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# Meta-Data

## Lesson Goals

* Students will understand what HCI is and where it came from.
* Students will understand the difference between HCI and similar fields like UI design, UX design, Human Factors engineering, etc.
* Students will understand that HCI involves twin disciplines: industry and research.
* Students will understand some of the basics of design thinking.

## Lesson Outcomes

* Students will be able to describe HCI as a discipline, including its research and design topics.
* Students will be able to connect HCI to related fields.

## Assessments

* Students will reflect on the role of HCI in their own lives.

## Lesson Plan

* Students will start by being introduced to the general field of human-computer interaction, including how we define people, computers, and the interactions between them.
* Students will then be introduced to HCI’s role in a broader hierarchy of disciplines, such as psychology, human factors, and UI design.
* Finally, students will be introduced to HCI as it is defined for this class: research and design.

# Script

## 1.1.1 Humans

### 1.1.1.1 Headshot Studio (Morgan)

* [C] Video of Morgan, white background
* This is Morgan.
* [Morgan] Hi!
* Morgan is a human.
* [Morgan] Last time I checked?
* [A] Icons appear around Morgan’s head representing seeing, hearing, and touch.
* As a human, Morgan has various ways of perceiving the world around her, like seeing, hearing, and feeling.
* [Morgan] <points to icons around her head> Is anyone else seeing these?
* [A] Other icons appear, representing smell, taste, balance, pressure, and [more](http://www.todayifoundout.com/index.php/2010/07/humans-have-a-lot-more-than-five-senses/).
* There are a few more as well, like smell and taste, but we won’t deal with those as much.
* [Morgan] Oh thank goodness.
* [A] Icons representing memories, experiences, skills, etc. appear.
* But Morgan has more than senses. She also memories, experiences, skills, knowledge.
* [Morgan] Aww, thank you!
* [C] Icons disappear, David via green screen walks on camera, small in the bottom right of the screen.
* In Human-Computer Interaction, we have to take into consideration every element of the human, from the way they perceive and interact with the world to their long history of using computers and technology.
* [Morgan] <looks down at David> You’re smaller than I expected.

## 1.1.2 Computers

### 1.1.2.1 Headshot Studio

* [C] David standing next to a desktop computer on a desk
* This is a computer. Or at least, this is probably what you think of when you think of the term ‘computer’.
* [C] David pulls out a laptop, or a laptop takes the desktop computer’s place.
* But this is also a computer.
* [C] David pulls out a tablet.
* And so is this.
* [C] David pulls out a phone.
* And so is this.
* [C] David points to Fitbit.
* And so is this.

### 1.1.2.2 Headshot Studio (Behind Camera)

* [C] Cut to David standing next to the camera.
* And so is this.
* [Amanda] Oh hey!
* Hey! This is Amanda, my video producer.
* <pause>
* [Amanda] Go on!
* Oh, right!

### 1.1.2.3 Tablet Studio (On Camera)

* [C] Cut to David in the tablet studio.
* And so is this.

### 1.1.2.4 GLC

* [C] Cut to David next to a meeting room with the virtual scheduler visible.
* And so is this.

### 1.1.2.5 David’s House (Car)

* [C] Cut to David in his car.
* <pointing to various features of the car> And so is this, and this, and this, and even this.

### 1.1.2.6 David’s House (Security System)

* [C] Cut to David by his security system.
* And so is this.

### 1.1.2.7 David’s House (Living Room)

* [C] Cut to David playing a video game.
* And so is this.

### 1.1.2.8 David’s House (Playroom)

* [C] Cut to David’s daughter playing with her electronic Elmo.
* And so is this.

### 1.1.2.9 David’s House (Thermostat)

* [C] Cut to David by the thermostat.
* And so is this.

### 1.1.2.A David’s House (Kitchen)

* [C] Cut to David by the microwave.
* And so is this.

### 1.1.2.B David’s House (Park)

* [C] Cut to sitting on a park bench on his phone
* <pause> <pause> <pause>
* [Amanda] Hey! David!
* One second, I’m trying to catch a Squirtle.
* <pause>
* Ok, there we go. Where were we? Oh, right.
* <motions around> And so is this.
* With mobile devices and augmented reality, HCI is, quite literally, everywhere. Pokemon Go was released a few days before I recorded this, and augmented reality games like it turn effectively the entire world into an instance of HCI.

