

# Design for Interaction

A decorative graphic element consisting of a large, light blue arc that starts from the left edge of the slide and curves downwards and to the right, ending near the bottom right corner. The arc is semi-transparent, allowing the dark blue background to show through.

Interaction Design Issues

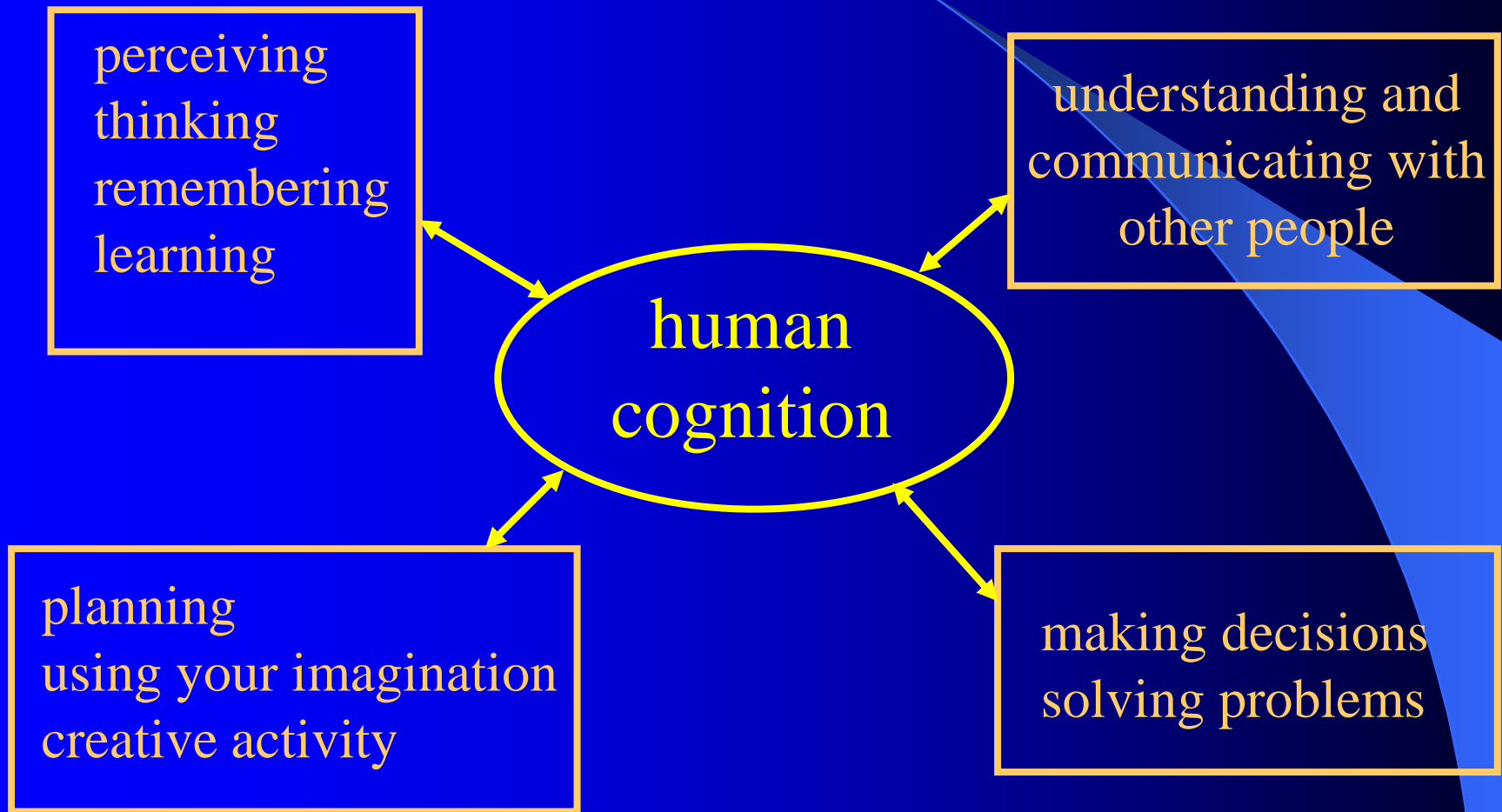
# Contents

- human cognition
- mental models
- affective aspects of multimedia

# Human Cognition

- cognition: how our minds work
- the various forms of mental processing which give rise to our behaviour, actions and knowledge
- understanding cognitive processes allows us to understand how we use, and relate to, interactive systems

