

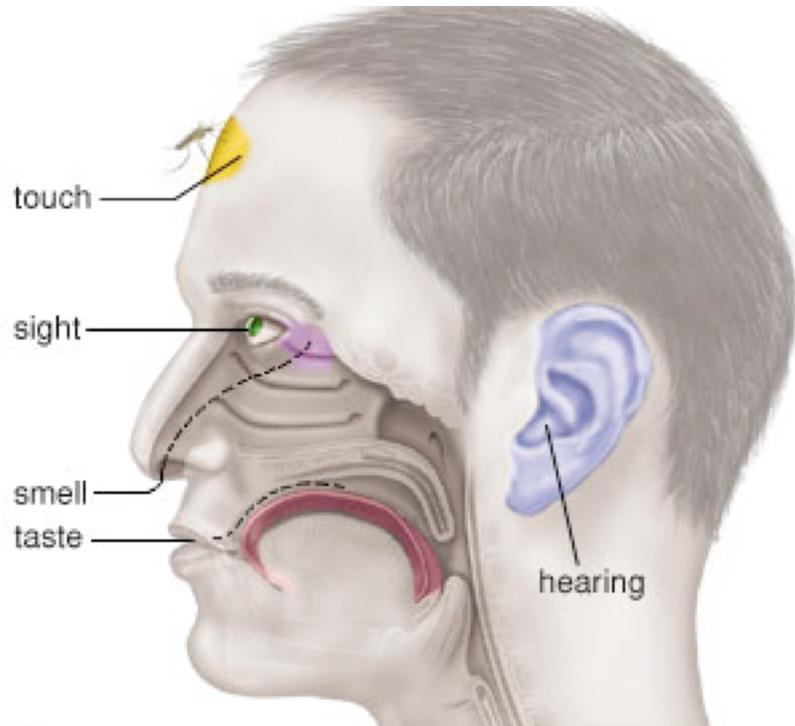
Taking the user into account in the design process

Lecture 3
Adam Girard

What we need to understand

- The user as an entity
 - So we know what's possible
- The user's needs & desires
- The user's reaction to our design
 - So we can make it better/ understand how it affects users

The Human as an input device



© 2006 Encyclopædia Britannica, Inc.

- How we make ‘sense’ of the world around us...
- Input, Process, Interpretation, Reaction



Each Sense has.....

- A tool – e.g.. Eye, skin, ear etc
- A process – nerves, electricity etc
- Certain limitations – pitch, brightness etc
- individual differences in sensory perception

Important to think of.....

- Environment
 - Limitations and boundaries
- Bounds
 - Psychological limitations
- Utility
 - What people value
 - Trade offs (e.g. speed vs accuracy)

