

IIT Madras

ONLINE DEGREE

Modern Application Development – I
Professor Nitin Chandrachoodan
Department of Electrical Engineering
Indian Institute of Technology, Madras
Usability Heuristics

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Guidelines / Heuristics

Jakob Nielsen's heuristics for design

<https://www.nngroup.com/articles/ten-usability-heuristics/>

- Not specific to web apps, or even software UI design
- Very useful and relevant



Hello, everyone, and welcome to this course on Modern Application Development. Now, user interface design, as I told you is something that has been studied extensively over the years. And one good set of heuristics, so to say, is what we have over here, Jakob Nielsen. He is a person who has been doing research on user interfaces, not just in the context of web applications, generally in computer user interfaces, yes.

But, the first set of sort of usability guidelines or heuristics that he had put out, were in 1994, when the web did not really exist in any big form. So, clearly, this is something that he had been working on well before many of these concepts came into place. Now, this website over here, the ten usability heuristics is something that pretty much has the information from 1994, but has again been updated over the years. Especially with, some kind of context for modern day. And it is worth sort of going into that in a little bit more detail.

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The screenshot displays the Nielsen Norman Group (NN/g) website. The main article, '10 Usability Heuristics for User Interface Design' by Jakob Nielsen, is the central focus. The article's summary states: 'Summary: Jakob Nielsen's 10 general principles for interaction design. They are called "heuristics" because they are broad rules of thumb and not specific usability guidelines.' The article is dated April 24, 1996, and updated on November 15, 2020. A sidebar on the left lists various topics such as Agile, Design Process, and Usability. A right sidebar includes social media sharing options and an 'About the Author' section for Jakob Nielsen. A video inset in the bottom right corner shows a presenter, likely the instructor, discussing the content. A large, semi-transparent watermark for 'INDIAN INSTITUTE OF TECHNOLOGY MADRAS' is overlaid on the image.

So, what I am going to do over here, rather than putting up the slides is to just sort of run you through the page itself, which talks about the usability heuristics. And some, why some of those ideas are good? And one of them, for example, is the very first one is the visibility of the system status. What do we mean by that? You need to communicate as the author of an application, you need to be able to communicate with the users, what this system is doing?

So, for example, even something like this, as you can see over here, there is a cursor over here that is moving around when I move the mouse, over the screen. Now, that cursor is giving me immediate feedback about what will, about where exactly, the computer now expects me to interact with it. And it also tells me something about what will happen if I do go ahead and click.

So, for example, when it is an arrow, it indicates that nothing much is going to happen, if I do go ahead and click on the screen.

But, if it changes to this hand icon, for example, up here, it sort of tells me that this is a hyperlink. And if I click on it, there is a chance that now, something else will happen. So, that is an example of a system status. Similarly, on a map, which is let us say pasted on a wall somewhere or in a mall, you might find that there is a you are here, which basically tells you, this is the system status. It has nothing to do with computers again. But it is useful information to the person who is trying to use that map.

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The screenshot shows a presentation slide titled "#2: Match between system and the real world". The slide content includes:

- Recent Articles:** Journey Mapping 101, Why You Only Need to Test with 5 Users, 10 Usability Heuristics Applied to Virtual Reality, Why 5 Participants Are Okay in a Qualitative Study, but Not in a Quantitative One, Local Navigation is a Valuable Orientation and Wayfinding Aid, Feature Checklists Are Not Enough: How to Avoid Making Bad Software, Confidence Intervals, Margins of Error, and Confidence Levels in UX.
- Recent Videos:** Remote Usability Testing Costs, Should Experienced Designers Go Back to College?, DesignOps Maturity: 10 Modes and Models, Lost at First Sight in Eyetracking.
- Main Text:** "The design should speak the users' language. Use words, phrases, and concepts familiar to the user, rather than internal jargon. Follow real-world conventions, making information appear in a natural and logical order." "The way you should design depends very much on your specific users. Terms, concepts, icons, and images that seem perfectly clear to you and your colleagues may be unfamiliar or confusing to your users." "When a design's controls follow real-world conventions and correspond to desired outcomes (called natural mappings), it's easier for users to learn and remember how the interface works. This helps to build an experience that feels intuitive."
- Image:** A diagram of a stove with four burners. The top-left burner is labeled "1" and the top-right burner is labeled "2".
- Example of Usability Heuristic #2:** "When stove-top controls match the layout of heating elements, users can quickly understand which control maps to which heating element."
- Tips:**
 - Ensure users can understand meaning without having to go look up a word's definition.
 - Never assume your understanding of words or concepts will match those of your users.
 - User research will help you uncover your users' familiar terminology, as well as their mental models around important concepts.
- Learn more:**
 - Full article: Match Between the System and the Real World
 - 2-minute video: Match Between the System and the Real World

A video inset in the bottom right corner shows a man with glasses and a blue shirt speaking.

