

# **Building User Interfaces**

## ***Platform-Specific Design***

# **Mobile Design**

**Professor Bilge Mutlu**

# What we will learn today?

- Mobile input
- Microinteractions
- Mobile design patterns

# Mobile Input

# Mobile Device Capabilities

Mobile devices have unique capabilities, including input and sensing, that expand possibilities for interaction.

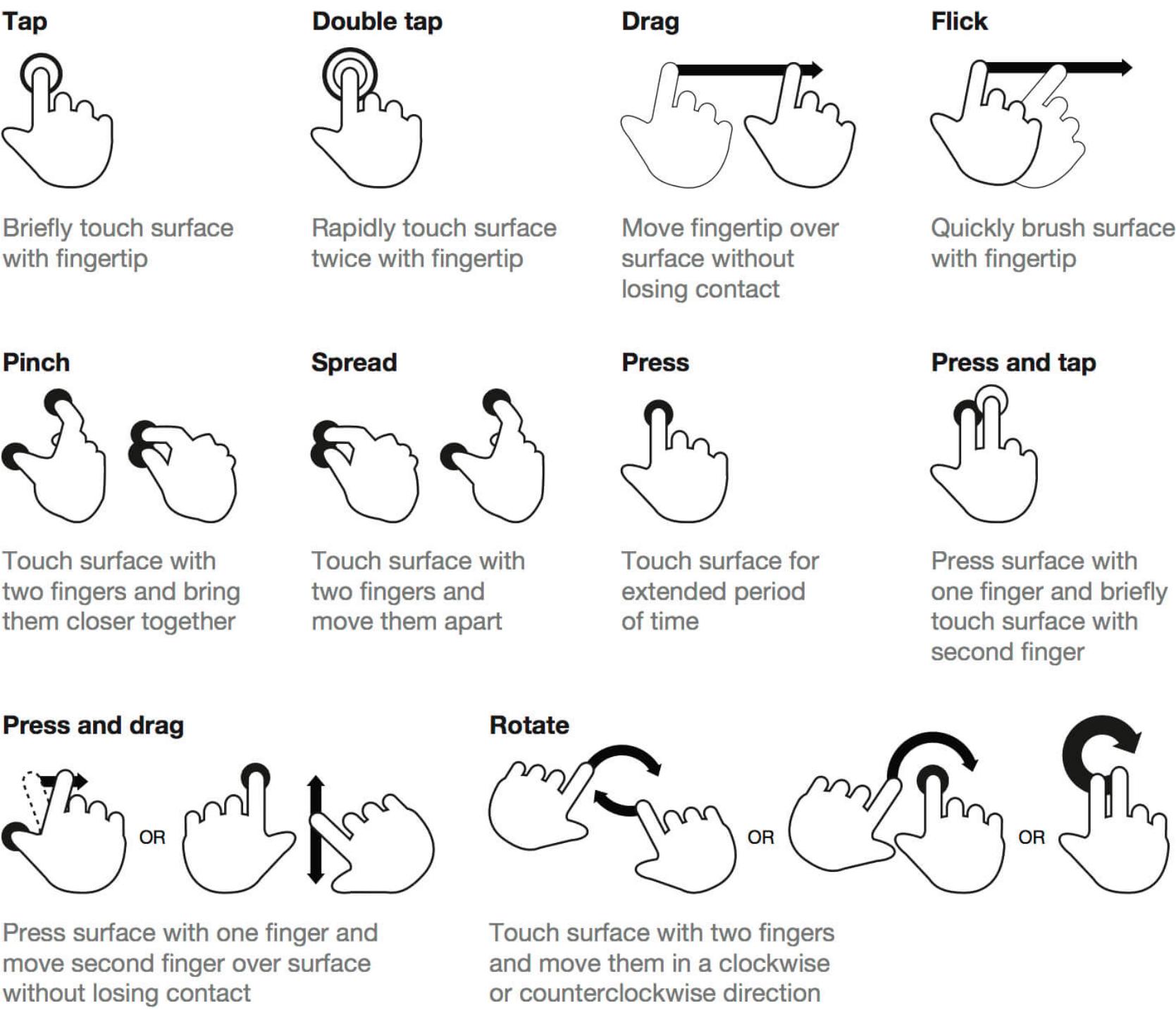
Mobile input primarily centers around the use of touch-sensitive screens that offer two capabilities: *direct manipulation input* and *multi-touch gestures*.

**Direct Manipulation Input:** In web and desktop interfaces, direct manipulation input involves mouse or trackpad input that is mapped to the screen using a *relative* mapping. On mobile devices, this mapping is *absolute*, and the user directly interacts with screen elements.<sup>1</sup>



<sup>1</sup> Image source

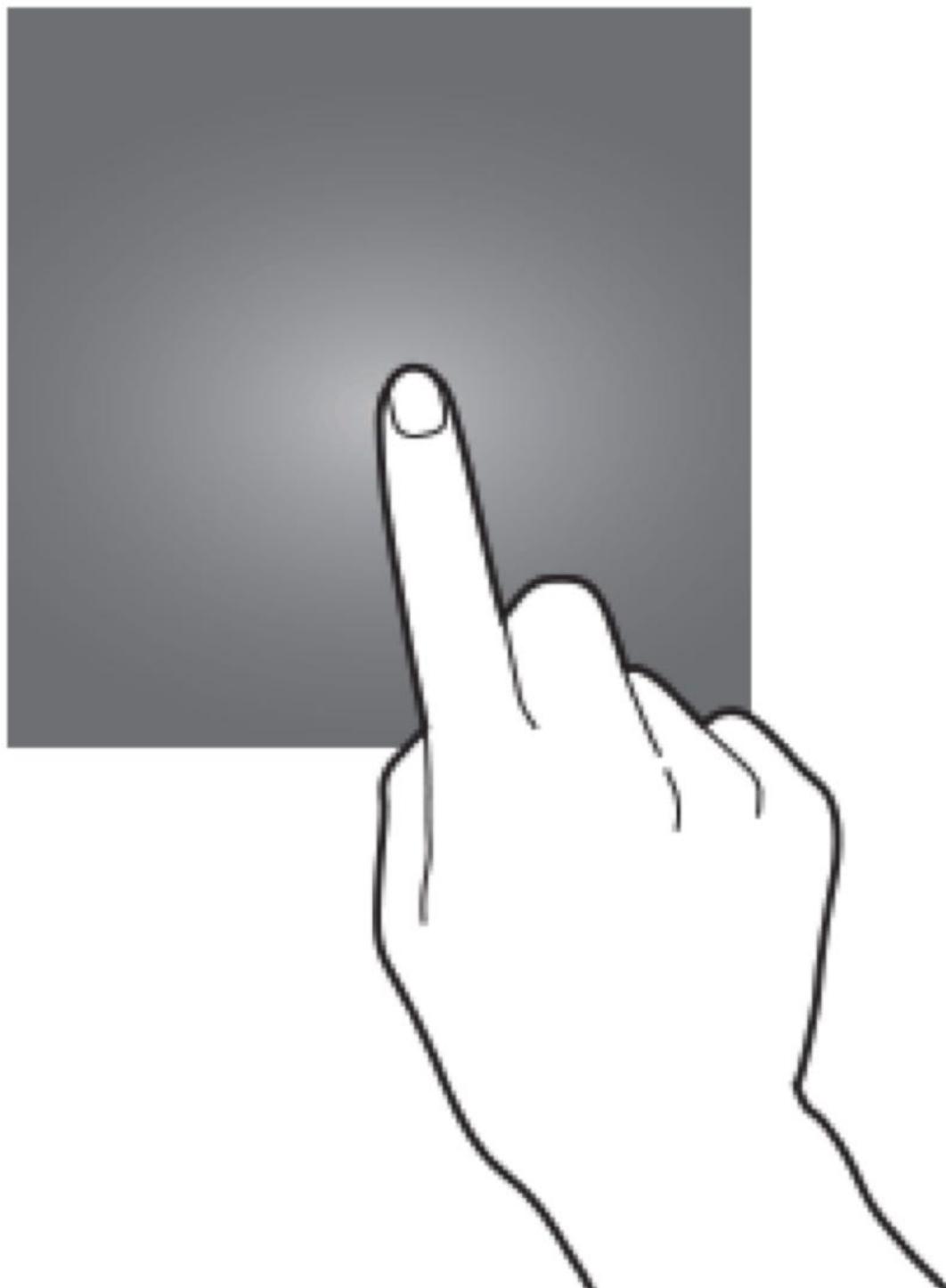
**Multi-touch Gestures:** Mobile input method include a number of idiomatic gestures dedicated to specific functions.<sup>2</sup>



<sup>2</sup>[Image source](#)

## Gestures: Tap

**Usage:** Maps to a "click" on the desktop computer to select objects or to activate/toggle the state of a control.<sup>3</sup>



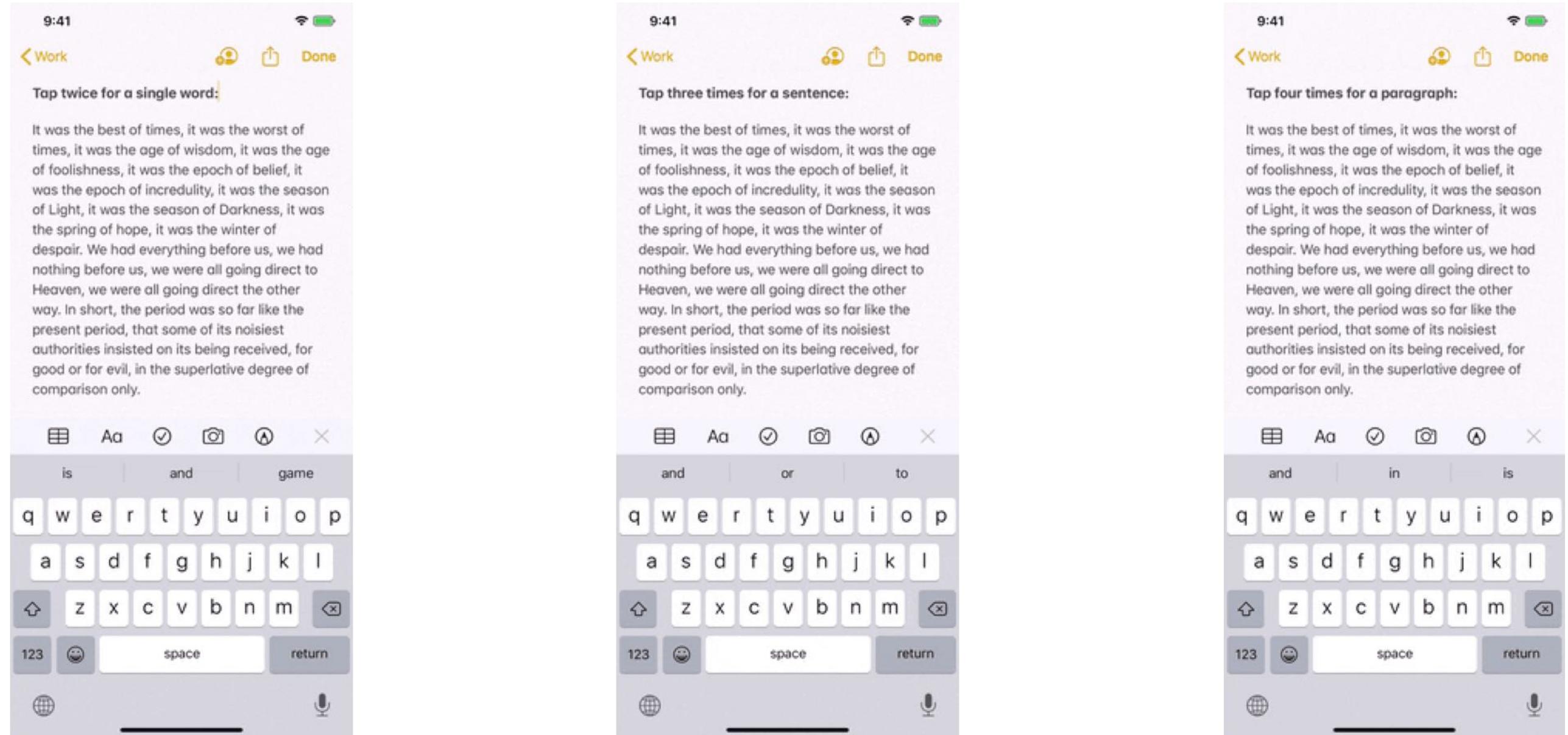
<sup>3</sup>Image source

## Gestures: Double-tap

**Usage:** Zooming in/out content, enabling other navigational modes for accessibility purposes, or selecting text.<sup>4</sup>



<sup>4</sup>Image source



## <sup>5</sup> Image source

## Gestures: Long-press

**Usage:** Opening contextual menus, previews of content, or enabling editing modes.<sup>6</sup>

The screenshot shows a mobile application interface for D&D Beyond. At the top, the time is 10:36 and the battery level is shown. The URL dndbeyond.com is at the top right. The main header features the D&D BEYOND logo with a search icon and a menu icon. The content area displays text about the 'Surprise' rule in D&D. It describes how creatures spring from trees to attack, how a 'gelatinous cube' glides down a dungeon passage unnoticed, and how one side of the battle gains surprise over the other. It explains that the DM determines who might be surprised based on Dexterity (Stealth) checks and passive Wisdom (Perception) scores. It also notes that if you're surprised, you can't move or take an action on your first turn of combat, and you can't take a reaction until that turn ends. A member of a group can be surprised even if the other members aren't.

camp, springing from the trees to attack them. A **gelatinous cube** glides down a dungeon passage, unnoticed by the adventurers until the cube engulfs one of them. In these situations, one side of the battle gains surprise over the other.

The DM determines who might be surprised. If neither side tries to be stealthy, they automatically notice each other. Otherwise, the DM compares the Dexterity (**Stealth**) checks of anyone hiding with the passive Wisdom (**Perception**) score of each creature on the opposing side. Any character or monster that doesn't notice a threat is surprised at the start of the encounter.

If you're surprised, you can't move or take an action on your first turn of the combat, and you can't take a reaction until that turn ends. A member of a group can be surprised even if the other members aren't.

**Initiative**

Initiative determines the order of turns during combat. When ~~combat starts, every participant~~

<sup>6</sup>Image source

## Gestures: Drag/Swipe

**Usage:** Used to scroll through content, move objects, or adjust controls. These gestures are the most commonly used gestures on mobile devices.<sup>7</sup>

Drag involves a swipe and hold at the same time.



