🌟 WEEK-06 (Paradigms) – Super Easy, Well-Explained Notes

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1. What Are Paradigms? (Very Easy Meaning)

- A **paradigm** means **a big idea or way of thinking**.
- It is like a "style" or "approach" we follow for many years.
- In HCI, a paradigm tells us **how humans and computers should interact**.

Example:
Using a mouse & icons is one paradigm.
Using voice commands is a new paradigm.

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2. Why Do We Study Paradigms?

- To understand **how computer interaction changed** from old to new.
- To learn:
  - What worked well
  - What failed
  - What improvements were needed
- Helps us design **better and more user-friendly systems today**.

Example:
Early computers had no screen → very hard to use.
Now we have touchscreens → easier and faster.

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3. Paradigms Change Over Time

Computers changed A LOT.
Each big change is called a **paradigm shift**.

It is like moving from:

- Simple phones → smartphones
- Normal houses → smart houses

Every new technology changes:

- How we see computers
- How we use them
- How we think about them

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4. First Paradigm: Batch Processing

What it was:

- In very old computers, users did **not** use computers directly.
- People wrote programs on **paper cards**.
- Then they **submitted the cards** to the computer.
- Had to wait **hours** for results.

Problems:

- No direct interaction
- No instant feedback
- One small error → whole job fails

Example:
It's like giving your assignment to someone who checks it after 6 hours.
If one spelling mistake is there → whole assignment rejected.

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5. Paradigm Shift: Time-Sharing

What changed?

- Many people could use **the same computer at the same time**.
- Users interacted through **terminals** (keyboards + screens).
- Faster, more interactive.

Why important?

- Users no longer had to wait for hours.
- Computing became **interactive**.

Example:
Like many students using the same computer lab server.

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6. Paradigm Shift: Networking

What changed?

- Computers could now **connect with each other**.
- Allowed:
  - File sharing
  - Emails
  - Remote access

Example:
Sending emails between universities in early days.

This was the foundation of the **Internet**.

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7. Paradigm Shift: Community Computing

Meaning:

- Computers became a way for **people to communicate socially**.

Tools:

- Early emails
- Message boards
- Chat rooms

Example:
Students discussing assignments online → early form of WhatsApp groups.

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8. Paradigm Shift: Graphical Displays

Before:

- Computers only showed text.

After:

- Computers could show **pictures, drawings, shapes**.

Key Person:

- **Ivan Sutherland – Sketchpad (1962)**
  - First system where users could draw directly on screen.

Why important?

- Made computers visual
- Opened the door to modern GUIs (Graphical User Interfaces)

Example:
Drawing on MS Paint today started from Sketchpad.

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9. Paradigm Shift: Direct Manipulation

What it means:

- You directly **touch, move, drag** things on the screen.
- No need to type commands.

Features:

- You see objects clearly
- You get fast feedback
- You can undo mistakes
- Very easy to learn

Example:
Dragging a file into the recycle bin → instead of typing "delete file.txt".

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10. Paradigm Shift: Microprocessors → Personal Computers

Microprocessor:

- A very small but powerful chip.

What changed?

- Computers became:
  - Smaller
  - Cheaper
  - Faster
  - Personal (one computer for one person)

Major Contributions:

- **LOGO (Papert)** → easy language for kids
- **Dynabook (Alan Kay)** → idea of laptop/tablet

Example:
Today's laptops and tablets are results of this paradigm.

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11. Window Systems & WIMP

WIMP =

- **W**indows
- **I**cons
- **M**enus
- **P**ointer

What changed?

- Users could:
  - Open multiple windows
  - Switch between tasks
  - Click on icons

First system:

- **Xerox Star (1981)**

Example:
Your Windows desktop uses WIMP.
Your phone uses icons (part of WIMP ideas).

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12. Metaphors in Interfaces

What is a metaphor?

- Using a real-life idea to explain computer tasks.

Common metaphors:

- Desktop
- Folder
- Trash bin
- "Save" icon (floppy disk)

Benefits:

- Easy to understand for beginners

Problems:

- Some cultures don’t understand all metaphors
- Some tasks don’t fit into metaphors

Example:
In some countries, trash bins don’t look like the icon on computers → becomes confusing.

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13. Direct Manipulation – More Explanation

Why people love it?

- Simple
- Visual
- Easy to understand
- No need to memorize commands

Features:

- Everything is visible
- You can try things safely
- Undo/Redo helps learning

Example:
Photoshop uses direct manipulation → moving objects, resizing, dragging.

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14. Language vs Action

Action-based interfaces:

- You click, drag, drop.

Language-based interfaces:

- You type commands or speak.

Which is better?

