



# Invisible Intuition: Blockmesh and Lighting Tips to Guide Players and Set the Mood

David Shaver  
Game Designer, Naughty Dog

GAME DEVELOPERS CONFERENCE | MARCH 19-23, 2018 | EXPO: MARCH 21-23, 2018 #GDC18



Hello everyone. Thank you for coming!

Quick reminders: please silence cell phones and no video recording.

This hour-long talk is split into two halves by me and Robert Yang, so we have separate evaluation forms.

Please fill them out. Your feedback is important to us!

# Who Am I?

David Shaver

 @DavidShaver

**NAUGHTY DOG**

 **Respawn**  
ENTERTAINMENT

 **SHELL GAMES**

 **zynga**



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My name is David Shaver, and I'm a Game Designer at Naughty Dog.

Before that, I was at Respawn Entertainment, Schell Games, and Zynga.

I've been in the industry for almost 11 years and worked on lots of different games - the most recent you can see here.

I started out as a game programmer, and switched to game and level design.

Years ago, THIS VERY workshop helped me realize my love of design and helped with that transition.

This talk is about how to guide players naturally with your level layout to minimize the reliance on HUD markers, forced camera moves, and so on.

It's the talk I wish someone had given to me years ago, because it would have saved a lot of time!

# Overview

## Part 1: Blockmesh Guidance by Me

- Terminology
- Blockmesh Guidance Principles!
- Wrapping Up

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Speaking of saving time, this talk is jam packed, so this overview is quick.

Part 1: Guiding players with your blockmesh layouts with me.

# Overview

## Part 1: Blockmesh Guidance by Me

- Terminology
- Blockmesh Guidance Principles!
- Wrapping Up

## Part 2: Level Lighting by Robert Yang

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And Part 2: Robert will talk about level lighting.

Alright, let's go!





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First up, let's all get on the same page.



So what the heck is “blockmesh?”

# What is “Blockmesh?”

- **Blockmesh** = Greybox = Whitebox, etc.



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Well, at Naughty Dog, we call levels built with simple geometry and textures, “blockmesh.”

Unfortunately, our industry hasn’t arrived at a single term for this yet. It’s also called greybox, whitebox, and more.

# What is “Blockmesh?”

- **Blockmesh** = Greybox = Whitebox, etc.
- Greybox and Whitebox imply a single color – not ideal!



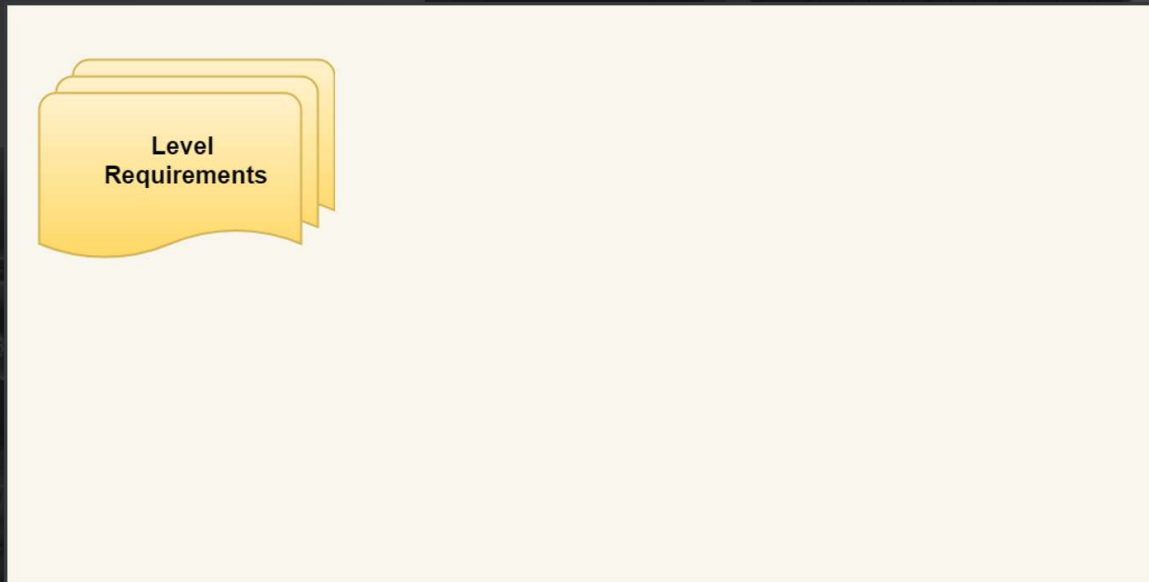
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Mostly, I prefer blockmesh because it includes color and lighting which are very important when playtesting layouts since they help guide players.

Also, handing off colored blockmeshes to your artists make it easier to communicate the kinds of textures and colors you had in mind. Green floor? Probably grass. Brown? Probably dirt. And so on.

# Level Design Pipeline



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Next let's look at a common level design process at a game studio.

First, you need to establish the context and constraints of your level.

# Level Design Pipeline



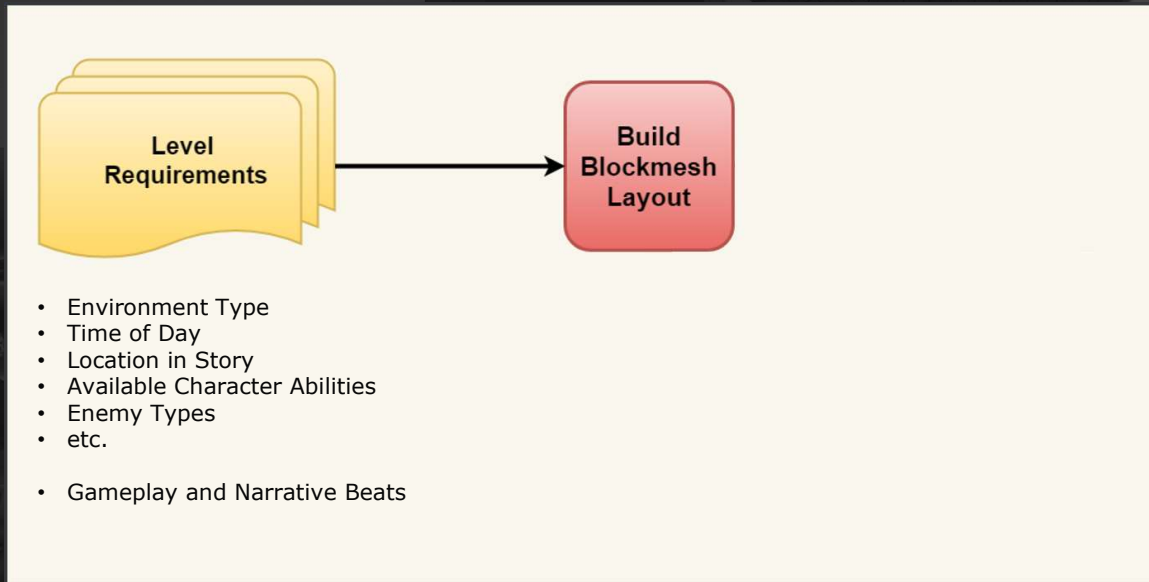
- Environment Type
- Time of Day
- Location in Story
- Available Character Abilities
- Enemy Types
- etc.
  
- Gameplay and Narrative Beats

This includes things like environment type, time of day, location in the story, available character abilities, enemies types, etc.

You should decide on the gameplay and narrative beats too.



# Level Design Pipeline



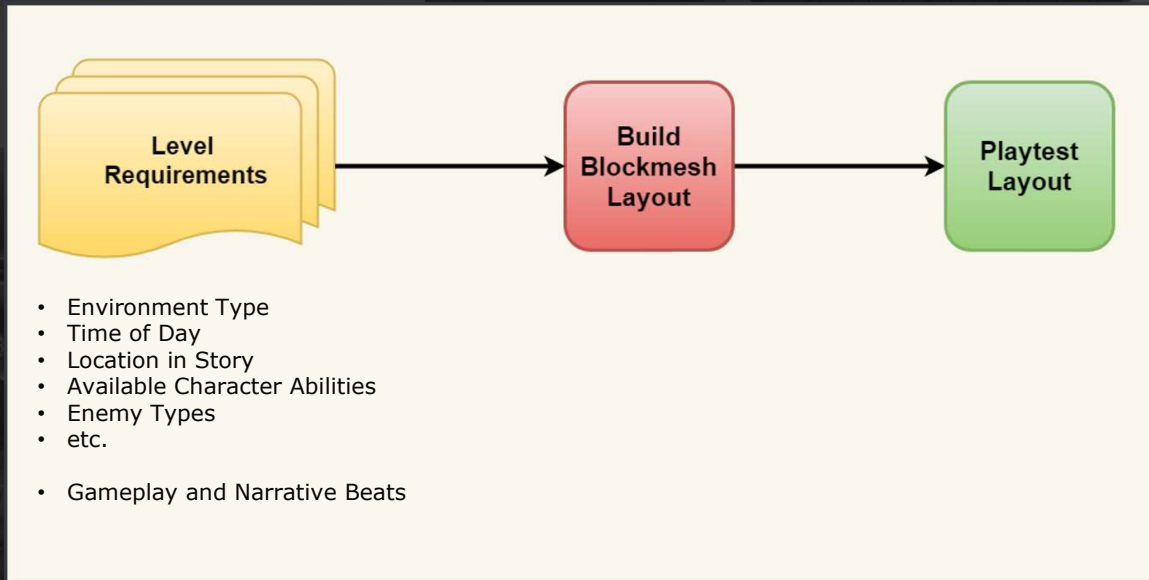
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Once you have your requirements and beats, dive right into building a rough version of the entire level so you can get a sense of pacing and scale.

Be sure to stub in those gameplay and narrative beats too.

# Level Design Pipeline



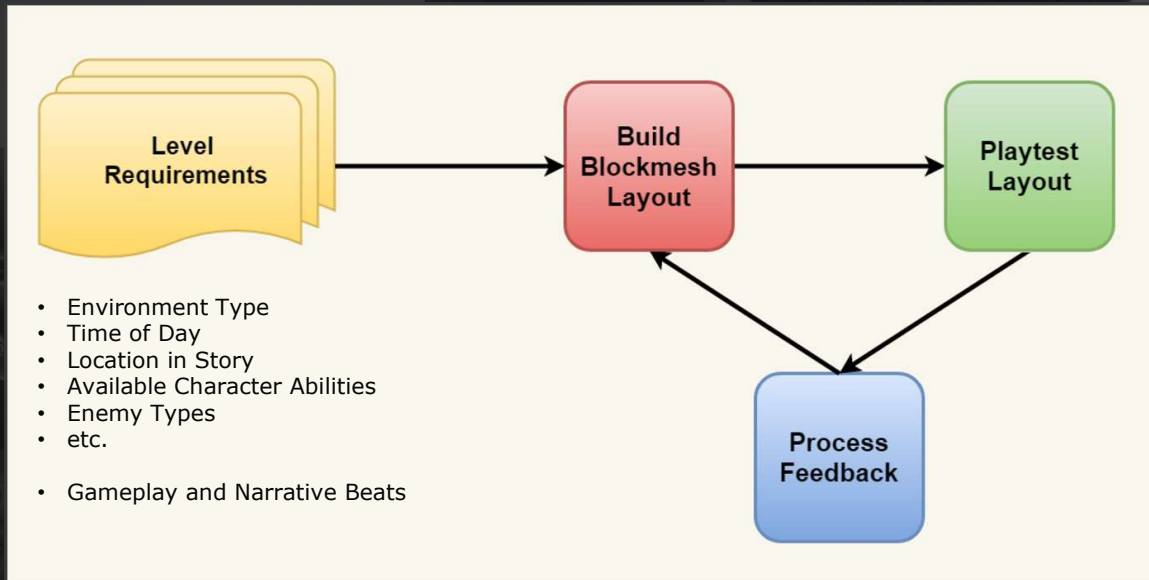
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Get something playable quickly, and then watch other people play it.

No need for formal playtests – just grab anybody.

# Level Design Pipeline



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The feedback you get from them will change your Blockmesh.

Repeat this iteration loop until you...basically run out of time.

And once you run out of time, your layout is locked and handed off to the rest of the team to make it look amazing.

But your job isn't done yet! Your task at this stage is to ensure YOUR design goals mesh with THEIR artistic goals.

Keep playtesting, and work with your artists to ensure it still plays great with real art.

It's worth noting that every studio has a different process, but this core iteration loop is universal.

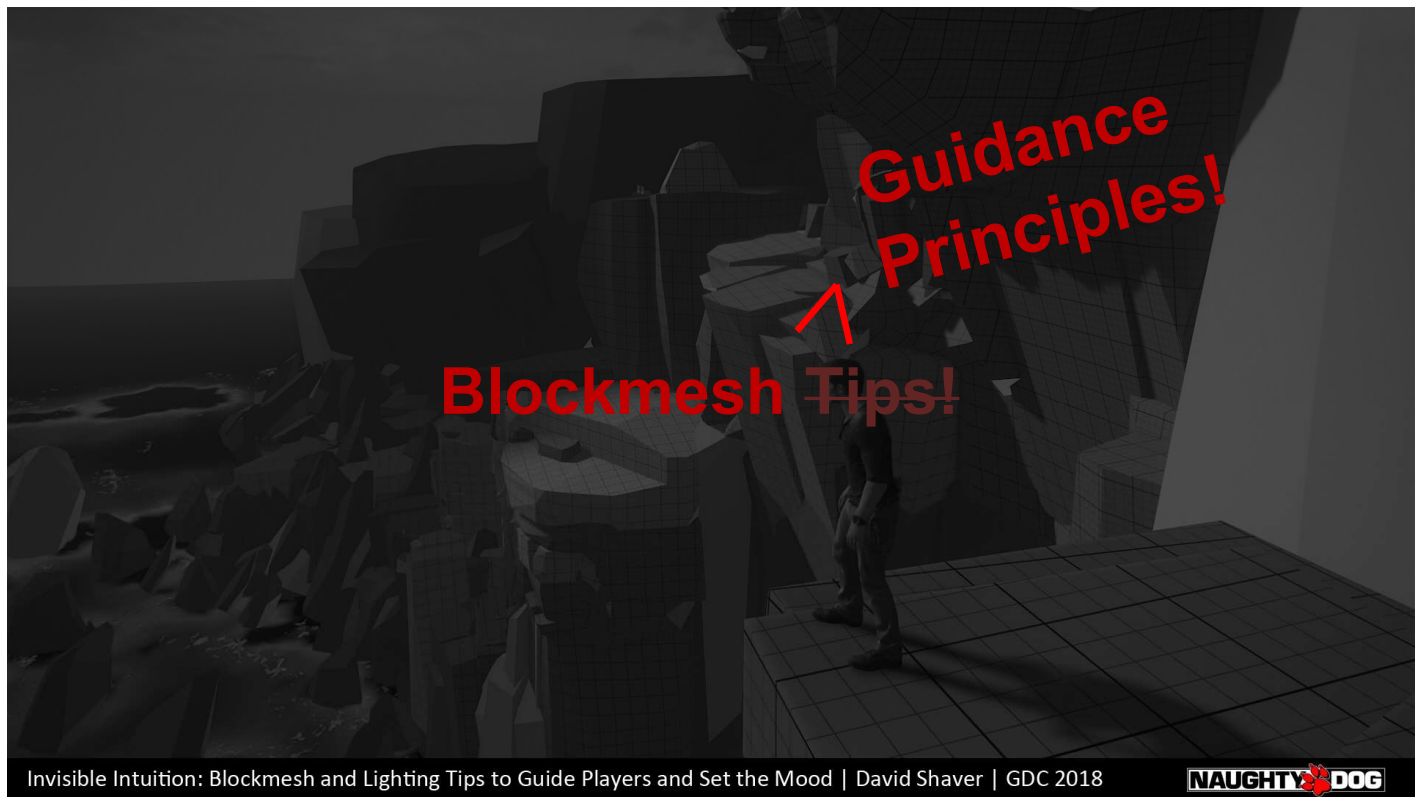


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Now it's time for Blockmesh Tips...

Our game director, Kurt, told me that "tips" wasn't a strong enough word for how important these are so I'm going to rename them now to...



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## Guidance Principles!

## Blockmesh Guidance Principles

- **Affordance**
- Denying Affordance
- Visual Language – Shape
- Visual Language – Color
- Landmarks
- Openings Attract
- Gates & Valves
- Leading Lines
- Pinching
- Framing & Composition
- Breadcrumbs
- Textures
- Movement
- Light & God Rays

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First up, we have affordance.



# Affordance

**Affordance** – “...properties of an object that define its possible uses or make clear how it can or should be used.”

<https://www.merriam-webster.com/dictionary/affordance>

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One of the most powerful ways to guide players is by using affordances, which are “

# Affordance

- Form implies function



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A classic example is a door handle.

Just by looking at a push bar or a pull handle, you intuit whether to push or pull the door as you approach it.



Ladders afford climbing.



Edges also afford climbing.



Ramps afford jumping off...or...





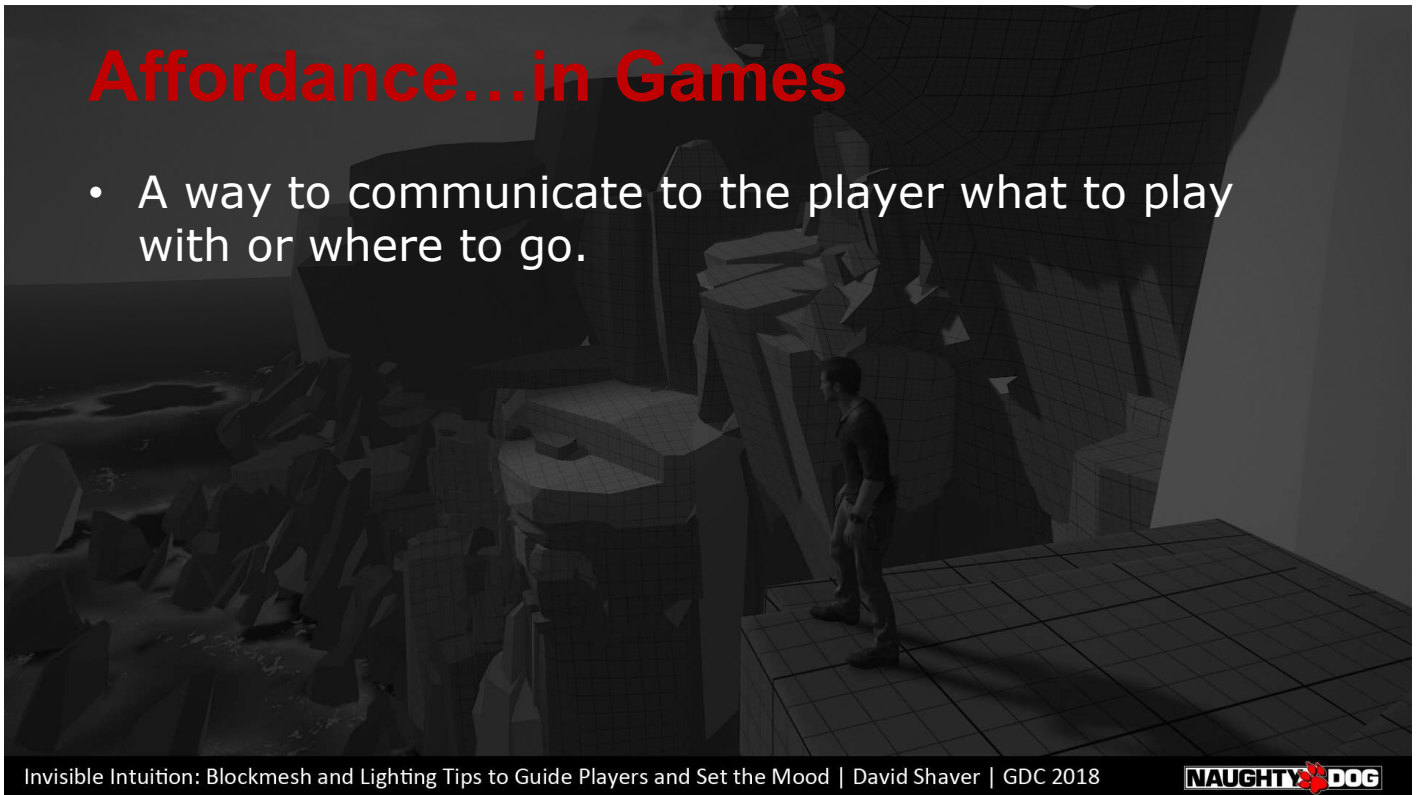
...smashing through a vent in  
Wolfenstein 2.

Affordances depend on your game  
rules because that's what they're  
communicating to the player.



# Affordance...in Games

- A way to communicate to the player what to play with or where to go.



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So, for game designers, affordance is a great way to communicate to the player what they can interact with or where they can go.

Players will learn what is interactive and it will attract them toward these affordances.

# Affordance...in Games

- A way to communicate to the player what to play with or where to go.
- Players learn the affordance rules via consistent color and shape and a trust contract is formed.

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Consistent color and shape establish a trust contract with players who use this to learn the game rules.

# Affordance...in Games

- A way to communicate to the player what to play with or where to go.
- Players learn the affordance rules via consistent color and shape and a trust contract is formed.
- Ensure affordances work consistently game-wide.

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You should ensure that all of your affordances work consistently throughout the game or it breaks that trust contract which will cause player frustration.

# Affordance...in Games

- A way to communicate to the player what to play with or where to go.
- Players learn the affordance rules via consistent color and shape and a trust contract is formed.
- Ensure affordances work consistently game-wide.
- Add to your blockmesh for playtests!

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You should also include affordances  
your Blockmesh phase.

It will help guide players where you  
want them to go.

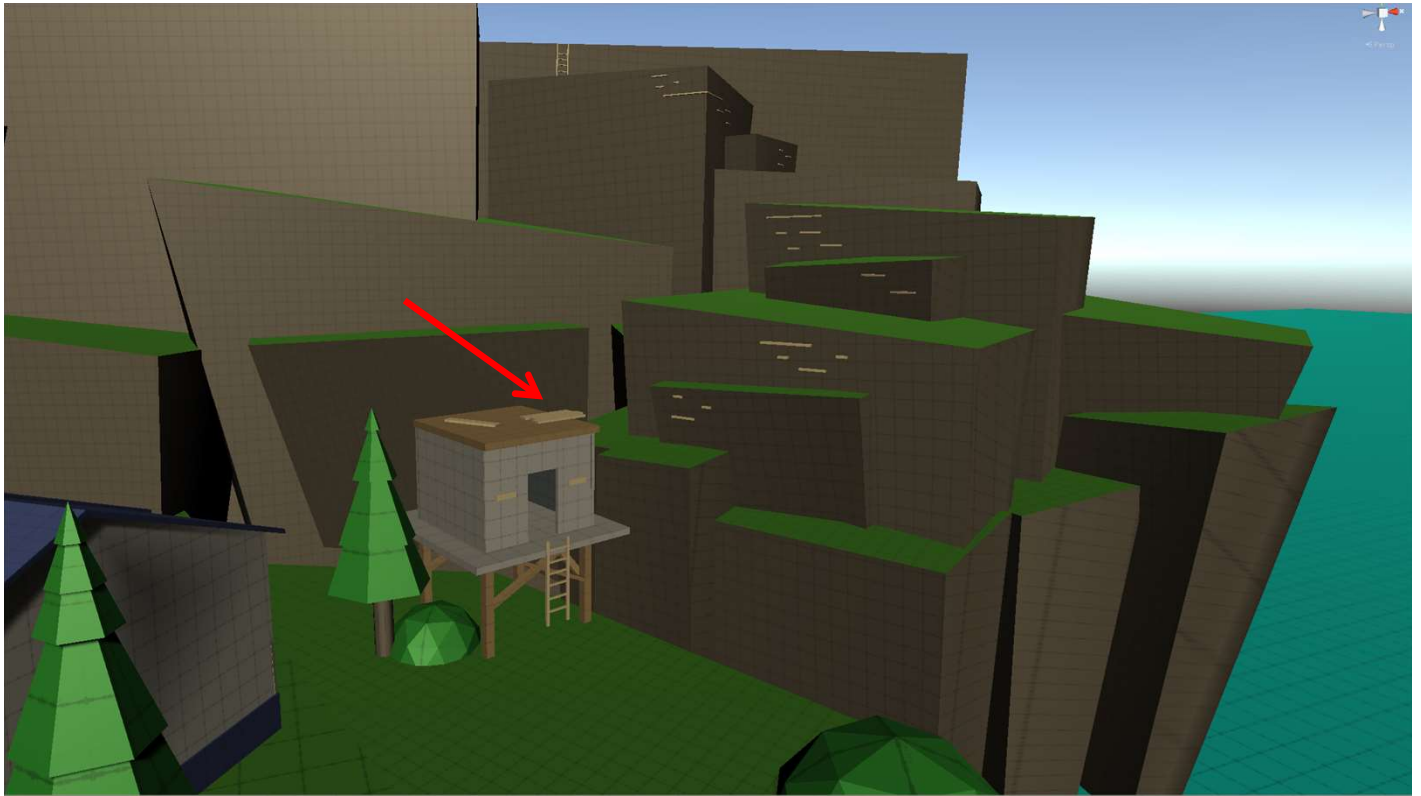
Let's see what that looks like.



In this blockmesh, it's not clear where the player should go next.

Sure the ladder affords climbing the little tower, but then what? Jump to the cliff? Dive into the water?

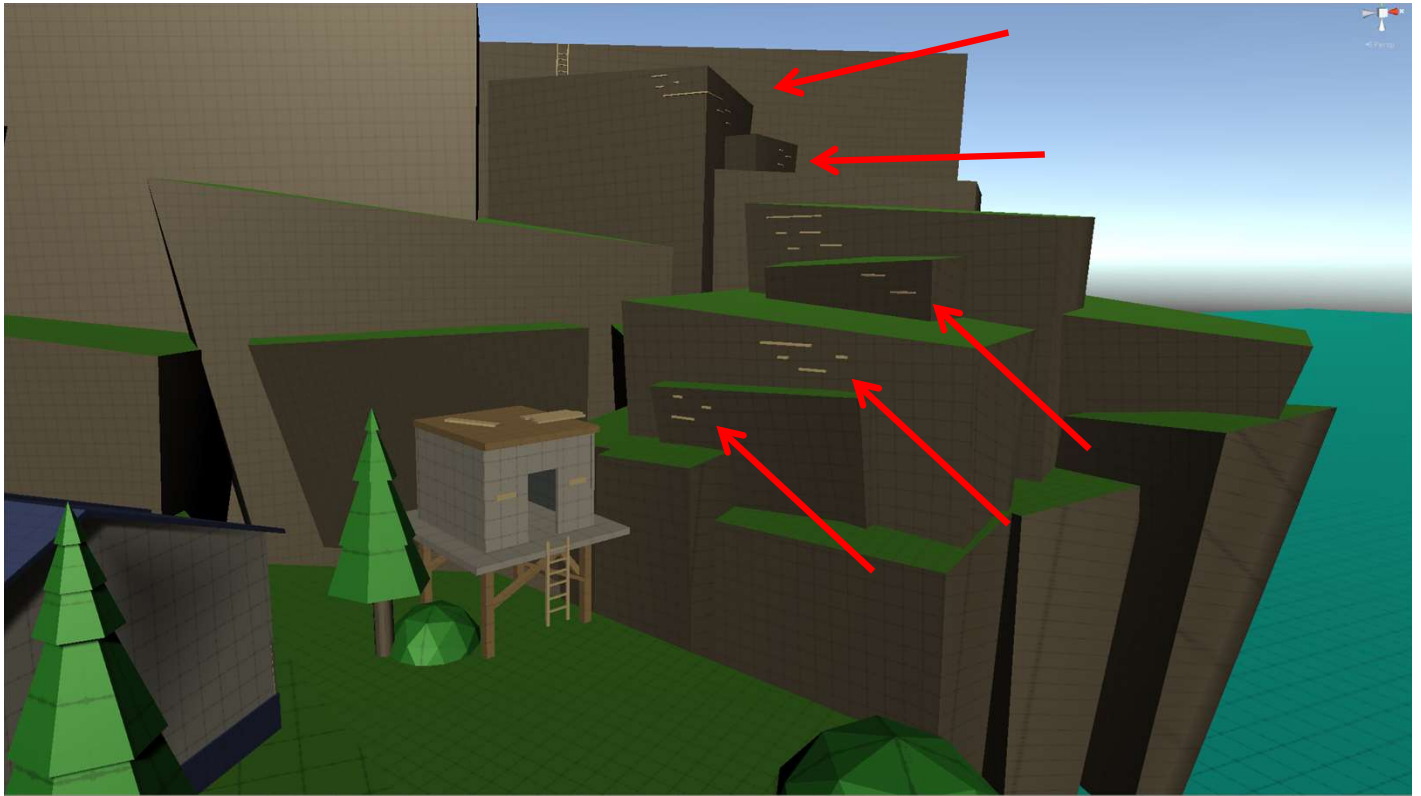
But if we add affordances...



...it becomes clear where to go.

The boards on the roof afford jumping to the cliff.