<sup>7</sup>Image source



<sup>8</sup> Image source

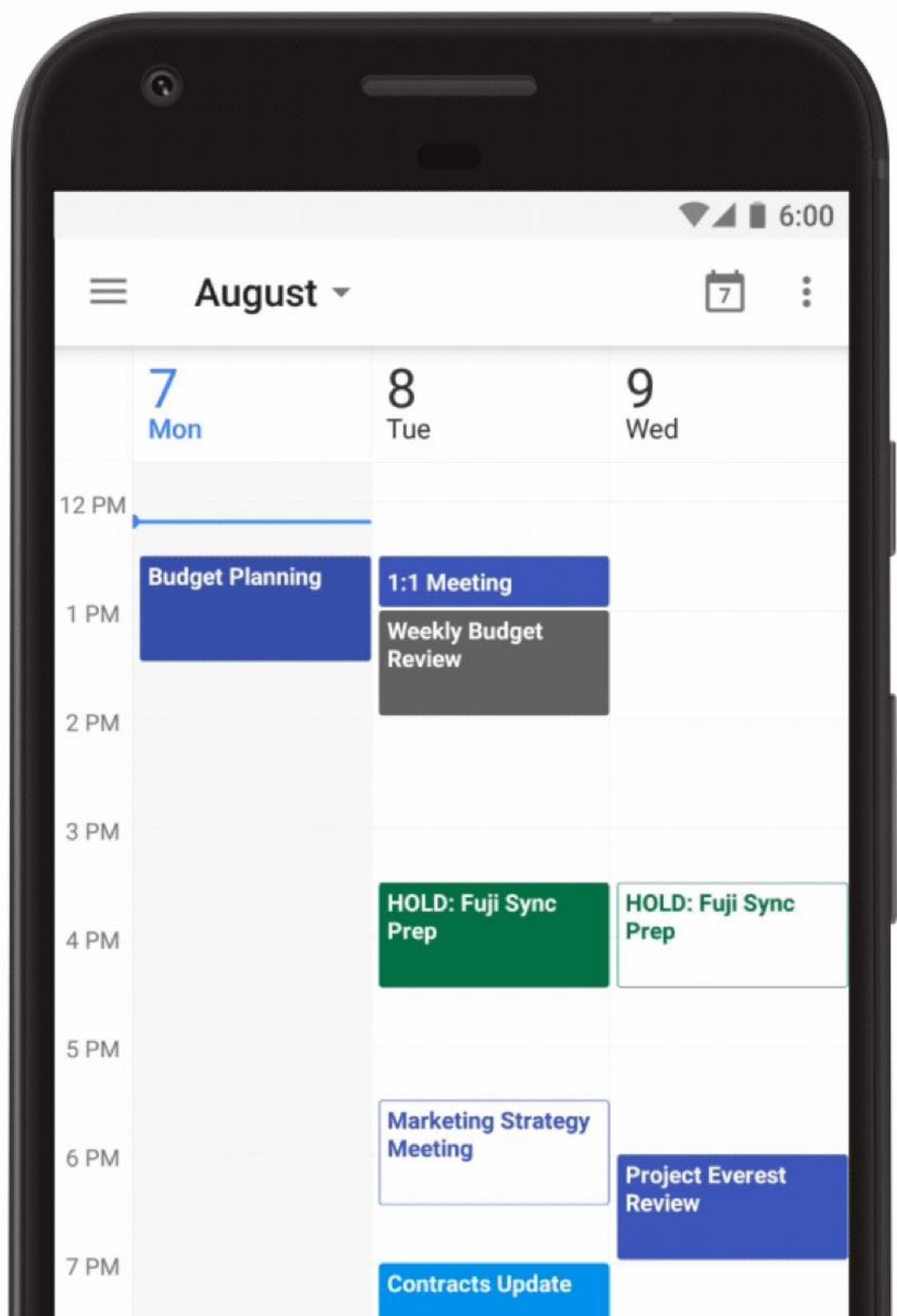


In scrolling, dragging vertically scrolls through large amounts of content, and dragging horizontally scrolls through carousels, opens drawers, and navigates to the previous/next screen.<sup>9</sup>



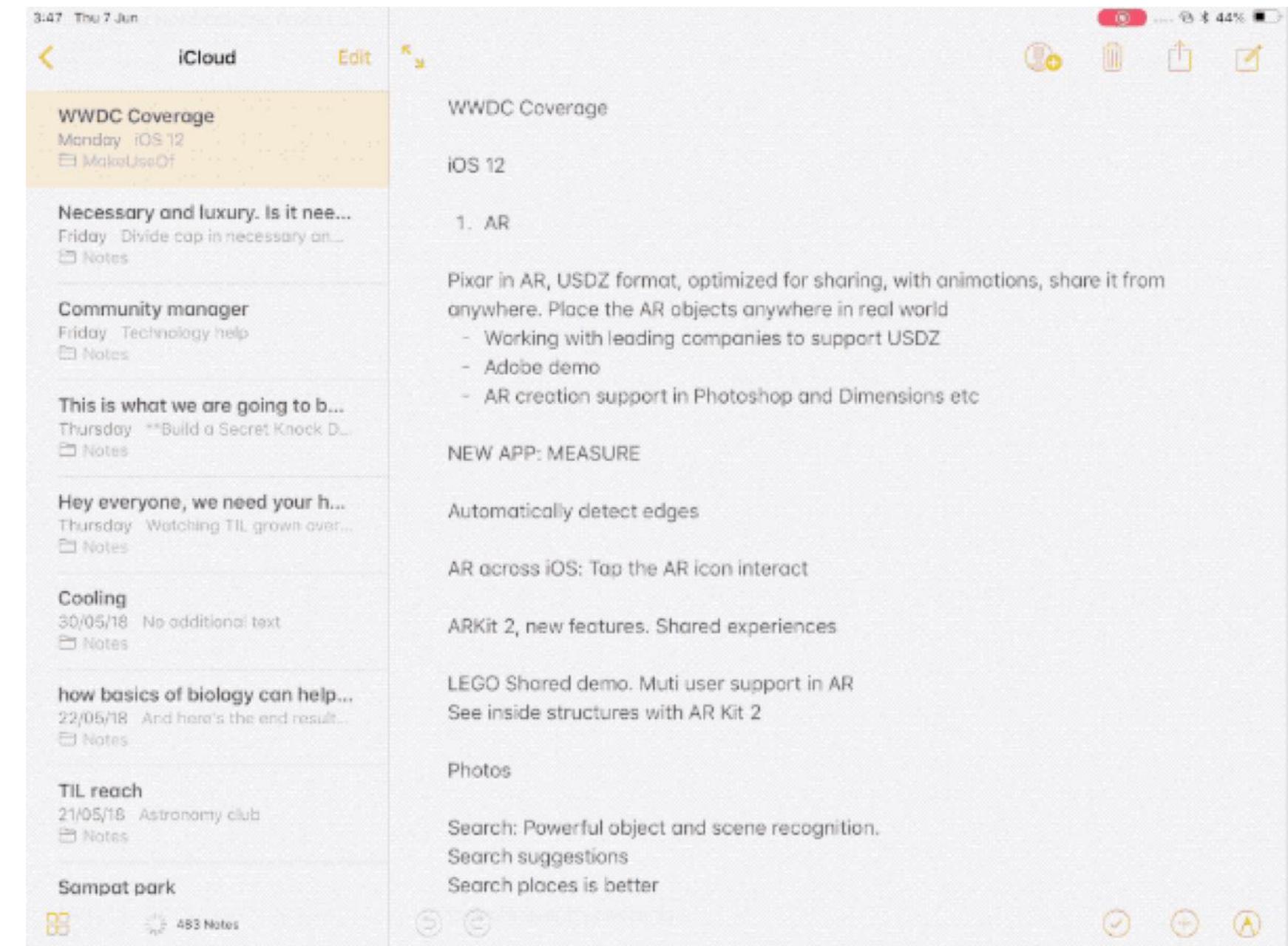
<sup>9</sup> Image source: [left](#), [right](#)

Dragging can also move objects, such as shapes on a canvas, or operate controls, such as knobs, switches, sliders, and virtual control pads.<sup>10</sup>



<sup>10</sup> [Image source](#)

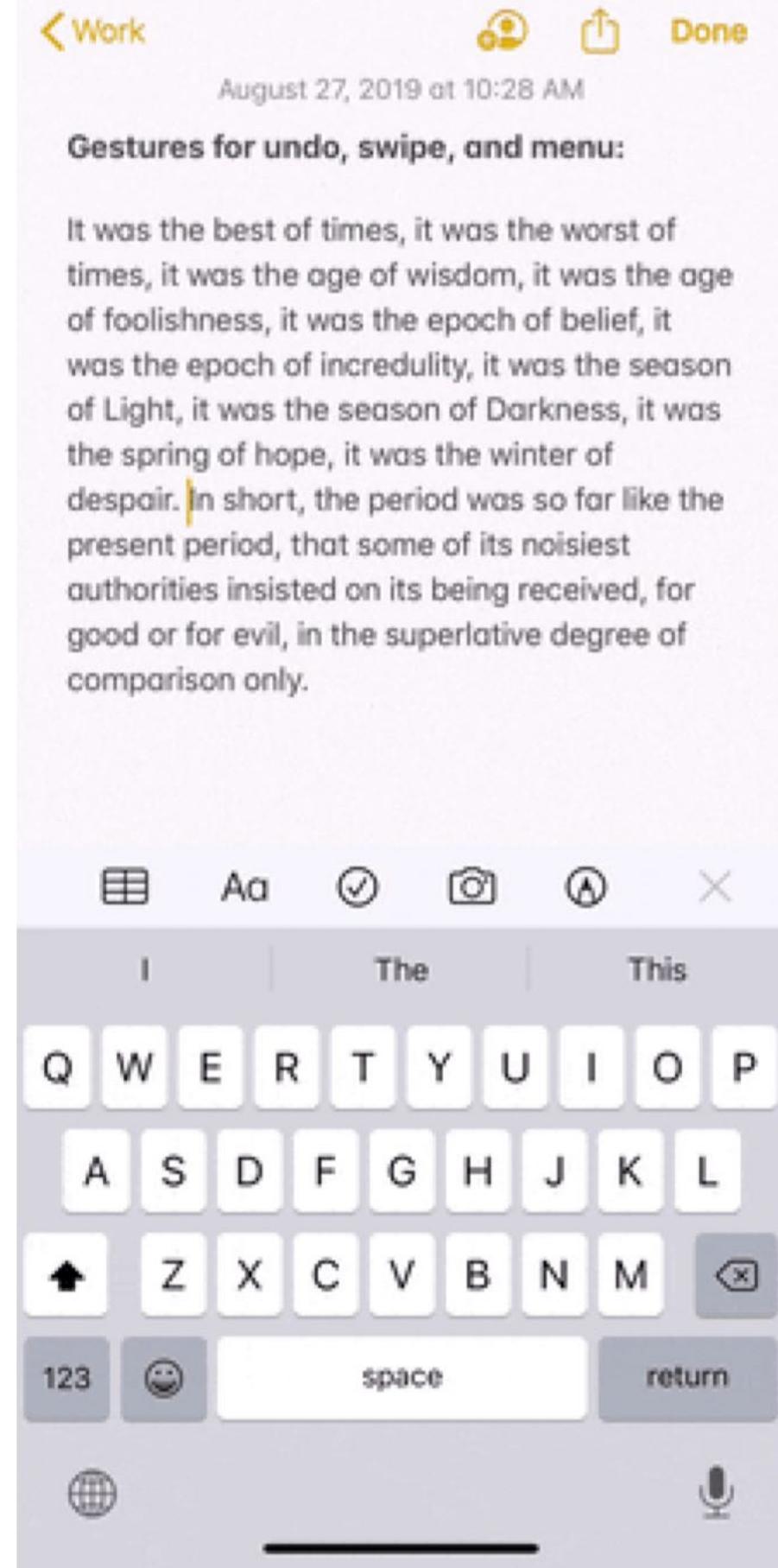
Finally, dragging or swiping with multiple fingers activate OS-level actions, e.g., switching between applications.<sup>11</sup>



<sup>11</sup> [Image source](#)

## Gestures: Triple-swipe

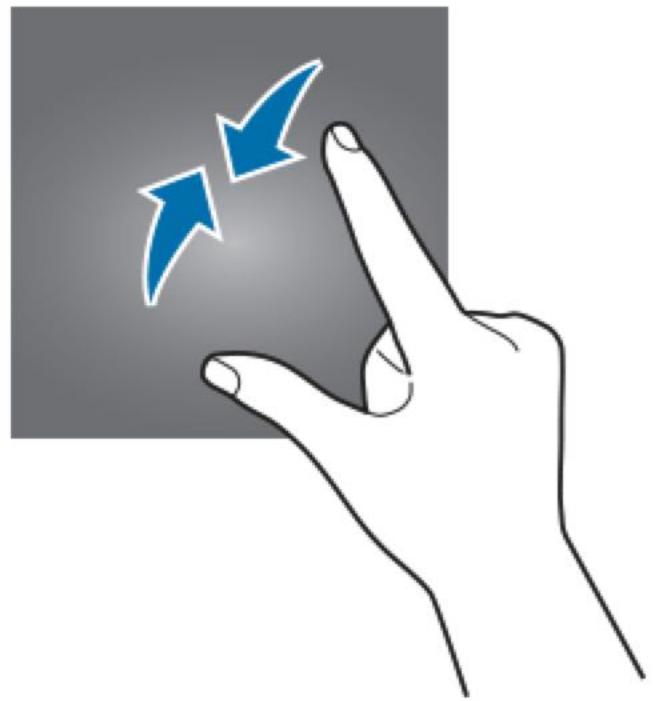
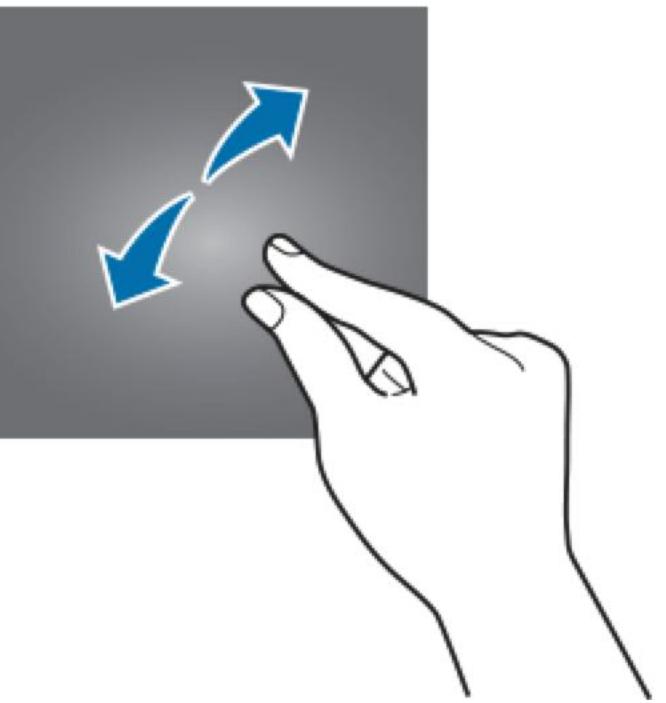
**Usage:** Mapped to specific OS-level activities, e.g., undo, that can usually be customized.<sup>12</sup>