## 1.1.3 Interaction

### 1.1.3.1 Tablet Studio

* [V] Show a human (Morgan, maybe) on the left and a computer on the right
* We have humans and we have computers, and we’re interested in the interaction between them.
* That interaction can take different forms, though.
* [V] Arrows appear between human and computer. The arrow from the human to the computer is labeled ‘input’, and the arrow from the computer to the human is labeled ‘output’.
* The most obvious seems to be: the human interacts with the computer, and the computer responds. They go back and forth interacting.
* And that’s a valid view, but it perhaps misses the more interesting part of HCI.
* [V] Arrows stretch and go through the computer to the task underneath (a document?).
* We can also think of the human interacting with the task, *through* the computer.
* Or, to put this differently, the human and computer *together* interact with a task.
* [V] The interface fades, such that the arrows now just go between the user and the task.
* Ideally in this case, we’re interested in making the interface as invisible as possible so the user can spend as little time focusing on the interface as possible, instead focusing on the task they’re trying to accomplish.
* [V] Faded interface reappears
* Realistically, our interfaces are likely to stay somewhat visible, but our goal is to let the user spend as much time as possible thinking about the task, and as little time as possible thinking about the tool.

## 1.1.4 Reflections: Interacting Through Interfaces (Exercise)

### 1.1.4.1 David’s House (Living Room)

* [C] David talking on the couch
* We’ll talk extensively about the idea of disappearing interfaces and designing with tasks in mind.
* But in all likelihood, you use computers enough to have some experience in this area as it is.
* So take a moment and reflect on some of the tasks you do each day involving computers.
* Try to think of an example where you spend most of your time thinking about the task, and an example of where you spend most of your time thinking about the tool.

### 1.1.4.2 David’s House (Living Room)

* [C] David talking on the couch
* Video games actually give us some great examples of interfaces becoming invisible
* <quick walk through of a video game’s space>
* An example of a time when the interface is more visible, however, comes from the classic problem of having too many remote controls.
* <quick walk through of the remote control example>

## 1.1.5 The HCI Space

### 1.1.5.1 Headshot Studio

* [C] David talking
* [B] Definition; Ubiquity: the state or capacity of being everywhere.
* One of the most exciting parts of HCI is its incredible **uniquity**.
* Computers are all around us, and we interact with them every day.
* It’s exciting to think about designing the types of tools and interfaces we spend so much time dealing with.
* But there’s a danger there, too.
* Because we’re all humans interacting with computers, we think we’re experts at human-computer interaction.
* But that’s not the case.
* We might be experts at interacting with computers, but that doesn’t make us experts at designing interactions between other humans and computers.
* We’re like professional athletes or world-class scientists: just because we’re experts, doesn’t mean we know how to help other people become experts.
* [A] Visual of small dot in small circle appears
* In my experience, many people look at HCI like this. The red dot represents what they know, and the black circle represents what they think there is to know.
* They know there’s probably some things they don’t know yet, but they’re pretty good at it, and it wouldn’t be hard to become an expert.
* [A] Visual of larger dot in much larger circle.
* After studying HCI for a bit, though, they look more like this.
* You can see that they’ve increased what they know, but their perception of what there is to know has grown even more.
* That’s the journey we’ll be taking together.
* You’ll learn how to do work in HCI, but perhaps more importantly, you’ll learn how complex and large the field of HCI is.
* Your knowledge will increase, but yet you might exit the class less confident in your HCI ability than when you started.
* You’re taking the first step into a larger world.

## 1.1.6 HCI in the Big Picture

### 1.1.6.1 Tablet Studio

* [V] HCI in big letters
* Now, what we’ve described so far is a huge field, far too big to cover in one class.
* [V] Logos of HCI programs
* In fact, there are lots of places where you can get entire Master’s degrees or PhDs in human-computer interaction.
* [V] Logos disappear
* So let’s look more closely at what we’re interested in for the purposes of the next few months.
* [V] A hierarchy appears around ‘HCI’. At the top are ‘Engineering’ and ‘Psychology’ pointing together at ‘Human Factors Engineering’, although initially ‘Engineering’ and ‘Psychology’ are off-screen. Under ‘Human Factors Engineering’ are three things: ‘Human-Computer Interaction’, ‘Industrial Design’, and ‘Product Design’. There can be other arrows coming out of ‘Human Factors Engineering’ going off screen to show there are more things under it. Then, underneath HCI are ‘User Interface Design’, ‘User Experience Design’, ‘Interaction Design’, and other arrows pointing off screen to indicate more.
* To do that, let’s look at where HCI sits in a broader hierarchy.
* [V] Highlight Human Factors Engineering
* We can think of HCI as a subset of the broader field of human factors engineering.
* Human factors engineering is interested in a lot of the same ideas as we are, but not just in computers.
* [V] Highlight bubbles below HCI.
* Then, there are also sub-disciplines within HCI. This is just one way to represent this -- some people might put UI design under UX design, some might elevate UX design to HCI’s level, etc.
* But generally, these use many of the same methods and principles that we’ll talk about in HCI, but they also have their own more specific principles and methods.
* So to get a feel for what we’re talking about when we discuss HCI, let’s compare it to these other areas a bit.