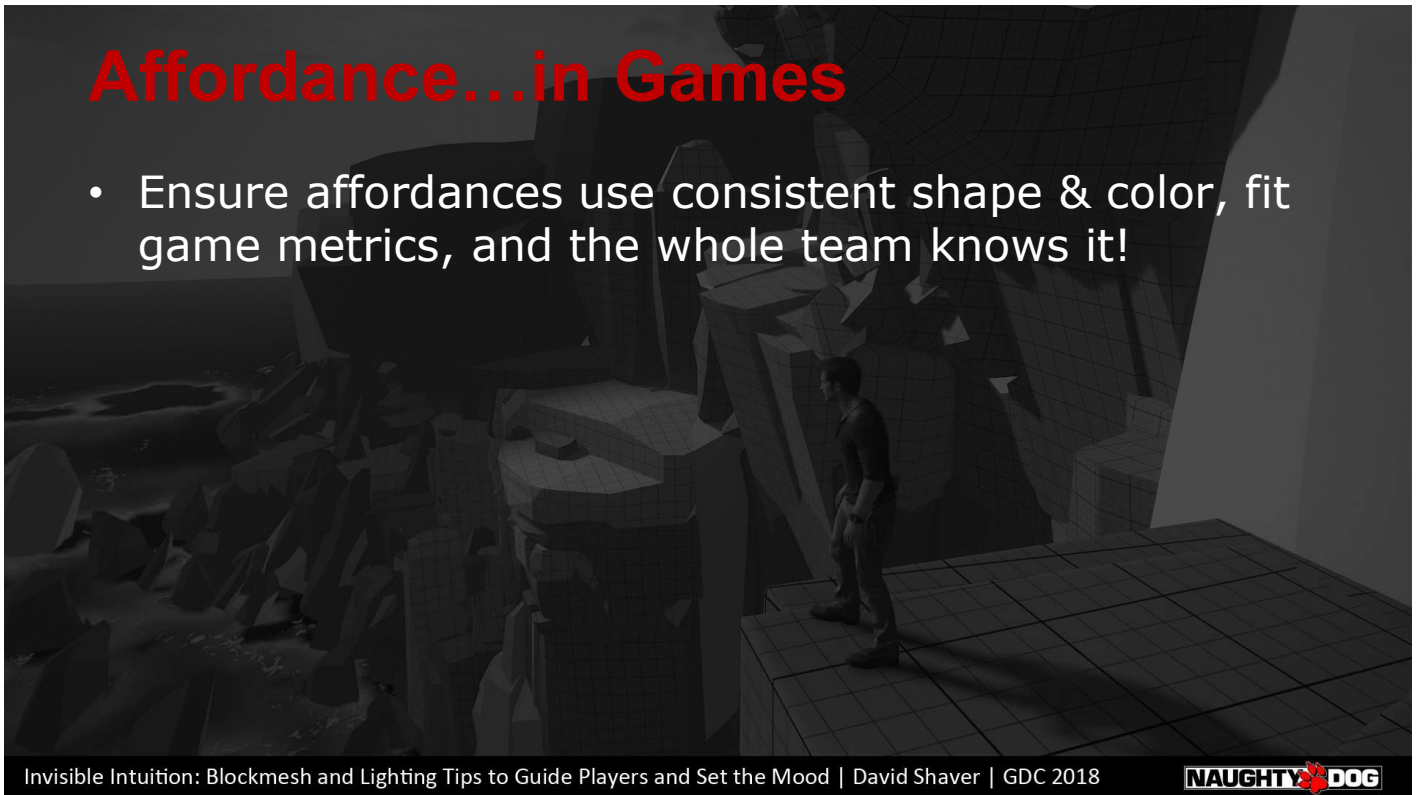
While the edge grabs on the cliffs afford climbing.

Of course, this example is tailor-made for a game like Uncharted, but the same concepts apply to your traversal mechanics.

It may seem silly to add these so early, but trust me, it makes a world of difference in your playtests and doesn't take much effort.

# Affordance...in Games

- Ensure affordances use consistent shape & color, fit game metrics, and the whole team knows it!



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One more thing.

Ensure your affordances use consistent shape and color, follow the game metrics, and you empower your team with this information.

They could even prefab objects the entire team can use.

## Blockmesh Guidance Principles

- Affordance
- **Denying Affordance**
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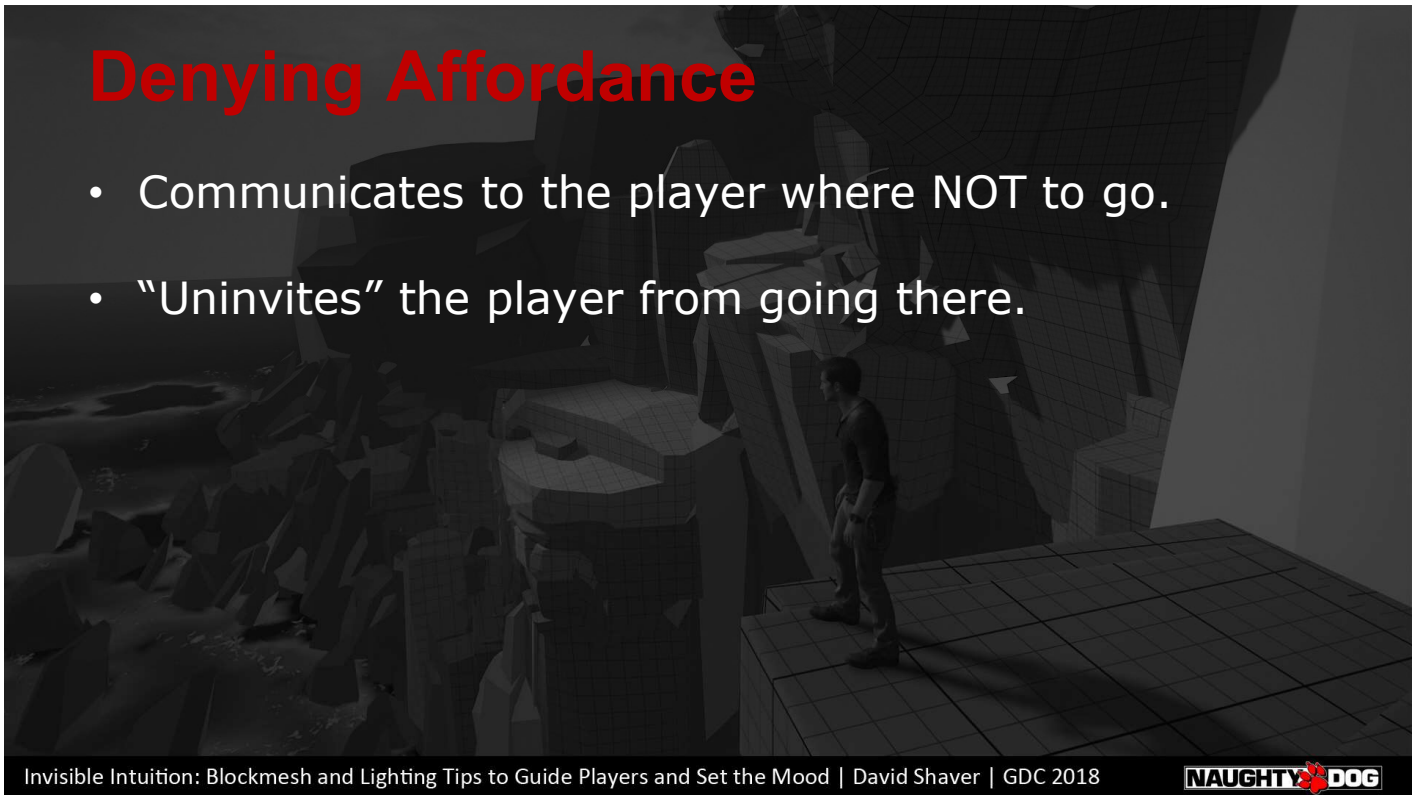


Next tip – denying affordance.

(4:52)

# Denying Affordance

- Communicates to the player where NOT to go.
- “Uninvites” the player from going there.



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While affordances are important at showing players what they can interact with, showing them what they CANNOT interact with is also important.

This is “denying affordance” and it prevents player frustration and guides them.

## Denying Affordance

- Communicates to the player where NOT to go.
- “Uninvites” the player from going there.
- Contextualize why the player can’t use it/go there!

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Now, you can’t just disable a ladder or place invisible walls.

I mean, you CAN, but you shouldn’t because it will just confuse and frustrate players.

You need to contextualize why you can’t use the affordance by adding clearly visible things that say “can’t use this” or “don’t go here.”

# Denying Affordance

- Communicates to the player where NOT to go.
- “Uninvites” the player from going there.
- Contextualize why the player can’t use it/go there!
- Add to your blockmesh for playtests!

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Also, make sure the reason for denied affordance is clear in your blockmesh.





At Naughty Dog, we record when a playtester tries to jump and grab something they can't grab.

We call these "bad jumps" and overlay them as red spheres in game so we can identify problem areas.

Often, we'll find something that LOOKS climbable but isn't supposed to be.

So we cover it with foliage or something, and after the next playtest, those "bad jumps" are gone.

Like sanding down a piece of wood, this process makes the levels play much smoother.



Here's an example of using spiky shapes and breaking up the horizontal edge to deny climbing affordance.





Even though the window is within climbing range, you still can't grab it because it's visually blocked.

Notice how this is contextualized to the environment with bricks and rebar.

This is important for games grounded in reality.

# Denying Affordance



*The Legend of Zelda: Breath of the Wild - Nintendo*

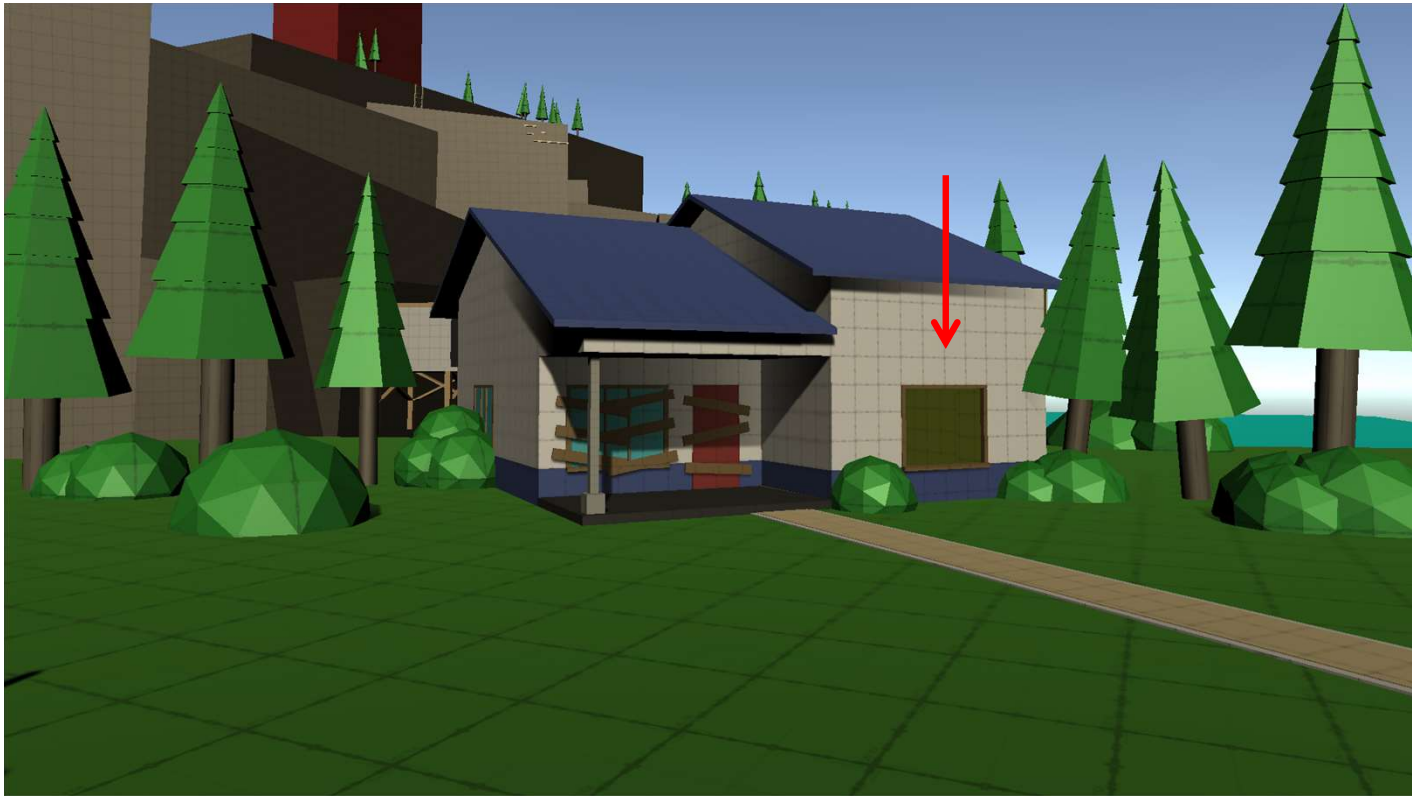
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For games not so grounded, you can get away with a lot and that's OK.

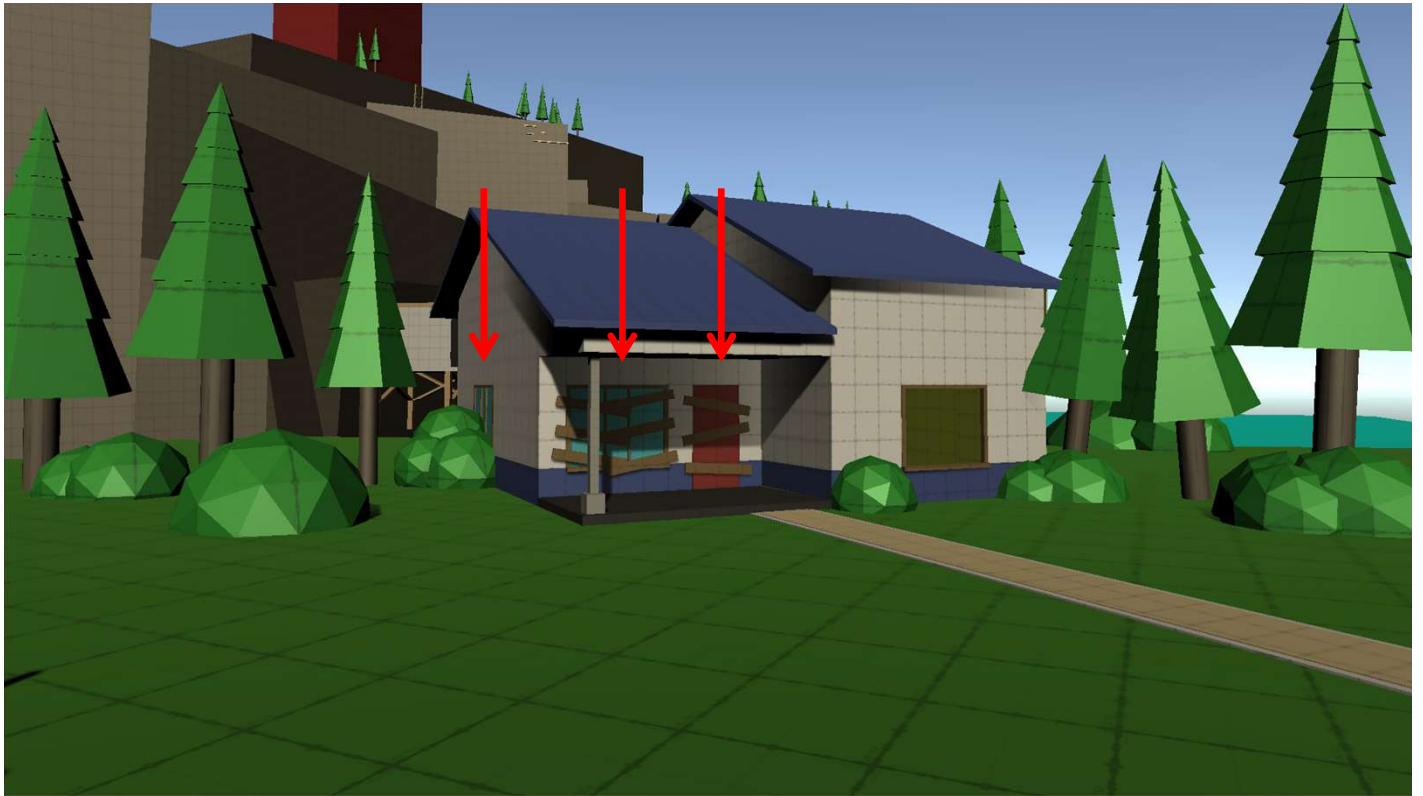
Just find the right tone and context for YOUR world to make it feel natural and still deny affordance.

Now let's see a Blockmesh example.



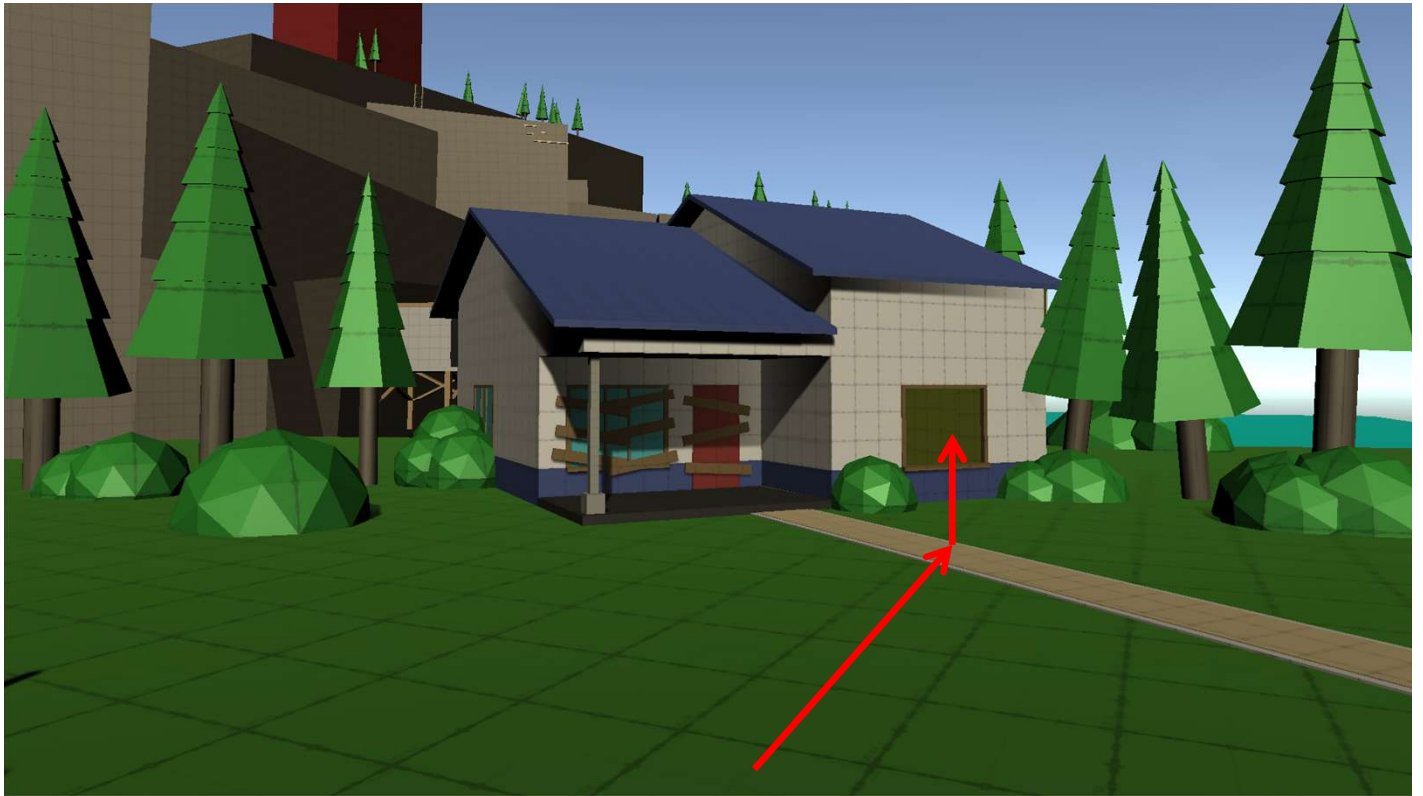
Let's say we want the player to go through the window on the right, which is busted open.





The left window is covered with a bush, and the front porch window and door are boarded shut.





Most players will glance at this house and go right for that window in a playtest.

The intended way forward is open, while the rest of the entrance affordances are denied.

## Blockmesh Guidance Principles

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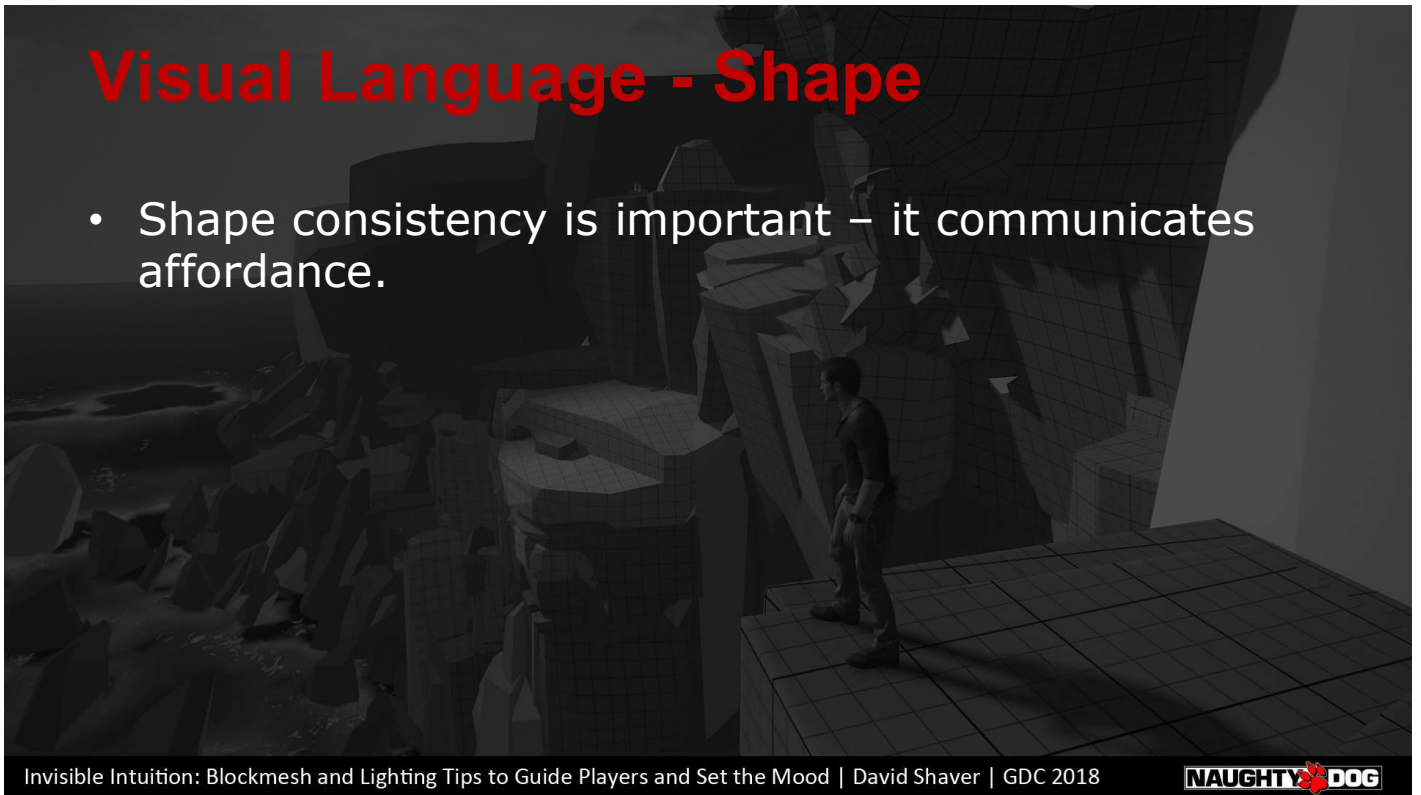


Next tip –Shape language

(6:41)

# Visual Language - Shape

- Shape consistency is important – it communicates affordance.



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Establishing a consistent shape language communicates affordance and guides players.



Climbing edges in Uncharted are always horizontal and flat.

As a player, you learn this visual language affords climbing and can spot it easily.

# Visual Language - Shape

- Shape consistency is important – it communicates affordance.
- Primitive shapes have an effect on player psychology.

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Also, people tend to have emotional associations to certain primitive shapes.

This even happens across cultures.

# Visual Language - Shape

- Shape consistency is important – it communicates affordance.
- Primitive shapes have an effect on player psychology.
- We can use this to guide players!

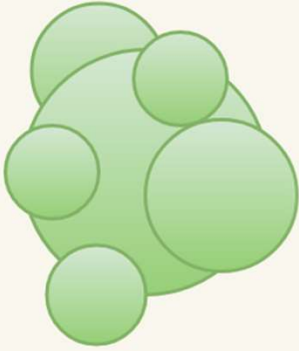
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We can use this to our advantage to guide players toward or away from certain shapes.



# Visual Language - Shape



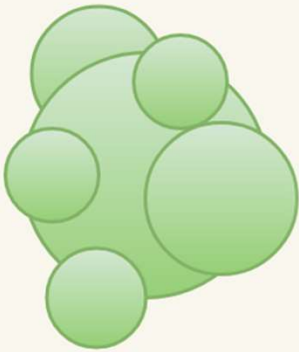
I'm safe and  
won't hurt you.

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Round shapes tend to be viewed as nonthreatening – nothing to stab you with.

## Visual Language - Shape



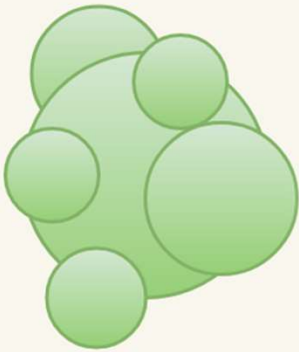
I'm safe and  
won't hurt you.



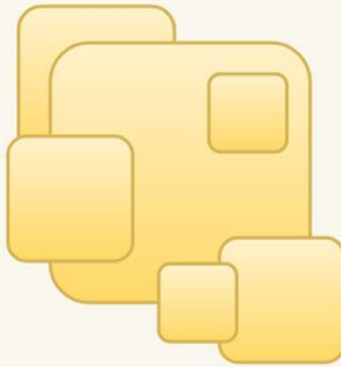
I'm stable  
and useful.

Rectangular shapes are viewed as stable and trustworthy – like a shelter.

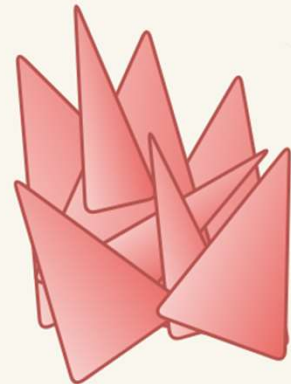
# Visual Language - Shape



I'm safe and  
won't hurt you.



I'm stable  
and useful.



LOOK OUT!

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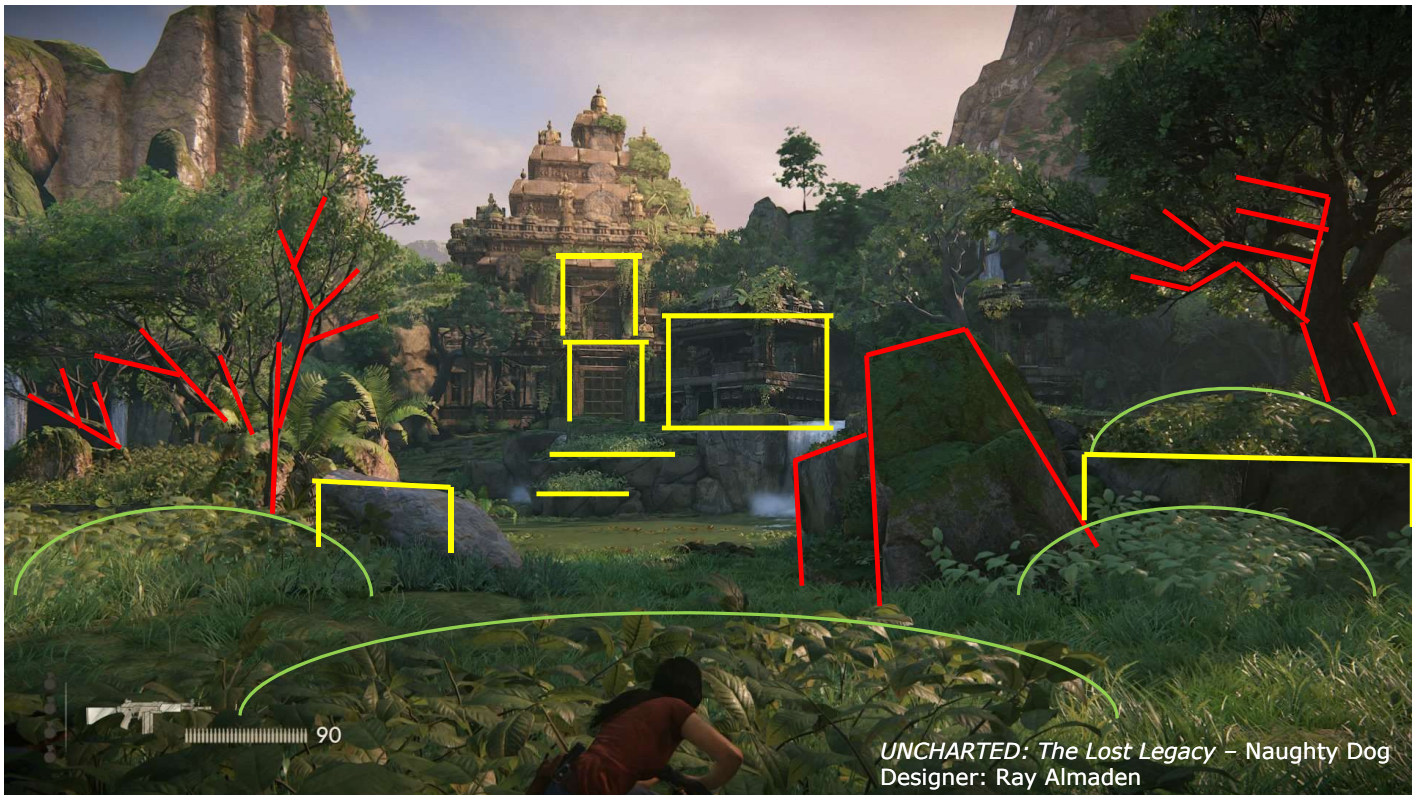
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Diagonal shapes are viewed as aggressive and dangerous – like a spear.



Let's take a look at a screenshot from Uncharted: The Lost Legacy and highlight the shapes.