# What is Cognition?



# Cognitive Processes

- cognition can be described in terms of specific mental processes
  - attention
  - perception/recognition
  - memory
  - learning
  - communicative processes (reading, speaking, listening)

# Attention

- deciding what to concentrate on
- our brains are constantly receiving information through our various senses
  - attention mainly involves sight and hearing
- attention allows us to focus on the currently important task(s)
- various factors will determine how effectively this works

# Attention Effects

- two main factors affect attention
- current goals (**internal**)
  - if we are looking for specific information, our attention will be keener
  - if we are just “browsing”, we won’t focus so well on individual content items
- information presentation (**external**)
  - if content is structured so that relevant material is obvious then our attention will be better held

# Perception and Recognition

- perception is the process by which we understand what our senses tell us
- to aid perception, designers must ensure differently functioning elements in an interface are easily distinguishable
  - for example, icons must be clearly distinct from one another
- perception can be enhanced by using **multi-sensory** or **multimodal** interaction



# Memory

- different types
- sensory memory: the brief period in which we “register” sounds, images, etc.
- working memory: where data is held for active processing
  - “conscious”, or short-term memory
  - usually holds 5-7 “information units”
- long term memory: “archived” storage

# Memory Effects

- much of memory is associative
  - especially true for visual information
- **recognition** is much easier than **recall**
  - more likely to recognise faces than names
- cognitive processing is made much easier as visual input is improved
  - graphical user interfaces (GUIs) gave massively improved productivity compared with text-based interfaces

# Memory and Overload

- as stated previously, our working memory holds around 5-7 information “units”
  - a “unit” is a distinct piece of information – eg. a random number in a sequence
- this means there is a limited number of choices we should offer a user
- a menu with, say, 12 items may lead to the user feeling overloaded

# Learning

- learning is a very important cognitive process
- as discussed last week, learnability is an important aspect of usability
- interactive systems can also be important tools for learning
  - computer-aided learning (CAL)
  - e-Learning and m-Learning (m=“mobile”)

# Multimedia Learning Rules

- research has identified a number of rules for using technology to deliver learning content
- the multimedia effect
  - people retain more from integrated sound and visuals than from the two elements separately
- the contiguity effect
  - people learn better where text and images/video are located together on a screen than when they are separated

# Multimedia Learning Rules (2)

- the coherence effect
  - additional interesting but irrelevant material detracts from the overall message
- the modality effect
  - visuals with spoken narration work better than visuals with additional text
- the redundancy effect
  - using spoken narration along with identical text detracts from the overall message

# Communication

- communication is at the heart of human development and cognition
- meaningful communication with an interactive system is hard to achieve
  - we are used to communicating with humans
  - human-like responses are hard to mimic
  - hard to produce authentic natural language
  - interactive systems have little “body language”

# Mental Models

- it has generally been found that people interact well with a system when they can fit it into a conceptual framework
- another (easier) term for this is a mental model
- mental models enhance our understanding of a system and allow us to predict how it will behave



# Enabling Mental Models

- system design can help the development of mental models
  - use of intuitive modes of interaction
  - copying well-understood real-world systems
  - providing relevant, immediate feedback
  - providing sufficient transparency that users can have a feel for how a system functions
  - providing clear, context-sensitive information for users

# Affective Aspects of Interactivity

- the term “affective” relates to a person’s emotional response to an experience
- in our case we are looking at emotions generated by use of interactive systems
- a related term is affective computing
  - designing computer-based systems which behave and interact in human-like ways

# Expressive Interfaces

- one approach is to make an interface embody some expressive qualities
  - might be purely aesthetic – colour, font styles, layout, etc.
  - might involve the language used or the way content is structured
  - might involve the ways in which the interface responds to user activity

# Interface Agents

- use of agents or characters can make an interface more expressive
- often used in software for children
- many potential problems:
  - often seen as patronising, especially by advanced users
  - badly designed agents may enhance existing negative feelings about the system

# Anthropomorphism

- the tendency with interfaces and agents is to anthropomorphise them as much as possible
  - anthropomorphism = the assigning of human qualities to non-human objects
- this can be the wrong approach:
  - users often relate better to cartoon-like agents than ones which attempt to be realistic
  - such agents are also usually easier to create!

# Affective Aspects of Feedback

- an important factor in a user's emotional response to the system is **feedback**
- especially true for error messages
- feedback should:
  - be clear and relevant to the user
  - use natural language and minimal jargon
  - be polite and non-threatening
- “Fatal exception error at....” does not do this