Sight- Interpreting Images

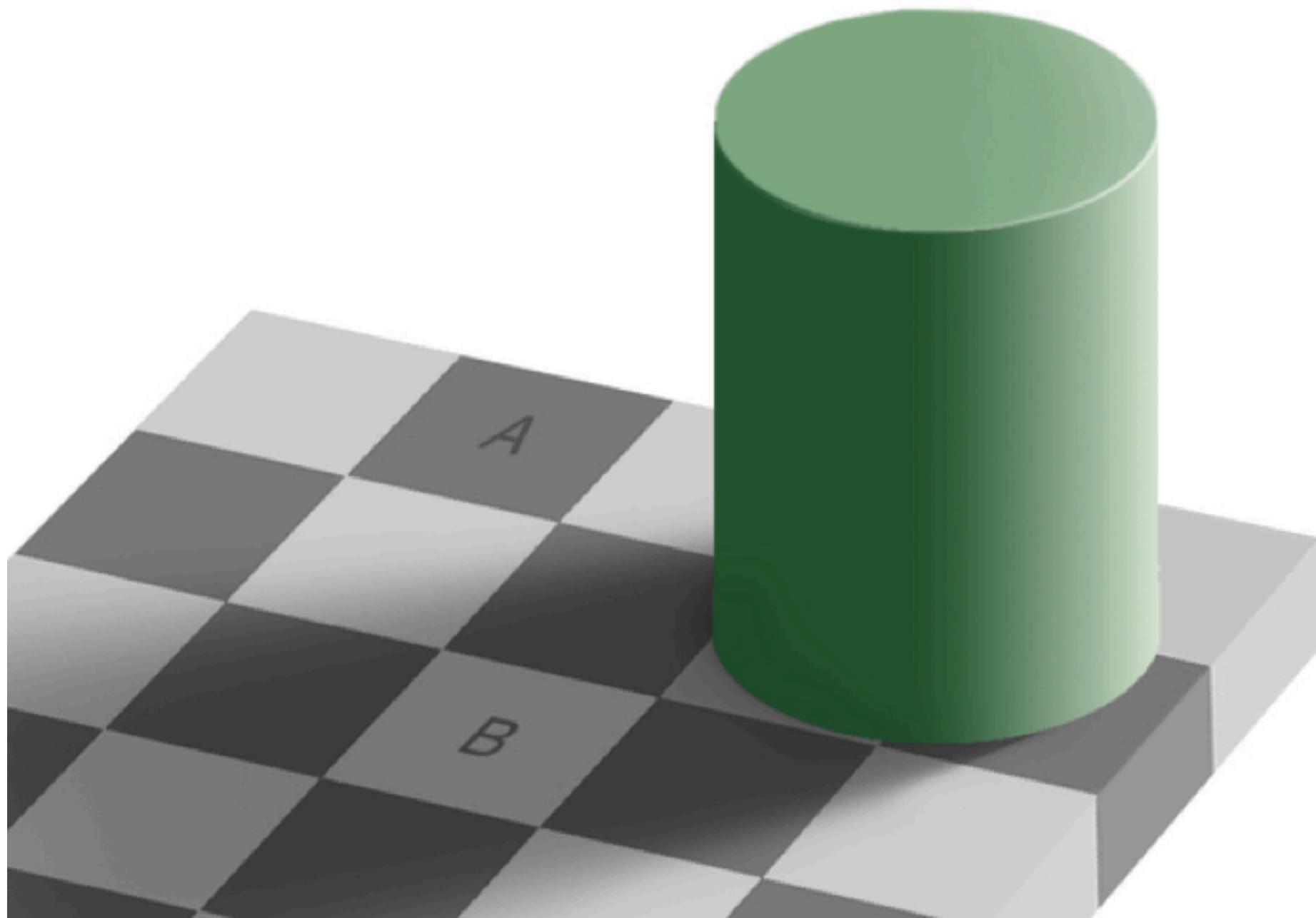
- Size and depth
 - visual angle shows how much of view object occupies
 - cues like overlapping help perception of size & depth
- Brightness
 - Amount of light emitted by object (luminance)
 - measured by just noticeable difference in brightness
 - visual acuity increases with luminance as does flicker
- Colour
 - Cones in fovea sensitive to diff wavelengths
 - 8% males and 1% females colour blind

Vision

The environment gives us priors

they give us expectations

Brain infers structure and given
expectations....

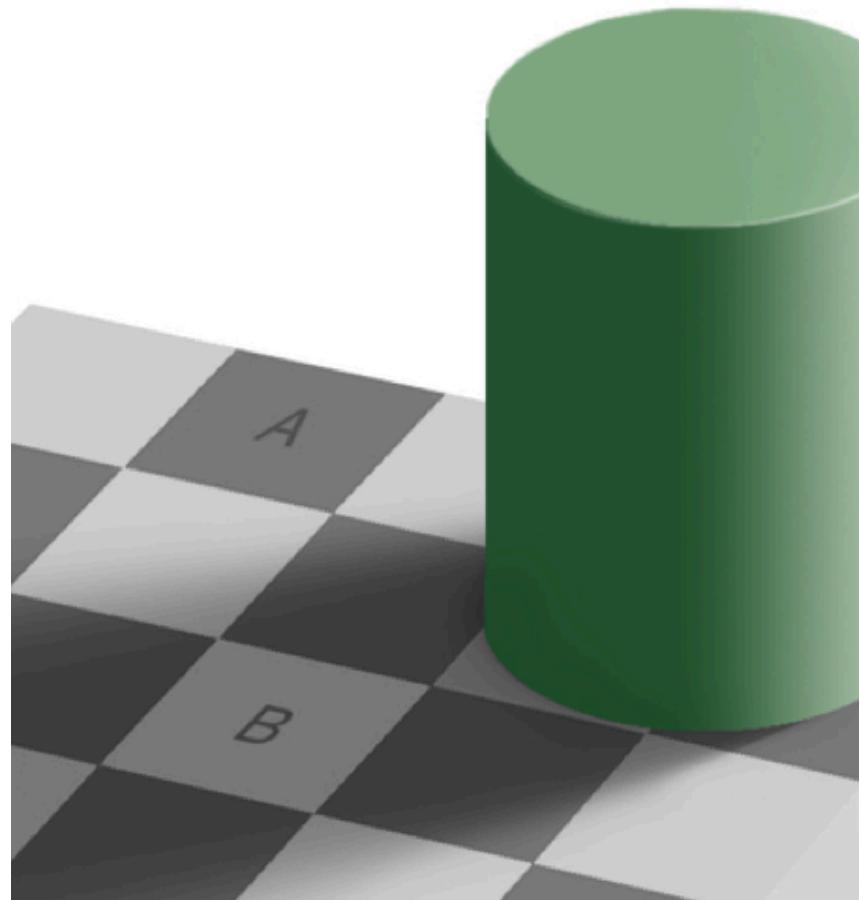


B

A

A is the same as B

- Brain uses image to infer grayness
- affected by prior expectations



What is the middle
object?