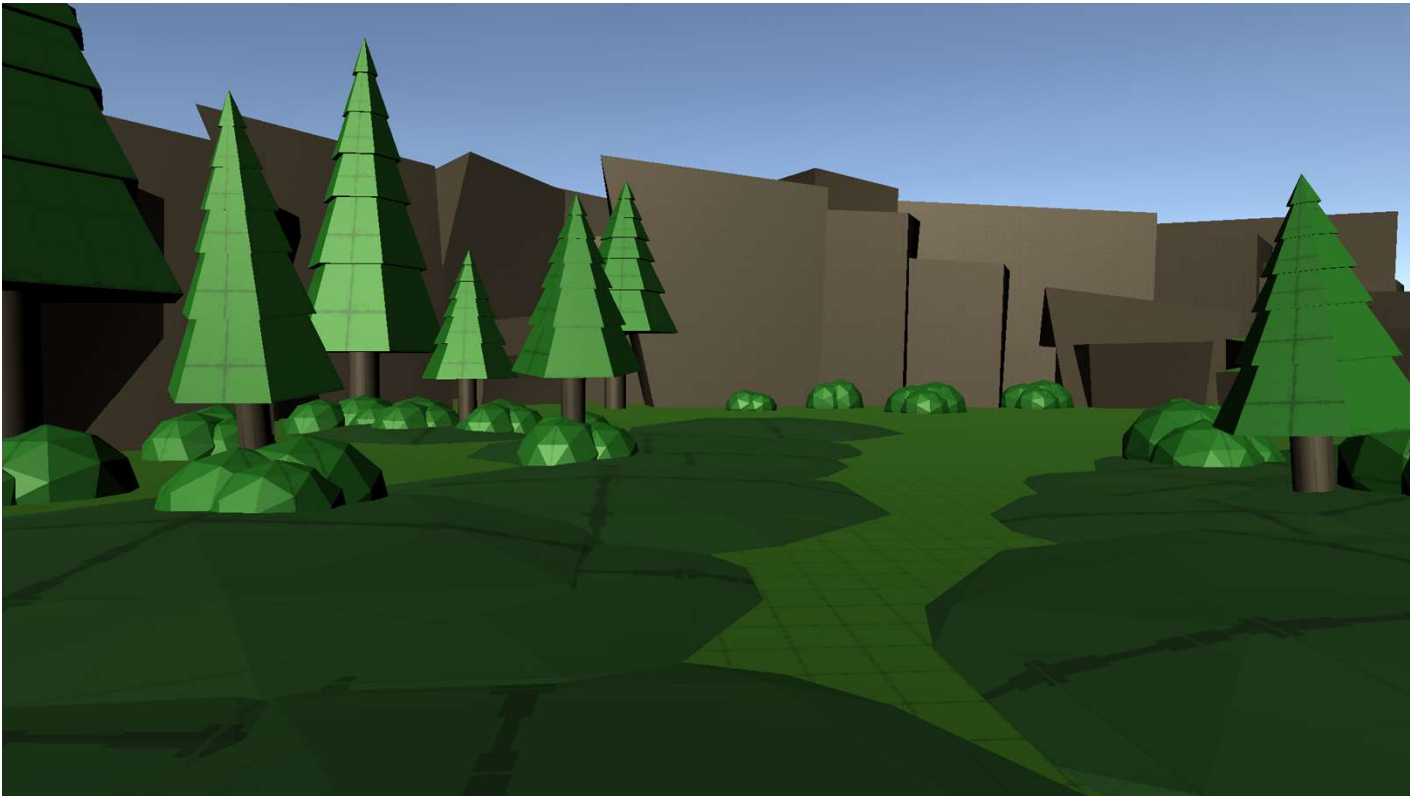
As you can see, the spiky shapes feel a bit uncomfortable, possibly causing you to want to avoid the area.

The round areas aren't a threat and provide stealth.

The square shapes are combat cover or buildings – nice and stable.

All of this subtly guides you to the buildings.

Now let's see what it looks like in blockmesh.

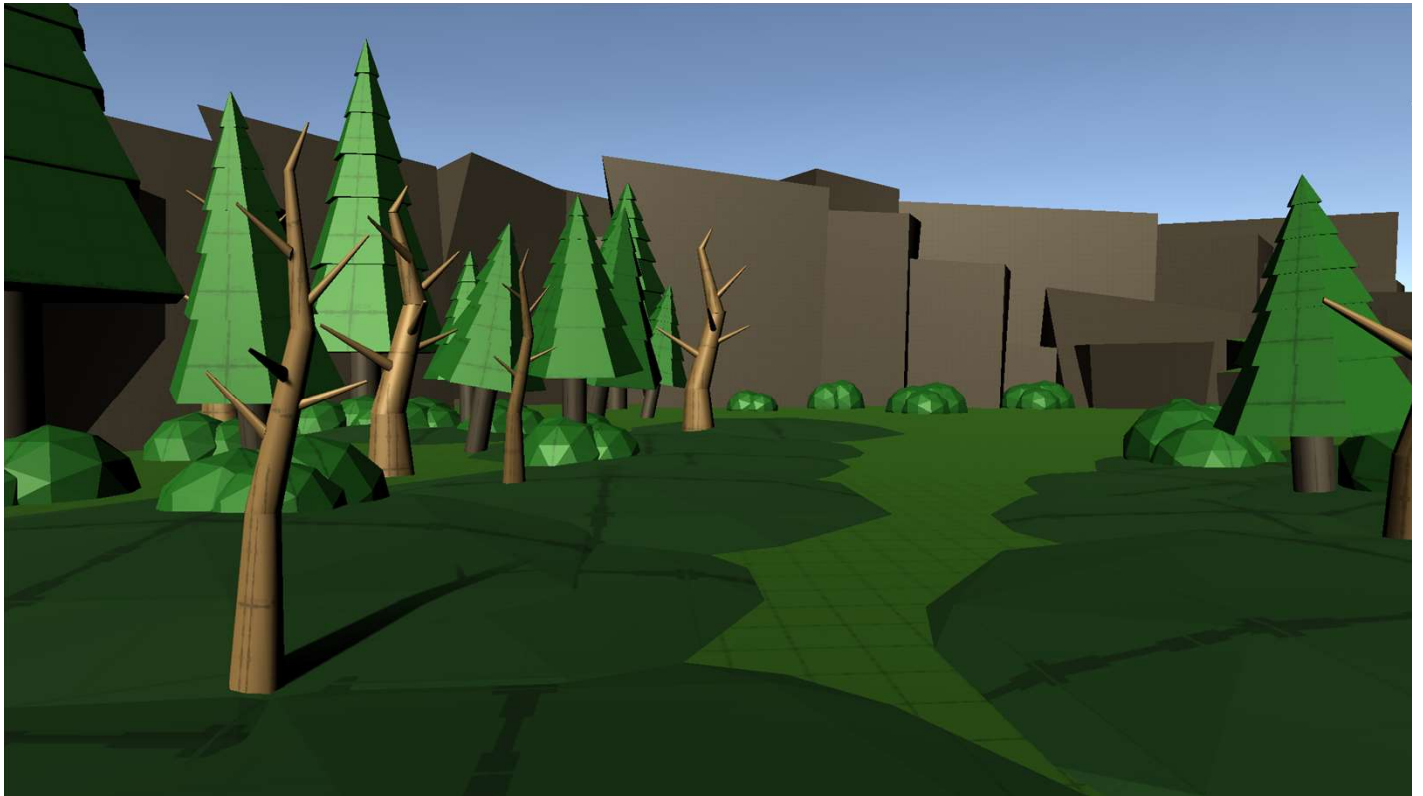


Let's say we want players to go to the right and they are being chased so exploration wrecks pacing.

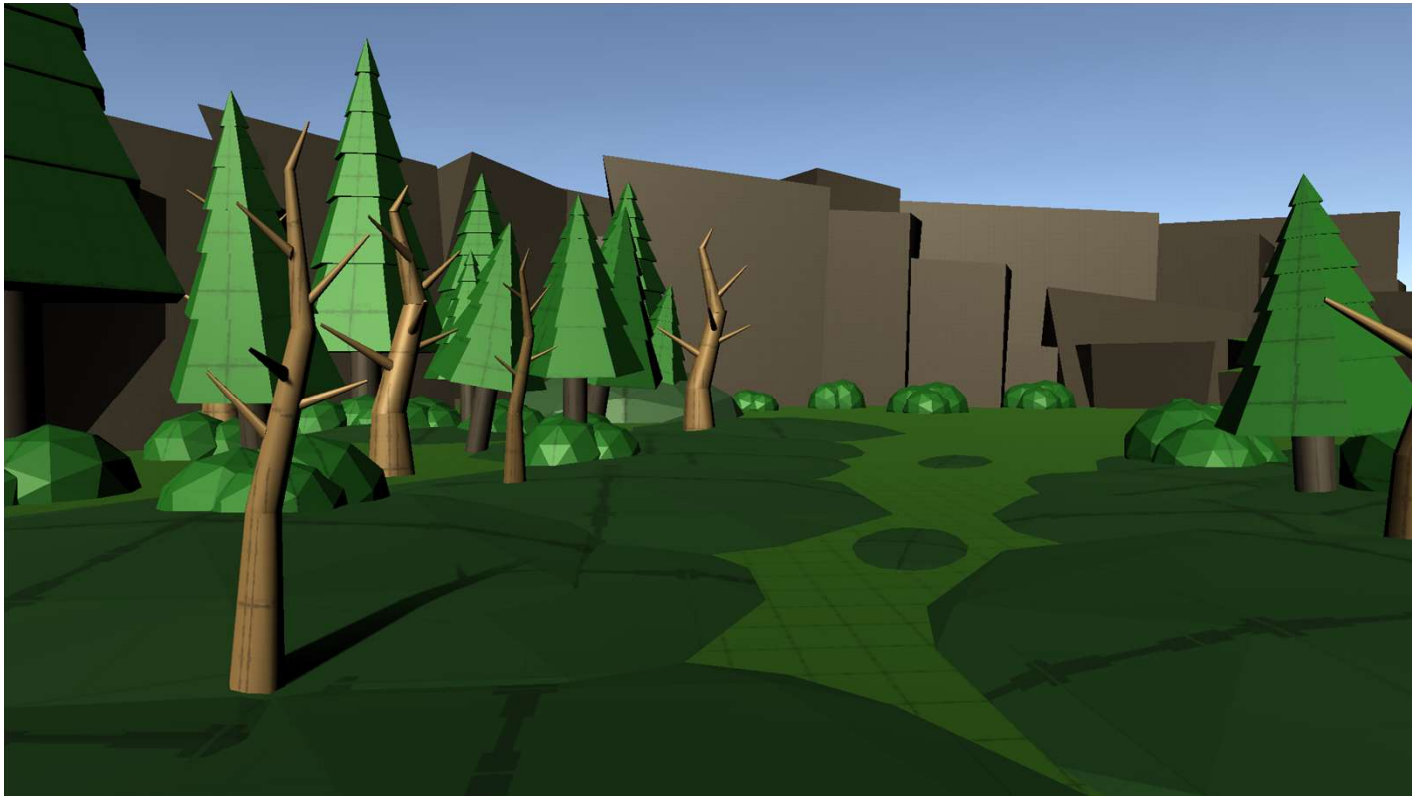
The path sort of leads there, but some players may veer to the left.

How can we nudge them to go to the right?

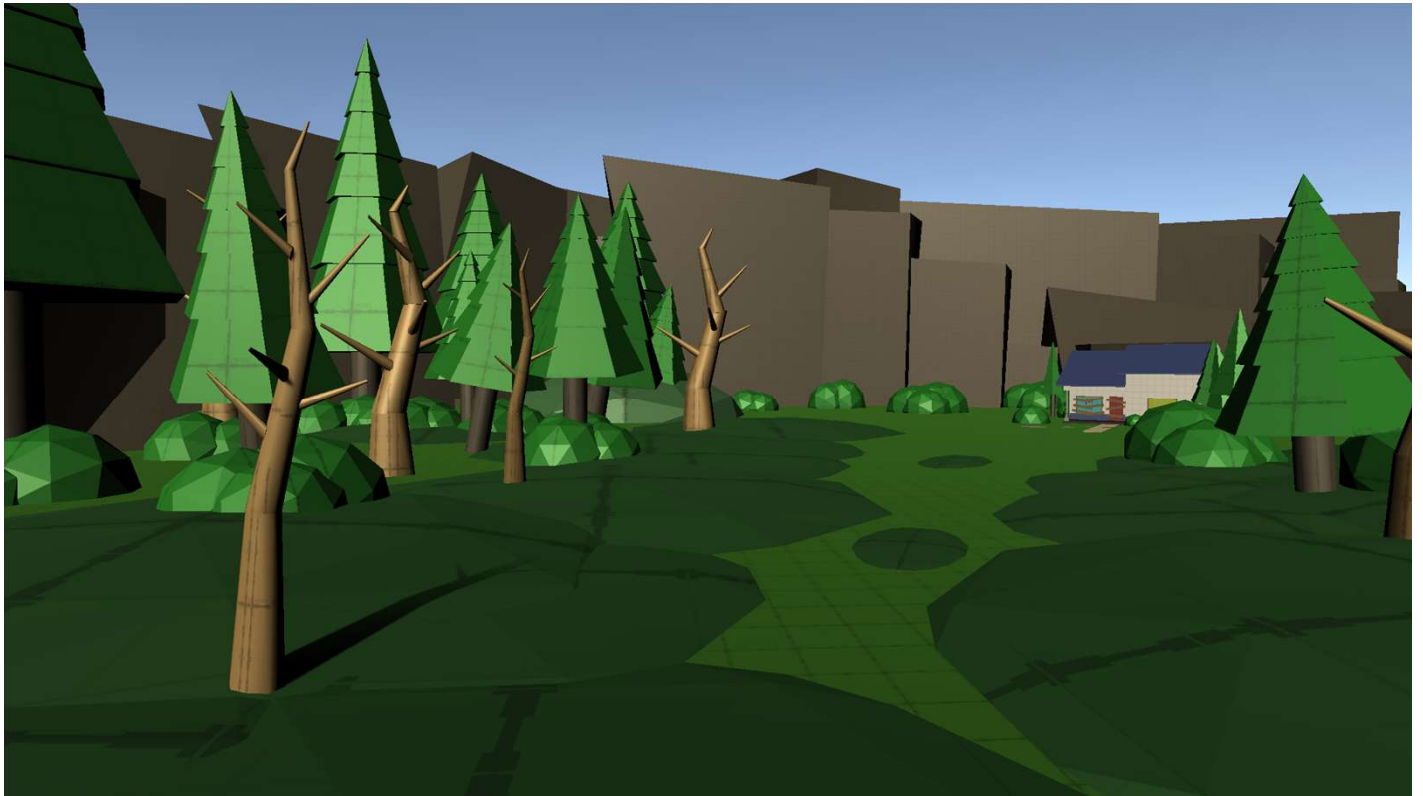




First, let's add some spiky trees and some other pine trees that angle toward the goal.



Then we add some round bushes.

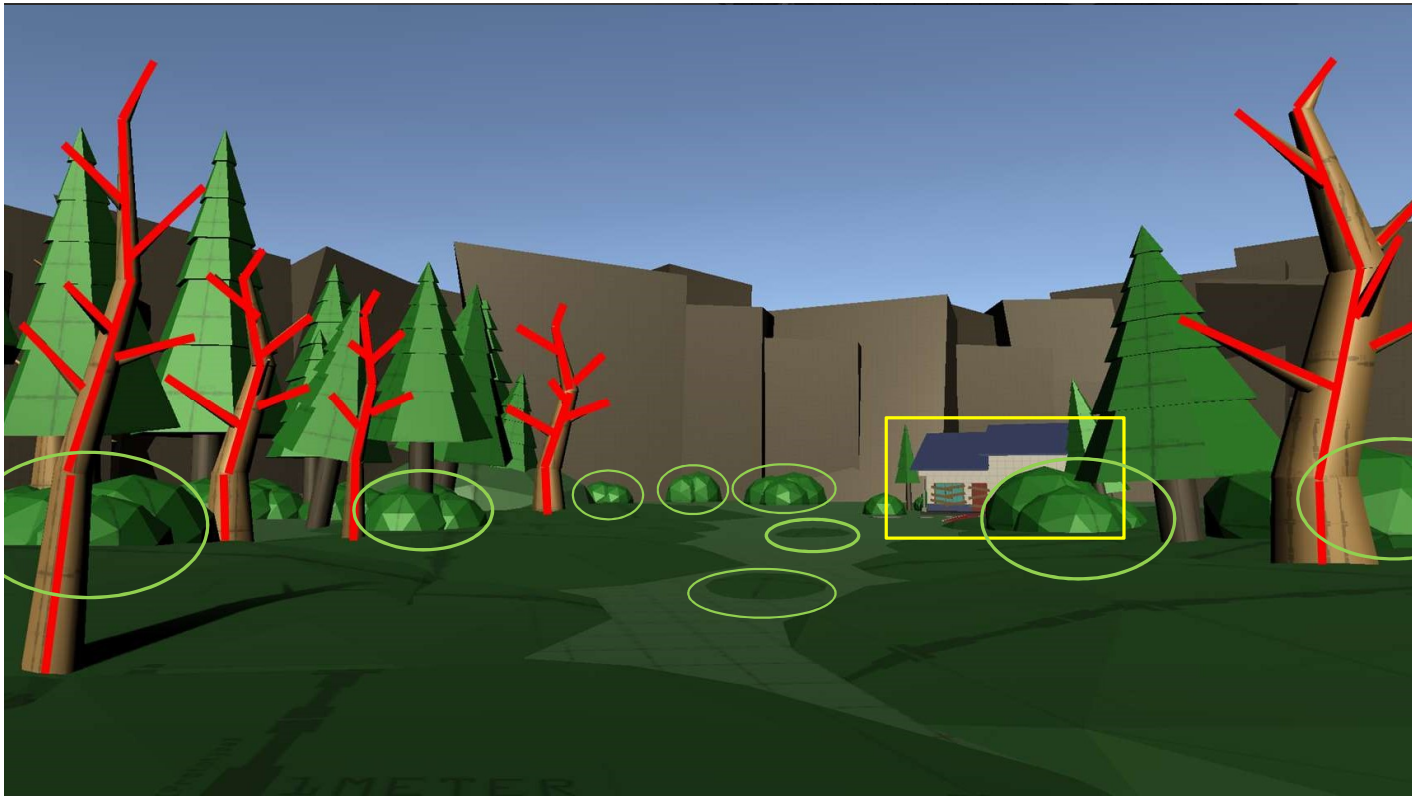


Finally, we add a small building.

OK, not gonna lie, at this point I feel like this.



But...with a lot less hair.



Let's highlight those shapes we just added.

The spiky shapes say "danger" and discourage going there.

The square building, implies "hey, stability this way!"

The round stepping stones on the ground act as breadcrumbs to safety.

And the round bushes act as bumpers to frame the play space.

Of course, none of this prevents players from going wherever they want.

It just gently guides them where they SHOULD go.

## Blockmesh Guidance Principles

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- **Visual Language – Color**
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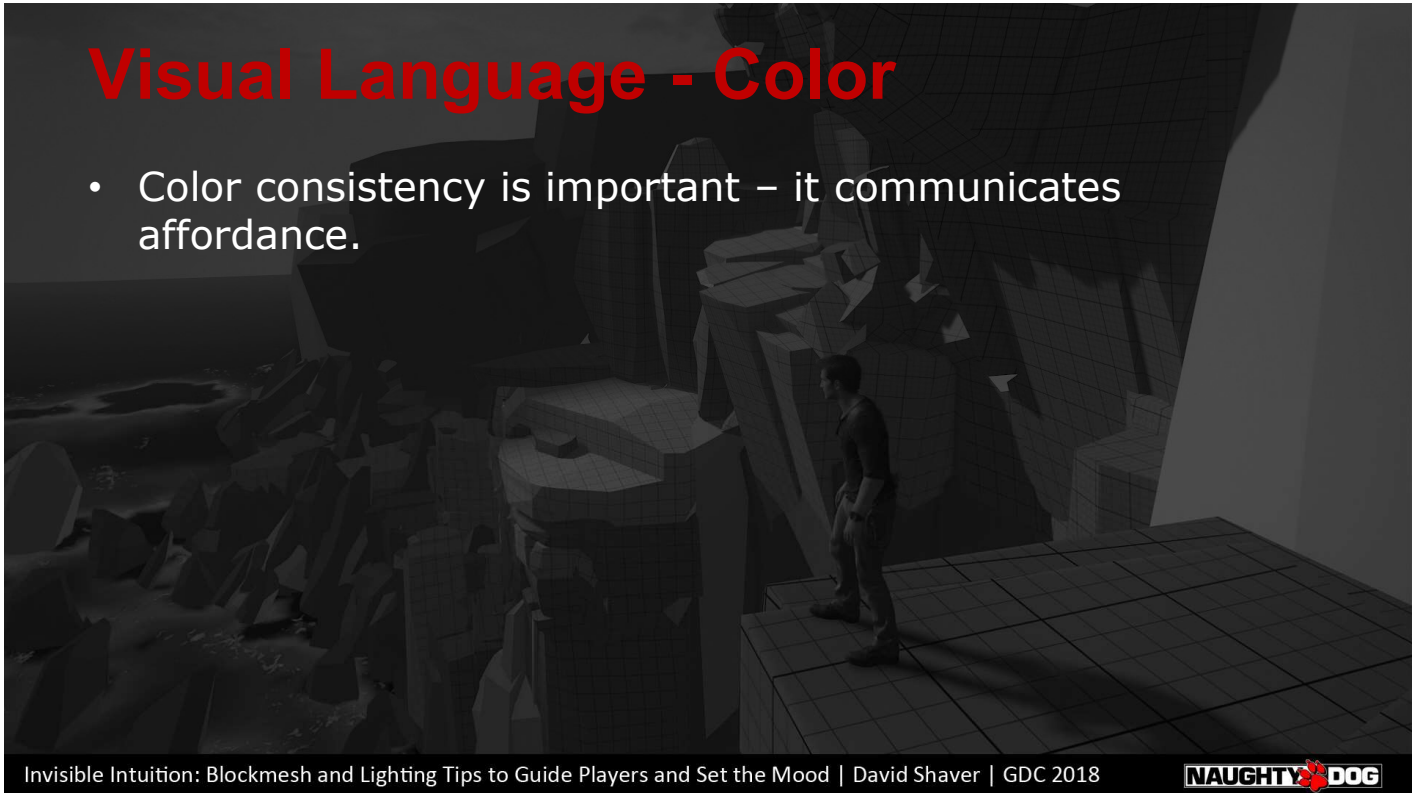
Next tip –Color language

(8:32)



# Visual Language - Color

- Color consistency is important – it communicates affordance.



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When you are trying to establish a consistent visual language in your affordances, shape is only half of it.

You also need consistent colors as well.

# Visual Language - Color

- Color consistency is important – it communicates affordance.
- Color provides context in a blockmesh.

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Adding color provides context for an otherwise barren blockmesh.

It also adds depth if you are making a 3D game.

# Visual Language - Color

- Color consistency is important – it communicates affordance.
- Color provides context in a blockmesh.
- Gets the team on the same page without explanation.

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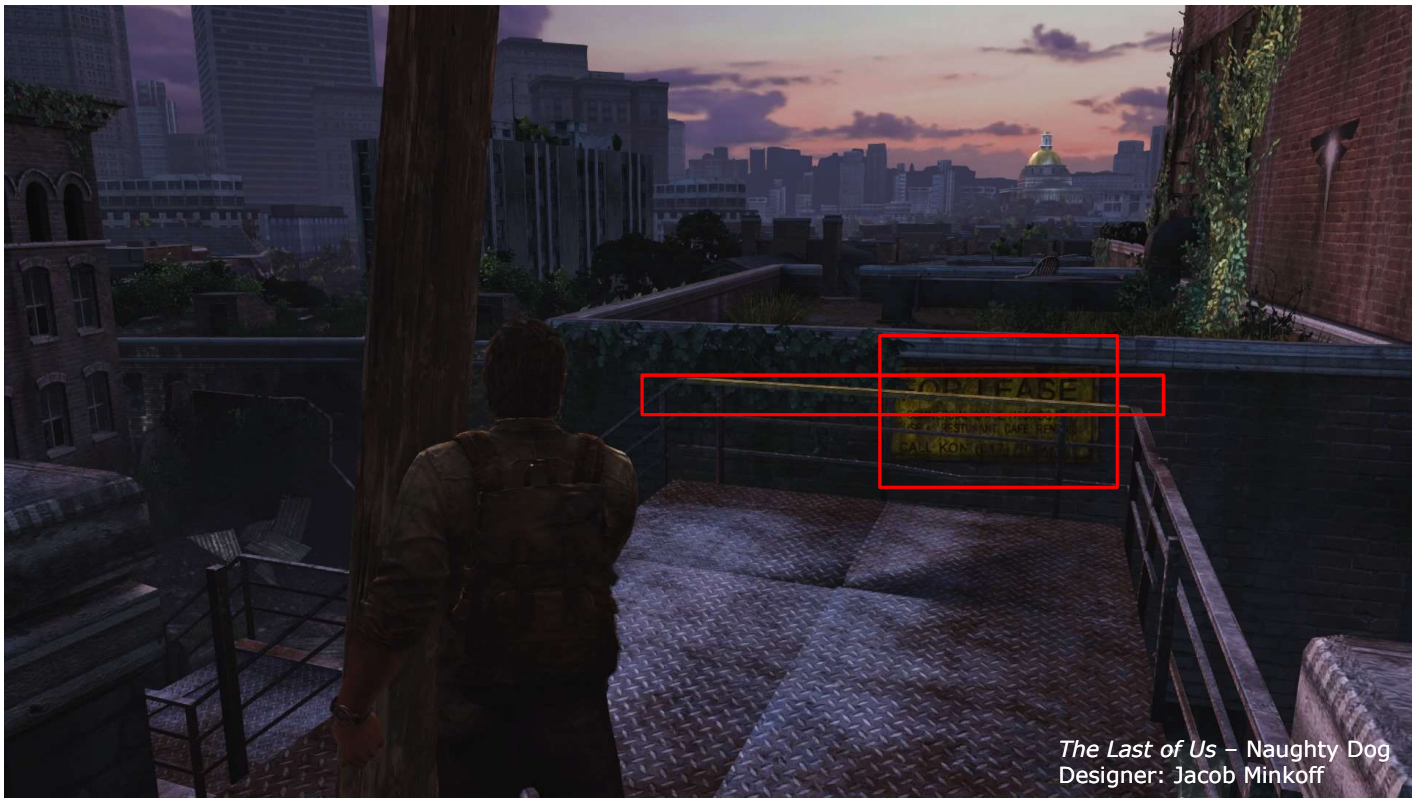
NAUGHTY DOG

Coloring also speeds up collaboration with your team because at a glance, they can “get it” without explanation.



*The Last of Us* – Naughty Dog  
Designer: Jacob Minkoff

Naughty Dog is notorious for using contrasting colors to draw the eye to where you should go.



*The Last of Us* – Naughty Dog  
Designer: Jacob Minkoff

Here we have a bright yellow sign and rail. It subtly lets the player know where to put the plank.

Most people won't question why only one rail is yellow, and will just remember they intuitively knew where to go.





Here we have white climbable edges!



And here are more edges.

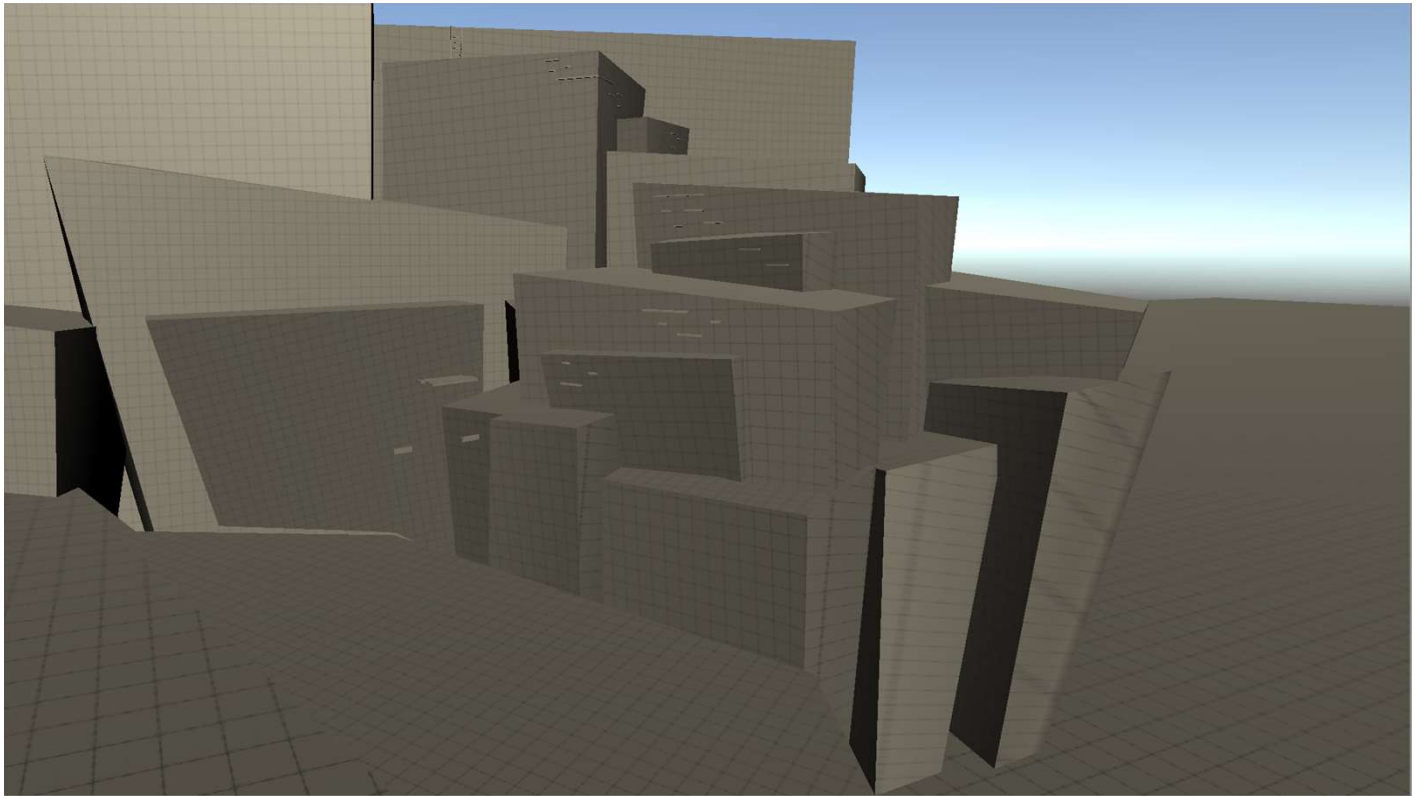
But wait, these are green. I thought you said to be consistent!

Well, it's not a SINGLE color that is important.

It's using consistent colors AND shapes in the CONTEXT of the environment.

Try to blend them into the environment so it looks natural, but still stands out.

Let's see how color can aid your blockmesh.

