

# User Interface Design

Fundamentals

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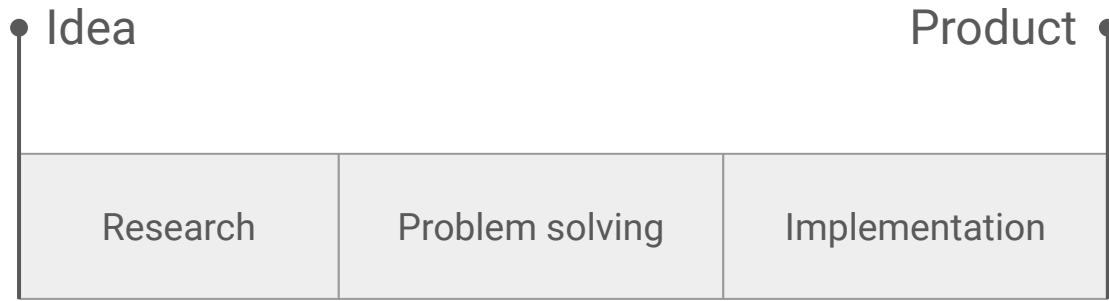
# Who's this for

This presentation covers fundamentals of user interface (UI) design and how they're used to build a simple interface element. It's been tailored for:

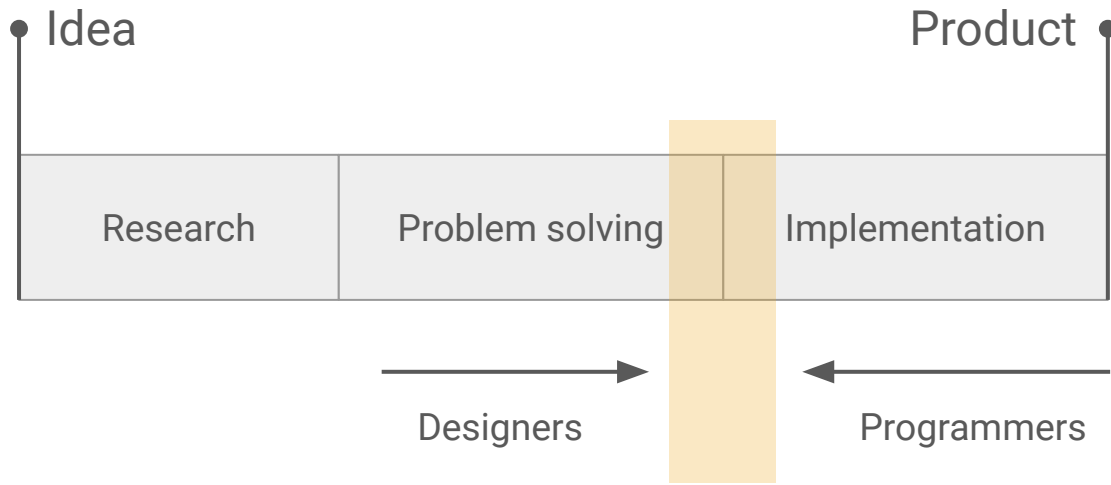
- Programmers who don't have much experience building UIs.
- Beginner UI designers who are still learning basic concepts.
- People who want to learn more about the process, like project managers.

# From idea to product

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Getting to the final product requires lots of activities and skills. The timeline on the left is a simplified model. The real process is more complex and often iterative.



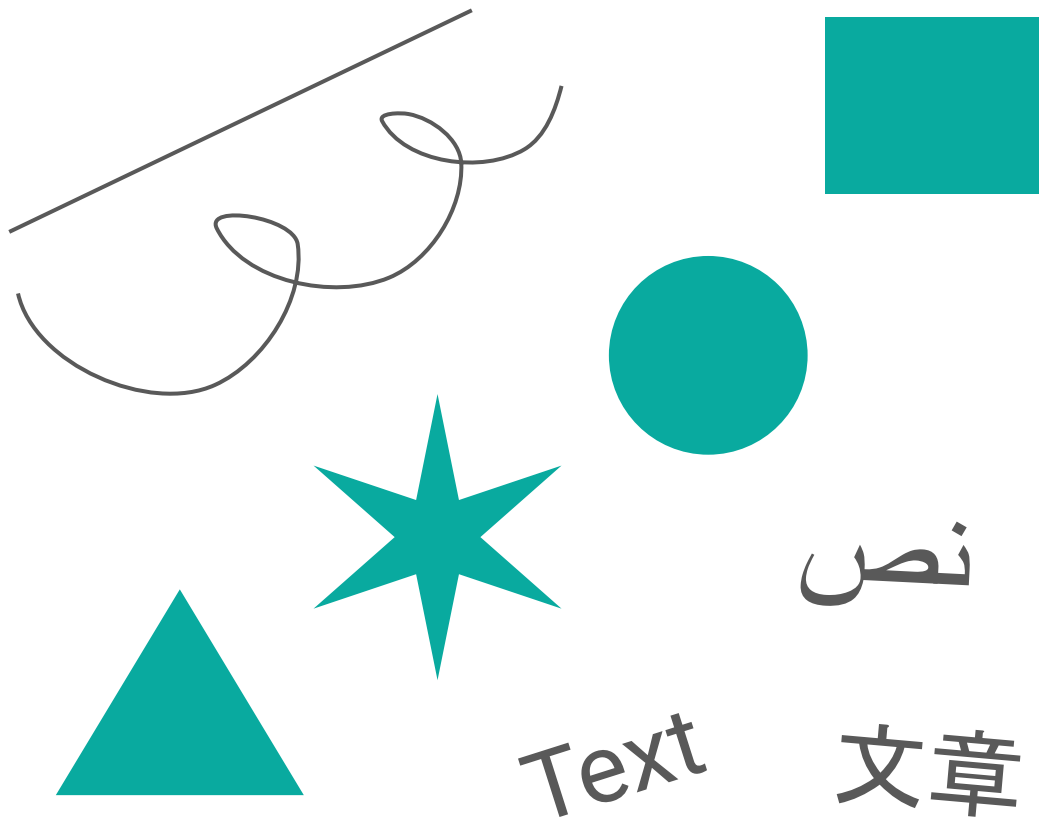
We'll tackle only a narrow part of the timeline. This part is especially important because it is—for better or worse—the most common point where designers and programmers meet. A lot of conversations happen here, so it's good to share the same vocabulary.

