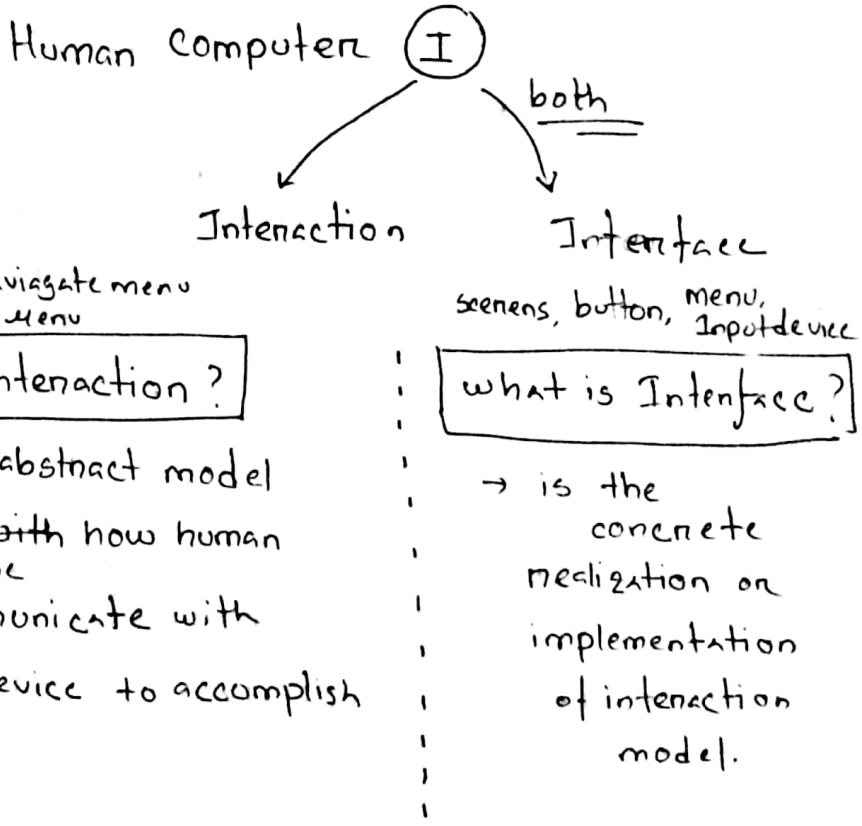
Human Computer Interaction (chapter-1)

⊛ what is HCI?

→ HCI is a field that encompasses various disicipline such as engineering, psychology, engonomics and design + focuses on understanding, designing, implementing, & evaluating the ways human interact with computing device



what are the goals of HCI ?

1. Functional completeness (Nothing Missing)
2. High usability (ease to use)
3. Asthetic Appeal (Looks good)
4. Compelling user Experience
   → great to use, user continue using it

what are the challenge of good HCI design ?

1. Consideration of
   - i → usertypes
   - ii → chanacteristic of tasks
   - iii → capabilities and cost of the device
   - iv → Lack of objective
   - v → changing technologies
2. Considerable knowledge in different field required
3. Balancing Simplicity vs Complexity
4. Balancing User Expectations vs Innovation

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(*) what are the principle of HCI ?

1. Know the User
2. Understand the task
3. Reduce memory load
4. Strive for consistency
5. Remind Users and Refresh their memory
6. Prevents Errors / Reversal of Action
7. Naturalness

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(1) Know Thy Users

→ Understanding the user
{ factors [age, gender, education culture, preference] }

→ Age vs gender Related difference

→ Universal usability

(2) Understand the Task:-

→ Task refers to specific jobs that the user intends to complete through the use of interactive system

→ identify sequence / structure of tasks and subtasks

Tasks

Invoke Browser → enter password

Newbie User

Tasks

Invoke Browser → WLAN setup → Select Access point → Enter password

Expert User

(3) Reduce Memory Load

STM → Human short time memory

(5-9 chunks memory)

A pizza app

Ex :- → user no need to remember their/fav orders / past address.

