

# Color in UI Design

The **fundamental** skill of coloring interface designs is being able to **modify** one base color into **many different variations**.

I know this sounds a little odd. Hear me out. I'm going to give you a framework for adjusting color in your UI designs.

This framework will:

- Allow you to modify **one theme color** for basically any purpose in your UI (this is hugely powerful, and, as we'll see, what apps like facebook are already doing)
- Help you to **predict what color changes will look good**
- Make color seem **less subjective** (“subjective” is often a word for “I haven't figured out how it works” — and it's a

word you hear a *ton* when folks talk about color)

Are we cool? We're cool?

Great.

## Darker & Lighter Variations

One thing I've noticed across many great-looking interfaces is that they often have darker and lighter variations on a particular theme color.

Header is **theme color**



Search Bar is **darker variation**

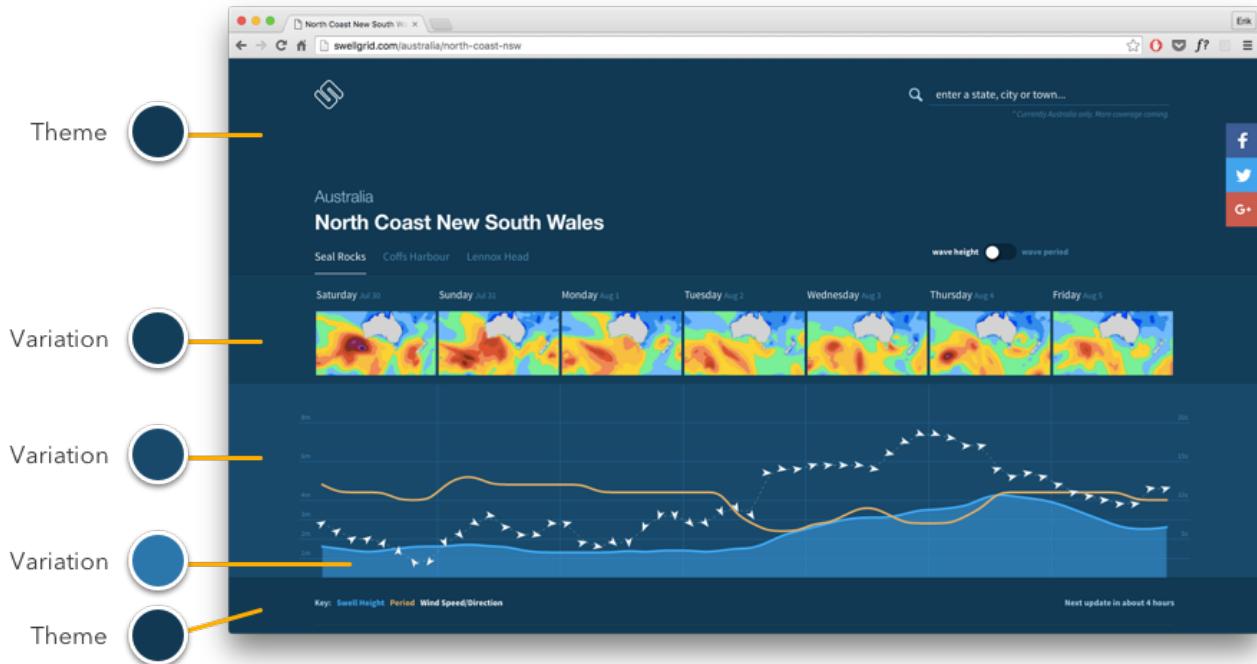


Icon is **lighter variation**



You didn't think that search bar was just a translucent black overlay, did you? Spoiler alert: it's not. No opacity of black overlaid on that blue will give you the color of the search bar. It's a variation picked by some other magic.

Quick, now look at Swell Grid, the beautiful surf forecast app.



Sha-BAM. We just got hit with a boatload of variations. How many are there? Go to the [website](#) and count 'em yourself. Practically everything on this page is a variation of the initial blue.

Or, here's another simple example:



Even element *states* are variations on a color. This isn't best described as "a palette of 3 blues". It's one blue with variations.

But this begs the question: *how do you actually modify a color to get good variations?*

We'll get there, but I want you to understand this stuff from the ground-up. So here are our 2 trusty principles for figuring this stuff out:

- We'll look to the **real world for reference cues**. Even though our interfaces are "fake", we still copy like mad from the real world, because after decades of seeing things in the real world, we just *expect* light and color to work in certain ways.
- We'll use the **HSB color system**. The short of it is: it's the most intuitive color system with broad usage (for my purposes, Sketch and Photoshop). If you don't know what hue, saturation, and brightness are, let's break and meet back in 10.

# Real-World Color Variations

Alright, look around you. What “color variation” are you undoubtedly seeing two dozen instances of every time you glance around your room?

*Shadows.*

You can think of a shadow as a darker variation on a base color.