- **Both have strengths.**

When action is better:

- Simple tasks like:
  - Moving files
  - Scrolling
  - Dragging images

When language is better:

- Complex tasks like:
  - Writing formulas
  - Searching files
  - Giving detailed instructions

Example:
Typing “sort largest to smallest” is easier than manually moving 200 numbers.

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15. Hypertext

What is it?

- A system where you can jump from one document/page to another using **links**.

Inventors:

- Vannevar Bush → early idea
- Ted Nelson → coined “hypertext”

Today:

- Hypertext = **the basic idea of the web**
- Every click on a link is hypertext

Example:
Wikipedia pages linked to each other.

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16. Multimodality

Meaning:

Using **more than one sense** to interact with a computer.

Modes:

- Speech
- Touch
- Gesture
- Keyboard
- Eye movement

Why useful?

- More natural
- Easier for disabled users
- Faster for multitasking

Example:
On a phone you can:

- Speak (“open YouTube”)
- Touch swipe

- Type
- Use gestures

All at the same time.

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17. CSCW (Computer Supported Cooperative Work)

Meaning:

Computers used by **groups of people** working together.

Tools:

- Google Docs
- Microsoft Teams
- Zoom
- Slack

Why important?

- Modern work requires teamwork
- People work from different locations

Example:
Three students editing the same document at once.

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18. The World Wide Web (WWW)

Why it was a big paradigm shift?

- Made sharing information extremely easy
- Anyone could publish a webpage
- People across the world connected

Core technologies:

- HTTP
- HTML

- Web browsers

Example:
Shopping online, reading news, social media → all became possible.

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19. Agent-Based Interfaces

Meaning:

Systems that act like **smart assistants**.

Examples:

- Siri
- Alexa
- Google Assistant
- Chatbots

What they do:

- Understand natural language
- Make suggestions
- Automate tasks
- Perform actions without being told every detail

Example:
You say: “Set an alarm for 7 AM” → assistant sets it automatically.

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20. Ubiquitous Computing (Ubicomp)

Main idea:

Computers become **everywhere** but **invisible**.

Inventor:

- Mark Weiser (1991)

What it means:

- Computers blend into daily life
- They don’t demand attention
- They help quietly

Examples:

- Smart homes
- Smart TVs
- Smartwatches
- IoT devices
- Smart fridges

Everyday example:
Lights turning ON automatically when you enter the room.

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21. Sensor-Based & Context-Aware Systems

Meaning:

Devices sense the environment and react automatically.

Sensors detect:

- Light
- Sound
- Temperature
- Location
- Motion
- Identity (face recognition)

Purpose:

- Make interaction automatic
- Reduce user effort

Examples:

- Phone screen turns OFF near your ear
- Google Maps changes directions as you move
- AC adjusts temperature automatically

⭑ WEEK-07 – Interaction Design Basics (SUPER EASY + WELL-EXPLAINED NOTES)

(Clear, simple, student-friendly)

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1. What Is Interaction Design?

Interaction Design is about **how users interact with a computer system**.
It focuses on:

- How users **see** (vision)
- How they **hear**
- How they **touch**
- How they **move**
- How they **think and remember**
- How they **feel** (emotions)

In simple words:
☞ *Interaction design is making computer systems easy, comfortable, and natural for humans to use.*

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2. Human Information Flow

This means **how information enters the human brain and how we react**.

Steps:

1. **Input** (what we see, hear, touch)
2. **Cognitive processing** (brain understanding)
3. **Motor response** (action → clicking, typing, moving)

Example:
You SEE a button → your BRAIN decides → your HAND clicks it.

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3. Sensory Inputs (The Body Channels)

Humans interact with computers through senses:

a. Visual (Eyes)

- Detects light, color, shapes
- Most important sense for UI design
- 70–80% of interaction is visual

b. Auditory (Ears)

- Detects sound, alerts, voice instructions

c. Haptic (Touch)

- Detects pressure, vibration, temperature
- Used in touchscreens, haptic feedback

d. Movement

- Body movement, hand movement
- Used for clicking, tapping, selecting

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4. Vision Processing (How Eyes Understand Screens)

Vision has **two stages**:

Stage 1: Physical Reception

Eyes receive light → image formed on retina.

Stage 2: Interpretation

Brain interprets shapes, objects, colors, icons.

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5. Eye Structure (Simple)

- **Rods** → sense brightness
- **Cones** → sense color
- **Ganglion cells** → detect movement & patterns

These help us recognize:

- Icons
- Buttons
- Motion
- Screen layout

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6. Visual Interpretation (How Users See the UI)

Humans use:

✓ Size perception

Bigger objects look closer or more important.

✓ Depth perception

Shadows can make buttons look “clickable”.

✓ Context

Brains try to make sense of what they see based on surroundings.

