UNIVERSITY OF
WOLVERHAMPTON

5CS020-HCI (Human Computer Interaction)
Week - 2

HCI, HCI Theories and Usability Principles

March, 2024

1. HCI/Usability Introduction
2. Shneiderman's 8 Golden Rules of Interface Design
3. Jakob Nielsen's 10 Usability Heuristics
4. Overlap between Schneiderman's and Nielsen's
5. Differences between Schneiderman's and Nielsen's
6. Conclusion

Introduction

- What is HCI/ Usability
- Shneiderman's **8 Golden Rules of Interface Design**
- Jakob Nielsen's 10 **Usability Heuristics**

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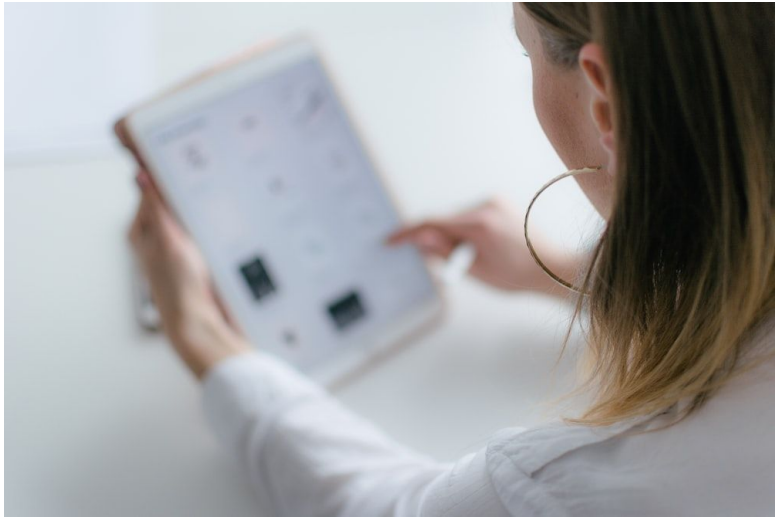
What is HCI/ Usability

- HCI is concerned with the design of (computer-based) user interfaces and how human beings interact with them
- Overlaps with Accessibility (Week 5), and Evaluating Interfaces (Week 7)



https://unsplash.com/photos/lMEMH5Rd30U

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What is HCI/ Usability

- Our applications and interfaces can have countless use cases
- User Interface need to be fit for purpose, allowing users to achieve their objectives in the least frustrating (maybe pleasurable) way

https://www.dreamstime.com/young-male-warehouse-worker-tablet-checking-something-male-warehouse-worker-tablet-image108248388

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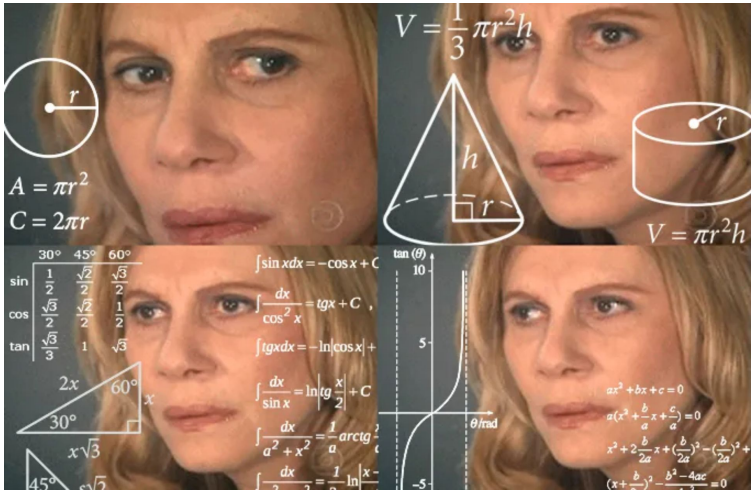
What is HCI/ Usability

- Theories of HCI are based on human psychology which is an ever changing field
- Countless theories have popped up over the years and can be overwhelming
- We will be relying on two of those
  - Shneiderman's Rules
  - Nielsen's Usability



https://www.kapwing.com/explore/confused-math-lady-meme-maker

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Schneiderman's 8 Golden Rules In Interface Design

- Created back in 1987 by Ben Shneiderman
- Despite the age, the rules are as relevant today as they were back then
- Consists of eight 'best practice' steps, which if applied, should result in well designed interfaces

http://www.cs.umd.edu/users/ben/

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The 8 rules

1. Strive for consistency
2. Enable frequent users to use shortcuts
3. Offer informative Feedback
4. Design dialog to yield closure
5. Offer simple error handling
6. Permit easy reversal of actions
7. Support internal locus of control
8. Reduce short-term memory load

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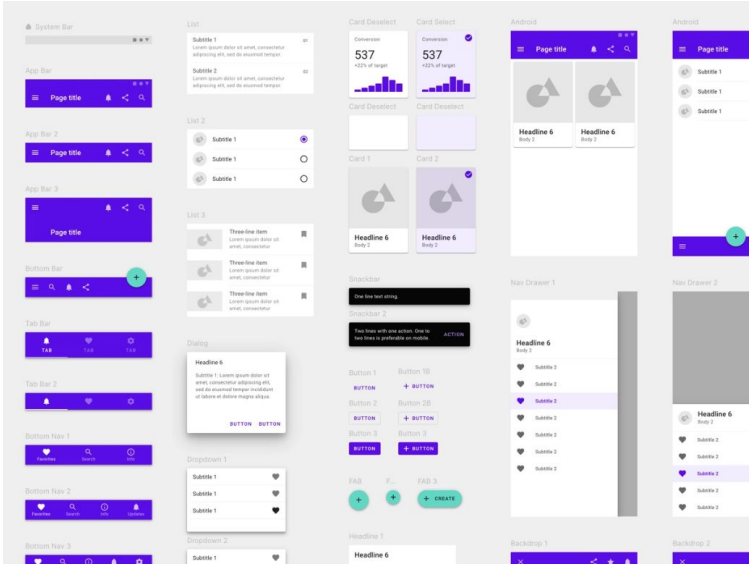
Strive for Consistency

- Consistent layout/ navigational elements
- Tried and tested UI patterns (drop down menus, carousels, underlined hyperlinks, etc.)
- Use a style guide or a design guide - set of standards for writing/ designing documents (typically, public-facing)



https://www.framer.com/templates/material-design/

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https://www.kindpng.com/imgv/momwiJ_the-history-of-windows-start-menu-windows-xp/
https://www.thespinningdonut.com/the-windows-vista-start-menu/
https://www.dummies.com/article/technology/computers/operating-systems/windows/windows-10/getting-to-know-the-windows-7-start-menu-195481

