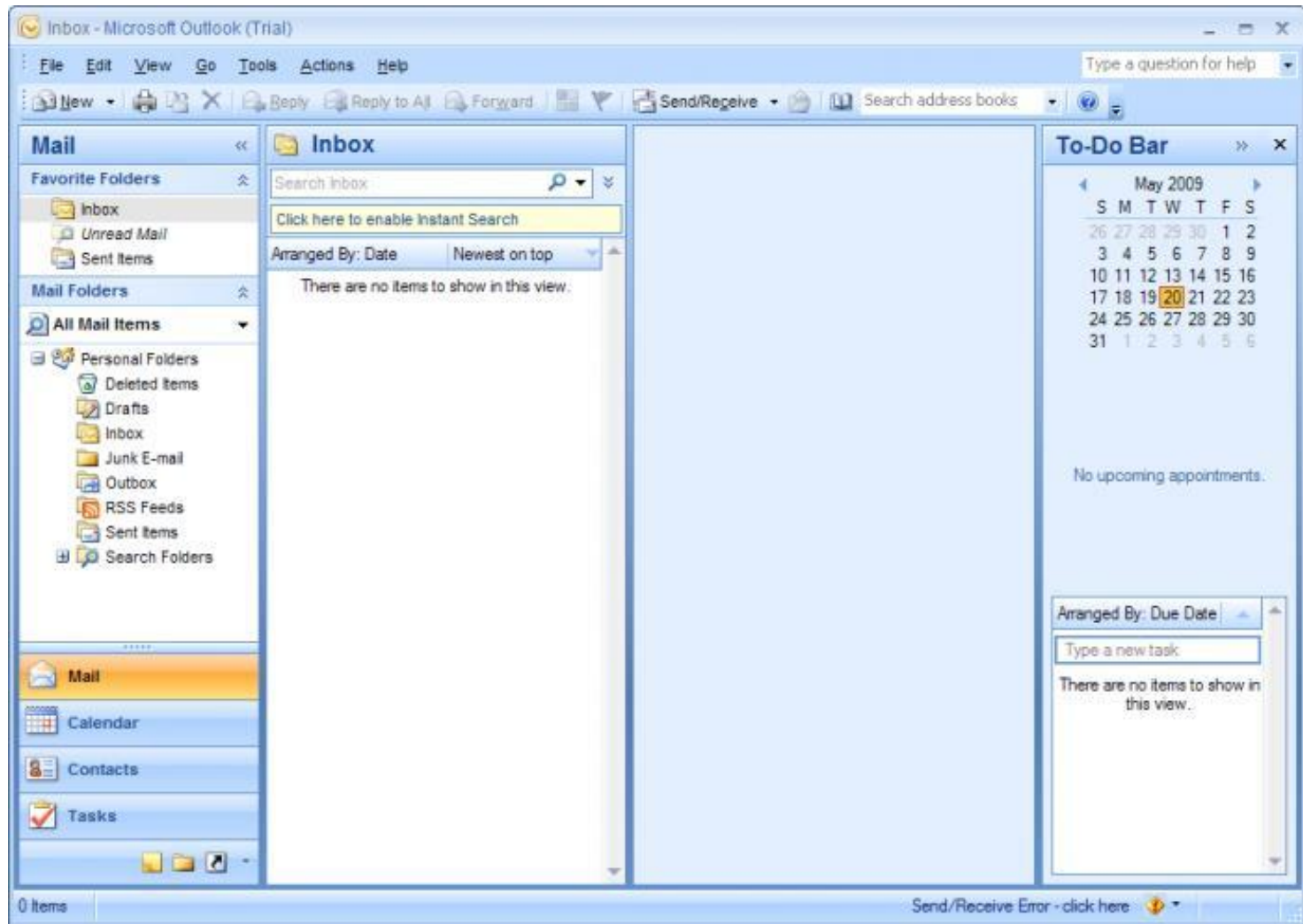- Scale and buttons
- Touchscreen size

Cell Phone Examples

Kisa

- Built from ground up for seniors
- No complex screen
- 10 pre-programmed buttons
- Owner and medical conditions on back