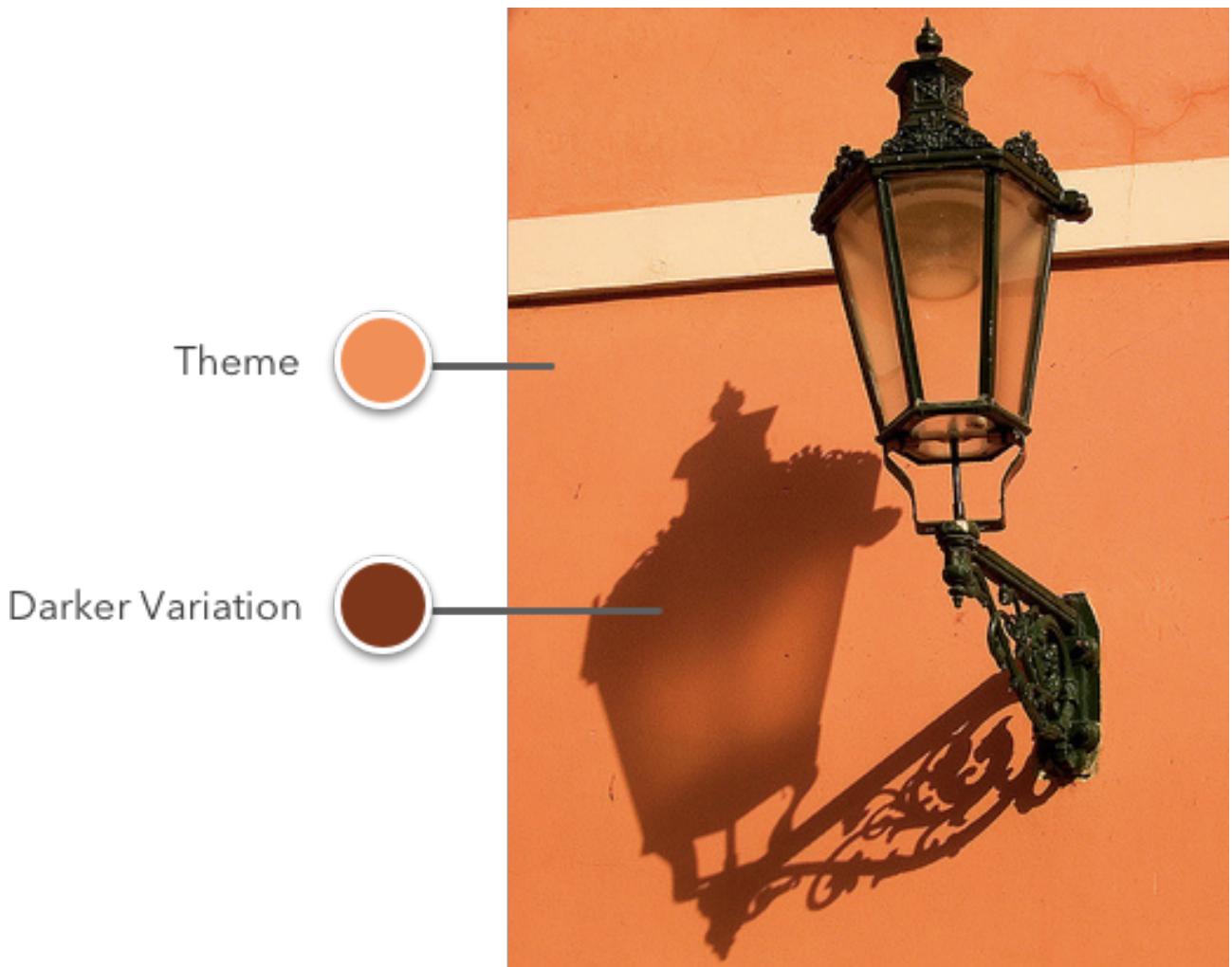
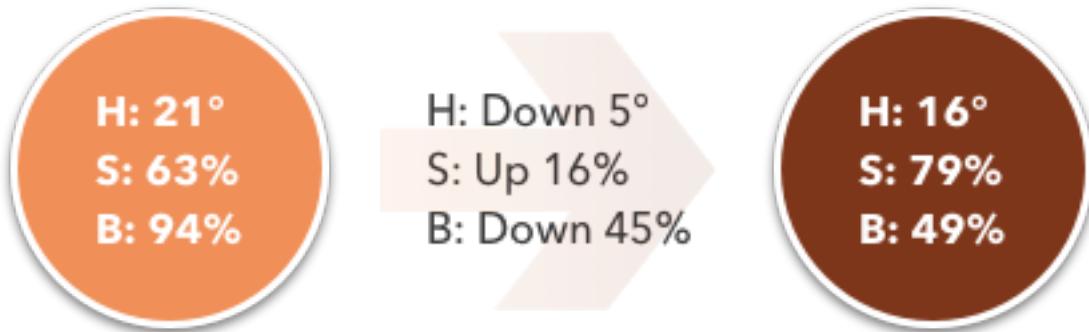


Photo by [David Blaikie](#)

With me?

Now let's jump into Sketch and get our color pickers and figure out *exactly* what happens when a shadow falls on our coral wall.

Like I mentioned, we'll be figuring this out in HSB.



Note: Monitor/image color profiles might make these exact measurements different for you.

The brightness moves down — OK, so *that* was pretty obvious. But hold up — before we go generalizing too much, let's actually look at another example.

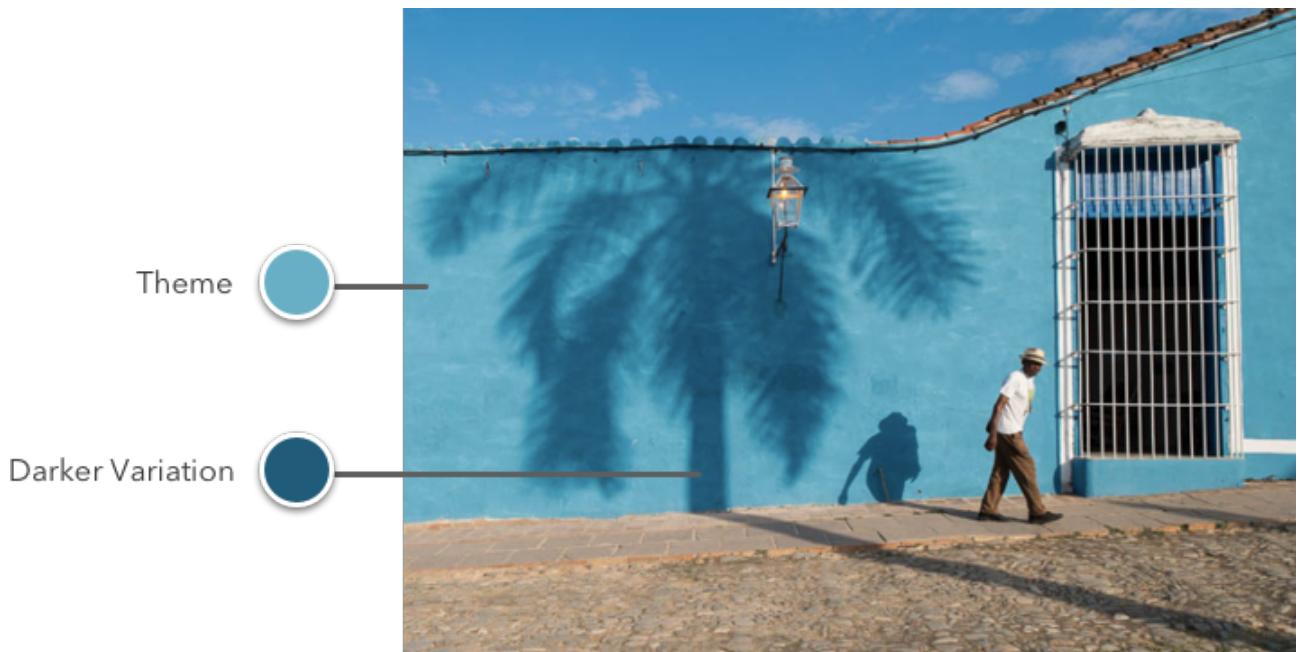


Photo by [Matthias Uhlig](#)

Do shadows work the same way in Cuba? We're about to find out.

**H: 194°  
S: 47%  
B: 77%**

**H: Up 6°  
S: Up 25%  
B: Down 30%**

**H: 200°  
S: 72%  
B: 47%**

Alright, now we can compare and contrast. Notice a pattern?

When there's a shadowed variation of a color, you can expect *brightness* to go *down* and *saturation* to go *up*. We just looked at this in two instances,

**but as far as I've ever seen, it's a solid rule you can go by.**

Now hue is a bit crazier — it went *down* for the coral wall shadow, and *up* for the teal wall shadow.