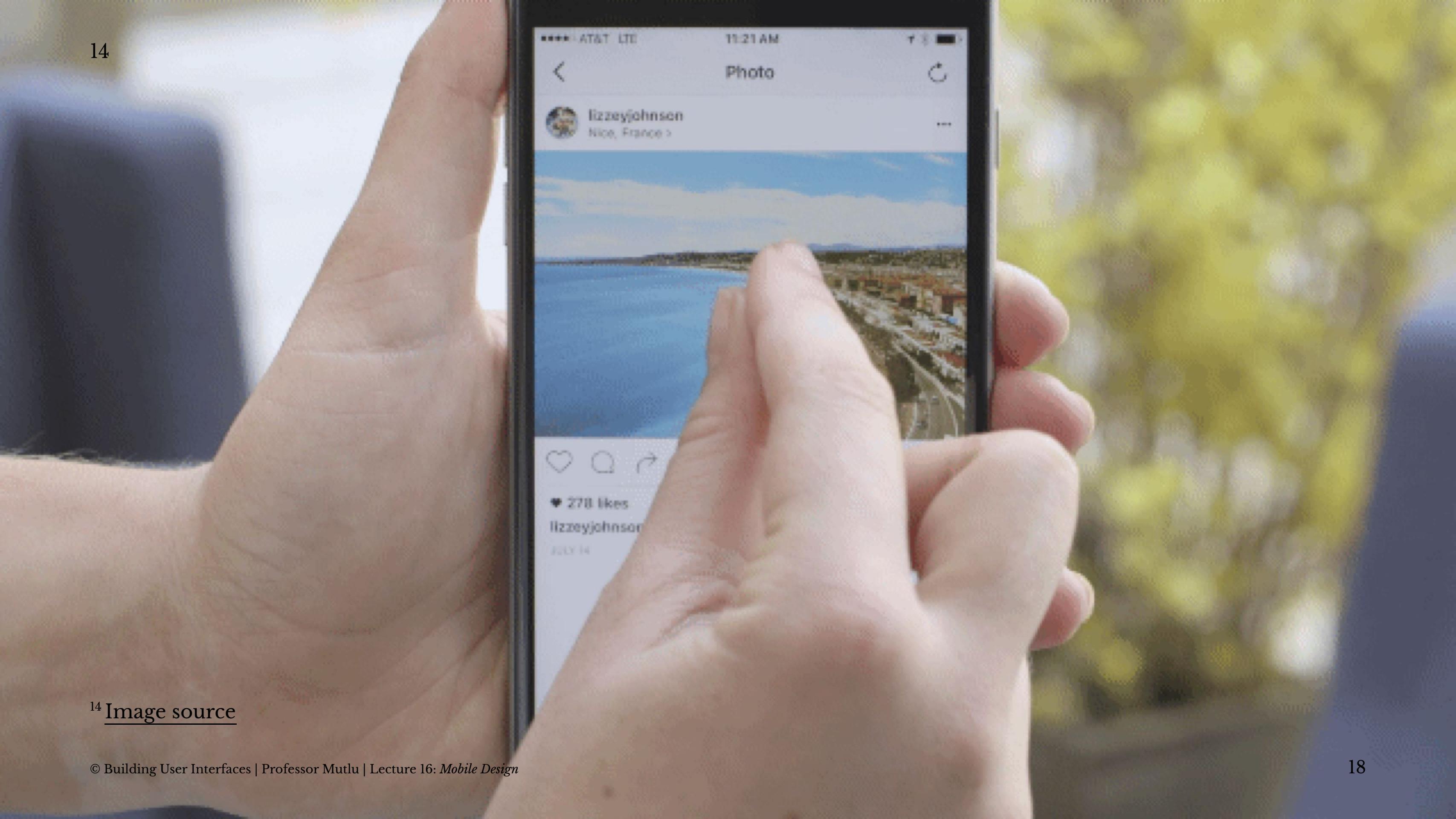
<sup>12</sup> [Image source](#)

## Gestures: Two-finger Pinch and Spread

**Usage:** Used to shrink or expand visual elements, e.g., changing the scale of a map.<sup>13</sup>



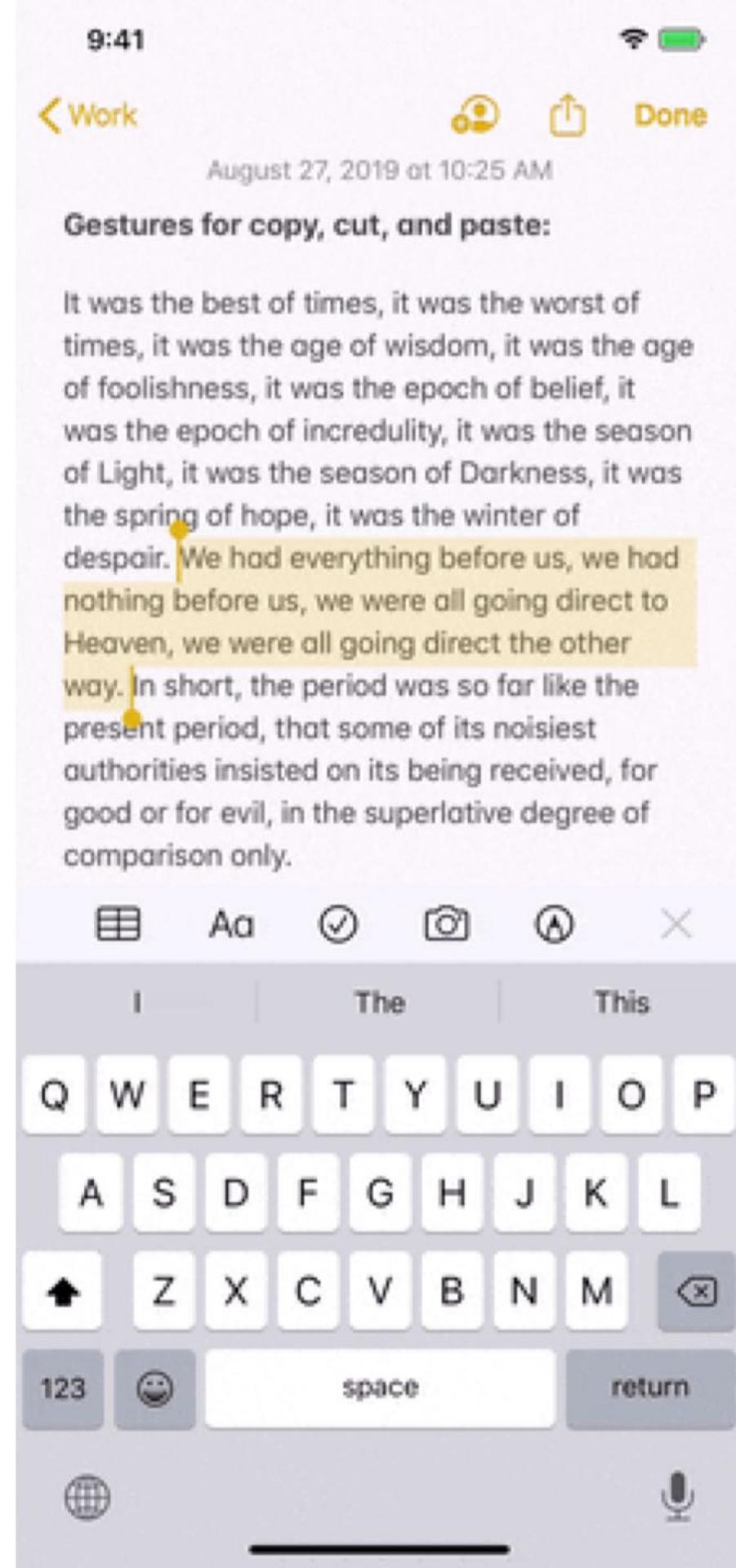
<sup>13</sup> [Image source](#)



<sup>14</sup> Image source

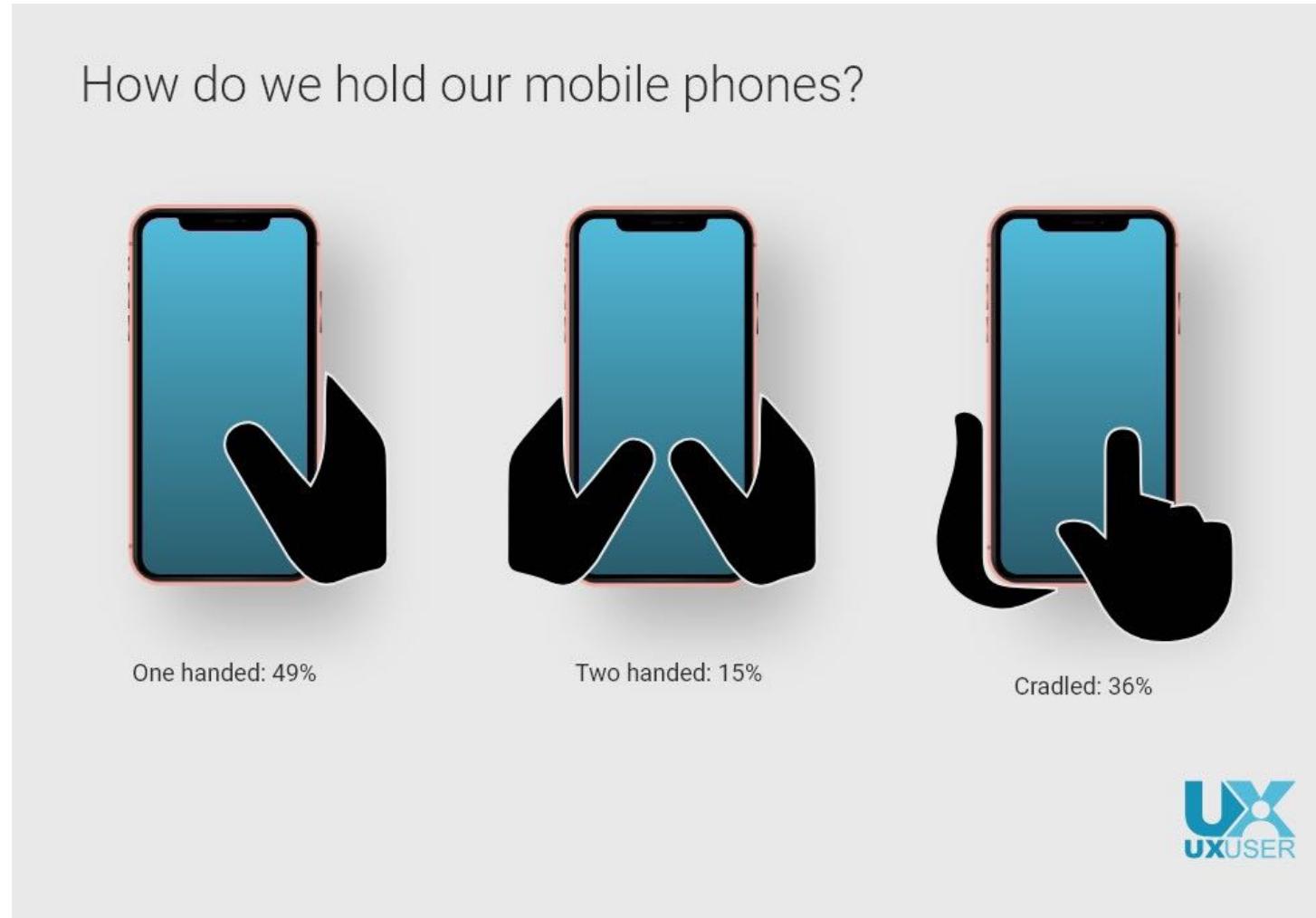
## Gestures: Three-finger Pinch and Spread

**Usage:** Mapped to OS-level actions, such as copy, cut, and paste, that can usually be customized.<sup>15</sup>



<sup>15</sup> [Image source](#)

