Comp 341/441 - HCI

Spring Semester 2020 - Week 13

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Principles for Usability

intro

- consider some of the underlying design principles that help guide our designs
- eg: Don Norman's design principles for usability
  - *Norman, D. The Design of Everyday Things. 1988.*
- Norman introduced a set of basic design principles and concepts
  - *consistency*
  - *visibility*
  - *affordance*
  - *mapping*
  - *feedback*
  - *constraints*

Principles for Usability

consistency

- one of the primary ways our users learn is by discovering *patterns*
  - *new situations easier to learn by reference to existing patterns of knowledge*
- *Consistency* is key in helping our users recognise and apply such patterns
- overall, things that look the same should perform the same general way
  - *same button, same colour normally infers same pattern of interaction and usage*
- behaviour and actions should also follow a similar pattern
  - *sound, animation, vibration etc should follow a similar pattern for users*
- design inconsistency can cause confusion and overload for our users
- memorisation of exceptions may also increase user resentment towards the app
- internal design and interaction consistency crucial for our users
- external consistency equally important and useful
  - *consistency between OS and app design guidelines*

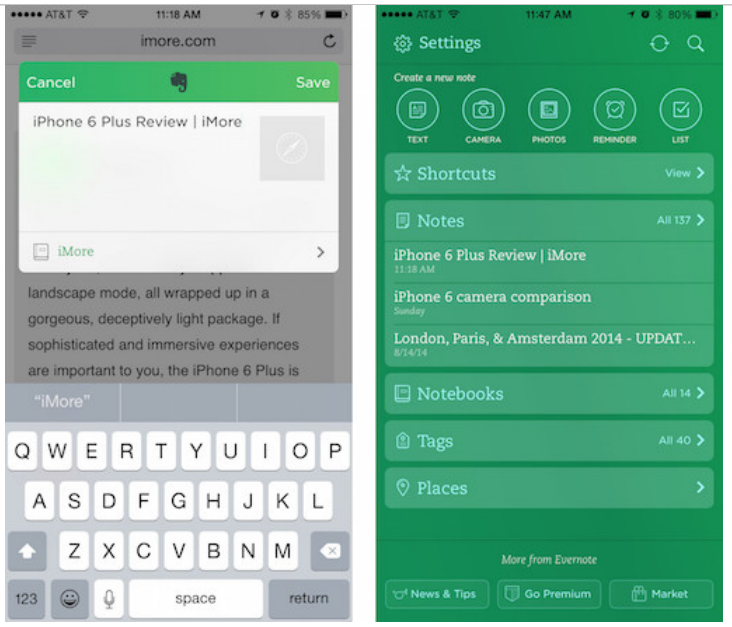
Image - Principles for Usability

Evernote

This is an image of the popular note-taking application, Evernote, on iOS 8.

questions to consider

- What does it tell us about the consistency of the app?
- looking at the possible actions available within this app screenshot, how would you expect consistency to be used?



Evernote for iOS 8

Source - Evernote

Principles for Usability - Consistency

Fun exercise - part 1

Consider a company's online services, which are available as both a responsive web application and mobile app. e.g. a mix of music and video streaming and editing...

Then, outline the following

- default *consistency* considerations for UI design - explicit
- subtle *consistency* considerations for UX - implicit
- difference between internal and external *consistency* for these apps
  - *consider both web and mobile apps...*