→ app remembers user details no need to input everytime

(4) Strive for consistency

→ diff pages of app same (mspowerpoint vs word : use same design style)

→ same style / position / Layout

(5) Remind users and Refresh Their Memory

Pizza App → If user abandon their order midway, app sends a notification to remind them to complete their purchase

ms word → bring users back where they left last time

⑥ Prevents errors / Reversal of actions :-

→ choose from options rather input text

→ Review order before finalize and edit

→ confirm popup before delete & confirm

⑦ Naturalness

→ make comfortable and effortless to use

→ how natural interact with physical world

chapter-2

Guidelines two categories

1. Domain specific
2. General HCI Design

1. Display Visual Layout (HCI Guidelines)

19 guidelines

1. Avoid cluttered display :- Pages are not cluttered
2. place important items consistently :- put important clickable items in the same location
3. place important items top center
4. structure for easy comparison
5. Establish level of importance of information
6. optimize display density (pages not to crowded with information)
7. Align items on page
8. set appropriate page length

~~(9)~~ choose appropriate line lengths (75-100 character per line)

~~(10)~~ uses themes when function must remains accessible

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Information structuring & Navigation

guidelines

(1) one single screen should not encompass too much Information

(2) Information organized in a structured manner, easy to navigate

(3) Easy movement of items without being disoriented

(4) Fast and easy navigation for helping users to find action and info quickly

→ (5) use appropriate menu types and descriptive labels

(6) provide clickable list of page content on long pages

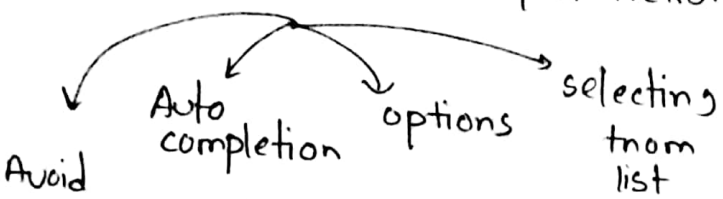
Taking User Input Guidelines

6 guidelines

(1) Consistency of data entry transactions :-

< same date format (mm/DD/YYYY) across all the application >

(2) Minimal Input Actions by user :-



Avoid switching between mouse & keyboard

(3) Minimal memory load on user

(4) Clean and effective labeling of buttons and entry fields

(5) Match the sequence of data entry and selection fields in a natural scaning and hand movement direction (top to bottom, Left → right)

(6) donot place semantically opposing entry selection options close together

| Save | | Undo | X

(*) User disability guidelines:-

Perceivable

(1) provide text alternatives for non text context

(2) provide captions and other alternatives for multimedia

(3) Create content that can be presented in different ways without lossing meaning

(4) make it easier to see & hear content

Operable

(1) make all functions available from a keyboard

(2) Give users enough time to read and use content

(3) Donot use content that cause seizures

(4) Help users navigate and find content

Understandable

1. Make text readable and understandable
2. Make content appear and operate in predicted ways
3. Help users avoid and correct mistake

Robust

1. Maximize compatibility with current and future user tools

(check-out process)

* E-commerce application guidelines

1. check-out should start at the shopping cart
2. should be followed by Gift options or shipping methods.
3. Shipping address, billing info collection from user.
4. Order Review
5. Order Summary
6. Displaying confirmation page