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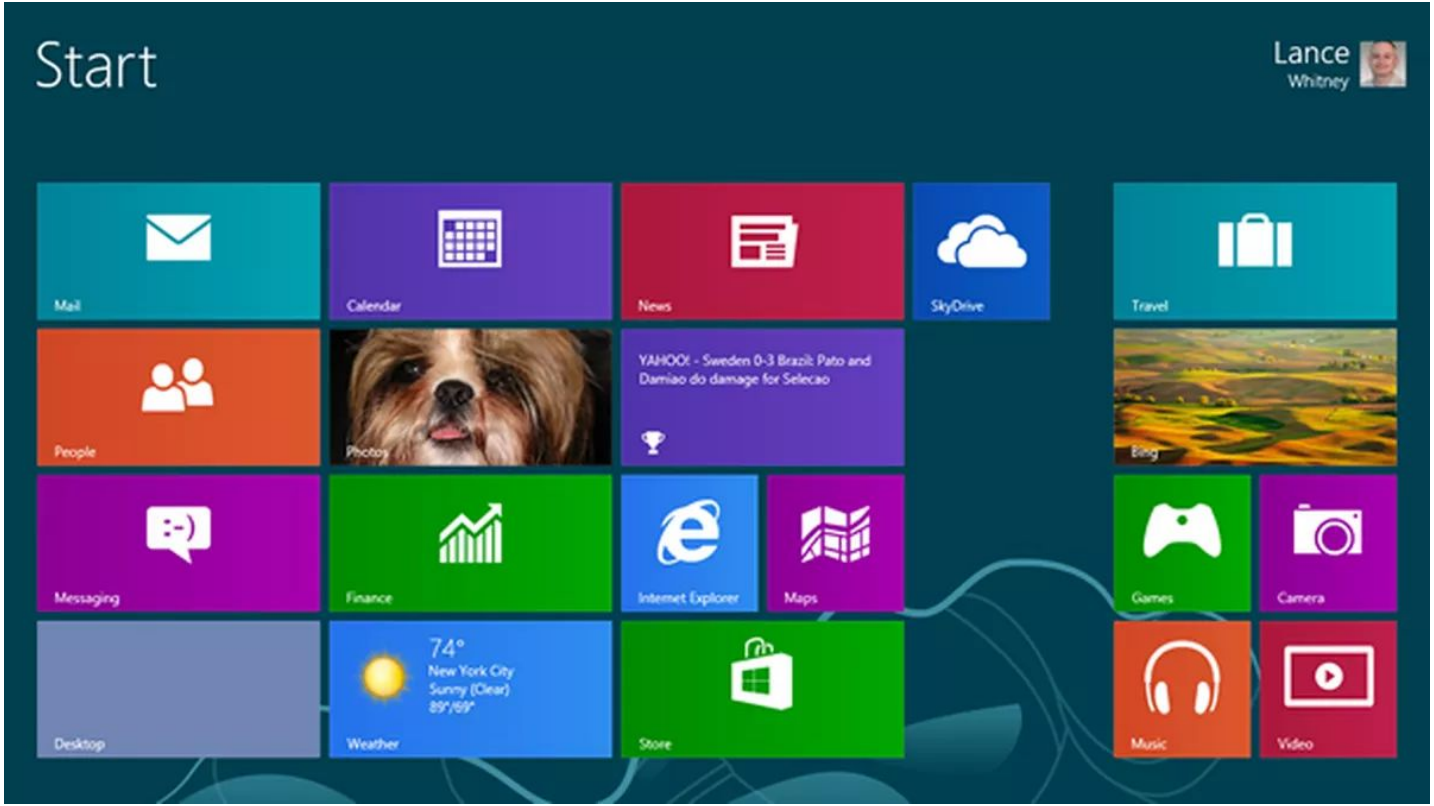

https://www.cnet.com/tech/computing/how-to-get-the-start-menu-back-in-windows-8/

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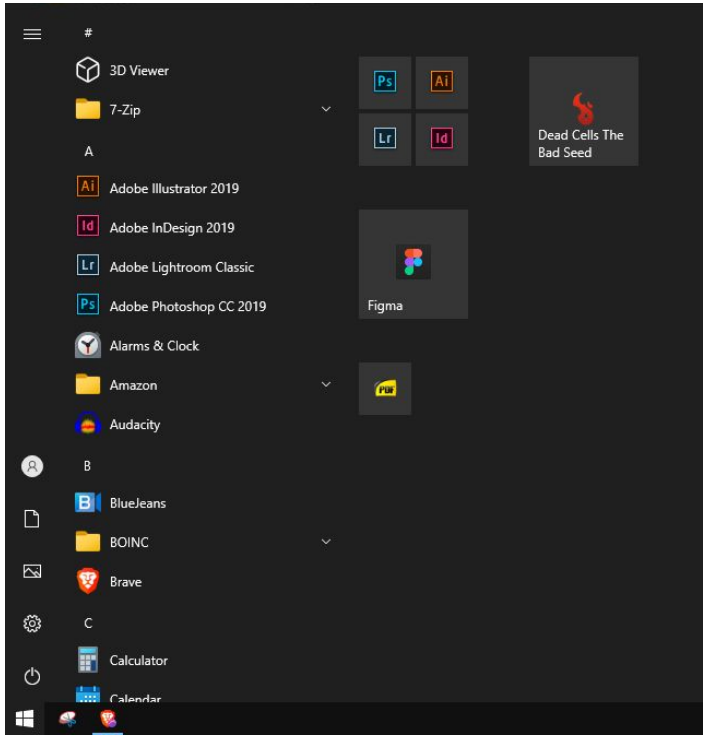

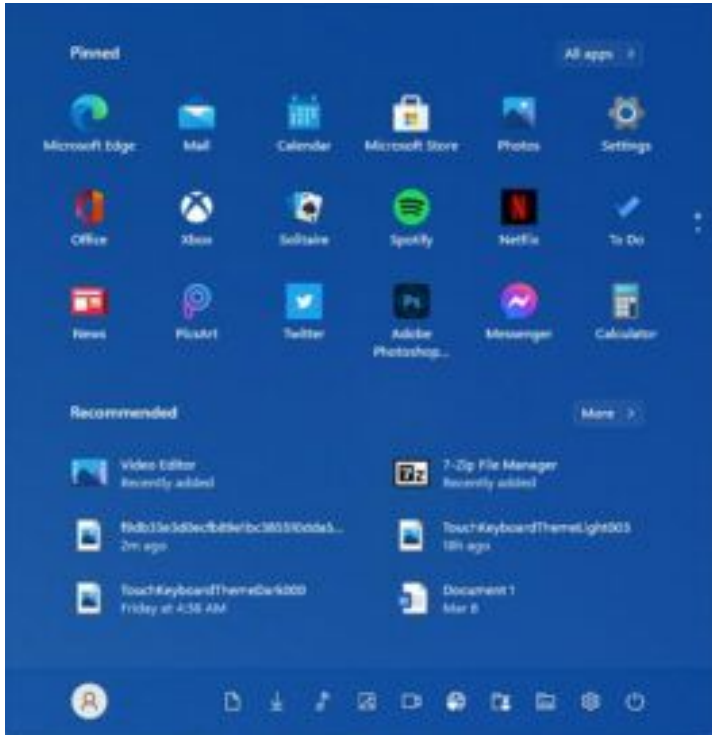

https://www.windowslatest.com/2021/06/20/microsoft-doc-hints-at-new-gesture-experience-on-windows-11/

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Recommended Browsing

m3.material.io

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Enable shortcuts for frequent users

- As the frequency of use increases, so do the user's desires to reduce the number of interactions and to increase the pace of interaction.
- Abbreviations, function keys, hidden commands, and macro facilities are very helpful to an expert user.”

https://medium.com/@goldtree/please-stop-using-these-images-to-compare-ui-design-vs-ux-design-ec514d291a9a

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Enable shortcuts for frequent users

- This dates back to when user interfaces were text-based
- However, use of shortcuts can be applied to 'modern' user interfaces

https://www.pcmag.com/news/the-forgotten-world-of-dumb-terminals#3

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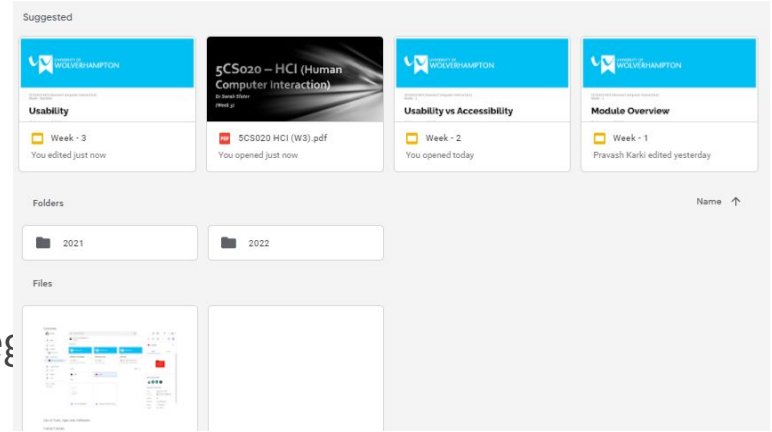