Principles for Usability

visibility

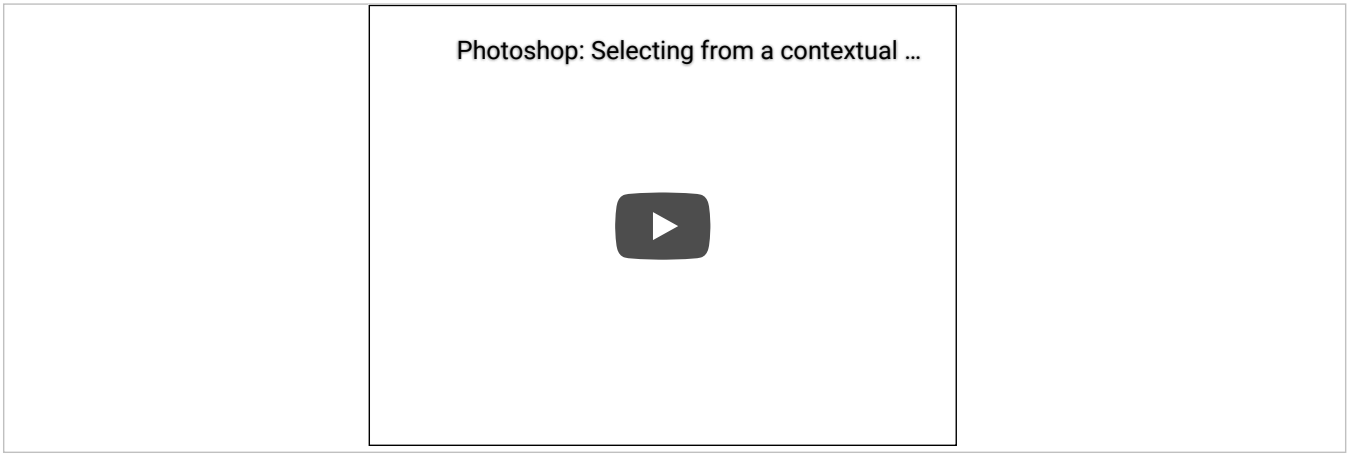
- users normally learn app functionality by visually inspecting the UI
  - *eg: available menus, menu items, icons, buttons, links, tools etc…*
- sequential tasks should be well labelled and navigation obvious
  - ***next** button obvious, and highlighted*
- usability and learnability naturally improved when options and commands clear and visible
  - *controls should be easily visible, contextually appropriate, logically placed*
- functionality within an application that is not visually represented often hard to discover
  - *keyboard shortcuts often a bad choice for sole command option*
  - *shortcut combinations often noted in visual menus*
- visibility does not, necessarily, infer that all options and functions be graphically represented
- impractical for many complex applications
  - *need for careful, considered design choices and contextual awareness*

Video - Photoshop

contextual menus

questions to consider

- How does this simple, yet powerful design feature improve usability?
- How are we helping our users by offering such contextually aware features?



Photoshop: Selecting from a contextual menu
Source: YouTube

Principles for Usability - Visibility

Fun exercise - part 2

Continue the design of a company's online services, which are available as both a responsive web application and mobile app...

Then, outline the following

- general consideration of *visibility* from the web app to the mobile app
- contextual use of *visibility* in each app's UI
- example of visual *perspective* in each app UI and UX

Principles for Usability

affordance

- a visual attribute or physical property of a given object or control
- gives the user clues to the operation or functionality of an object or control
- system parts manipulated to allow a user to interact with the given system
  - *eg: a door handle*
  - *shape of door handles, the nature of the door itself present clues to functionality*
- visual clues can be used to show UI element functionality
- eg: make controls, buttons etc appear clickable and ready for interaction
- add some highlight to show a user that a submit button is ready for a completed form
- design conventions developed for a reason
  - *offer a useful reminder of how patterns can easily be developed relative to a UI*
  - *blue underline for links on a web page*