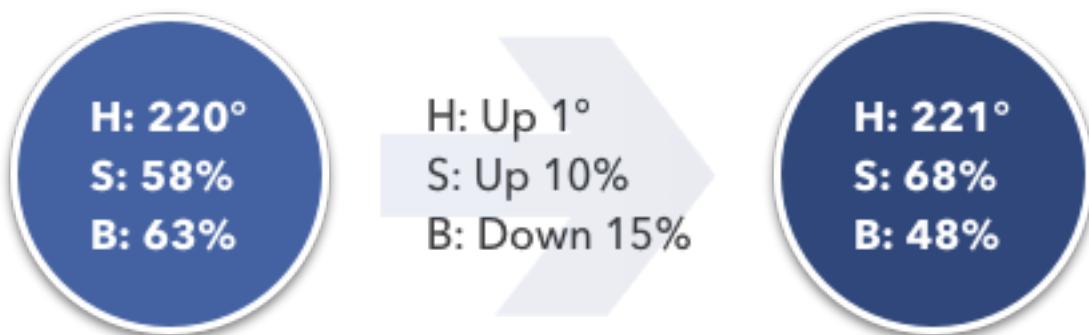
There *is* an explanation for that, but it's much less important and a bit more esoteric than saturation/brightness — so we'll come back to hue later.

## The Rules

Let's unpack these concepts a bit more.

**Darker color variation = higher saturation + lower brightness**

If you look back to our facebook search bar example, you'll see that's exactly what's going on.



The hue moves  $1^\circ$  out of  $360^\circ$ , which is practically a rounding error.

The saturation went up as the brightness went down. The reason the search bar couldn't be an

opacity of black overlaid on the base blue is because, in HSB, *adding black* is equivalent to *reducing brightness*. Instead, we want to reduce brightness *while simultaneously adding saturation*. Black doesn't add any saturation to our color!

Why, in the real world, are darker colors correlated with higher saturations? I haven't the slightest idea. But I can always make something up: *it's because as the intensity of the light (brightness) overtakes intensity of color (saturation), the color necessarily becomes more washed out—and vice versa.*

That might be complete BS, but it *kind of* makes sense, right?

## **Lighter Color Variation = lower saturation + higher brightness**

Now, being the discerning and erudite readers that you are, you probably guessed that the opposite transform that gives us *darker variations* will give us *lighter variations*.

And you nailed it, by golly.

Of course, we can go one step further. If we go on lowering saturation and raising brightness till the cows come home, where do we end up?

Here:



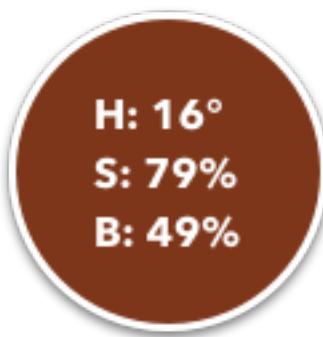
We end up at white.

You can think of *making lighter variations* as *adding white*. And there are two very simple ways to *add white* to a color in Sketch et al:

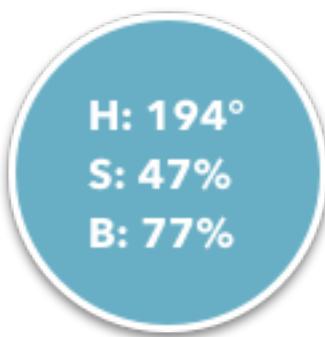
- Reduce the opacity of the element (if it's on a white background)
- Add a translucent layer of white on top of the element



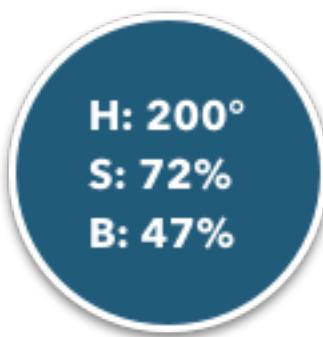
H: Down 5°  
S: Up 16%  
B: Down 45%



That's why the shadow on the coral wall shifted *down* in hue—it was shifting towards red, at 0°, which is the nearest minimum point to 21°.



H: Up 6°  
S: Up 25%  
B: Down 30%



And that's why the shadow on the teal wall shifted *up* in hue—it was shifting towards blue, at 240°, which is the nearest minimum point to 194°. Mind blown yet?

## The Way of Color

So when it comes to color variations, ask yourself: do I need simply a lighter or darker variation on a color I already have?

(And if you're going for something clean and simple, the answer is so, so often *yes*)

### **Darker variations:**

- Brightness decreases
- Saturation increases
- Hue (often) shifts towards a luminosity minimum (red, green, or blue)

### **Lighter variations:**

- Brightness increases
- Saturation decreases
- Hue (often) shifts towards a luminosity maximum

This will allow you to take one hue, but modify it endlessly for all your UI needs, using darker and lighter variations where appropriate.

There are still many topics to cover:

- How is **hue** even more important in **gradients** and **data visualization?**
- When you're in Sketch (etc.), what technique do you use to make **darker variations?**
- Do you move **saturation** or **brightness** more?
- How do you find **grays** that match your color scheme?
- How do you pick **totally unrelated colors** that look good together?
- How do you fix it when colors **clash**?
- And, of course, just why *are* RGB and CMY the low/high points on the luminosity graph?

I'm glad you asked.



# The HSB Color System

We're going to cover what H, S, and B are, and then I'm going to tell you about why this is the single-best color system in wide usage, plus some intricacies of using it in day-to-day digital design.

## Hue = “Color of the Rainbow”

Hue is a number between 0 and 360. It's measured in degrees, like degrees of a circle (because *whoa*, spoiler, circles also have  $360^\circ$ ). Remember the color wheel? Hue is just *where you are on the color wheel*.

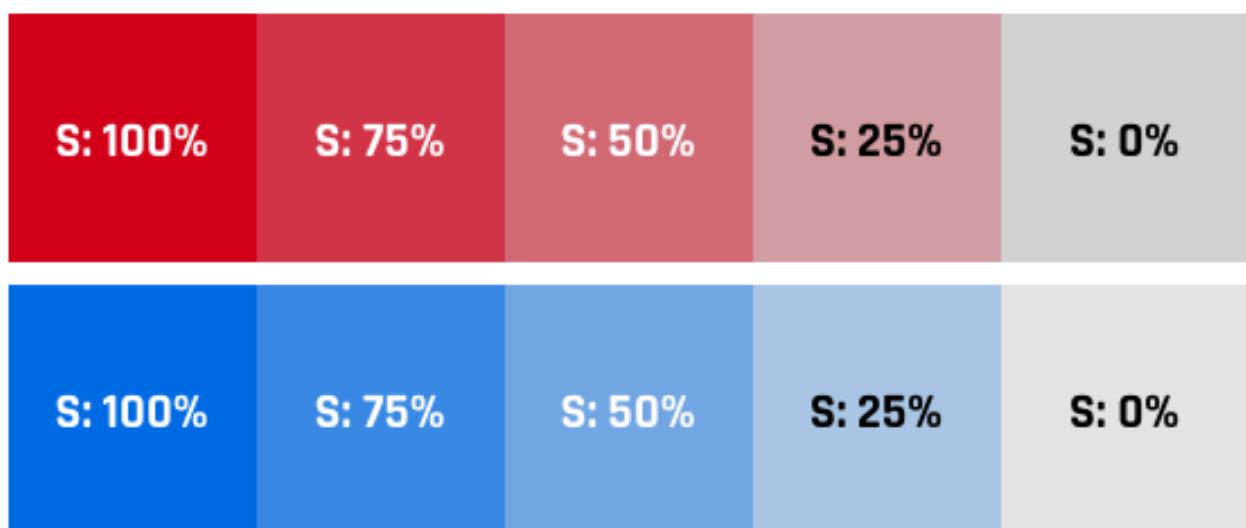
- 
- 

So when I'm thinking of what color to add in, I can quickly just type a number that will get me *pretty* close to the right hue, just by thinking about where those three points are.