## Note

When you're starting, spending just a couple of hours on learning basic principles of visual design greatly improves your ability to produce a decent looking user interface. It won't make you an expert, but it will steer you away from major disasters. If you continue to learn, you **will** become good.

# Building blocks

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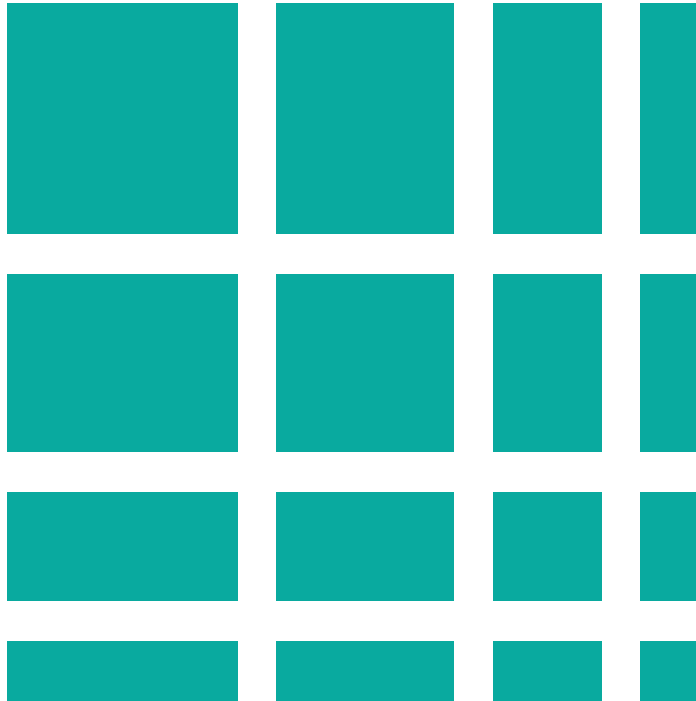


## Lines and shapes

Straight or curved lines, circles, different polygons, ...

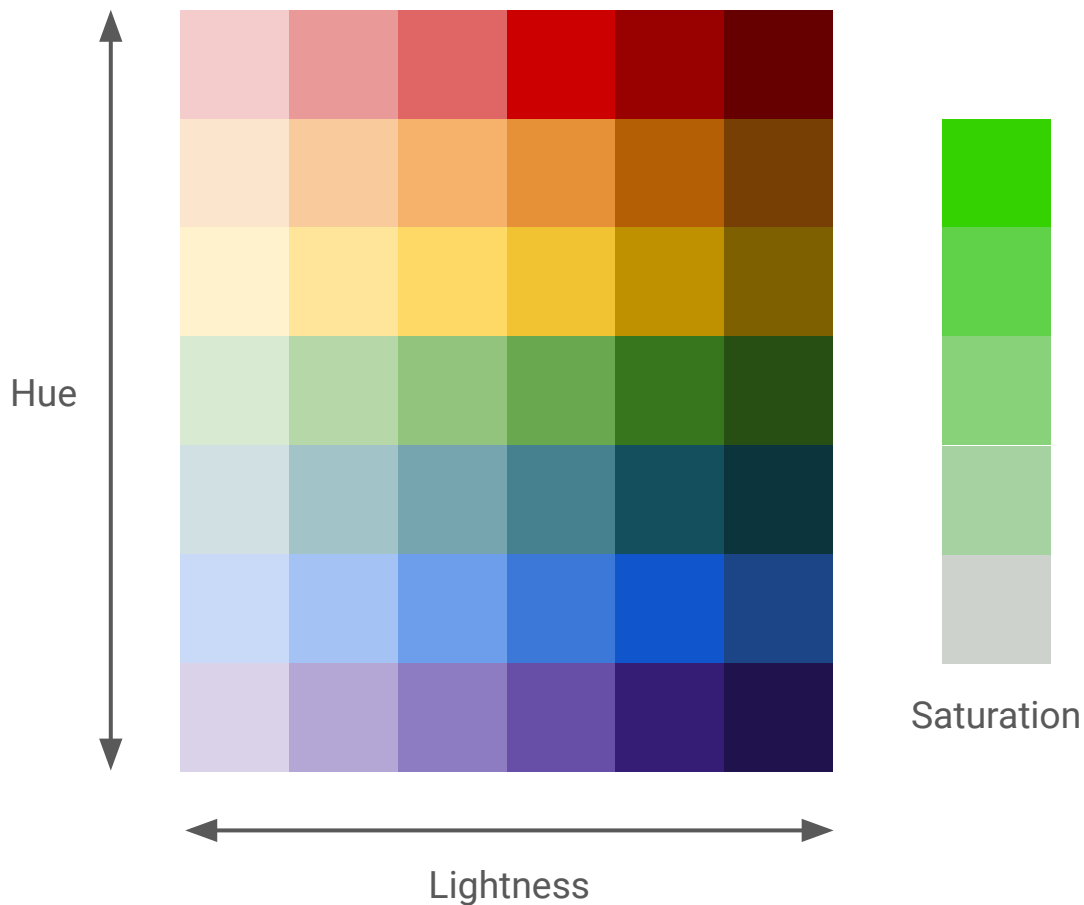
What we perceive as text is just a combination of different lines and shapes.