(*) Platform type Guidelines

1. Fast status information (provides quick updates)
2. Efficient use of screen pages
3. Follow devices interface pattern

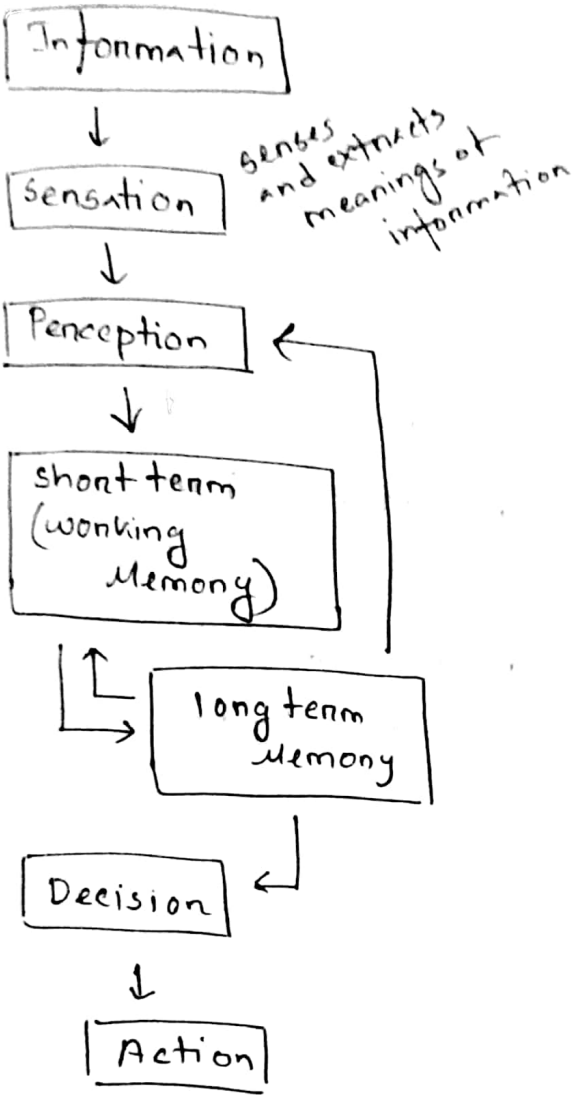
4. large hit targets (buttons)
5. Minimize typing/Input pressure on hardware
6. Avoid density of Information and object
7. Fience Task Focus
8. Enable shortcuts
9. keep user informed of his action

Chapter-3

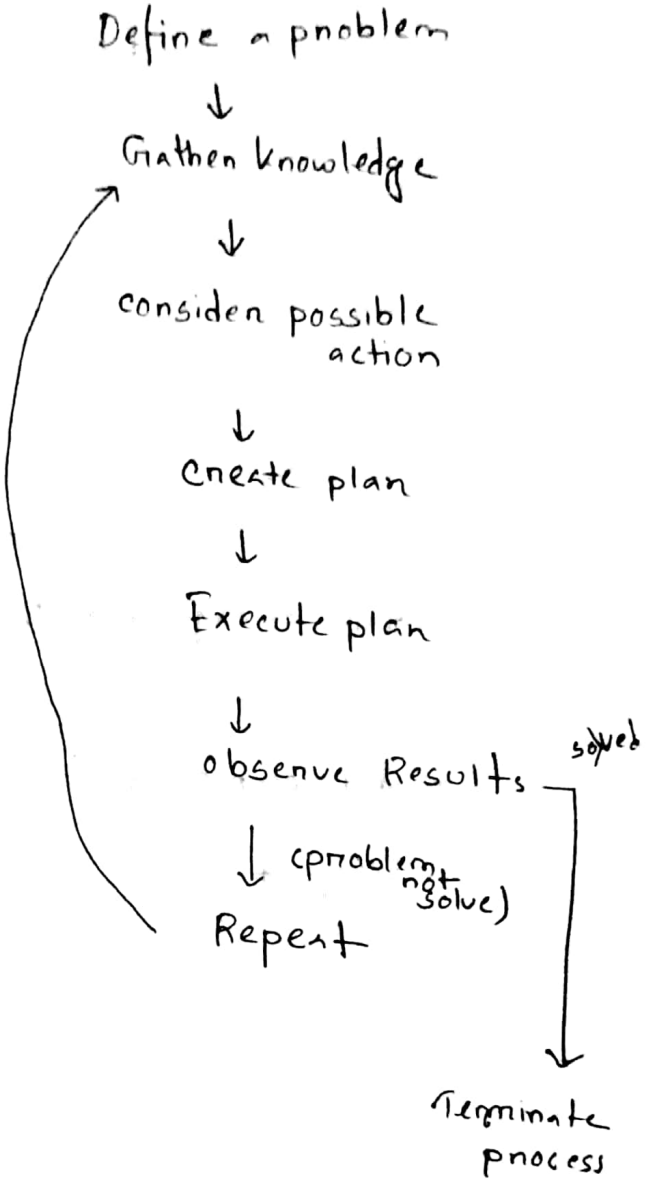
Human Factors as HCI Theories

- visual
- Aural (hearing)
- Haptic (pressure)
- Tectile (touch)

Decision maker



Human problem solving model



Human Problem solving Process

* Gulf of execution

The gap between expected and actual

- Does the system display expected Result?
- Does the system offer actions that I expect to apply?