Match between the system and the real world, a simple example is you have a stove with multiple burners, the location of the burner knob should match with the location of the actual burner. That makes it clear, let us say that the knob on the right controls the burner on the left, that is not intuitive, I do not expect that to happen. And it becomes difficult to use such a device.

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10 Usability Heuristics for User Interface Design


Bruce Tognazzini

Don Norman
Jakob Nielsen
See all authors

#3: User control and freedom

Users often perform actions by mistake. They need a clearly marked "emergency exit" to leave the unwanted action without having to go through an extended process.

When it's easy for people to back out of a process or undo an action, it fosters a sense of freedom and confidence. Exits allow users to remain in control of the system and avoid getting stuck and feeling frustrated.



Tips

- Support Undo and Redo.
- Show a clear way to exit the current interaction, like a Cancel button.
- Make sure the exit is clearly labeled and discoverable.

Learn more

- Full article: User Control and Freedom
- 2-minute video: User Control and Freedom

Example of Usability Heuristic #3:
Digital spaces need quick "emergency exits," just like physical spaces do.

#4: Consistency and standards

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform and industry conventions.

Jakob's Law states that people spend most of their time using digital products other than yours. Users'

User control and freedom, one of the things is, you will find that pretty much any application that you are used to these days has some kind of undo support. You do something it, okay it was a mistake, I need to take that back, it allows you to go back, including to the point where for example, let us say you have deleted a file somewhere, it does not actually usually delete it, it puts it into a trash or, recycle bin or whatever it is called on the application on the OS that you have.

Why is that? Because, there is a chance it was done by mistake, and you might want to undo it. So, it gives the user that sort of safety net, some ability to do things without worrying too much that, something is going to be a completely destructive operation.

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The screenshot shows a presentation slide titled "#4: Consistency and standards". The slide content includes:

- #4: Consistency and standards**
- Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform and industry conventions.
- Jakob's Law* states that people spend most of their time using digital products other than yours. Users' experiences with those other products set their expectations. Failing to maintain consistency may increase the users' *cognitive load* by forcing them to learn something new.
- Tips**
 - Improve *learnability* by maintaining both types of consistency: internal and external.
 - Maintain *consistency* within a single product or a *family of products* (*internal consistency*).
 - Follow established *industry conventions* (*external consistency*).
- Learn more**
 - [Full article: Consistency and Standards](#)
 - [3-minute video: Consistency and Standards](#)
- Example of Usability Heuristic #4:**
Check-in counters are usually located at the front of hotels. This consistency meets customers' expectations.
- #5: Error prevention**
Good error messages are important, but the best designs carefully prevent problems from

A presenter is visible in the bottom right corner of the slide.

Now, this number four, consistency is one of the most important things to keep in mind. What consistency means is, anytime I look at a page, if I or when I am browsing through a website, or if I am going using browser for something, I expect certain consistency. An example would be that, whenever I hover over a link, I expect the icon, the cursor shape to change, or perhaps the link to get highlighted in some way.

Instead of that, if you did that, any time that you hover over this, if you hover over links on the right hand side, it would show you a particular kind of cursor. If you hover over links on the left hand side, it does something else. Maybe it automatically assumes you are clicking and just goes through the link, that is inconsistent. Though there are actually pages that do things of that sort. And those can be very disorienting to a user. It is difficult to get used to a website and be able to use it when such things happen.

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The screenshot shows a presentation slide titled "#5: Error prevention". The slide content includes a paragraph about the importance of error messages and the types of errors (slips and mistakes). It features a diagram of a road with guardrails and a list of tips for error prevention. A presenter's video is overlaid on the right side of the slide.

#5: Error prevention

Good error messages are important, but the best designs carefully prevent problems from occurring in the first place. Either eliminate error-prone conditions, or check for them and present users with a confirmation option before they commit to the action.

There are two types of errors: **slips and mistakes**. Slips are unconscious errors caused by inattention. Mistakes are conscious errors based on a mismatch between the user's mental model and the design.

Tips

- Prioritize your effort: Prevent high-cost errors first, then little frustrations.
- **Avoid slips** by providing helpful constraints and good defaults.
- Prevent mistakes by removing memory burdens, supporting undo, and **warning your users**.