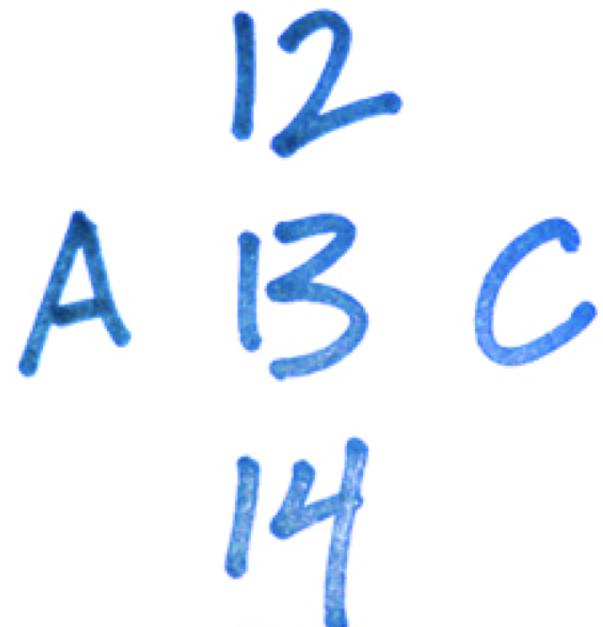
12
13
14

What about now?

12
A B C
14

Sight- Interpreting Images

- The visual system compensates for:
 - movement
 - changes in luminance
- Context is used to resolve ambiguity
- Optical illusions = over compensation



Sight- Reading

Perceive visual pattern on page

Decoded based on internal representation of language



Sight- Reading

Saccades & fixations

Eye moves
backwards &
forwards (regressions)

Complex text= more
regressions



Sight- Reading

We read at 250 words a minute

Use word shape for fast reading

Standard fonts (pt 9-12)

Harder to read on computer than book



Hearing

Provides info about environment:

- distances, directions, objects etc.

Physical apparatus:

- outer ear, middle ear, inner ear

Key sound variations

- pitch – sound frequency
- loudness – amplitude
- timbre – type or quality



Hearing

Humans can hear frequencies from 20Hz to 15kHz

- less accurate distinguishing high frequencies than low

Auditory system filters sounds

- attend to sounds over background noise



Touch

Feedback about environment

key sense for visually impaired

Stimulus received via skin receptors:

- thermoreceptors – hot and cold
- nociceptors – pain
- mechanoreceptors – pressure



Touch

Some areas more sensitive than others
e.g. fingers

Kinesthesia - awareness of body position

- affects comfort and performance.



