Human Computer Interaction

Material Design and Visual Vocabularies

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Outline

Overriding principles

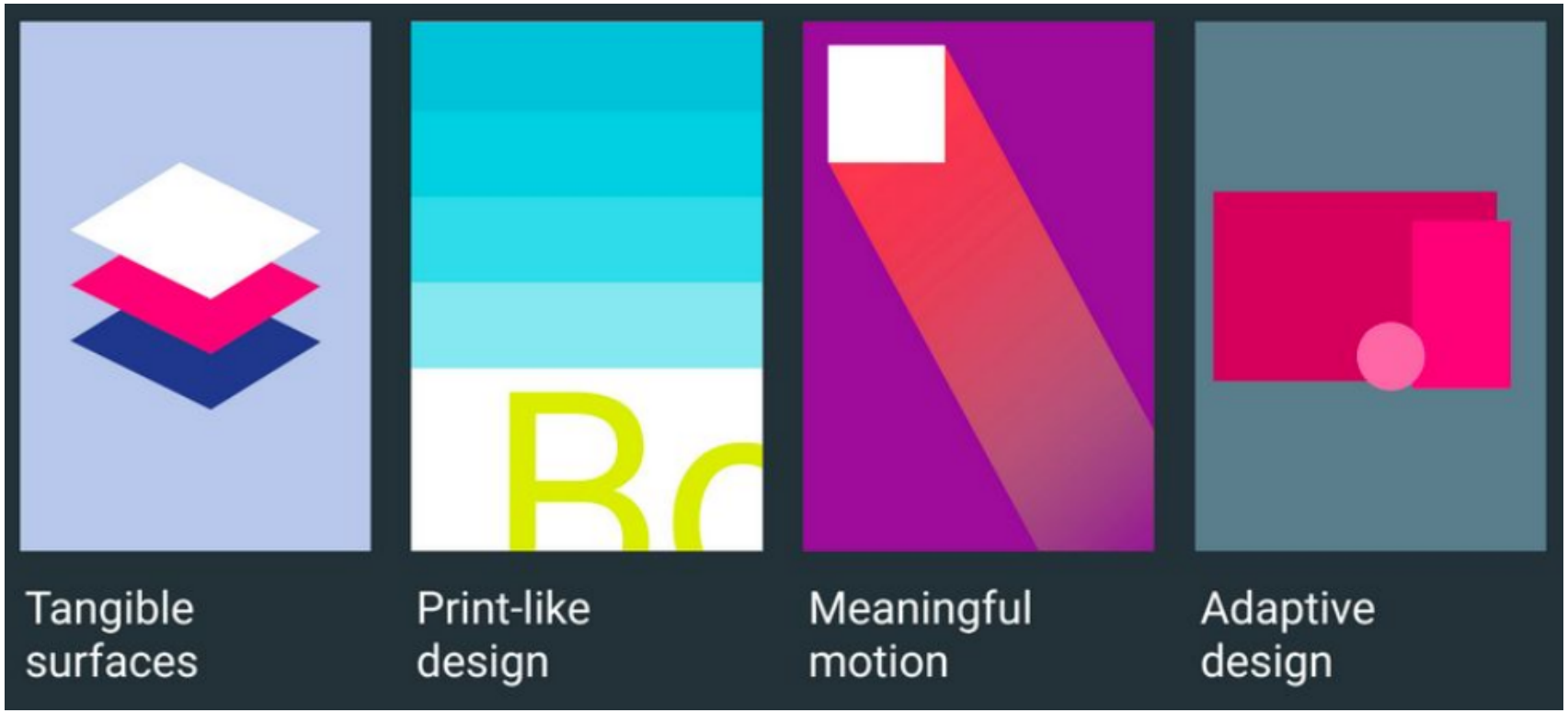
Overview

- In this lesson we will have a brief, high-entropy overview of Material Design.
- Material Design is a design language developed and heavily promoted by Google.
- It makes liberal use of grid-based layouts, responsive animations and transitions, and especially depth effects.
- It relies heavily on an underlying physical metaphor of cards and paper (in fact the original codename for the project was Quantum Paper).
- However, this metaphor is bent and extended to enable maximum exploitation of limited space.

What is material design?

- Marketing mumbo-jumbo:
  - Material Design is a visual language that synthesizes classic principles of good design with the innovation and possibility of technology and science.
  - It was inspired by the study of paper and ink, yet technologically advanced and open to imagination and magic.
- This lesson will barely scratch the surface of Material Design.
- The real objective is to take a more careful look at a visual language that we are all familiar with – but maybe never realized it.
- And, to shine the light of our new understanding of visual perception and visual design onto something we maybe take for granted.

What is material design?



Material is tangible

Material is a metaphor

- Surfaces and edges of the material provide visual cues that are grounded in reality.
- The use of familiar tactile attributes helps users quickly understand affordances.

Print-like design: bold, graphic, and intentional

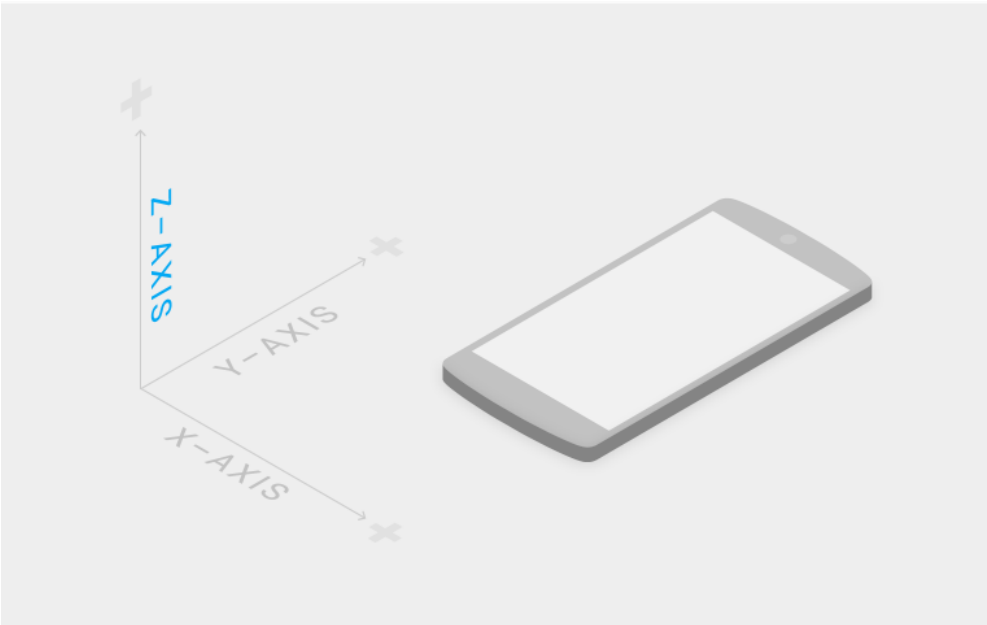
- Typography, grids, space, scale, color, and use of imagery do far more than please the eye, they create hierarchy, meaning, and focus.
- Deliberate choices and intentional white space create a bold and graphic interface.

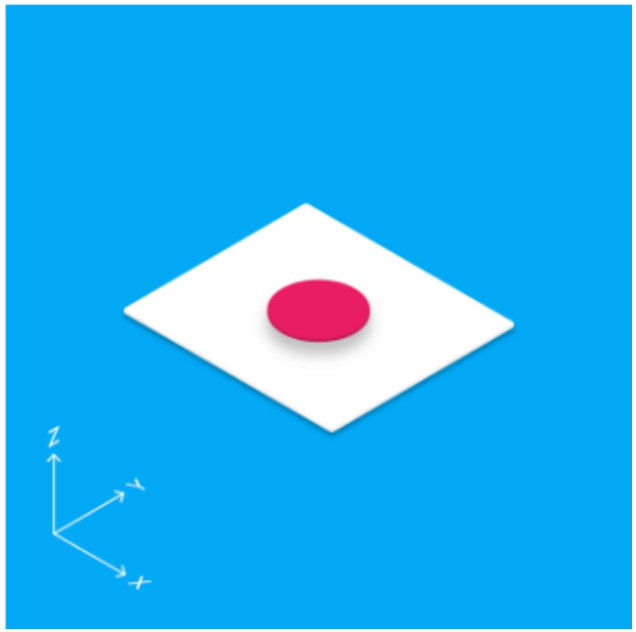
Motion provides meaning

- Motion respects and reinforces the user as the prime mover.
- Motion is meaningful and appropriate, serving to focus attention and maintain continuity.
- Feedback is subtle yet clear.
- Transitions are efficient yet coherent.

Material environment

- Material design is a three-dimensional environment containing light, material, and cast shadows.
  - All material objects have x, y, and z dimensions.
  - Lights create directional shadows, ambient light creates soft shadows.
  - Every sheet of material occupies a single position along the z-axis and has a standard 1dp thickness (1dp = 1 pixel of thickness on screens with pixel density of 160).



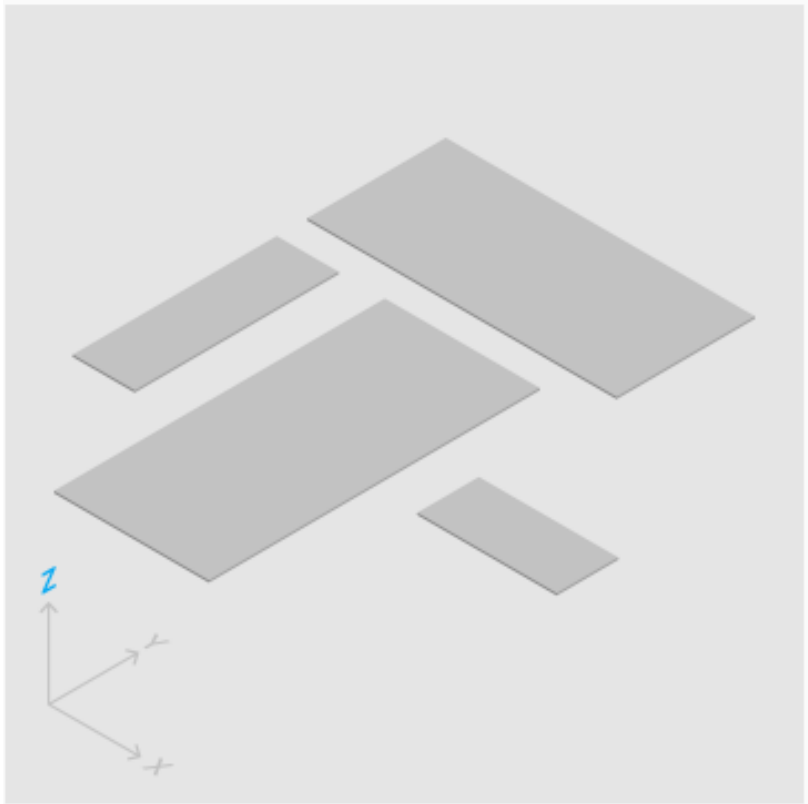


Material properties

- Material has certain immutable characteristics and inherent behaviors.
- Understanding these qualities of material will help you manipulate material in a way that's consistent with the vision of material design.
- Material characteristics:
  - Solid
  - Occupies unique points in space
  - Impenetrable
  - Mutable shape
  - Changes in size only along its plane
  - Unbendable
  - Can join to other material
  - Can separate, split, and heal
  - Can be created or destroyed
  - Moves along any axis