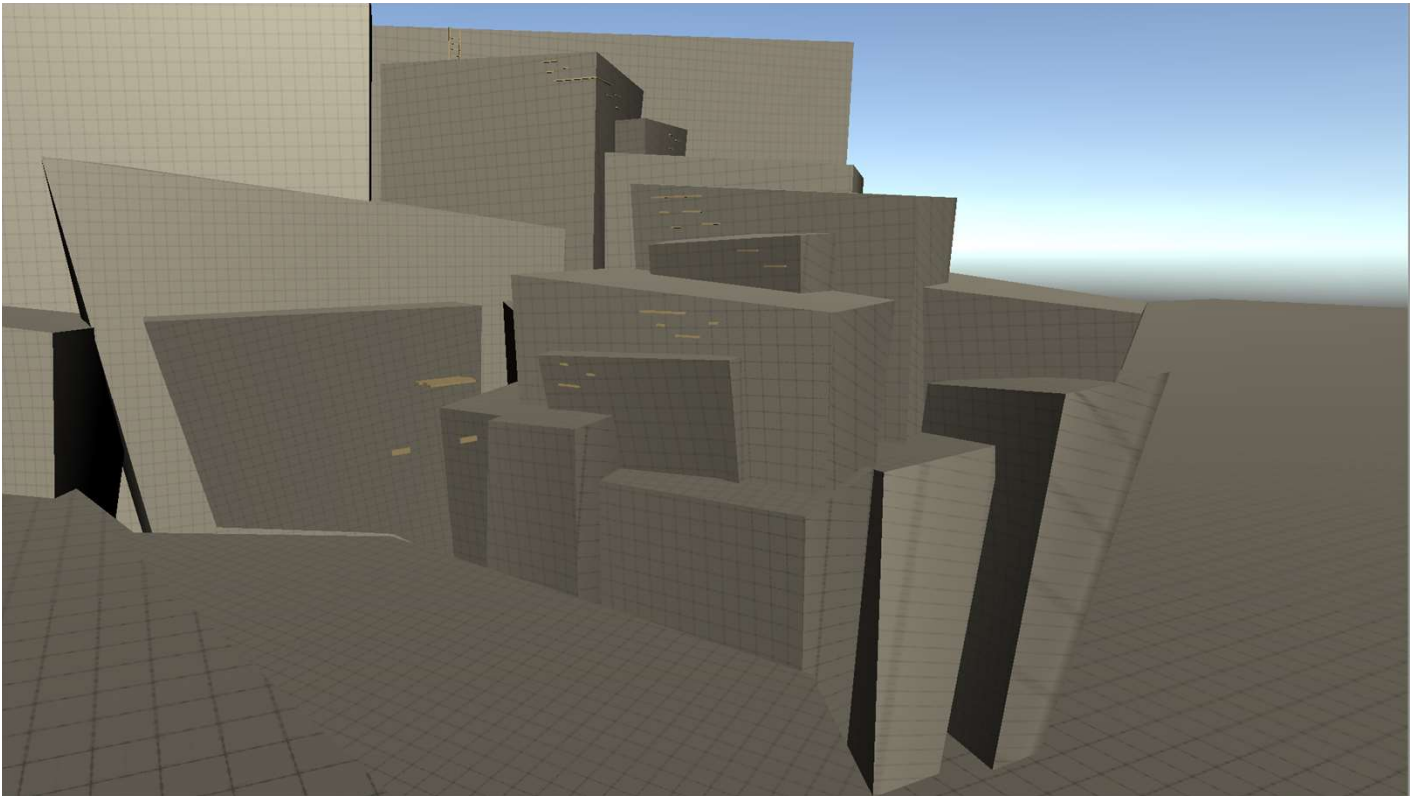


Here we have a greybox.

It's not really clear where the player should go or even CAN go.

Affordances are grey and hard to see.

Also, what kind of environment is this? Desert? Icy Planet?

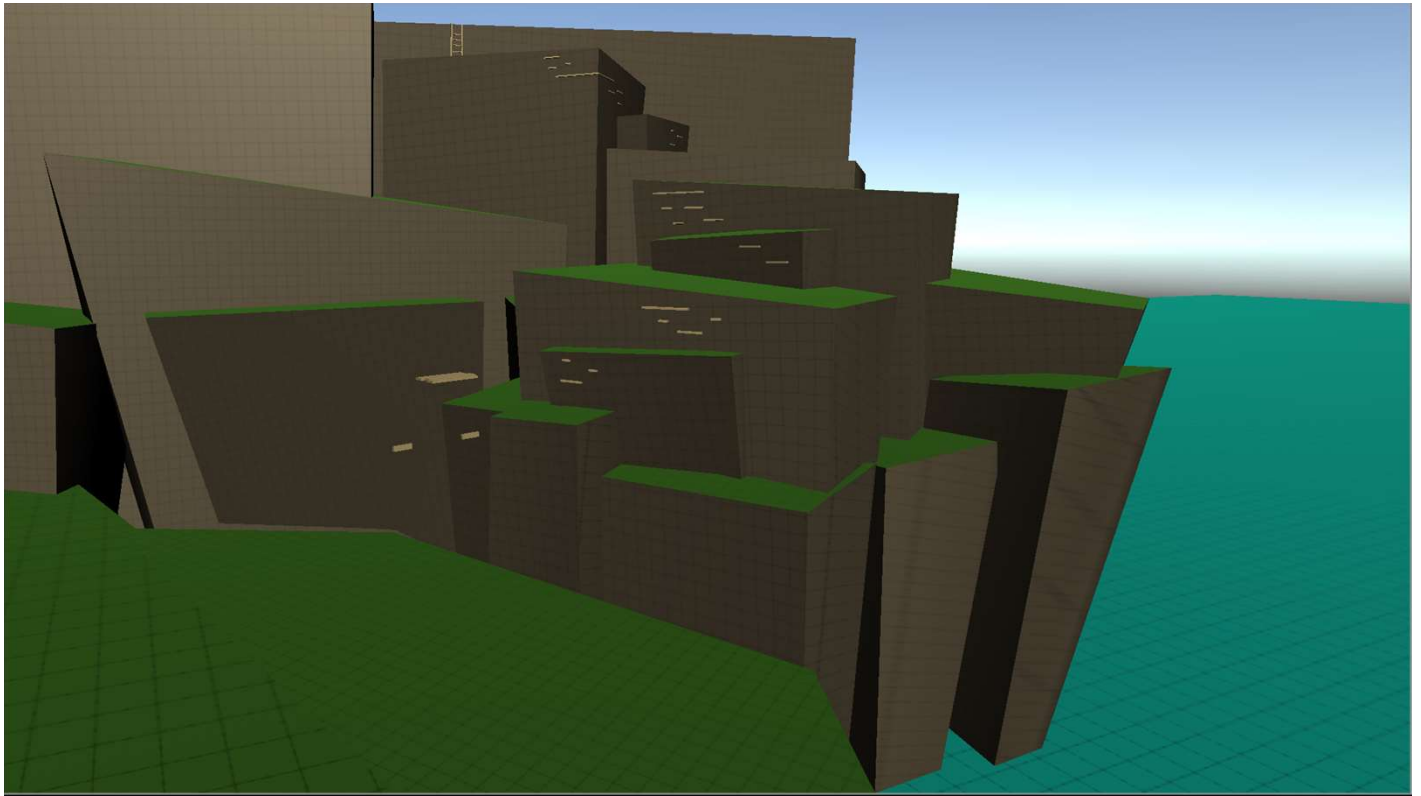


First, let's add color to the affordances, so that you can see them and the path forward...sort of.

But we're still missing context.

What is this place?

Everything still blends together.



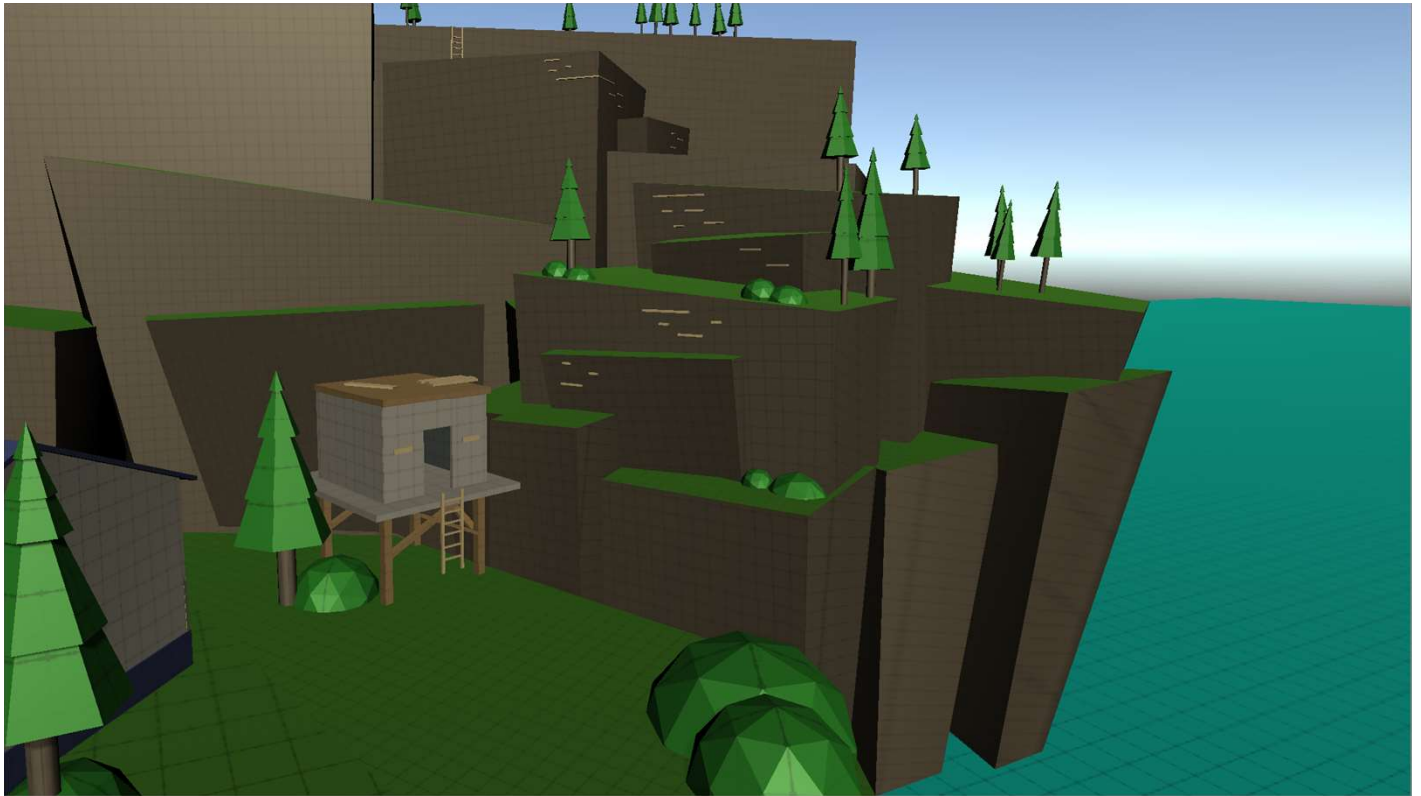
Boom.

We add color to the top of the blocks and suddenly, you're in a grassy mountainous area with water down below.

As you can see, adding color to your blockmesh helps contextualize the level to playtesters and teammates.

To further ground this on Earth, let's add some props.





Now, color is important, but it shouldn't be the only thing you rely on because some players are colorblind.

You should combine color with other techniques – like unique shapes, and using contrasting color values rather than hues.

Bonus points if you can get colorblind playtesters or teammates to help identify problems, and make your game more accessible.

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- Leading Lines
- Pinching
- Framing & Composition
- Breadcrumbs
- Textures
- Movement
- Light & God Rays

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Next tip – landmarks.

(10:37)



VIDEO: Several examples of characters pointing to things in the distance saying “there’s the \_\_\_\_\_” in Naughty Dog games.

# Landmarks (aka weenies)

- Orients players.



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NAUGHTY DOG

Ever wonder why game characters spend so much time pointing to things in the distance?

That's because they're landmarks, and they're a great way to orient players in your world.

# Landmarks (aka weenies)

- Orients players.
- Distant object seen from many vantage points in the level.



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A landmark is basically just a big object that can be seen from far away and from different vantage points.

If used correctly, players will see this object over and over as they get closer to it to let them know they're headed in the right direction.



# Landmarks (aka weenies)

- Orients players.
- Distant object seen from many vantage points in the level.
- A goal to work toward.

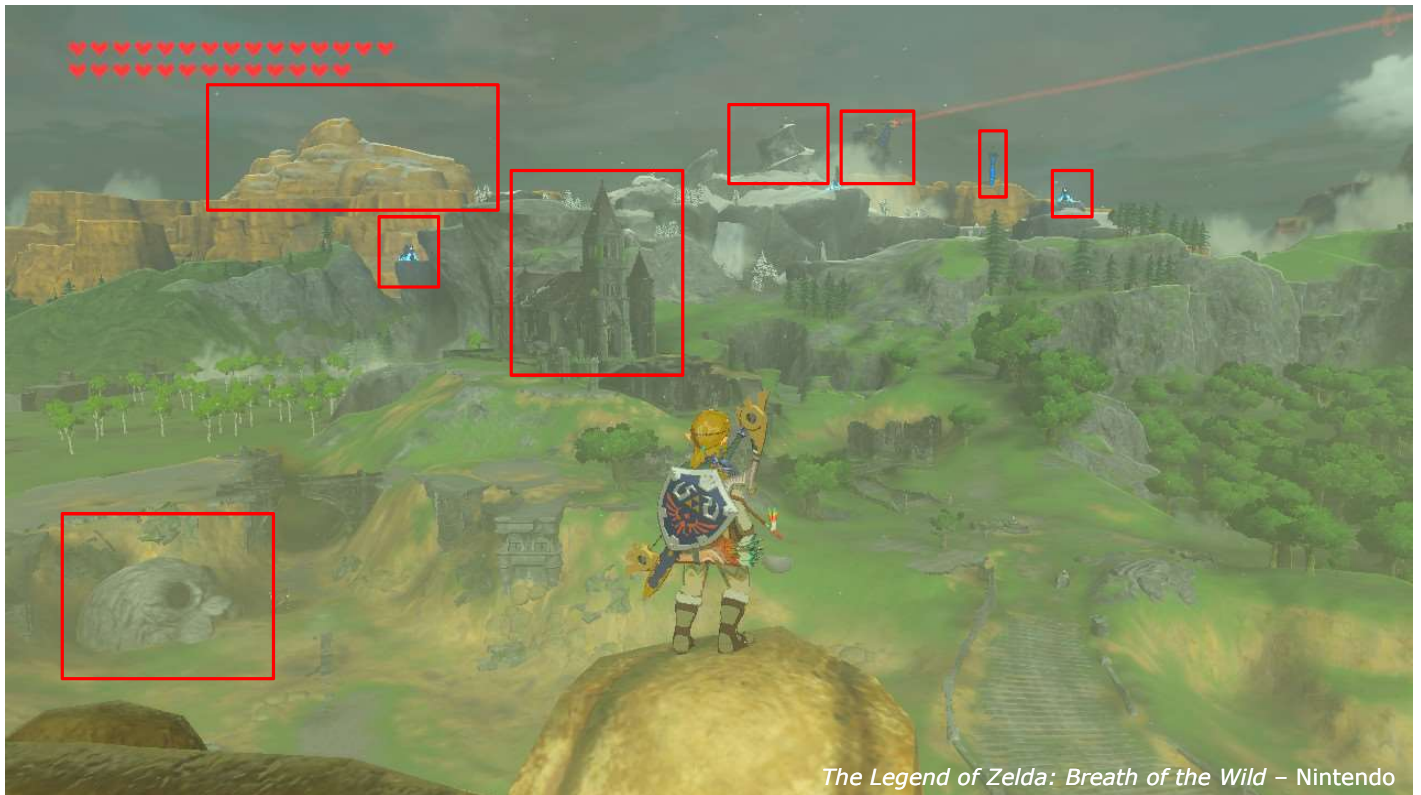


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NAUGHTY DOG

Landmarks also act as a goal for the player to work toward.

They're also called "weenies." If you want to know more about that, Google "Disney" and "Weenies". Don't worry, it's safe for work. Probably.



Check this out.

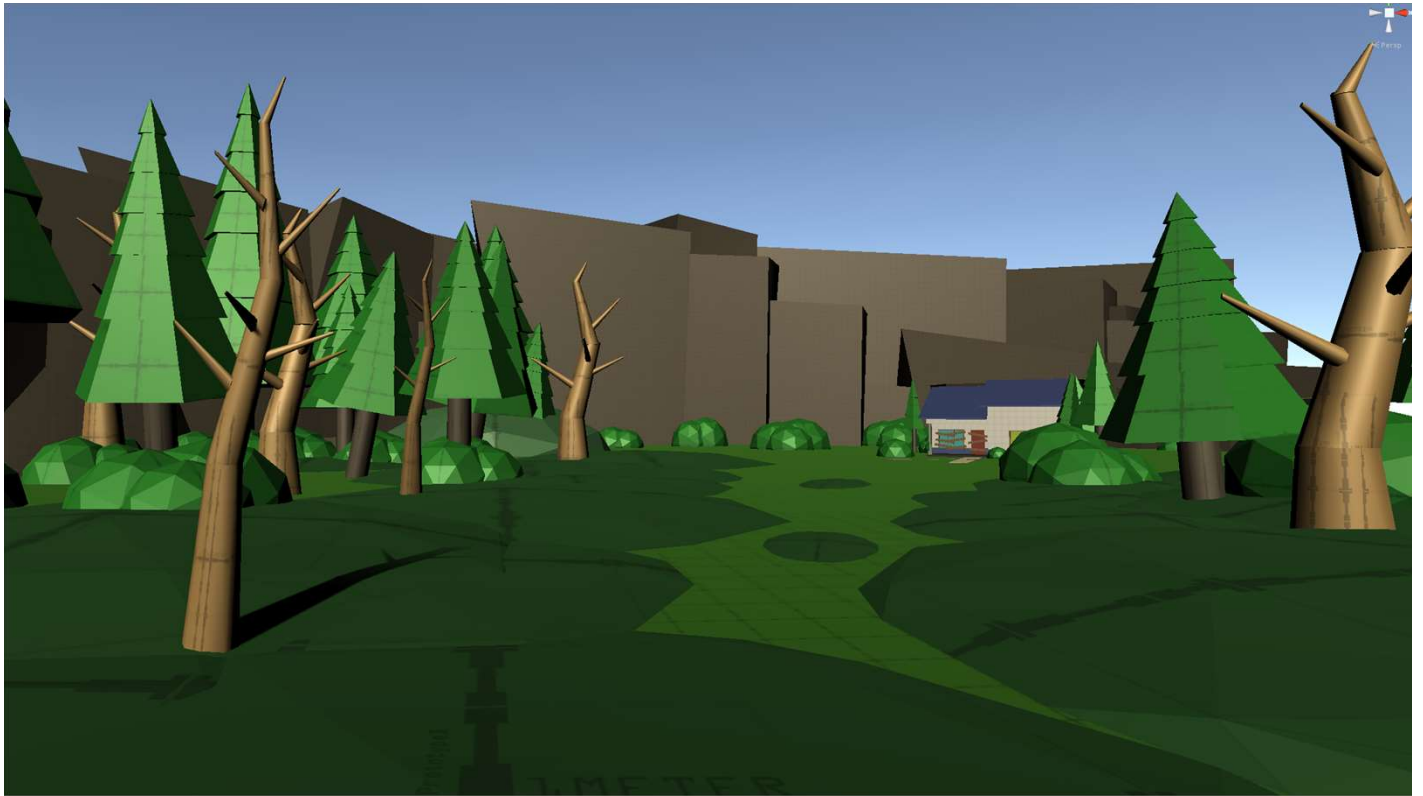
Zelda: Breath of the Wild really goes nuts with the landmarks.

In just this one shot, there are several visible in a row and not overlapping one another.

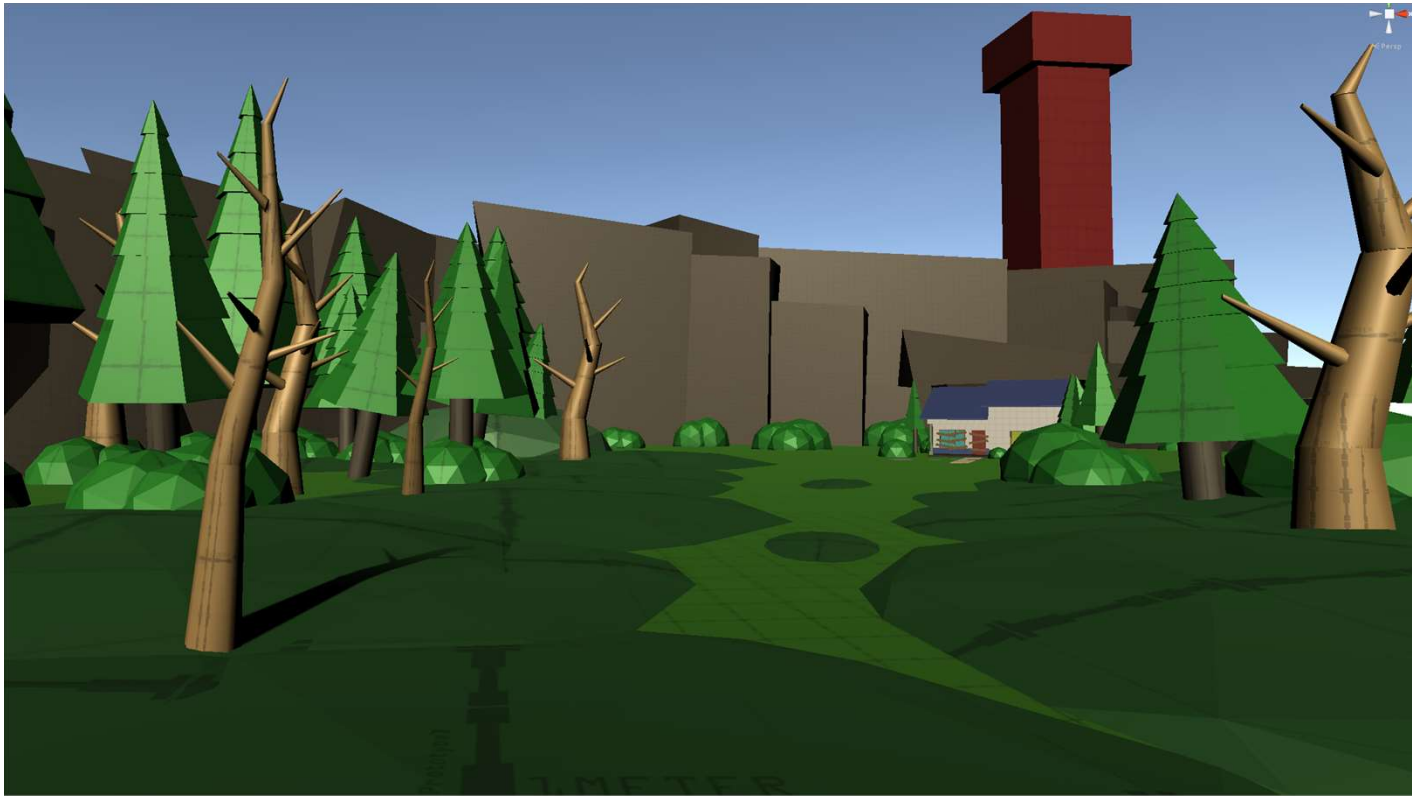
They also have unique silhouettes so you don't confuse them - which is also a great tip.

Try to have unique silhouettes for things in your game so players can distinguish them at a glance.

OK, blockmesh time.



Let's add a landmark in the distance.



Pretty basic. But it can have a huge impact on drawing players a certain direction.

If I'm working with a landmark, I like to add it first and build the level backwards from there.

That way, I can always see it in the distance and shape the level accordingly.

## Blockmesh Guidance Principles

- Affordance
- Denying Affordance
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- **Openings Attract**
- Gates & Valves
- Leading Lines
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- Movement
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Next tip – openings attract.

(11:59)



# Openings Attract

- Caves, doors, archways, etc.



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NAUGHTY DOG

Caves, doors, etc.

They all seem to attract people toward them.

## Openings Attract

- Caves, doors, archways, etc.
- Often leads to a **REFUGE SPACE**, which psychologically feels safe.

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NAUGHTY DOG

These openings often lead to a refuge space which psychologically feels safe.

## Openings Attract

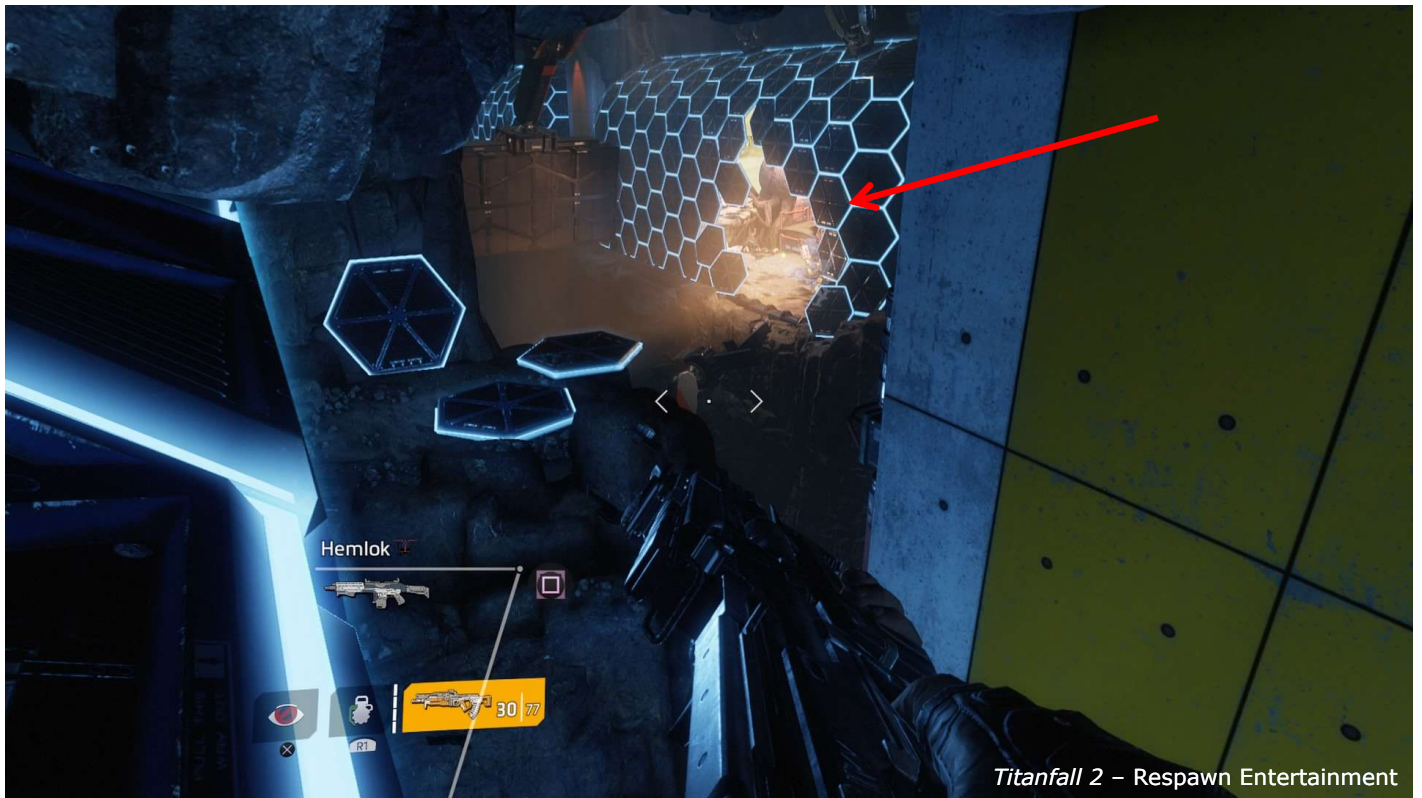
- Caves, doors, archways, etc.
- Often leads to a **REFUGE SPACE**, which psychologically feels safe.
- Mystery – “What could be inside?!”

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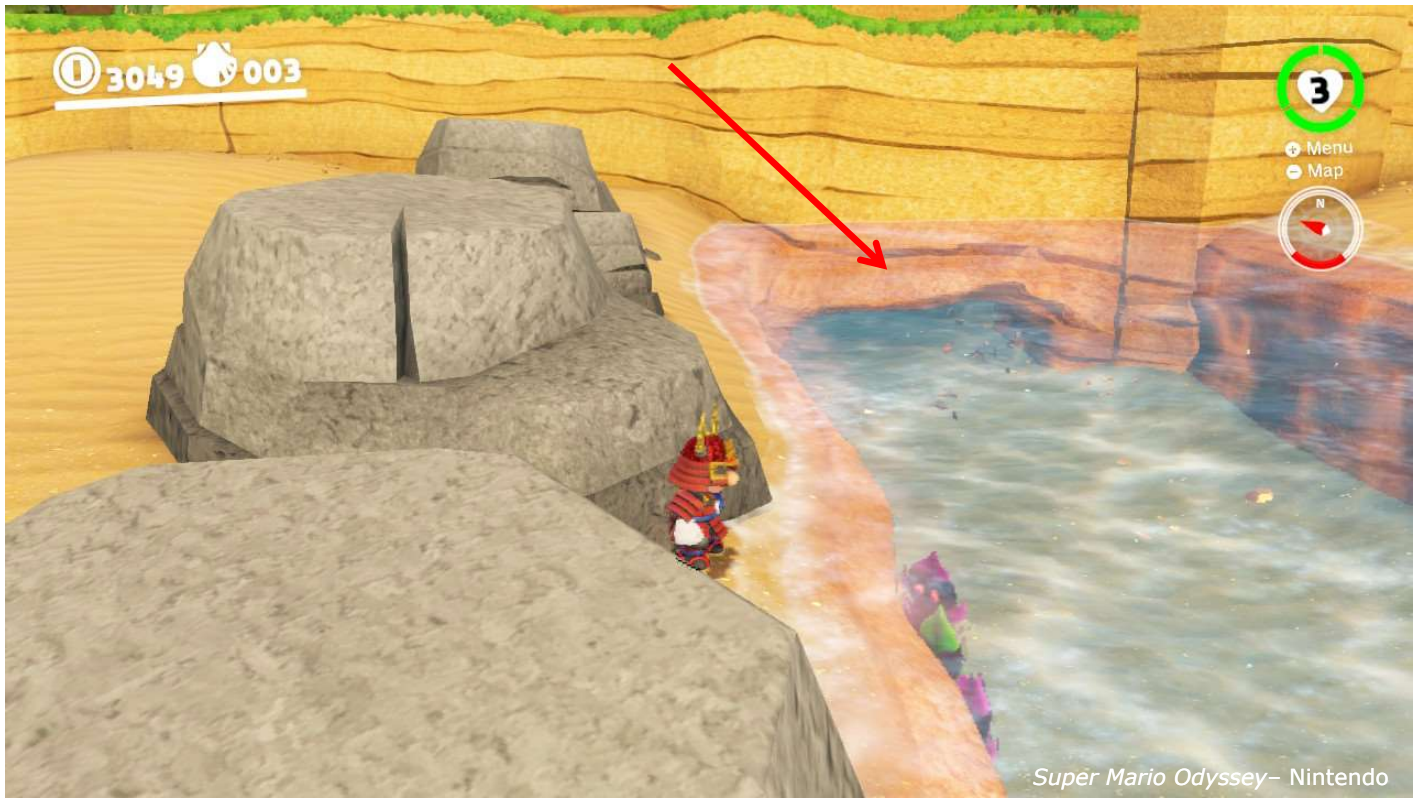
NAUGHTY DOG

Openings also have an air of mystery about them and people want to see what's inside.