Smell and Taste

Not much used in computer interfaces

Olfactory interfaces using smell are currently being developed

As we will not use these senses we are not discussing them here

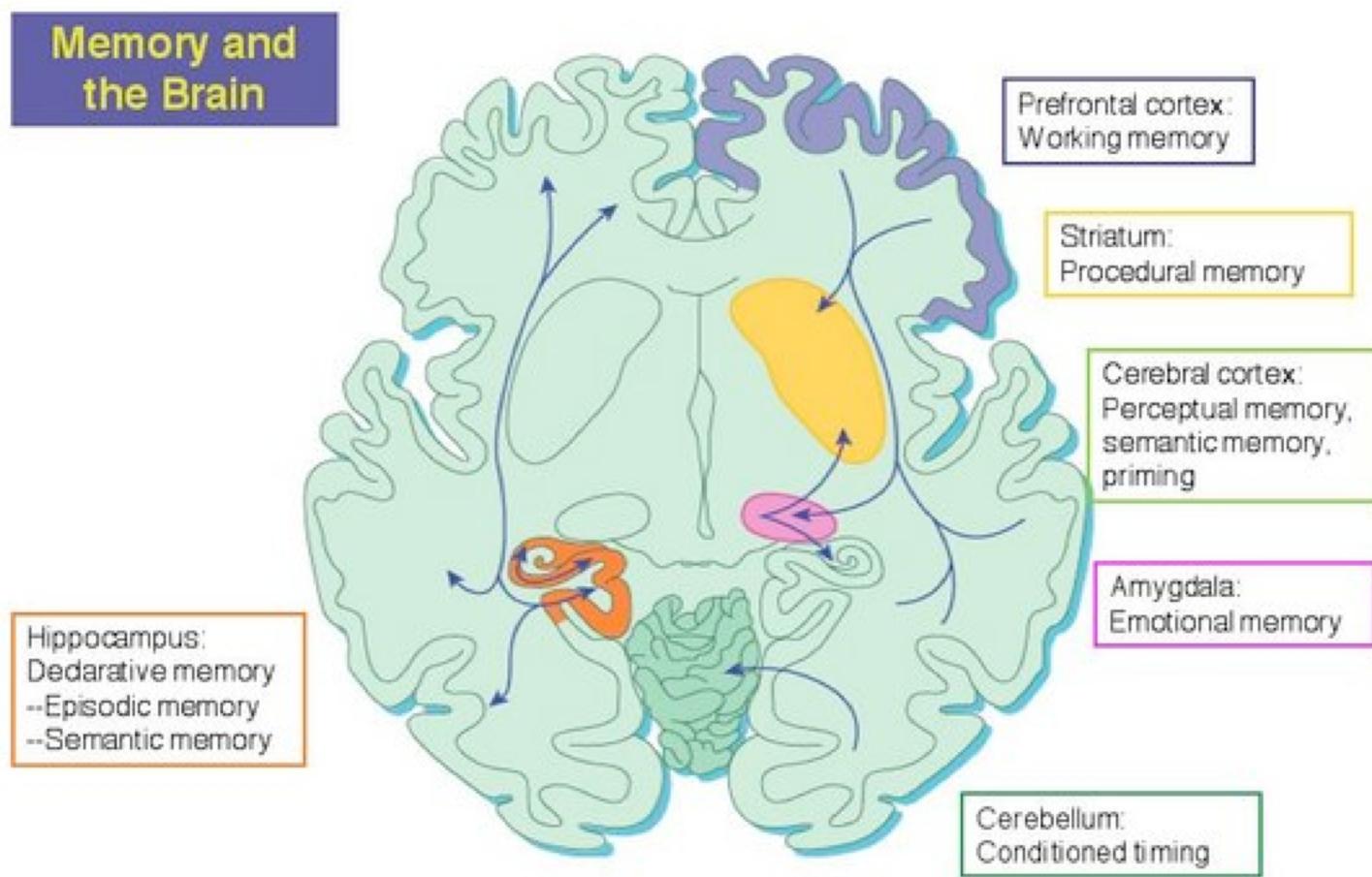
The Human and Storage

We have the capacity to remember & retrieve information

This affects the way we use technology



Memory is Complex



Multi-Store Theory

Sensory stores

Short-term memory

Long-term memory

Sensory Store

Momentary store for stimuli received by the senses

modality specific (i.e. limited to 1 sense)

unless encoded in ST it's quickly lost



Short Term Memory (STM)

Recalling a telephone number long enough to write it down

Degrades quickly, and has a limited capacity.

- Quick access time – 70ms
- Short term storage – 200ms (10 – 20 second decay time)
- Limited capacity
- Maintained and increased with rehearsal- stored in LTM

Remember this list of numbers

8 7 9 2 3 0 4 7 1 0 3 6 4 7 6 5

Count backwards in steps
of 7 from 1000

How many of the numbers do you remember?

Chunking & STM

STM holds information that is being used

A chunk= single object that conveys a larger amount of information

- words, shapes and colours.

Chunking & STM

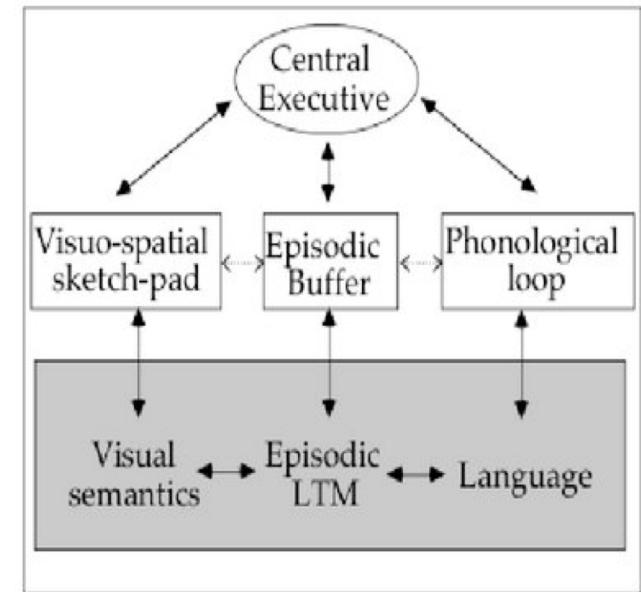
Information decays as new items come in

Icons are an example of chunked information on a desktop

- allows users to distinguish between the various programs available to them.