Some examples:

- 'Remember' most/ last visited pages/ products (eg daraz)
- Google allows personalization of Search 'home' page
- Navigation structures (Week 9) i.e. 'Breadcrumbs' can act as 'shortcuts'

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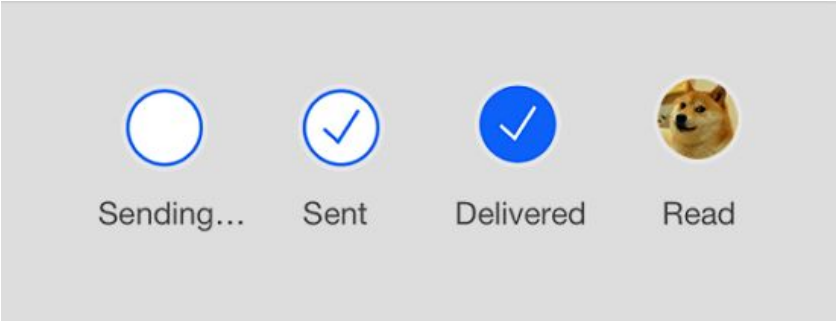
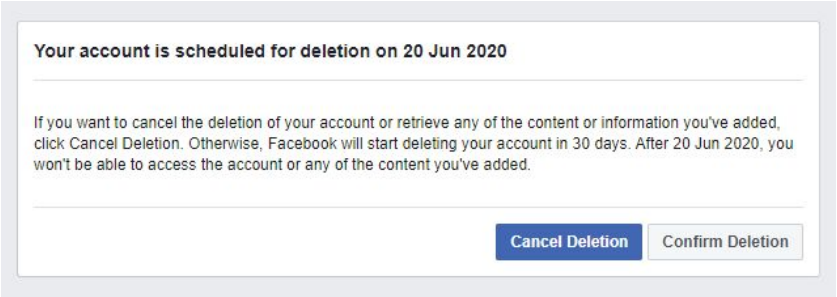
Offer Informative Feedback

- For every operator action, there should be some system feedback.
- For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial

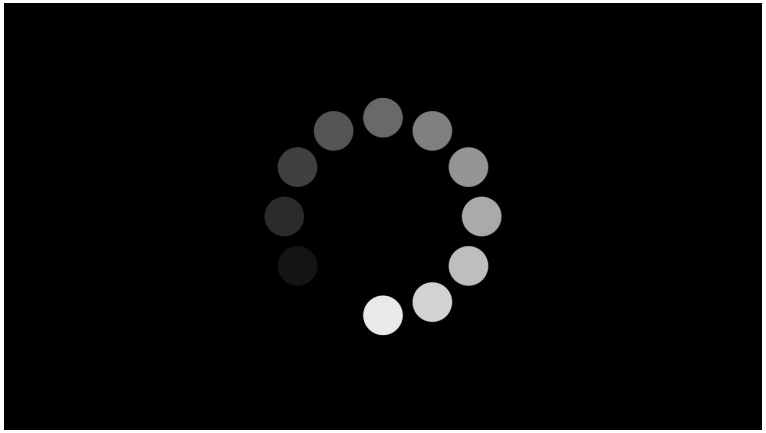




https://wethegeek.com/how-to-recover-deleted-facebook-account/

Offer Informative Feedback

- Display a "please wait" message or an animated picture when your system is "doing something" eg. a search



https://www.youtube.com/watch?v=qxOkaU6RVz4

If users see an indication that something is going on, they're much more patient.

Tidwell, 2005, Progress indicator – Designing Interfaces

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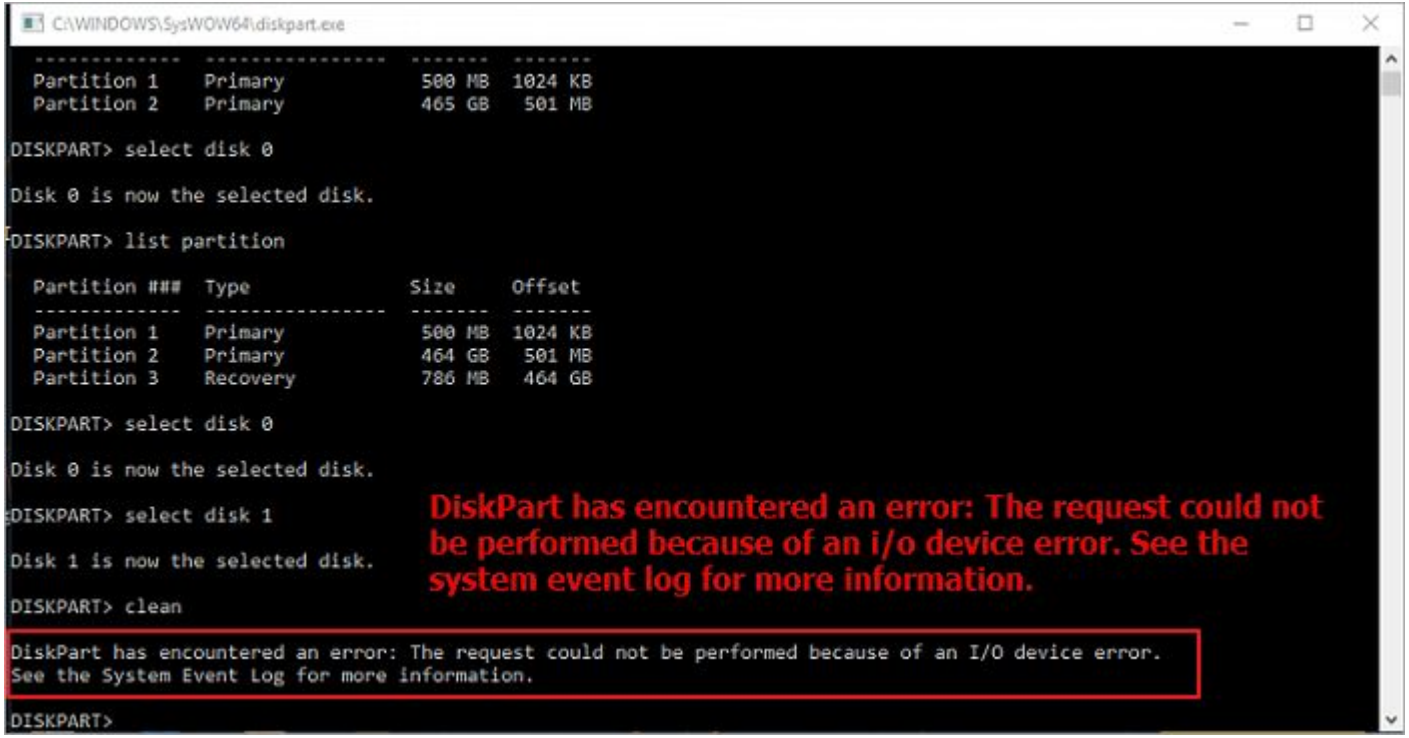

https://www.easeus.com/partition-manager-software/fix-diskpart-i-o-device-error.html

