Human-Computer Interaction
Week 2 Practical: 2nd Wave HCI
Session Overview

In this session, we will explore how **breakdown, situated action** and **affordances** can help us reflect on how we design and interact with artefacts.

1 Affordances Refresher

An **affordance** is an action possibility (a glass affords drinking). We perceive these action possibilities via **information** about affordances (light bounces off the glass and hits our retina in a way that tells us the glass contains water and is within our reach).

Affordances are a huge topic in HCI. Although the concept seems simple there is a lot of room for nuance – people argue over different definitions which have different implications for design and cognitive science. Luckily you only need to worry about a little bit of this in this course.

The most famous definition of affordances in HCI comes from Don Norman. Norman distinguishes between two kinds of affordances, distinguished by how the affordance relates to information about the affordance: 1) **Real/ Actual Affordances**, which concerns natural objects 2) **Perceived Affordance**, which capture digital and some other designed objects. For natural objects there is a strong reliable and *lawful* relationship between the information and the affordance. Norman's word **real** reflects this lawful relationship. For virtual objects information about action is not based on the laws of nature, but designed by designers. We learn the connection between information and affordance based on *conventions* (e.g. a disc means "save"). Language is included as a convention: it can be seen as a complex system of conventions.

Bill Gaver offered another interpretation. This stresses the importance of separating the information available about an affordance from the actual

affordance. This allows him to account for **False Affordances** (where an interface element communicates information about an affordance that doesn't exist), **Hidden Affordance** (where an interface element does not communicate information about an affordance that exists); **Perceptible Affordance** (the ideal scenario, where the interface element communicates information about an affordance that exists); and **Correct Rejection** (where no affordance exists and no information is communicated to the user) . In the lecture slides for this week there is a table representing this idea.

In the following exercise, we will rely on Gaver's affordance space to analyse an interactive object.

Exercise 1 (10 mins)

Consider a spray paint can: To use it, one hand needs to shake it to mix the paint with the material which propels it out of the can. Most people tend to forget to shake the can.

In terms of Gaver's account of affordances, why might this be?

In your group spend a few minutes discussing a few ways of redesigning the can to solve this problem

2 Breakdown Refresher (25 mins)

The concept of **breakdown**, and **modes of tool use** comes from phenomenology – a very important philosophical tradition which is far too big to get into in this unit.

According to phenomenology, a tool can be in three potential **modes**:
1) A tool is **ready-to-hand** when it is being *used*, *effectively* by an *adequately skilled* user (all those words are important!). In this mode the tool "disappears" or becomes transparent to the user. Instead the user perceives the task they are engaged with and they act through the

tool. Think of playing a game with a controller: you forget the controller. If the controller has feedback you may not notice this as a buzzing, but feel it as part of the explosion or action on screen. If you are typing well you forget the keyboard: your fingers just find the keys.

2) A tool can become **present-at-hand** when something about it breaks down and it doesn't function as it is expected to. At the moment of **breakdown**, the tool becomes a separate object in our consciousness: we suddenly become aware of it, and we may reflect on it (e.g. a sticky key on the keyboard that, once pressed, keeps typinggggggggggggggg on the screen, the user stops typpppping to try to fix it!) Here the tool moves to the foreground of awareness and conscious reflection.
Equally, when you are learning to type, but don't yet have the skill, you look at the keys and engage with them consciously.

3) Finally, a tool can be **unready-to-hand.** Here a tool is *slightly* broken, or *janky*. We can still use it but we are somewhat aware of it. We feel frustration, and need to focus harder on the activity. Here, we still cope with the task, but the tool becomes obtrusive.

We can use breakdown in design:
- Most successful designs support *ready to hand* modes of use: the technology disappears to some degree, and the interaction is fluid.
- If a task breaks down through lack of skill or malfunction, then we can expect the user to become more consciously aware of the technology: to lose the sense of immersion.