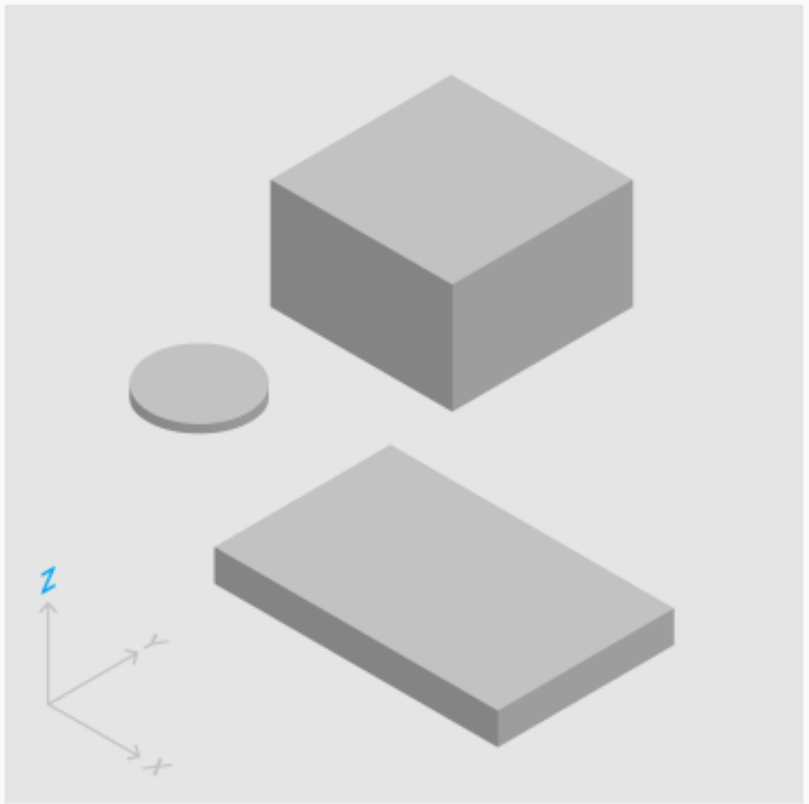
Material properties

- Material has varying x & y dimensions (measured in dp) and a uniform thickness (1dp).



Do.

The height and width of material can vary.

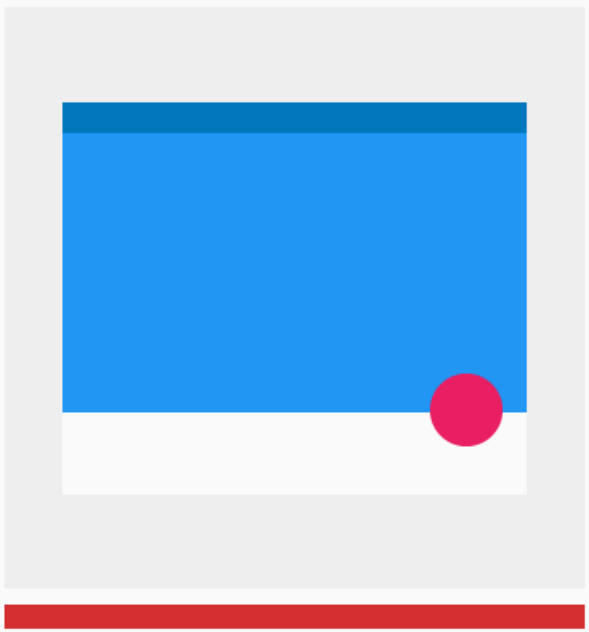


Don't.

Material is always 1dp thick.

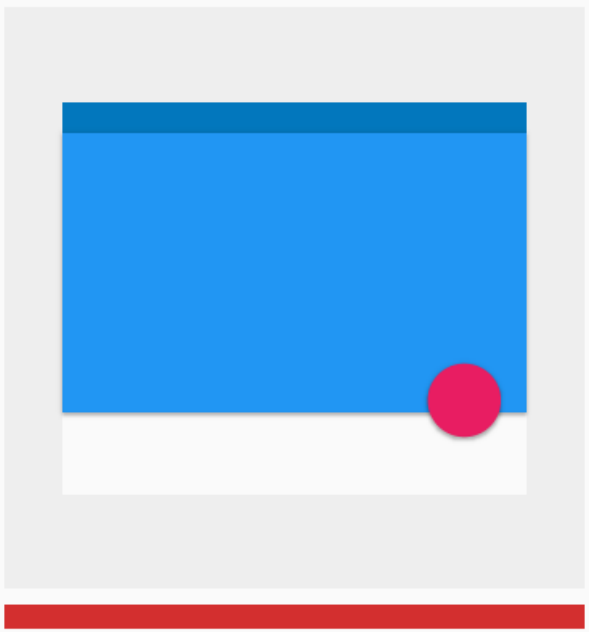
Elevation and shadows

- Material casts shadows.
- Shadows result naturally from the relative elevation (z-position) between material elements.
- Do: Shadows depict the relative elevation between material elements.
- Don't: Shadows are never approximated by coloring material.



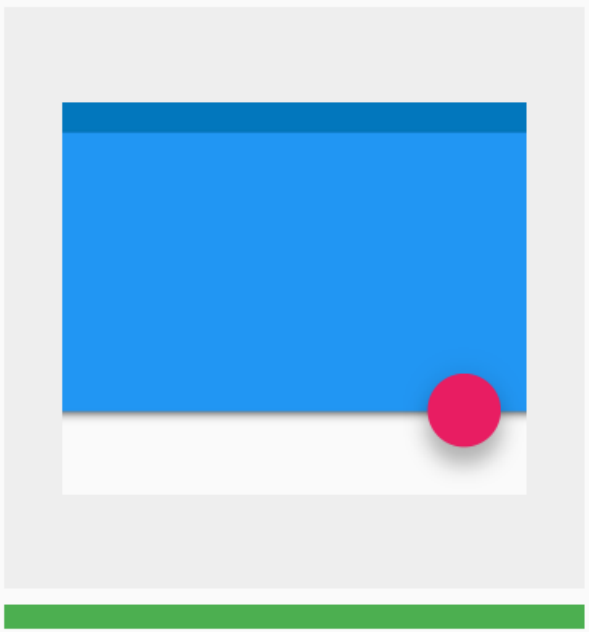
Don't.

Without a shadow, nothing indicates that the floating action button is separate from the background surfaces.



Don't.

Crisp shadows indicate the floating action button and the blue sheet are separate elements. However, their shadows are so similar that they imply they are both at the same elevation.

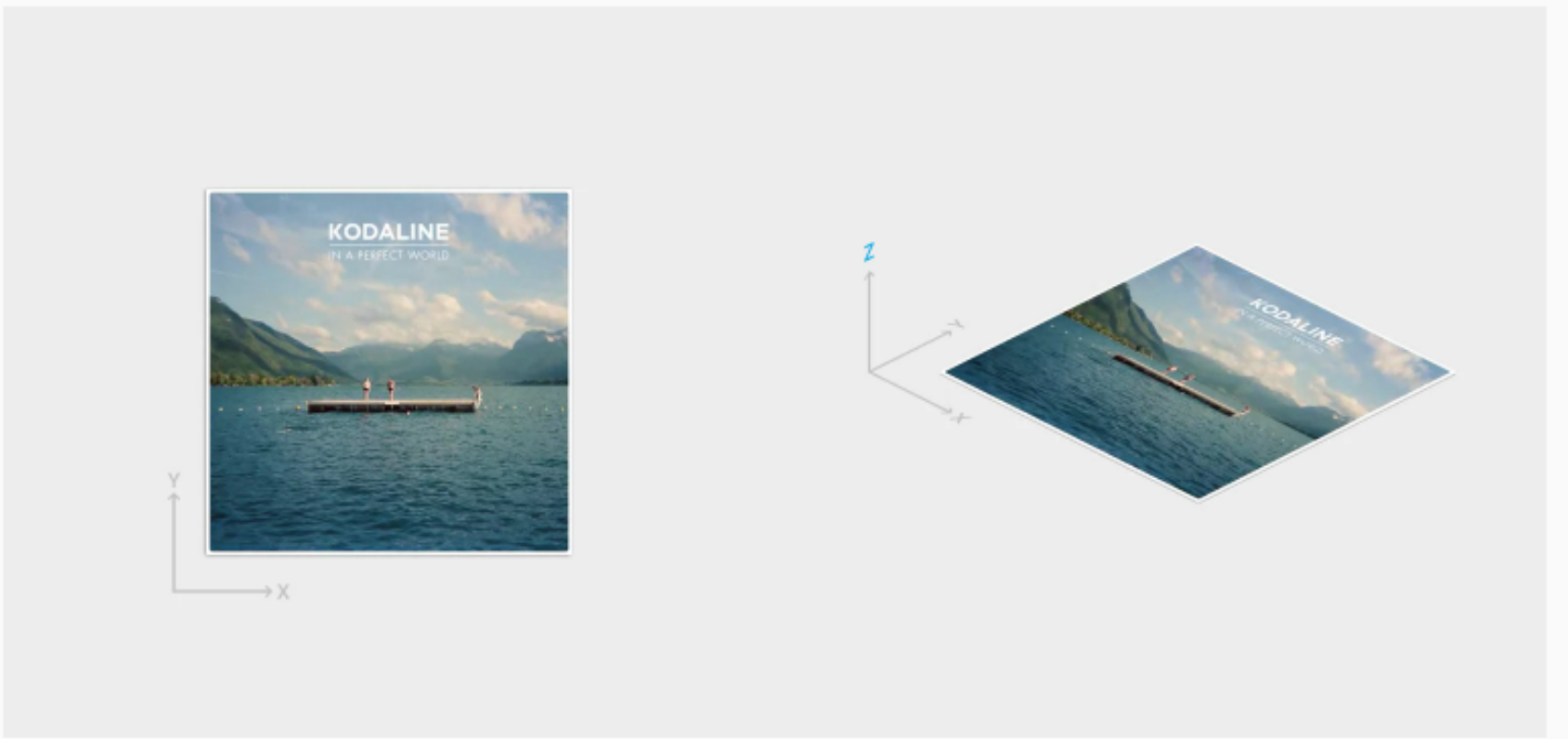


Do.

