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# Meta-Data

## Lesson Goals

* Students will understand the value of brainstorming multiple design alternatives.
* Students will understand the strengths and weaknesses of individual and group brainstorming.
* Students will understand methods for brainstorming design alternatives.
* Students will understand rapid ways of exploring design alternatives from the perspectives of personas, timelines, and scenarios.

## Lesson Outcomes

* Students will be able to perform individual brainstorming exercises.
* Students will be able to conduct and participate in group brainstorming activities.
* Students will be able to mentally simulate design alternatives according to personas, scenarios, and user models.

## Assessments

* Students will reflect on the application of the lesson’s concepts to their chosen area of HCI.
* Students will engage in a short design task based on the lesson’s concepts.
* Students will complete a short answer assignment in which they critique a provided interface from the perspective of the lesson’s concepts.
* Students will complete a short answer assignment in which they select an interface to critique from the perspective of the lesson’s concepts.
* Students will complete a short answer assignment in which they design a revision of one of the critiqued interfaces from the perspective of the lesson’s concepts.

## Lesson Plan

* Students will initially be introduced to the value of brainstorming multiple design alternatives rather than fixating too early on one.
* Students will then be introduced to methods of individual and group brainstorming for design alternatives, and the strengths and weaknesses of each.
* Students will then be given methods for early simulation and evaluation of those design alternatives based around personas, scenarios, and user models.

# Script

## 3.4.1 Introduction

### 3.4.1.1 Headshot Studio

* [C] David talking
* [A] Clips of the lesson
* [B] Topic; Design alternatives
* When we’ve spent a lot of time finding the needs of the user, it’s time to move on to the second phase of the design life cycle: **design** alternatives.
* This is when we start to brainstorm how to accomplish the tasks we’ve been investigating.
* The problem here is that design is very hard.
* It’s hard for a number of reasons.
* The number of choices we have to make and things we have to control is more expansive than ever before.
* Are we designing for desktops? Laptops? Tablets? Smartphones? Smartwatches?
* Augmented reality? Virtual reality? 2D? 3D?
* Gesture input? Pen input? Keyboard and mouse input? Voice input?
* [B] Topic; Generating ideas
* In this lesson, we’re going to talk about how to **generate** ideas for designs.
* [B] Topic; Exploring ideas
* Then, we’ll chat about how to **explore** those ideas a bit to figure out what to pursue.

## 3.4.2 The Second Biggest Mistake

### 3.4.2.1 Tablet Studio

* [V] The design life cycle
* The biggest mistake a designer can make is jumping to designing an interface without understanding the users or the task.
* The second biggest mistake, however, is settling on a single design idea or genre too early.
* This can take on multiple forms.
* [V] Visual of thermostats over the years
* One form is staying too allegiant to existing designers or products.
* Take the thermostat for example: if you settled on tweaking the existing design of a thermostat, you would never invent the Nest.
* So if you’re working on improving an existing interface, try to distance yourself from the past solutions, at least initially during brainstorming.
* But this is a problem if you’re designing interfaces for new tasks as well.
* [A] Visual of the audiobook problem, a still from one of the videos
* Imagine, for instance, that while you were observing people exercising, you started sketching interface ideas, like how to make the buttons big enough or what buttons need to be featured prominently.
* In doing so, you’re getting tunnel vision and missing out on any design alternatives that might involve voice or gesture control.
* So, the biggest mistake you can make is focusing too strongly on one alternative from the very beginning.

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

* [C] David talking
* The reason why this is such a common mistake is that there’s a natural tendency to think it’s a waste of time to develop interfaces you’re not going to use.
* You think you can get the work done faster by picking one early and sticking to it.
* But fleshing out ideas for an interface you don’t end up using is not a waste of time because by doing so, you continue to learn more about the problem.
* The experience of exploring those ideas that you leave behind will make you a better designer for the ideas you pursue.
* In all likelihood, your ultimate design will be some combination of the design alternatives you explored.
* Take my security system for example.
* There are two ways of using it: the keypad and my keychain.
* Two different designs that in this instance, integrate just fine.
* Different alternatives won’t always integrate side by side this easily, but the design process as a whole is an iterative process of brainstorming, combining, abandoning, revising, and improving your ideas.
* That requires starting with several ideas in the first place.