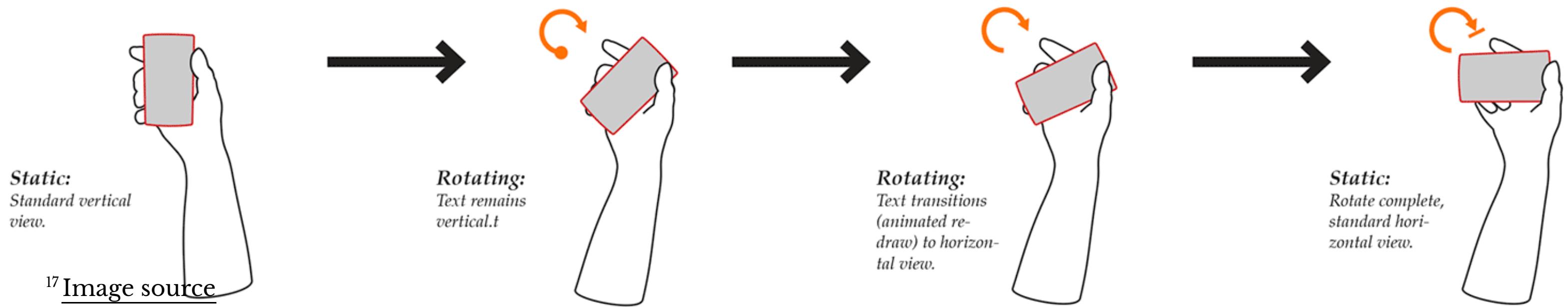
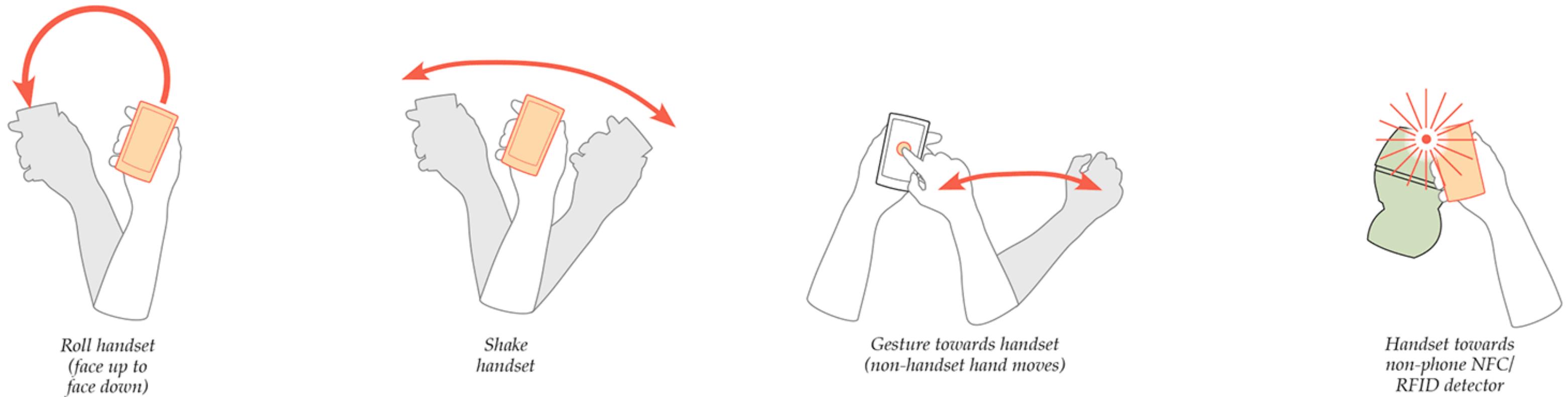
*Pro Tip:* In choosing which gestures to use, consider the context of use, e.g., how people hold their devices, how large the device is, what we are expecting to do.<sup>16</sup>



<sup>16</sup> [Image source](#)

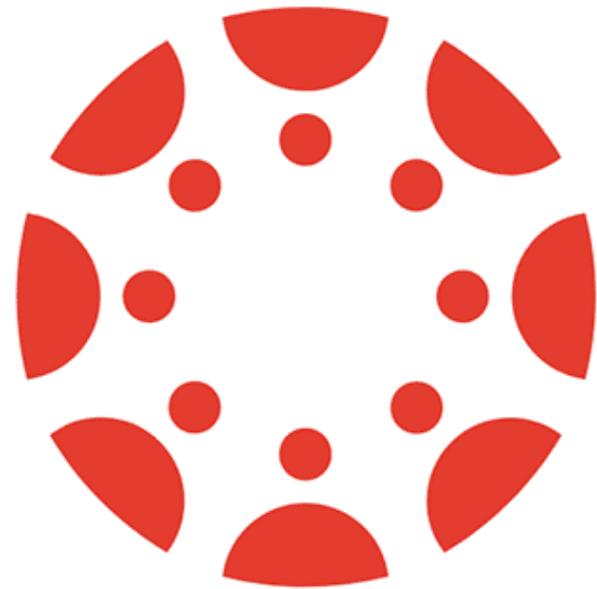
# Motion Gestures

**Definition:** Gestures that involve moving the mobile devide in specific ways, e.g., shaking to enable/disable silent mode. These gestures are usually application specific or customizable at the OS level.



# Quiz 1

Complete the Canvas quiz.



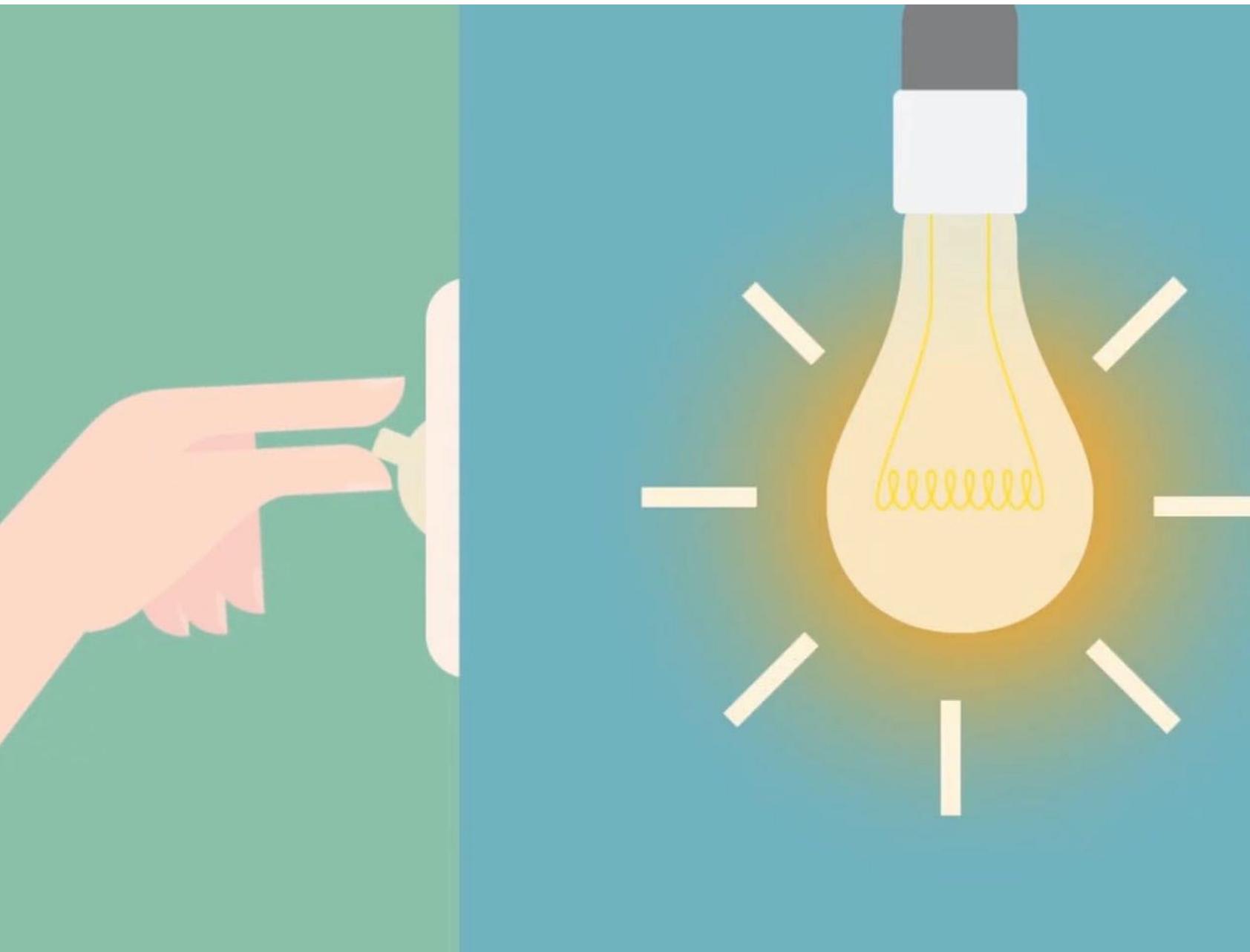
canvas

# Microinteractions

# What are *microinteractions*?

**Definition:** *Microinteractions* are contained product moments that revolve around a single use case.<sup>18</sup> [^19]

E.g., Facebook like button, pull-to-refresh action, flicking a notification to dismiss it, etc.



<sup>18</sup> Dan Saffer, 2014, Microinteractions  
[^19]: Image source: Nick Babich

# How microinteractions work<sup>20</sup>

Each micro interaction has four parts:



<sup>20</sup> [Image source](#)

## Trigger

**Definition:** Events that initiate the microinteractions. Triggers can be *manual/user-initiated* for *automatic/system-initiated*.

Manual triggers involve intentional and explicit interaction with the system, e.g., by flipping a switch, pressing a button, speaking to the system.

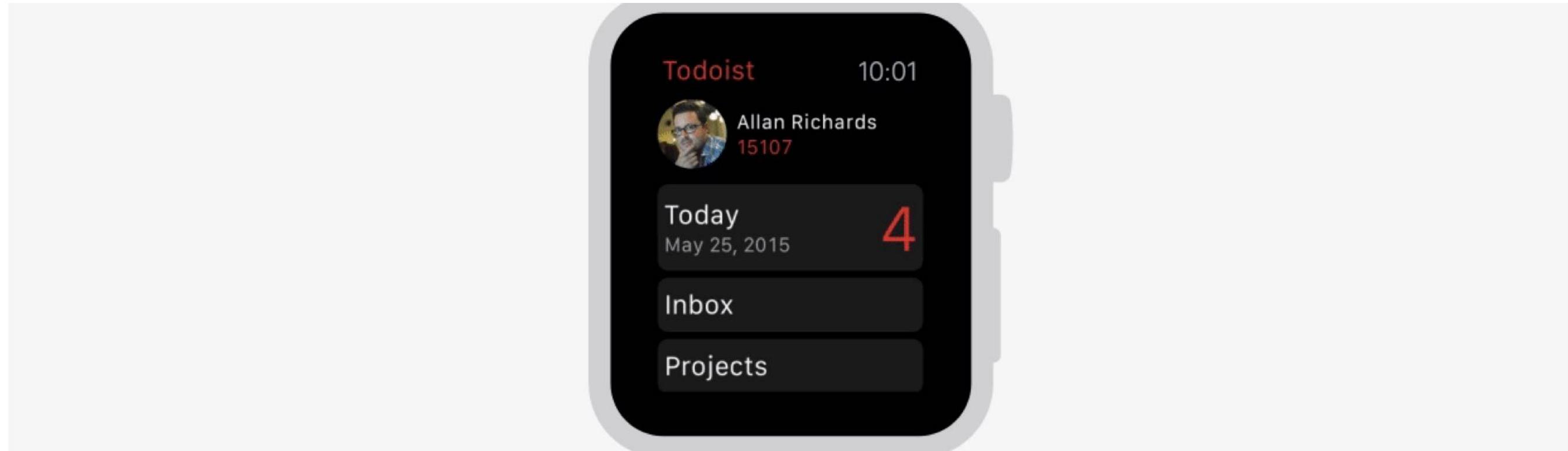
Automatic triggers occur when certain conditions are met, e.g., chime when a new text message arrives, swoosh when an email is sent.



<sup>21</sup> Image source: [left](#), [right](#)

## Rules

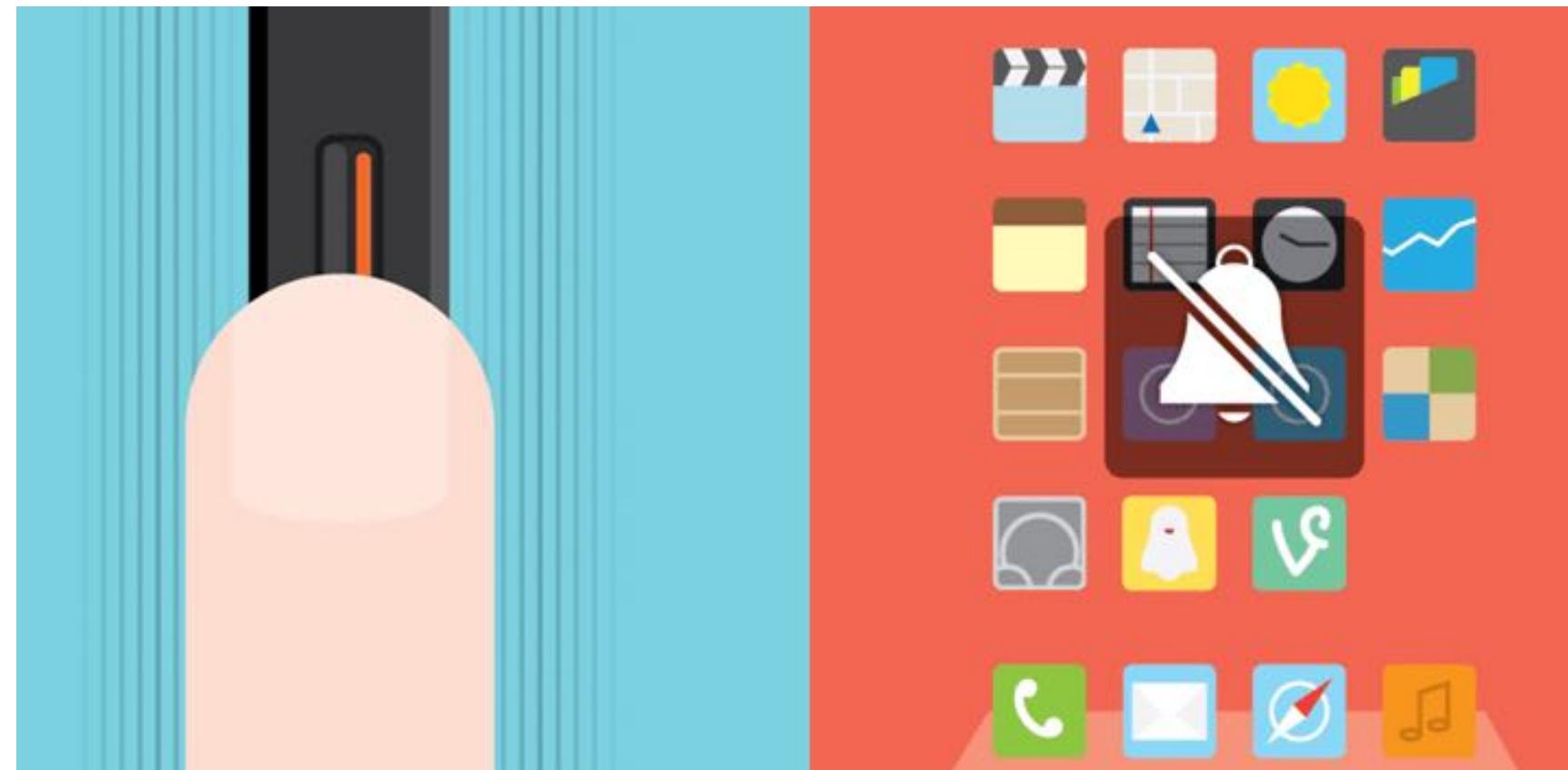
**Definition:** Rules determine what happens (and doesn't happen) in the system when a microinteraction is triggered.<sup>22</sup>