Example of Usability Heuristic #5:
Good rail-on-carry mountain roads prevent drivers from falling off cliffs.

Learn more

- [Full article: Preventing User Errors](#)
- [3-minute video: Error Prevention](#)

Error prevention, it is not just good enough to detect errors after they happen. Ideally, you should be able to prevent an error from happening in the first place. The example given over here, of course is, you put guardrails on roads when they are going close to a cliff edge or something like that, a mountain edge. Why? Because you want to make it very clear to the person that look, if you go too fast, you are likely to fall off the edge of the steep slope.

You would rather prevent that from happening rather than saying, if they do fall off, we have some way of catching them when they do, that is not good enough. Ideally, you want to prevent it from happening in the first place.

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The screenshot shows a presentation slide titled "#6: Recognition rather than recall". The slide content includes a paragraph about minimizing memory load by making elements, actions, and options visible. It features a diagram of a castle and a list of tips for recognition. A presenter's video is overlaid on the right side of the slide.

#6: Recognition rather than recall

Minimize the user's memory load by making elements, actions, and options visible. The user should not have to remember information from one part of the interface to another. Information required to use the design (e.g. field labels or menu items) should be visible or easily retrievable when needed.

Humans have limited short-term **memories**. Interfaces that promote recognition reduce the amount of cognitive effort required from users.

Tips

- Let people recognize information in the interface, rather than having to remember ("recall") it.
- Offer **help in context**, instead of giving users a long tutorial to memorize.
- Reduce the information that users have to remember.

Example of Usability Heuristic #6:
It's easier for most people to recognize the capitals of countries, instead of having to remember them. People are more likely to correctly answer the question "Is Lisbon the capital of Portugal?" rather than "What's the capital of Portugal?"

Learn more

- [Full article: Recognition vs. Recall in UX](#)
- [3-minute video: Recognition vs. Recall](#)

Recognition rather than recall. Once again, this is, related to the door handle. I should be able to look at the door and say if I press over here, I should be able to open the door, rather than saying, I remember this sign corresponds to push, and therefore, I, if I push the door will open. The recognition saying that, this looks obviously like something I need to push or to press, is more important than something which needs to be remembered so that I need to act on it correctly.

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The screenshot shows a presentation slide titled "#7: Flexibility and efficiency of use". The slide content includes:

- Shortcuts** — hidden from novice users — may speed up the interaction for the expert user such that the design can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.
- Flexible processes can be carried out in different ways, so that people can pick whichever method works for them.

Below the text is a diagram showing a map with red lines indicating shortcuts between points. The diagram is labeled "Example of Usability heuristic #7: Regular routes are listed on maps, but locals with more knowledge of the area can take shortcuts.".

Tips

- Provide accelerators like keyboard shortcuts and touch gestures.
- Provide personalization by tailoring content and functionality for individual users.
- Allow for customization, so users can make selections about how they want the product to work.

Learn more

- Full article: [Flexibility and Efficiency of Use](#).
- The 7th Usability Heuristic Explained
- 3-minute video: [Flexibility and Efficiency of Use](#)

Below the slide content, the next slide title is visible: "#8: Aesthetic and minimalist design". The presenter, a man with glasses and a blue shirt, is visible in the bottom right corner of the frame.

Flexibility efficiency of use, most of you who are using desktops, at least you would find that there are shortcuts, mostly using the keyboard for a lot of applications. In fact, when I use Gmail on my desktop, a lot of my navigation is done by using the keyboard shortcuts, I do not use the mouse for going back to the inbox. I do not use it for composing a new email. All of those have some kind of keyboard shortcuts that make it easier and faster for me to do certain things. Those kinds of things, improve the usability of the system.

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The screenshot shows a presentation slide titled "#8: Aesthetic and minimalist design". The slide content includes a definition: "Interfaces should not contain information which is irrelevant or rarely needed. Every extra unit of information in an interface competes with the relevant units of information and diminishes their relative visibility." It also states: "This heuristic doesn't mean you have to use a [flat design](#) — it's about making sure you're keeping the content and visual design focused on the essentials. Ensure that the visual elements of the interface support the user's primary goals." Below this is a "Tips" section with three bullet points: "Keep the [content](#) and [visual design](#) of UI focus on the essentials.", "Don't let unnecessary elements distract users from the information they really need.", and "Prioritize the [content and features](#) to support primary goals." There is also a "Learn more" link and a "3-minute video: Aesthetic and Minimalist Design". An example of a usability heuristic is provided: "An overly complex may have excessive decorative elements that can interfere with usability, like an uncomfortable handle or hard to wash nozzle." The slide is part of a presentation from "IIT Madras BSc Degree". A video inset shows a man in a blue shirt speaking.

