



# **This is your Brain on VR:**

A Look at the Psychology of doing VR Right

**Dr. Kimberly Voll**  
Radial Games  
@zanytomato

Hi! I'm Kim.

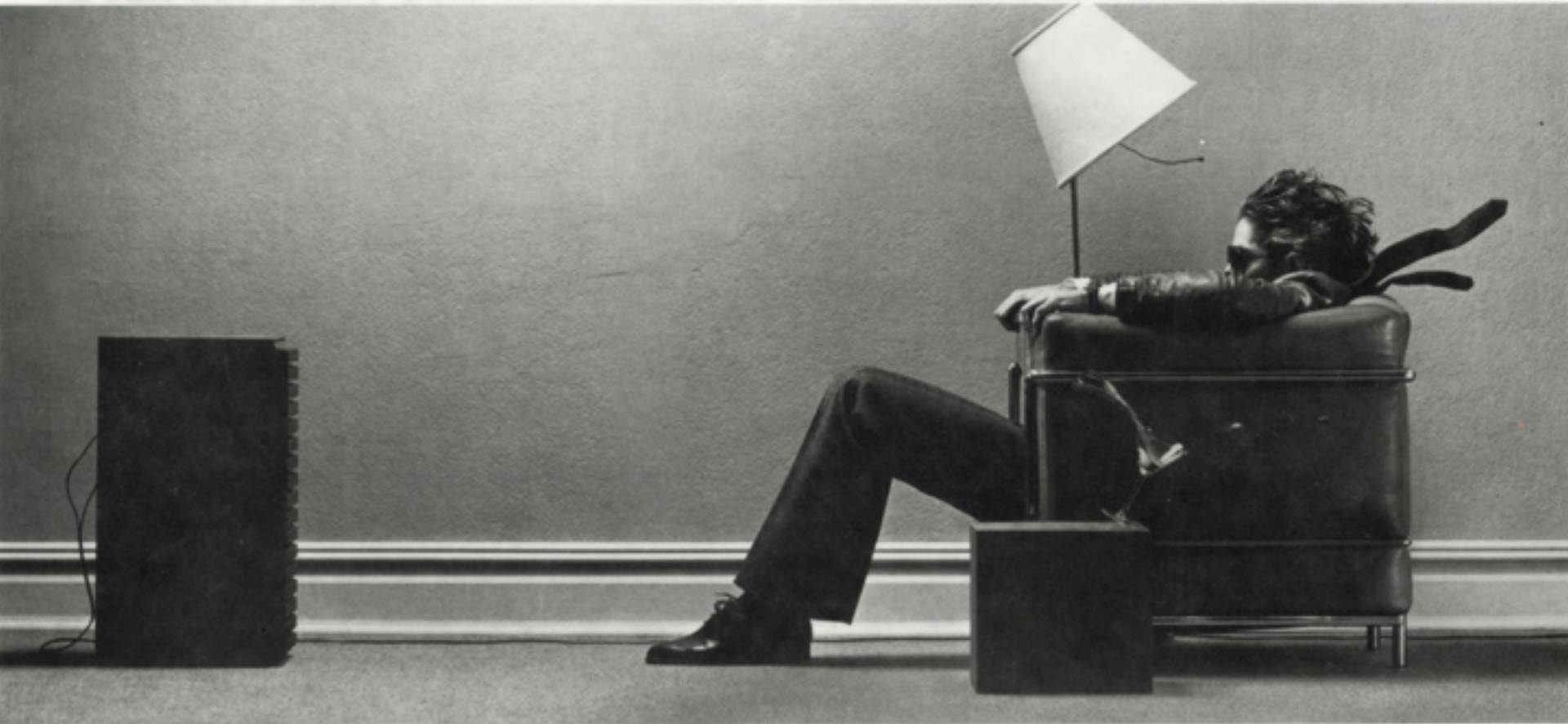
I'm a research scientist and a technical designer

I think about how people  
think in games



So **VR**, huh?

**AFTER 500 PLAYS OUR HIGH FIDELITY TAPE STILL DELIVERS HIGH FIDELITY.**



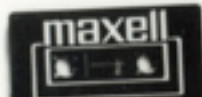
Maxell Corporation of America, 800 Oxford Drive, Mahwah, N.J. 07430

If your old favorites don't sound as good as they used to, the problem could be your recording tape.

Some tapes show their age more than others. And when a tape ages prematurely, the music on it does too.

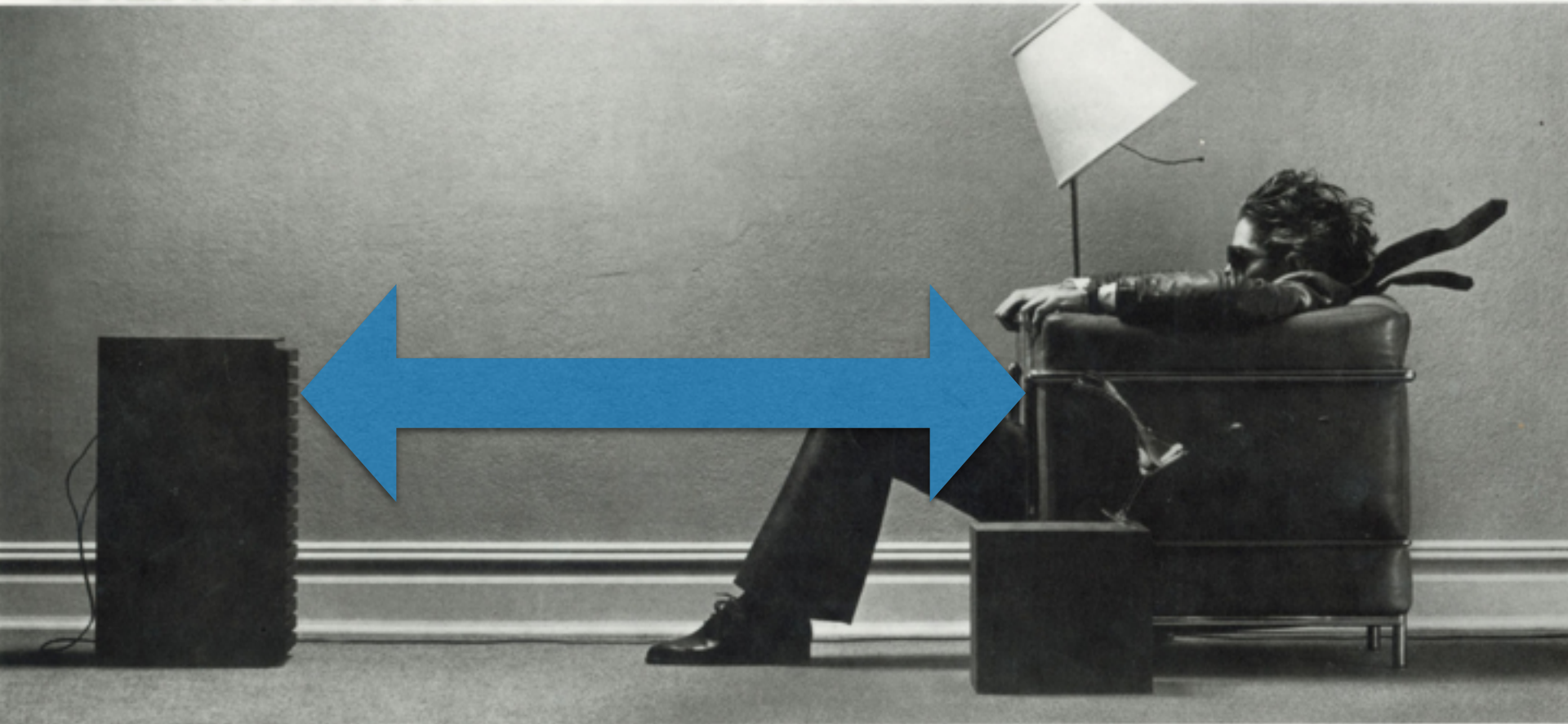
What can happen is, the oxide particles that are bound onto tape loosen and fall off, taking some of your music with them.