<sup>22</sup> Image source

# Feedback

**Definition:** Information that the user sees, hears, or feels are forms of system feedback on what is happening.<sup>23</sup>



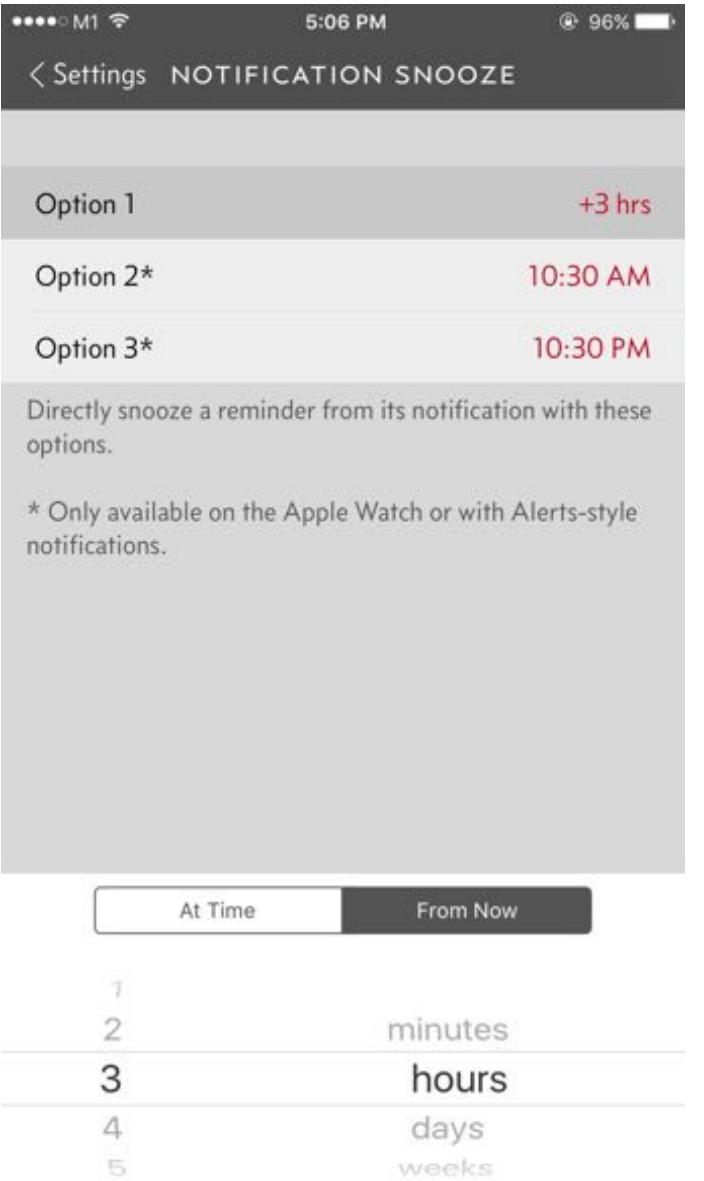
<sup>23</sup> [Image source](#)

## Loops & Modes

**Definition:** Meta-rules that, depending on *context*, change microinteraction rules and feedback (e.g., "snoozing" a reminder; chime/vibration feedback when silent mode is off/on).

*Loops* determine the length of the micro interaction and whether the interaction repeats (e.g., related beeping when you leave the fridge door open) or changes over time (e.g., microwave oven reminder to pick up food changing over time).

Modes switch the functioning or operation of the system. E.g., "do not disturb" mode that changes system behavior.



<sup>24</sup> Image source

*Pro Tips:* Minimize the scope of the microinteraction and make sure that it doesn't turn into a feature. Best microinteractions support single task, single action.

Simpler way of thinking about microinteractions is *action-feedback pairs for a single purpose*.

# In-class Activity

## Mobile Microinteractions

**On your mobile device or tablet, identify a microinteraction and describe its four elements.**

[Assignment template](#)

## Quiz 2

Complete the Canvas quiz.



canvas

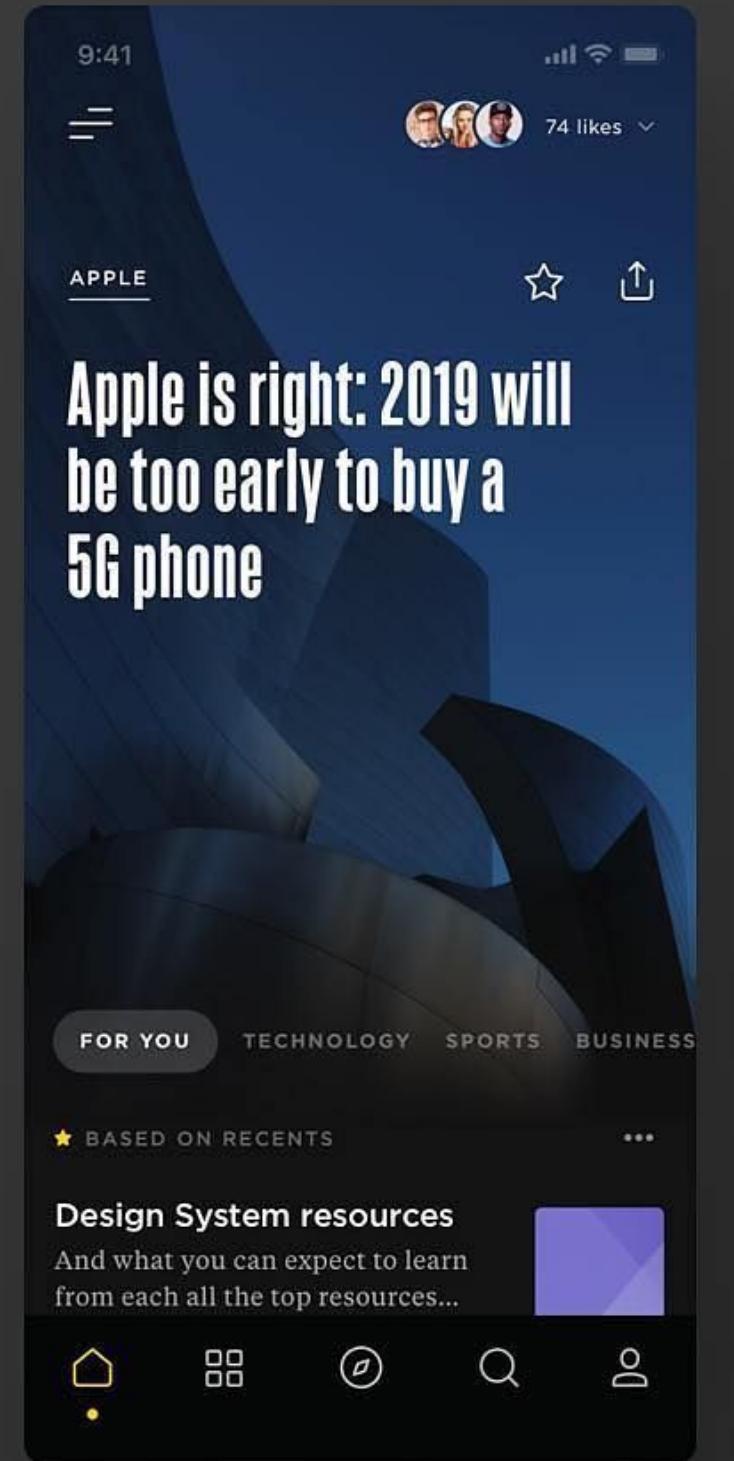
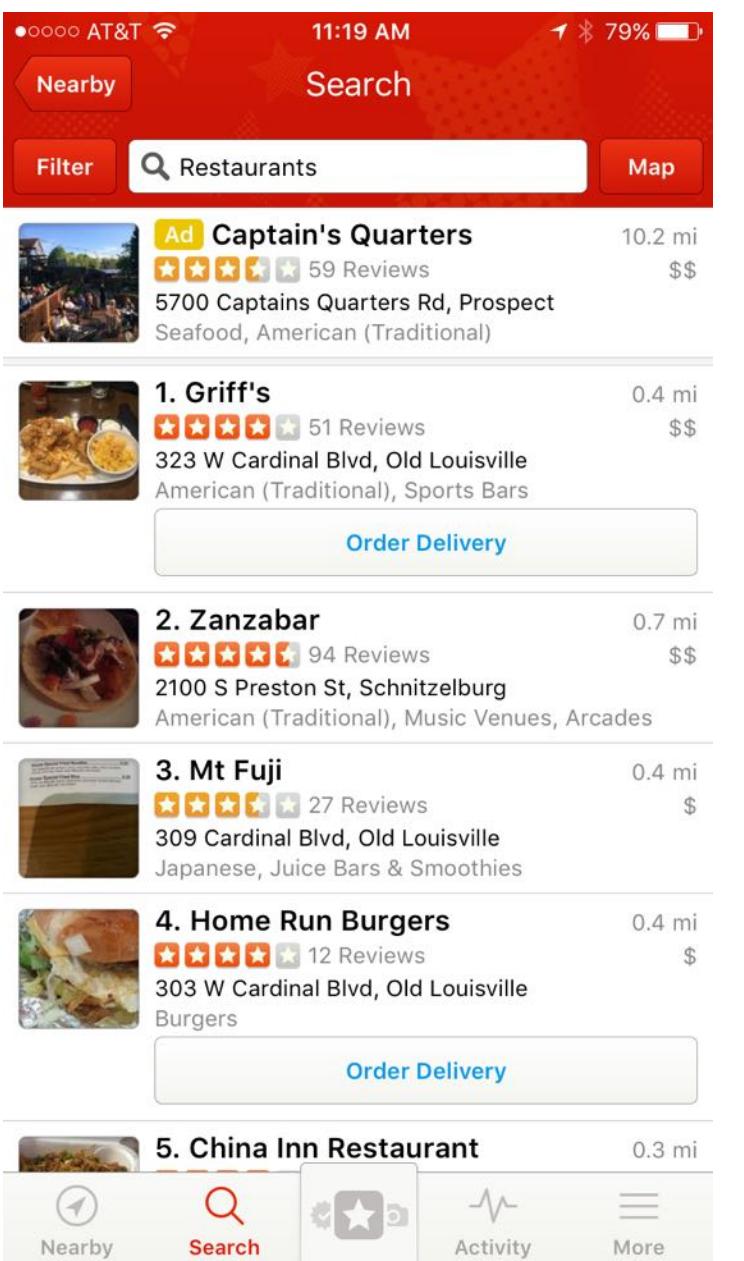
# Mobile Design Patterns

## Why mobile design patterns?

Mobile platforms are highly constrained design environments. Mobile design patterns help designers overcome these limitations by expanding capabilities for input, display, and navigation.

## Patterns: Stacks

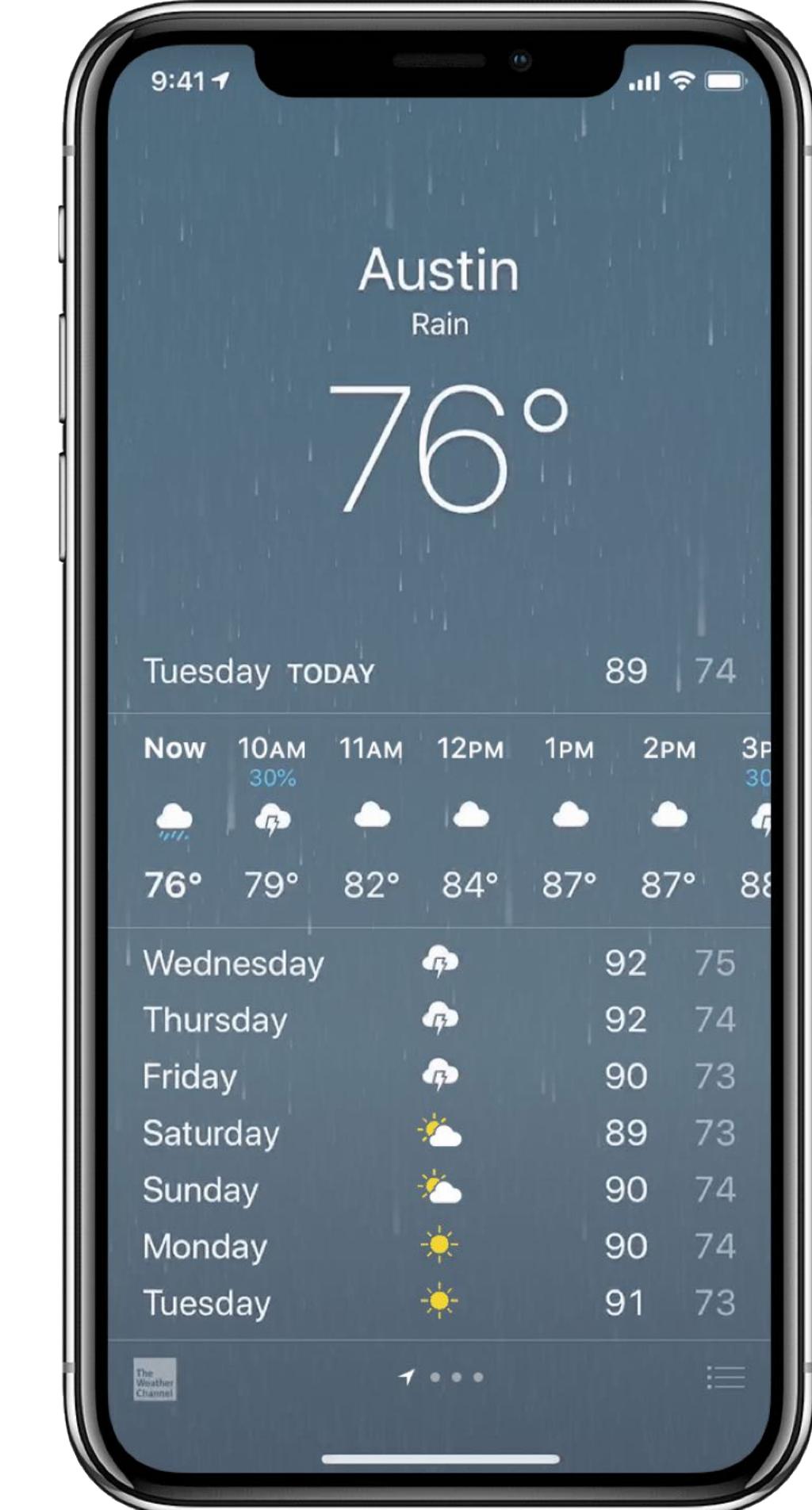
**Usage:** Used to vertically organize design elements such as a toolbar, content panes, and a navigation bar to maximally utilize the vertical space in mobile devices.