This attraction happens in the real world with hobbies like spelunking and urban exploration.



Here in Titanfall 2, a ramp affords jumping to a nicely lit opening that begs to be explored.



Super Mario Odyssey – Nintendo

This underwater opening lets you know there's something beyond if you swim for it.



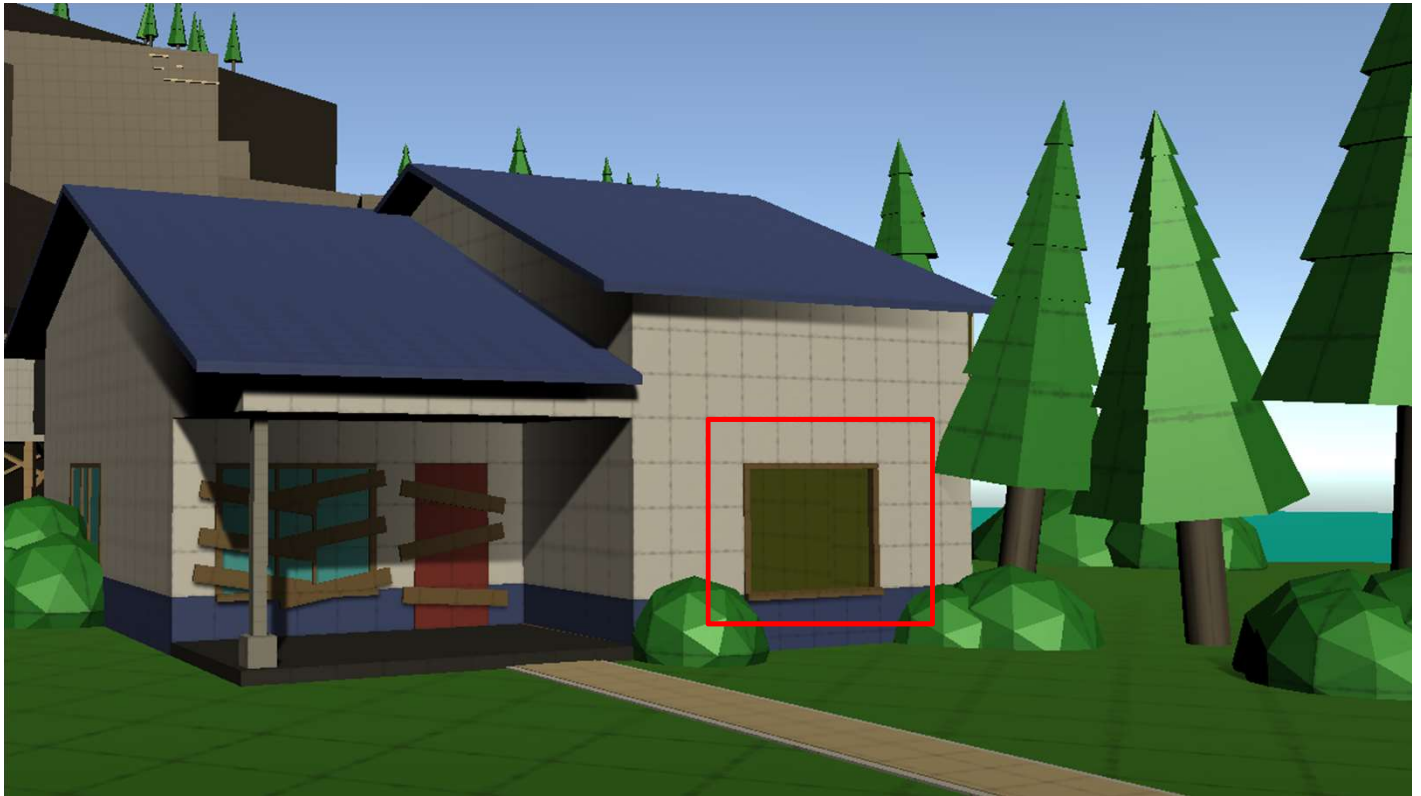


It even works in block worlds!

As soon as I saw this, I went right for it.



Doors and archways also draw you inside even though an archway may not have a roof beyond it.



When adding openings to blockmesh, it's important to have different colors for interior and exterior walls.

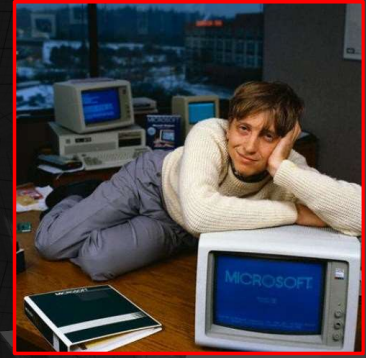
Here we have a cool white exterior and a warm yellow interior.

This helps players read depth in your blockmesh. If they're the same color, it's hard to tell it's even an opening.

Also, communicate this design intent to your artists to ensure **THEY** know this is an entrance, and needs to stand out.

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NAUGHTY DOG

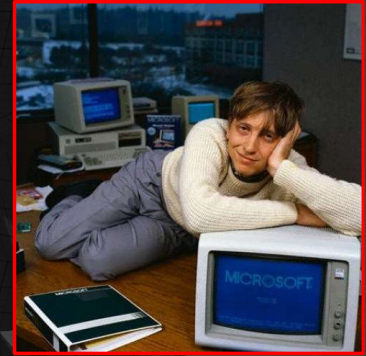
Next tip – Gates and

(13:03)



## Blockmesh Guidance Principles

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NAUGHTY DOG

# Valves!



## Blockmesh Guidance Principles

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NAUGHTY DOG

No, not those Gates & Valves!

The kind that makes WAY less money.

We want the level design kind!

## Gates & Valves

- Gates stop progress until conditions are met.



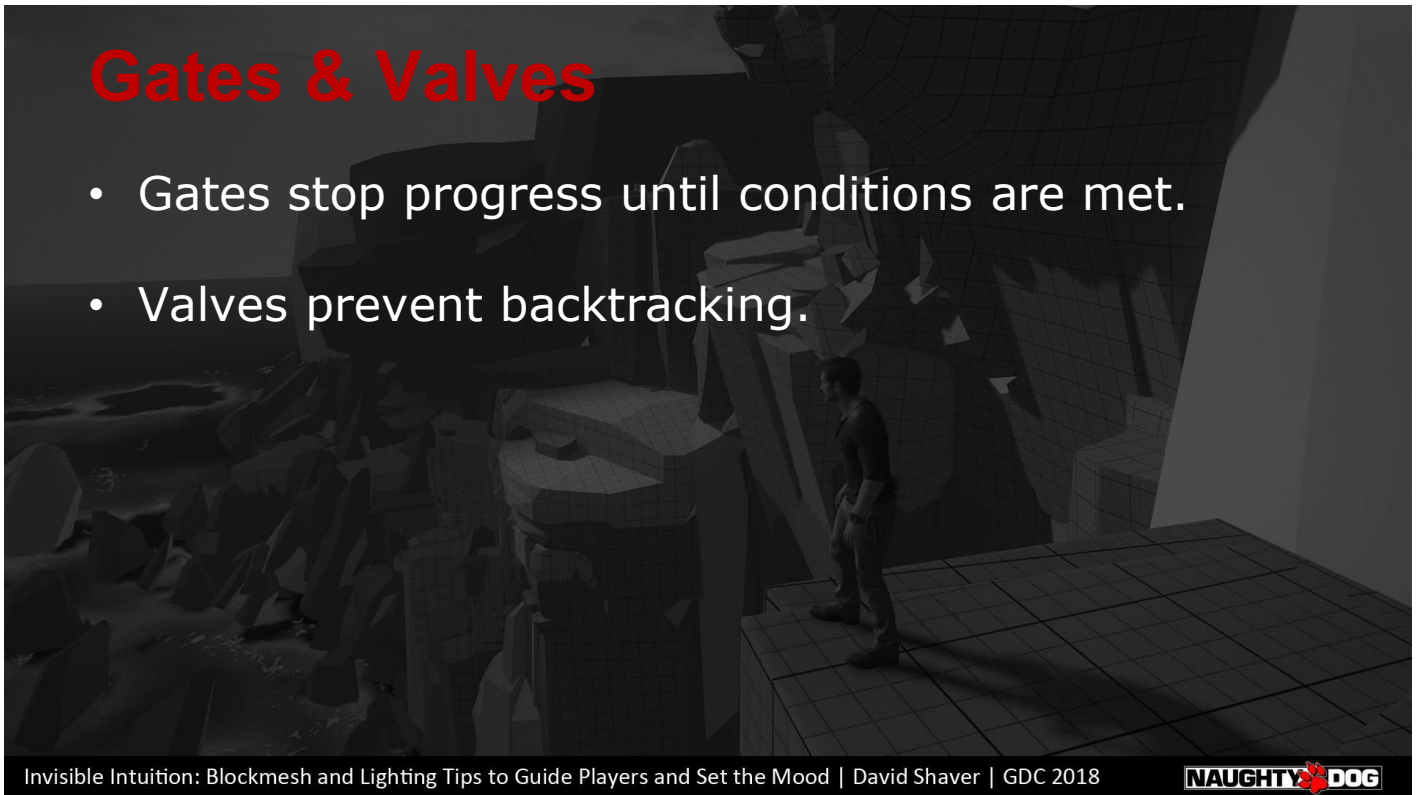
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NAUGHTY DOG

Gates stop progress until some sort of conditions are met: you've killed all the enemies, you've moved the debris out of the way, etc.

## Gates & Valves

- Gates stop progress until conditions are met.
- Valves prevent backtracking.

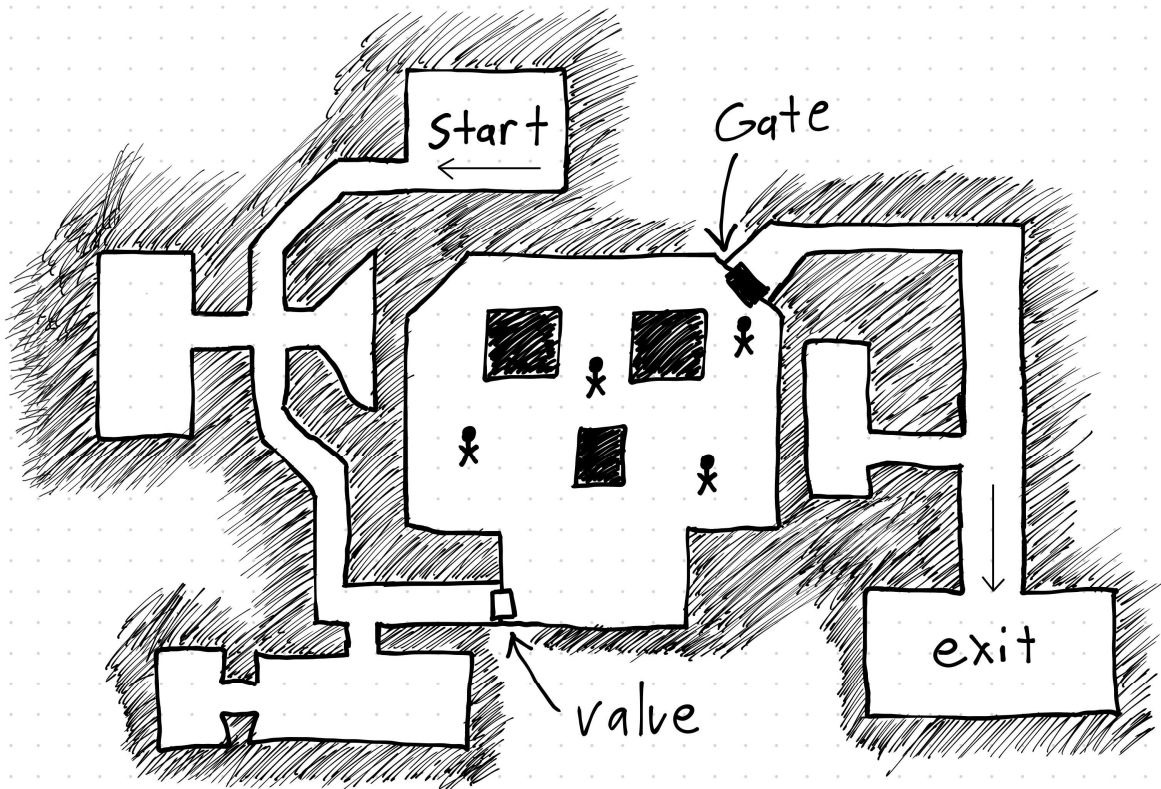


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NAUGHTY DOG

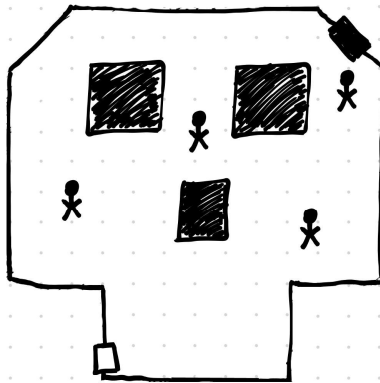
Valves are the opposite.

They let players move forward and then slam the door shut behind them so they can't backtrack.



In this scenario, we want the player to enter the combat space and be trapped until combat is over.

We have a valve INTO the space and then a gate at the other end to block them.



Once they enter, the gates and valves reduce the possibility space of the world to just the combat zone.

Also, there's less to mentally keep track of, so players can focus on the task at hand.



## Gates & Valves

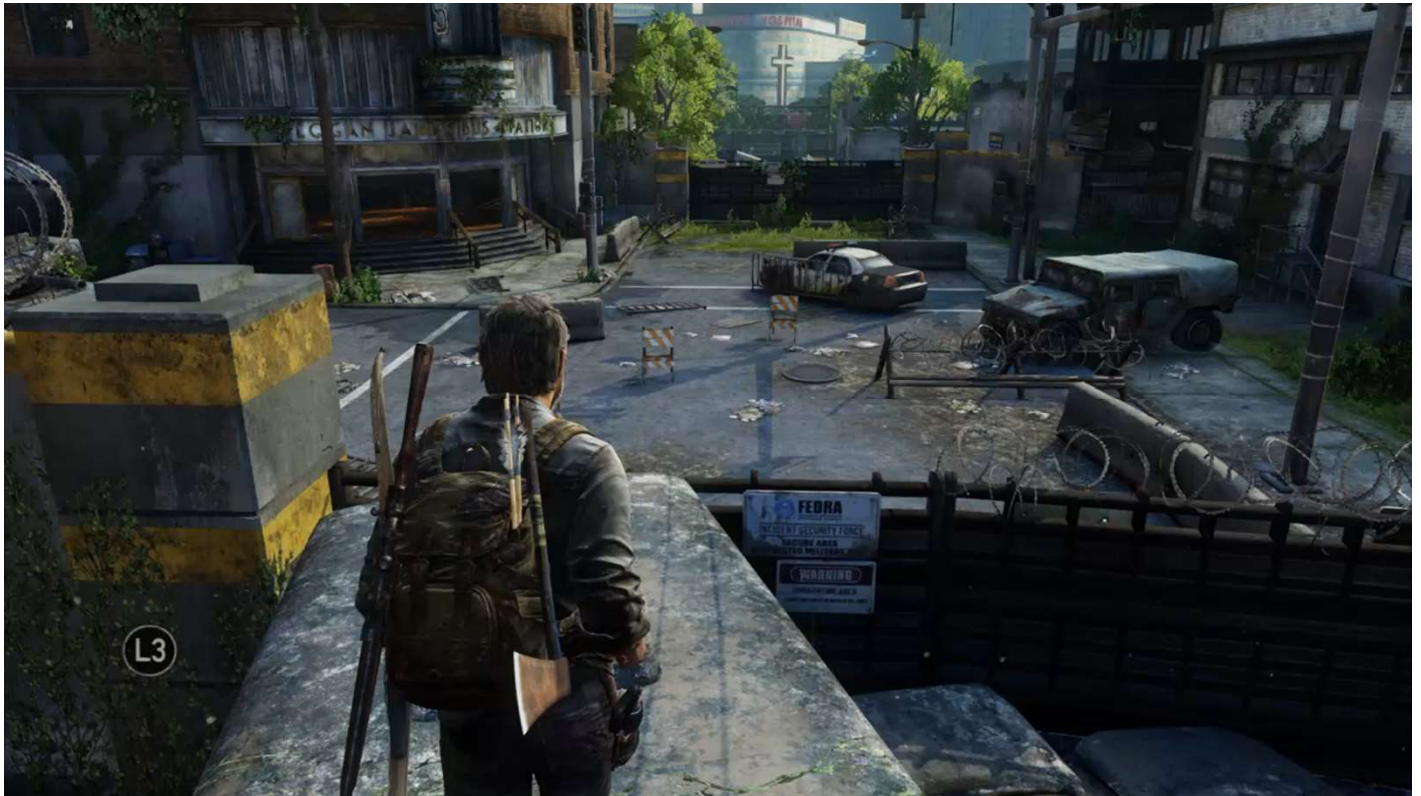
- Gates stop progress until conditions are met.
- Valves prevent backtracking.
- Both reduce the possibility space and prevent aimless wandering.
- Great for linear games, but can be sprinkled into open worlds too!

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It may look like this is only useful for linear games, but open world games can use them too with scenarios like arena battles.

The Halo series did a great job of having big open levels that also gated and valved players when needed.

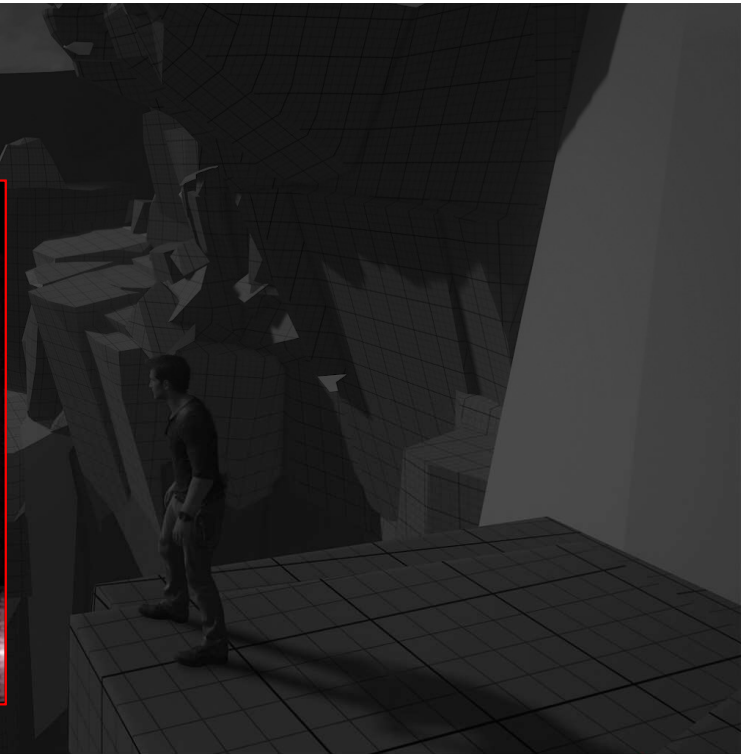


Gates are pretty straightforward - something's blocking you until you clear it - so I'll focus on valves which can be more nuanced.

In this valve example video, you drop down and can't get back up. You can only move forward.

VIDEO: Joel and Ellie drop down from the top of a bus and can't climb back up.

## Gates & Valves



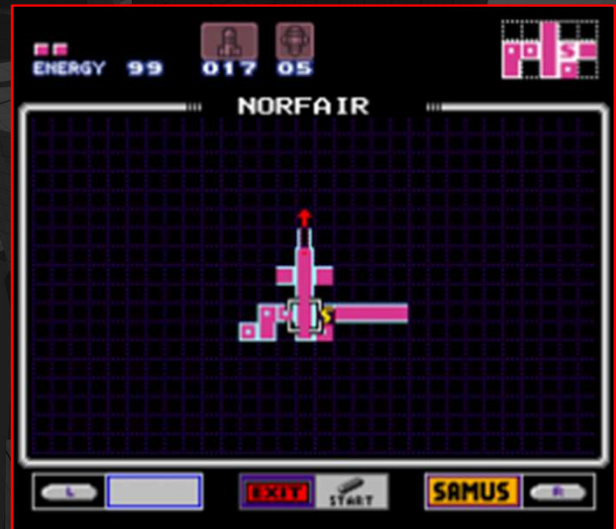
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NAUGHTY DOG

A fairly famous valve is in Super Metroid, where an entire chunk of level acts like a valve.

At some point, the player falls down this really long shaft and there's no way back up.

## Gates & Valves



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NAUGHTY DOG

They're stuck, and the vast possibility space of the game is reduced to this tiny portion as seen on this map.

IN this space, they find two critical items: the High Jump Boots and Ice Beam, and learn they can freeze enemies and high jump off of them to escape the shaft.

The shaft that was once a VALVE is now a GATE to overcome.

Given the entire world to explore, they may never have discovered this ability.



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- Movement

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Next tip – leading lines

(15:00)



# Leading Lines

- Lines that draw your eye to the intended point of interest.

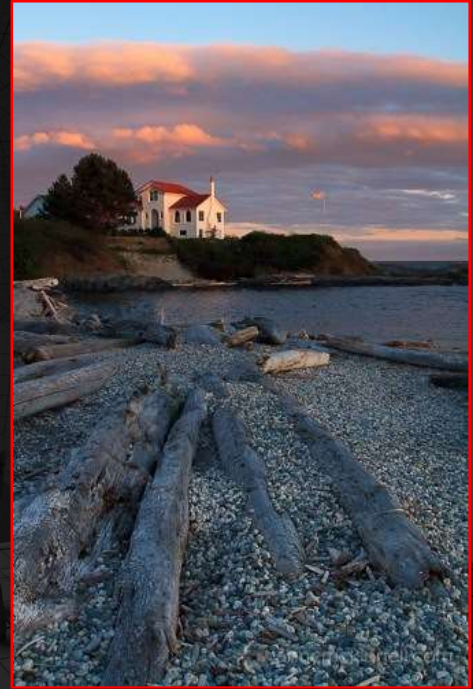


Image Source:  
<https://digital-photography-school.com/how-to-use-leading-lines-for-better-compositions/>

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NAUGHTY DOG

Leading lines are a composition technique where lines in the environment draw the eye to a specific place in the scene.

# Leading Lines

- Lines that draw your eye to the intended point of interest.



Image Source:  
<https://digital-photography-school.com/how-to-use-leading-lines-for-better-compositions/>

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NAUGHTY DOG

In this photo, the logs draw the eye up and into the frame to finally rest on the house.

# Leading Lines

- Lines that draw your eye to the intended point of interest.
- Roads, pipes, cables, etc.



Image Source:  
<https://digital-photography-school.com/how-to-use-leading-lines-for-better-compositions/>

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NAUGHTY DOG

In games, these are often roads, pipes, cables, and all sorts of things.



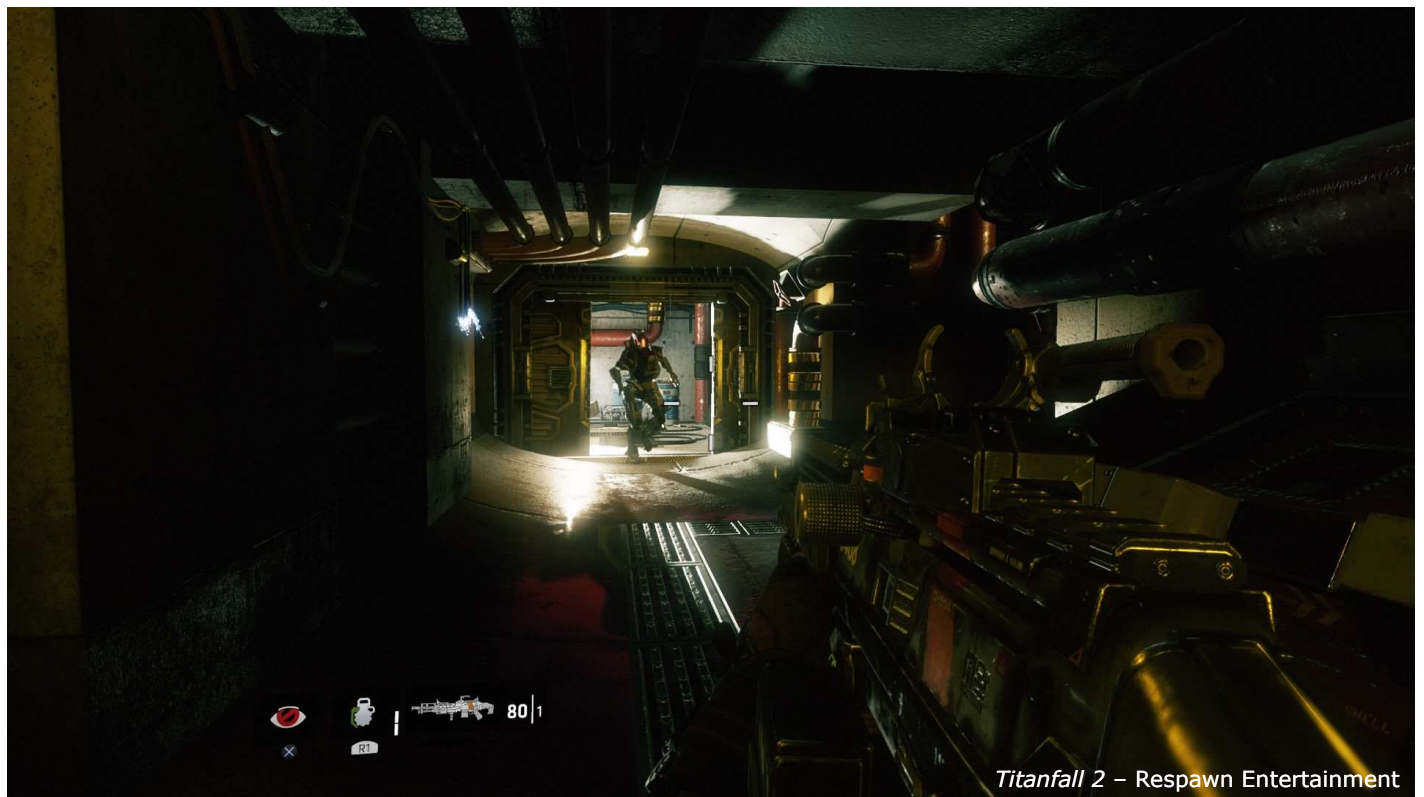
Here in Titanfall 2, we wanted the player to focus on this door and not miss the reveal of a new enemy.



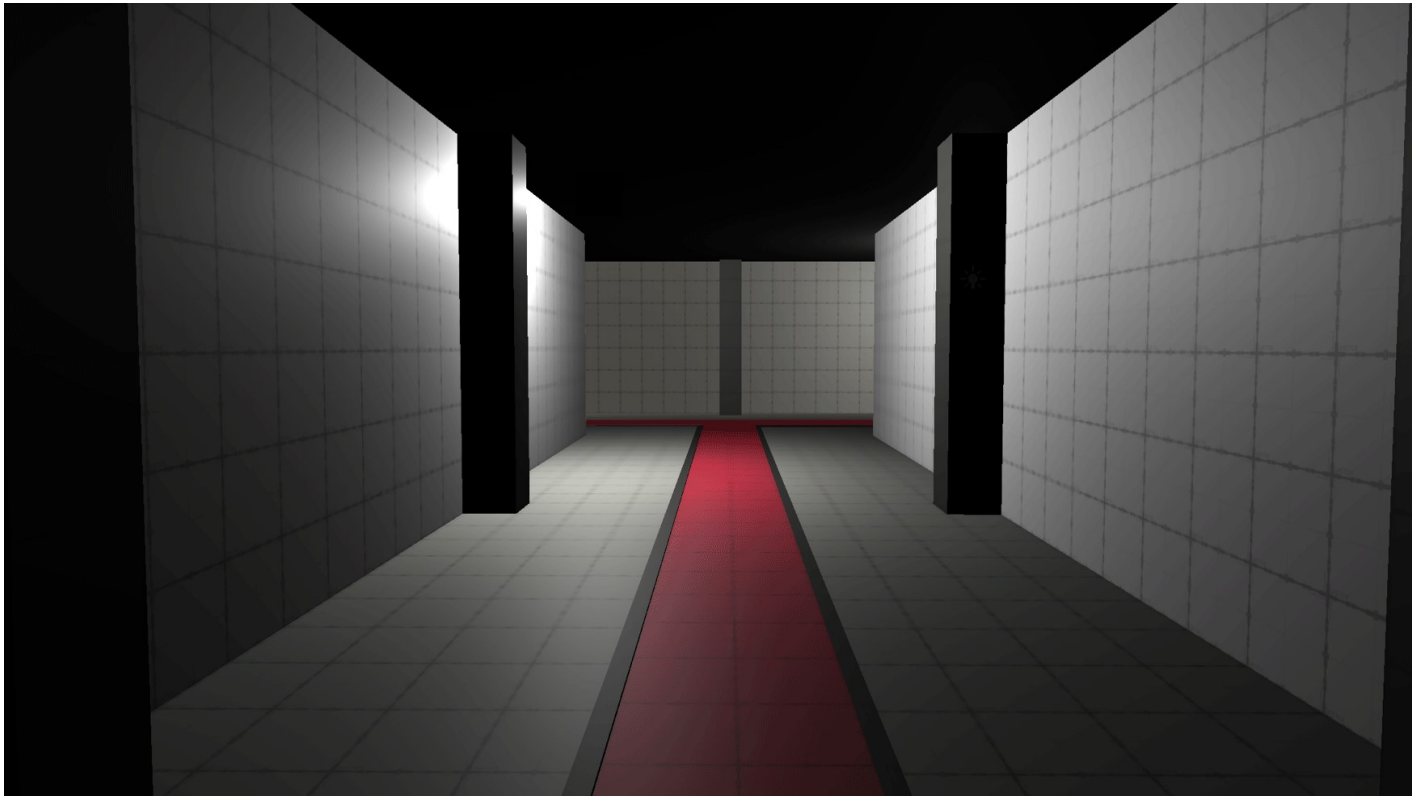


Pipes and floor grates form leading lines to the door.





When you get close, a Stalker rips the door open for a grand reveal.