Informative Feedback

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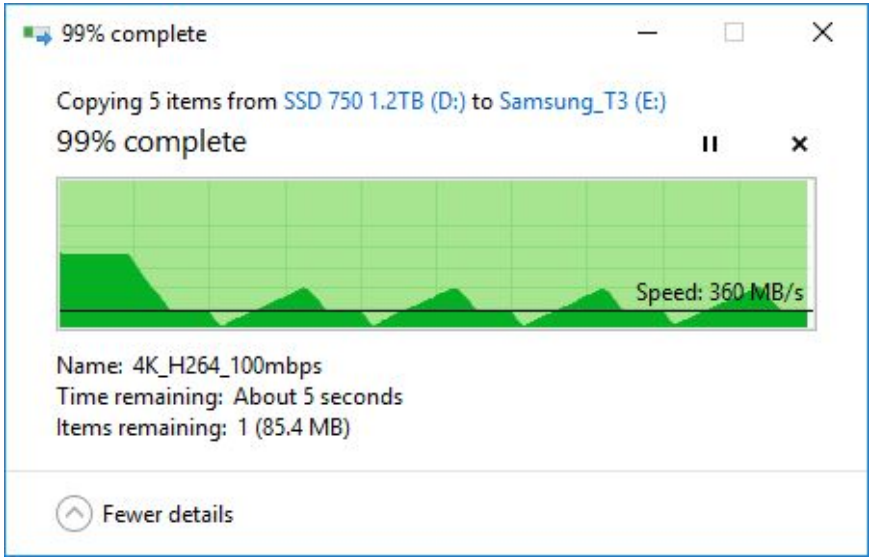

https://www.easeus.com/partition-manager-software/copying-files-stuck-at-99.html

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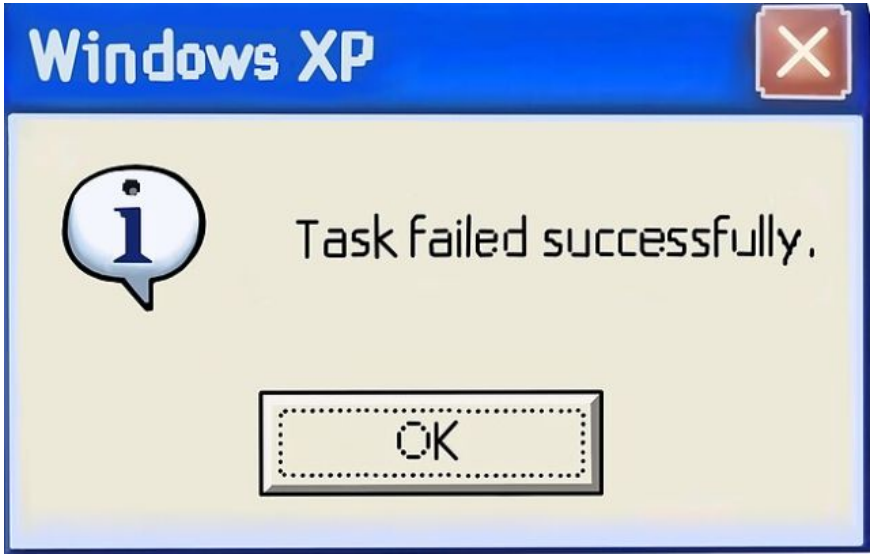

https://medium.com/swlh/the-ten-most-ridiculous-error-messages-in-the-history-of-software-4198d710ea8e

Please, **for the love of god and all things pure**, don't do this

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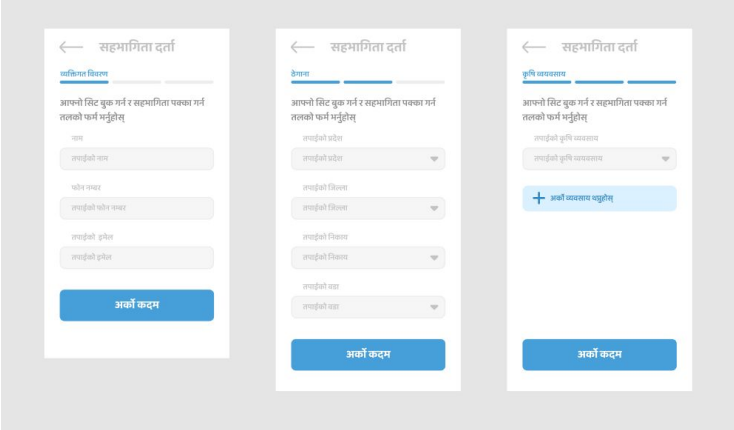
Design dialog to yield course

- Sequences of actions should be organized into groups with a **beginning, middle, and end.**
- The informative feedback at the completion of a group of actions gives the users the satisfaction of accomplishment, a sense of relief.
- It is a signal to drop contingency plans and options from their minds, and an indication that the way is clear to prepare for the next group of actions.



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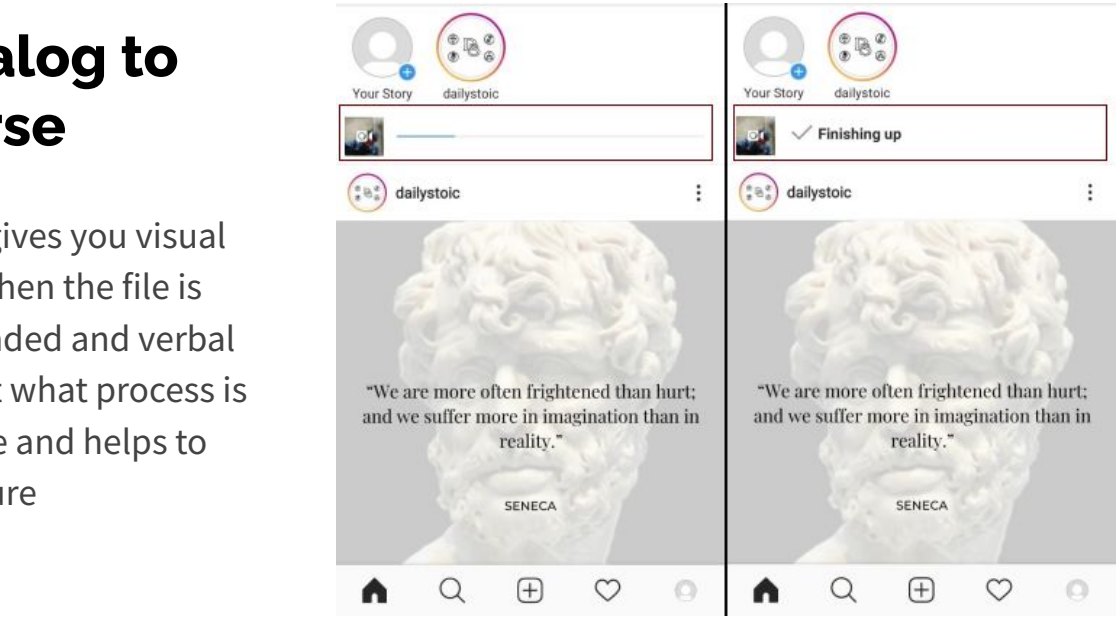
Design dialog to yield course

- Instagram gives you visual feedback when the file is being uploaded and verbal input about what process is taking place and helps to create closure



https://uxplanet.org/8-golden-rules-of-interface-design-e80a17a1312f

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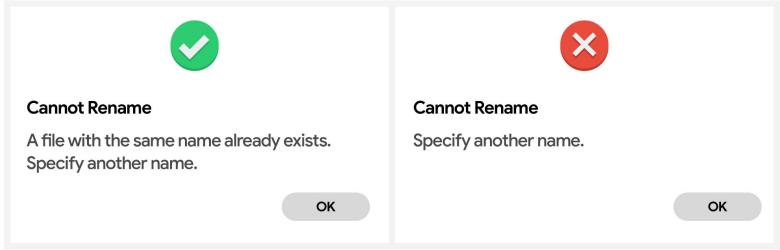
Offer Simple error Handling

- As much as possible, the system should be designed so that the user can't make serious errors.
- If an error is made, the system should be able to detect the error and **offers simple, comprehensible mechanism** for handling the error



The message contains problem, cause of error and solution

The cause of error is missing in the message

https://uxplanet.org/how-to-write-good-error-messages-858e4551cd4

Proper error handling should ideally

- Identify the problem
- Identify the cause for the problem
- Solution for the problem

Offer Simple error Handling

- Emotional Design is a growing trend
- It suggests that the interfaces should not just be functional and usable, but also enjoyable and fun. **User satisfaction should be a usability goal**
- More specifically, incidents that would normally stress users (eg. error messages) are now 'somehow enjoyable' as well as informative

Offer Simple error Handling

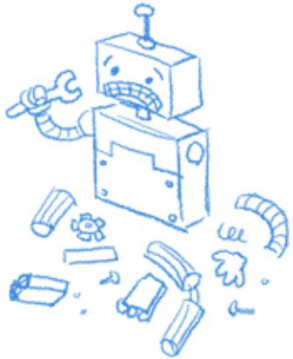
- When aiming for a clever error message, make sure that the tone of the joke fits in with the overall message, places the blame off the user, and provides users a way forward.