→ when an interactive system doesnot offer certain actions / doesnot result in a state as expected by users. This mismatch between the user's mental model and task model employed by the interactive system creates gulf.

Visual

① Visual and display parameter :-

6 parameter

(i) **Field of view (FOV)** - refers angle covered by Human visible area

(ii) **Viewing distance** :- How far you are from screen

6 parameters

(iii) **Display field of view** :- angle covered by the display area when viewed from specific distance

(iv) **Pixel** :- A display system is typically compose of array rectangle areas

(v) **Display Resolution** :- No of pixels

(vi) **Visual Acuity** :- How clear you can see thing ?

② Detail and peripheral vision :-

- center of your vision see color and detail well (5° FOV)
- Peripheral vision detects motion
- displays may have but eyes don't have uniform resolution

brightness/ color

③ Brightness, colon, contrast → difference in ^ between things you see

↓ How much light an object emits

↓ How perceive diff. wavelenght of lights

④ Pre-attentive Features and High level ~~dig~~ diag-nostic semantics

- color + size + shape + motion grabs our attention quickly
- visual items are automatically identified within 10ms

Aural (hearing)

(1) Aural Display parametens :-

(i) Intensity | Volume : Refers to the amount of sound in db

(ii) Sound :- made up of diff frequency that has many chancetenistic

(iii) phase :- time diff among sound wave from same source

(2) Othen chanactentistic of sound as Intenaction Feedback

- attract and direct usen

(3) Aural modality as Input method :-

Two major methods

(1) keyword recognition

(2) Natural Language understanding

→ has limitations

- switching
- annoyance
- hard to compute long sent.

Haptic (Pressure)

modality of sensing force and feedback through our joints and muscles

4 parameter

1. The degree of freedom : no of direction force can be felt
2. Force Range :- range of force that can be displayed
3. operating / Interaction Range :- How much movement device allows
4. stability :- How steady the force feels

Tactile

3 parameters

sense touch through skin

1. Tactile Resolution :- How sensitive your skin to feel things
2. Vibration Frequency :- speed of vibration felt
   optimal comfort :- 250Hz
3. Pressure Threshold

multimodal Interaction

Using more than one way of Interacting with a device can make it better

(1) Complementary :-

Aunal (sound) phone Ring - someone is calling

Visual (visual) sceneen shows - who is "

(2) Redundant :-

phone Ring → sound + vibrate
(anual) (tactile)

(3) Alternative :-

make a call

either press a button

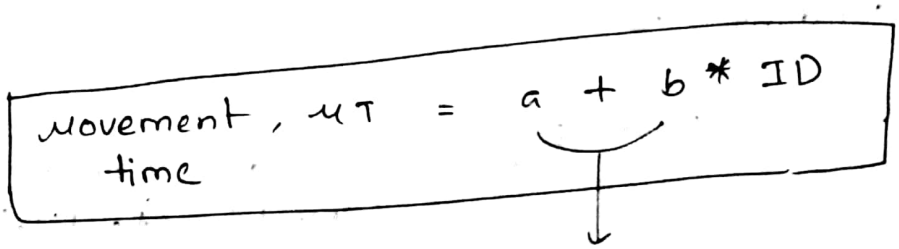
or speak someone's name

Human body ergonomics

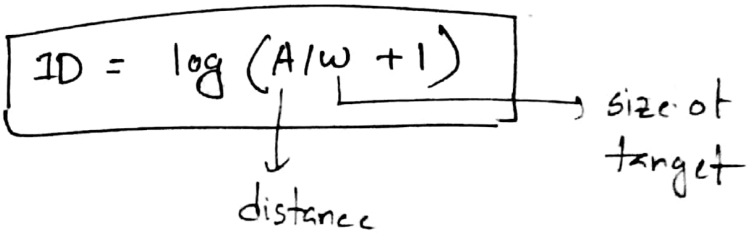
Fitt's Law

Law :- A model of Human movement that predicts the time required to rapidly move to a target area as a function of the distance to and the size of the target