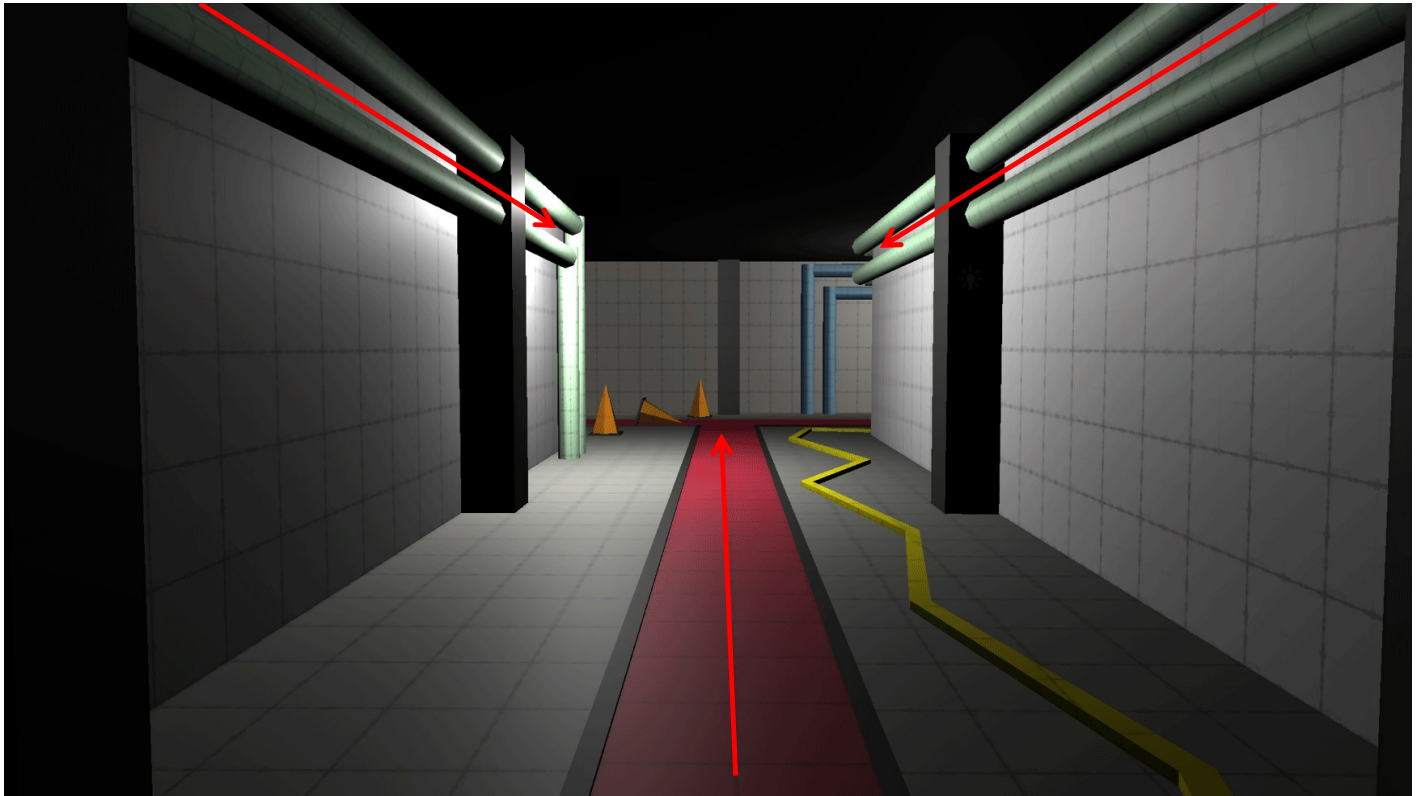


Here in the blockmesh, is a hallway with a T junction at the end.

Let's say you want the player to go to the right.

Right now, it's a coin toss.

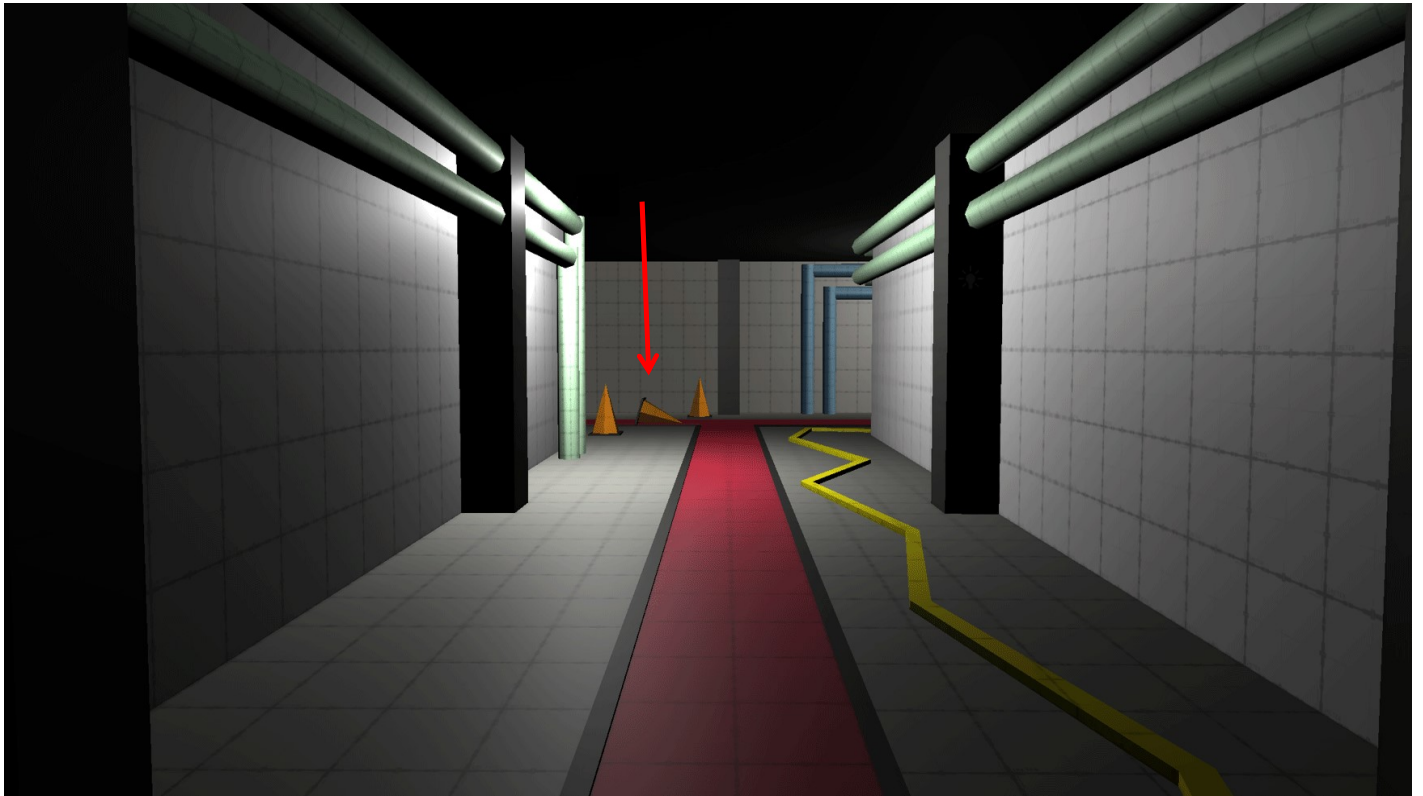
They may turn left, see a locked door and have to turn around, or they may turn right and go into the next area.



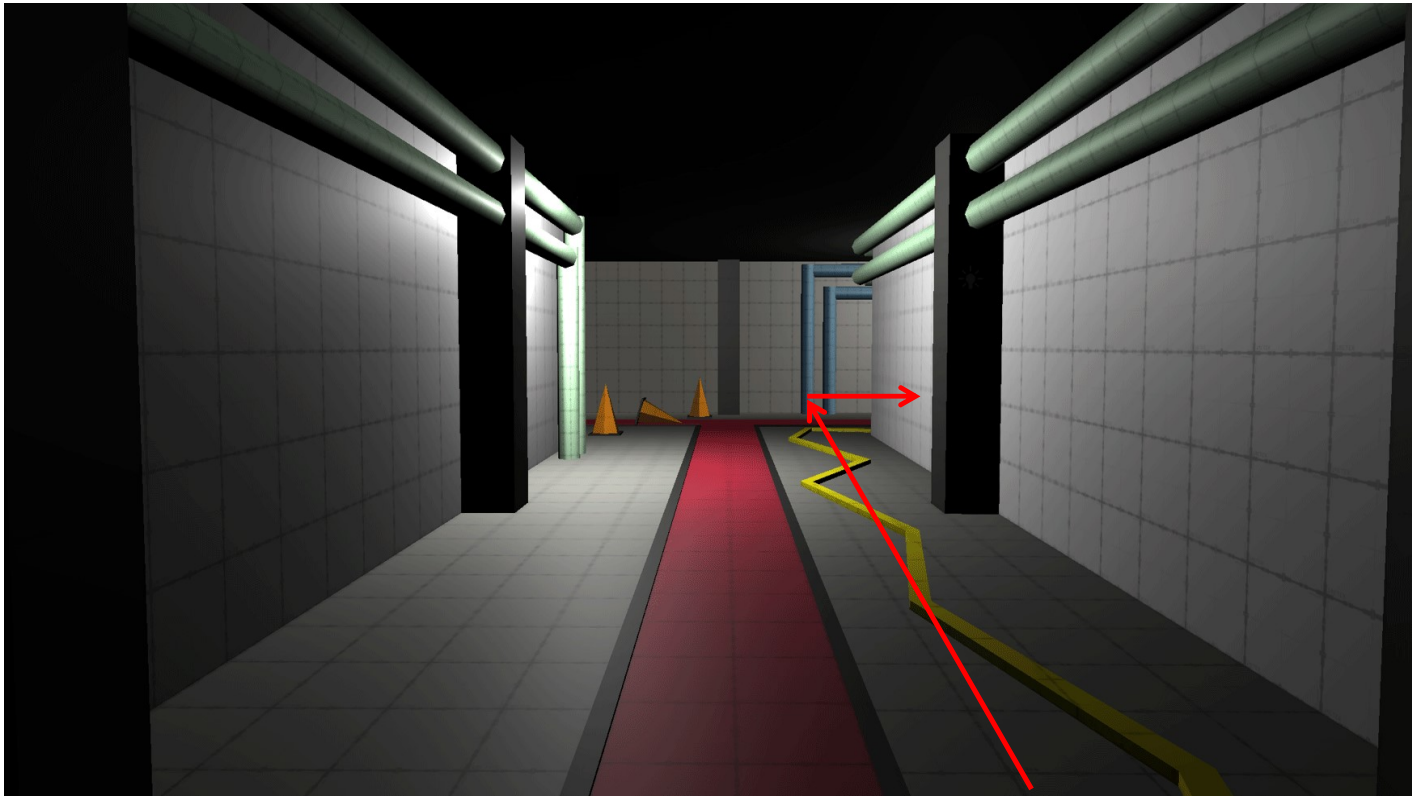
By adding some leading lines, we can draw their attention to the right and increase the chances they go there.

Pipes on the walls and a rug guide the eye down the hallway.

But, the pipes on the left stop while the pipes on the right go around the corner, leading the eye.



The caution cones break up the red line of the rug going left.



And to go over the top, we add a bright yellow cable that hugs the right side and goes around the corner.

Just simple shapes, but it can have a huge impact on smooth navigation and playtests.



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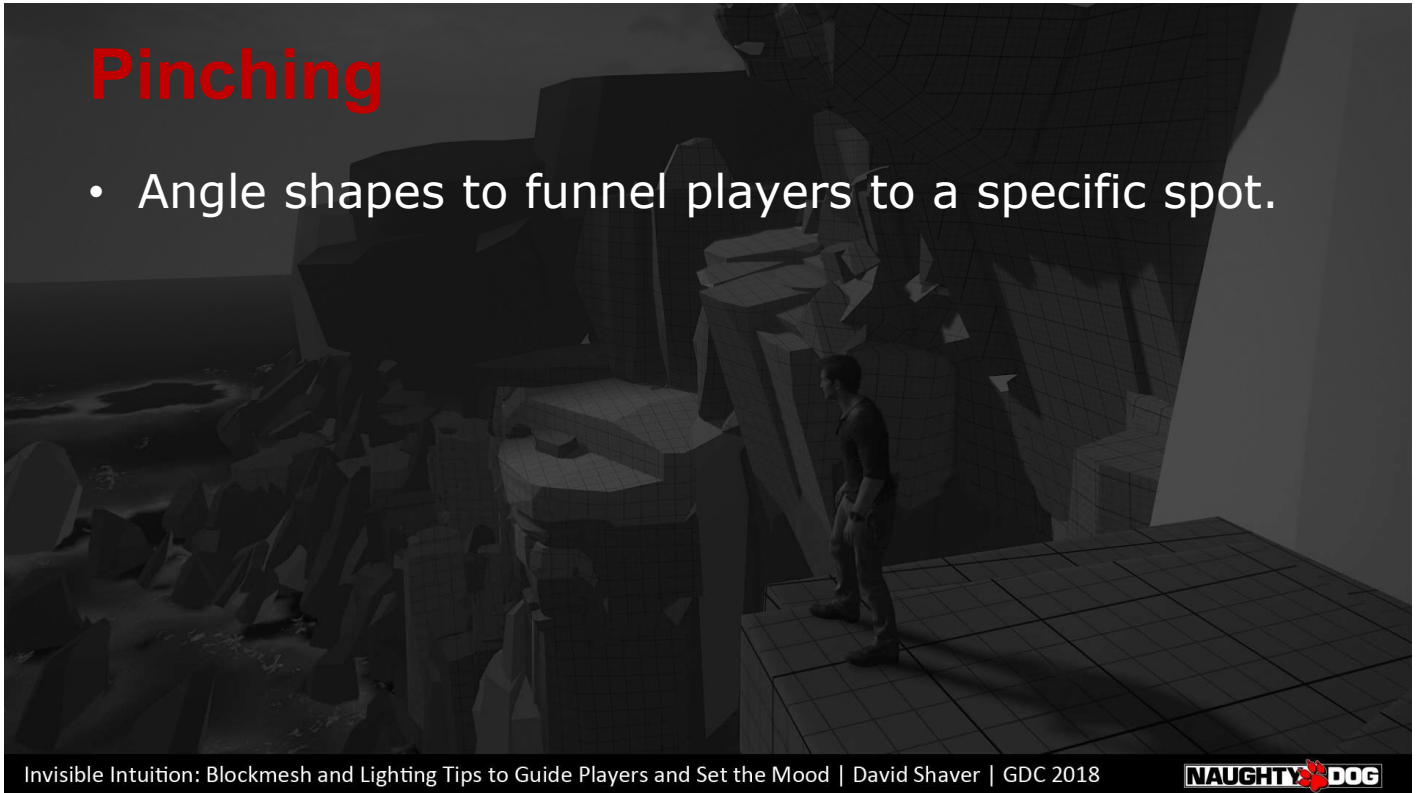


Next tip – pinching.

(16:15)

# Pinching

- Angle shapes to funnel players to a specific spot.



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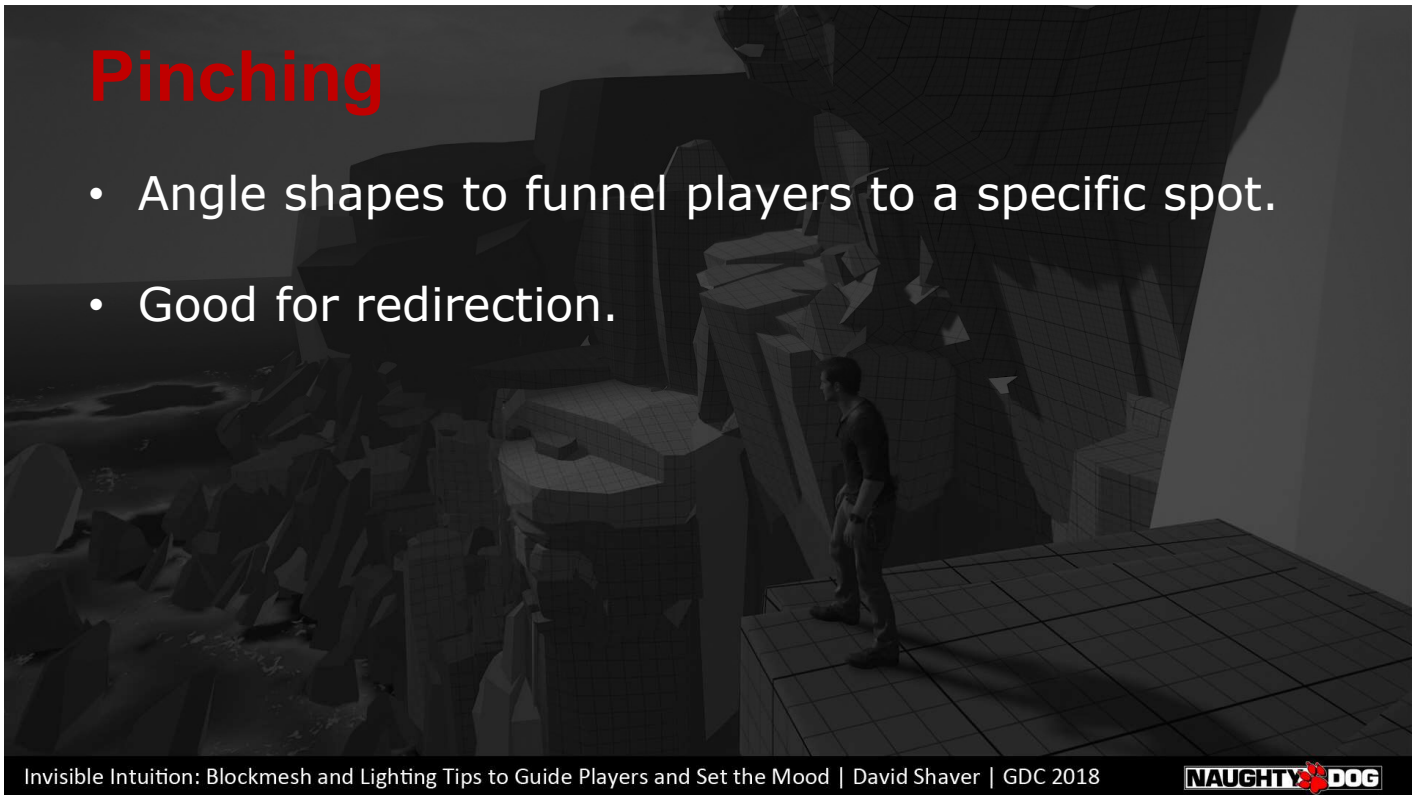
NAUGHTY DOG

Pinching basically means your layout funnels the player to a specific spot.

You accomplish this by blocking off areas and angling shapes to naturally flow to that spot.

# Pinching

- Angle shapes to funnel players to a specific spot.
- Good for redirection.



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NAUGHTY DOG

It's good for redirecting players to a specific area.

# Pinching

- Angle shapes to funnel players to a specific spot.
- Good for redirection.
- Great for setting up a reveal.

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NAUGHTY DOG

It's also a great way to setup a cool reveal like the view of a landmark without forcing the camera to look at it.

If you pinch them to a specific spot, the camera will be naturally pointed at the thing you want them to see.

## Pinching

- Angle shapes to funnel players to a specific spot.
- Good for redirection.
- Great for setting up a reveal.
- Depends on your mobility mechanics!

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NAUGHTY DOG

Of course, all of this completely depends on your mobility mechanics.

It's MUCH easier to do this in a game where players are stuck on the ground than in something like Titanfall where players are flying all over the place.

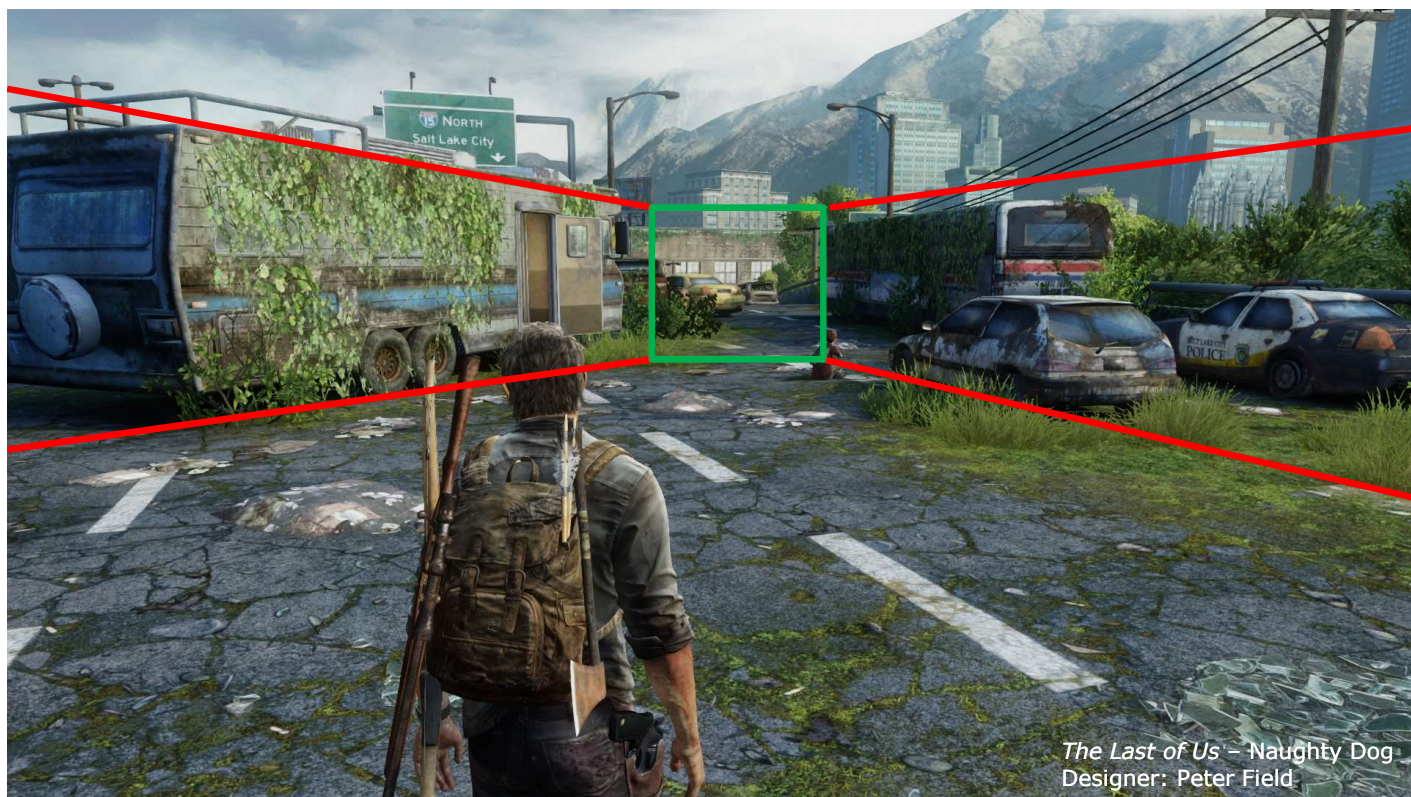
Let's look at an example.





*The Last of Us* – Naughty Dog  
Designer: Peter Field

Here, the buses and cars are angled to a specific spot.



Which you can see highlighted here.





*The Last of Us* – Naughty Dog  
Designer: Peter Field

Walking down the street, the shapes naturally bring you to the end of the pinch which faces the way forward.



Let's see it in action.

In this video, the pinch lines up a perfect shot of the hospital in the distance (which is your goal) and the tunnel that takes you there.

VIDEO: Joel and Ellie move toward the bus and wall which forces them to look at the hospital and tunnel.

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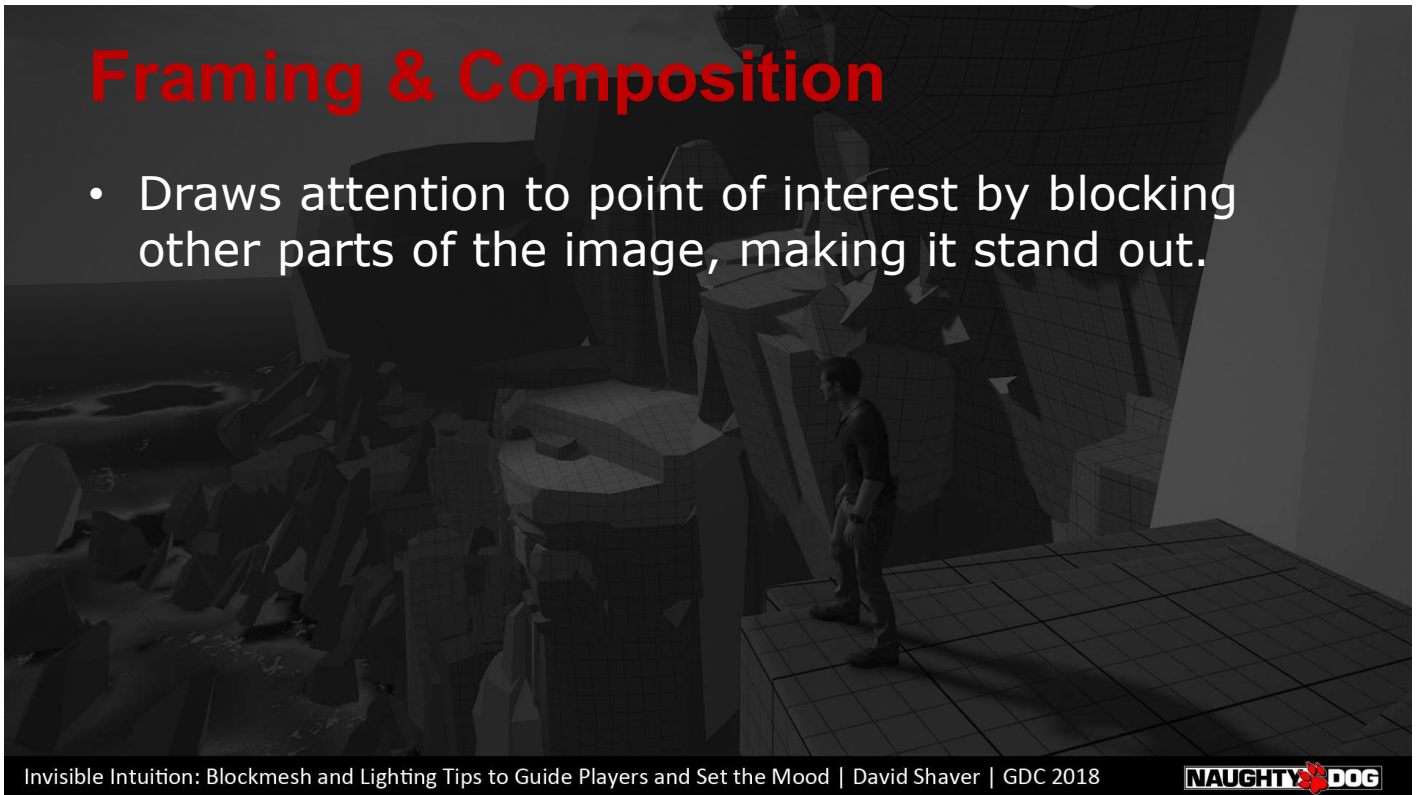
Next tip – framing & composition.

(17:28)



# Framing & Composition

- Draws attention to point of interest by blocking other parts of the image, making it stand out.



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NAUGHTY DOG

Another technique borrowed from photography.

By framing your subject (a landmark, a big enemy, a cave opening, etc.), you draw attention to it.

# Framing & Composition

- Draws attention to point of interest by blocking other parts of the image, making it stand out.
- Google photography composition techniques – lots of good websites!

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NAUGHTY DOG

If you'd like to learn more, just Google photography composition techniques.

There are tons of good free resources and examples.

# Framing & Composition

- Draws attention to point of interest by blocking other parts of the image, making it stand out.
- Google photography composition techniques – lots of good websites!
- Great when combined with Pinching!

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NAUGHTY DOG

This one is really useful when combined with Pinching to setup an important reveal in the level.

After you pinch the player to a specific spot, perfectly frame the object for maximum effect.

Let's see it in action.



VIDEO: Joel follows the winding path up a hill with a river to the left and a big rock formation on the right. The rocks occlude the dam until Joel is facing it perfectly for the reveal.



As you saw, the player is naturally pointed at the dam and due to good framing, it was the dominant thing on the screen.

Also, side tip, people's eyes are drawn to detail and the dam very detailed.

All with just some layout and no forced camera moves.



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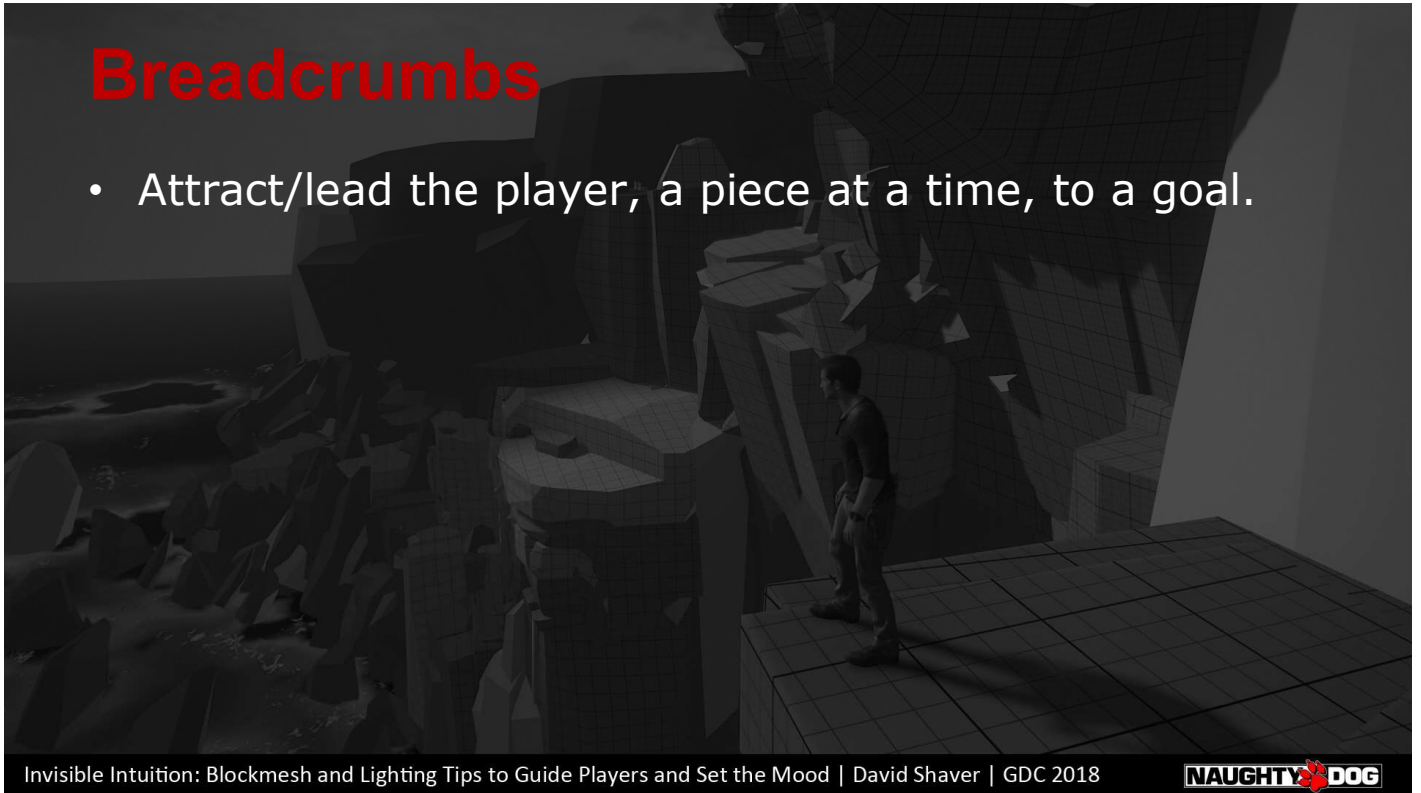
NAUGHTY DOG

Next tip – Breadcrumbs! Aw yiss.