But breakdown is not always negative
- We only really *see* objects when they are present-at-hand. If we want a user to see something, or reflect on something, some amount of "friction" or breakdown might be helpful.
- Breakdown can help us identify alternative strategies for interaction. Speedrunning in games exists because players noticed breakdowns, and this let them reflect on other possibilities for activity.
- Breakdown is how we learn: unfamiliar objects/interactions are present-at-hand (they become ready-to-hand as we become more proficient at using them)
- Experts may fail to see things that are more apparent to newcomers

Exercise 2

    a) Type out the following string of texts without looking at your keyboard (either on phone or laptop – whichever is easier for you)
    "The quick brown fox jumped over the lazy dog"

    b) Now do the same for this string (a randomised version of the same string)
    "oirjo hf quoe xr lth mw adukzog ev tbpcyeend"

Which required more focus and attention? Reflect on the role of familiarity and the ordering of low-level actions in tasks.

The second one requires more attention because you haven't got the muscle memory of having typed the word many times before.

    c) Now work in a pair. The one person should call out the letters of the following randomised string.

    d) The other person should sit with their hands on their lap, then for each letter, try to point at the letter on the keyboard.

    Repeat again, for the string 'mehnol ta krouxq duw jizhrt cfv gdbe eepooy'
    Now, for each letter, the typer must state the row and key number of the letter (without looking at a keyboard).

These examples showcase different kinds of breakdown in typing skill.
In the first task we rely on ***ready to hand***, skill or "know how". You "know how" to type the phrase. This does not mean that you have the same "know how" for individual actions within that task, separated from the task, or if the order of actions is randomised. Human behaviour leverages routines and norms. It is path dependent.

In the other parts of the task the technology becomes **unready to hand,** or

even **present at hand,** relying on a conscious, perceptual representation of the keyboard instead of embodied skill.

We might instinctively expect that the first skill relies on implicit representational knowledge (and psychologists have believed variations on this idea), but in this case it seems like we know how to perform the task, but representational knowledge about aspects of the task is far harder to access. This is very common in human behaviours.

DISCUSS:
- How does this connect to "situated action"?
- Do some people find part 2 easier than others? (e.g. Mechanical keyboard enthusiasts?, others?).
- What supports *present-at-hand* knowledge of the keyboard?
- Do some people find part 1 easier than others? (e.g. people who are used to typing in another language?).
- What supports this *ready-to-hand* skill with the keyboard? Why is it easier on a laptop/phone for you?
- What do these experiences tell you about how technologies should work for users.

3 Situated Action REFRESHER

A simple summary of situated action might be this: Situated action means understanding how technology use plays out in real situations. It means focusing on how people actually do things, how they adapt to tasks. It means not assuming that they will do what seems to you the most "rational" thing.

Situated action argues that we do not come to most tasks with clear and detailed plans which we execute. Instead we act, we adapt our behaviour to what we think we need to do, based on cues in the environment, we improvise our way to a solution. This "improvisation" might be quite structured: we draw on tricks and behaviours we have used before, but it will not be held in mind as a neat plan to be executed.

Situated action tells us to observe behaviour in detail: make "rich descriptions" of what people actually do, how they communicate with

each other to get the task done, when things break down, and the tactics people have for repairing these breakdowns.

Exercise 3 (in your free time, over the week)

This is one to carry around with you for the rest of the week. Watch how people use technologies in improvisatory ways. Note down any ways people appropriate technologies and deviate from the "plan" or design goals of the technology. Look at breakdowns and how people repair them, how people improvise new ways of using things when things don't work well.

A few examples – but you can look at anything.
- Water bottles are designed to hold water. In the gym look at how people use their water bottles to temporarily mark that they are using equipment.
- Look at how cashiers in shops have stuck notes and other objects which help them do their jobs around the point of sale device – things that were not intended by the designers of the POS device.
- Watch the automated checkouts in supermarkets: what kinds of breakdowns happen. What room is there for the user to improvise or find other solutions?
- Often call centres and help services are very rigid, and they follow strict plans rather than making room for situated action. If you have a bad outcome with a call centre, think about how the technologies and the rules limit the ability of the staff to improvise and find a good solution. Think who this benefits and who this disadvantages.

Make notes on all this kind of stuff and discuss it with your team at the start of next week's session.