At Maxell, we've developed a binding process that helps to





**AFTER 500 PLAYS OUR HIGH FIDELITY TAPE STILL DELIVERS HIGH FIDELITY.**



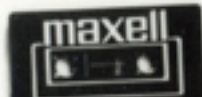
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# FANTASTIC CONTRAPTION

# The **FANTASTIC CONTRAPTION** team



Sarah



Colin



Andy



Lindsay

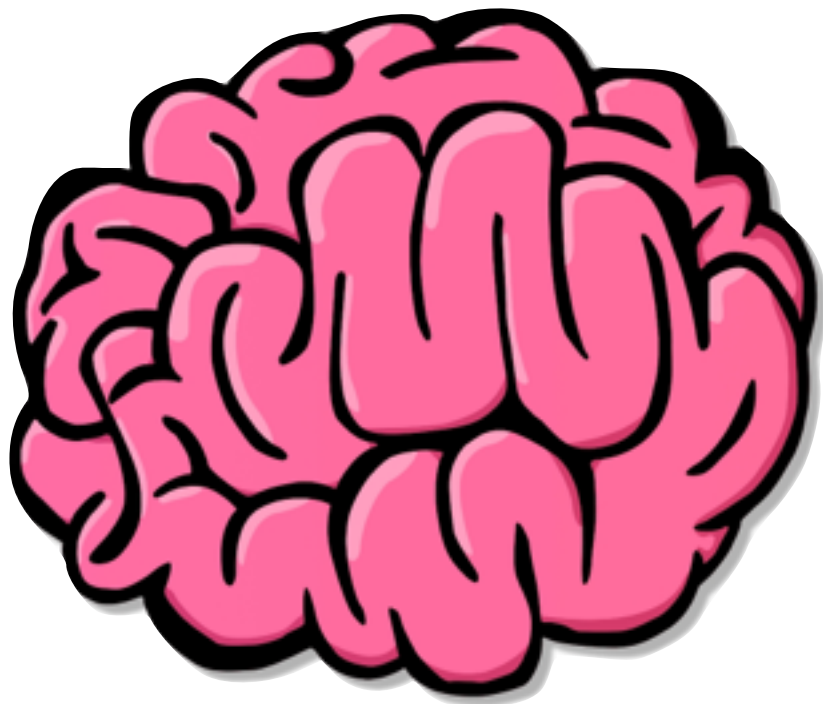


me



Gord





+ **VR**



Today...



Brains

Presence & engagement

Fidelity contract

Movement and nausea

The player

Trust and safe spaces



Today...



## Brains

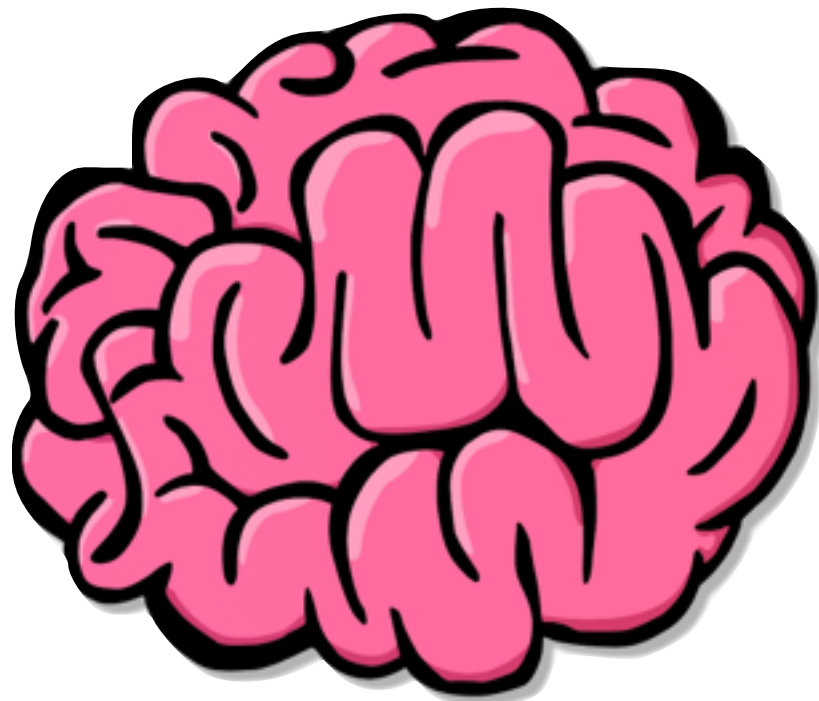
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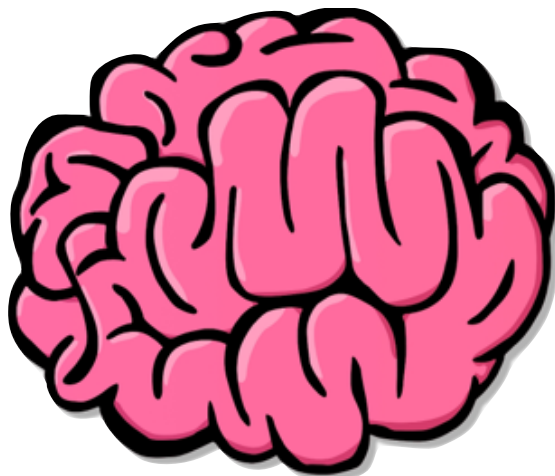
Trust and safe spaces



# Brains **101**

First...