Softer, larger shadows indicate the floating action button is at a higher elevation than the blue sheet, which has a crisper shadow.

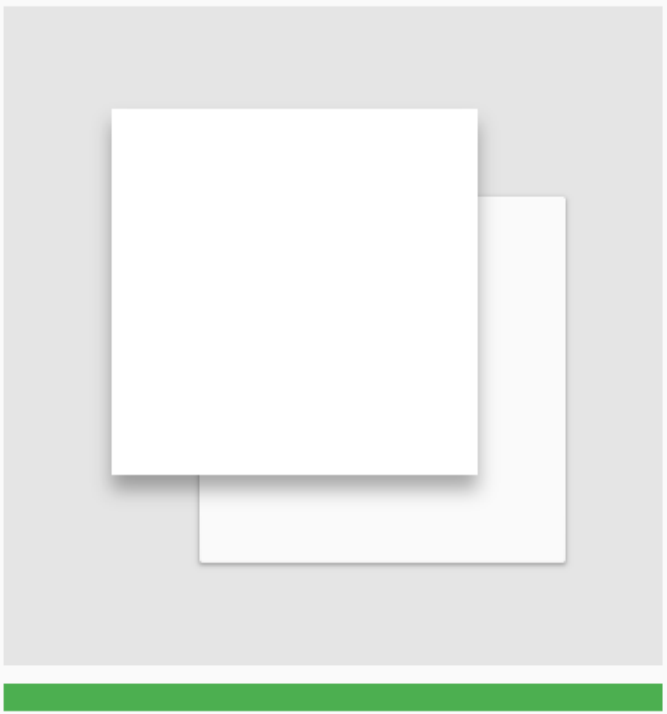
Material is a medium

- Content is displayed on material, in any shape and color.
- Content does not add thickness to material.
- Content can behave independently of the material, but is limited within the bounds of the material.
- Video



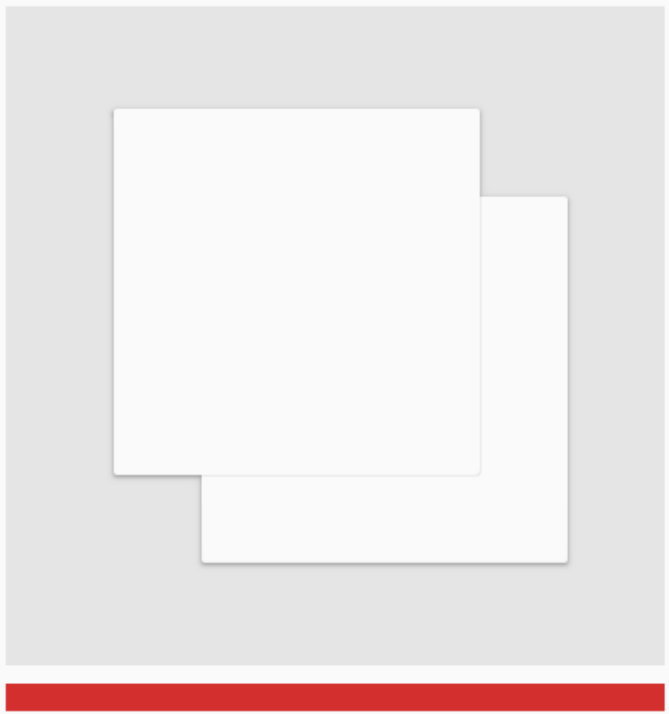
Material permanence

- It can grow or shrink – but only along it's own plane (Video).
- It should never bend or fold (Video).
- Material can be spontaneously created (Video).
- Multiple material elements cannot occupy the same point in space simultaneously.



Do.

Using elevation to separate material elements is one method of preventing multiple material elements from occupying the

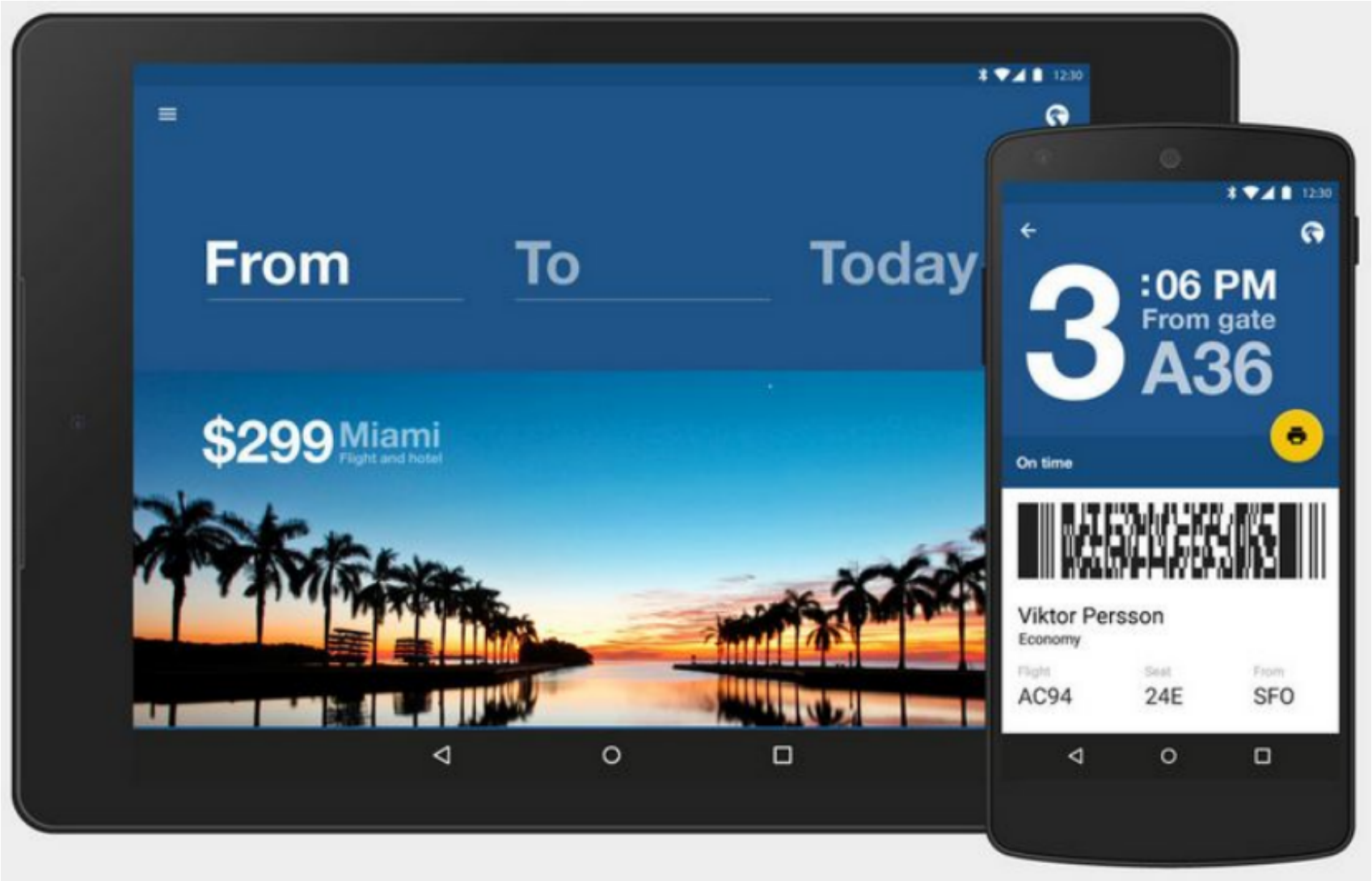


Don't.