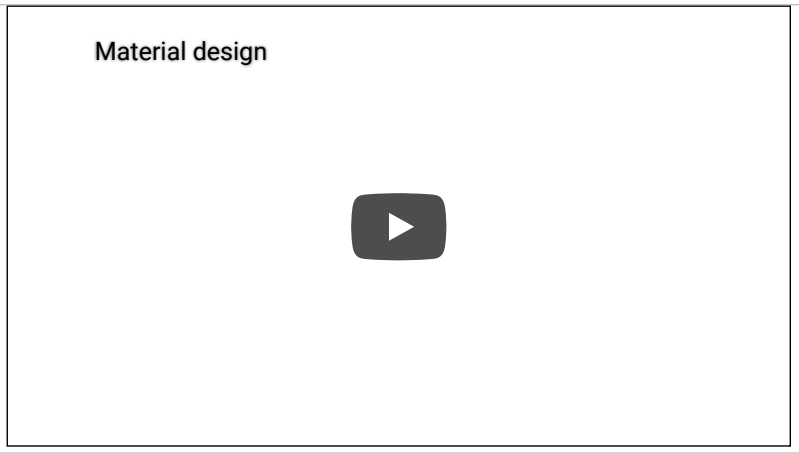
Video - Principles for Usability

material design

Again, we return to Google's recent design changes based upon its Material design guidelines.

question to consider

- How are they promoting affordance within Material design?



Google's Material Design
Source: YouTube

Principles for Usability - Affordance

Fun exercise - part 3

Continue the design of a company's online services, which are available as both a responsive web application and mobile app...

Then, outline the following

- consideration and promotion of *affordance* in the UI
- consideration and promotion of *affordance* in the UX
- any necessary differences between the web app and mobile app

Principles for Usability

mapping

- expected relationship between a performed action and the expected result
  - *mapping between a given control and its behavioural effect*
- such mappings should be logical, explicit, and straightforward
  - *descriptive labels, icons etc on buttons, menus…*
- controls should be positioned in a logical manner
  - *adhering to conventions where possible*
  - *many UI guidelines, real-world examples to help guide our design choices*
- modifications of expected conventions will cause unnecessary issues for users
  - *where necessary, reinforce with training and help…*

Principles for Usability - Mapping

Fun exercise - part 4

Continue the design of a company's online services, which are available as both a responsive web application and mobile app...

Then, outline the following

- UI conventions and *mapping*, which migrate effectively from web app to mobile app
- UI conventions and *mapping*, which *do not* migrate effectively from web app to mobile app

Principles for Usability

feedback

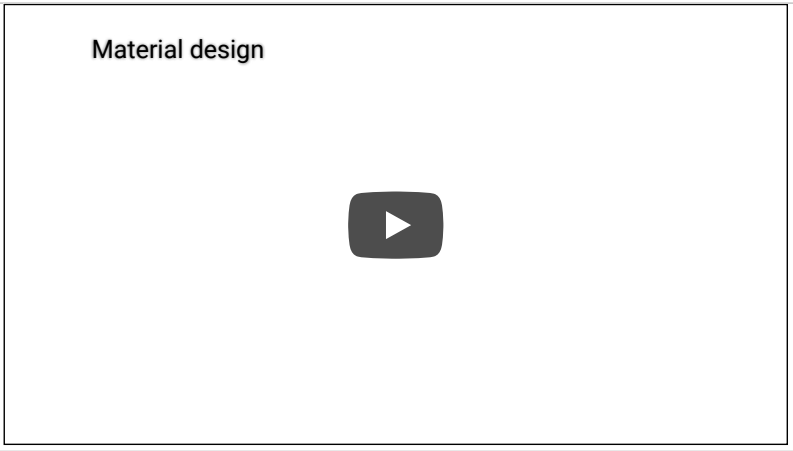
- plays a crucial role in reinforcing users' perception, expectations, general experience…
- principle of feedback states that designers should offer users confirmation or acknowledgement for the result of an action
  - *good or bad, successful or unsuccessful*
- distinguish two types of feedback
  - *activational feedback*
    - provides evidence that a given control was actioned successfully.
    - e.g. a button pressed, menu item selected, slider control moved to a new position
    - feedback may be offered visually, in a tactile manner for physical controls, an audible alert
  - *behavioural feedback*
    - provides evidence an action etc has had an effect of the application, system…
    - e.g. app closes an open, active window, shows a dialog window and status message, audible sound…

Video - Principles for Usability

material design

questions to consider

- where is feedback shown in the UI and interaction?
- how are they showing feedback to the user within the UI?
- will it reinforce user actions within an application's UI?