Google

502. That's an error.

The server encountered a temporary error and could not complete your request.

Please try again in 30 seconds. That's all we know.



https://kinsta.com/blog/502-bad-gateway/

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Permit easy reversal of actions

- This feature is there to relieve anxiety and encourages exploration
- When the user knows that errors can be undone, it encourages exploration of options and minor risk taking
- The **units of reversibility** can be a single action, a data entry, or a complete group of actions

https://www.howtogeek.com/679976/how-to-skip-the-recycle-bin-for-deleting-files-on-windows-10/

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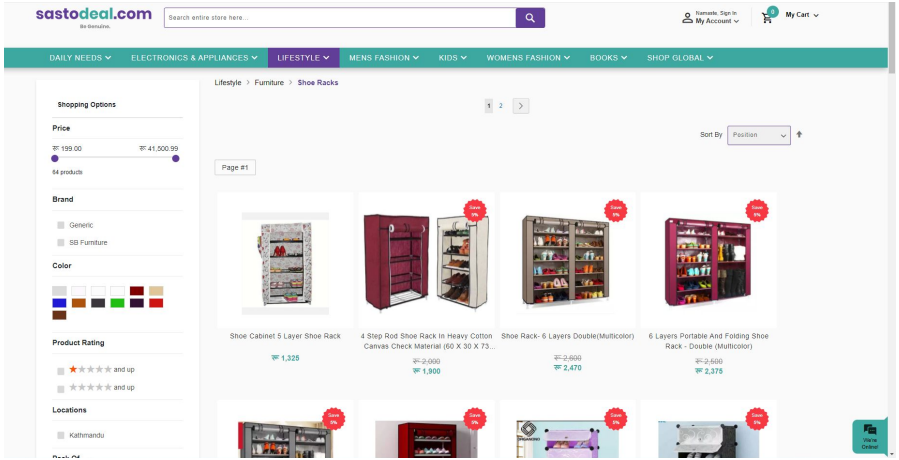
Permit easy reversal of actions

- In web design, reversal of actions can be incorporated through the navigation structure used
- Example:
  - Breadcrumbs
  - Mega Menu
  - Hierarchical Menu



https://www.sastodeal.com/home-and-living/furnitures/shoe-racks.html

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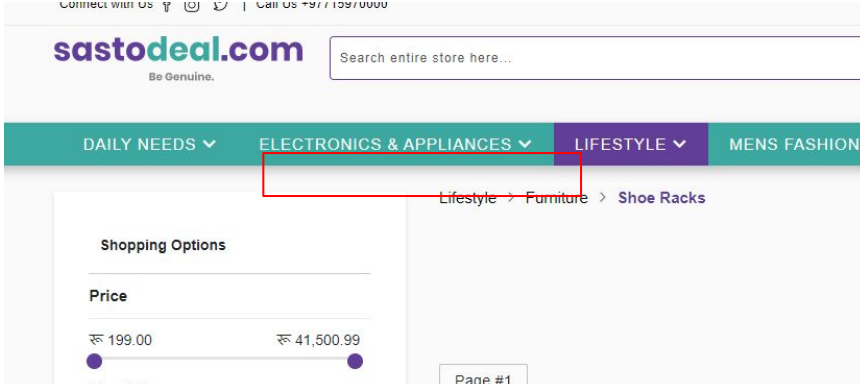

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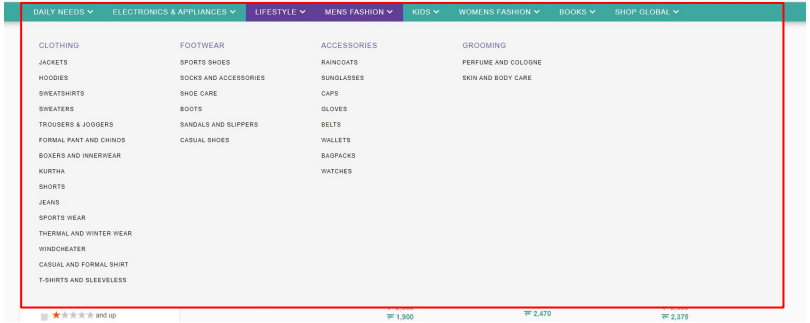

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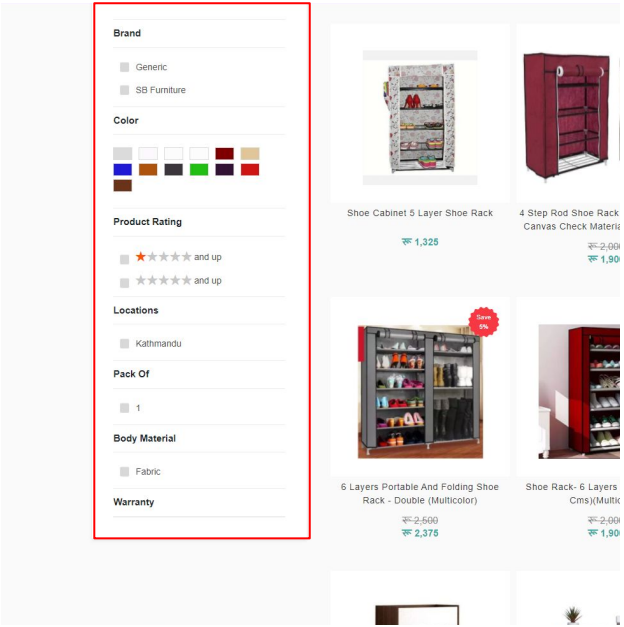
  - Mega Menu
  - **Hierarchical Menu**



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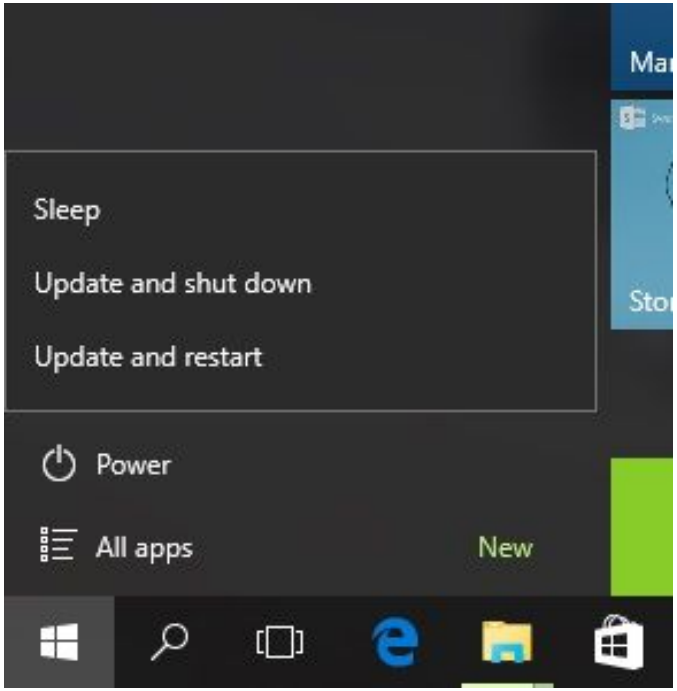
Support internal locus of control

- Experienced operators strongly desire the sense that they are in charge of the system and that the system responds to their actions.
- Design the system to make users the initiators of actions rather than the responders



https://www.reddit.com/r/assholedesign/comments/6ajmqe/theres_no_way_to_shut_down_windows_10_without/

Reduce short term memory load

The limitation of human information processing in short-term memory requires that:

Displays be kept simple

- multiple page displays be consolidated
- window-motion frequency be reduced
- sufficient training time be allotted for codes, mnemonics, and sequences of actions.