Multiple material elements cannot occupy the same point in space simultaneously

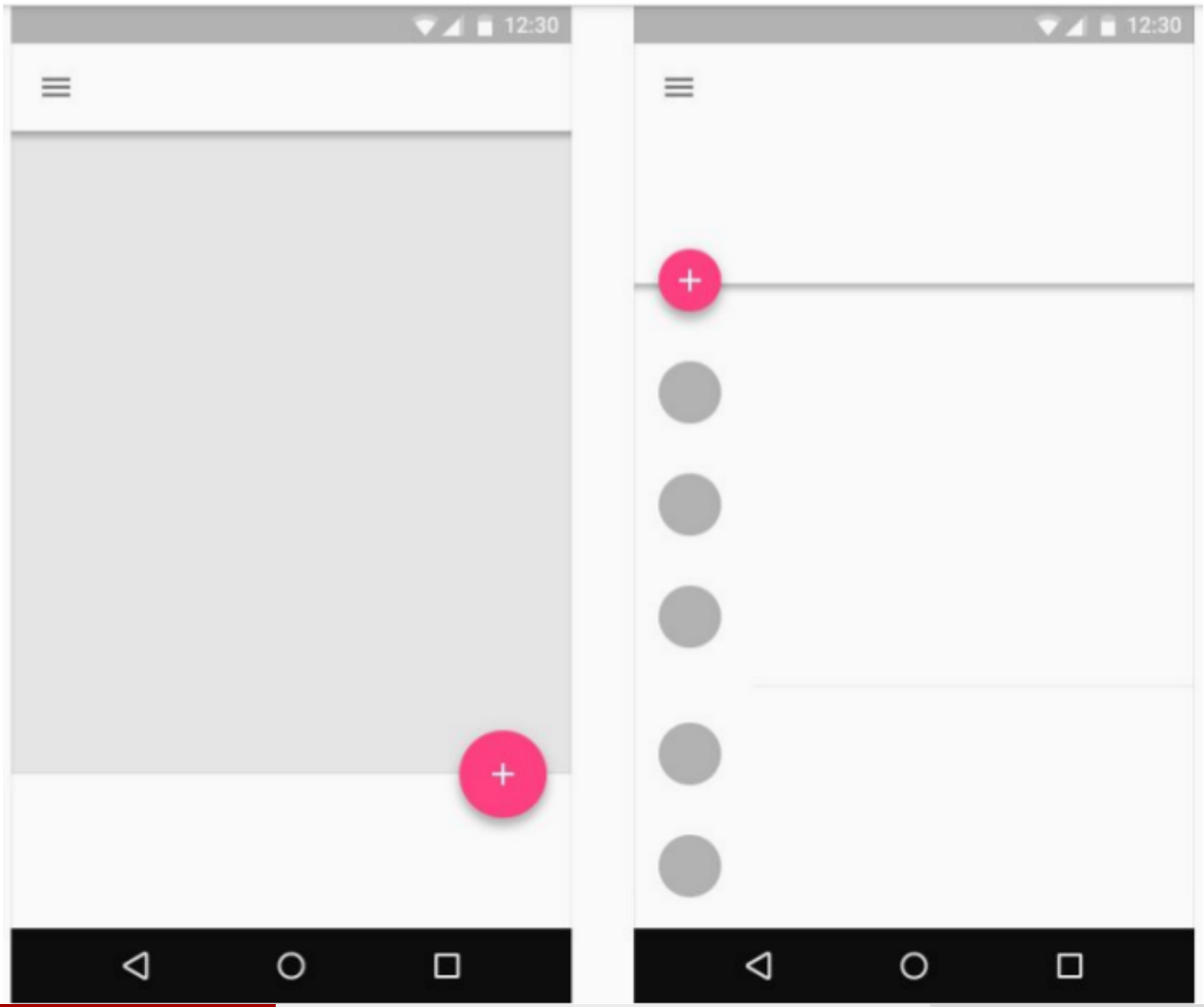
A quick tour

Not copies of Google apps



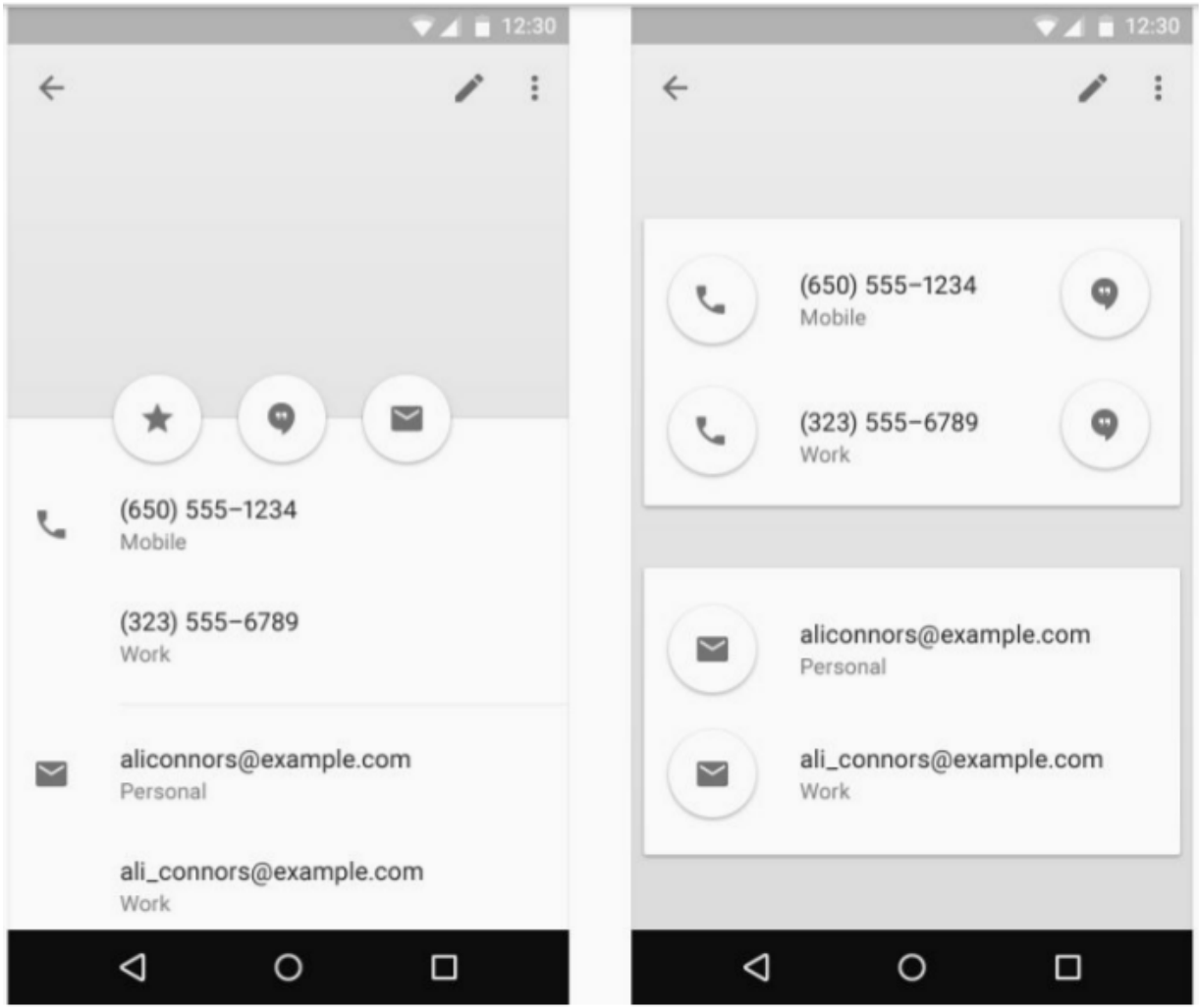
Material Action Button

- Material Apps will generally have one primary action button at any time (at most one):



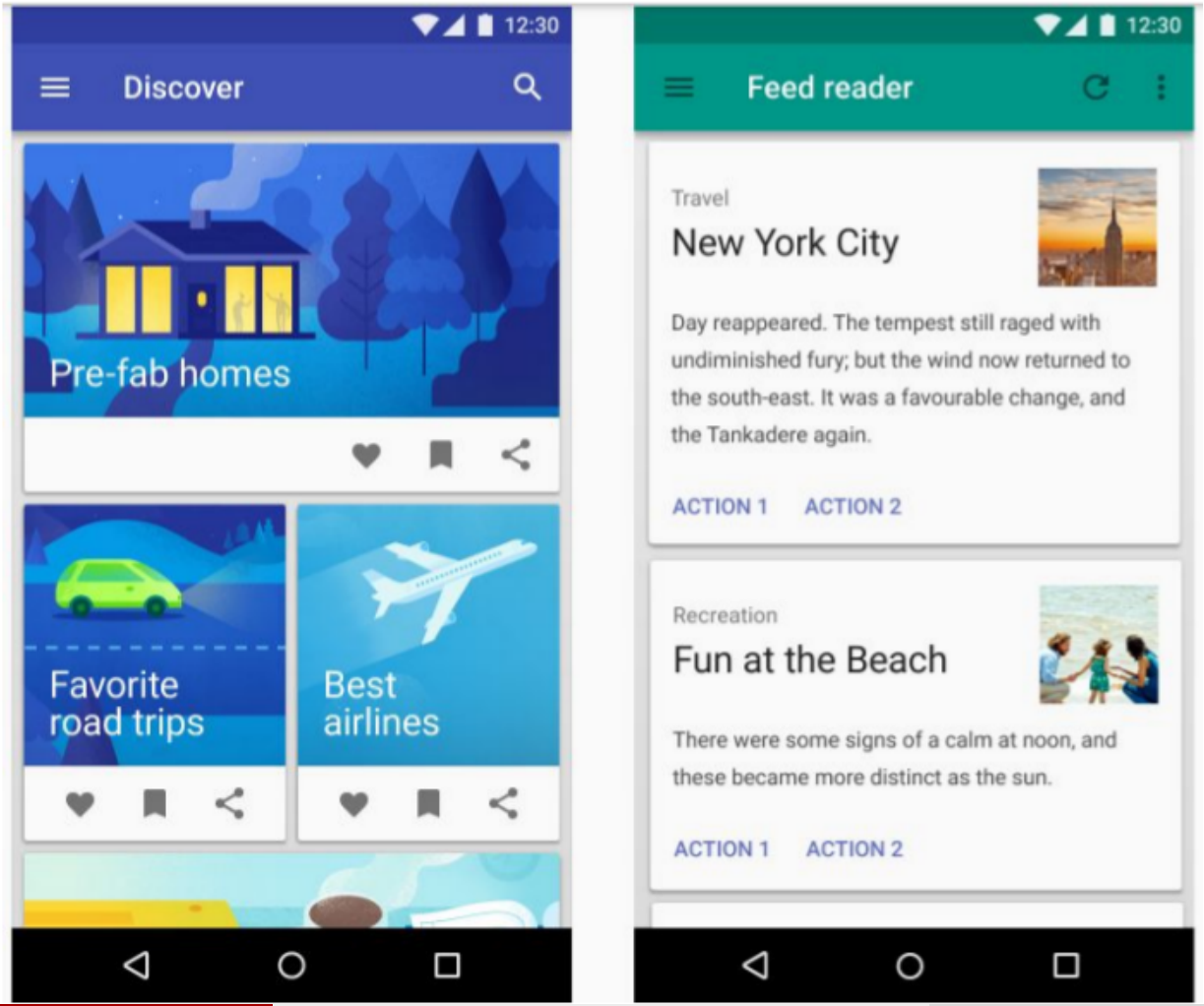
Material Action Button

- Don't make everything an action button:



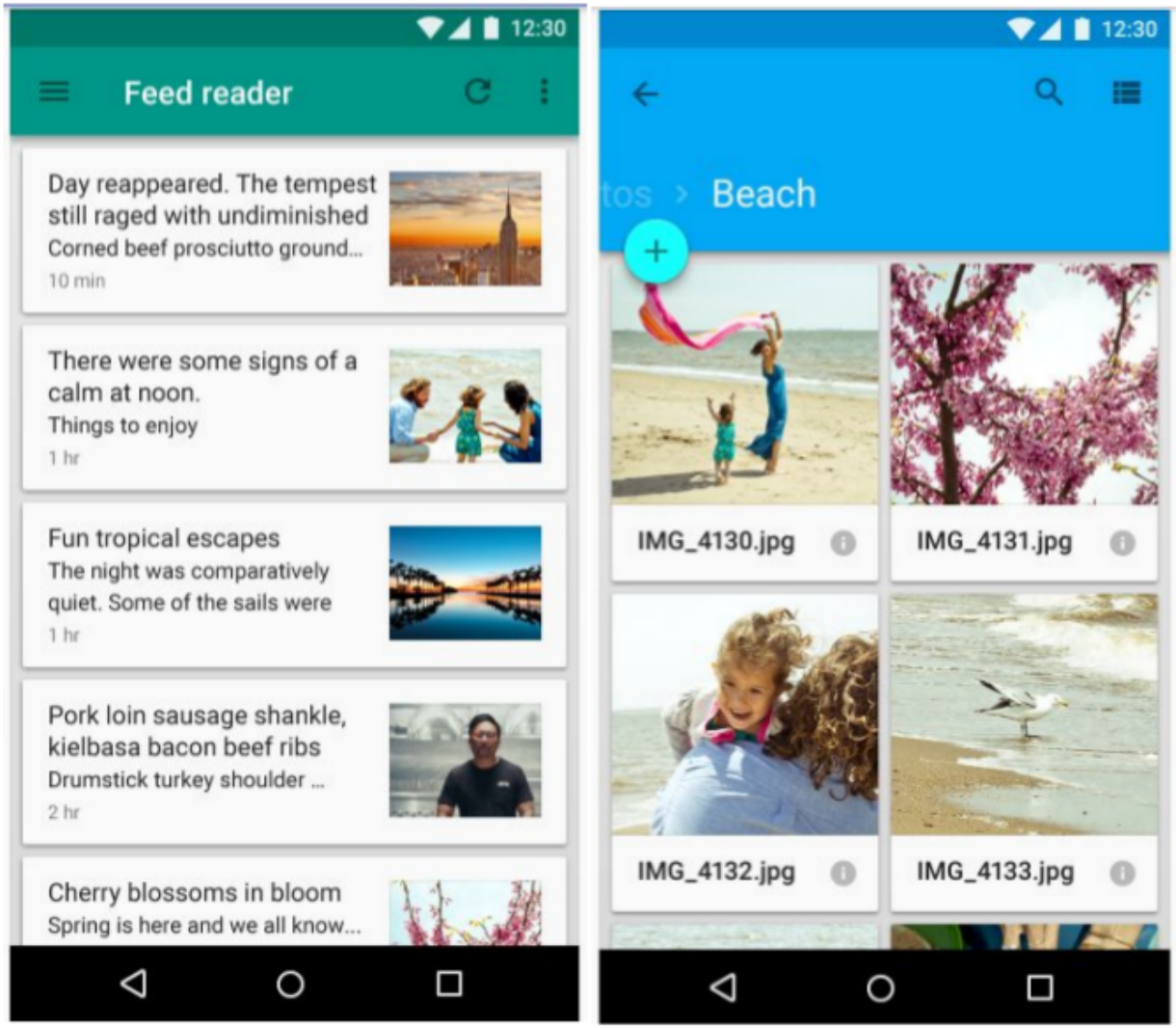
Material Cards

- A card is a piece of paper with unique related data that serves as an entry point to more detailed information (and interactions):



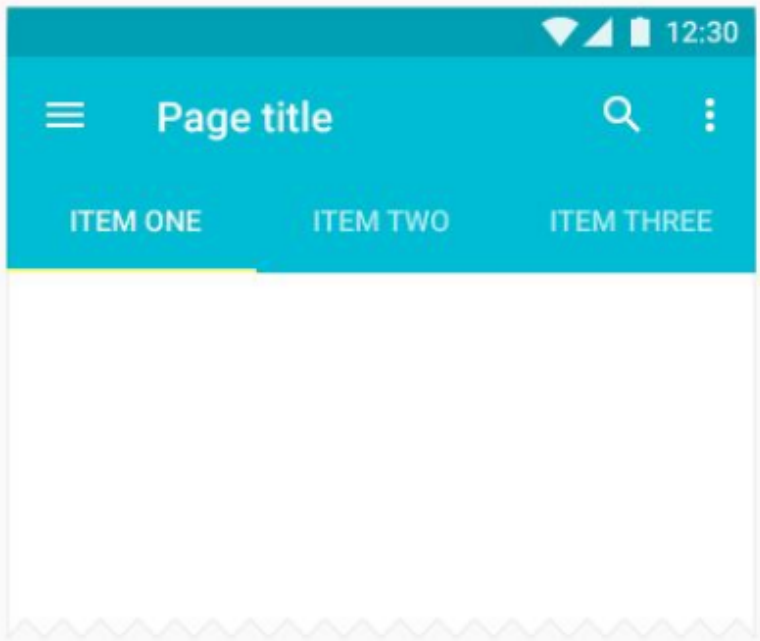
Material Cards

- Don't make boring, ambiguous cards just to have cards:

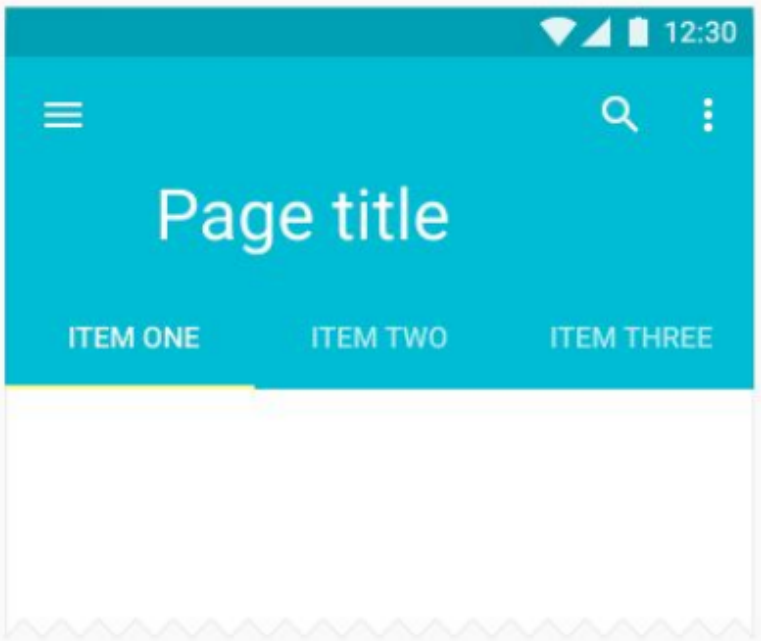


Material Tabs

- A tab provides the affordance for displaying grouped content.
- Use tabs to organize content at a high level, for example, presenting different sections of a newspaper.



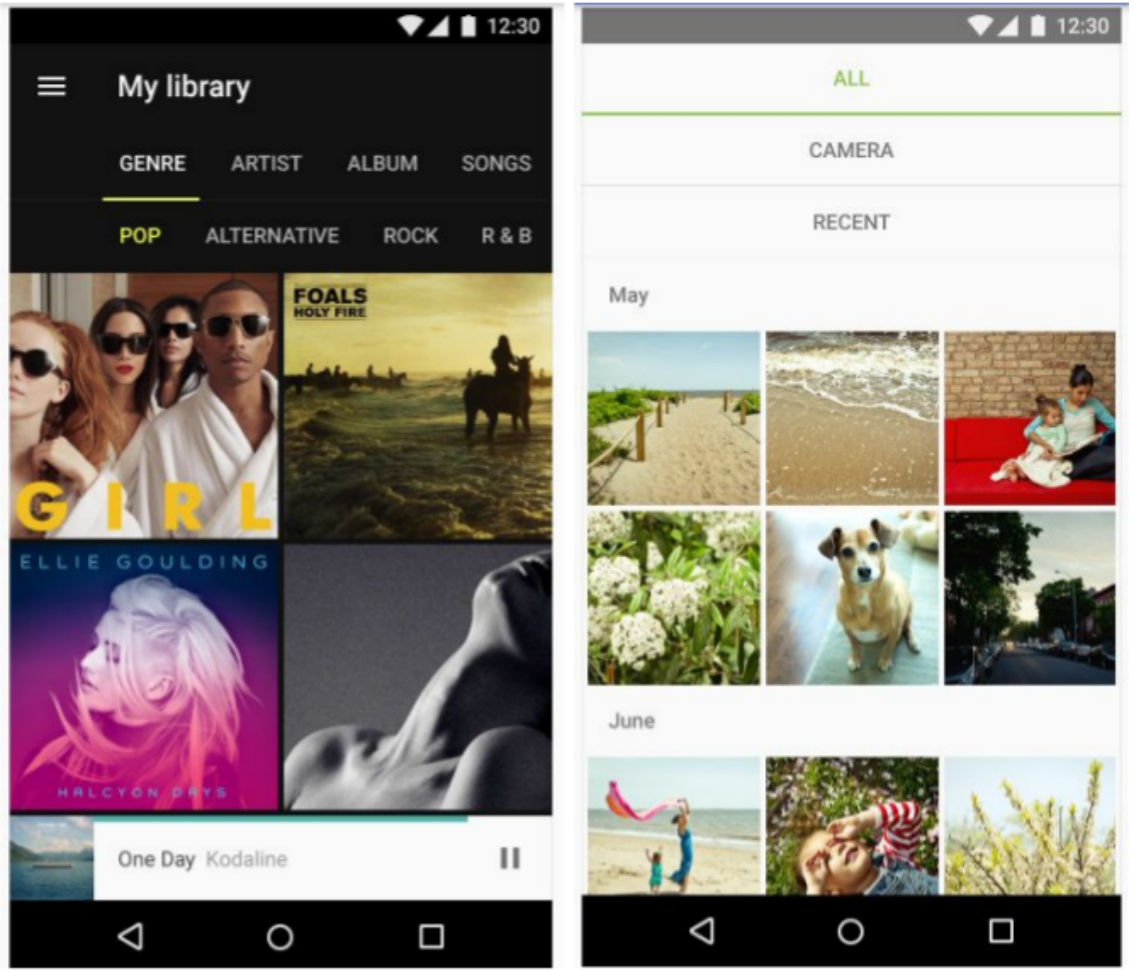
Default app bar and fixed tab bar



Extended app bar and fixed tab bar

Material Tabs

- Don't try to jam as many groups as you can into distinct tabs, or use non-horizontal layout:



Motion

Why does motion matter?

- Motion shows how an app is organized and what it can do.
- Motion provides:
  - Guided focus between views.
  - Hints at what will happen if a user completes a gesture.
  - Hierarchical and spatial relationships between elements.
  - Distraction from what's happening behind the scenes (like fetching content or loading the next view).
  - Character, polish, and delight.