✓ Optical illusions

Sometimes brain sees wrongly — bad UI can confuse users.

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7. Brightness & Color

- Brightness is affected by screen luminance.

- Color comes from different light wavelengths.

Important UI Note:
☞ **Blue is hard to see in small details** → avoid using thin blue text/icons.

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8. Hearing System

The ear works in three steps:

1. **Outer Ear** – receives sound
2. **Middle Ear** – sends vibrations
3. **Inner Ear** – converts sound to signals for brain

Useful for:

- Notification alerts
- Voice assistants
- Warning sounds

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9. Sound Properties

Property	Meaning
Pitch	How high or low the sound is
Loudness	Volume (amplitude)
Timbre	Quality or tone (what makes a piano different from a guitar)

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10. Auditory Perception

Humans use **auditory filtering** to focus on important sounds.

Example:
☞ “Cocktail Party Effect” – hearing your name in a noisy room.

In UI:
Good notification sound cuts through background noise.

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11. Touch Perception

Skin sensors detect:

- Pressure
- Vibration
- Temperature
- Pain

Used in:

- Touchscreens
- Haptic feedback (vibration on click)

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12. Movement & Response (Motor Behavior)

Action = **reaction time + movement time**

Fitts' Law

Used to predict pointing speed.

☞ The closer and bigger the target → the faster you can click it.

Example:
Large buttons on mobile = easier and faster to tap.

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13. Memory Types

Human memory affects how interfaces should be designed.

a. Sensory Memory

Very short (1–2 seconds).
Types:

- Iconic (visual)
- Echoic (audio)
- Haptic (touch)

b. Short-Term Memory (STM)

- Holds 7 ± 2 items
- Quick to forget
- Used when reading menus
  UI Tip: Avoid long menus.

c. Long-Term Memory (LTM)

Stores:

- Knowledge
- Skills
- Experience
  Two kinds:
- **Episodic** (event memories)
- **Semantic** (facts, concepts)

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14. LTM Organization

Information is stored like a **network**:

- Concepts connect to other concepts
- Helps users remember UI patterns

Example:
Folder icon → memory says “store files”.

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15. Reasoning Types

Type	Meaning	Example
Deductive	Rule → result	If “red” = error → click carefully
Inductive	Observation → rule	User learns app behavior over time
Abductive	Best guess	System froze → restart it

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16. Problem Solving

Steps:

1. Define problem
2. Find possible solutions
3. Execute and test

UI should support this by:

- Clear feedback
- Simple layouts
- Undo options

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17. Errors in Action

Two main types:

Slips

Goal is correct, action is wrong.
Example: Clicking the wrong button.

Mistakes

Goal itself is wrong.
Example: User misunderstands how the system works.

Why errors happen?

- Confusing UI
- Bad mental model
- Stress

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18. Emotion & Cognition

Emotion influences:

- Thinking
- Attention
- Decision-making

Positive mood → creative, better interaction
Negative mood → narrow focus, more mistakes

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19. Emotional Theories (Simple)

1. James-Lange

Body → Emotion
Example: Heart races → “I feel scared”.

2. Cannon

Brain → emotion is mental, not body-first.

3. Schachter-Singer

Emotion = physical reaction + situation
Example: Fast heartbeat + dark room = fear;
Fast heartbeat + gym = exercise.

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20. Design & Emotion

Good UI =

- Relaxing colors
- Simple layout
- Supportive feedback

This increases satisfaction and reduces errors.

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21. Individual Differences

Users differ based on:

- Age
- Vision/hearing ability
- Experience

- Stress level

Design must be inclusive:

- Large text
- Clear icons
- Simple language

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22. Interface Design Implications

Important rules:

- Avoid thin blue details (hard to see)
- Use clear typography
- Provide feedback on all actions
- Consider emotions & stress
- Keep mental load low (simple steps)

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23. Navigation & Interaction

Navigation = how users move through a system.

Two types:

Local Navigation

Inside a single page (scroll, tabs)

Global Navigation

Across the whole app (menus, home)

Good navigation:

- Predictable
- Easy to learn
- Shows “Where am I?”

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24. Scenario-Based Design

Uses stories to:

- Understand user goals
- Predict user behavior
- Improve design decisions

Example:
“Ali wants to book a ticket quickly using mobile.”

Scenarios help identify:

- Problems
- Steps
- User needs

⭐ WEEK-07 Summary (Easy)

- Human interaction depends on senses, memory, movement, and emotions.
- Designers must understand human limits and abilities.
- Good design is simple, clear, predictable, and emotionally pleasant.
- Memory limits and visual perception shape UI layouts.
- Navigation must be easy and well structured.
- Designing with scenarios helps meet real user needs.