Working Memory Model (Baddeley 2003)

- STM and WM not exactly the same thing
- STM = storage without manipulation
- STM is part of WM
- Used in reasoning, comprehension and learning



Fluid systems *Crystallised systems*

Working Memory Model (Baddeley 2003)

Central Executive

- Attentional Control

V-S Sketchpad

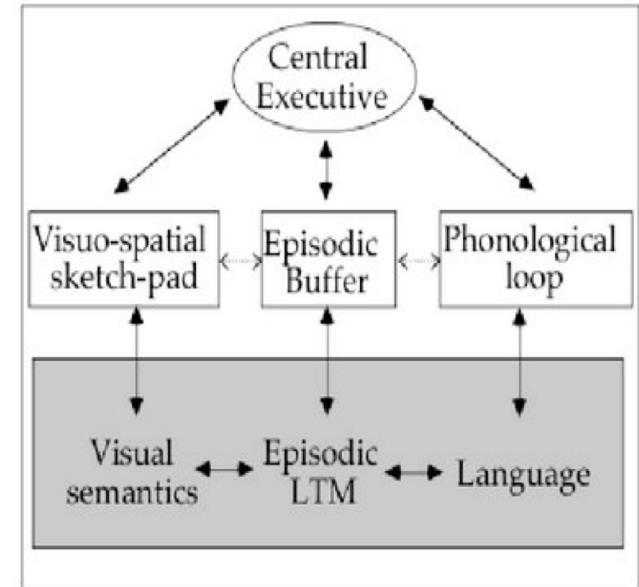
- Subsidiary storage system
- Limited capacity; 3-4 objects

Phonological Loop

- Subsidiary storage system
- Phonological store
- Articulatory loop

Episodic Buffer

- Downloads LTM representations
- Can then be used by WM

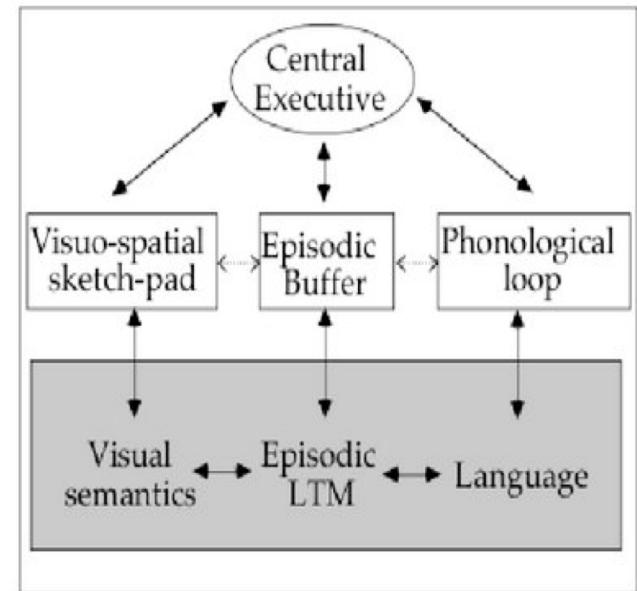


Fluid systems Crystallised systems

Working Memory Model (Baddeley 2003)

Purpose of WM

- Language acquisition (Phon. Loop)
- Visuo-Spatial manipulation of objects (VS-Sketchpad)
- Formation of new representations & interaction between other components (Episodic Buffer)



Compensation strategies (Wolters, 2009)



Long Term Memory (LTM)

Here we store everything we ‘know’