## Saturation = “Richness”

Saturation is a number between 0 and 100. So, no matter what hue you've picked, a saturation of 100% will be the richest possible version of that color and a saturation of 0% will be the gray version of that color (i.e. if the color is light, it'll be a light gray; if the color is dark, it'll be a dark gray).

Wanna see?



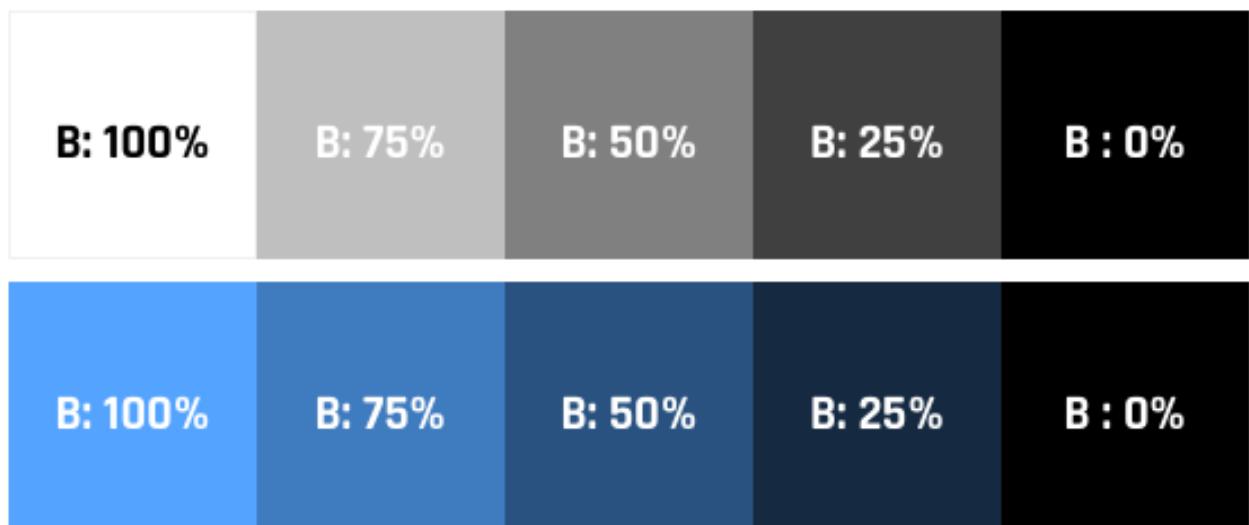
Saturation is pretty simple. I sometimes think about it as the amount of color *injected* into the gray. So 0% is a flat gray, but 100% is the most *colorful* color your monitor can make.

## **Brightness = *Brightness*, Duh.**

Brightness is a number between 0 and 100. Like saturation, it's sometimes written as a percentage. This one is *fairly* obvious as to what it means, but there's a quick catch.

- 0% brightness is black, no matter the hue, no matter the saturation.
- 100% brightness is white *only if* saturation is also 0%. Otherwise, 100% brightness is just a... very bright color.

Sound confusing? Think of it this way. Imagine Brightness is a lightbulb. 0% means the lightbulb is off (pitch black in the room). 100% means the light is on full strength. So maybe 100% brightness is a *bright color*, or, *if the light is already white*, then 100% brightness is pure white.



Alright, so to review, we can describe a color with three sensible numbers:

- Hue: the color it most resembles on the color wheel, from  $0^\circ$  to  $360^\circ$
- Saturation: how injected with color it is, from 0% to 100%
- Brightness: how much the “lightbulb” is turned on, from 0% to 100%

We good? Great.

# HSB in Practice

If you're still with me, I want to start getting into the practicalities of using this system. If you've never used HSB, don't freak out too much about the details coming up... Give the system a try first. Mess around a bit, and come back - it'll make more sense after some use.

## Color Variations with Hue

First, hue is a fantastic way of creating variations on color. Because you have so many choices from  $0^\circ$  to  $360^\circ$ , rather than blue simply being "blue", you can push the hue slightly down or up, and get nice variations pretty easily.



Here we start with a *very* default blue, centered smack dab on  $240^\circ$ . But rather than choosing the *most boring possible color* ever, we decide to spice things up a bit.

Even shifting the hue down  $30^\circ$  to  $210^\circ$  gives a cool vibe. Lighter, more fun, more casual. Kind of in twitter's territory, but this is only step one.

And bumping the hue up to  $260^\circ$  gives me an indigo. A mere  $20^\circ$  shift, and it's got a totally different feel -

something cooler, might work well with neon colors or dark backgrounds. Could lend a subtle feminine vibe to something. Etc - you get it.



Likewise, red. Tough color to work with right out of the gate. It's super bold, super strong. But depending on what we want to do - let's say this is our error message or something - we can make it friendlier by injecting the slightest amount of pink (moving the hue down 10°). Or we can get a more staid variation by adding some orange.

So working with hue gives you a lot of options. Do yourself a favor: *don't restrict your palettes to the colors you learned in Kindergarten*. Play around with it.

## Adjust Visibility with Saturation

There's plenty of techniques and tricks that involve adjusting saturation, but one I keep coming back to is *adjusting visibility*.

If you have a color that's really overpowering everything in your UI, a quick go-to way of fixing it is to reduce the saturation.

For instance, take a look at this variation on the Google logo. I've saturated the blue to 90%, and you'll see it sticks out like a sore thumb.



Notice how much the blue sticks out. If you're having trouble seeing it, try relaxing your eyes and just staring at the logo for a few seconds. Almost immediately, you'll start to see the "G" and the "g" popping out from the other colors.



In the normal Google logo, there's *much* better balance between the different colors.

You'll come to use saturation for all kinds of things, including fixing clashing colors and enriching your darker shades, but I just wanted to give a quick example here.

Now let's move on to one of the more intriguing facts of HSB – and what it means.

# Black is Not the Opposite of White

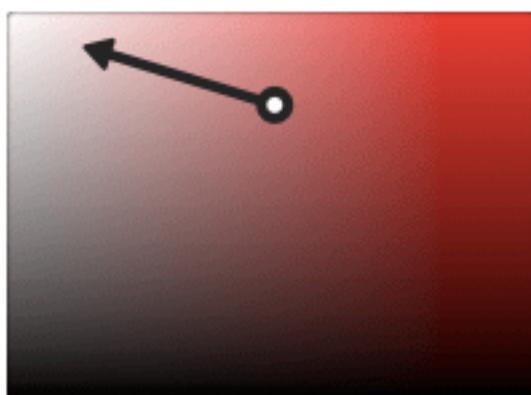
In HSB, here's how we make black and white:

- Black: set the brightness to 0%. Hue and saturation can be anything.
- White: set the brightness to 100% *and the saturation to 0%*. Hue can still be anything.