(18:23)

# Breadcrumbs

- Attract/lead the player, a piece at a time, to a goal.



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NAUGHTY DOG

Breadcrumbs lead the player, a little piece at a time, to a goal.

# Breadcrumbs

- Attract/lead the player, a piece at a time, to a goal.
- Can be almost anything that draws the eye:
  - Stuff that breaks up the negative space of floor/walls.
  - Pickups
  - Enemies
  - Lit areas

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NAUGHTY DOG

They can be almost anything: chunks of stuff on the ground, pickup items, enemies, lit areas, etc.

# Breadcrumbs

- Attract/lead the player, a piece at a time, to a goal.
- Can be almost anything that draws the eye:
  - Stuff that breaks up the negative space of floor/walls.
  - Pickups
  - Enemies
  - Lit areas
- Usually better to add after early playtests of blockmesh to see if they are even needed.

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It's usually better to add breadcrumbs to your blockmesh after early playtests because they can hide fundamental layout guidance problems.

If they're still needed after a few revisions, then don't feel bad about adding them.



*UNCHARTED: The Lost Legacy* – Naughty Dog  
Designer: Derek Chatwood

In this example, the bits of fence and roof create visual stepping stones to the ledge.





In Destiny 2, these panels guide players to the tunnel.



*Super Mario Odyssey - Nintendo*

If your game has them, pickups are a classic way to breadcrumb players around a level.





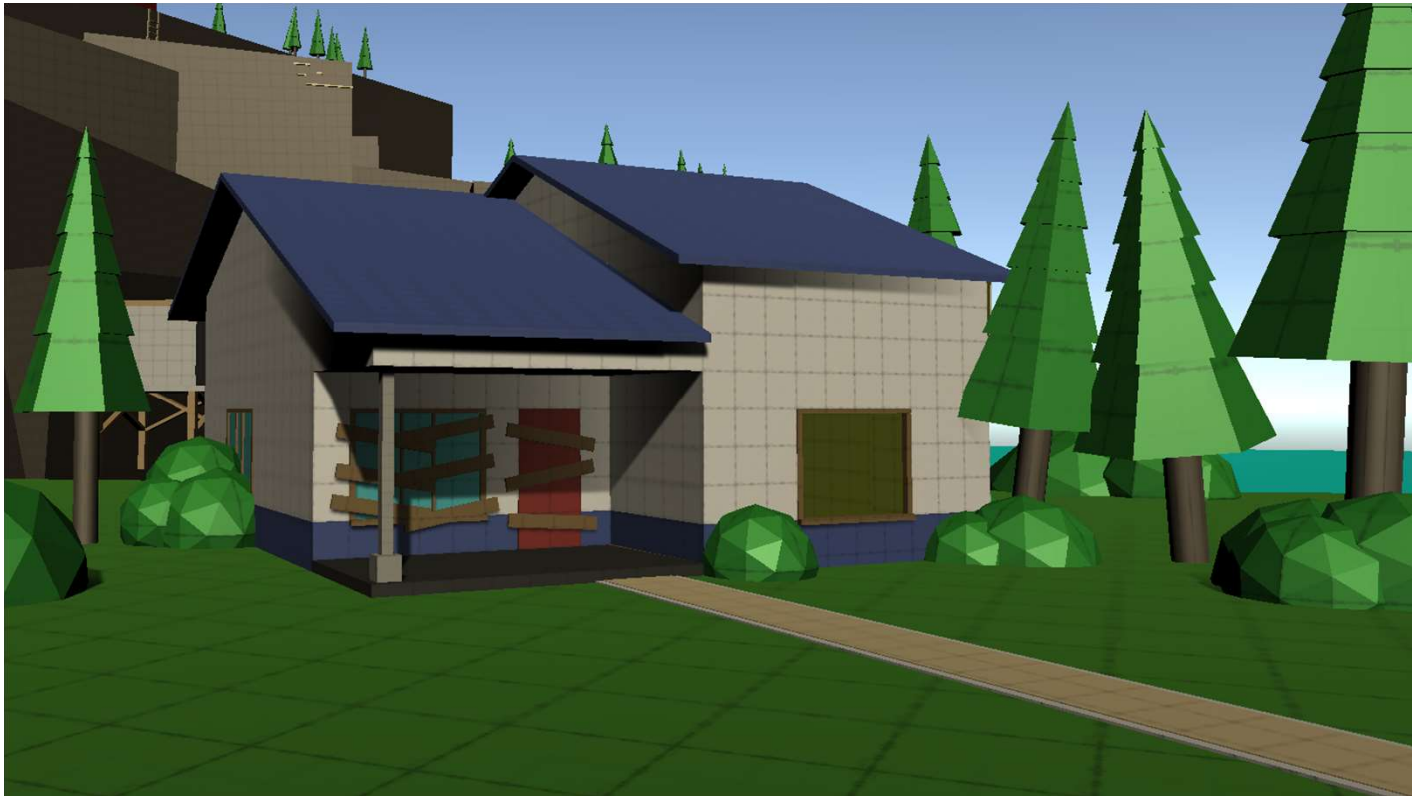
Super Mario Odyssey - Nintendo

How many times have coins led you to new areas in Mario games?



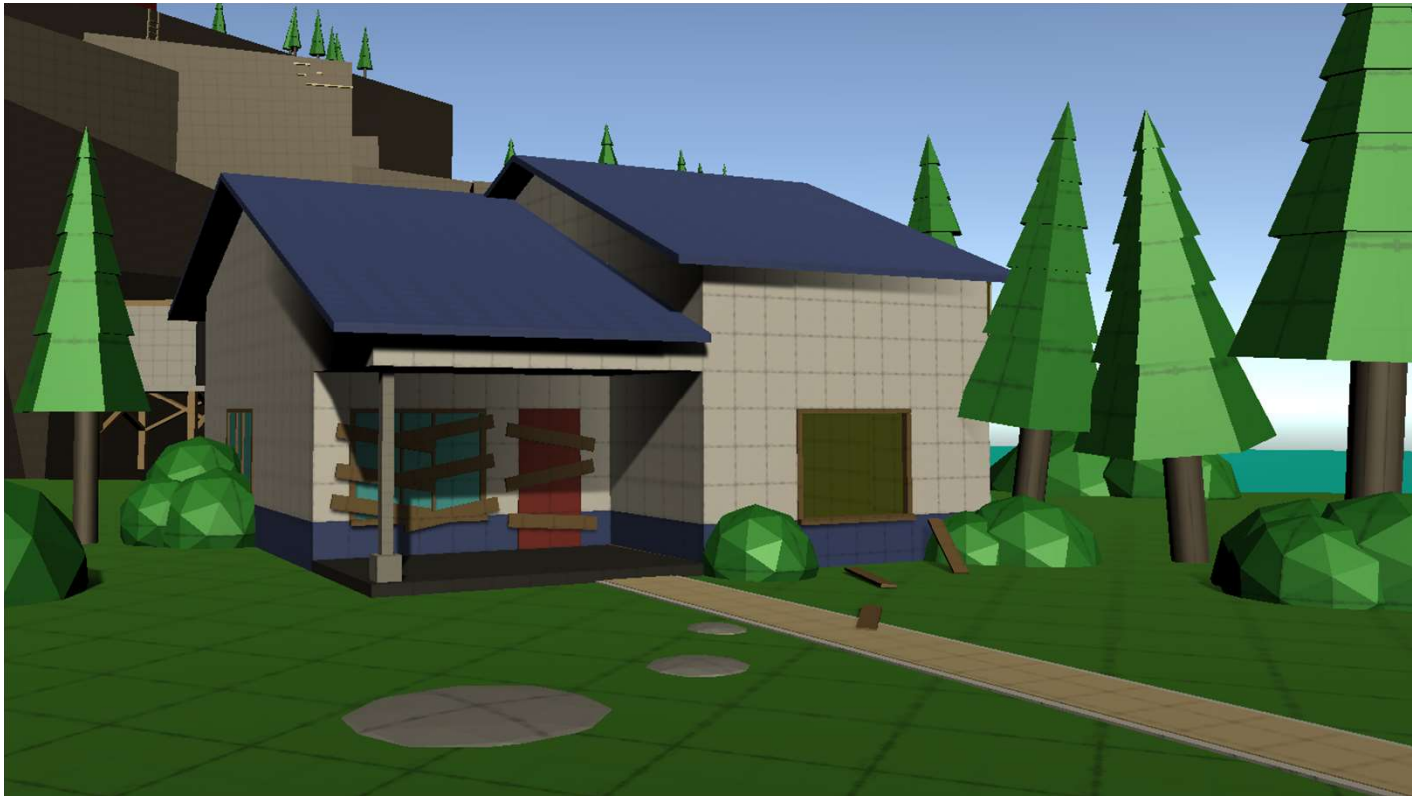
Pickups are also great for letting players know they're on the right path in a cluttered or mazelike environment.

This one is placed next to an area you need to duck under (which some players forget they can do), so it subtly hints "Yep, you're going the right way."



So going back to this house, let's say only half the players during the last playtest went into the house – and the other half got lost.





Let's add some rocks and boards as breadcrumbs leading to the window.

Notice the boards are angled toward the window as well creating leading lines.

You also can still sprinkle breadcrumbs in open world areas to lead players to interesting things - like the panels leading to a tunnel in the Destiny screenshot.

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Next tip – textures.

(19:39)

# Textures

- Just point the way to go!
- Examples:
  - Arrows pointing the way.
  - Scrapes on the ground/walls
  - Signs,
  - etc.

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NAUGHTY DOG

You can use textures to subtly (or obviously) point the way to the goal.

These can be just about anything...arrows, scrapes along the wall, signs, etc.



*UNCHARTED: The Lost Legacy* – Naughty Dog  
Designer: Derek Chatwood

Here in Uncharted: The Lost Legacy...



Scrape textures on the wall communicate affordance that you can shimmy here.

This example leads to a secret area and a collectable, so you don't always need to use these tips just for the main path.





Here in Uncharted 4...



UNCHARTED 4: A Thief's End – Naughty Dog  
Designer: James Cooper

...tire tracks on this rock  
communicate affordance that you can  
drive here.

When I played this game, I didn't  
notice the tracks at first and got lost.  
Once I noticed the tracks, the rest of  
the driving went smoothly.

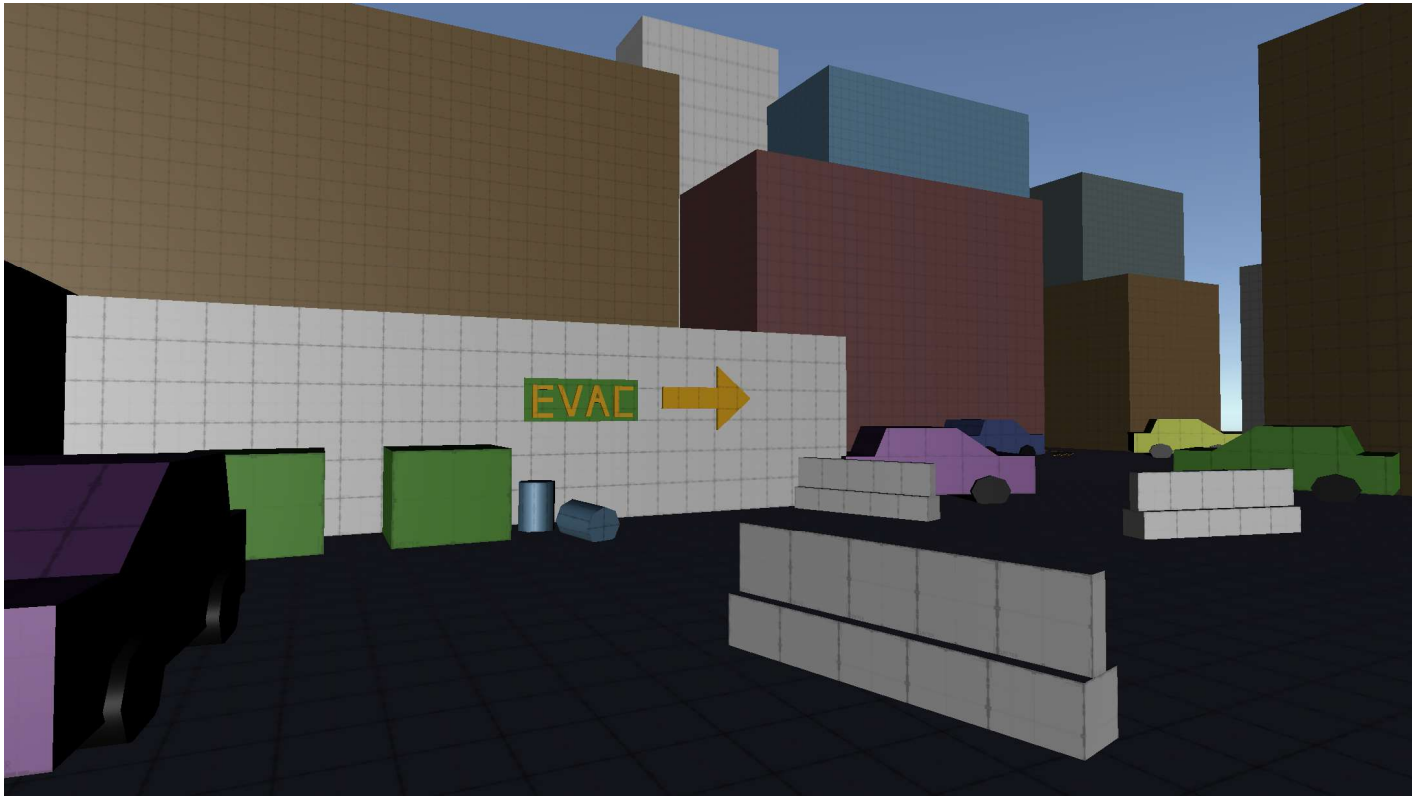




Signs literally point the way to the hospital, which is also your goal.

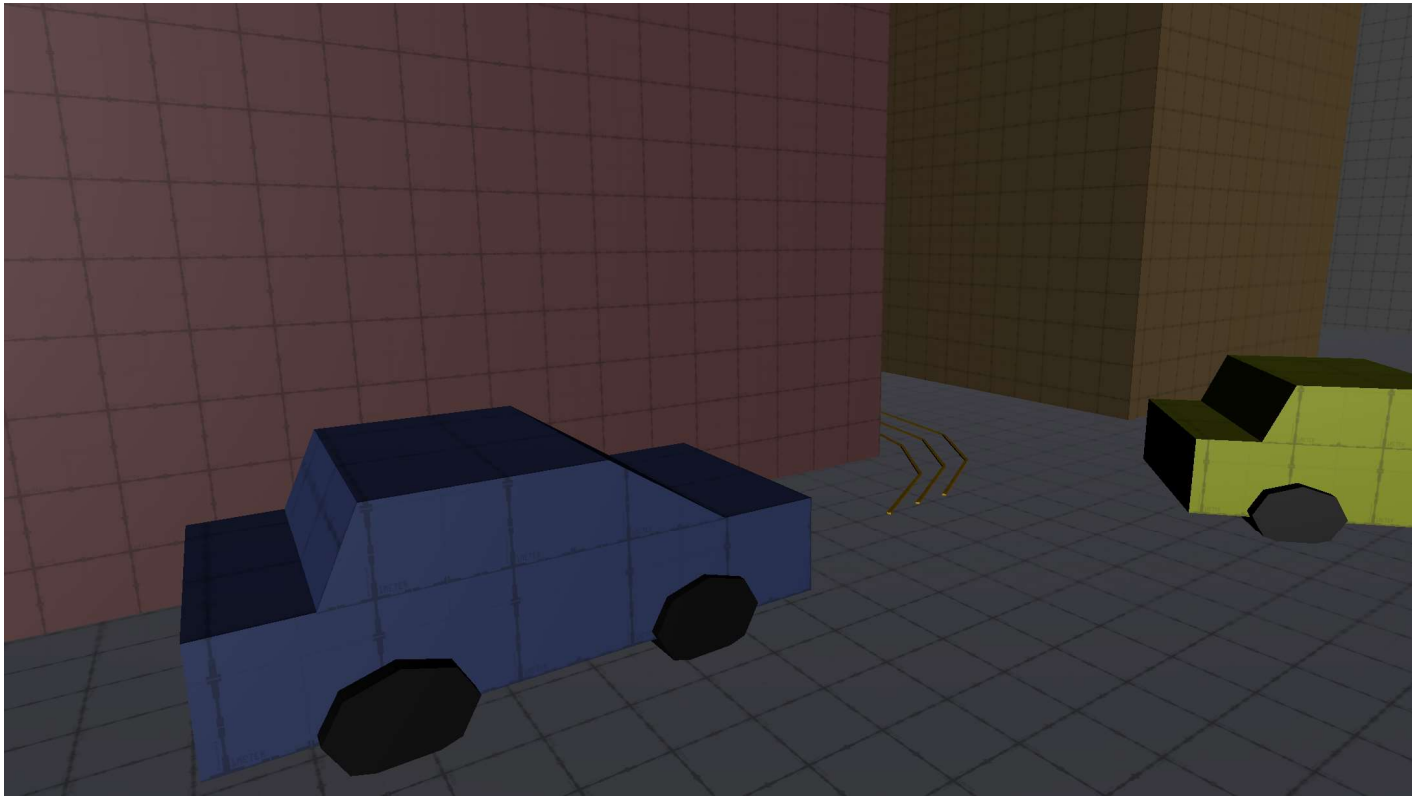
These textures are often some of the last things added when making a level which doesn't really help the early blockmesh phase.

But, guess what? You don't need to wait for an artist to add these!



You can build them out of blockmesh for your playtests!

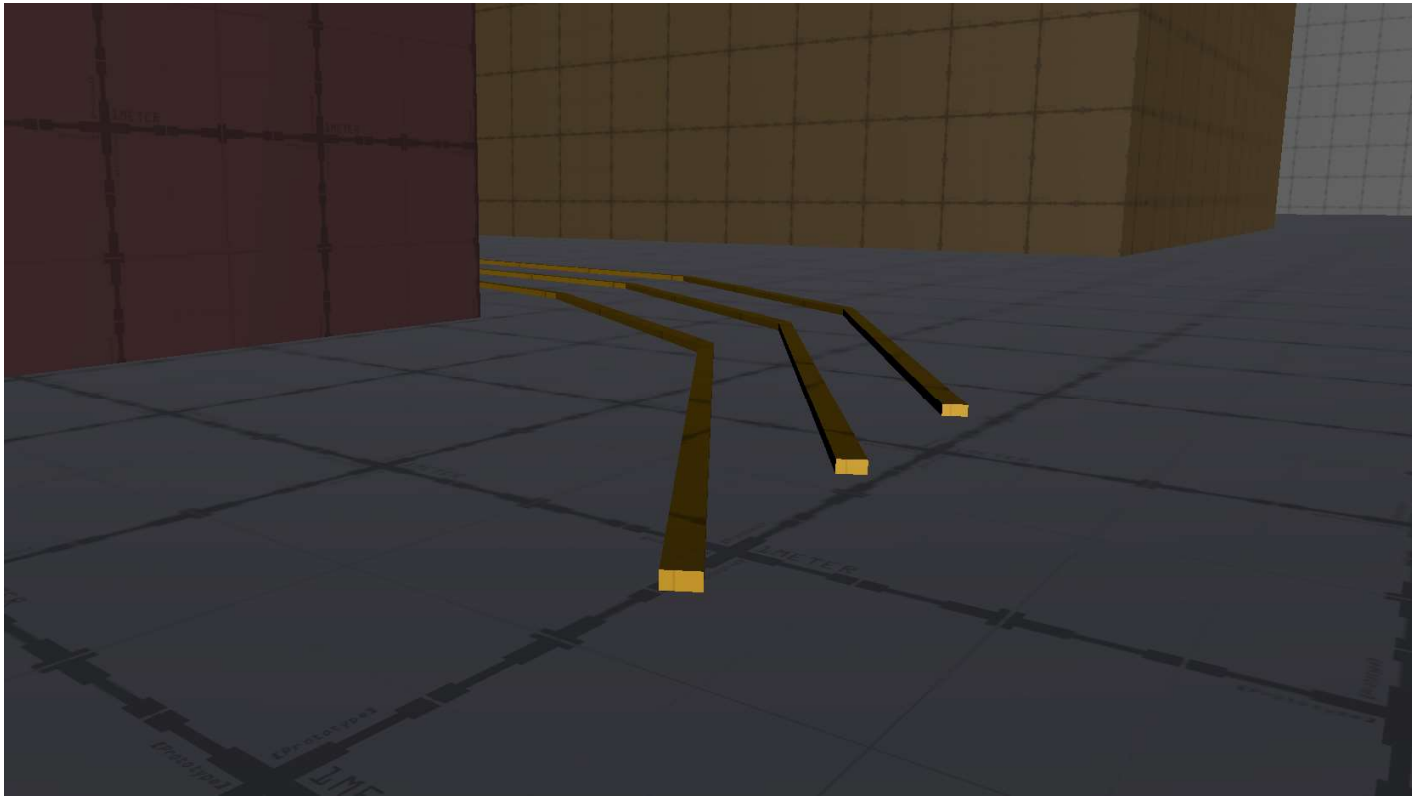
Here I've added an arrow and a sign to point the way.



And these scratch marks lead into the alley indicating something heavy was dragged back there.

And the best part?



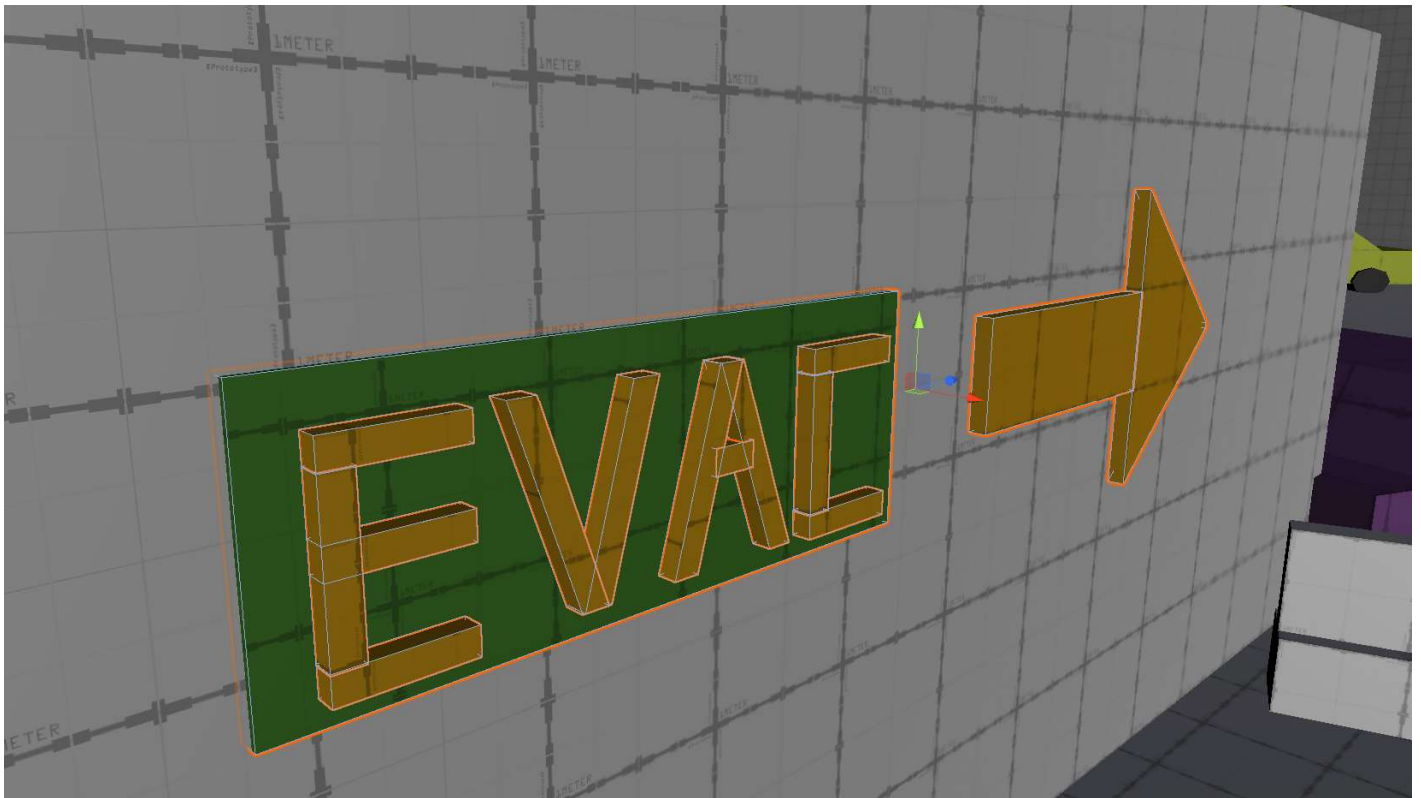


These are just blockmesh too!



Labeling rooms and areas can be super helpful for both linear and open games.

If you're building a school, for example, having labels like GYM and CAFETERIA provides valuable context and signposts as your playtesters explore.



Here, I've pulled this away from the wall a bit to show that it's just a bunch of blocks.

This stuff only takes a few minutes to do, but works wonders for playtests and to communicate with your artists where you think signage might go.

I'm not gonna lie – this one is so simple and obvious and it kinda blew my mind when I learned it.

## Blockmesh Guidance Principles

- Affordance
- Denying Affordance
- Visual Language – Shape
- Visual Language – Color
- Landmarks
- Openings Attract
- Gates & Valves
- Leading Lines
- Pinching
- Framing & Composition
- Breadcrumbs
- Textures
- **Movement**
- Light & God Rays

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Next tip – movement.

(21:18)

# Movement

- Use movement to grab the eye.



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NAUGHTY DOG

Movement grabs the eye and the player's attention.



# Movement

- Use movement to grab the eye.
- Examples:
  - Big scripted moments.
  - Birds
  - Spark FX
  - Enemies
  - Something flapping in the breeze

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NAUGHTY DOG

This can be anything that fits your game...big scripted moments, birds, sparks, buddies, enemies, and even just something flapping in the breeze.

# Movement

- Use movement to grab the eye.
- Examples:
  - Big scripted moments.
  - Birds
  - Spark FX
  - Enemies
  - Something flapping in the breeze
- Directionality guides the eye to where you want players to go or what you want them to see.

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Also, make good use of the direction of the movement.

The player's eye will follow the movement, and it can draw an invisible line right to the goal.



In the example I'm about to show, the birds draw your attention to the left where there's an open trailer door.

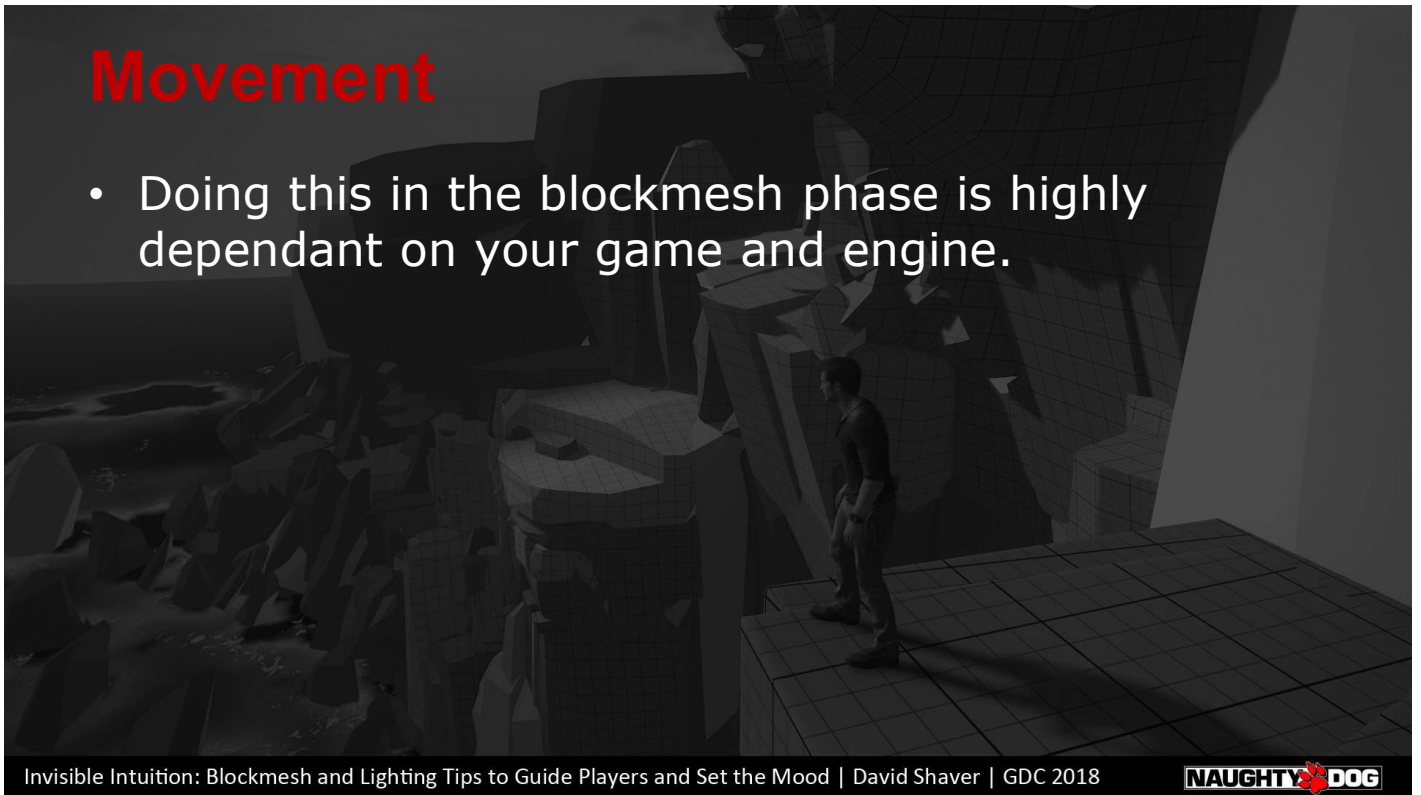
The door is also banging in the wind.