- huge capacity

- ability to hold information for long periods of time

- slow access time

Mental Lexicon

We have approximately 75,00 words in memory

Only takes 250 milliseconds to access

Short words are faster to access than long ones

More frequently used words are faster to access

Mental Lexicon

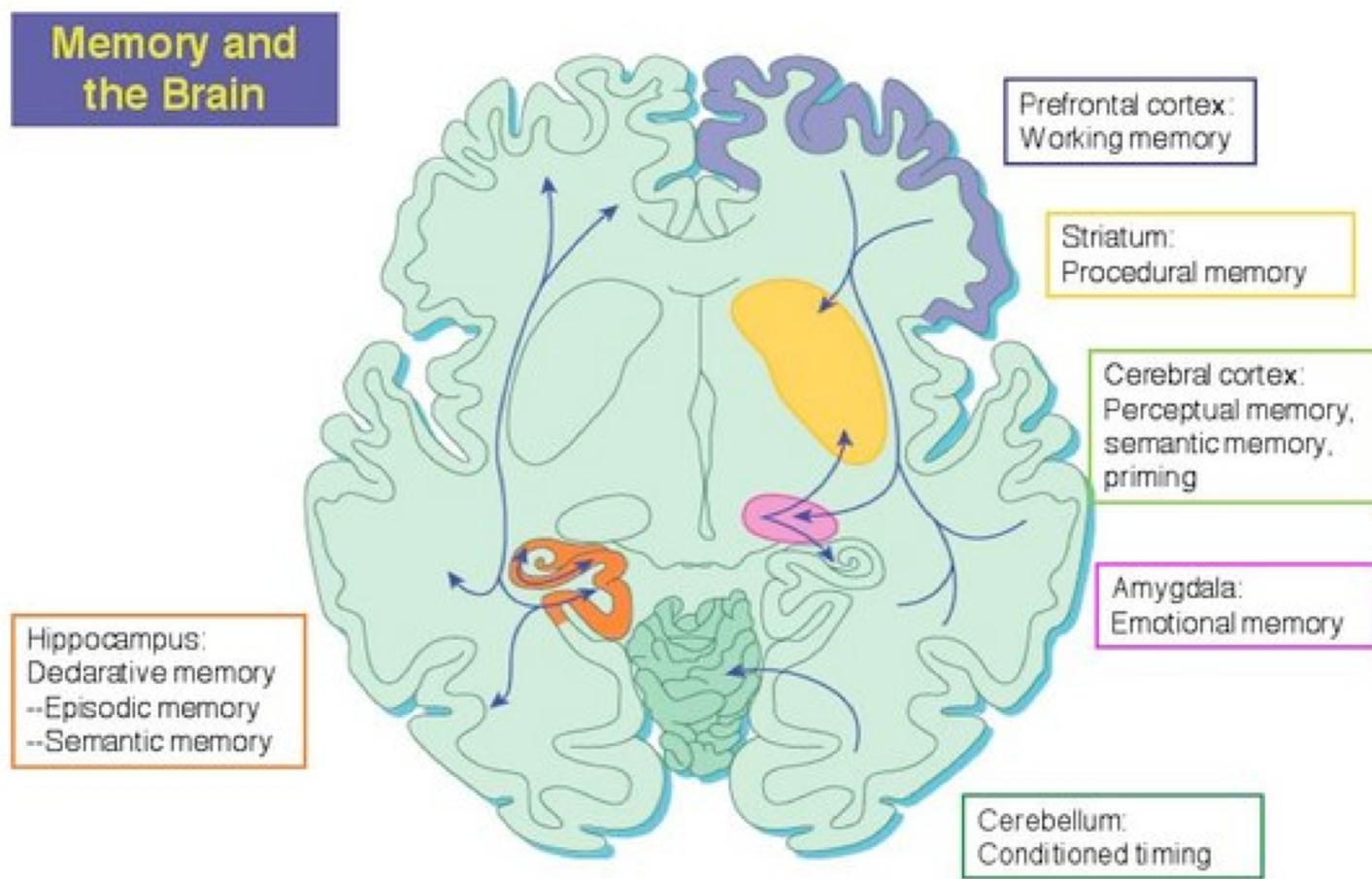
Mental lexicon has entries for each word

This entry has all of the information about a word

e.g. spelling, pronunciation, semantics

Priming effects

Memory is Complex



Individual Differences

- Personality
 - OCEAN (Costa & McCrae)
- Intelligence
 - (Deary)
- Sensory/Perception
 - Synesthesia (Simner)
- Memory/ Cognitive ability
 - (Baddeley, Logie)

Why is this important in HCI?

- The human is fundamental to the discipline
 - Remember the H
- Understanding the scope of human abilities is essential for good design
- Know your subject

Establishing Requirements

What are we trying to achieve?

To gain understanding of

- The user
- Their activities
- The context of that activity

To influence the design of our system

Produce set of requirements as basis for designing

Why Bother?

“Finding and fixing a software problem after delivery is often 100 times more expensive than finding and fixing it during the design stage”

(Boehm & Basili, 2001)

What is a requirement?

Statement specifying what a product should do or how it should perform

Should be specific, unambiguous and clear

- i.e. time to download any page should be less than 5 secs
- i.e. Visitor should find the tabletop engaging
 - More vague than first and need to research what would be need to achieve this.

Functional & Data Requirements

Functional Requirements

- Should do x
- Game should be challenging to all users

Data Requirements

- Type, volatility, size, persistence, accuracy etc

Environmental Requirements

Physical

- lighting, noise, movement, safety
 - E.g. Bank Machine

Social

- collaboration, sharing of data, physical location of team members

Environmental Requirements

Organisational

- user support likely? How easily obtained?
facilities for training?

Technological

- What tech will product run on/be compatible with, relevant tech limitations.