Google's Material Design
Source: YouTube

Principles for Usability - Feedback

Fun exercise - part 5

Continue the design of a company's online services, which are available as both a responsive web application and mobile app...

Then, outline the following

- *activational feedback* in the UI and UX for the web app and mobile app
- *behavioural feedback* in the UI and UX for the web app and mobile app
- role of *consistency* and *affordance* in these design choices for both web app and mobile app

Principles for Usability

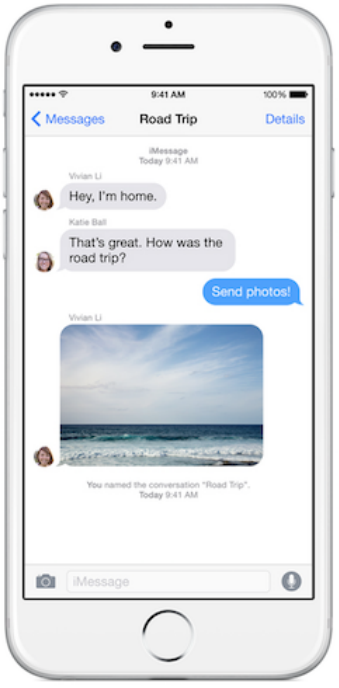
constraints

- apps and interfaces need to be designed and tested to prevent invalid states
  - *incorrect, invalid user interaction, invalid actions…*
- constraints may take various forms
  - *check correct relationships between elements and actions*
  - *check elements active only as needed*
  - *actions only performed when default data etc available*
  - *menu items active relative to contextual requirements*
  - *physical products often display such constraints*

Image - Principles for Usability

Message app on iOS

Constraints relative to type of messaging within Messages app on iOS.



Messages for iOS

Source - Apple

Principles for Usability - Constraints

Fun exercise - part 6

Continue the design of a company's online services, which are available as both a responsive web application and mobile app...

Then, outline the following

- variant *constraints* in UI design for the web app and mobile app
- role of *feedback* to promote *constraints* in the UI design for the web app and mobile app
- role of UI conventions and *mapping* to help promote UX *constraints* in the web app and mobile app

Principles for Usability

naming

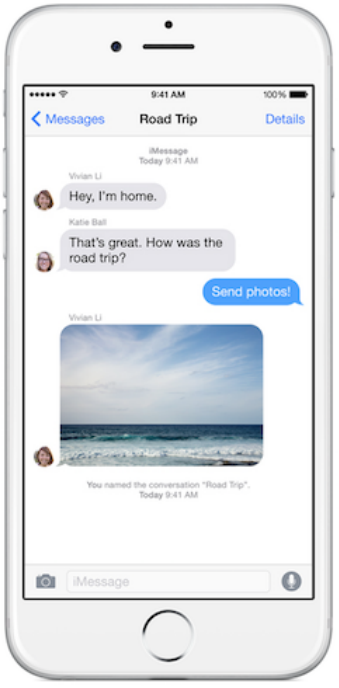
- names and labels key aspect of human communication, thought, understanding…
  - *also an important consideration in design*
- naming helps users understand the application
  - *their current location relative to navigation*
  - *the data and information they are viewing*
  - *action they can and cannot perform…*
- good naming helps a user form a correct mental model
- do not confuse naming with the use of technical jargon and terms
- precise, consistent naming helps us form unambiguous instructions, help, feedback…
- naming helps identify as well as differentiate between aspects of the design and functionality
- names should be unique relative to the context and the application
- namespaces are useful relative to application design and development

Image - Principles for Usability

good(ish) naming

questions to consider

- what do you notice about the naming scheme for the Messages app?
- does it make a difference to the clarity of this scheme by Apple's mixed use of words and icons?