This means, intriguingly enough, that (in the HSB system) black is *not* the opposite of white.

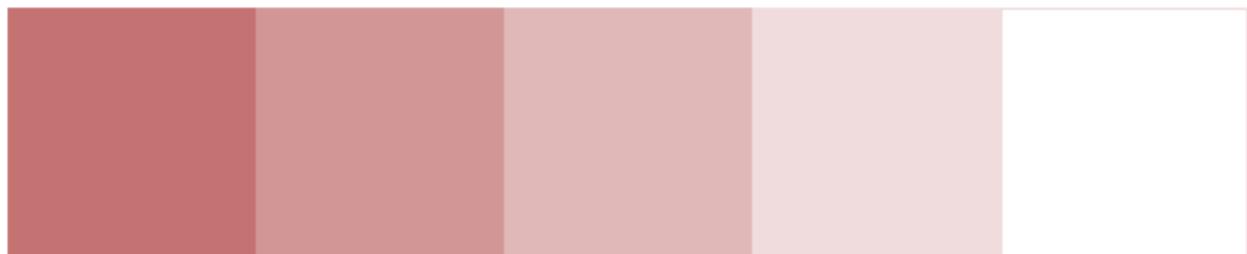
Another way of proving this to yourself is to think about what it *means* to add black or white to a color.

To add white, you must move your color towards white on your color picker. White is in the upper-left corner, and sure enough, adding white involves decreasing saturation (moving left) and increasing brightness (moving up).

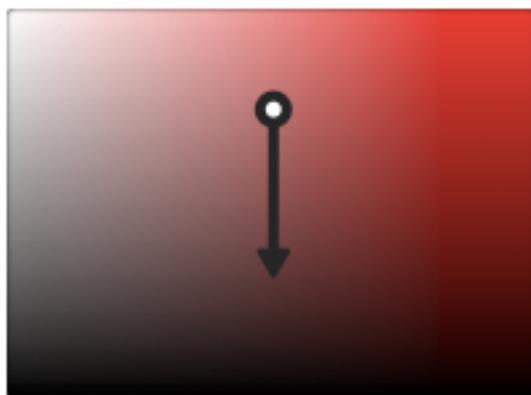


*Going from one red to a whiter red.*

Adding white looks like this:



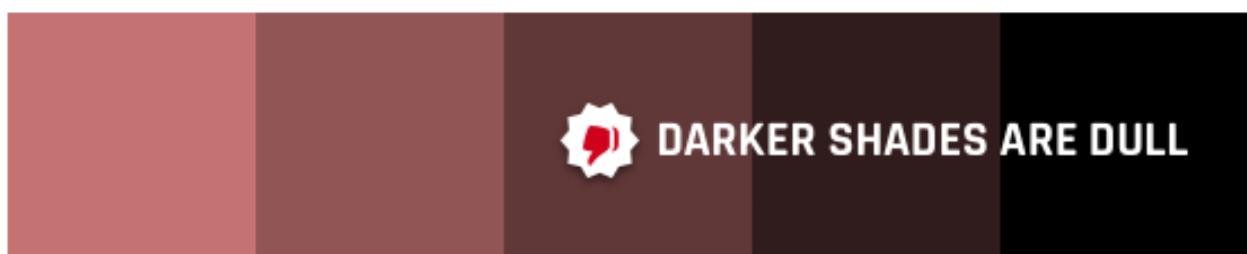
But adding black? Well, since black is the *whole bottom side* of the color picker rectangle, adding black is just decreasing brightness. Saturation doesn't matter.



*Going from one red to a blacker red.*

Those two arrows don't cancel each other out! Black and white are not opposites in HSB.

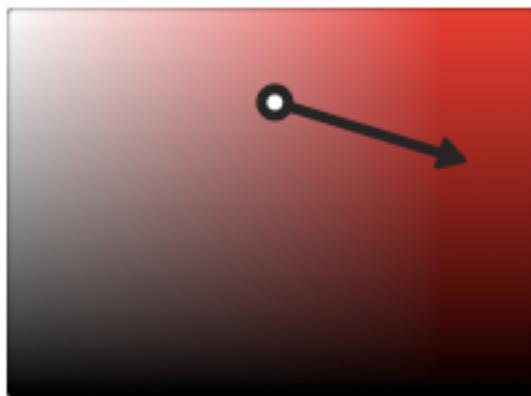
On a practical level, the darker shades you get by adding black are really dull compared to the lighter versions:



Here's the big kicker. Instead of *adding black*, I want you to *remove white*. In other words, simultaneously:

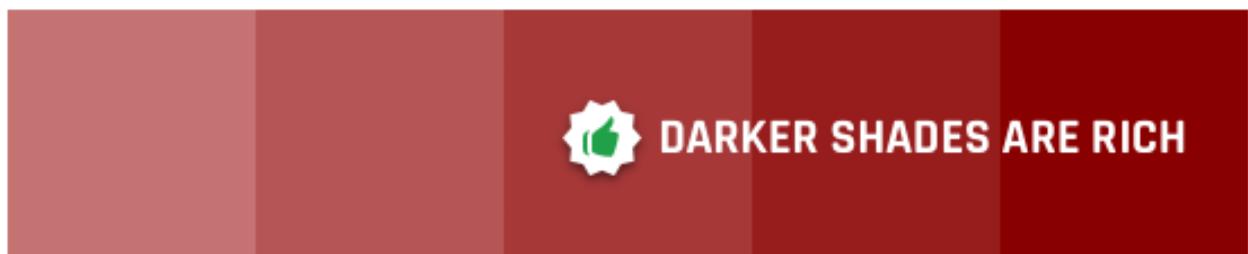
- Increase saturation
- Decrease brightness

Or, if you prefer the diagram:



*Going from one red to a less white red.*

This will give you much *richer* dark shades:



Removing white - that is, making your darker shades richer - is the "correct" way to generate darker variations of a color 95%+ of the time.

# Bonus Explanation: What's the Difference between HSL and HSB?

The front-end devs among you might know that CSS uses a color system HSL (hue, saturation, *lightness*). Wow. That sounds vaguely familiar. Are HSB and HSL the same thing?

Short answer: *no*. But they're *similar*.

Now that you're an expert in HSB, I can explain this really simply: *HSL is exactly like HSB, except black and white are actually opposites*.

So, in HSL:

- To get *black*, set lightness to 0% (doesn't matter what hue or saturation are)
- To get *white*, set lightness to 100% (doesn't matter what hue or saturation are)

Now that's well and good, but as soon as you try and describe intuitively how to translate between the two systems, things get messy.