Aesthetic and minimalist design. Remember what I said about avoiding the use of excessive colors, and so on? This is something important, the interfaces should not contain information, which is irrelevant or rarely needed. In fact, even if you look at this web page, this looks quite nice. I have scrolled down to a point where it just has the bare minimum of information that is useful to convey the point that they are trying to make.

There is a lot of other navigation and other various kinds of information on this page. But it is not present right here. I know that if I scroll to the top of the page, I will be able to find it. Could this have been improved in some ways? Maybe, but it is not too bad. At the same time, it is aesthetic. It does not have sharp, jarring colors, there is some white, there is gray, clear black fonts, the headlines are in a larger font, the main point is in bold. The links are clearly differentiated in color. All of those are sort of useful things to keep in mind.

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The slide is titled "#9: Help users recognize, diagnose, and recover from errors". It contains the following text: "Error messages should be expressed in plain language (no error codes), precisely indicate the problem, and constructively suggest a solution." and "These error messages should also be presented with visual treatments that will help users notice and recognize them." There is an illustration of a road sign with a downward arrow and the text "WRONG WAY". Below it, an example of a usability heuristic #9 is provided: "Wrong way signs on the road remind drivers that they are heading in the wrong direction and ask them to stop." A "Tips" section lists: "Use traditional error message visuals, like bold, red text.", "Tell users what went wrong in language they will understand — avoid technical jargon.", and "Offer users a solution, like a shortcut that can solve the error immediately." A "Learn more" section includes a link to a "2 minute video: Helping Users Overcome Errors". The slide is part of a presentation by IIT Madras BSc Degree, as indicated by the logo in the top right corner.

Similarly, help users recognize, diagnose and recover from errors. If you do find that you are doing something wrong, the system should try and catch it as early as possible and tell you wait, something is going wrong. Why do not you look at what you are doing? Rather than allowing them to make a lot of mistakes, and then sort of saying, oh, you messed up.

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The slide is titled "#10: Help and documentation". It contains the following text: "It's best if the system doesn't need any additional explanation. However, it may be necessary to provide documentation to help users understand how to complete their tasks." and "Help and documentation content should be easy to search and focused on the user's task. Keep it concise, and list concrete steps that need to be carried out." There is an illustration of a person sitting at a desk with a computer, with a red arrow pointing to the screen. Below it, an example of a usability heuristic #10 is provided: "Information kiosks at airports are easily recognizable and solve customers' problems in context and immediately." A "Tips" section lists: "Ensure that the help documentation is easy to search.", "Whenever possible, present the documentation in context right at the moment that the user requires it.", and "List concrete steps to be carried out." A "Learn more" section includes links to "Full article: Help and Documentation: The 10th Usability Heuristic" and a "3 minute video: Help and Documentation". The slide is part of a presentation by IIT Madras BSc Degree, as indicated by the logo in the top right corner.

And, of course, some form of help and documentation. We might find that, the system we designed is perfectly usable and, very nice for us to use, that might not be the same viewpoint shared by a third person. So, how do you actually document in such a way that this becomes

actually usable and easy for a person to interact with your application, that is also something important to keep in mind.

So, like I said, these guidelines are useful, this particular website is a nice resource. I would strongly advise that you go through it, but there are a lot of other heuristics and other kinds of suggestions that you will find for UI design. There are increasingly many such heuristics for mobile based designs, for responsive designs and various sort of variants, Nielsen's initial heuristics are for any kind of user interface design, not just for web applications.

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General principles

- Consistency
- Simple and minimal steps
- Simple language
- Minimal and aesthetically pleasing



So, as I said, the core principles if you try to distill them down, consistency, simple and minimal, simple language, your language that you use in order to describe what something is doing, use simple words. Do not try to use a fancy word just because it is sort of, even though it may fit the bill perfectly. Because it throws the user off, they have to take a step back, try and understand what you are trying to say and then make use of the system.

And also minimal and aesthetically pleasing. Now the problem with all of these principles is that they are subjective, you might find that there are places where what you find to be aesthetically pleasing is different from what I do, for example. So, for all, for the most part, we are not going to be focusing too much on aesthetics here, except to try and keep this in mind, minimal as far as possible, do not unnecessarily complicate things beyond what is needed.