(How ~~much~~ long it takes us to move our hand/mouse to click on something on a computer screen)

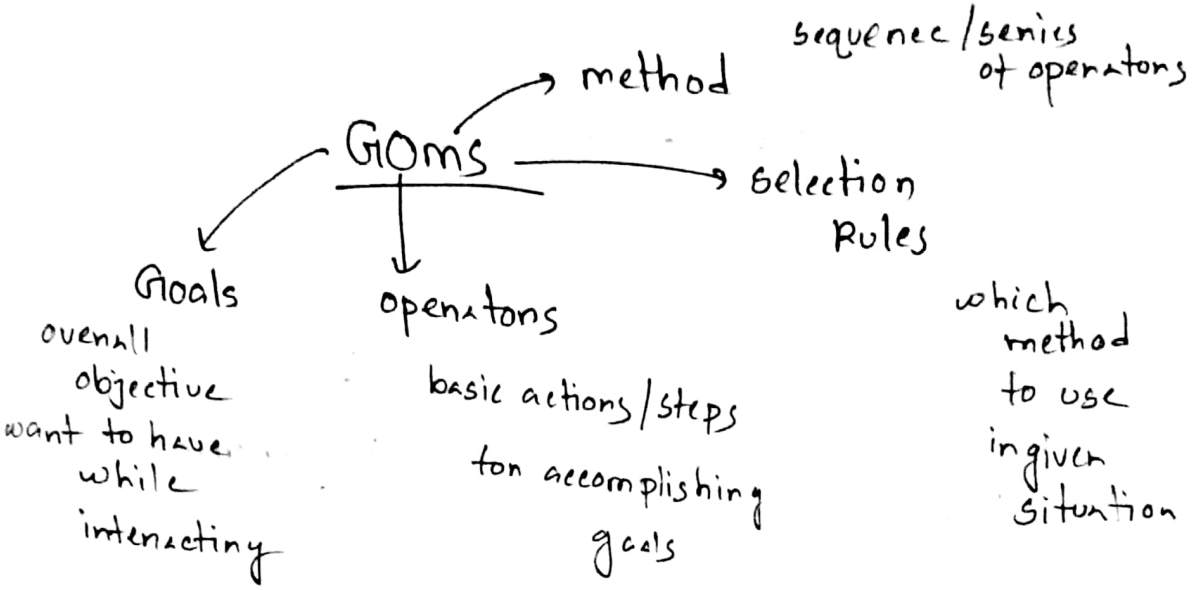


a, b = emphinically determined contraints



✓ → target as large as possible

✓ → Distance as small as possible



Goms is a cognitive ~~psh~~ psychology and HCI framework used to analyze and predict the time it takes for people to perform specific tasks on computer or other system.

Human factors

Cognitive Science

understand how human mind works

Engonnomics

how 5sense take into form outside wond l

How Human facton knocoledge help HCI ?

1. Task Intenacting node l
2. Pnediction, Assesment & Evaluation of intenactive behaviour.

1. what is HCI?
2. what is interaction vs interface?
3. what are the goals of HCI? (4)
4. what are the challenge of good HCI design? (4)
5. what are the main principle of HCI? (7)
   (example of each principle)

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1. Visual Display Layout guidelines? (10)
2. Information & Navigation goidelines? (6)
   structuring
3. Taking User Input guidelines? (6)
4. User disability guidelines? (4 types)
   perceivable, operable, understandable
   · Robust
5. Ecommence website checkout process guideline? (6)
6. App Platform type guidelines? (8)

* Four Factors of HCI?
* Draw Human problem solving model?
* Draw Human problem solving process model?
* Explain Gulf of execution?
* Explain 4 points of visual ?
* write the 6 parameter visual and display?
* Explain 3 points of Aural?
* write 3 paramaters of Aural display?
* what is haptic ? 4 parameters of it
* what is Tactile? 3 parameters of it
* what is multimodal intenaction Intenaction?
  Explain its parameter with example?

* what is Fitt's law?
* what is GOMS method?