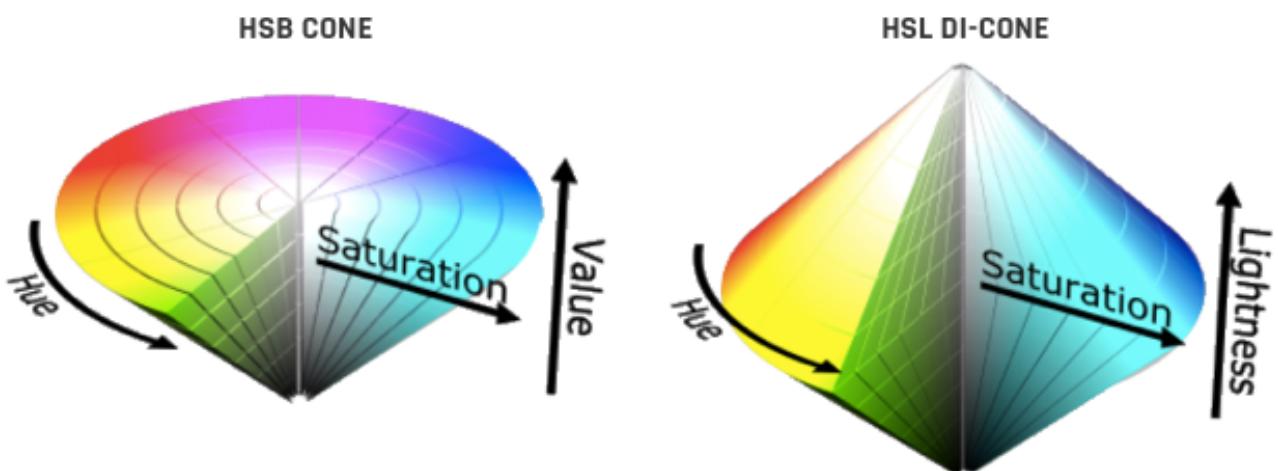
- Adding lightness above 50% is the same as adding white (meaning the equivalent HSB saturation goes *down* and HSB brightness goes *up*)

- Subtracting lightness below 50% is the same as adding black (no effect on HSB saturation, but HSB brightness goes down).

So HSL's lightness property is this weird mix of HSB's saturation and brightness, depending on how light it is!

Nonetheless, having black and white be opposites may actually be a *slightly* more sensible system, but modern UI design apps (Sketch, Figma, and Adobe XD) all use HSB, not HSL. And frankly, your UI design app is where you're picking and adjusting colors in the first place. So let's keep it simple: if you want to translate color values from design to code, just use hex values, which are far less accessible than either system!

(But at least you can copy and paste 'em.)



*Image courtesy of Wikipedia's [SharkD](#)*

If you're interested in learning more about color systems, this diagram contains the seeds of your demise. It should make clear the subtle but critical difference between HSB and HSL. But whipping out color spaces like this is where

we leave *practice* and enter *theory*, so I'll let someone else take the reigns here.

# How a good UI becomes a good UX

Last year (March 2017) I've made a design talk at GDGLisbon for an audience mostly composed of Developers. (<https://www.meetup.com/gdglisbon/events/238243199>)

**Mission:** Trying to clarify some misconceptions about Usability, User Experience, User Interface, and also the importance of each one of these elements to build great products.

## Good UI vs Bad UI

What are the conceptions behind a Bad UI or a Good UI? Is it Bad when Ugly? Is it Good when

Beautiful? Is it just a matter of opinion? What make us to prefer one website over another?

*beautiful*      *ugly*  
~~GOOD UI VS BAD UI~~

**Common misconceptions part I**  
*If an interface has a good visual design it will be simple and easy to use*

1st: Craigslist

The screenshot shows the Craigslist homepage with several search categories:

- comunidade**: animais, artistas, atividades, classes, compril. carro, cuidar de crianças, eventos.
- imóveis**: alugueis de férias, grupos, músicos, notícias locais, perdidos, política, voluntários.
- empregos**: admin/escritório, alim/beb/hosp, arq/engenharia, arte mídia/des., beleza / spa, ciência/biotécnica, contábil+financ., educação, eng. internet, fabricação, governo, gravação/edição, imóveis, legal/paralegal, marketing/PR, médico/saúde, negócios/adm., projeto da web/inf., recursos humanos, segurança, serviços/arte, serviços clientes, sistemas/redes, software/q/a/dba, suporte técnico, terceiro setor, trabalho geral, transporte, tv/filme/video, varejo/atacado, vendas/neg.
- venda**: antig., artesanato, barcos, bicicletas, bilhetes, carro/caminhão, cds/dvds/vhs, celulares, coleções, computador, desejados, eletrodom., eletrônicos, equip., pesados esportes, faz.+jardim, ferramentas, foto+video, geral, gratuito, infantil, inst musicais, jogos/brinqu., jóias, lar, liquid. domést, livros, materiais, mobília, motocicletas, negócios, peças de carro, quad./util/snow, roupas/aces., saúde e beleza, trail+camp, trailers, troca, video game.
- bicos**: [ETC] [meio perido]
- fóruns de discussão**: só platônico, mulher procura mulher, mulher procura homem, homem procura mulher, homem procura homem, romances diversos, encontros casuais, conexões perdidas, violentos e enfurecidos.
- serviços**: animais est., aulas, automotivos, beleza, cell/mobile, ciclo, computador, criativo, evento, faz.+jardim, financeiros, imóveis, jurídica, lar, marítimos, peq. negócios, skilled trade, terapêuticos, trab./mudança, viagem/férias, write/ed/tran.
- curículos**: [not visible in the screenshot]

## Craigslist's Homepage

Maybe we all agree that this is a poor interface just because there's nothing catchy or funny there. Not a lot of colours or even an image. But what's the goal of this interface? What's the major task of almost 60 millions of Craigslist's users ?

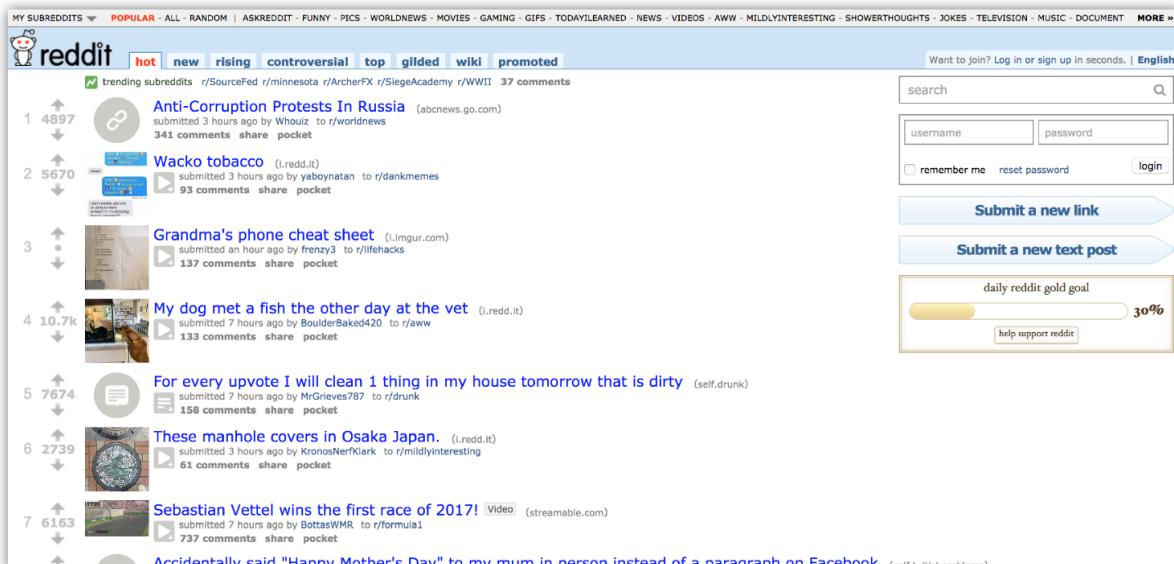
Craigslist is a classified ads website that has community forums and ads for hundreds of subjects like sports, services, jobs, housing...