## 1.1.7 HCI vs. Human Factors

### 1.1.7.1 Headshot Studio

* [C] David talking
* First, let’s start by comparing HCI to the broader field of human factors.
* Human factors is interest in designing the interactions between people and products, systems, or devices.
* That should sound familiar: we’re interested in the designing the interactions between people and computers, but computers are themselves products or systems.
* But human factors is interested in the non-computing parts of this as well.
* Let’s take an example.

### 1.1.7.2 David’s House (Car)

* [C] David sitting in the driver seat, filmed from outside, door open
* I drive a pretty new, electric car, which means there are tons of computers all over it.
* From an HCI perspective, I might be interested in visualizing the data on the dashboard or helping the driver control the radio.
* Human factors is interested not only in how I interact with the computerized parts of the car, but the non-computerized parts as well.
* It’s interested in things like the height of the steering wheel, the size of the mirrors, the positions of the chair.
* It’s interested in designing the entire environment, not just the electronic elements.
* But that means it’s interested in a lot of the human characteristics that we care about, like how people perceive the world and their own expectations about it.
* So, many of the principles we’ll discuss in this class come from human factors engineering, applied more narrowly to computerized systems.
* But the exciting thing is that as computers become more and more ubiquitous, the number of application areas for HCI are growing.
* 20 years ago, a car would not have been an application of HCI.
* 10 years ago, a wristwatch would have been more about industrial design than HCI.
* And within only the last couple years, things like shower heads and refrigerators have started to become truly computerized devices.
* As computers integrate themselves into more and more of our devices, the gap between human-computer interaction and human factors engineering is shrinking.

### 1.1.7.3 At a Tesla

* [C] David by an open Tesla
* Don’t believe me? Check out the inside of Tesla’s Model S.
* [C] A shot of the interior, with two massive screens
* When you look at the console of a Tesla, almost everything you see is a giant computer
* Cars have become computers on wheels, watches have become computers on wristbands, car keys have become computers on keychains.
* Computers are everywhere, and so HCI is everywhere.

## 1.1.8 HCI vs. User Interface Design

### 1.1.8.1 Tablet Studio

* For many years, human-computer interaction was largely about user interface design.
* [V] Pictures of the original light pen and computer mouse (Google image search for these)
* The earliest innovations in HCI were the creation of things like the light pen computer mouse, which allowed for flexible interaction with things on screen.
* But the focus, then, was squarely on the screen.
* [V] Picture of examples of user interfaces, preferably with nice grids -- maybe a Wall Street Journal screenshot and a Windows 10 Metro view screenshot.
* And so, we developed many principles about how to design things nicely for a screen.
* We borrowed from the magazine and print industry and identified the value of grids in displaying content and guiding the user’s eyes.
* [V] Comparison of Mac and PC toolbars -- screenshots of the same program on both OSs to show how the toolbar differs.
* We developed laws that governed how difficult it is for a user to select what they want on a screen.
* [V] Side-by-side views of the LucyLabs web site on a desktop and on a phone.
* We developed techniques for helping interfaces adapt to different screen sizes.
* [V] Example of a wireframe developed in any wireframing tool (including PowerPoint).
* And we developed methods for rapidly prototyping user interfaces.
* [V] Visual of hierarchy from 1.1.6, with UI Design highlighted
* In the process, UI design became its own well-defined discipline.
* The concepts we’ll cover in HCI can be applied to UI design as well, but in HCI we’re interested in things that go beyond a user’s interaction with a single screen in front of them.