<sup>25</sup> Image source: [left](#), [right](#)

## Patterns: Screen carousels

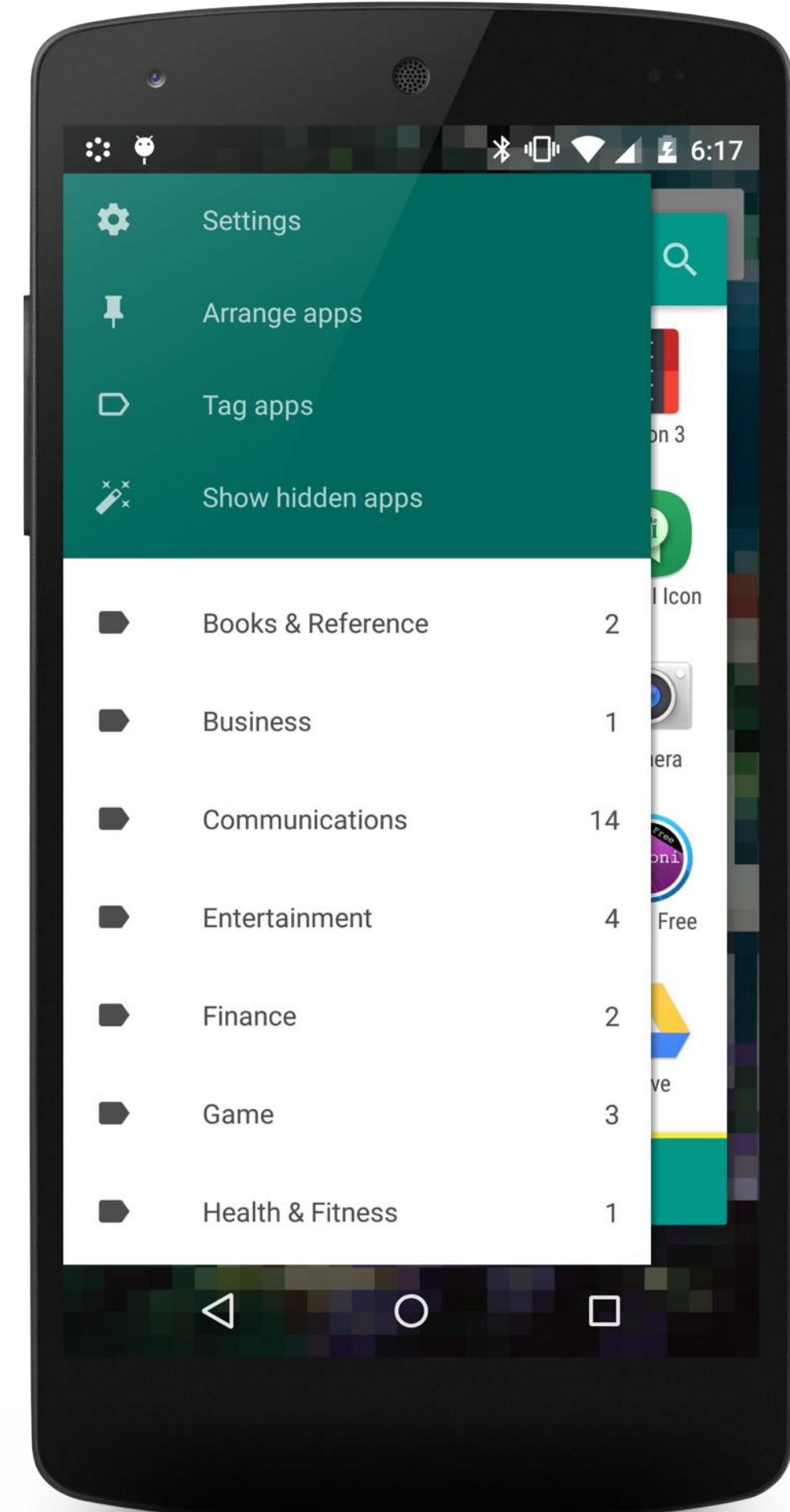
**Usage:** Full-screen content panes that can be placed on a horizontal array to display different instances of the same kind of information, such as weather information for different cities.<sup>26</sup>



<sup>26</sup> [Image source](#)

## Patterns: Drawers

**Usage:** Drawers provide links for navigation or controls for the various settings of the application.<sup>27</sup>



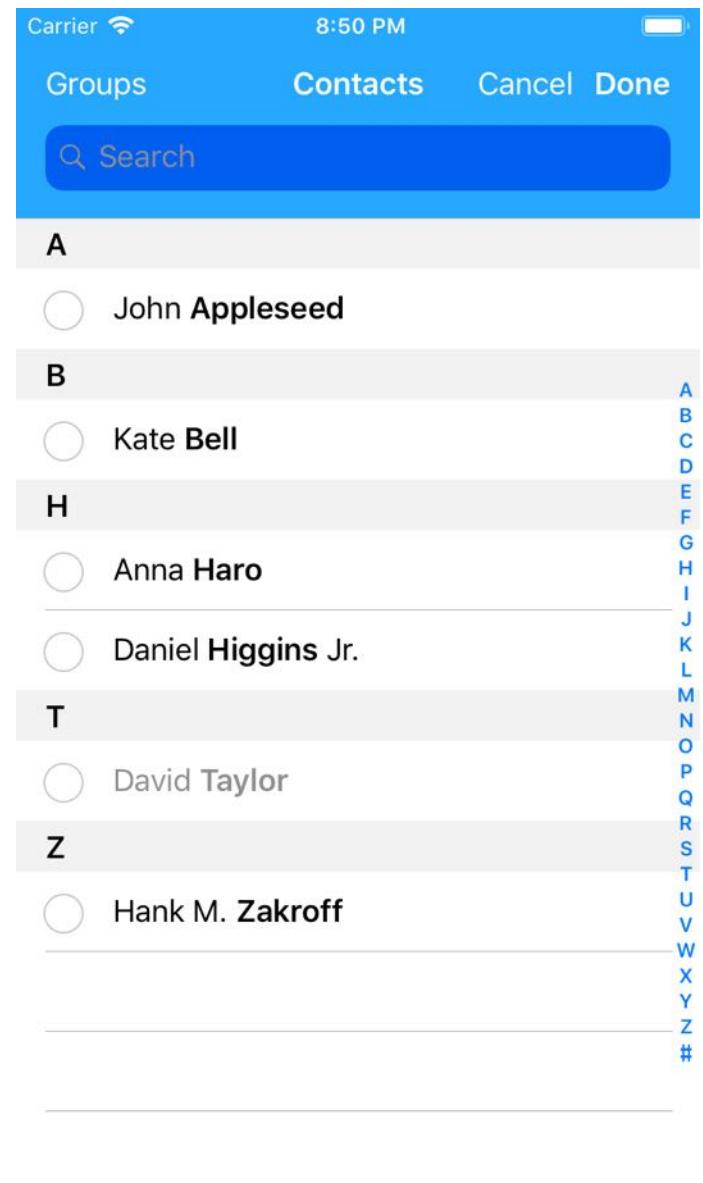
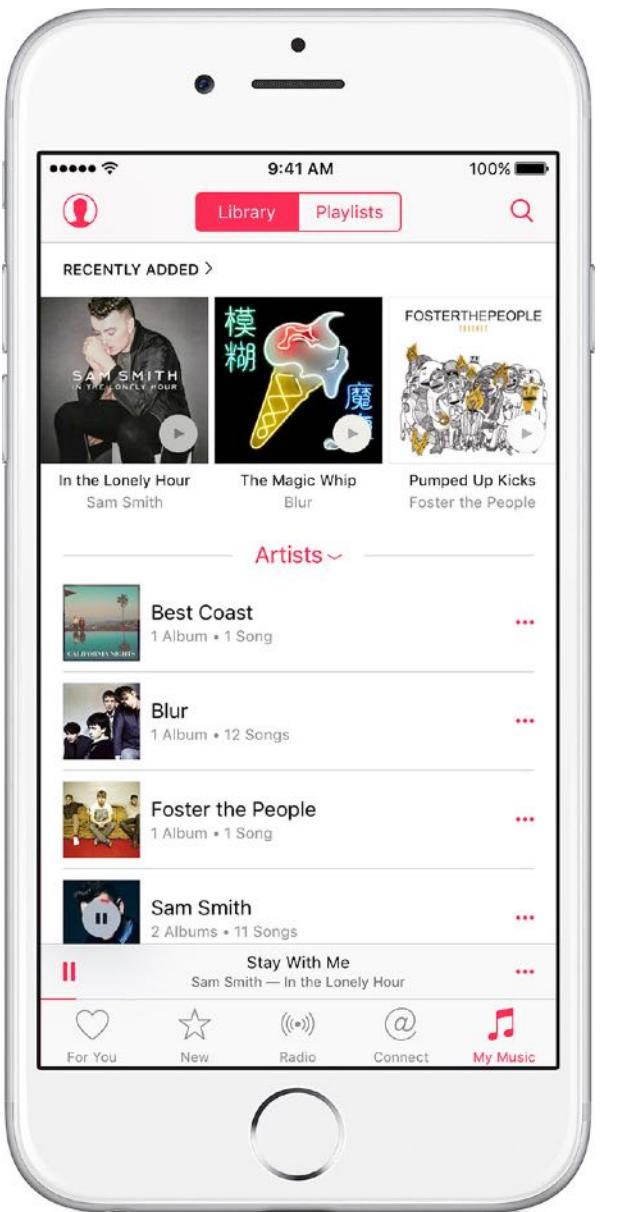
<sup>27</sup> [Image source](#)

## Patterns: Lists & Grids

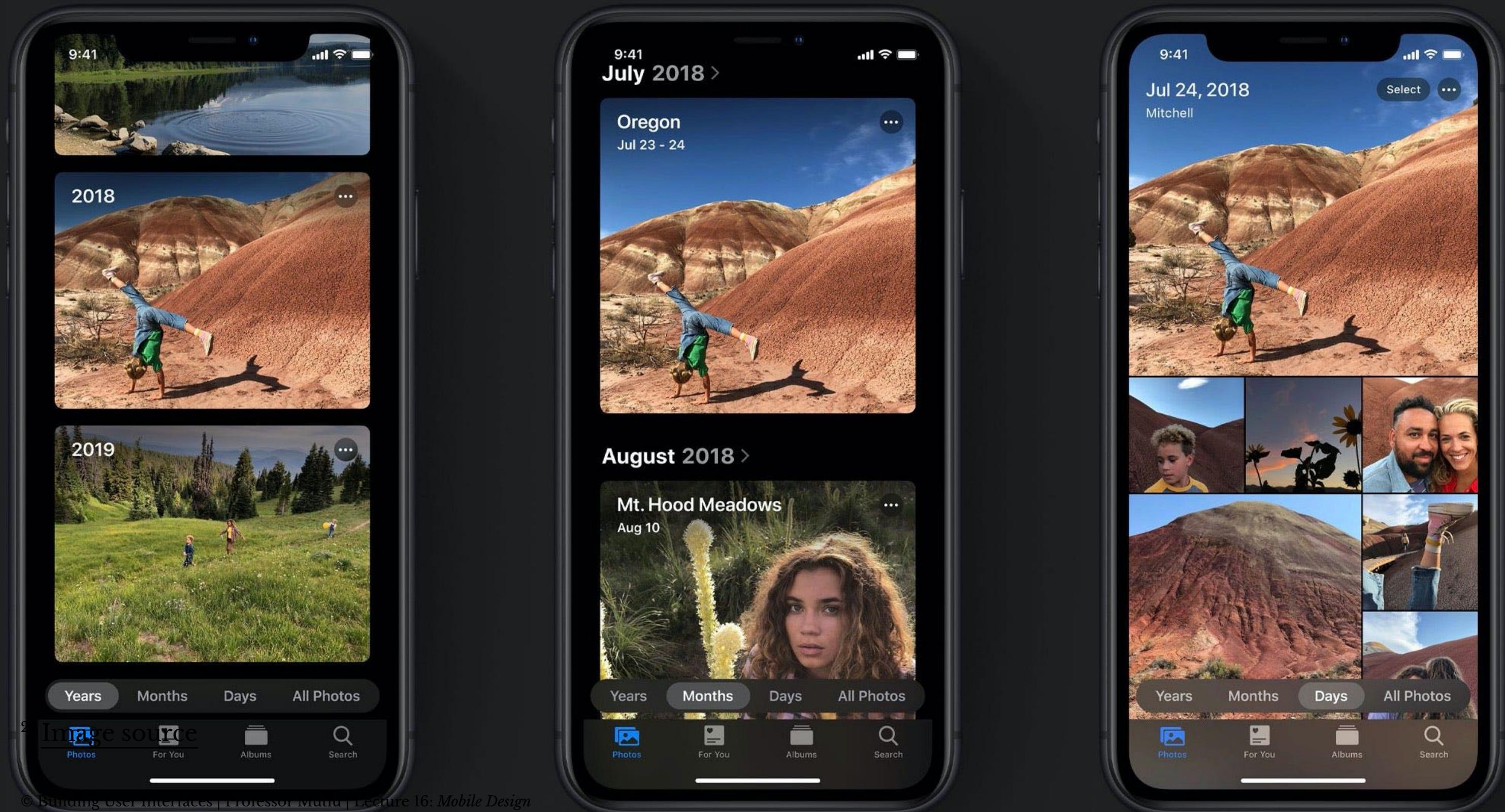
**Usage:** Lists involve vertically stacking a large number of items, including text, controls, and thumbnails, and supporting navigation through vertical scrolling.

Grids involve a large continuous grid or multiple panes of grids that users can scroll through vertically or horizontally.

Grids are more commonly used for information with more visual content, such as media thumbnails, icons, and photos.