Messages for iOS 8

Source - Apple

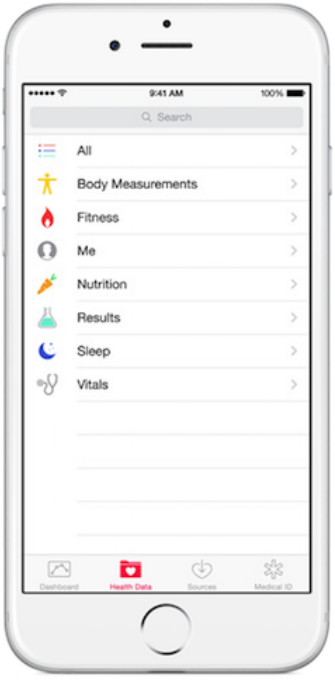
Image - Principles for Usability

bad(ish) naming

So, this time we're looking at the Health app for iOS.

questions to consider

- do you like the naming scheme for this app?
- what about the combination of icons and names?



Health for iOS 8

Source - Apple

Principles for Usability

naming guidelines - a few thoughts

- does the name accurately reflect and describe its intended target?
  - *consider the action of the element relative to the name*
- is the name clear, concise, and free of ambiguity?
- use concise, easy to remember names
  - *better than longer, hard to remember descriptions*
- does the name inherently assume prior knowledge from the user?
  - *consider naming relative to perceived domain knowledge*
- acronyms are useful, but assume prior knowledge of the domain
  - *be careful when using acronyms, and consider cultural bias*
    - e.g. VAT well known in Europe
- carefully consider capitalisation, and ensure consistency for chosen pattern
  - *e.g. This Is Capitalised…This is Capitalised…This is not Capitalised (fully)…*
- users should be able to pronounce a name…not helpful if they have to check first

Image - Principles for Usability

cultural naming concerns

Calpis Water	Pocari Sweat
	

Source: Calpis | Pocari Sweat

Image - Principles for Usability

bad naming and icon

Here we have the iOS 6 and iOS 8 icons for the Foursquare app. Firstly, the name foursquare was often used to refer to a game such as handball or a slightly more violent version often used in physical education or gym classes at school.

Secondly, notice how the app's icon has changed over time.

questions to consider

- what does the iOS6 icon remind you of?
- how have they modified the design for the iOS 8 icon? What are they trying to suggest?

iOS 6 icon	iOS 8 icon
	

Positive user experience

- we need to be able to identify traits of a positive user experience
  - *conversely, understanding a negative experience is also helpful*
- application allows a user to feel they are in control
- helps develop a sense of confidence and competence with the application
- helps encourage high productivity and efficiency
  - *enables and encourages our user to develop a sense of **flow***
- allows simple, routine tasks to be completed as quickly and easily as possible
- produces valid, useful output for the user
- user feels confident with the validity of produced results, calculations…
- considered aesthetically pleasing
- exhibits acceptable, sufficient performance to avoid unnecessary delays and waiting
- stable and reliable for the user…no *blue screen of death*
- makes it easy for a user to correct or modify any errors, mistakes…
- inspires trust and confidence in the user with logical, well-ordered design, navigation…

Negative user experience

- application leaves a user with a sense of feeling a lack of control
- overwhelming the user, creating a sense of incompetence and inadequate ability
- hinders the user from improving productivity and general efficiency
  - *prevents a sense of flow*
- simple tasks and routine patterns prove overly complicated for the user
- output from the application is flawed, incorrect, poorly formatted…
- the app may produce unreliable results and calculations
- the UI design is aesthetically disorganised, cluttered, unappealing…
- slow in performing tasks, and exhibits unnecessary delays and lags in performance
- unstable, buggy, and prone to crashing…
  - *user loses data due to poor performance*
- **excessive complexity** and difficulty in general functionality
- **too much work** involved to use the application in general
- design that conflicts with a user's perception of previous applications, iterations of a design, and competing products

Violating Design Principles

- issues that arise in usability
  - *consequence of poor interpretation, implementation, or misunderstanding general design principles*
- reconsider Norman's design principles
  - *lack of consistency*
  - *poor visibility*
  - *poor affordance*
  - *poor mapping*
  - *insufficient feedback*
  - *lack of constraints*