## 1.1.9 HCI vs. User Experience Design

### 1.1.9.1 Tablet Studio

* [V] Visual of hierarchy from 1.1.6
* The relationship between HCI and UX design is a bit closer, and in fact if you ask a dozen people working in the field, you’ll likely get a dozen different answers.
* [V] Shift to visual comparing HCI and UX -- side-by-side headings
* For the purposes of our conversations, though, we can think about the difference in this way.
* [V] ‘Understanding’ comes up under HCI.
* HCI is largely about understanding the interactions between humans and computers.
* [V] ‘Dictating’ comes up under UX.
* UX design is largely about designing, or dictating, those interactions.
* In order to design user experiences well, you need to be able to understand the user, and that’s why I consider UX design a sub-field of HCI.
* [V] Visual of hierarchy from 1.1.6, highlighting UX Design
* In our work on HCI, we’ll use the principles and methods from HCI to to inform how we design user experiences.
* It’s important to note, though, that this relationship is deeply symbiotic.
* We use what we understand about humans to design user experiences, then we use the results of these user experiences to examine whether our understanding was correct.
* This is something called design based research, using the results of our designs to conduct research.
* [V] Feedback cycle diagram from 1.1.3
* This is also related to feedback cycles, which we’ll talk about a lot in this course, both within the user and within us as designers.

## 1.1.10 HCI vs. Psychology

### 1.1.10.1 Tablet Studio

* [V] Hierarchy from 1.1.6
* The research side of HCI connects to the relationship between HCI and psychology.
* [V] Zoom out to show the top level, Engineering and Psychology pointing to Human Factors Engineering
* If we zoom out further on this loose hierarchy of disciplines, we might say that human factors engineering itself is in many ways the merger of engineering and psychology, as well as other fields like design and cognitive science.
* In HCI, the engineering side takes the form of software engineering, but this connection to psychology remains.
* In fact, it’s symbiotic. We use our understanding of psychology, of human perception, of cognition to inform the way we design interfaces.
* We then use our experiences with those interfaces to reflect on our understanding of psychology.
* [T] Paper by Mander, Salomon, and Wong
* [For example](https://dl.acm.org/citation.cfm?id=143055&dl=ACM&coll=DL), in 1992 psychologists at Apple wanted to study how people organize the rapid flow of information in their workspaces.
* [T] Screenshot of [Figures 4 and 5](http://monet.cs.columbia.edu/courses/csw4170/resources/p627-mander.pdf).
* They observed that people tended to form piles of related material, like a less formal filing system.
* They then designed a computer interface that would mimic that ability.
* [T] Screenshot of Figure 6.
* Finally, they used the results of that development to reflect on how people were managing their workspaces in the first place.
* [V] Hierarchy from 1.1.6
* In the end, they had a better understanding of the thought processes, as well as an interface that helped the users.

## 1.1.11 HCI: Research and Design

### 1.1.11.1 Tablet Studio

* [V] ‘HCI’ header in the top middle
* So now that we’ve talked at length about what HCI isn’t, let’s talk about what HCI is.
* [V] ‘Research’ appears on the left
* On the one hand, HCI is about research.
* [V] Example methods appear: needfinding, prototyping, evaluation
* Many of the methods we’ll discuss are about researching the user, understanding their needs, and evaluating designs for them.
* [V] ‘Design’ appears on the right
* On the other hand, HCI is about design.
* [V] Example design principles appear: distributed cognition, mental models, universal design
* HCI is about creating interactions to help humans interact with computers, oftentimes using some known principles for good interaction.
* [V] Examples disappear.
* But these aren’t isolated sides.
* [V] Arrow from research to design appears, stylized similarly to the feedback cycle from 1.1.3
* The results of our user research inform the designs we construct.
* [V] Arrow from design to research appears
* And the results of our designs inform our ongoing research.
* [V] Feedback cycle from 1.1.3 appears below
* What is particularly interesting here is that the same feedback cycle we want to design for our users, we experience for ourselves.
* We’ll talk at length about how users will execute actions and evaluate the results.
* That’s precisely what we’re doing as well, though: executing designs, and evaluating the results.

## 1.1.12 Welcome to HCI!

### 1.1.12.1 Headshot Studio

* [C] David talking
* [A] Clips of the lesson playing
* So, now you know what we’re going to cover in our exploration of HCI.
* [B] Topic; HCI Principles
* We’re going to talk about some of the **fundamental design** principles that HCI researchers have discovered over the years.
* [B] Topic; HCI Research Methods
* We’re going to talk about **performing user research**, whether it be for designing new interfaces or exploring human cognition.
* [B] Topic; Design <-> Research
* We’re going to talk about the **relationship between** these two, how our research informs what we design and how what we design helps us conduct research.
* [B] Topic; HCI Applications
* And we’re going to talk about how these principles work in lots of **domains**, from technologies like augmented reality to disciplines like healthcare.
* I hope you’re excited. I know I am.
* [B] Amanda?; So meta.
* I like to think this isn’t just a course about human-computer interaction, but it’s also an example of human-computer interaction: humans using computers in new and engaging ways to teach about human-computer **interaction**.
* We hope this course exemplifies the principles as well as it teaches them.