## Size

All shapes can vary in size, width and height. Lines can be thicker or thinner. We usually assign more importance to bigger things.



## Color

Color can be evaluated on three dimensions: hue, lightness, and saturation.

Hue is what most people mean by color and what we have a clear name for: red, green, yellow, etc.

Lightness, often called value, is how light or dark a color is.

Saturation is how vivid and intense a color is. Desaturating a color leads to gray.

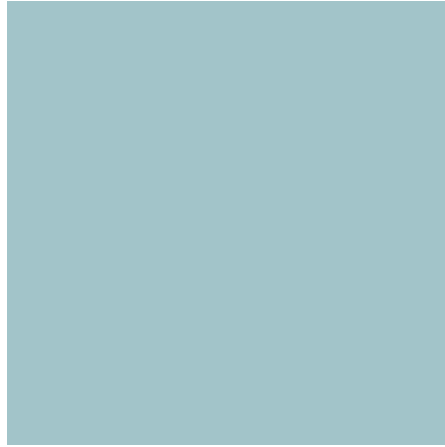


## Texture

Surface patterns, shininess, reflection are all texture components.

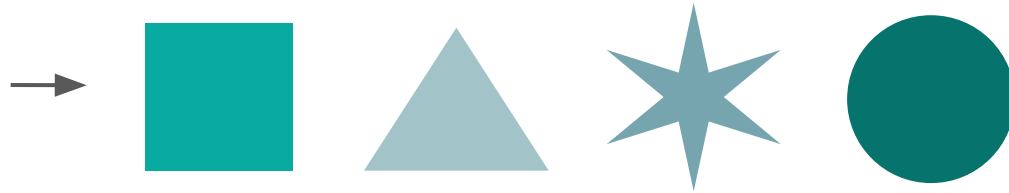
# Basic principles

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## Balance

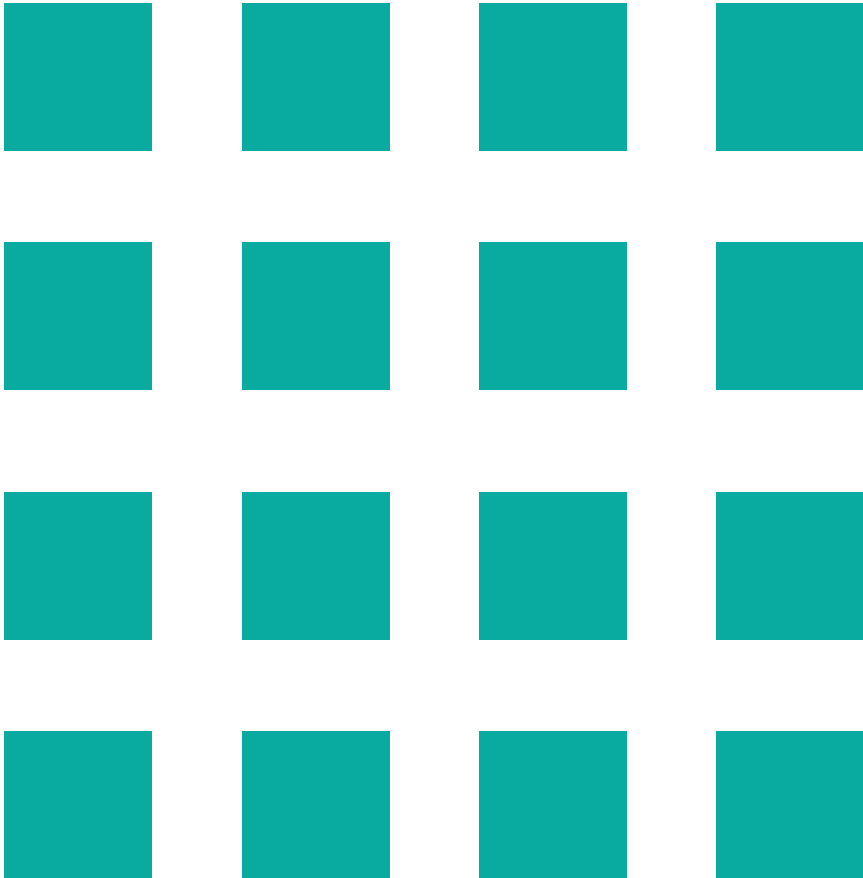
Saturated or dark colors and big size add weight to elements. We can use that to visually balance the page.