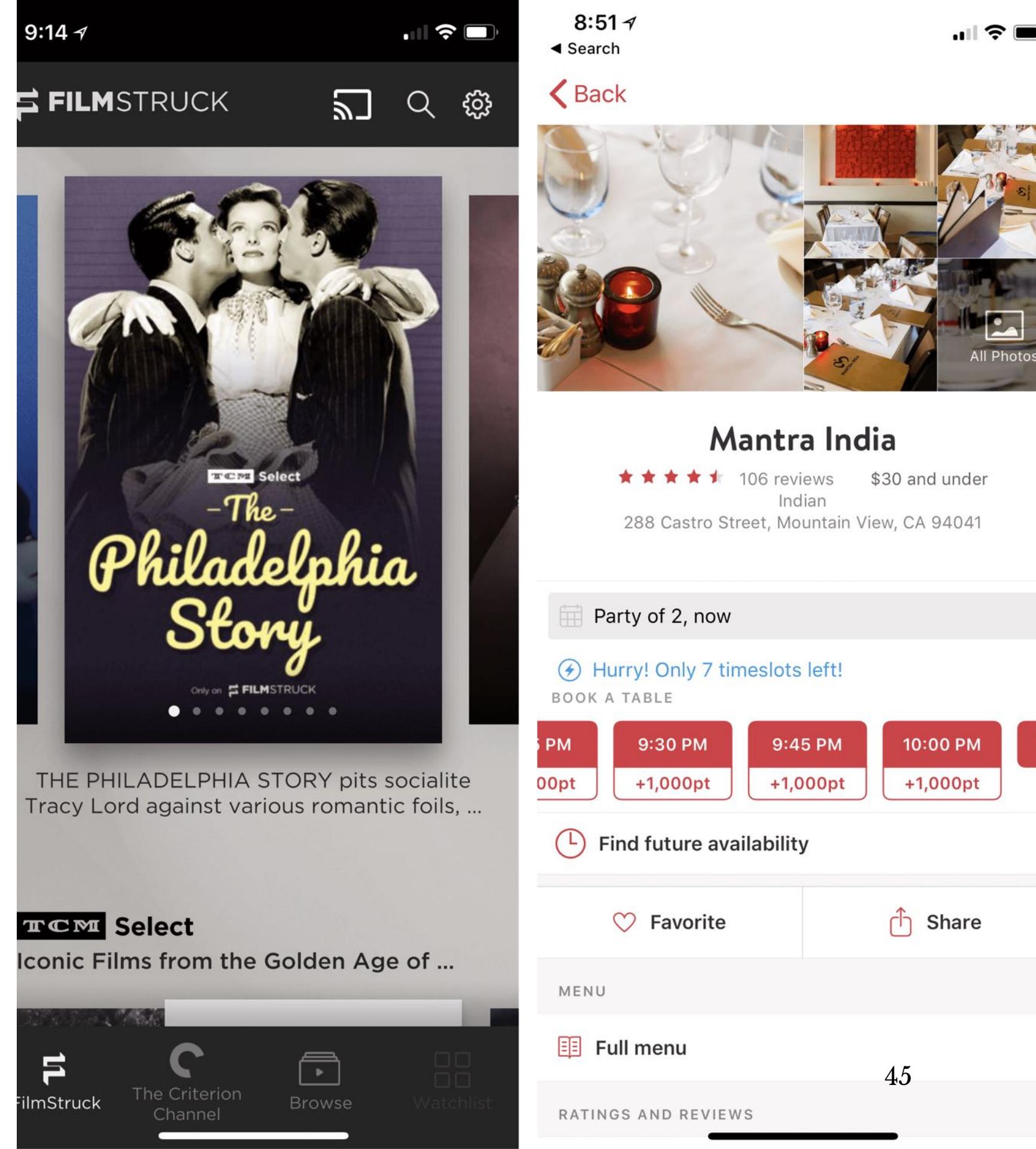


<sup>28</sup> Image source: [left](#), [right](#)



## Patterns: Carousels

**Usage:** Content carousels provide a row of content items including images or textual cards that users can navigate through by swiping left and right.<sup>30</sup>



<sup>30</sup> [Image source](#)

## Patterns: Swimlanes

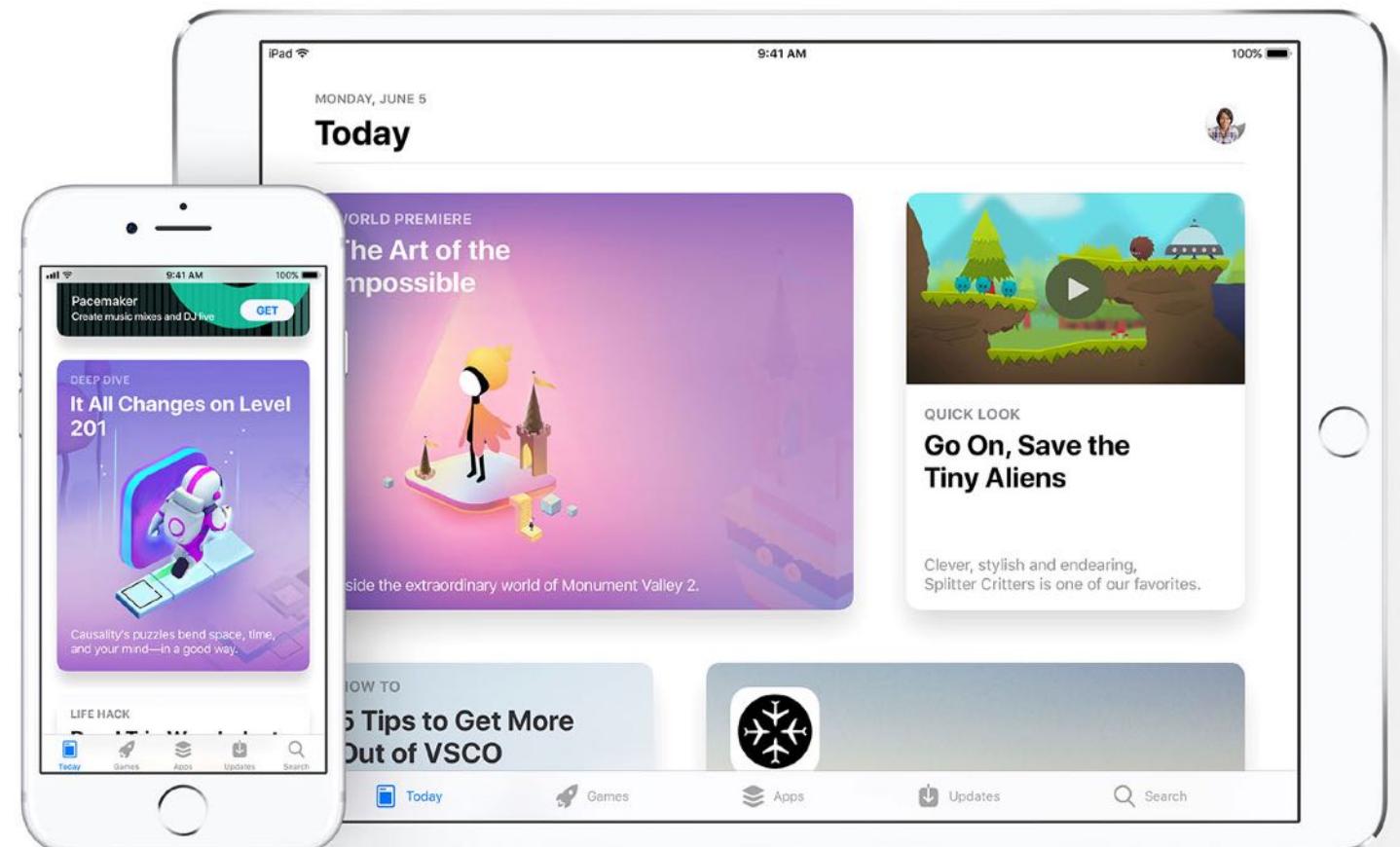
**Usage:** Swimlanes are stacked content carousels that each show a row of items, enabling visual browsing through several different lists with minimal navigation.<sup>31</sup>



<sup>31</sup> [Image source](#)

## Patterns: Card

**Usage:** Cards are similar to lists and grids, but they put together different compositions of multimedia content, including images, text, and links, on a column, row, or grid that users navigate through by swiping horizontally and vertically.<sup>32</sup>

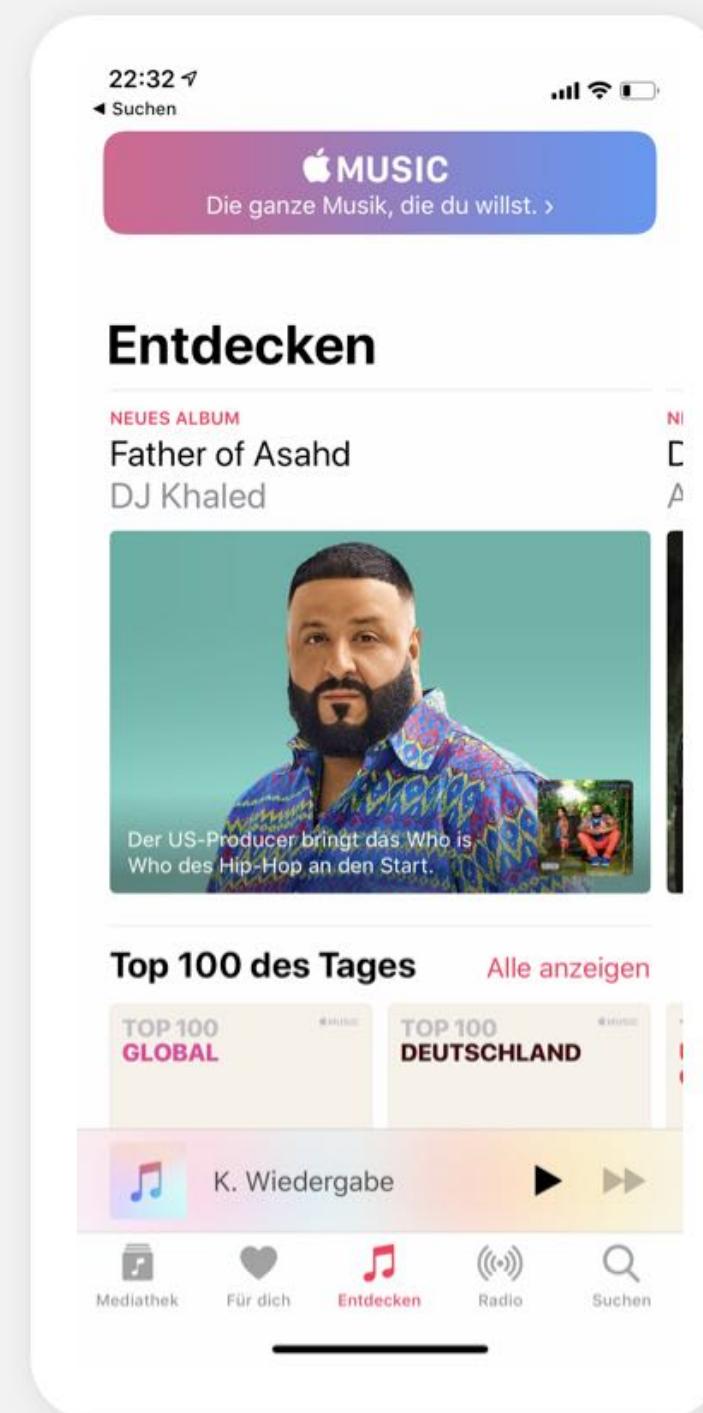


<sup>32</sup> [Image source](#)

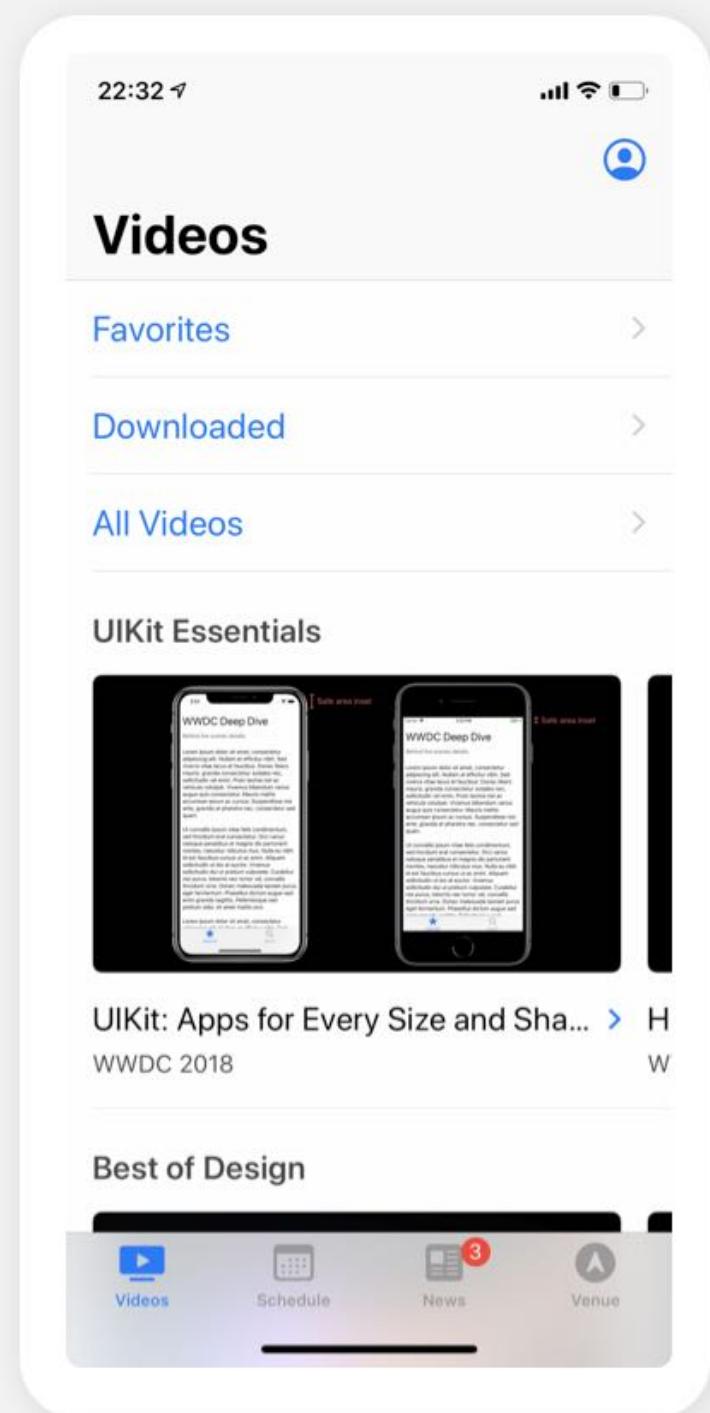
## Patterns: Bars

**Usage:** These are vertical or horizontal strips containing buttons or tabs dedicated to different components or tools.

