



HCI : Perception and motor behaviour

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- ▶ Perception and HCI
- ▶ Motor behaviour and HCI
- ▶ Results
- ▶ Guidelines and examples
- ▶ General conclusions

- ▶ Perception theory well developed
- ▶ We should put an adequate amount of focus on perception in HCI
- ▶ Here we focus on visual perception, but sound and other senses are also relevant within HCI related theory

Stages in visual perception



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- ▶ Stage one: early vision
- ▶ Stage two: pattern perception
- ▶ Stage three: Objects

- ▶ guidelines about colour, motion, form etc.
- ▶ motion
- ▶ colour (mostly studied)
- ▶ texture
- ▶ 3D
- ▶ form
- ▶ preattentive processing theory, i.e. what draws attention to something

- ▶ To draw attention to an object, use a unique attribute (colour, form, direction, movement)
- ▶ Movement is especially suitable when objects are not in immediate focus
- ▶ Make sure the contrast between objects (text) and background is big enough. Different colours might not be enough

- ▶ Stage two in the perception process
- ▶ Related to Gestalt theory
- ▶ Supports problem solving by external representation, methods for visualising

- ▶ Grouping conflict
- ▶ Proximity is outweighed by region

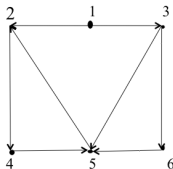


- ▶ Proximity is outweighed by connectedness

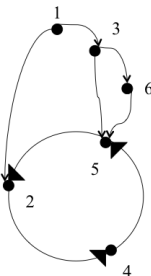


More conflicts

- Symmetry emphasises structure



- Continuity emphasises information flow



- ▶ Place links, icons or functions/tools close to indicate that they are related
- ▶ Use frames if proximity is not enough to indicate relationship
- ▶ Be aware of conflicting signals and patterns that may appear unintentionally

- ▶ related to working memory
- ▶ relate an objects attribute to form, colour, texture, where form is primary and colour and texture are secondary (cf. lowest level where colour is primary)

Some guidelines for level 3



- ▶ Humans can only remember a few objects at a time, objects could be combined to form few but more complex objects
- ▶ Use colour and texture to represent the attributes of the object
- ▶ when looking at simple objects, form is more important than colour and texture

- ▶ Theories on the lowest level of perception give us distinct guidelines for design
- ▶ On higher levels humans are more unpredictable and design decisions must involve other aspects

- ▶ Predictive models
- ▶ Descriptive models Questions to ask:
- ▶ What is done?
- ▶ How do we do things?
- ▶ How long does it take?
- ▶ How well does it work?

- ▶ Simplify the reality
- ▶ For the purpose of
 - ▶ designing
 - ▶ evaluating
 - ▶ understanding
- ▶ Descriptive or
- ▶ Predictive

- ▶ Quantitative results
- ▶ Analysis based on the model, not on results of an experiment or studies
- ▶ Does not need a working systems
- ▶ Hick-Hyman law
- ▶ Fitts'law
- ▶ Keystroke level model

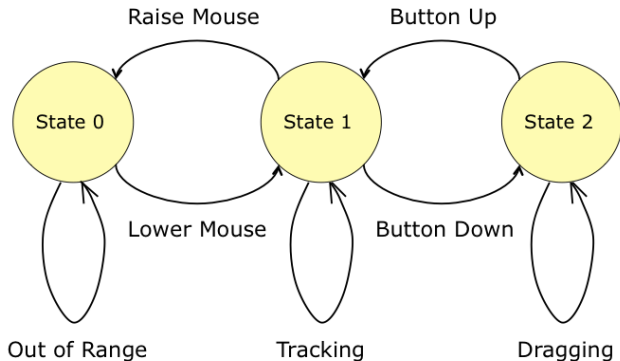
- ▶ Help describing and thinking about a situation or a problem
- ▶ Key-Action model
 - ▶ Symbol keys
 - ▶ Executive keys
 - ▶ Modifier Keys
- ▶ Buxton's 3 state model
- ▶ Guiard's 2 hands model

- ▶ Graphical input
- ▶ Three states:
 - ▶ out of range
 - ▶ tracking
 - ▶ dragging
- ▶ To explore pointing devices and what they afford

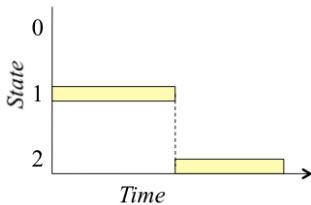
3-state model of graphical input



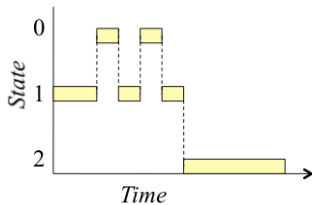
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Use of Buxton's model



(a) Mouse



(b) lift-and-tap touchpad

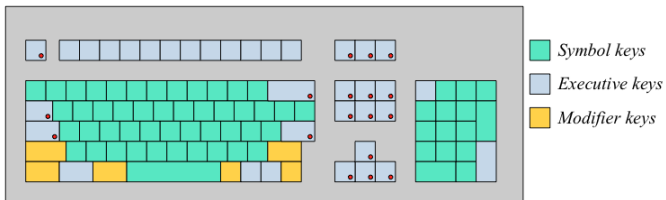
- ▶ A model that clarifies the relation between dimensions and degrees of freedom
- ▶ Makes obvious that a mouse is not fully 2D
- ▶ Inspiration for alternative ways of input

- ▶ Yves Guiard 1987
- ▶ Focus on the roles of the hands (cf. Buxton and Myers, 1986)
- ▶ Analysis of the location of keys in an ordinary keyboard related to the mouse for pointing
- ▶ Three unique keys to the left, 15 to the right
- ▶ Ordinary keyboards more suitable (less unsuitable) for left-handed people

101-Style keyboard



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Perception

- ▶ Colin Ware
- ▶ Anne Treisman
- ▶ David Marr (Vision)

Motor behaviour

- ▶ I. Scott MacKenzie
- ▶ William Buxton
- ▶ Yves Guiard

- ▶ Theories on the lowest level of perception give us distinct guidelines for design
- ▶ Higher levels of perception involves interpretation
- ▶ Predictive models for motor behaviour when design alternatives are compared and evaluated
- ▶ Descriptive models help us understand interaction situations, think about design suggestions and how to study them