Designing an interaction concept

intro

- app's **interaction concept**
  - *basic summary of our base, fundamental idea of how the user interface will actually work*
  - *describes presentation of the UI to the user*
  - *general interaction concepts that allow a user to complete tasks*
- inherent benefit is that it will often highlight initial usability issues
  - *including navigation, workflow, and other carefully considered and planned interactions*
- every aspect cannot be defined and outlined at the initial design stage
- follow a more agile approach instead of formal specification documents
- prototyping a particularly effective method for
  - *testing different design ideas*
  - *receiving feedback through peer reviews and associated usability testing*
  - *representing and communicating intended design to a client etc*
- lightweight written records as supplemental and supporting material

Designing an interaction concept

analysis of interaction concepts

- interaction styles
- information architecture basics, which often include the following
  - *a data model*
  - *a naming scheme, or defined glossary of preferred names and labels*
  - *a navigation scheme*
  - *a search and indexing scheme*
- an outline of a framework for interactions and workflow
- an outlined concept for transactions and any necessary persistency
- AND, a framework for the general visual design of the application

Designing an interaction style

- app's **interaction style**
  - *fundamental way it presents itself to a user to allow interaction with available functionality*
  - *many different concepts for interaction styles and overlap*
  - *many will employ a variety or combination of these interaction styles*
- an application might present the following styles to its users
  - ***menu driven options** - user is able to select options from menus, sub-menus*
  - ***forms** - user able to enter data, respond to queries by completing forms*
  - ***control panel options** - may show data visualisations, summaries, quick access options*
  - ***command line** - allows expert, power users to control the app using commands and queries*
  - ***conversational input** - user may interact in a back-and-forth dialogue or conversational style*
    - a sense of question asked and reply returned
  - ***direct manipulation** - direct user manipulation of objects within the app on the screen*
  - ***consumption of content** - app is simply a way to consume content*
    - e.g. e-Book readers, music and video players…
- an app will normally use a combination of the above interaction styles

Image - iPhone

considerations of mobile application interaction styles

Consider for a moment some of the differences you may encounter in designing an application for mobile vs web.

questions to consider

- what are some of the immediate differences in possible interaction styles?
- how do we consider such interaction styles relative to hardware?
- if we were designing an app for both mobile and web publication, how might we limit the potential interaction style differences?

Apple iPhone

- Source - Apple iPhone

Video - Interaction Style

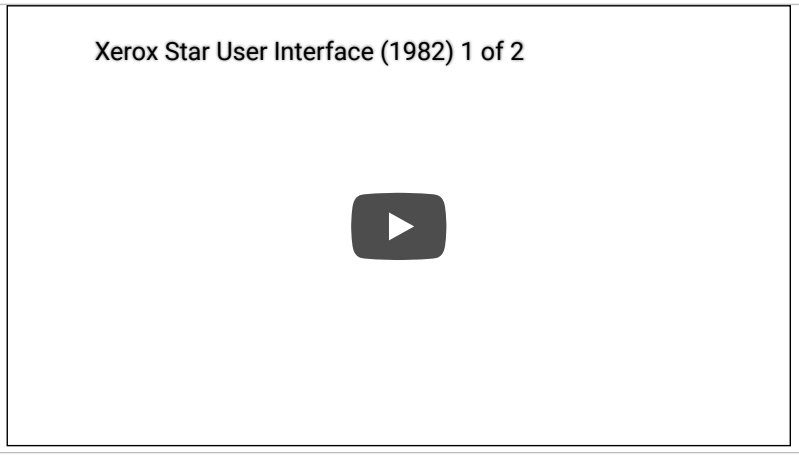
Xerox Star

The first GUI demonstrated for the Xerox Star.

Notice the interaction options for this system, including the introduction of a **mouse**, a customised keyboard, and the nature of the UI for the system.

questions to consider

- what did you notice about the expected interaction with this demo UI?
  - *in particular, the use of the keyboard relative to the UI?*
- what was the expected interaction style for the original mouse design?
- what are the benefits for the *move* and *copy* keys for this system?
- what are the obvious shortcomings of this interaction style and usage?