Material motion principles

- Most animated motion in user interfaces in highly unnatural.
- Changes in our real world are never instant.
- Objects rarely move at constant speed, and acceleration is similarly never instantaneous.
- Motion in the world of Material Design is used to describe spatial relationships, functionality, and intention with beauty and fluidity.
- This takes into account acceleration, trajectory, and contextual transformation of material in motion.
- Material Motion Page

Style

Material style

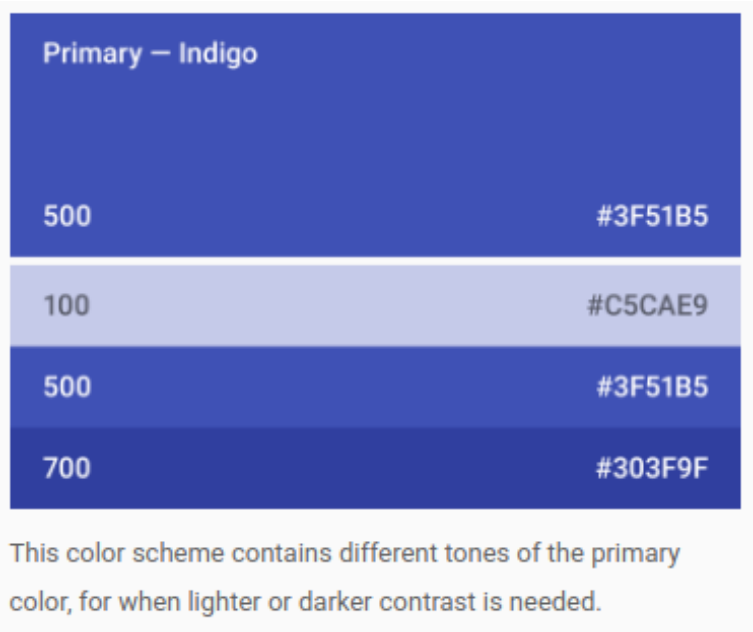
- Style is a complex, slippery concept in any language or discipline (engineering, design, etc).
- Material Design has a broad range of style guidelines you can apply to your applications.
- These guidelines cover concepts important to branding and recognition, and most importantly consistency.
- It covers aspects of design related to: color, iconography and imagery, typography and writing.
- We will only touch on two of these elements today.

Material color: design Schemes

- Material Apps use color schemes – colors that complement and contrast each other and that are consistently applied.
- Color schemes should include darker and lighter variations of your primary and secondary colors.
- Remember to check if text is accessible on different-colored backgrounds.
- This color palette comprises primary and accent colors that can be used for illustration or to develop your "brand colors.".
- The color palette starts with primary colors and fills in the spectrum to create a complete and usable palette for Android, Web, and iOS.

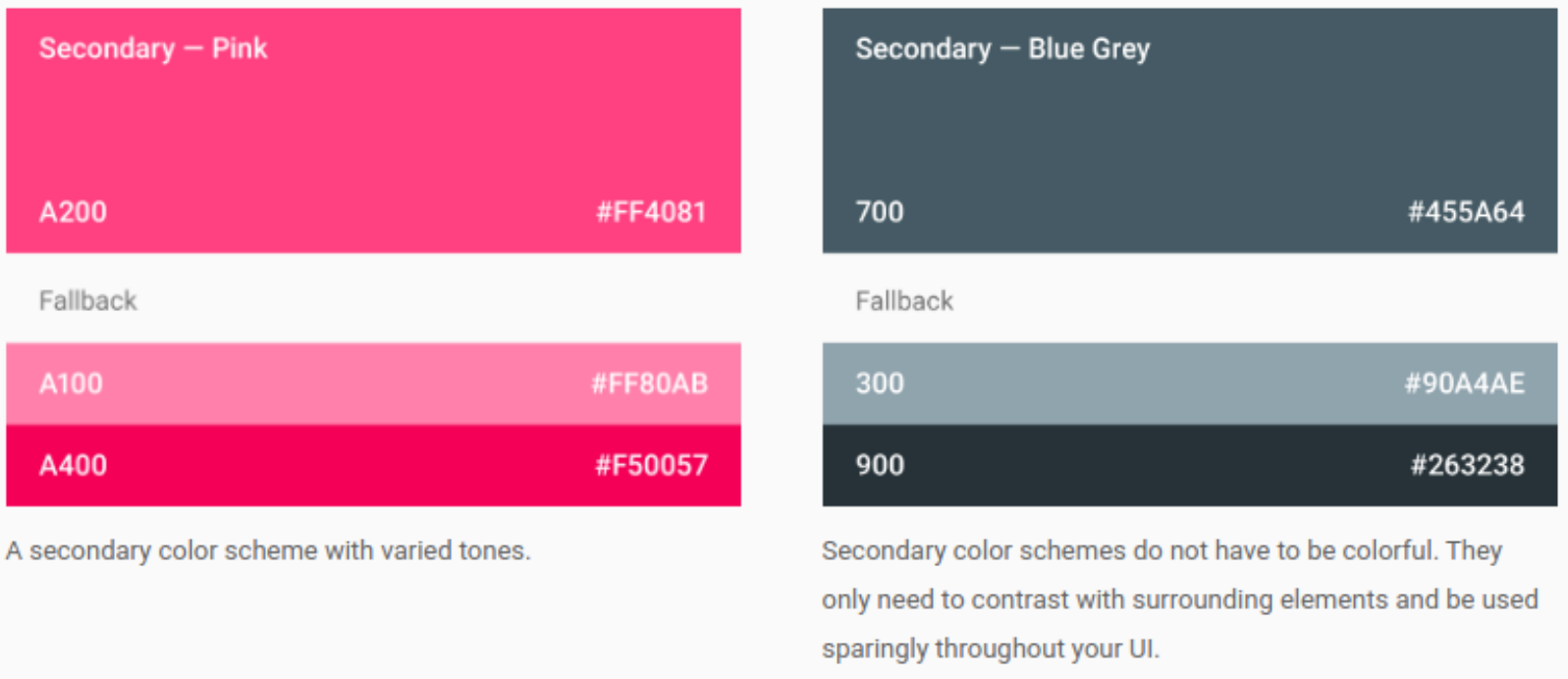
Material color: primary colors

- A primary color is the color displayed most frequently across your screens and components.
- To create contrast between elements, you can use lighter or darker tones of your primary color.
- The contrast between lighter and darker tones helps show division between surfaces



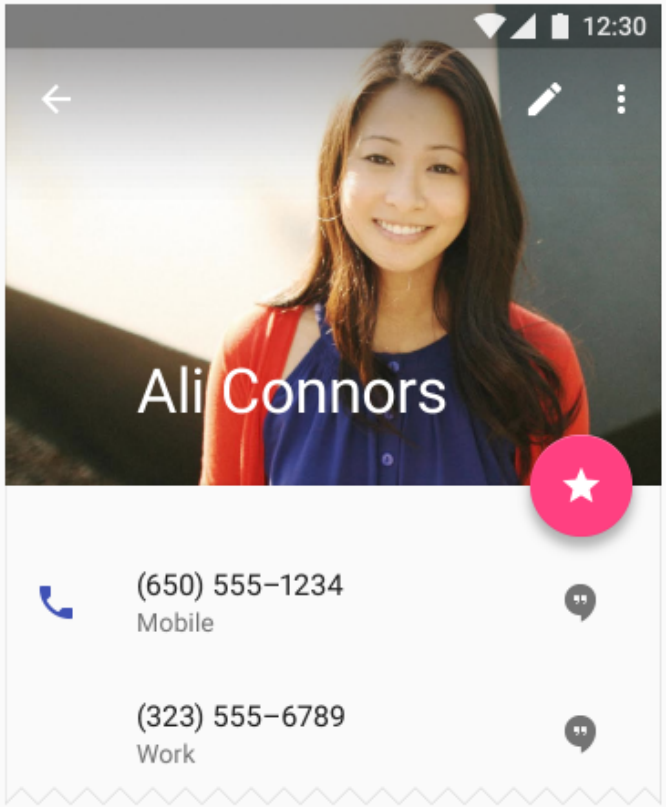
Material colors: secondary colors

- A secondary color is used to accent select parts of your UI.
- It can be complementary, but it should not simply be a light or dark variation of your primary color.
- Secondary colors are best used for: buttons and button text, and text fields, cursors and text selection, progress bars, secondary controls.

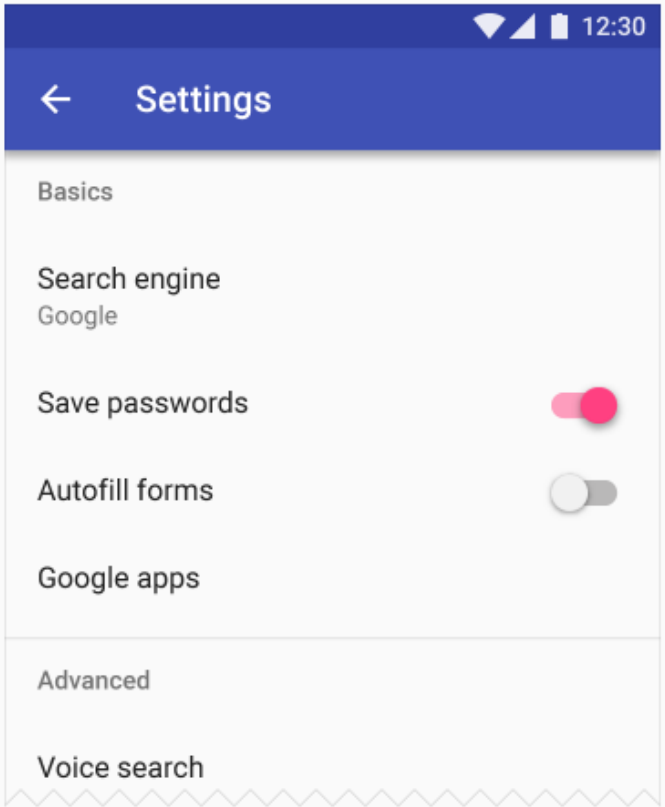


Material colors: putting it together

- Large UI areas and elements should be colored with your primary color, and a secondary color can be used to accent smaller areas.