your brain will work  
to generate a  
**consistent,**  
**sensible**  
world view



your brain will work  
to generate a  
**consistent,**  
**sensible**  
world view



which is  
**great news** for VR





it means the brain is working  
**for us**

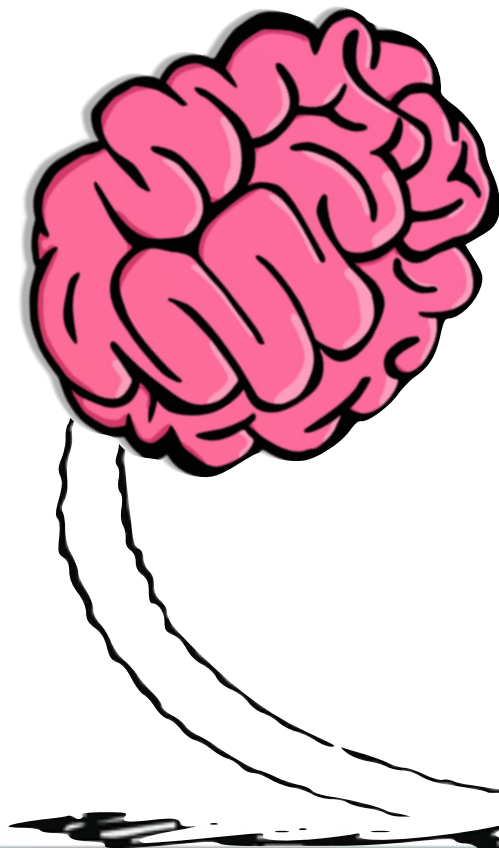
Second...

we  
**can't**  
**trust**  
our  
brains



Third...