Sano Exercise

145327498

Next

251 096 478

Compare

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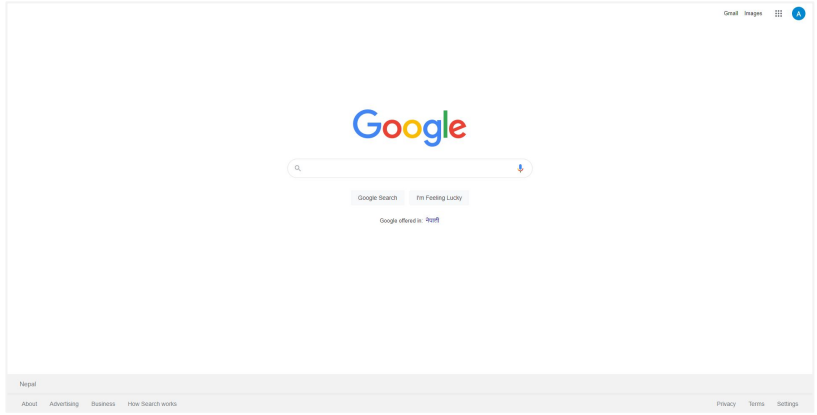
2.7. Support internal locus of control

2.8. Reduce short-term memory load

Reduce short term memory load

Simplicity is King

- Keep the design to the strict minimum
- Do not use an element if not needed
- Use icons to de-clutter your pages
- Think of the dominion of google on the search market: Google, Bing, Yahoo



https://www.google.com

2. Shneiderman's 8 Golden Rules of Interface Design

2.1. Strive for Consistency

2.2. Enable frequent users to use shortcuts

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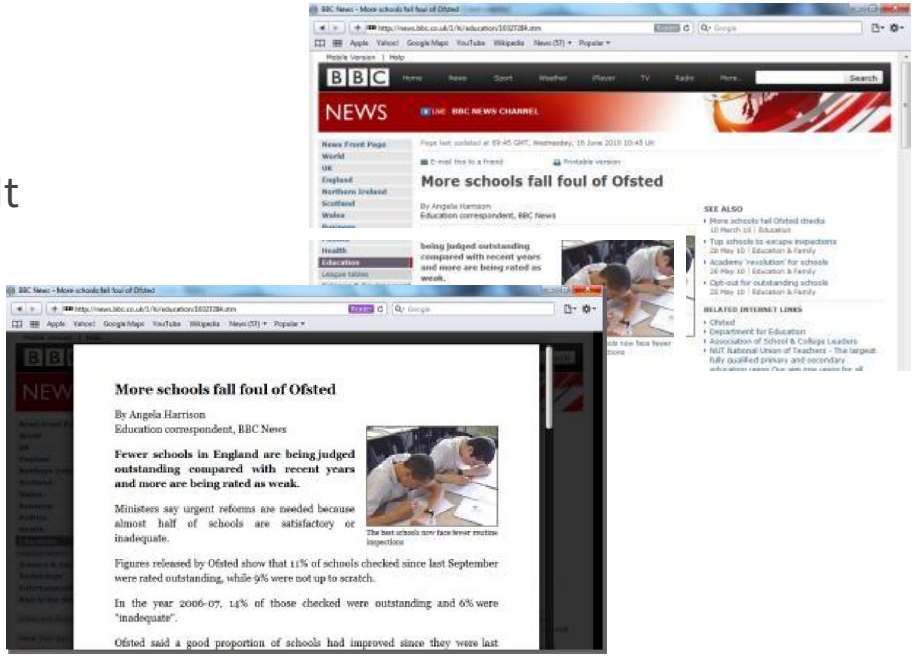
Reduce short term memory load

Example:

"Reader View" in browsers. It simplifies the clutter of a web page



Reduce short term memory load

- Visual Structure: Break information into smaller elements which in turn are easier to process
- Use of white space
  - Active White Space: White space used deliberately (within information blocks)
  - Passive White Space: Areas around/ outside information blocks

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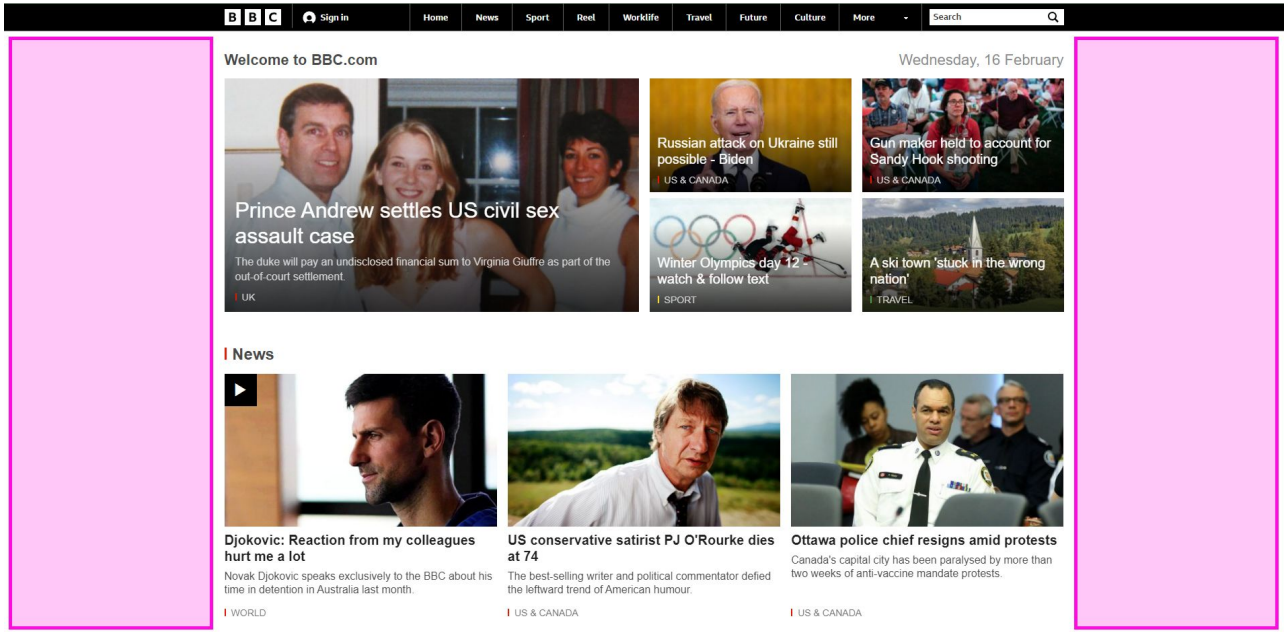
Reduce Short Term Memory Load