## 3.4.3 The Design Space

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

* [C] David talking
* When we talk about the problem we’re solving here, we defined the problem space here as disabling a security system as we enter a home.
* Our problem was designed as far as possible away from the current interface for doing it.
* [B] Definition; Design Space: the area in which we design our interfaces
* The design space, in turn, is the area in which we might design our solutions.
* The current design space for this problem is wall-mounted devices and portable devices, like my keychain.
* As we design, though, the space of possible ideas might expand.
* For example, we might be interested in voice interfaces, interfaces that use our mobile phones, or wearable devices.
* Our goal during the design alternative phase is to explore the possible design space.
* We don’t want to narrow in right now on sticking to devices on the wall or devices on keychains, we want to brainstorm lots of possible approaches and grow a large space of possible designs.

## 3.4.4 Individual Brainstorming 1

### 3.4.4.1 Headshot Studio

* [C] David talking
* When you first start brainstorming, your goal is to generate a lot of ideas.
* These ideas can be very short, very high-level, and very general.
* Your goal is just to generate an expanse of them.
* They don’t even have to be ideas for interfaces: just any idea for solving the problem.
* If you look online, you’ll find numerous great guides to how to brainstorm ideas.
* One of the most interesting takeaways is that research generally indicates that it’s better to start with individual brainstorming.
* That’s non-intuitive, though -- so often we hold meetings for brainstorming, but it should start individually.
* That’s because brainstorming is most effective when it initially just generates a *lot* of ideas.
* Groups tend to coalesce around ideas, though.
* [B] Davidface; Brainstorm individually before brainstorming as a group
* So, start out **individually**.
* Generate a *lot* of ideas. Each idea needs only be a few words or a sentence.
* Don’t worry right now if they’re good or bad. Write down everything.
* Think about how you’d design with different types of interactions, like gestures, voice, or touch.
* Think about how you’d design for different interfaces, like smartwatches, tablets, augmented reality.
* Think about how you’d design for different audiences, novices and experts, kids and adults.
* Get silly with it, some of the best ideas start as silly ideas.
* How would you design this for your dog, for your cat?
* How would you design this for someone with three arms? With one arm?
* Go nuts.
* Your goal is to generate a lot of ideas.
* These are going to get loaded into your mind and they’ll crop up in interesting ways throughout the rest of the design process.
* That’s why it’s important to generate a lot: you never know what will come up.

## 3.4.5 Individual Brainstorming 2

### 3.4.5.1 Headshot Studio (At Desk)

* [C] David sitting behind a desk
* So, I’m going to demonstrate this for you real quick.
* I’m going to brainstorm ideas for our problem of allowing exercisers to consume books and take notes.
* <hold up paper>
* So, I have my paper for brainstorming.
* Now, please enjoy this 30 minute video of me sitting here writing at my desk.
* [A] Yakkety sax plays, fast-motion of David brainstorming. Starts out simple, but gets silly.
* So, here’s my list of ideas.
* As you can tell, it’s kind of crazy.
* Some of the ideas are pretty straightforward.
* Voice commands, gestures, text transcription.
* Some are crazier. On-skin interfaces. Augmented reality like Google Glass. Portable keyboards.
* Notice that this is a mess -- that’s a good thing.
* Lists are fine, but chances are a lot of your ideas are related to each other.
* Notice also that I never crumpled up my paper, never crossed anything out, nothing like that -- nothing is wrong at this stage.