Example- WetPC



User Characteristics

Key attributes of user group

- E.g. abilities, skill level, technical knowledge, nationality, personal circumstances, disabilities

Generation of a user profile

Personas-Bringing the user to life

Cooper (1999)

- Rich description of typical user for product
- Allow product team to focus on user
- Not real people but based on real people from data gathering stage (user interviews, observations)
- Focuses on set of goals related to product
- Not job description/life story but detailed

Personas

- Detailed: users skills, attitudes, tasks and their environment
- Crucial to capture user goals & motivations
- Layout can vary
- More than one needed



Doris - Newcomer

Profile	Doris is a 28-year-old nanny, new to British Columbia from the Phillipines, working with a family in the Dunbar area of Vancouver. She is in Canada on a temporary domestic worker visa.
Goals	To stay in Canada working as a nanny and to support her family back in the Phillipines.
Attitudes	Not sure where to turn for help for legal questions. Finds Canadian legal terms to be confusing.
Behaviours	Prefers to talk with someone when seeking advice. When she uses the Internet, she uses Google Phillipines as her starting point for searches.
Computer skills	She has access to a computer at home, uses computers at the houses of friends and at the library. Uses email and chat to keep in touch with family in the Phillipines.
Legal access and history	Unfamiliar with BC or Canadian law. Worked through the immigration process.

Personas

www.interactionbydesign.com/presentations/olsen_persona_toolkit.pdf

Given realistic names, faces, and personalities

Fosters **user empathy within a product team.**

Usability and UX goals

Usability Engineering

- Measures & goals agreed early and progress measured across iterations
- Objective or subjective

UX goals

- Harder to measure progress
- Needs stated as requirement

Interviews

Structured
Semi structured
Unstructured

Trade off

- More structured = easier to analyse but more formal

Useful to list topics



Interviews

Stages

- Ethics/anonymity
- Background: details like experience etc
- Venting: Let them vent issues
- Addressing issues: Prompt, introduce topics
- Tying up: sum up issues

Good for eliciting scenarios (more later)

Tips

Don't do all the talking!

Don't ask leading or restrictive questions

Don't let participants drift off topic

Emphasise that there is no right or wrong

Don't give participants your opinion

Gathering Requirements

Questionnaires

- Identify people for interview
- Get wider perspective/views

Observation

- existing work practices, nature of tasks & context
- Done mostly by trained observers (ethnographers) or designers

Gathering Requirements- Tools

Research similar products

Cultural Probes

- Give people items
- Ask them to answer questions related to items

Focus Groups

- Group vocalising views on specific issue
- No more than 6 ppl, no less than 3

Which to choose?

Depends on
Task

Participants needed
Resources available

Can use more than one method

Tips for Gathering

Focus on understanding people's needs

Involve the right people

Get more than one of the types of people involved

Don't be afraid to facilitate
Props, task descriptions, prototypes

User Requirements....Done

What now?

Scenarios

Informal narrative description (Carroll, 2000)

“A scenario is a concise description of a persona using a product to achieve a goal ” (Cooper).

Describes activities in story like fashion

Doesn’t necessarily discuss in detail the use of tech

Good to explore constraints, irritations, context, fun things in task etc

Scenarios

Things you expect users to encounter

Cover the most likely of cases

Impossible to cover every scenario

Scenarios

In development should emphasise

- Context
- Usability and UX goals
- Task the user is doing

Personalised accounts

Used to describe existing task or future interaction

Created from data gathered in interviews etc

Scenarios should.....

