Gestures

Disclaimer: This is version 0.1 of this lecture. It might contain unfinished/unclear formulations as well as subjective, non-validated data and opinions.
Gesture-based interaction
Research on gesture-based interaction goes a long way back!

SketchPad, Ivan Sutherland 1963
Put-that-there (Bolt, 1980)
>20 years of Virtual reality research
Two paradigms in gesture-based interaction

• On-screen

• Free-form/mid-air
  • Empty-handed
  • Holding device
How to define gestures in the field of interaction design?

“…any physical movement that a digital system can sense and respond to without the aid of a traditional pointing device such as a mouse or stylus.”

Saffer (2008)
How to define gestures in the field of interaction design?

”...expressive, meaningful body motions –i.e. physical movements of the fingers, hands, arms, head, face or body with the intent to convey information or interact with the environment.”

Turk (2002)
Advantages with gesture-based interaction?
Advantages with gesture-based interaction?

• Gestures fundamental part of human communication
• No need for designated input devices
• Has potential for high information bandwidth
Gesture taxonomies
Gesture taxonomies

• Problem:

Traditional taxonomies are not suited for gesture research in human-computer interaction (HCI)
Kendon (1972)

1. Gesticulation
2. Language-like gestures
3. Pantomimes
4. Emblems (e.g. V for victory)
5. Sign languages

- Designed for speech-related gestures
- Not completely relevant for interaction design
Aigner et al (2012)

1. Pointing gestures
2. Semaphoric gestures (e.g. thumbs-up meaning “OK”)
3. Pantomimic gestures
4. Iconic gestures (e.g. showing the size of an object)
5. Manipulation gestures (e.g. dragging an object)

• Gesture-based interaction without the support of speech input
• Tailor-made for interaction design!
Innate and learned gestures
Innate gestures

• Gestures that the user intuitively knows or that make sense, based on the person’s understanding of the world
• Examples:
  • Pointing to aim
  • Grabbing to pick up
  • Pushing to select
Learned gestures

• Gestures the user needs to learn before

• Examples
  • Waving to engage
  • Making a specific pose to cancel an action
Discussion: Samsung Smart TV gestures. Innate or learned?

Are there any problems with gestures?
Norman & Nielsen

• Gestural Interfaces: A Step Backwards in Usability

Norman & Nielsen (2010).
Discoverability

• WIMP interaction is based on recognition and exploration => easy discovery

• We have moved away from the principle of discoverability

Norman & Nielsen (2010).
Reliability

“When users think they did one thing but actually did something else, they lose their sense of controlling the system because they don't understand the connection between actions and results.”

Norman & Nielsen (2010).
Gestures-based UI’s need a good conceptual model

http://www.youtube.com/watch?v=ls5kj7oVwto
Example of a good conceptual model

A clear conceptual model: "Aha, it works like cover flow! I know this!"

Arrows to indicate possible actions and gesture direction (affordance)

Users get direct feedback when moving hand

Older artifacts to the left, newer to the right (mapping)
Are there any “standardized” gestures?
Not really.

- We are test subjects in an enormous gesture experiment
- Patent wars are probably not making things easier
Nevertheless, there are some conventions that are important to be aware of.
Example "Core" touch gestures

- **Tap**: Briefly touch surface with fingertip.
- **Double Tap**: Rapidly touch surface twice with fingertip.
- **Drag**: Move fingertip over surface without losing contact.
- **Flick**: Quickly brush surface with fingertip.
- **Pinch**: Touch surface with two fingers and bring them closer together.
- **Spread**: Touch surface with two fingers and move them apart.
- **Press**: Touch surface for extended period of time.
- **Press + Tap**: Press surface with one finger and briefly touch surface with second finger.
Example "Shake"

- Update
- Reset
- Next track
- Shuffle
- Unlock
- Remove
- Etc.
“Shake”

• Intuitive
• Low demands on precision
• (Probably) suitable for actions that involve a clear state change
• Might not be suitable for usage that involves a moving (e.g. running) user (false positives)
Cultural aspects
Discussion: does culture matter? If yes, how much?
Cultural aspects

• The gesture ”The ring” has been found to have four major meanings:
  • OK/Good
  • Orifice
  • Zero
  • Threat

Morris, Collett, Marsh, & O’Shaghnessy (1979)
Cultural aspects

"Very tasty", for example in...

USA  Australia  Spain  India  Italy  Netherlands  Turkey
Cultural aspects
Cultural similarities and differences in user-defined gestures for touchscreen user interfaces

• 340 participants defined their own gestures for 28 common actions (e.g. ”Zoom”)
• Generally a high agreement across cultures
• Higher agreement for actions that can be performed through direct manipulation
• Lower agreement for actions that were more symbolic

Mauney, Howarth, Wirtanen and Capra (2010)
Thumbs up to gesture-controlled consumer electronics?

- Studying gestures for consumer electronics in 18 countries
- A limited gestural language already exists across cultures (that could be used of basic commands)
- As complexity increases, cultural differences start to emerge
- Participants seemed to prefer semantic gestures over pointing gestures

UX fellows (2013)
A preliminary theoretical study in natural interaction applied to cultural heritage contexts

- Comparison of gestures for interaction with virtual environments
- 19 basic actions
- Three countries: Italy, Sweden and Egypt

Example of preliminary results

• ”Select”
  • Italy: Pointing
  • Sweden: Pointing/One open hand
  • Egypt: Two open hands

Design principles for gestures
Look for "un-offical" standards!

- **Example** "Shake" is used for Update, Reset, Next track, , Shuffle, Unlock, Remove etc.
Game mindset ≠ UI mindset

In game mindset, a silly gesture can be fun or entertaining.
Game mindset ≠ UI mindset

In UI mindset, a silly gesture is awkward or unprofessional.
Consider physical ergonomics
Consider social factors

• Are the gestures proper for the social context?
  • Might they be disturbing to other people?
  • Will they make the user feel ashamed?
Help new users

• Quick tutorial
• Visual que or hint
• A describing image
• Animations
Offer a good conceptual model!

A clear conceptual model: "Aha, it works like cover flow! I know this!"

Arrows to indicate possible actions and gesture direction (affordance)

Users get direct feedback when moving hand

Older artifacts to the left, newer to the right (mapping)
Further reading
3D User Interfaces: Theory and Practice

Foreword by Jim Foley
Coauthor of Computer Graphics: Principles and Practice

Doug A. Bowman
Ernst Kruijff
Joseph J. LaViola, Jr.
Ivan Poupyrev
References