## 3.4.6 5 Tips: Individual Brainstorming

### 3.4.6.1 Headshot Studio

* [C] David talking
* [B] Tips blooping
* Here are five quick tips for effective individual brainstorming.
* **1. Write down the core problem.** Keep this visible. You want to let your mind enter a divergent thinking mode, but you also want to remain grounded in the problem. Writing down the problem and keeping it available will help you remain focused while remaining creative.
* **2. Constrain yourself.** Decide that you want at least one idea in a number of different categories. Personally, I try to make sure to have at least three ideas that use non-traditional interaction methods, like touch and voice. You can constrain yourself in strange ways, too: force yourself to think of solutions that are too expensive or not physically possible. The act of thinking in these directions will help you out later.
* **3. Aim for 20.** Don’t stop until you have 20 ideas. These ideas don’t have to be very well-formed or complex, they can be simple one-sentence descriptions of designs you might pursue. This forces you to think through the problem rather than getting tunnel vision on an early idea.
* **4. Take a break.** You don’t need to come up with all of these at once. In fact, you’ll probably find it’s easier if you leave and come back. I’m not talking just 10-minute breaks, either. Stop brainstorming and decide to continue a couple days later, but be ready to write down new ideas that come to you.
* **5. Divide and conquer**. If you’re dealing with a big problem like helping kids live more healthy lifestyles, divide it into smaller problems and brainstorm solutions for those. If we’re designing audiobooks for exercisers, we might divide things into smaller tasks like the ability to take and review notes or the ability to control playback hands-free.

## 3.4.7 Challenges in Group Brainstorming

### 3.4.7.1 Headshot Studio

* [C] David talking
* Group brainstorming presents some significant issues.
* Thompson in 2008 laid out four behaviors in group brainstorming that can block progress.
* [B] Definition; Social Loafing: A The tendency to exert less effort working in groups than working alone.
* The first is **social** loafing: people often don’t work as hard in groups. It’s easy to feel like the responsibility for unproductive brainstorming is shared and deflected. In individual brainstorming, it’s clearly on the individual.
* [B] Definition; Conformity: The tendency to agree with or follow the group’s reasoning and ideas.
* The second is **conformity**: people in groups tend to want to agree. Studies have shown that group brainstorming leads to convergent thinking. The conversation the group has tends to force the participants down the same line of thinking, generating fewer and less varied ideas than the individuals acting alone. During brainstorming, though, the goal is divergent thinking: lots of ideas, of creativity.
* [B] Definition; Production Blocking: The tendency of some individuals in discussions to block other individuals’ participation.
* The third is **production** blocking: in group brainstorming, there are often individuals who dominate the conversation and make it difficult for others to actually be heard. Their ideas can thus command more weight not because of the strength of the ideas, but because of the volume of the description.
* [B] Definition; Performance Matching: The tendency to match one’s level of performance to other collaborators’.
* The fourth is **performance** matching: people tend to converge in terms of passion and performance, which can lead to a loss of momentum over time. That might be able to get people excited if they’re around other excited people, but more often it saps the energy of those that enter with enthusiasm.
* In addition to these four challenges, I would add a fifth.
* [B] Definition; Power dynamics: The tendency to defer to more senior individuals, or to overpower less senior individuals.
* Group brainstorming may also be prone to **power** dynamics or biases.
* No matter how supportive and collaborative a boss might be, there likely always exists a tacit pressure to agree with her suggestions, which dampens creative brainstorming.
* There also exists considerable literature stating that other biases based on gender, age, or race can play into these group sessions as well.
* Note that this doesn’t mean group brainstorming should be avoided altogether.
* What it means, though, is that we should enter into group brainstorming with strong ideas of how to address these issues, ideally after a phase of individual brainstorming has occurred.

## 3.4.8 Rules for Group Brainstorming

### 3.4.8.1 Headshot Studio

* To have an effective group brainstorming session, we need to have some rules to govern individuals’ behavior to address common challenges.
* In 1957, Osborn outlined four rules.
* [B] Visualizing terms
* 1. **Expressiveness**. Any idea that comes to mind, share it out loud, no matter how strange.
* 2. **Nonevaluation**. No criticizing ideas. No evaluating ideas yet.
* 3. **Quantity**. Brainstorm as many as possible. The more you have, the greater your chance of finding a novel one.
* 4. **Building**. While you shouldn’t criticize others’ ideas, you should absolutely try to build on them.
* Then, in 1996, Oxley, Dzindolet, and Paulus presented four additional rules.
* 1. **Stay** focused. Keep the goal in mind at all times.
* 2. **No** explaining ideas. Say the idea and move on. No justifying ideas.
* 3. **When** you hit a roadblock, revisit the problem. Say it again outloud.
* 4. **Encourage** others. If someone isn’t speaking up, encourage them to do so.
* Note that all eight of these rules prescribe what individuals should do, but they’re only effective if every individual does them. So, it’s good to cover these rules, post them publicly, and call one another on breaking from them.