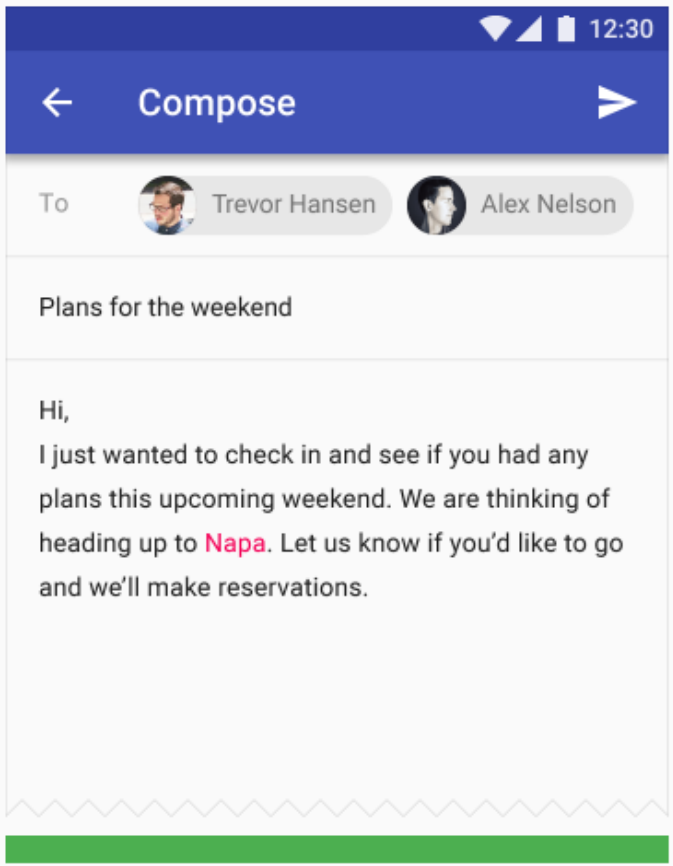
The floating action button is accented using the secondary color, while the phone icon uses the primary color.



The switch uses the secondary color as an accent. The system bar uses the primary color, while the toolbar uses a darker variation of the primary color.

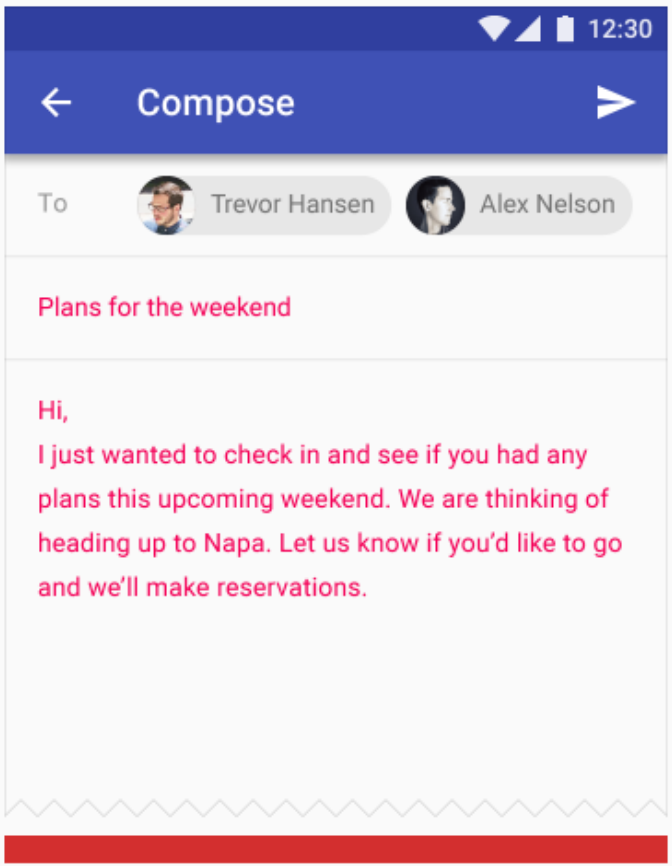
Material colors: putting it together

- Use secondary colors sparingly.



Do.

Use a secondary color for certain text, such as linked text.

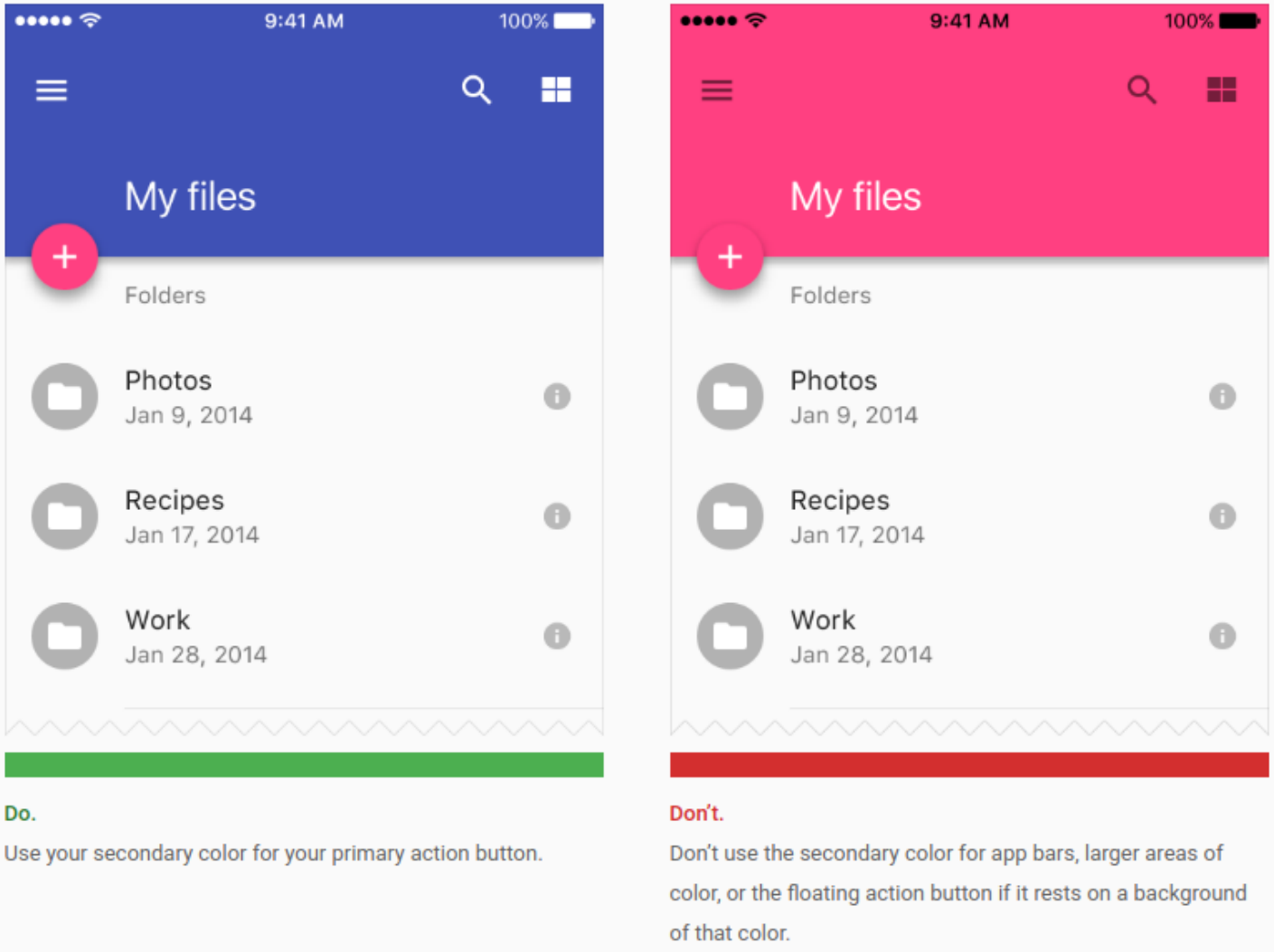


Don't.

Don't use bright colors for body text, even if your primary or secondary colors are bright.

Material colors: putting it together

- Make sure you maintain contrast between actions and background.



Material color: use the Color Tool

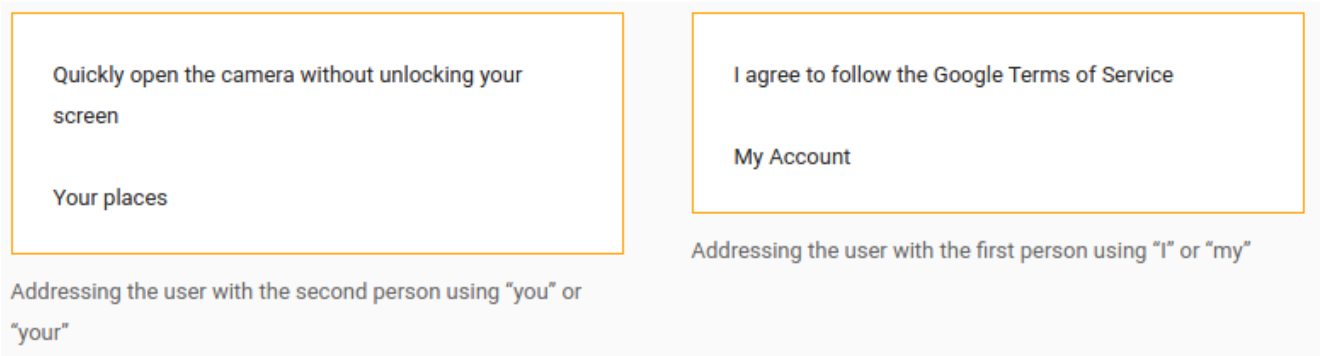
- Themes enable consistent app styling through surface shades, shadow depth, and ink opacity.
- The Material Designers have provided the Color Tool for making color design decisions.
- Google suggests using the 500 colors as the primary colors in your app and the other colors as accents colors.

Writing: style matters

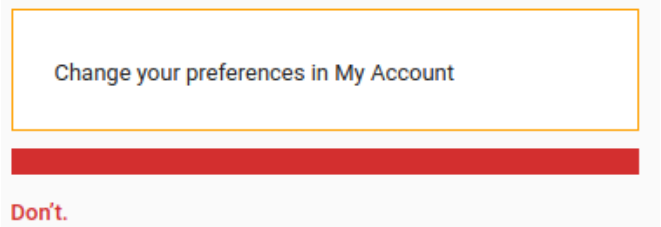
- Material design also includes a recommendations on language usage.
- This helps to maintain a consistent, concise, and clear communication with the user.
- Clear, accurate, and concise text makes interfaces more usable and builds trust.
- In addition to the general guidelines I discuss here, there are specific guidelines for many UI elements: Errors, Dialogs, Settings, and Data formats.