the brain is  
**gullible**





Let's look at **attention**

Let's look at **attention**

**exogenous** (reflexive)

Let's look

**exogenous** (reflexive)



Let's look at **attention**



**endogenous** (voluntary)



**divided** | attention





inattention  
**blindness**

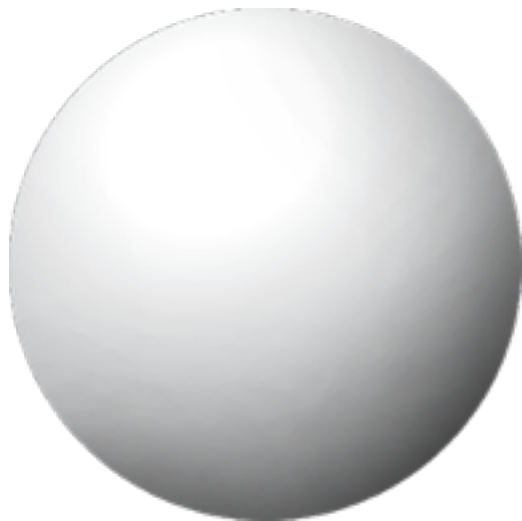


inattention  
**blindness**



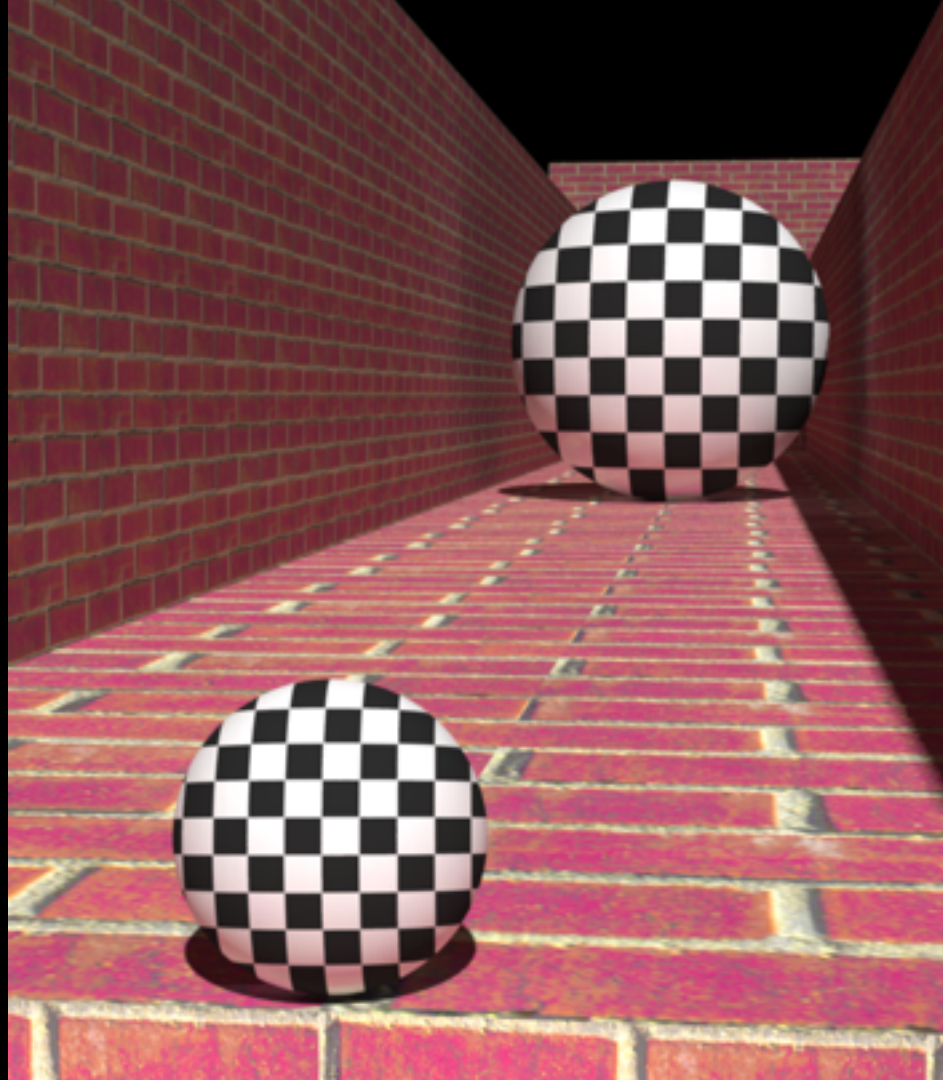
**change**  
blindness

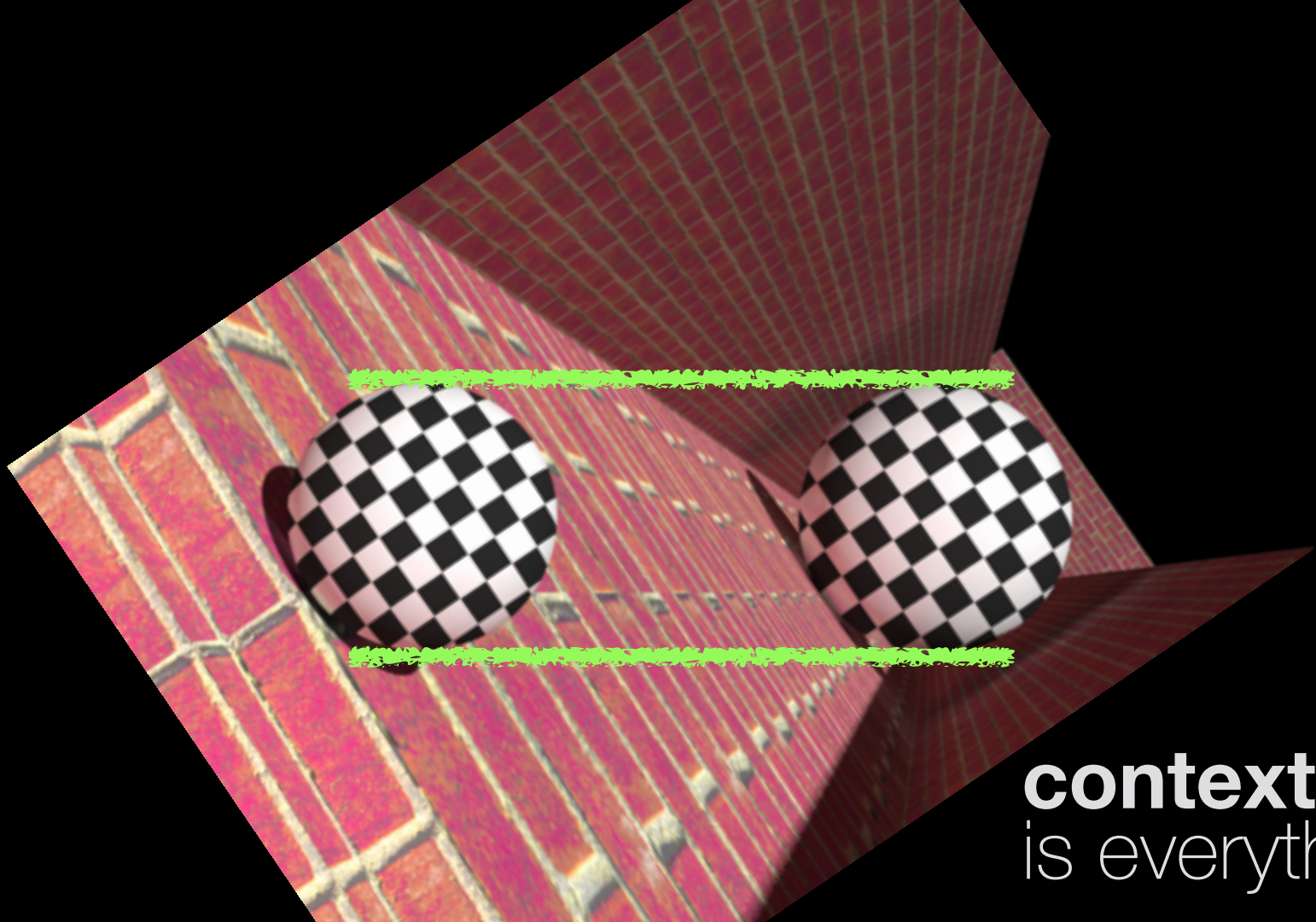




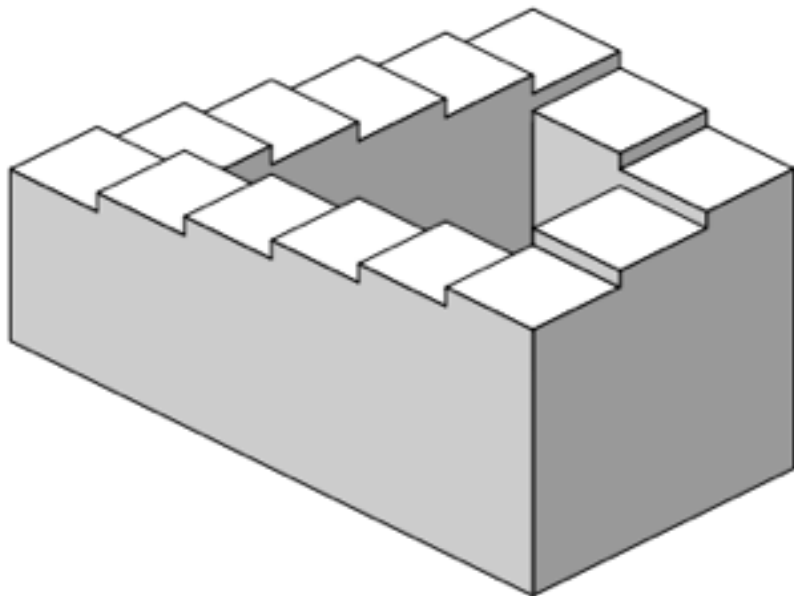