## 3.4.9 5 Tips: Group Brainstorming

### 3.4.9.1 Headshot Studio

* [C] David talking
* [B] Tips blooping
* The rules given by Osborn, Oxley Dzindolet, and Paulus are helping individuals understand how to act in group brainstorming.
* Here are a few additional tips, though, that apply less to the individual participants and more to the design of the activity as a whole.
* 1. **Go** through every individual idea. Have participants perform individual brainstorming ahead of time and bring ideas to the group brainstorming session, and explicitly make sure to go through each one. That will help avoid converging around an idea too early.
* 2. **Find** the optimal size. Social loafing occurs when there’s a lack of individual responsibility. When you have so many people that not everyone would get to talk anyway, it’s easy for disengagement to occur. I’d say a group brainstorming session should generally not involve more than five people. If more people need to give perspectives than that, then you can have intermediate groups that then send ideas along to the larger group.
* 3. **Set** clear rules for communication. Get a 20 second hour glass or timer, and when someone starts talking, start it -- once the timer is up, someone else gets to speak. The goal is to ensure no one can block others’ ideas, whether intentionally or accidentally.
* 4. **Set** clear expectations. Enthusiasm starts to wane when people are unsure how long a session will go or what will mark its end. You might set the session to go a certain amount of time, or dictate a certain number of ideas get generated: no matter how you do it, make sure people can assess where in the brainstorming session they are.
* 5. **End** with ideas, not decisions. It’s tempting to want to leave a brainstorming session with a single idea on which to move forward. That’s not the goal, though. Your brainstorming session should end with several ideas. Then, let them ruminate in everyone’s minds before coming back and choosing the ideas to pursue.

## 3.4.10 Fleshing Out Ideas

### 3.4.10.1 Headshot Studio

* [C] David talking
* The brainstorming process should lead you to a list of a bunch of high-level, general design alternatives.
* These are likely just a few words or a sentence each, but they describe some very general idea of how you might design an interface to accomplish this task.
* Your next step is to try to flesh these ideas out into three or four ideas that are worth taking to the prototyping stage.
* Some of the ideas you’ll dismiss pretty quickly: that’s alright. You can’t generate good ideas without generating a lot even though you won’t end up using all of them.
* In other places, you might explore an idea a little before dismissing it, or combine a couple ideas into one new idea.
* In the rest of this lesson, we’ll give you some thought experiments you can use to evaluate these ideas and decide what to keep, what to combine, and what to dismiss.

## 3.4.11 Personas

### 3.4.11.1 Tablet Studio

* [V] An empty box
* The first common method we can use to flesh out design alternatives is called personas.
* With personas, we create actual characters surrounding our users.
* So, let’s create a persona for the problem of helping exercisers take notes while reading books.
* Let’s first give her a face.
* [V] Face appears in the top left
* And a name
* [V] Name appears
* And some details.
* [V] Some details appear
* We want to put in anything that might be relevant at all.
* Why does this person exercise?
* When does this person exercise?
* What kinds of books do they like?
* How are they feeling when they’re exercising?
* Where do they usually exercise?
* [V] Four more personas appear, like cards overlapping
* We want to create at least three or four of these personas, and perhaps more depending on how many different stakeholders we have for our problem.
* The important thing is that these should be pretty different people, representing different components of the personas.
* Then, using these personas, we revisit our design alternatives.
* [V] Personas on one side, my list of design alternatives on the other
* How would our fake Janet feel about this kind of design alternative?
* Using this, we can start to explore the space and find the options that have the most appeal.

## 3.4.12 User Profiles

### 3.4.12 Tablet Studio

* [V] Personas
* Personas are meant to give us a small number of characters we can reason about empathetically.
* However, it can sometimes also be useful to formulaically generate a larger number of user profiles to explore the full design space.
* We can do this by defining a number of different variables about our user, and the possibilities within each.
* [V] Visual built out
* Here are a few examples:
* We care about novice and expert exercisers.
* We care about serious and casual readers.
* We care about high and low motivation users.
* We care about tech literate and tech illiterate individuals.
* We care about users that use the interface rarely and often.
* For each of these sets, there are design implications.
* For example, for users that are going to use our tool often, we care about it being efficient to use.
* For users that use it more rarely, we care about it being easy to remember.
* In deciding what to design, we need to understand what groups, what profiles we’re designing for, and use that to inform our design decisions.