Passive White Space

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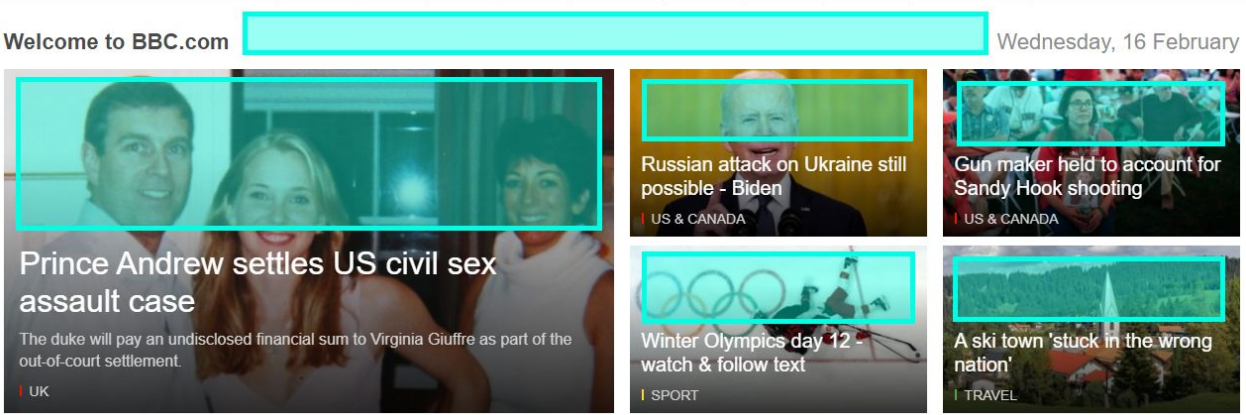

Active White Space

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Reduce Short Term Memory Load

No White Space Applied

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Passive White Space Applied

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Active and Passive White Space Applied

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Reduce Short Term Memory Load

- Most adults **can store between 5 and 9 items** in their short-term memory.
- This idea was put forward by Miller (1956) and he called it the magic number 7.
- He thought that short term memory could hold 7 (plus or minus 2 items) because it only had a certain number of "slots" in which items could be stored.

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Aim for recognition, not recall

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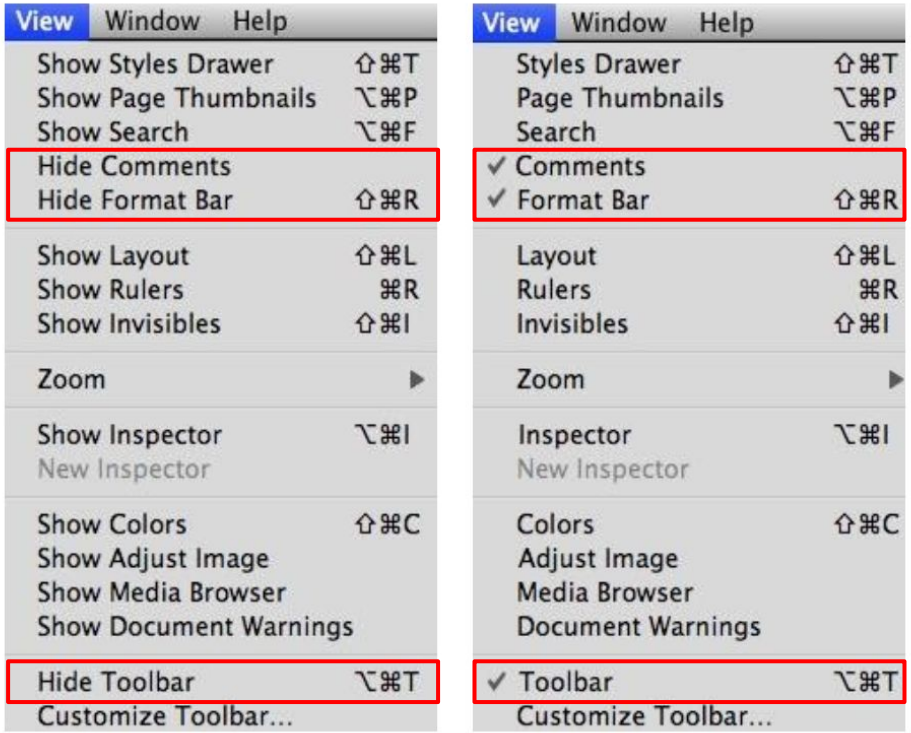

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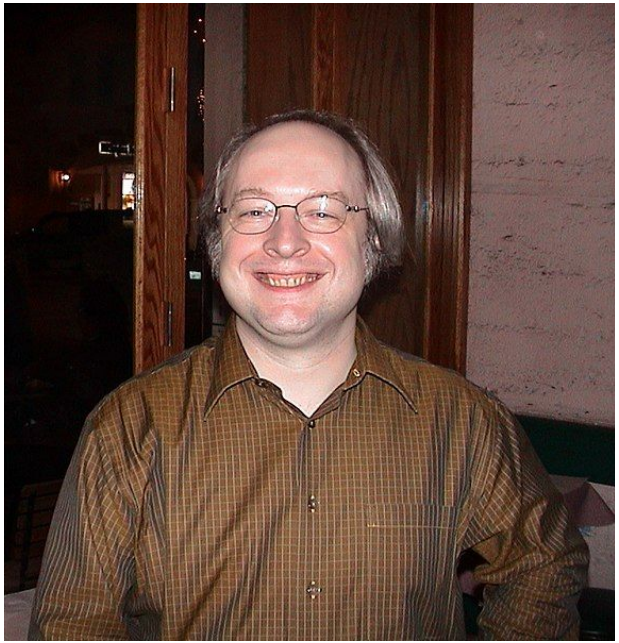
4. Overlap between Schneiderman's and Nielsen's
5. Differences between Schneiderman's and Nielsen's
6. Conclusion

Nielsen's list of 10 Usability Heuristics

- One of the most used usability framework
- Developed in 1990, published in Nielsen's book Usability Engineering in 1993



https://en.wikipedia.org/wiki/Jakob_Nielsen_(usability_consultant)#/media/File:Jakob_Nielsen_1.jpg

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Nielsen's list

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation

Nielsen's List

- **Visibility of System Status**
  - Keep users informed about what is going on
- **Match between system and the real world**
  - Use the terminology of the users rather than technical jargons
- **User control and freedom**
  - User has control over the system, eg: undo/ redo, etc.
- **Consistency and Standards**
  - Follow platform standards (Windows, Android, Linux, etx.)
- **Error Prevention**
  - Try to anticipate/ prevent users
- **Recognition rather than recall**
  - Simplicity is king

3.Jakob Nielsen's 10 Usability Heuristics

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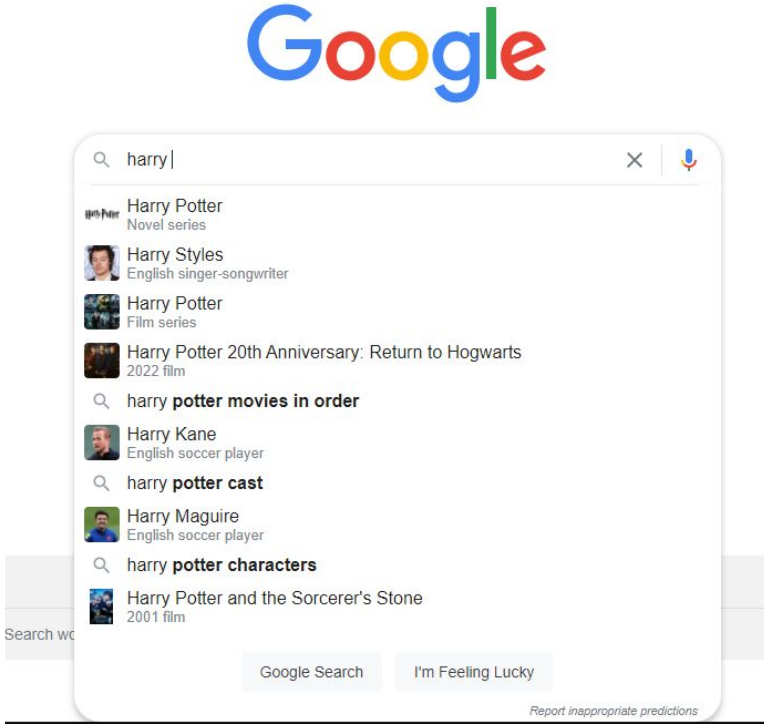
Nielsen's List