## Repetition

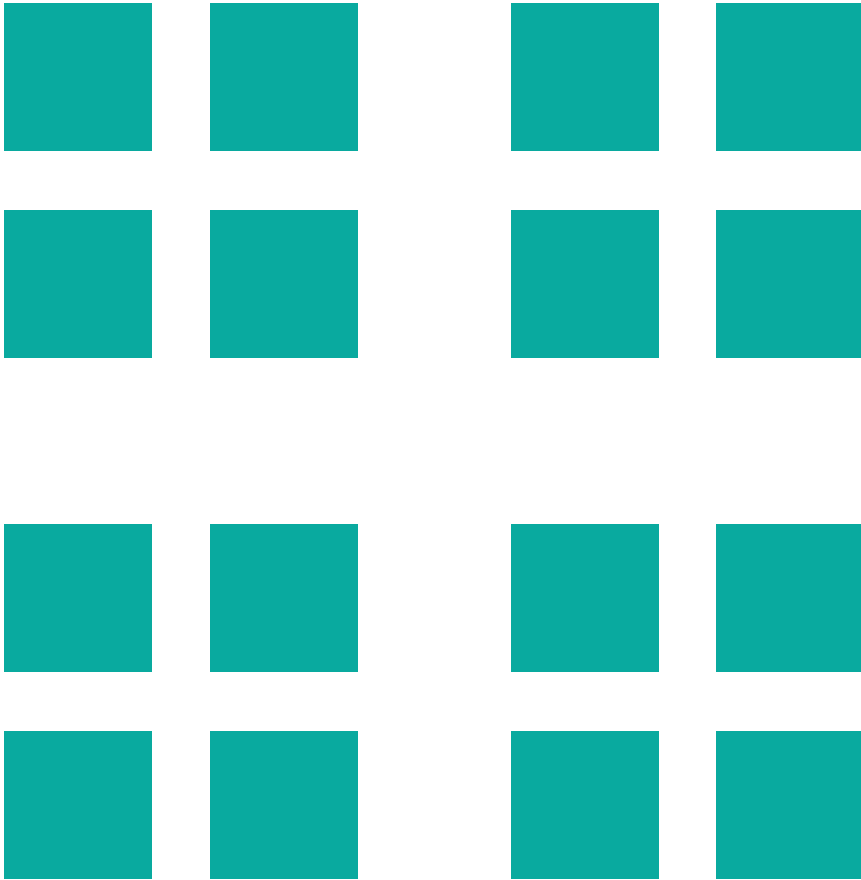
If similar things are repeated, we see them as belonging together; they form a group.

Repeated element don't have to share all characteristics. But the more they do, the easier it is for us to group them.



## Repetition

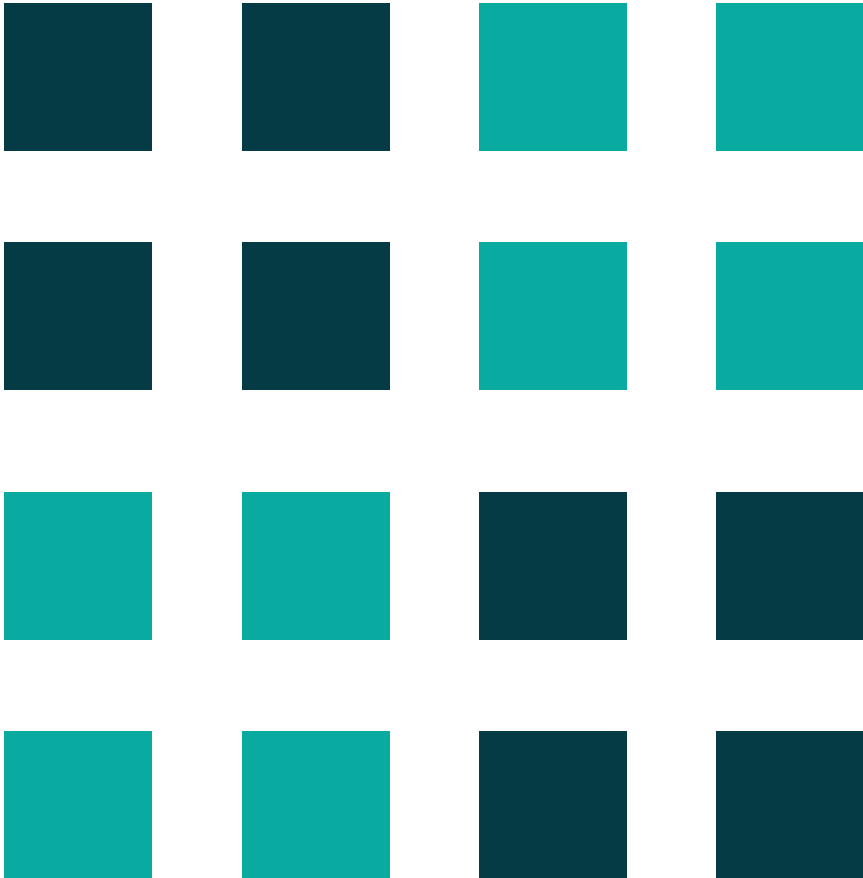
Here we see one group of sixteen elements.