## 3.4.13 Timelines

### 3.4.13.1 Tablet Studio

* [V] Personas thumbnail
* Building on the idea of personas, we can develop these up into timelines.
* I’ve also heard these called journey maps, although journey maps usually cover much longer periods of time.
* The goal is to take that persona and stretch it out over the timeline of the task in which we’re interested.
* [V] Timeline appears
* What prompts this persona to start engaging in the task?
* What actions lead up to starting the task?
* How are they feeling at every stage of the task?
* How would each design alternative impact their experience in the task?
* Exploring the different alternatives in this way allows us to start to gauge which designs might have the greatest potential to positively impact the user’s experience.

## 3.4.14 Scenarios and Storyboards

### 3.4.14.1 Tablet Studio

* [V] Timeline from previous video
* We can create general timelines for routine interaction with our interfaces, but it’s often also more interesting to examine the specific scenarios users will encounter while using them.
* Rather than outlining the whole course of the interaction, scenarios let us discuss the specific kinds of interactions and events we want to handle.
* These are sometimes also referred to as storyboards: sequences of diagrams or drawings that outline what happens in a particular scenario.
* Here’s one way we might visualize this.
* [V] Visual starts to be built of a scenario
* Morgan is out jogging when a fire engine goes by.
* It’s so loud that she misses about 30 seconds of the book.
* How does she recover from this?
* For a touch interface, she would need to stop, pull out her phone, turn on her screen, and pause the books.
* For a voice interface, she would have to wait for the fire engine to finish passing, then rewind.
* After all, the sound from it would dampen the microphone’s ability to hear her.
* For a gestural interface, she could simply make the gesture that would allow her to pause the book, then play again when the fire engine finishes passing.
* Ideally, we’d like to outline several such scenarios and explore them for various personas and design alternatives.
* Of course, now we’re reaching three degrees of freedom, so it’s not critical that we explore every combination of persona, scenario, and design alternative.
* This is more of a fluid process of exploring what ideas have potential and are worth exploring further.
* We might find there are certain combinations of scenarios and personas that we really care about that completely rule out some design alternatives.
* For example, if our needfinding revealed that a significant number of exercisers carry weights or other things in their hands, our gestural interfaces suddenly are significantly less promising.

## 3.4.15 User Modeling

### 3.4.15.1 Tablet Studio

* [V] Visuals from the Task Analysis lesson
* In our unit on Principles, we talk about task analysis, including cognitive task analysis and GOMS.
* Performing those analyses as part of our needfinding also gives us a nice tool for exploring our design alternatives.
* Using this, we can start to look at how exactly the goals, operators, and methods of a GOMS model map up to the ideas of our design alternatives.
* How does the user achieve each of their goals in each interface? How relatively easy are they between different design alternatives?
* With the results of our cognitive task analyses, we can start to ask some deeper questions about what the user is keeping in mind as well.
* Given what we know about the things competing for our users’ attention, what are the likelihoods that each interface will work?
* In some ways, this is a similar process to using the personas we outlined earlier, but with a subtle difference.
* Personas are personal and meant to give us an empathetic view of the user experience.
* User models are more objective and meant to give us a measurable and comparable view of the user experience.

## 3.4.16 Exercise: Design Alternatives Pros and Cons

### 3.4.16.1 Tablet Studio

* [V] Exercise
* In this lesson, we’ve covered several different ways of developing design alternatives.
* Each method has its advantages and disadvantages.
* Let’s start to wrap the lesson up by exploring this with an exercise.
* Here are the methods we’ve covered, and here are some potential pros and cons.
* For each row, mark the column to which that pro or con applies.
* Note that these might be somewhat relative, so your answer may differ from ours.

### 3.4.16.2 Exercise

* [E] Exercise: columns featuring ‘Personas’, ‘Scenarios’, ‘User Profiles’, ‘Timelines’, ‘User Modeling’
* [E] Row: “Includes the task context.”
* [E] Row: “Captures formal user information.”
* [E] Row: “Captures informal user information.”
* [E] Row: “Examines the user’s participation over time.”
* [E] Row: “Maps to the interface requirements.”
* [E] Row: “Examines technical constraints of the designs.”