Source: YouTube

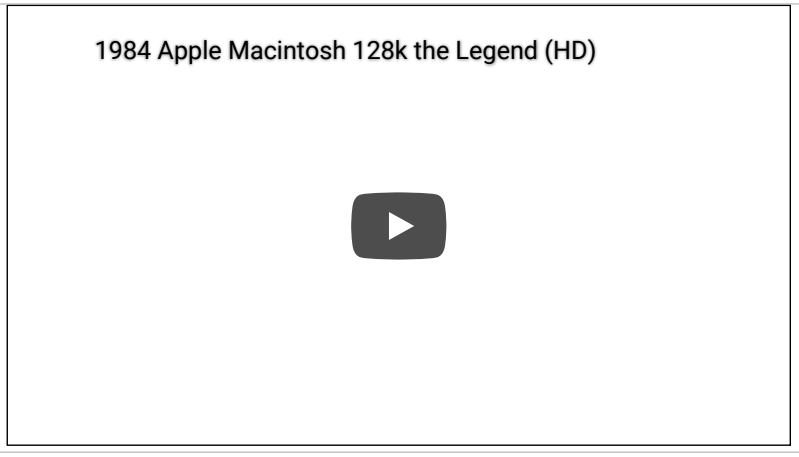
Video - Interaction Style

Macintosh UI

The Macintosh UI is often considered, incorrectly in some respects, as a copy of the previous Xerox UI. As you'll see in this demo, it might be better described as a logical evolution of some of this UI, which addresses issues with interactions noted for the Xerox UI.

questions to consider

- after reviewing this video, what is your first impression of the UI?
  - *i.e. what are the main differences in interaction style compared with the Xerox UI?*
- why do you think this incremental modification to mouse usage was introduced?



Source: YouTube

Video - Interaction Style

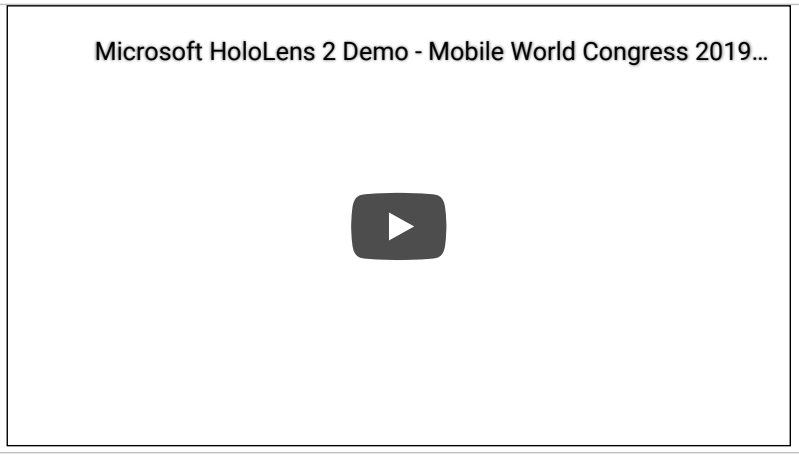
Microsoft HoloLens 2

So, we're now moving to what Microsoft calls **Instinctual interaction**. This is a demo for HoloLens 2, as shown recently at Mobile World Congress in Barcelona, 2019.

It's an interesting demo, and showcase of interaction perceptions by users.

questions to consider

- obvious question, but what has actually changed from standard desktop interactions to those shown for HoloLens 2?
- what hasn't changed? Or, effectively, what has migrated to this interaction style?



Source: YouTube

Resources

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- Cooper, A. et al. *About Face 3: The essentials of interaction design.* Wiley. 2007.
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- Tyldesley, D.A. *Employing usability engineering in the development of office products.* Computer Journal, Vol. 31. No. 5, PP. 431-436. 1988.