our **world**  
is **malleable**







**context**  
is everything



**Penrose**  
stairs

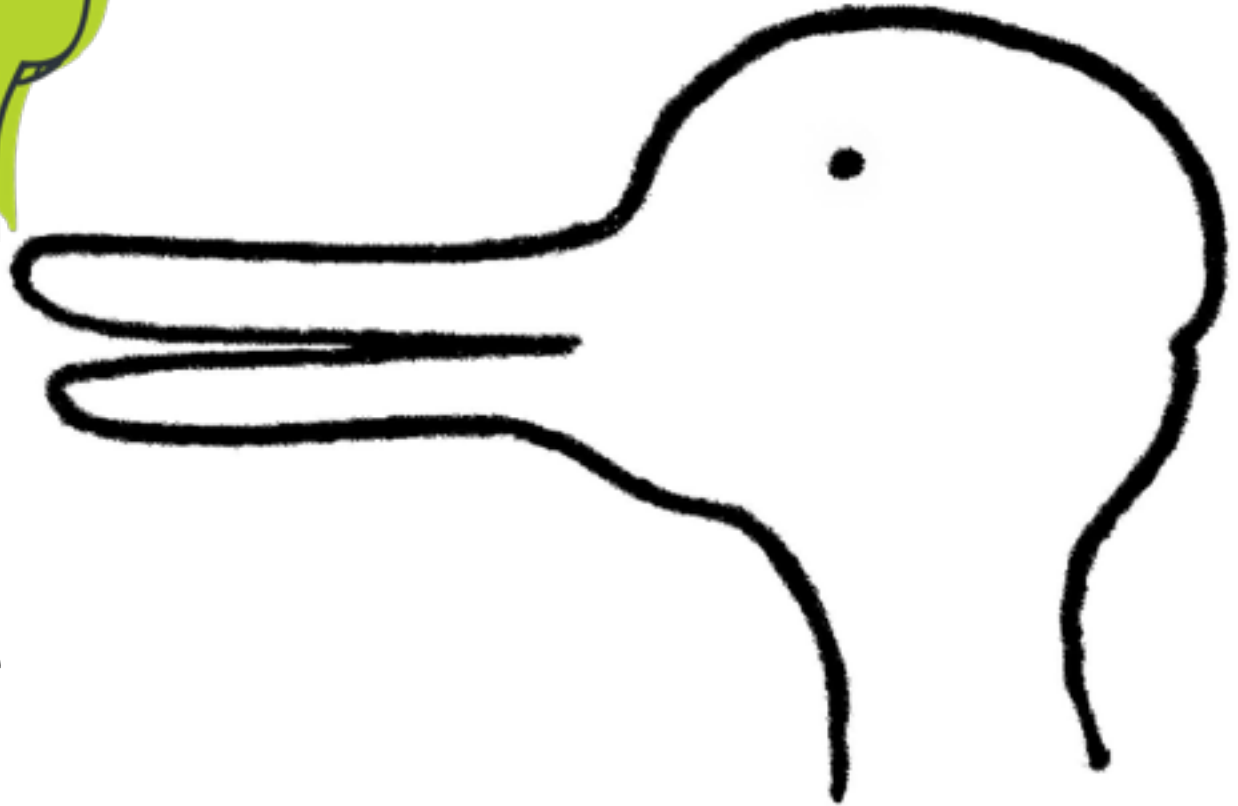


# Ames Room

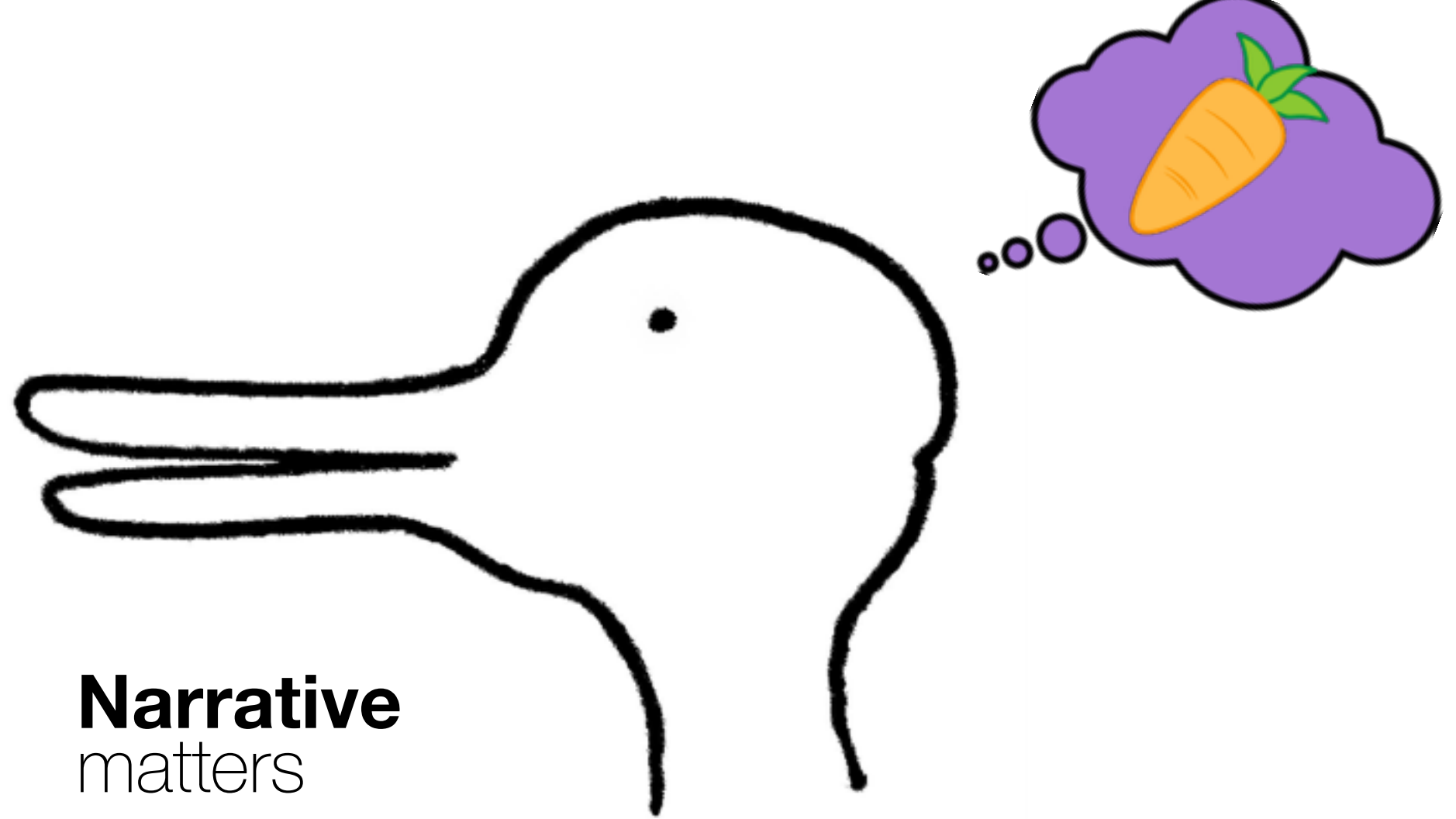


A workshop scene featuring a large white board leaning against a wooden frame. A ladder is visible on the right, and two paint cans are in the foreground. The background shows a workshop with various tools and materials.

# Ames Room



**Narrative**  
matters



**Narrative**  
matters

Today...