## Repetition

If we change the position of some elements, we suddenly see four groups. It's almost impossible to perceive all elements as one group, even though they are exactly the same.





## Repetition

We can accomplish the same grouping effect by varying some other characteristic, like color lightness.



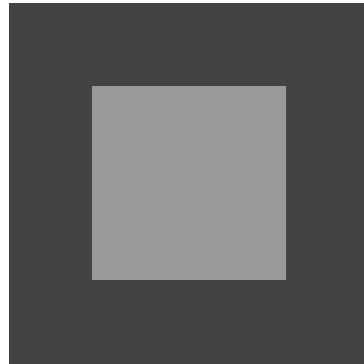
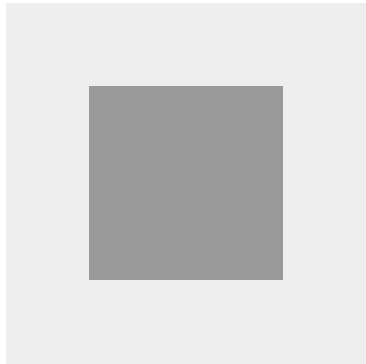
## Alignment and symmetry

Humans love alignment; it brings order. What we love even more is symmetry.

When we combine symmetry with repetition, rhythm emerges.

This text has high contrast  
and is easy to read.

This text has low contrast  
and is harder to read.

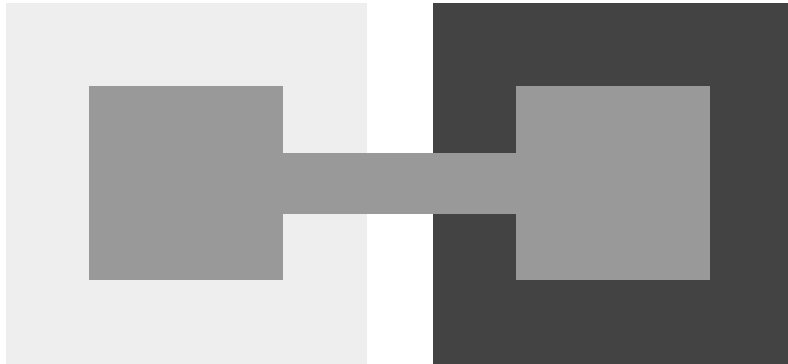


## Contrast

Contrast shows how different something is from its surroundings.

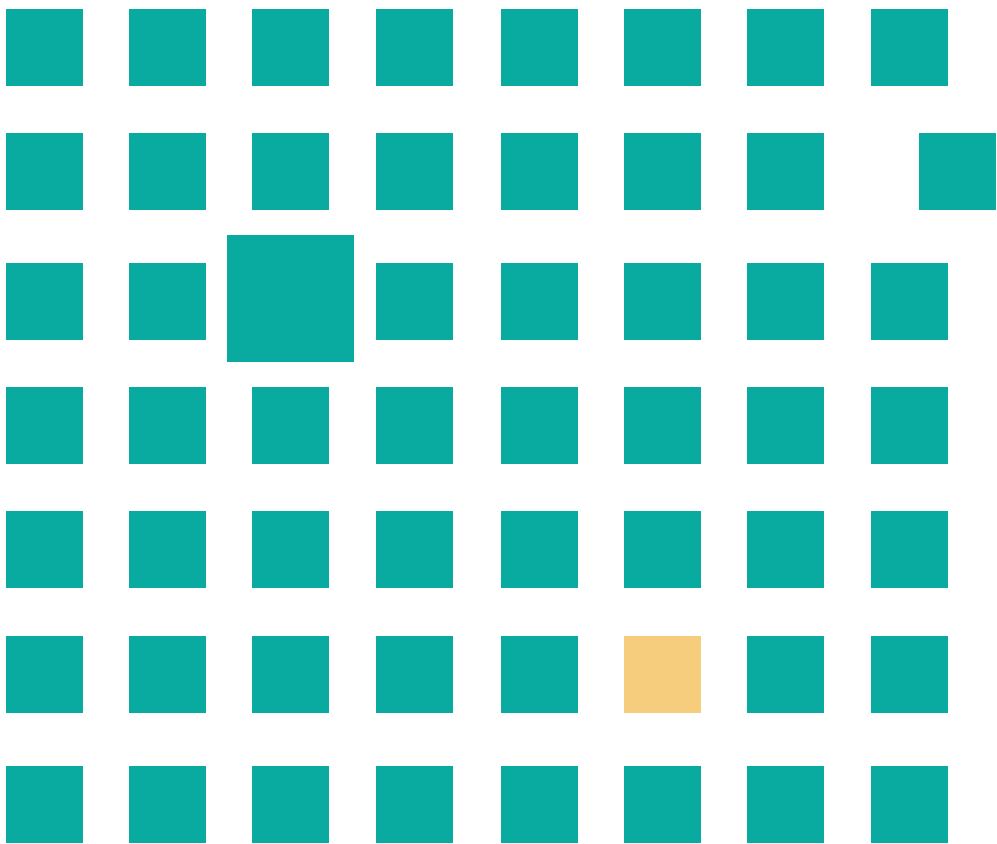
This text has high contrast  
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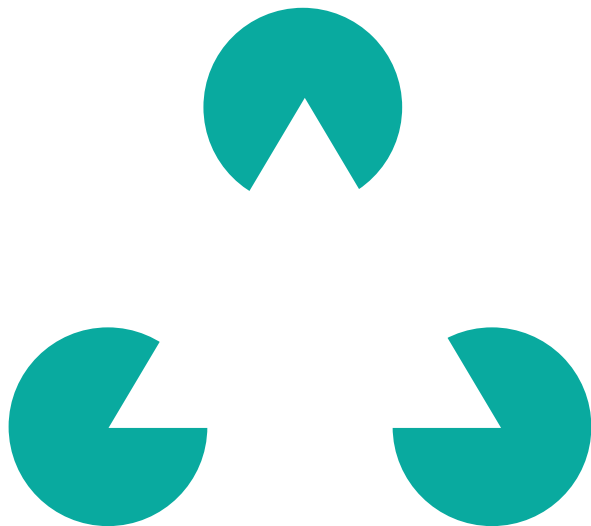
## Contrast