Writing: addressing the user

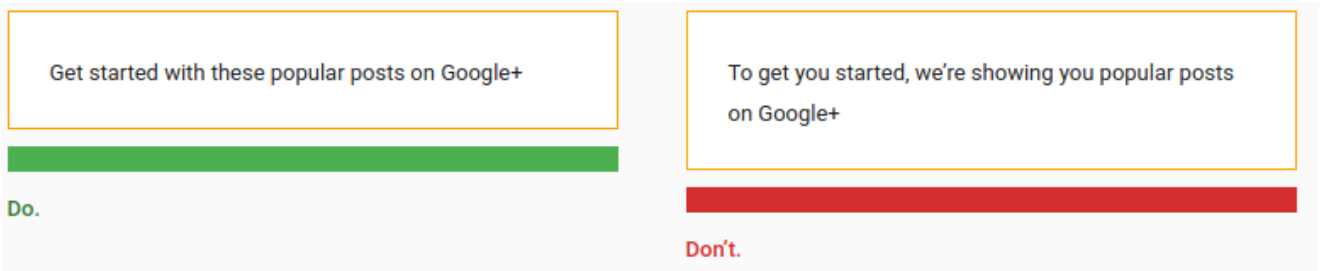
- Use first and second person, as appropriate:



- But don't mix it up:

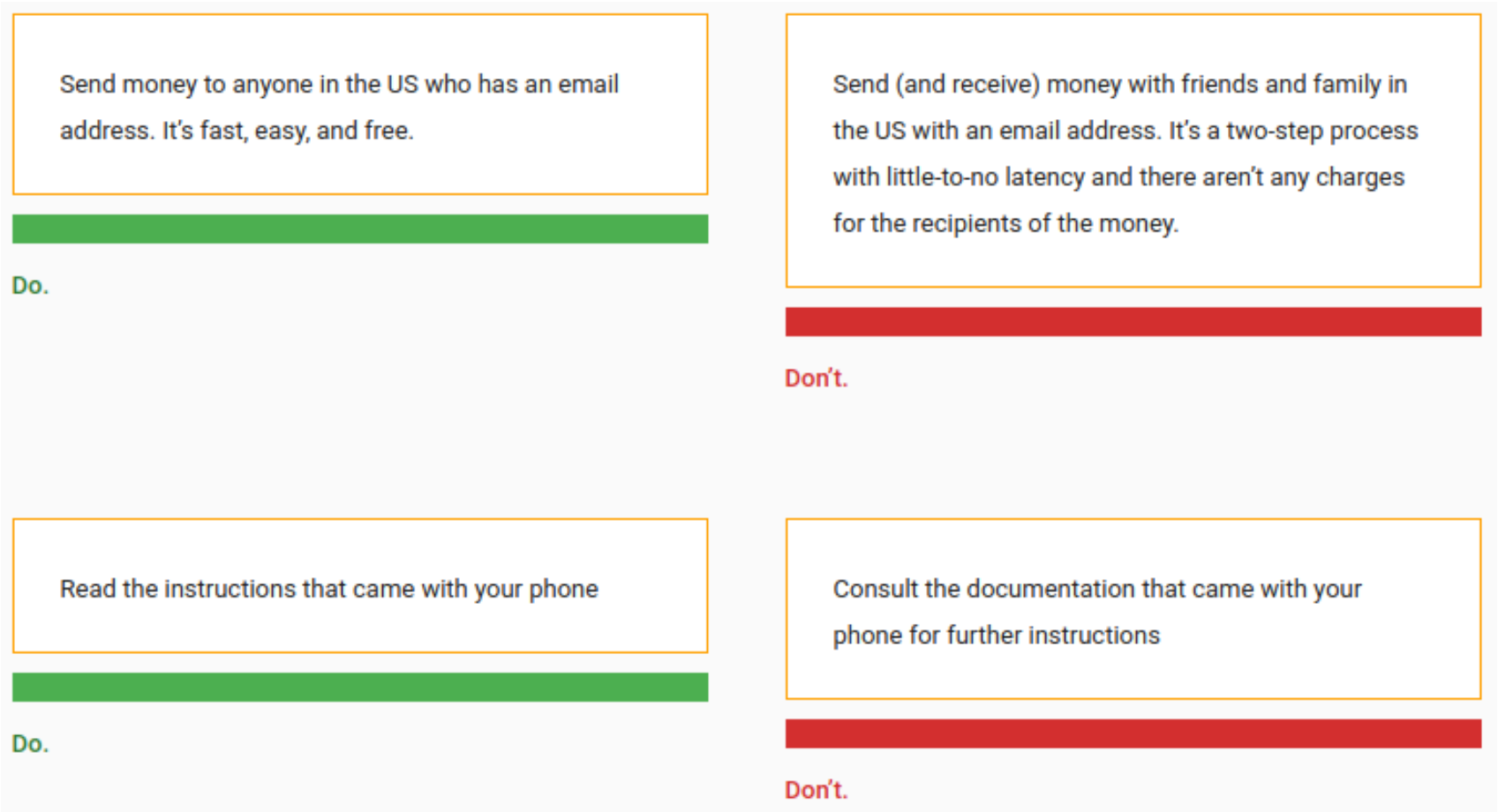


- Avoid the cowardly we:



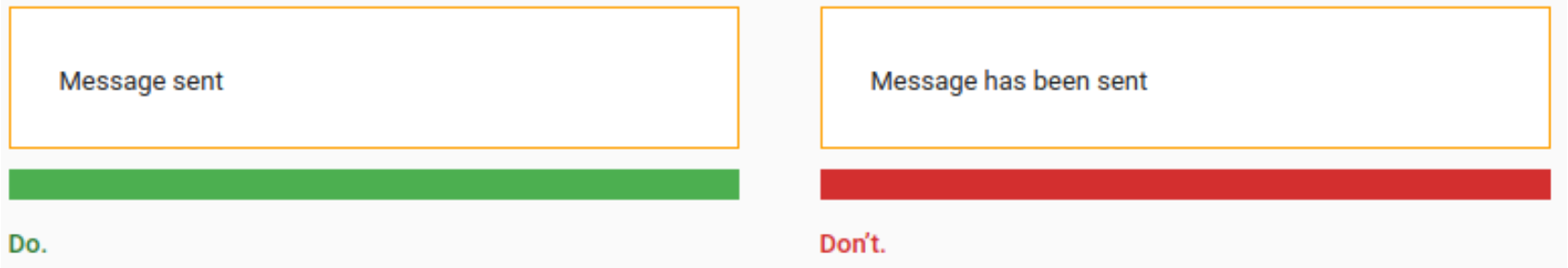
Writing: be concise

- . . . above all else:



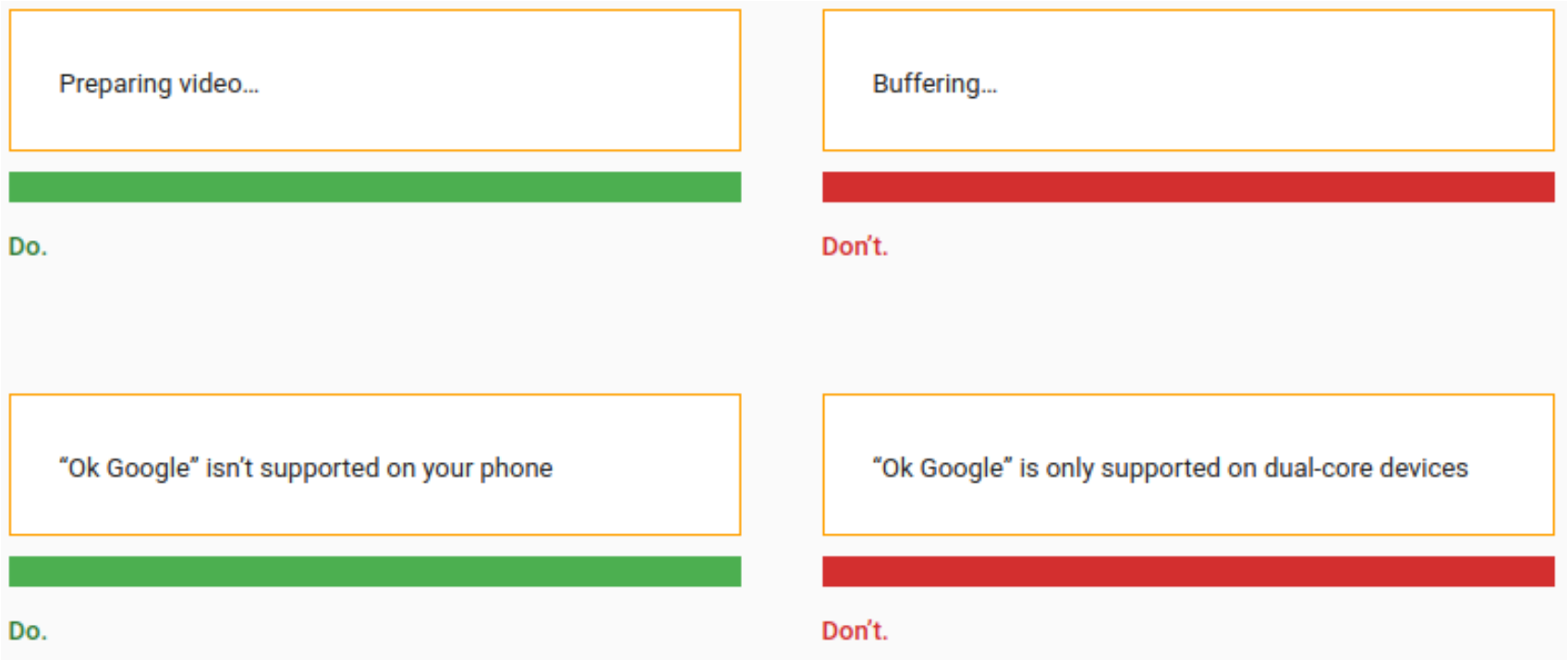
Writing: simple and direct

- Avoid conditionals and extraneous conjugation:



Writing: for all users

- Don't use extraneously technical language:



Components

Material Components

- Let's take a quick tour of some common Material Design Components.

Patterns

Material Patterns

- And similarly for some common Material Design Interface Patterns

Summary

Summary

- We are probably all familiar with Material Design.
- However, maybe we have also taken it mostly for granted.
- Material Design represents an intentional design process.
- The philosophy and visual language exploits metaphors like paper and cards to optimize communication and space.
- However, these metaphors are carefully translated in idiomatic ways to the digital world.
- Thus, the motion, transformation, and feel of Quantum Paper is at the same time familiar yet new.

Resources

- Material Design Guidelines: overview of the philosophy of Material Design.
- The new home of Material Design: has examples, code snippets for Android, iOS, and web.
- There is even the KivyMD library of Material Design Inspired widgets for Kivy.
- For running examples, we have:
  - The Material Design demo app for Android.
  - The best material design apps 2017.