Brains

## **Presence & engagement**

Fidelity contract

Trust and safe spaces

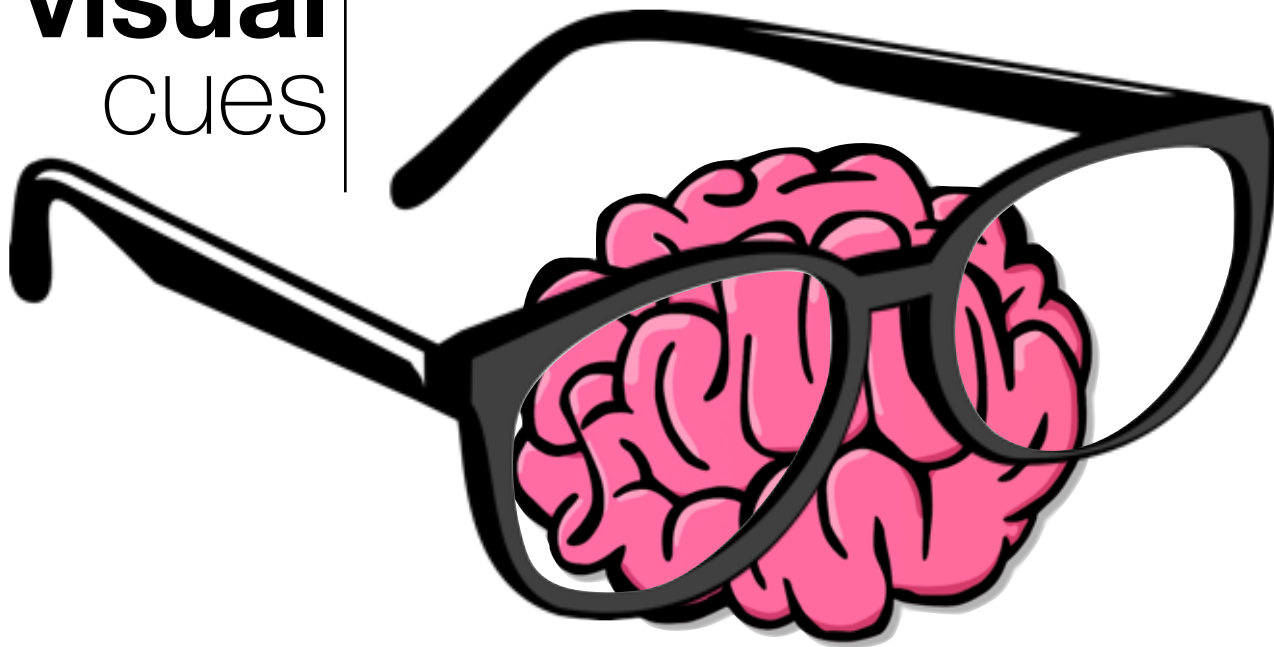
The player

Movement and nausea



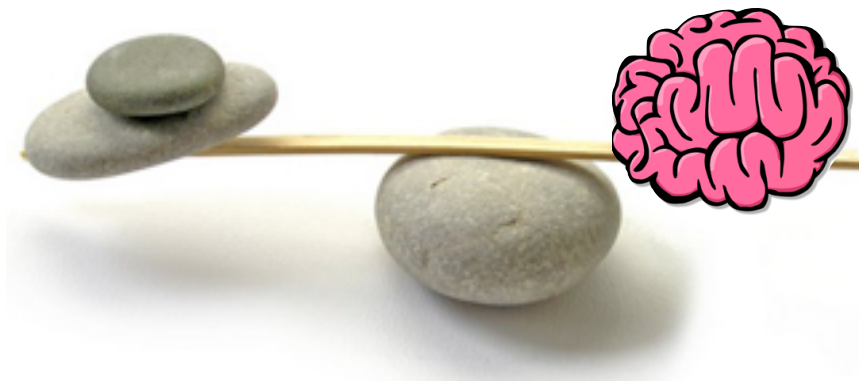
What does it mean  
**to be here?**

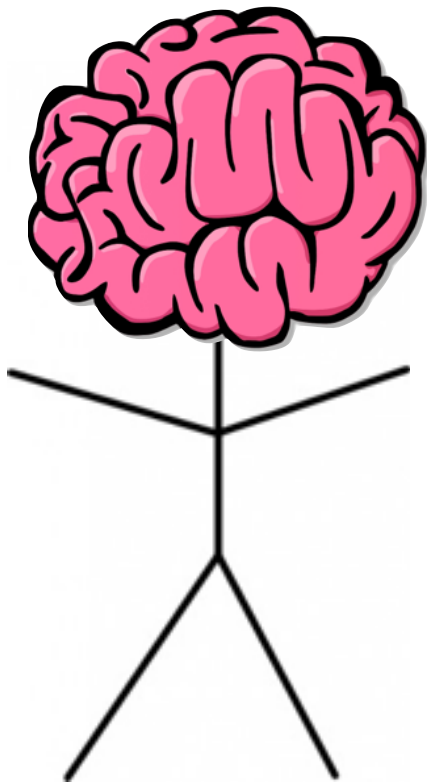
# visual cues





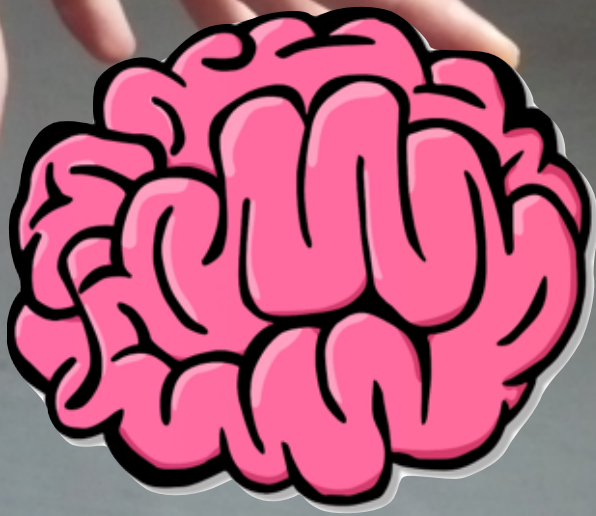
# vestibular system





**proprioception**  
body awareness

# Extension



# Job Simulator





perceptual **soup**





perceptual **soup**



# Presence



# Presence

AKA the  
biggest  
buzzword since  
the cloud



Presence is  
**hard to get**  
and **maintain**





But we don't need  
**perfect presence**  
to do cool stuff

whoops



# Engagement

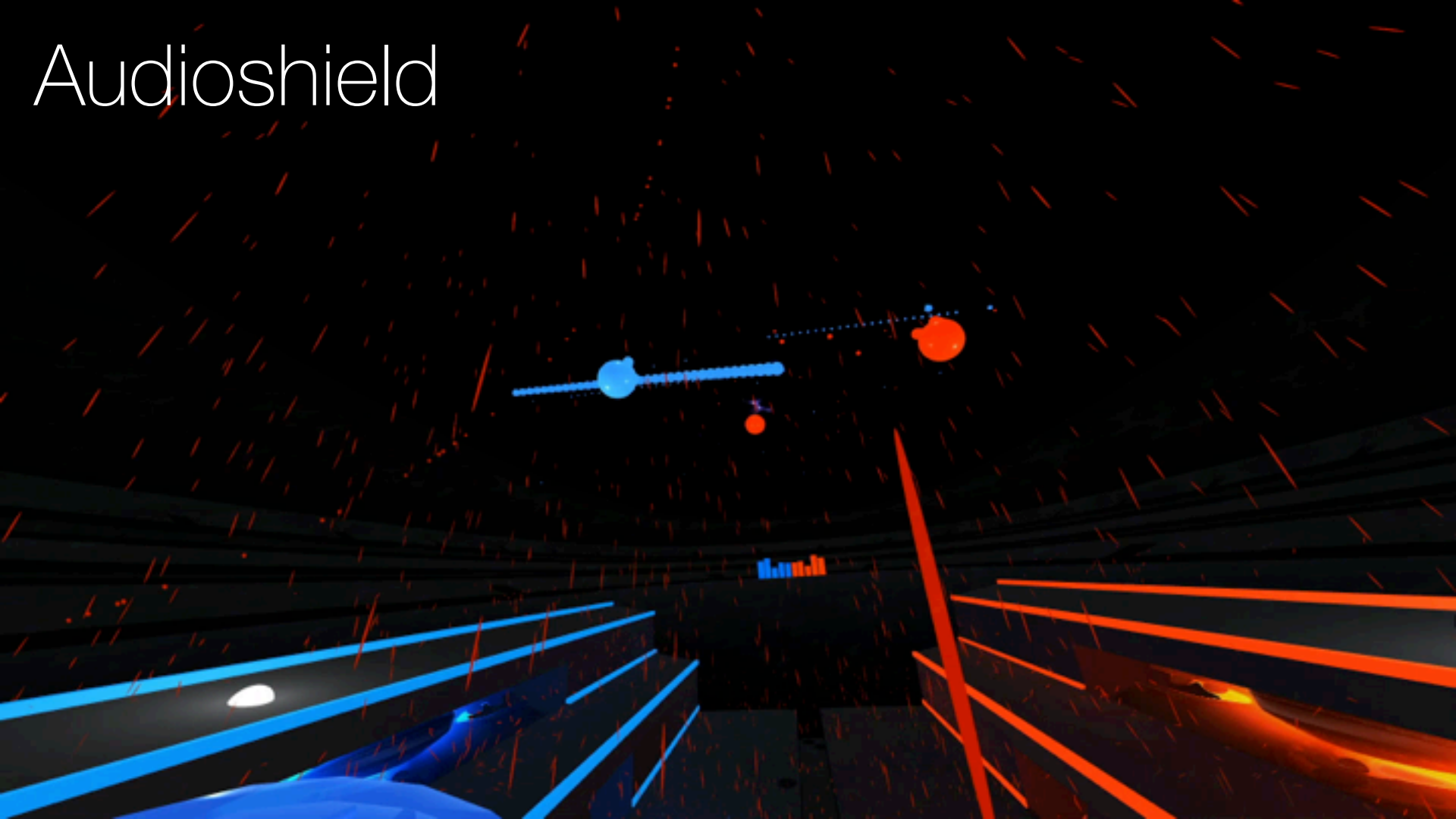
## in VR

# Flow

| a **highly  
focused** mental  
state



# Audioshield



**immersion**

flow

arousal

narrative

# Space Pirate Trainer









# Arizona Sunshine

We don't have to  
