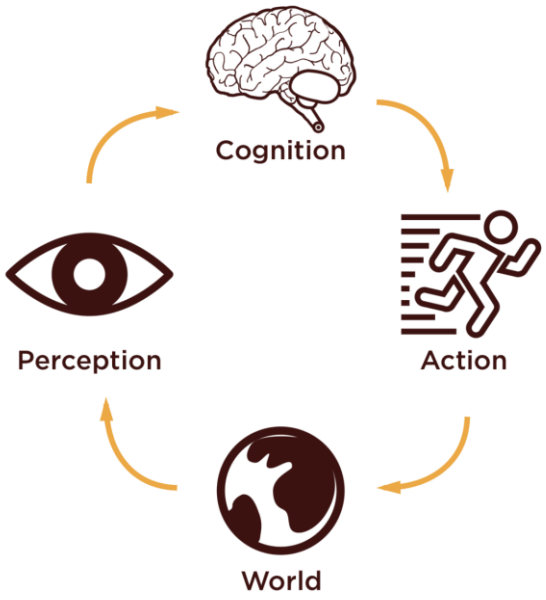
Cognition

- Interacting with technology is cognitive.
- We need to take into account cognitive processes involved and cognitive limitations of users



1. Attention
2. Perception and Recognition
3. Memory
4. Learning
5. Reading, speaking and listening.
6. Problem-solving, planning, reasoning, decision making.

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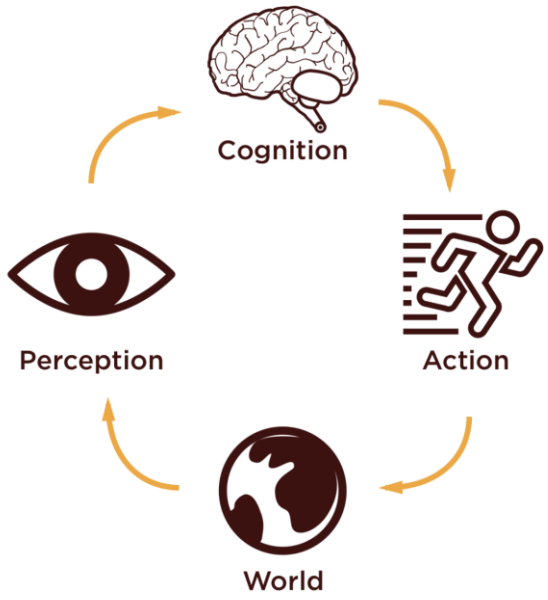

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Design Implications for Attention

1. Make information salient when it needs attending to at a given stage of a task.
2. Use techniques that make things stand out like colour, ordering, spacing, underlining, sequencing and animation
3. Avoid cluttering the interface with too much information.
4. Consider designing different ways to support effective switching and returning to an interface.

Design Implications: Perception and Recognition

1. Icons and other graphical representations should enable users to readily *distinguish* their meaning
2. Bordering and spacing are effective visual ways of grouping information
3. Sounds should be audible and distinguishable
4. Text should be legible and distinguishable from the background
5. Haptic feedback should be used judiciously

Design Implications: Reading, Speaking, and Listening

1. Speech-based menus and instructions should be short
2. Accentuate the intonation of artificially generated speech voices
   - They are harder to understand than human voice
3. Provide opportunities for making text large on a screen

Design implications: Memory

1. Reduce cognitive load by avoiding long and complicated procedures for carrying out tasks.
2. Avoid overloading short term memory (e.g. speech menus).
3. Design interfaces that promote recognition rather than recall.
4. Provide users with various ways of labelling digital information to help them easily identify it again.
   - For example, folders, categories, colour, flagging, and time stamping

Cognitive Processes

1. ~~Attention~~
2. ~~Perception and Recognition~~
3. ~~Memory~~
4. **Learning**
5. ~~Reading, speaking and listening.~~
6. Problem-solving, planning, reasoning, decision making.

Learning

- Involves the accumulation of skills and knowledge involving memory
- Two main types:
  - Incidental learning (for example, recognizing people's faces, what you did today)
  - Intentional learning (for instance, studying for an exam, learning to cook)
  - Intentional learning is much harder!
  - Many technologies have been developed to help (for example, multimedia, animations, VR)
- Many people find it hard to learn by following instructions in a manual
- Many people prefer to learn by doing

Design implications

1. Design interfaces that encourage exploration
2. Design interfaces that constrain and guide learners
3. Dynamically linking concepts and representations can facilitate the learning of complex material

Cognitive Processes

~~1. Attention~~

~~2. Perception and Recognition~~

~~3. Memory~~

~~4. Learning~~

~~5. Reading, speaking and listening.~~

6. Problem-solving, planning, reasoning, decision making.

Problem-solving, planning, reasoning, and decision-making

- All these processes involve *reflective* cognition
  - For example, thinking about what to do, what the options are, and the consequences
- Often involves conscious processes, discussion with others (or oneself), and the use of artifacts
  - Such as maps, books, pen and paper
- May involve working through different scenarios and deciding which is best option
- Weighing up alternatives

Dilemma

- The app mentality is making it worse for people to make their own decisions because they are becoming risk averse (Gardner and Davis, 2013)
  - Instead, they now rely on a multitude of apps
  - This makes them increasingly anxious
  - They are unable to make decisions by themselves
  - They need to resort to looking up info, getting other's opinions on social media, and comparing notes
- Do you agree?

Design implications

1. Provide information and help pages that are easy to access for people who wish to understand more about how to carry out an activity more effectively (for example, web searching)
2. Use simple and memorable functions to support rapid decision-making and planning

Cognitive Processes

1. ~~Attention~~

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