Both of these let you know "Hey, check out what's inside."

VIDEO: Birds flying and banging door.

# Movement

- Doing this in the blockmesh phase is highly dependant on your game and engine.



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NAUGHTY DOG

Of course, adding movement in the blockmesh phase is highly dependent on your game and engine.

# Movement

- Doing this in the blockmesh phase is highly dependant on your game and engine.
- Try to do it anyway for your playtests!

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NAUGHTY DOG

If you can, try to include it for your playtests.

Maybe not the first ones, but definitely before you lock it down.



# Movement

- Doing this in the blockmesh phase is highly dependant on your game and engine.
- Try to do it anyway for your playtests!
- Cubes triggered to lerp in a direction or along a spline will suffice!

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You don't have to get fancy.

You can have basic cubes lerping through the sky as a placeholder for birds.

# Movement

- Doing this in the blockmesh phase is highly dependant on your game and engine.
- Try to do it anyway for your playtests!
- Cubes triggered to lerp in a direction or along a spline will suffice!
- Can be a late game bandage for guidance.

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Adding movement is also super useful as a bandage late in the development process when the level is basically done, but players are still getting lost.

Since the level itself is done, you can script in some movement to help.

Don't rely on it though. Try to solve the player guidance problems in the blockmesh phase!

## Blockmesh Guidance Principles

- Affordance
- Denying Affordance
- Visual Language – Shape
- Visual Language – Color
- Landmarks
- Openings Attract
- Gates & Valves
- Leading Lines
- Pinching
- Framing & Composition
- Breadcrumbs
- Textures
- Movement
- **Light & God Rays (aka light ray/sunbeam)**

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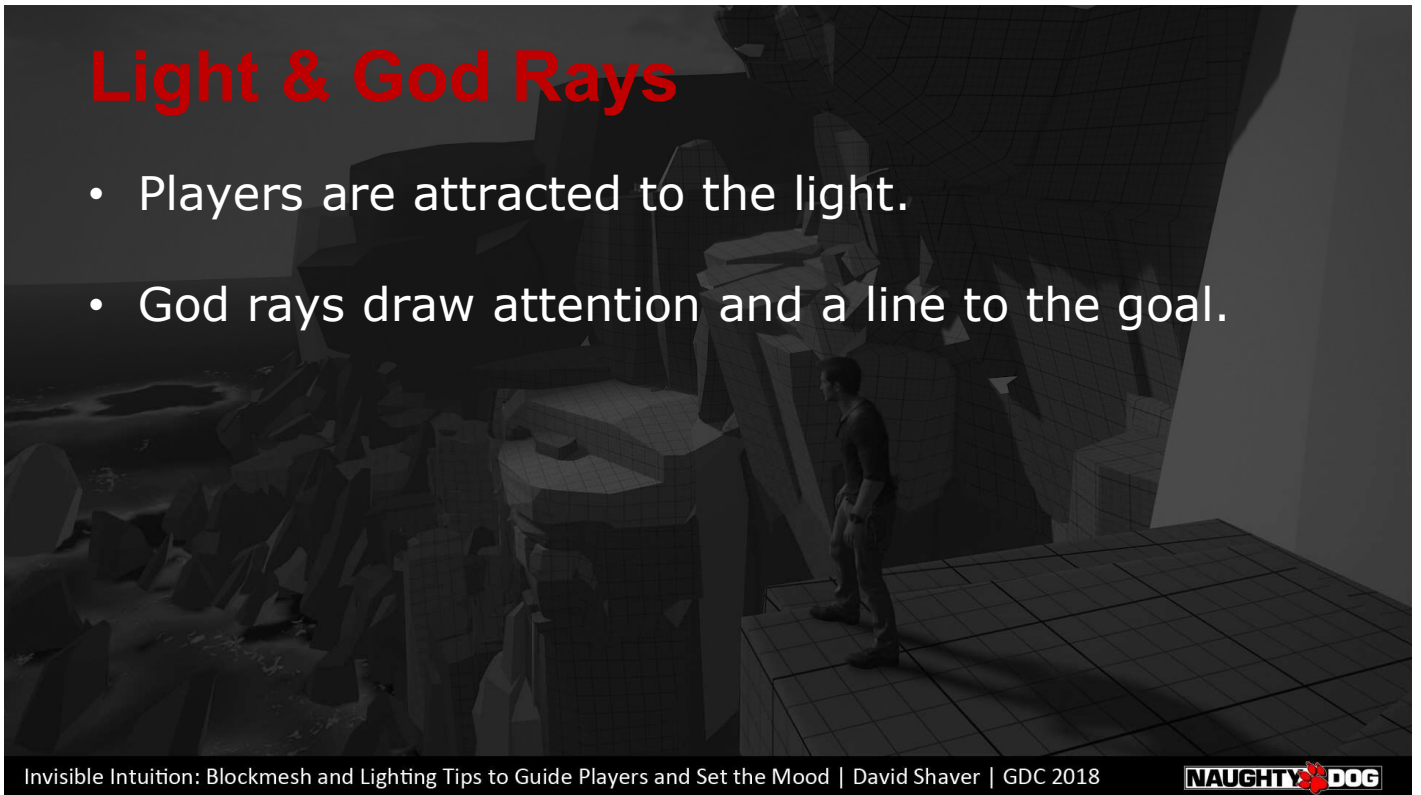


Last tip – Light and god rays, aka light rays or sunbeams.

(22:39)

## Light & God Rays

- Players are attracted to the light.
- God rays draw attention and a line to the goal.



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Light and god rays are useful to guide players to the goal.

People are naturally drawn toward light sources, and god rays point a line at the goal.

## Light & God Rays

- Players are attracted to the light.
- God rays draw attention and a line to the goal.
- Important in blockmesh phase!

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This is important even in the blockmesh phase!

The Naughty Dog lighting artists begin lighting levels early.





In this example...



The two lit areas are breadcrumbed goals.

First, the one with the bad guy in the middle, then the one at the top right.



Here we have some god rays coming out of a window.

They take up more screen space so you're more likely to notice them, and they draw leading lines to the window, which is the exit.

Since my talk is about player guidance, these light tips focus on that.

Robert's upcoming talk is about lighting a level so let's wrap this up.

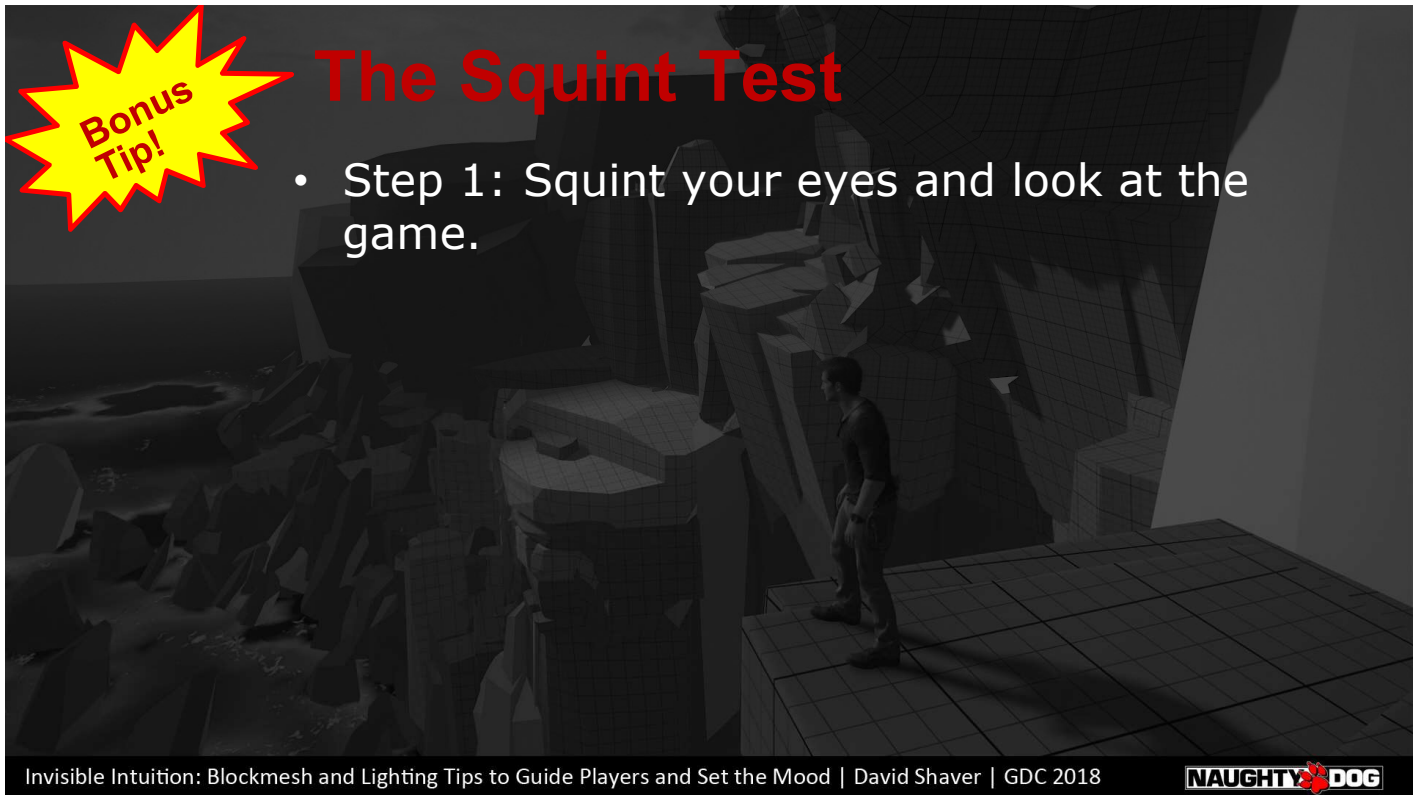
But first...

(23:21)



## The Squint Test

- Step 1: Squint your eyes and look at the game.



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...a bonus tip!

Ah, the squint test. So simple. So majestic. But what is it?

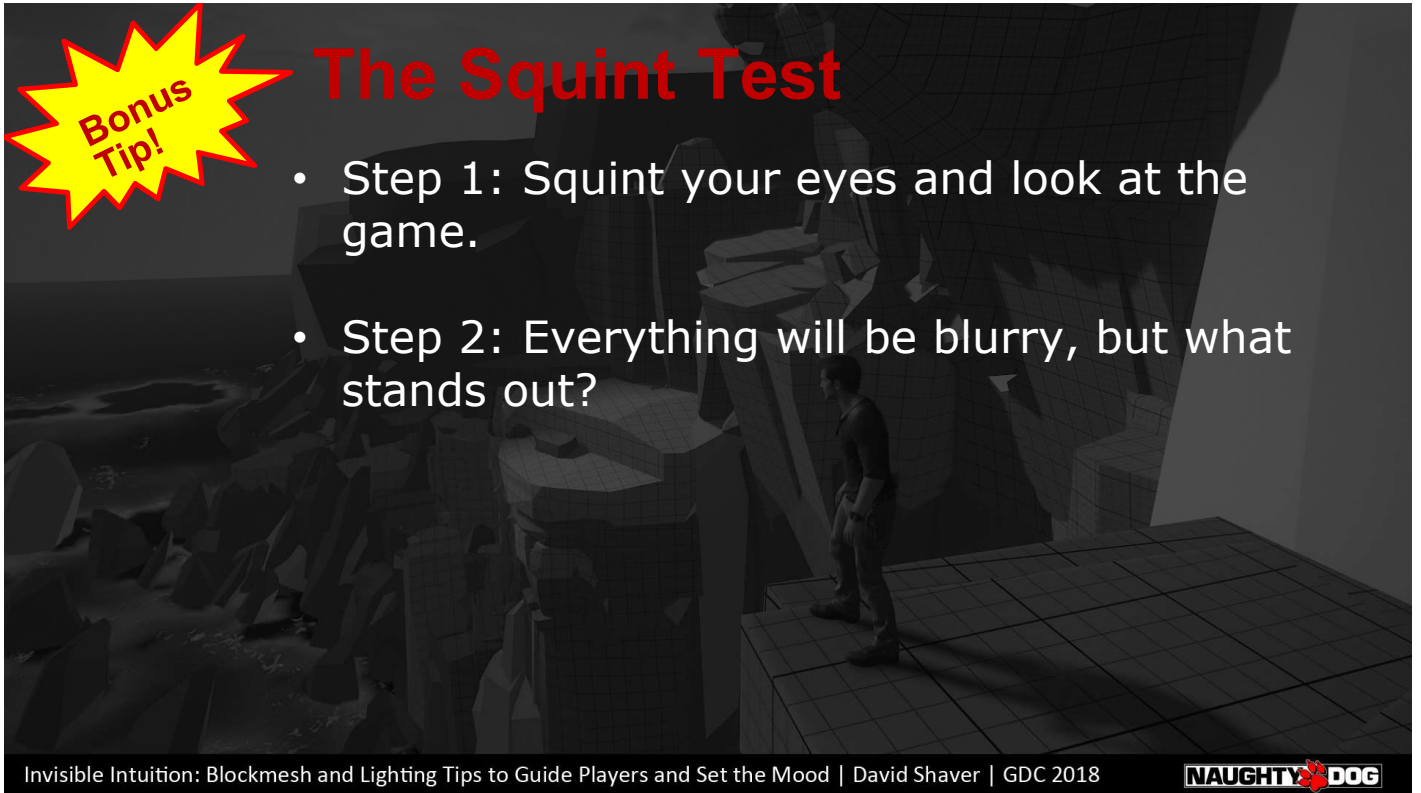
Well, it's basically an easy way to see what stands out in your level.

Step 1: Squint your eyes and look at your game.



## The Squint Test

- Step 1: Squint your eyes and look at the game.
- Step 2: Everything will be blurry, but what stands out?



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Step 2: Things will be blurry, but what stands out from the blur?

A lit door? A bright yellow truck?

The things that are standing out are the things players will likely notice first.





## The Squint Test

- Step 1: Squint your eyes and look at the game.
- Step 2: Everything will be blurry, but what stands out?
- Step 3: Adjust your layout and lighting to highlight what you want players to focus on.

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So, Step 3: Adjust your blockmesh and lighting to highlight what you WANT them to see.



Bonus  
Tip!

## The Squint Test

- Step 1: Squint your eyes and look at the game.
- Step 2: Everything will be blurry, but what stands out?
- Step 3: Adjust your layout and lighting to highlight what you want players to focus on.
- *"My professor used to say that squinting can replace 4 years of art school."* – Ian Milham

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NAUGHTY DOG

And here's a fun quote Matthias gave me.

*"My professor used to say that squinting can replace 4 years of art school."*

OK, let's see it in action before we wrap up.



Here is a shot from Titanfall 2.

Squint your eyes and take note of what stands out.

Go ahead, give it a shot!

.....

Got it? OK, good.





You probably noticed the yellow walls, the waterfall, and the orange cave opening.



The yellow walls are wall running paths that draw leading lines to the cave.

The waterfall uses movement and sound to grab your attention and also helps frame the cave.

Openings attract, and the cave is lit a different color from everything else in the scene.

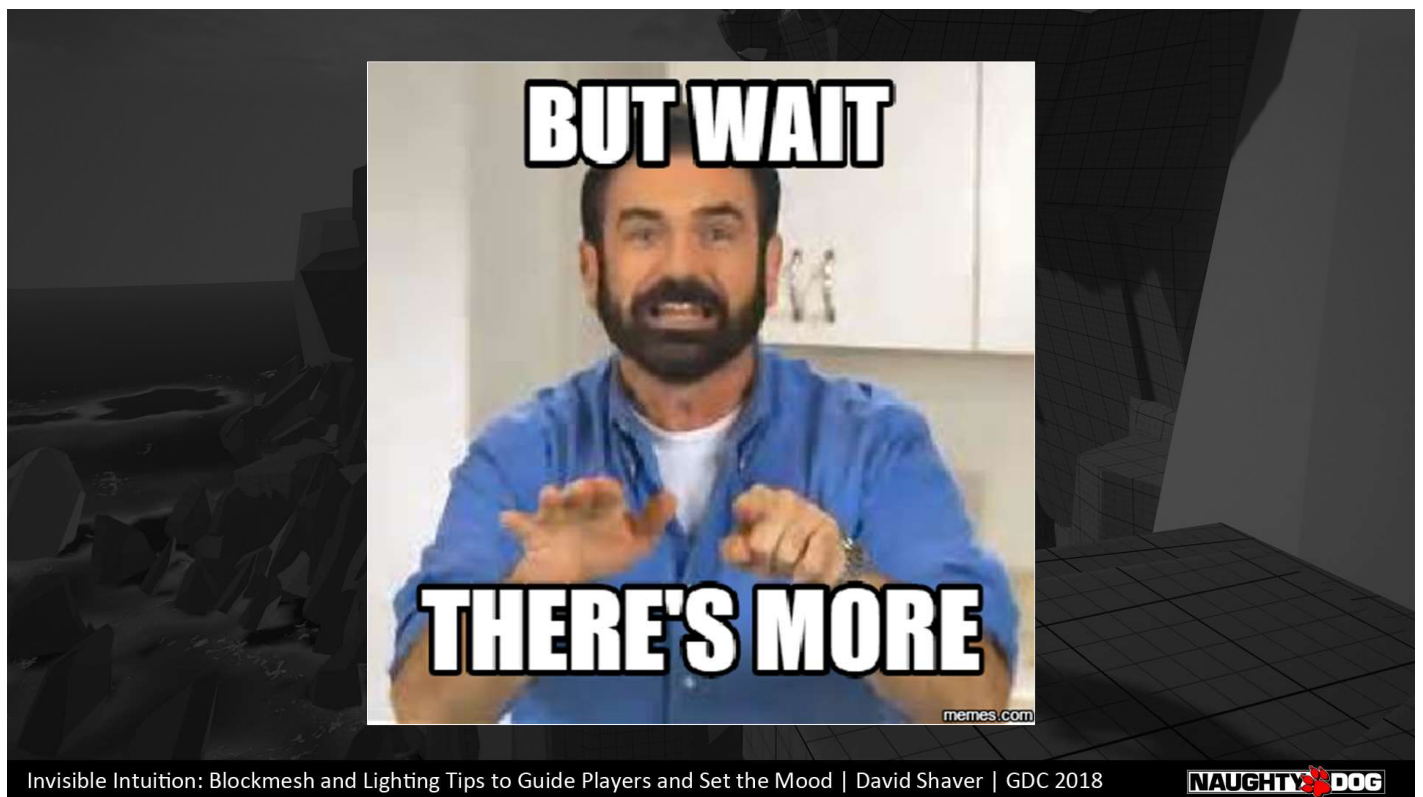




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OK, time to wrap it up.



BUT WAIT, THERE'S MORE!

(24:33)

# #blocktober



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I want to tell you about #blocktober!

Last October, Michael Barclay at Naughty Dog, tweeted this, but in his awesome Scottish accent that I won't attempt:

**"What's up level designers. Level blockouts are art. #blocktober should be a thing."**



**Jason McCord**  
@MonsterclipRSPN

Loving #Blocktober where LD's show early blockouts! Here's WarGames from #Titanfall. The orange/green area was a "Lagoon" style that was cut

3:04 PM - Oct 2, 2017

14 162 779



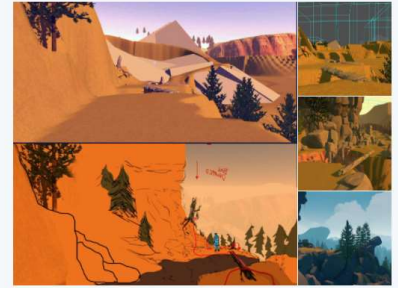
**Em Schatz**  
@thegreatbluebit

Uncharted 4 island arrival. #leveldesign #blocktober

11:55 AM - Oct 1, 2017

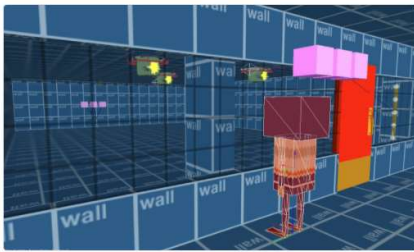
24 614 2,557

**Campo Santo** @camposanto · Oct 19  
And here's the hike to Brian's backpack, when it was first roughly blocked into Firewatch to test out (and its final look): #Blocktober



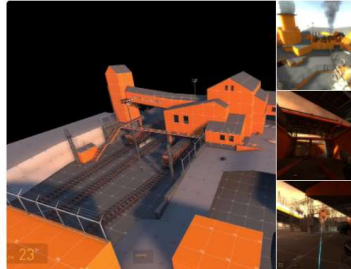
6 33 226

**Andy Durdin** @adurdin · Oct 23  
Here's what the first puzzle looks like right now. #Blocktober #QuadrilateralCowboy



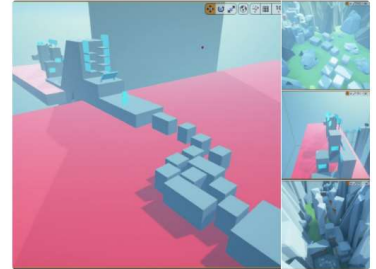
1 1 8

**Treybo360** @Treybo360 · Oct 13  
RT MFrooninck: I wasn't sure if I should but here's my #Blocktober stuff. #gamedev #leveldesign via tipatat



15 19

**Ahmin Hafidi** @ahminhafidi · Oct 19  
My contribution to #Blocktober  
First person platformer I'm making on my spare time with #UE4 #gamedev



6 24

The response was overwhelming.  
Everyone from hobbyists to AAA devs  
participated!

# #blocktober

- Follow [@blocktoberLD](#) on twitter.
- Start your blockmeshes NOW to show off in October! 😊



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I bring it up because it's important to demystify game development and encourage people to make things.

So many people didn't realize that the self-deprecating "crap" they were making looks exactly like their favorite games early in development, and they were inspired to keep going.

#blocktober is happening again this year and Mike created this Twitter account to collect everything people make.

Follow it and get started on your blockmeshes for October!



# References and Further Reading

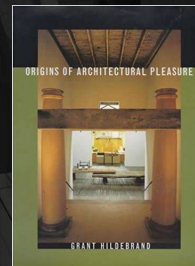
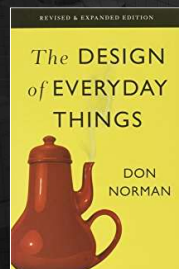
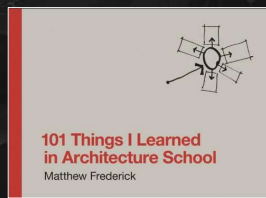
[Why Nathan Drake Doesn't Need a Compass](#) - Game Maker's Toolkit

[Defining Environment Language for Video Games](#) - Emilia Schatz, Lead Designer at Naughty Dog

[The Invisible Hand of Super Metroid](#) - Hugo Bille

[Attention, Not Immersion: Making Your Games Better with Psychology and Playtesting, the Uncharted Way](#) - Richard Lemarchand, USC Professor and former Lead Designer at Naughty Dog

[Singleplayer vs. Multiplayer Level Design: A Paradigm Shift](#) - Elisabeth Beinke-Schwartz, Certain Affinity



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If you liked this talk, check out these links and books.

If you make multiplayer maps, be sure to check out Elisabeth's talk from last year.

No need to write these down.

I'll have the slides on my website after GDC.

It has some bonus tips at the end too.

Hopefully, you found this talk useful, and I'll see your blockmeshes in #blocktober!

Thank you!



(25:34)



## Any Questions?



## Contact Info:



@davidshaver



[www.davidshaver.net](http://www.davidshaver.net)



Any questions?



## ~~Any Questions?~~



## Contact Info:



@davidshaver



[www.davidshaver.net](http://www.davidshaver.net)

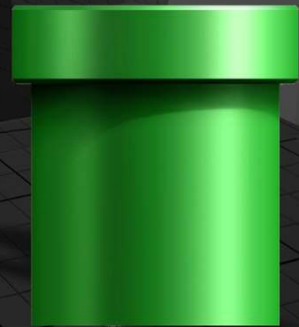


Actually, we're doing combined questions at the end of Robert's talk so please save them for then.

Next up, Robert Yang!

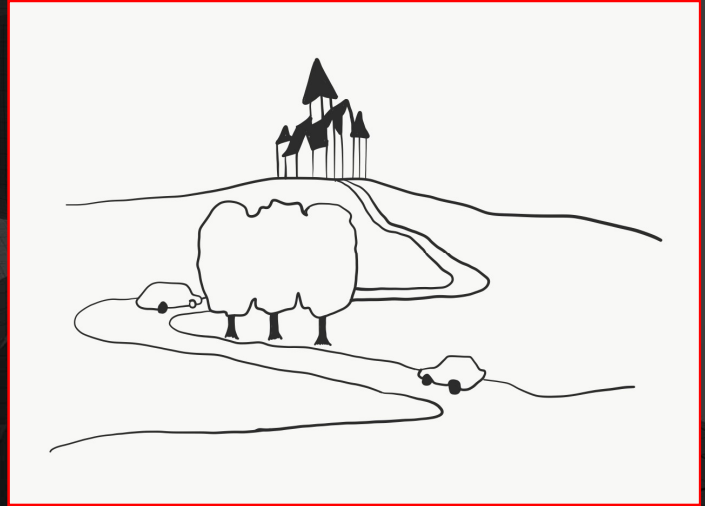
## Bonus Slides!

- Hello, brave reader!
- Sadly, these slides got cut from the main talk to save time, but you can still enjoy their work-in-progress state here!



# Denial & Reward with Landmarks

- Hide landmark for a while then show it from different angles as you approach.



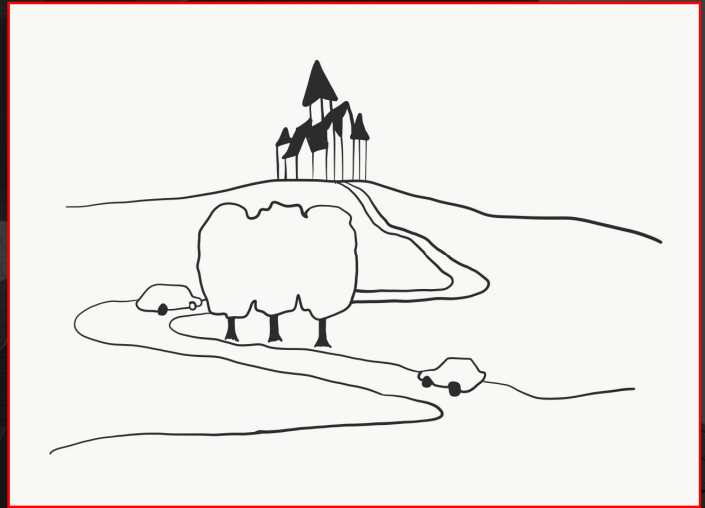
Don't just put a giant tower in the distance and make a level that goes right to it like I just did.

You can use an architectural term called "denial and reward" where you hide the landmark from view and then show it again from different angles as you progress in the level.



# Denial & Reward with Landmarks

- Hide landmark for a while then show it from different angles as you approach.
- “Denial and Reward” makes the journey more interesting.



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Do this a few times and it will make the journey feel much more interesting.

Of course there are always exceptions. If you're making a bombastic jeep driving sequence and you need to “get to the choppa” while epic stuff happens all around you, it might be awesome.

Ok next tip...

## Framing & Composition



During a dramatic escape sequence, you don't want the player getting lost or the excitement will die.

Here, the designer framed the rooftop and even put a leading line down the center to draw you into the opening.



As Mark Brown said in his Game Maker's Toolkit video, "it creates a portal that draws the player's eye to whatever is inside."

## Test Early & Often

- Important to playtest at every stage, but especially blockmesh stage!

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I've mentioned it before, but it's so important, it deserves it's own slide.

Test early and test often!

It doesn't matter how ugly the blockmesh is. Grab someone at work or a friend and watch them play through your level.

Does it guide them to where you want them to go? Do they get lost?

Quietly take note, make changes, grab someone else to play, and see if it fixes the problems.

# Test Early & Often

- Important to playtest at every stage, but especially blockmesh stage!
- A good blockmesh should be able to guide the player without the use of art or lighting.



# Test Early & Often

- Important to playtest at every stage, but especially blockmesh stage!
- A good blockmesh should be able to guide the player without the use of art or lighting.
- Only playtesting will tell you if your blockmesh is working.

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Only by playtesting, will you know if your blockmesh is working.

Of course, this assumes you have gameplay mechanics and metrics in place. In the early stages of development it's not so easy.

At Respawn, we did this process we called "action blocks" where we spent a week on a single, small prototype.

We generated over a 100 of them and picked the best to go in Titanfall 2.

There's a really awesome talk about these Action Blocks by my friend Chris Dionne on Wednesday this week at GDC if you want to know more.

# Bending the Rules

- Sometimes, you want to purposely obscure the way forward or surprise the player!
- If you have established languages and player trust, you can start to play with their expectations.
- Don't break **The Trust Contract**, but play with it!
- **Example:**
- **DON'T:** Have yellow hand-holds that are disabled or are out of reach.
- **DO:** Have hand holds that lead to a different place than the goal.

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INSERT WORDS HERE.

# Bending the Rules Examples

- Let's say you want players to slow down and explore an area, but you don't want to gate them. You can apply the techniques to various bits you want people to notice (audio logs, collectables, etc). As a "soft gate," you can obscure the exit in some way to encourage them to walk around and find it. Along the way, they will discover some of the various things you placed.
- Let's say you want the player to just pass through as quickly as possible because they are chasing/being chased. Apply all the things to make the exit obvious.

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INSERT WORDS HERE.