Contrast is always a relative measure and depends on the context. For example, the same gray fills both inner squares even though the left one looks darker than the right.



## Repetition and contrast

Contrast is used to point out different elements in a group. It's easy to spot which three elements are different from all other in the example.



1 3 5 \_ 9

## Closure

Our brains tend to look for simple and familiar patterns first, before engaging in a more detailed analysis. This allows us to quickly fill in the gaps at the cost of potentially missing important details. It's important to know about closure, because it can work for or against us.

# Summary

## **Building blocks:**

Lines and shapes

Size

Color

Texture

## **Basic principles:**

Balance

Repetition

Alignment and symmetry

Contrast

Closure

## Keep in mind

Majority of described principles belong to Gestalt principles first mentioned in the 1920s. There are many other design principles, but the ones here form the core and will be enough to start with.



**Let's apply what we learned**

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# Design brief

Design a **report** which is a part of a broader financial suite.

The report lists **invoices due in a given period with tax breakdown.**

It's important to mark which invoices are **overdue** and which are already **paid**.

“ I move things around  
until they look right.

Milton Glaser, graphic designer

## Start

Let's start by putting all required information and controls out there. Everything we need is here, but it's hard to focus on what's the most important.

**Building block:** lines, shapes

From: Oct 15, 2016

To: Dec 15, 2016

Generate report

Invoice 341230	Net	Tax	Total
Date issued: Sep 1, 2016	20152.66	3425.95	23578.61
Due date: Oct 28, 2016 paid		17%	
Invoice 341231	Net	Tax	Total
Date issued: Sep 13, 2016	412782.23	53661.69	466443.92
Due date: Nov 15, 2016 overdue		13%	
Invoice 341232	Net	Tax	Total
Date issued: Oct 22, 2016	377192.03	86754.17	463946.20
Due date: Dec 13, 2016		23%	

## Squint test

If we do a “highly scientific” squint test, we see our data is grouped in two big chunks: left group with invoice numbers and dates, and right group with monetary values.

We want to have horizontal groups for each entry, like rows, and not two vertical groups.

**Principle:** grouping

## Spread things around

Since “due date” is important, we moved it to a dedicated column. This will make it more prominent and balance everything on the screen.

These rows look very much like a table, so let’s do just that.

**Principle:** balance

From: Oct 15, 2016

To: Dec 15, 2016

Generate report

Invoice 341230	Due date	Net	Tax	Total
Date issued: Sep 1, 2016	Oct 28, 2016 paid	20152.66	3425.95 17%	23578.61
Invoice 341231	Due date	Net	Tax	Total
Date issued: Sep 13, 2016	Nov 15, 2016 overdue	412782.23	53661.69 13%	466443.92
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Date issued: Oct 22, 2016	Dec 13, 2016	377192.03	86754.17 23%	463946.20

From: Oct 15, 2016

To: Dec 15, 2016

Generate report

Invoice ID and date issued	Due date	Net	Tax	Total
Invoice 341230 Sep 1, 2016	Oct 28, 2016 paid	20152.66	3425.95 17%	23578.61
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Invoice 341232 Oct 22, 2016	Dec 13, 2016	377192.03	86754.17 23%	463946.20

## Move to a table

Redundant labels are removed. A new header row is created to explain data in the table. Lines are drawn between rows to create a clear boundary.