Flexibility and efficiency of use

- With a little bit of background AI, System should cater to expert and novice users alike
- Google Search - Autocomplete
- Clippy



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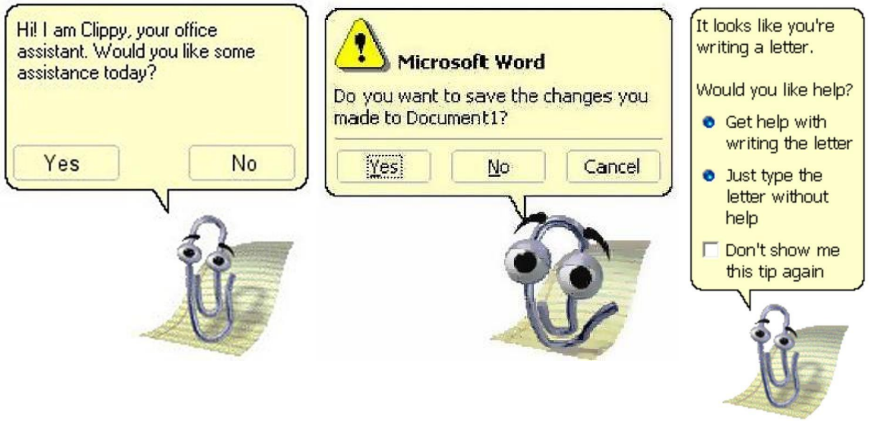

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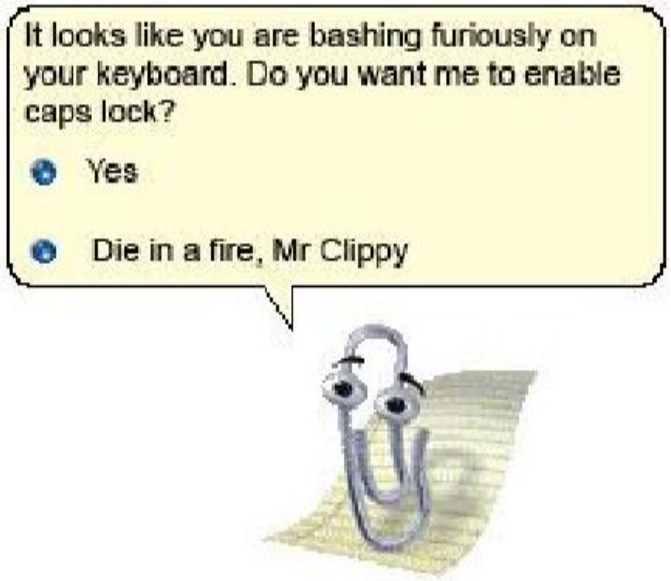

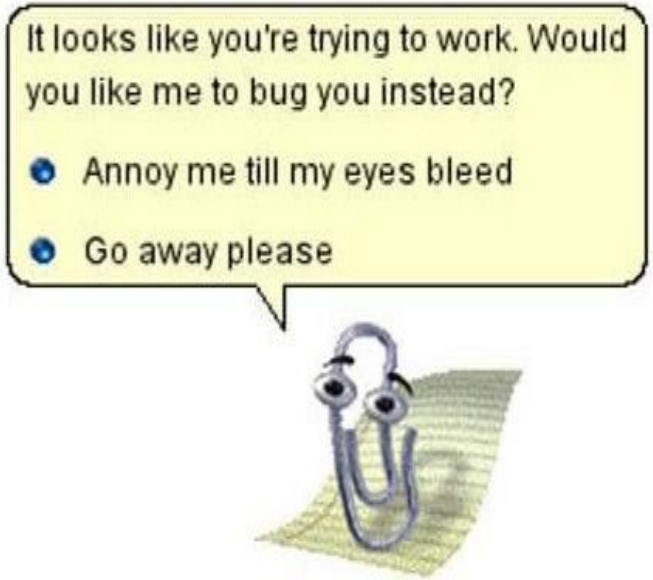

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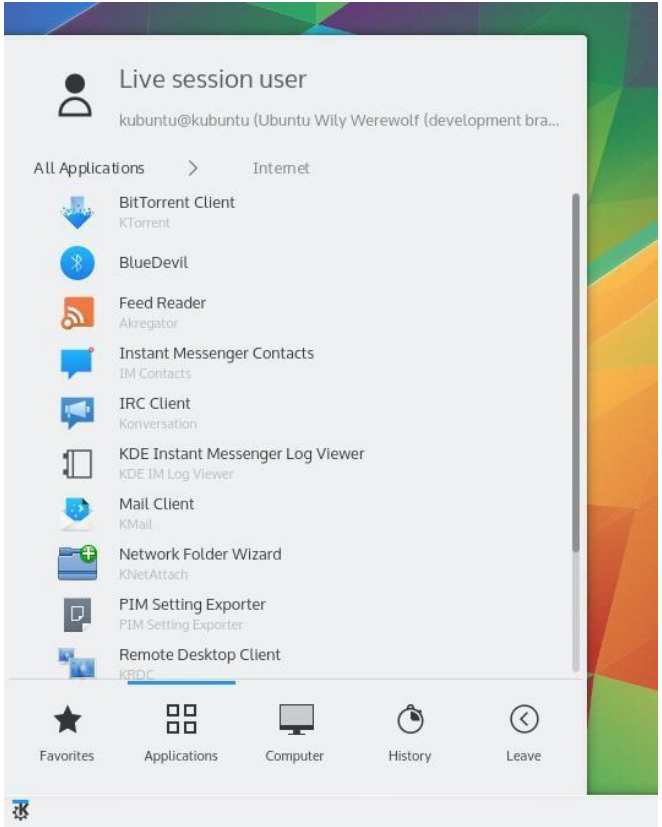
Nielsen's List

Aesthetic and Minimalist Design

- Reduce on screen noise and error



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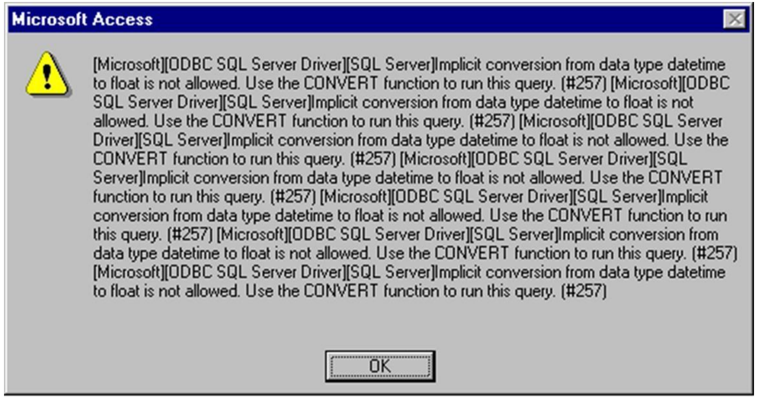
Nielsen's List

Help users recognize, diagnose and recover from errors

- Error messages in plain english



Help and Documentation

Overlap between Schneiderman's and Nielsen's

- **Strive for consistency**
- Enable frequent users to use shortcuts
- Offer informative Feedback
- Design dialog to yield closure
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- Permit easy reversal of actions
- Support internal locus of control
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Differences between Schneiderman's and Nielsen's

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Conclusion

What is HCI/ Usability?

- Concerned with UI design
- How human beings interact with UI

Focused on Today

- Shneiderman's 8 Golden Rules
- Jakob Nielsen's 10 'Usability Heuristics'

As with the other 'theories', both the above are regarded as 'Best Practice' for Interface Design