**feel like** we're somewhere  
to be engaged.



When we're  
**engaged**,  
the  
recipe changes



Today...



Brains

Presence & engagement

**Fidelity contract**

Movement and nausea

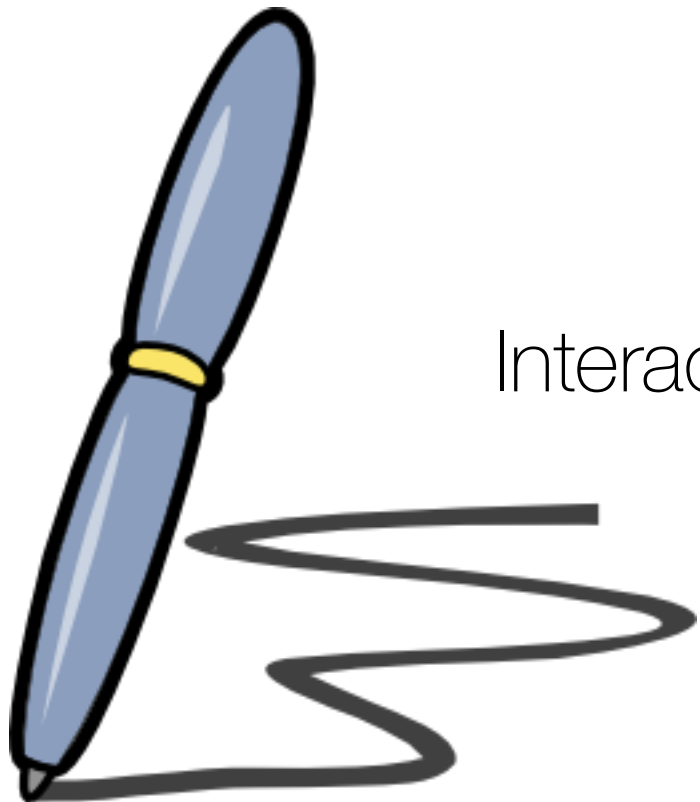
The player

Trust and safe spaces



# **fidelity contract**

expectations of a player  
combined with affordances of  
the world



# What's in the contract?

World and physics rules

Interactive expectations / affordances

Unconscious expectations

Desires

Narrative expectations

# Job Simulator





It's when you  
**break this contract**  
that an experience  
**starts to fail**



Key is **observing**  
what  
players **do**



“It’s  
**bigger**  
on the **inside**”

# Budget Cuts



# Budget Cuts



Today...



Brains

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**Movement and nausea**

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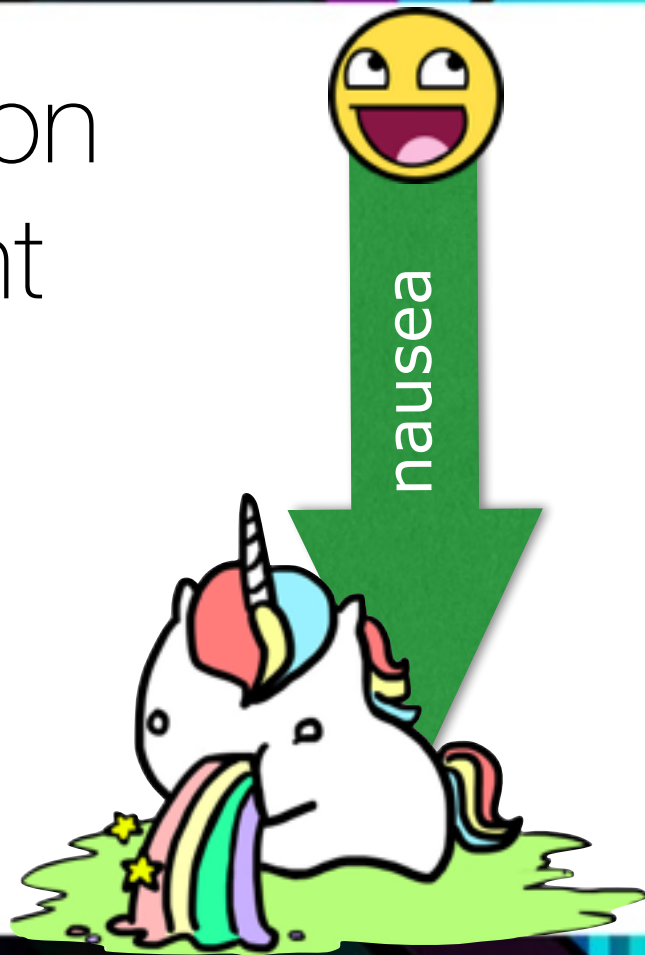
Nausea