**Building block:** line

**Principle:** grouping

From: Oct 15, 2016

To: Dec 15, 2016

Generate report

Invoice ID and date issued	Due date	Net	Tax	Total
Invoice 341230 Sep 1, 2016	Oct 28, 2016 paid	20152.66	3425.95 17%	23578.61
Invoice 341231 Sep 13, 2016	Nov 15, 2016 overdue	412782.23	53661.69 13%	466443.92
Invoice 341232 Oct 22, 2016	Dec 13, 2016	377192.03	86754.17 23%	463946.20

## Align numbers

Numbers are much easier to scan and compare if they're aligned to the right.

**Principle:** alignment



## Create hierarchy

We need to show what information is the most important. For example, headers, issue dates, and tax percentages aren't. By decreasing them in size and changing color to gray, we decreased the contrast between them and the background. The lines between rows were also too strong and they got a similar treatment.

**Building blocks:** color, size  
**Principle:** contrast

From: Oct 15, 2016

To: Dec 15, 2016

Generate report

Invoice ID and date issued	Due date	Net	Tax	Total
Invoice 341230 Sep 1, 2016	Oct 28, 2016 paid	20152.66	3425.95 17%	23578.61
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Invoices due from Oct 15, 2016 ▾ to Dec 15, 2016 ▾

Generate report

Invoice ID and date issued	Due date	Net	Tax	Total
Invoice 341230 Sep 1, 2016	Oct 28, 2016 paid	20152.66	3425.95 17%	23578.61
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## Create hierarchy

Big buttons were towering above the table and weren't too clear. Were "From" and "To" referencing due date or date issued?

Introducing a label makes it clearer. It also looks less intense and more balanced.

**Building blocks:** lines, shapes, color, size

**Principle:** contrast

## Create rhythm

Moving things around and modifying their properties changes their relative position and spacing. We want things to have good rhythm that comes from alignment and symmetry.

The best measure depends on the situation. We want to improve vertical rhythm in this situation so we took the height of the main text line in the table as the basic measure.

Overlaying the grid over everything allows us to see where are things out of sync.

Invoices due from Oct 15, 2016 ▼ to Dec 15, 2016 ▼

Generate report

Invoice ID and date issued	Due date	Net	Tax	Total
Invoice 341230 Sep 1, 2016	Oct 28, 2016 paid	20152.66	3425.95 17%	23578.61
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Invoices due from Oct 15, 2016 ▾ to Dec 15, 2016 ▾

Generate report

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## Create rhythm

By moving the overlay grid to the side we'll be able to see the changes better.

The goal is to align all text lines in the table with the grid and also have the row separator lines in the middle of one grid measure.

Invoices due from Oct 15, 2016 ▼ to Dec 15, 2016 ▼

Generate report

Invoice ID and date issued	Due date	Net	Tax	Total
Invoice 341230 Sep 1, 2016	Oct 28, 2016 paid	20152.66	3425.95 17%	23578.61
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Invoice 341232 Oct 22, 2016	Dec 13, 2016	377192.03	86754.17 23%	463946.20

## Create rhythm

Changes are minor, but the result is easier to scan and more pleasant to see.

Rhythm and grids are guidelines, not hard rules. For example, the header labels are not aligned with the grid, but rather stayed closer to the separator line.

**Principle:** alignment and symmetry

Invoices due from Oct 15, 2016 ▾ to Dec 15, 2016 ▾

Generate report

<u>ID and date issued</u>	<u>Due date</u>	<u>Net</u>	<u>Tax</u>	<u>Total</u>
341230 Sep 1, 2016	Oct 28, 2016 paid	20152.66	3425.95 17%	23578.61
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## Remove redundancy

The first column contained too many words “invoice”. We removed them and got more space for other columns.

As a general rule, removing redundant and unnecessary elements always improves clarity and focuses on what is important.

Invoices due from Oct 15, 2016 ▼ to Dec 15, 2016 ▼

Generate report

<b>ID and date issued</b>	<b>Due date</b>	<b>Net</b>	<b>Tax</b>	<b>Total</b>
341230 Sep 1, 2016	Oct 28, 2016 paid	20,152.66	3,425.95 17%	23,578.61
341231 Sep 13, 2016	Nov 15, 2016 overdue	412,782.23	53,661.69 13%	466,443.92
341232 Oct 22, 2016	Dec 13, 2016	377,192.03	86,754.17 23%	463,946.20

## Group

Long numbers are hard to read. We formatted monetary values by creating groups of three digits. This makes them easy to scan and compare.

The same principle is used for grouping credit card and phone numbers.

**Principle:** grouping

Invoices due from Oct 15, 2016 ▾ to Dec 15, 2016 ▾

Generate report

ID and date issued	Due date	Net	Tax	Total
341230 Sep 1, 2016	Oct 28, 2016 Paid	20,152.66	3,425.95 17%	23,578.61
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## Highlight details

We added color to critical elements. This way they're different enough from the rest to be immediately noticeable. Even if someone has a type of color blindness that would prevent them from discerning red from green, the text and the width of "Paid" and "Overdue" labels are different enough to be recognized.