### 3.4.16.3 Tablet Studio

* [V] Exercise
* <run through answers>

## 3.4.17 Exploring Ideas

### 3.4.17.1 Headshot Studio

* [C] David talking, sitting at the desk
* <David holds up sheet.>
* So, let’s apply these techniques to some of the ideas that I came up with.
* The first thing I might do is go ahead and rule out the ideas that are technologically unfeasible.
* Coming up with those wasn’t a waste of time because they’re all part of a broader free-flow brainstorming process.
* Skin-based interfaces and augmented reality, however, probably aren’t on the table for the immediate future.
* I might also rule out the options that are unfeasible for more practical reasons.
* We might be a small team of only app developers, so a wearable device isn’t in our expertise.
* Then I’d create some timelines covering the sequence of events in exercising.
* <David creates some timelines>
* I’m noticing that the users I observed and talked with valued efficiency in getting started.
* They don’t want to have to walk through some complex setup process every time.
* I’m also going to use my user personas to explore the cognitive load of the users.
* They have a lot going on between monitoring their exercise progress, observing their environment, and listening to the book, so I’m going to want to keep cognitive load low.
* Granted, we always want to keep cognitive load pretty low, but in this case the competing tasks are significant enough that I might want to sacrifice features for simplicity.
* Based on these timelines and these personas, I have three design alternatives I’m planning to explore.
* One is a traditional touch interface. A smartphone app. That unfortunately means that the user is going to have to pull out their phone whenever they want to take a note, but if I can design it well enough that might not be an issue.
* I know that this approach gets me a lot of flexibility as well, so it’s good to at least explore it.
* A second approach is a gestural interface. I know that people aren’t usually holding their device while exercising, so it would be great for them to have some way of interacting without pulling out their screen.
* Gestures might let us do that. I know gesture recognition is in its infancy, but we might be able to leverage smartwatch technology or something like a Fitbit to support interaction via gestures.
* A third approach is a voice interface. I know people generally aren’t communicating verbally while exercising, so why not a voice interface. That could even double as the note-taking interface.
* So, now that I have the three alternatives I’m interested in exploring, I would move on to the prototyping stage: building some version of these to test with real users.

## 3.4.18 Design Challenge: Design Alternatives and MOOC Recording

### 3.4.18.1 Headshot Studio (Behind Camera)

* [C] David talking
* <<to be scripted>>

## 3.4.19 Exploring HCI: Design Alternatives

### 3.4.19.1 Headshot Studio

* [C] David talking
* Design alternatives are where you explore different ways to facilitate the user’s task.
* If you’ve already chosen to focus on a certain area of technology, like wearable devices or gestural interaction, then in some ways you’ve put the cart before the horse.
* You’ve chosen your design without exploring the problem.
* As a learning experience, though, that’s fine. It’s fine to say, “I want to explore augmented reality, and I’m going to find a task that lets me do that.”
* You’re still exploring whether augmented reality is the right solution, you’re just altering the task if not instead of altering the design if not.
* For other domains, you might need to make sure to create personas for different stakeholders.
* In healthcare, for instance, you would want to make sure any interface you design takes into consideration nurses, doctors, patients, managers, family members, and more.
* So, you’d want to create personas for all those people as well, and make sure to explore scenarios that affect the different stakeholders.

## 3.4.20 Conclusion

### 3.4.20.1 Headshot Studio

* [C] David talking
* [A] Clips from the lesson
* [B] Topic; Generate ideas
* [B] Topic; Synthesize ideas
* The goal of the design alternative stage of the design life cycle is to **generate** lots of ideas, and then **synthesize** those ideas into a handful worth exploring further.
* [B] Topic; Brainstorming heuristics
* So, we started with some **heuristics** for generating lots and lots of ideas, through both individual and group brainstorming.
* [B] Topic; Exploring ideas
* Then we proposed some methods for **exploring** those ideas and deciding which ones to pursue.
* These were all thought experiments: we haven’t actually gotten to the point of designing any of these interfaces yet.
* That’s the next stage.
* At the end of the design alternatives stage, we want to carry a handful of designs that we think have potential forward to actual prototyping to get user feedback.