Be concise

- short but complete; breadth instead of depth

Include the product

- assume the product (software or physical device) exists, even if it doesn't

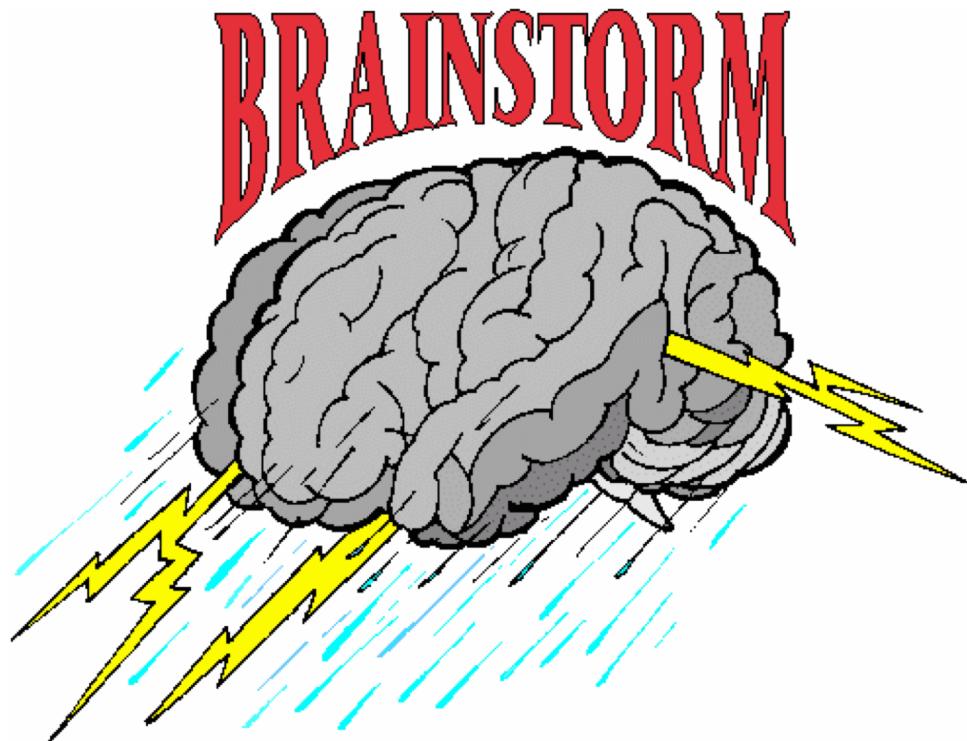
Describe the goal

- the reason why we perform a task

Writing Good Scenarios

Within the context of
our problem domain

The goals our
Personas will have



Writing Good Scenarios

Link it to the Persona
and what they would
do

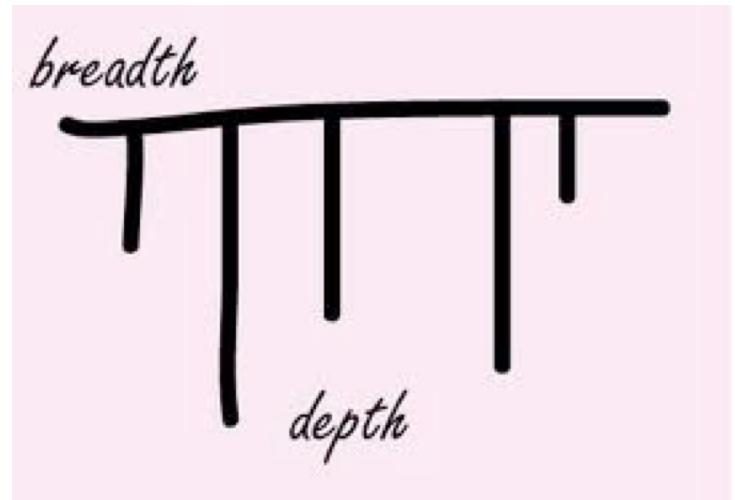
Remember the
Persona should reflect
knowledge of user

	Doris - Newcomer
Profile	Doris is a 28-year-old nanny, new to British Columbia from the Phillipines, working with a family in the Dunbar area of Vancouver. She is in Canada on a temporary domestic worker visa.
Goals	To stay in Canada working as a nanny and to support her family back in the Phillipines.
Attitudes	Not sure where to turn for help for legal questions. Finds Canadian legal terms to be confusing.
Behaviours	Prefers to talk with someone when seeking advice. When she uses the Internet, she uses Google Phillipines as her starting point for searches.
Computer skills	She has access to a computer at home, uses computers at the houses of friends and at the library. Uses email and chat to keep in touch with family in the Phillipines.
Legal access and history	Unfamiliar with BC or Canadian law. Worked through the immigration process.

Writing Good Scenarios

Go for breadth rather than depth

- it is more important to describe things from start to finish rather than in exhaustive detail



Are they any use?

Help us validate our design

Help us check our assumptions

Help us transfer theoretical/conceptual
design to “wireframe” design

Create shared understanding of user
for the entire design team

Scenarios- Existing Processes

“Say I want to find a movie by Martin Scorsese. I don’t remember the title but I know it came out in the cinema around 2006 or 2007. I go to the club website and choose the director option. A huge list is displayed.....another long list of movies leads me to the film I was looking for- The Departed.....the I need to enter my username and password....I am given an choice of rental periods. Then I download my movie” (Rogers, Preece & Sharp, 2011, p.375)

Scenarios- Future Visions

“Bramat has just finished a 4 mile run. He likes listening to music while he exercises, and has been playing his favourite pieces. This new skinput technology is great as he can focus on the running while scrolling through the available tracks, skipping through them with a simple tap of his finger. He comes in exhausted.....with a flick of his finger he turns off the music player and opens the palm of his had to reveal the television remote control panel.....” (Rogers, Preece & Sharp, 2011, p. 376)