The User's goal there is trying to find the fastest way possible for what he/she wants. So these groups with a list of URLs is what users need to

accomplish their goal.

Content is the most important element on the interface. Information arquitecture is the key.

## 2nd: Reddit

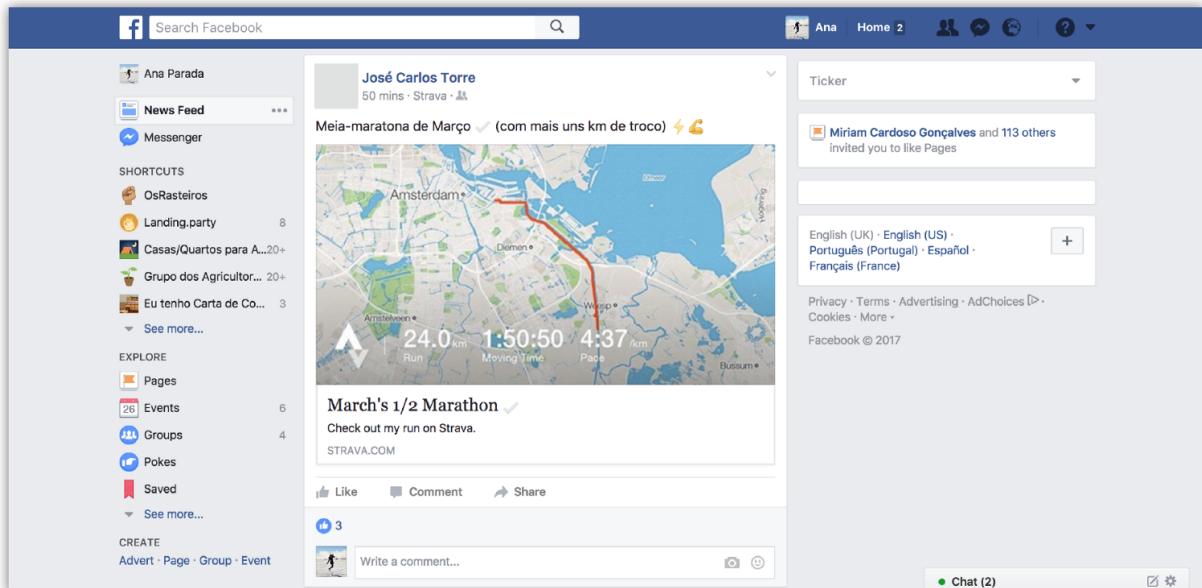


Reddit's homepage

Another example of a non appealing interface. The same questions I've asked above make sense at this example. In this case we have Reddit, an aggregator of news and web content, a place where people can discuss about any type of subject. The User's goal here is to follow subreddits, the trending ones but also the ones they like the most, to read discussions and participate in them. Is that a bad UI? Reddit

has 542 million monthly visitors (234 million unique users).

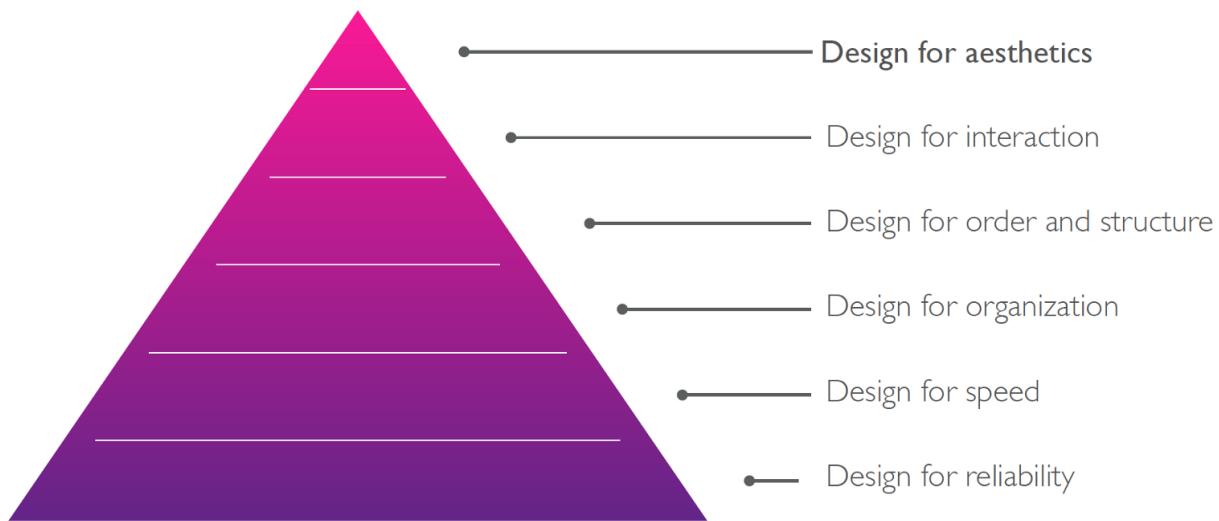
## 3rd: Facebook



Facebook is a particular example because everyone in the world uses it. No matter the culture, no matter the instruction, the age or even even the social stratum. We can agree that facebook doesn't have an attractive interface, but it works well for 1.86 billion monthly active users.

## Aesthetics in Design

Aesthetics is the last priority on a product / service design



First, you have to create and design a consistent product.

## **UX role in the process of building a product**

*Getting in the User's shoes and knowing how to better achieve their needs.*

We can say for instance that the main goal of the UX process is to add value to a product by establishing an emotional connection with the final user/client.

On the other hand Usability is an important step to achieve a Good User Experience.

- Usability goal is to make an interface *simple and easy to use.*

- Usability tries to *minimize the user effort to complete a task.*

We can say that both Usability and User Experience are essential to a Product's success.

So at the beginning of any product we first should try to answer these questions:

1. What problem this product /service is trying to solve?
2. Who are my product / service users?
3. What are their (the users) expectations ?
4. What qualities they value ?
5. What do they expect ?
6. How/ When they use the product / service?