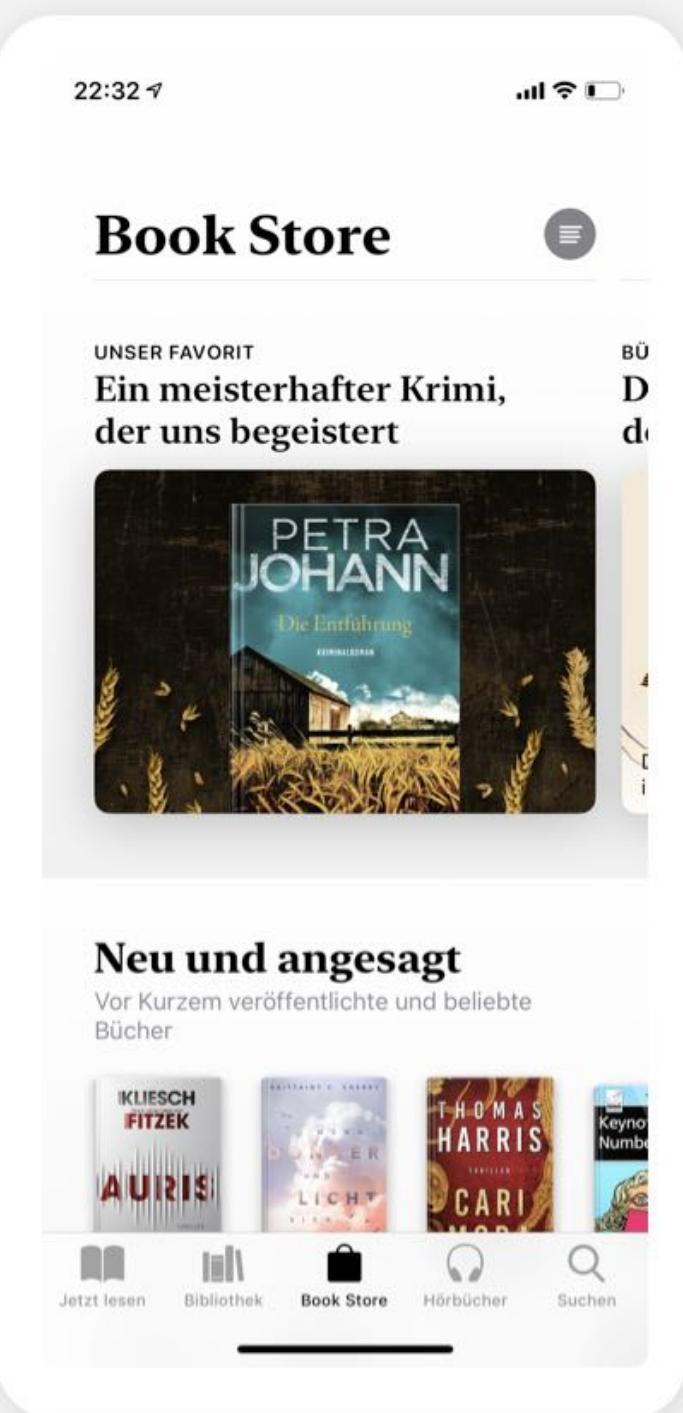
1. *Tab bars* that are placed at the top, bottom, or the side of the screen enable navigation between different components.
2. Bars can also serve as *toolbars* to activate various application or operating-system-level functions.
3. Bars help *navigation* by linking to previously viewed content or to view the previous/next item among multiple screens.



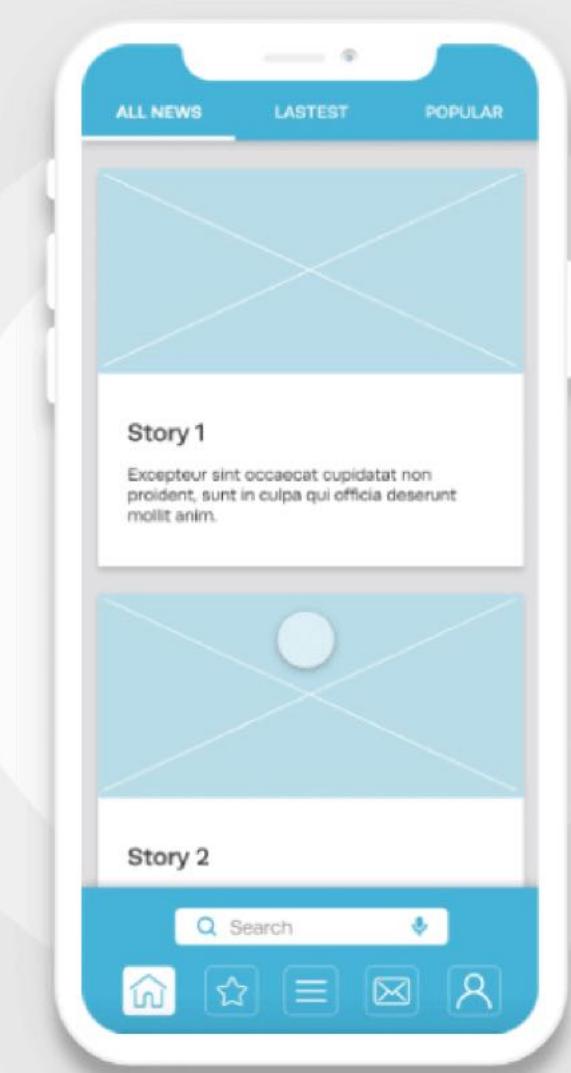
<sup>33</sup> Image source  
Apple Music



WWDC



Books



<sup>34</sup> Image sources: [left](#), [right](#)

## Patterns: Search, sorting, filtering

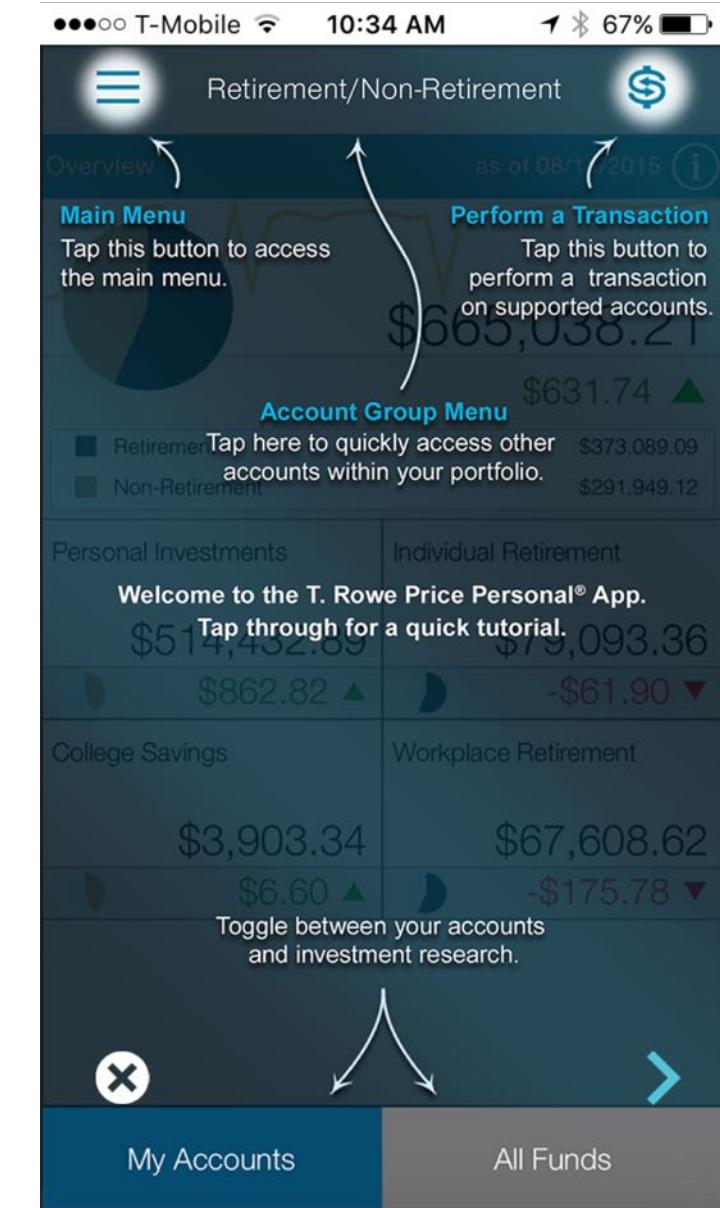
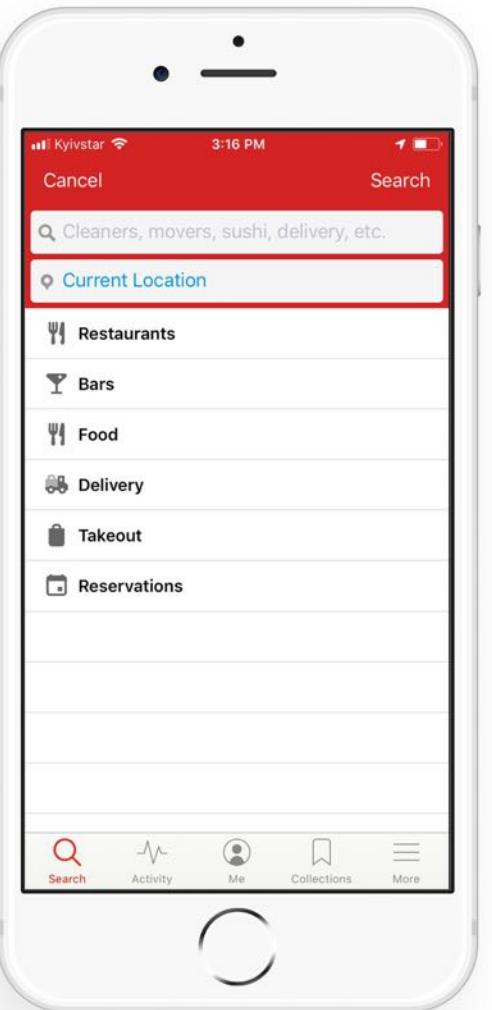
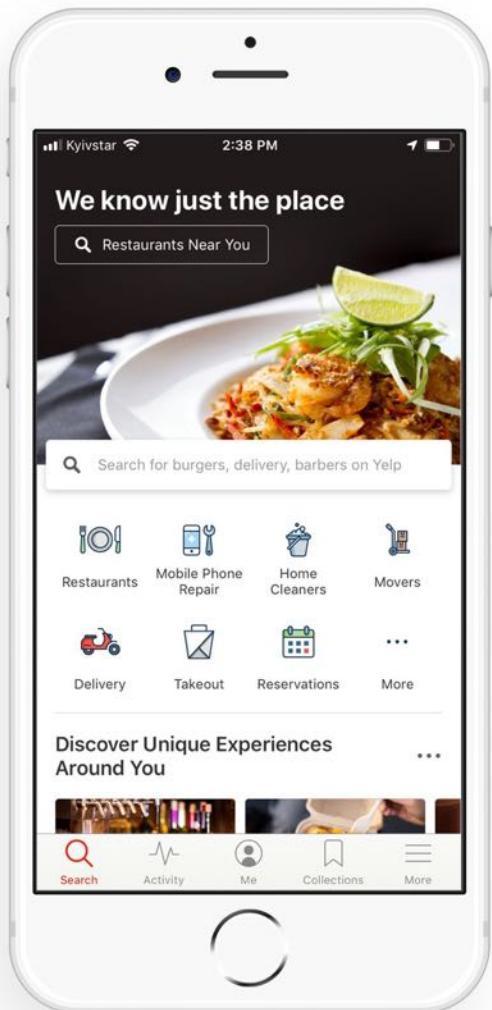
**Usage:** Used to enable search and filtering to navigate through a large body of content that may be distributed across the entire navigation structure of the application.

These patterns usually provide a search box to enter a search query either by typing text, voice input, or selecting from among a history of searches.

## Patterns: Landing pages, guided tours

**Usage:** Includes a landing, welcome, or home screen that can serve as a portal to the most frequently used functions or as a guide to the next action in the task.

This pattern can also serve as *guided tours* for new users or serve as help screens by overlaying instructions or tooltips on the screen.



<sup>35</sup> Image source: [left](#), [right](#)

## Advanced Direct Manipulation

**Usage:** Applications, such as image editors, drawing or presentation tools, or media players, enable direct-manipulation-based controls for content creation or editing.

These patterns provide customized user-input methods, such as control handles for object manipulation or scrollbars to navigate through video content.



<sup>36</sup> Image source

## Patterns: Panes and panels

**Usage:** Multi-pane structures and pop-up panels and tools are commonly used in tablets to provide secondary application windows in a way that's similar to desktop applications.<sup>37</sup>



<sup>37</sup> [Image source](#)

## Patterns: AR/VR

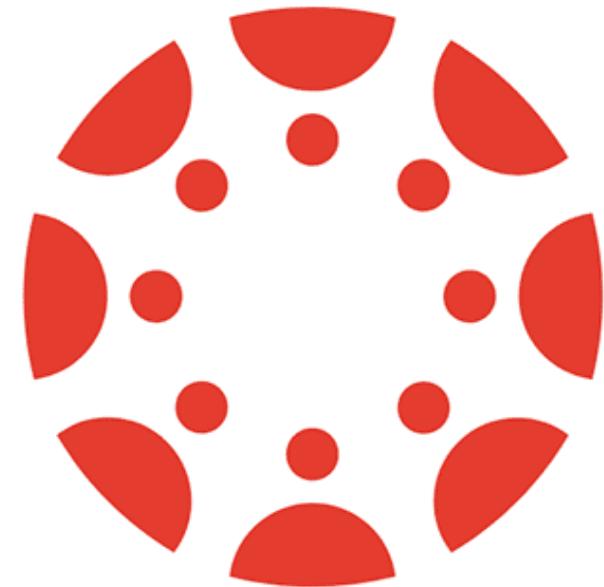
**Usage:** Augmented and virtual reality, a.k.a. *mixed reality*, are used to overlay objects or information on images or video of the user's real environment that is captured using the mobile device's camera.<sup>38</sup>



<sup>38</sup> [Image source](#)

# Quiz 3

Complete the Canvas quiz.



canvas

# What did we learn today?

- Mobile input
- Microinteractions
- Mobile design patterns