**Building blocks:** shape, color  
**Principle:** contrast



From: Oct 15, 2016

To: Dec 15, 2016

Generate report

Invoice 341230  
Date issued: Sep 1, 2016  
Due date: Oct 28, 2016  
paid

Net	Tax	Total
20152.66	3425.95 17%	23578.61

Invoice 341231  
Date issued: Sep 13, 2016  
Due date: Nov 15, 2016  
overdue

Net	Tax	Total
412782.23	53661,69 13%	466443.92

Invoices due from Oct 15, 2016 ▼ to Dec 15, 2016 ▼

Generate report

ID and date issued	Due date	Net	Tax	Total
341230 Sep 1, 2016	Oct 28, 2016 Paid	20,152.66	3,425.95 17%	23,578.61
341231 Sep 13, 2016	Nov 15, 2016 Overdue	412,782.23	53,661.69 13%	466,443.92

## Before and after

Each step was simple and logical; it didn't seem like a big change. But many steps together led to a complete transformation.

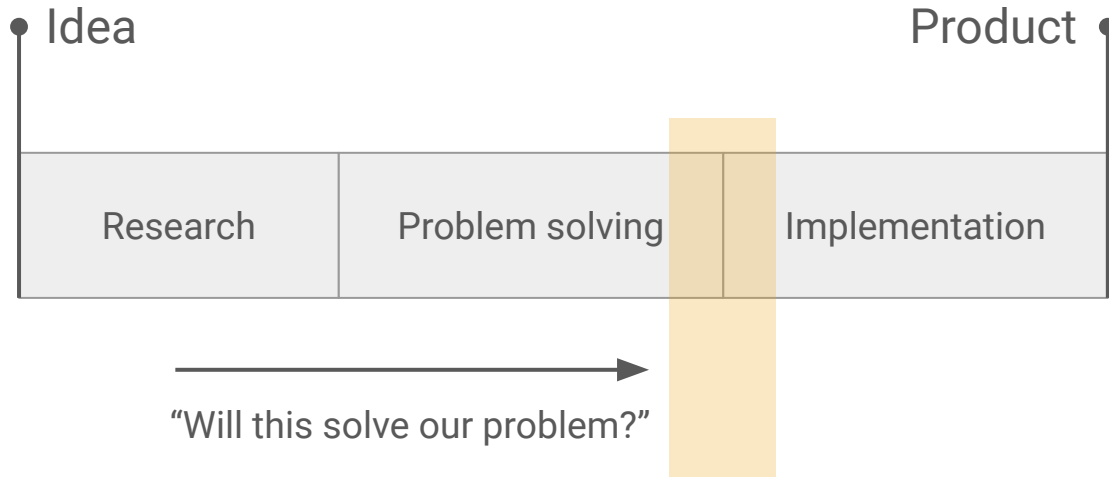
Visual design shouldn't look like magic anymore. It is a chain of deliberate decisions following basic principles.

# Success

That was neat, right? You should be able to build similar components by yourself now. Just remember basic principles and do one step at the time.

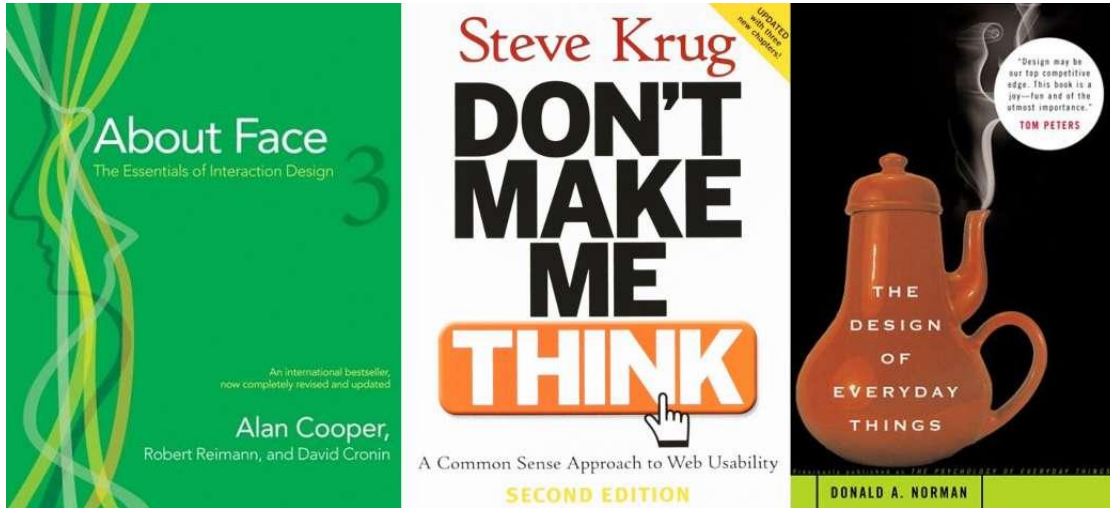
# Learn more about design

We've talked about one particular step in the whole process. Activities before user interface design determine what actually gets built.



# Recommended reading

If the step just before user interface design interests you, there are some very good books about it.



<https://merlin.rebrovic.net/books/recommendations/ux-beginner/>

**Learn. Build. Improve. Repeat.**

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[merlin.rebrovic.net](http://merlin.rebrovic.net)