MS Office Example

Eating Aids
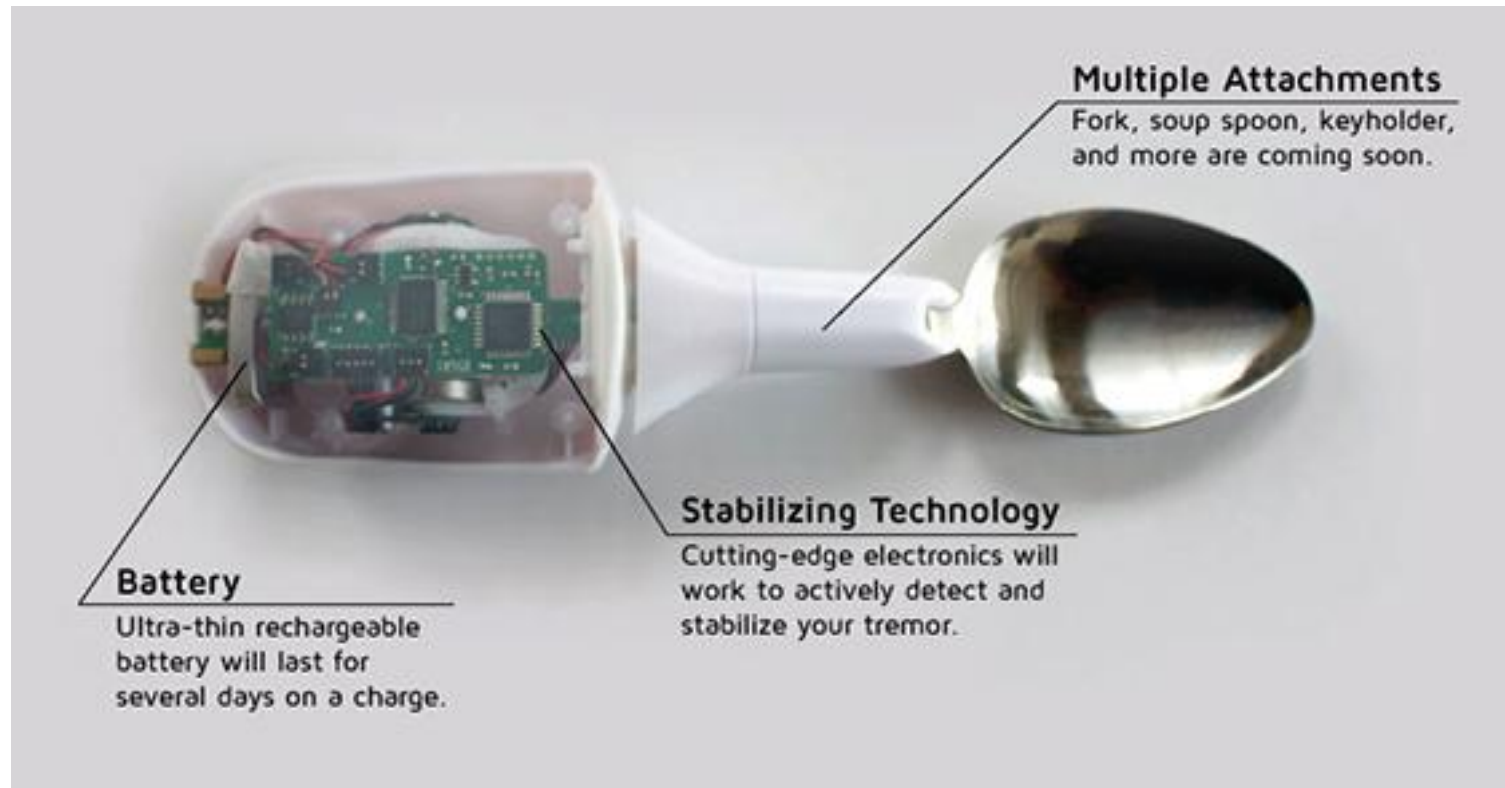
Grip changes

Strength limits

More Eating Aids

Good Grips® Utensils

Fork · Small Spoon · Teaspoon · Tablespoon · Souper Spoon™ · Rocker Knife

Yet More Eating Aids - Liftware

Self-stabilizing Spoon

https://youtu.be/fS01kn6YJ94

Multiple Attachments
Fork, soup spoon, keyholder, and more are coming soon.

Stabilizing Technology
Cutting-edge electronics will work to actively detect and stabilize your tremor.

Battery
Ultra-thin rechargeable battery will last for several days on a charge.

Summary

- Lots of work done in this area
- Often ignored by design community
- Difficulty in reaching out to target audience
- Cost considerations
- Major hurdles are physical and cognitive limits

Questions - If any have occurred

Thank you for your attention.

It's break time.

(Which is spent going to the apartment)