*When relating UX to an interface we can establish that the goal is to emphasise the 'feels like home' sensation.*

## **Common misconceptions part II**

*If an interface is easy to use it has good user experience.*

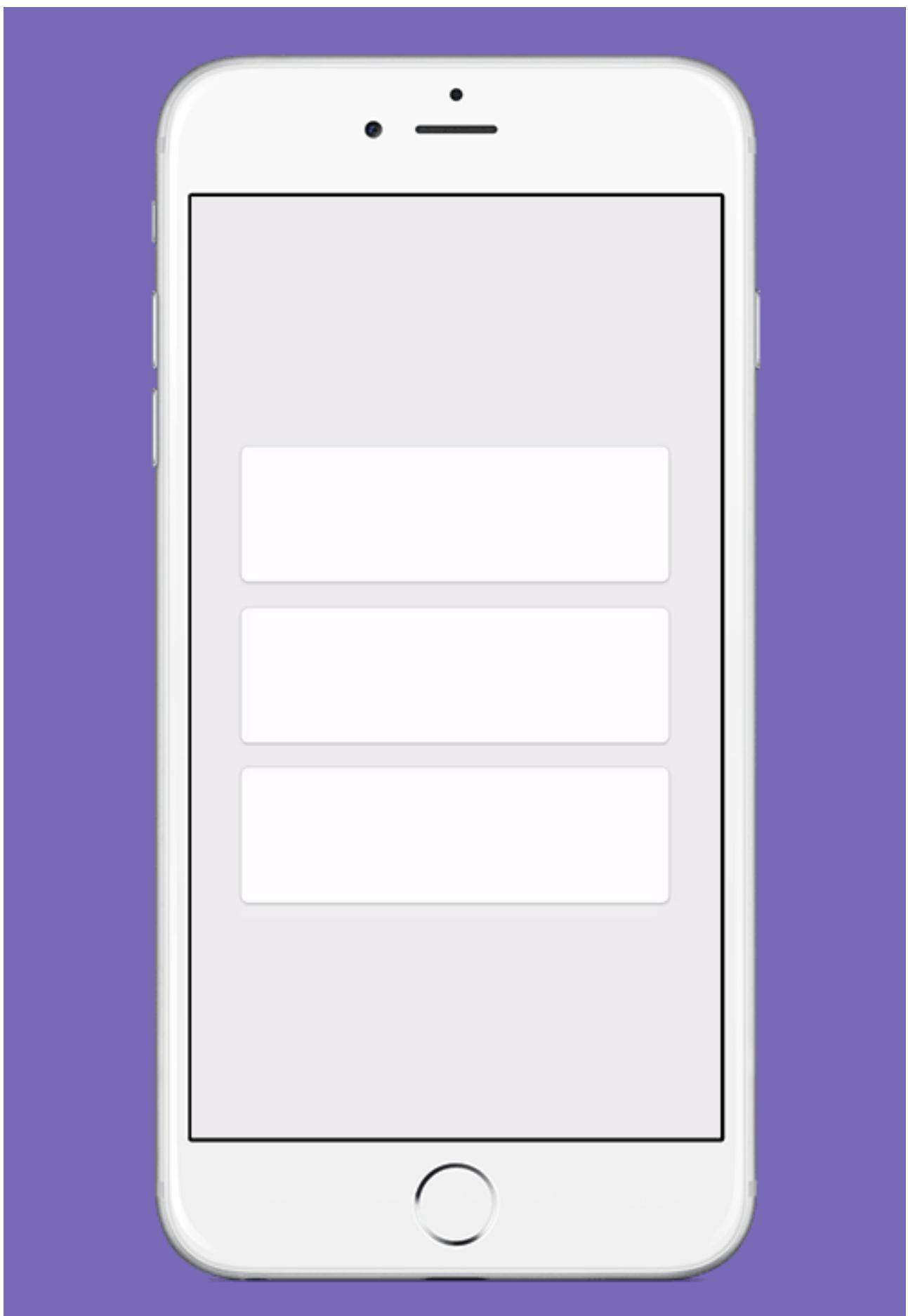
## **UI role in the process of building a product**

User Interface Design is an important step to achieve a Good User Experience.

*Visual (UI) Design is the use of imagery, color, shapes, typography, and form to enhance usability and improve the user experience.*

**How can we improve “the experience” ??**

- **by giving users visual feedback**



Communicating the results of an interaction shows the user that the interface has been updated with his action. This makes the user feels in control.

## 2. by giving elements some extra space

Because white space can make the content more discoverable and readable.



The screenshot shows a travel website for Lufthansa. At the top, there's a yellow header with the Lufthansa logo and the tagline "Nonstop you". On the right side of the header is a "VER PREÇOS" button. Below the header is a large image of a traditional wooden boat with a blue hull and a red roof, moving towards a tropical island with palm trees and a red-roofed building. To the right of the image, there's a black ribbon banner with the text "SITE OF DAY AWARDS". In the bottom left corner of the main content area, there are two small icons: one of a globe and one of an airport terminal. Next to these icons is a large number "6.892". Below this, smaller text reads "pessoas fazem o check-in nos aeroportos das Maldivas". In the bottom right corner, there's a section titled "Sem medo de altura" with a small paragraph about the Maldives being the flattest country in the world. At the very bottom right, there's a "Partilhe" button.

## 3. by using responsive layouts

...to avoid scrollable elements for example.

ExampleHtmlJavascriptopen example in new tab

Size to FitAuto-Size All↑↓

Athlete	Age	Country	Year	Date	Sport	Gold	Silver	Bronze	Total
Michael Phelps	23	United States	2008	24/08/2008	Swimming	8	0	0	8
Michael Phelps	19	United States	2004	29/08/2004	Swimming	6	0	2	8
Michael Phelps	27	United States	2012	12/08/2012	Swimming	4	2	0	6
Natalie Coughlin	25	United States	2008	24/08/2008	Swimming	1	2	3	6
Aleksey Nemov	24	Russia	2000	01/10/2000	Gymnastics	2	1	3	6
Alicia Coutts	24	Australia	2012	12/08/2012	Swimming	1	3	1	5
Missy Franklin	17	United States	2012	12/08/2012	Swimming	4	0	1	5
Ryan Lochte	27	United States	2012	12/08/2012	Swimming	2	2	1	5
Allison Schmitt	22	United States	2012	12/08/2012	Swimming	3	1	1	5
Natalie Coughlin	21	United States	2004	29/08/2004	Swimming	2	2	1	5
Ian Thorpe	17	Australia	2000	01/10/2000	Swimming	3	2	0	5
Dara Torres	33	United States	2000	01/10/2000	Swimming	2	0	3	5
Cindy Klassen	26	Canada	2006	26/02/2006	Speed Skating	1	2	2	5
Nastia Liukin	18	United States	2008	24/08/2008	Gymnastics	1	3	1	5
Marit Bjørgen	29	Norway	2010	28/02/2010	Cross Country Skiing	3	1	1	5
Sun Yang	20	China	2012	12/08/2012	Swimming	2	1	1	4