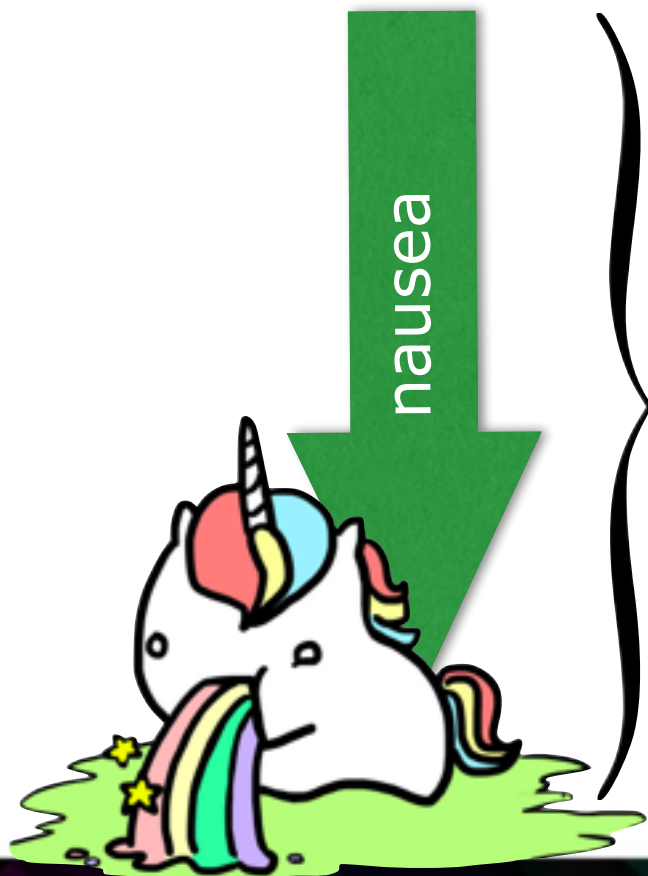
"Spin" by Melissa O'Donohue licensed under CC BY-ND 2.0

player locomotion  
linear movement  
acceleration  
rotation  
both



player locomotion  
linear movement  
acceleration  
rotation  
both





results  
**may vary**

“I don’t like  
**VR**  
*it makes me*  
**sick”**

“It’s  
**OK**  
because it  
doesn’t make  
**me**  
sick”



Today...



Brains

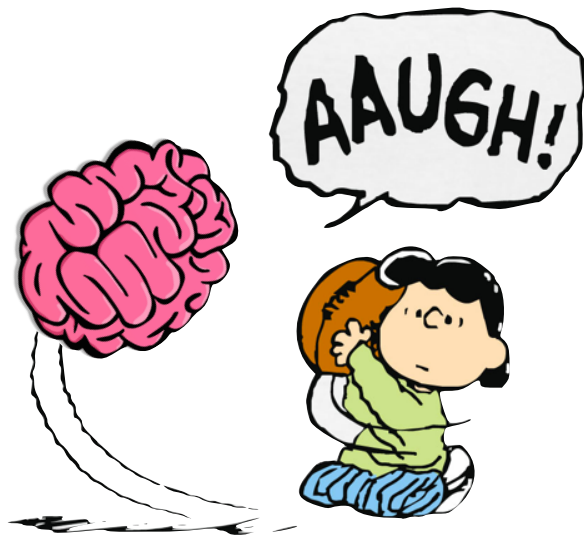
Presence & engagement

Fidelity contract

Movement and nausea

**The player**

Trust and safe spaces



remember the brain is  
**gullible**

we just have to figure  
out the **relevant**  
**perceptual**  
**moments**

Think about how your world  
**absorbs** the player/user

...and what might  
**distract** them

# Fantastic Contraption



Or **doesn't** get their attention

(remember inattention and change blindness?)

# Fantastic Contraption

Great!





Nudge their attention using  
**diegetic** cues

# Arizona Sunshine



Or with careful **absences**

If it's **too interesting**, the player has  
no reason to look away or try  
something else

# Tilt Brush



# Haptics



can help your brain  
**write a narrative**



# Fantastic Contraption





But  
**be careful...**

# Fantastic Contraption



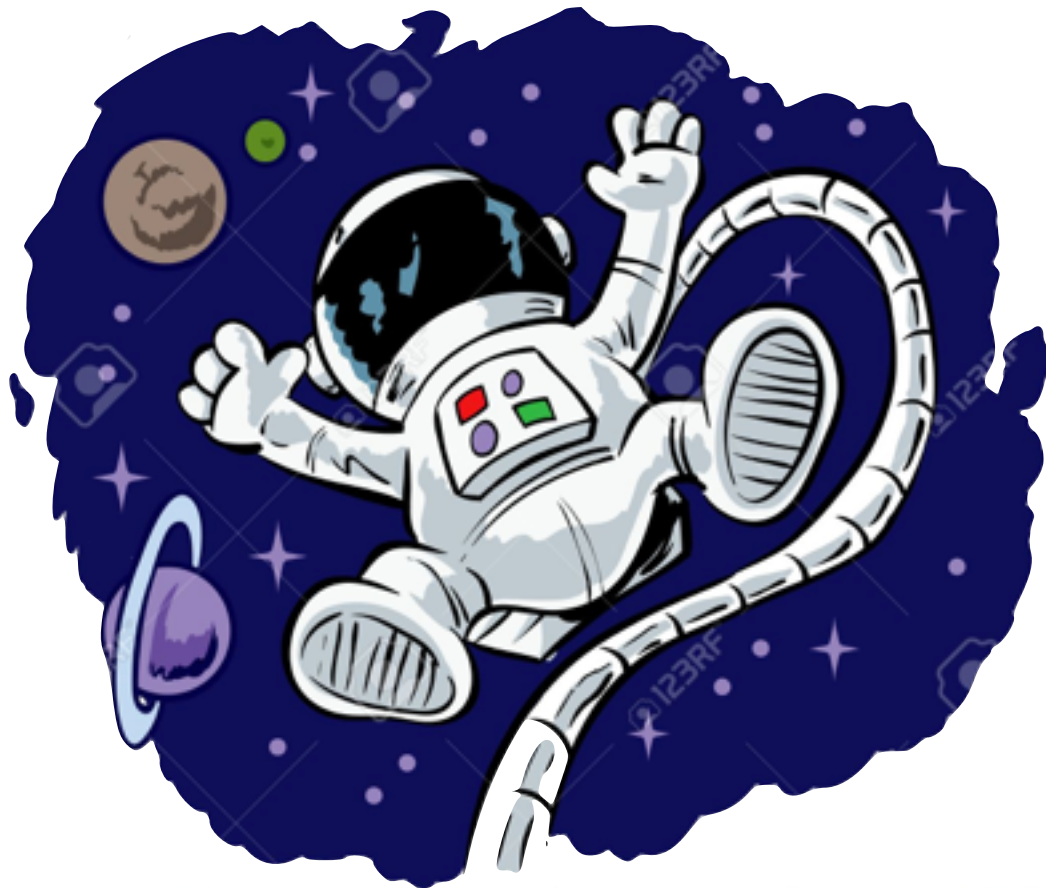
# Job Simulator



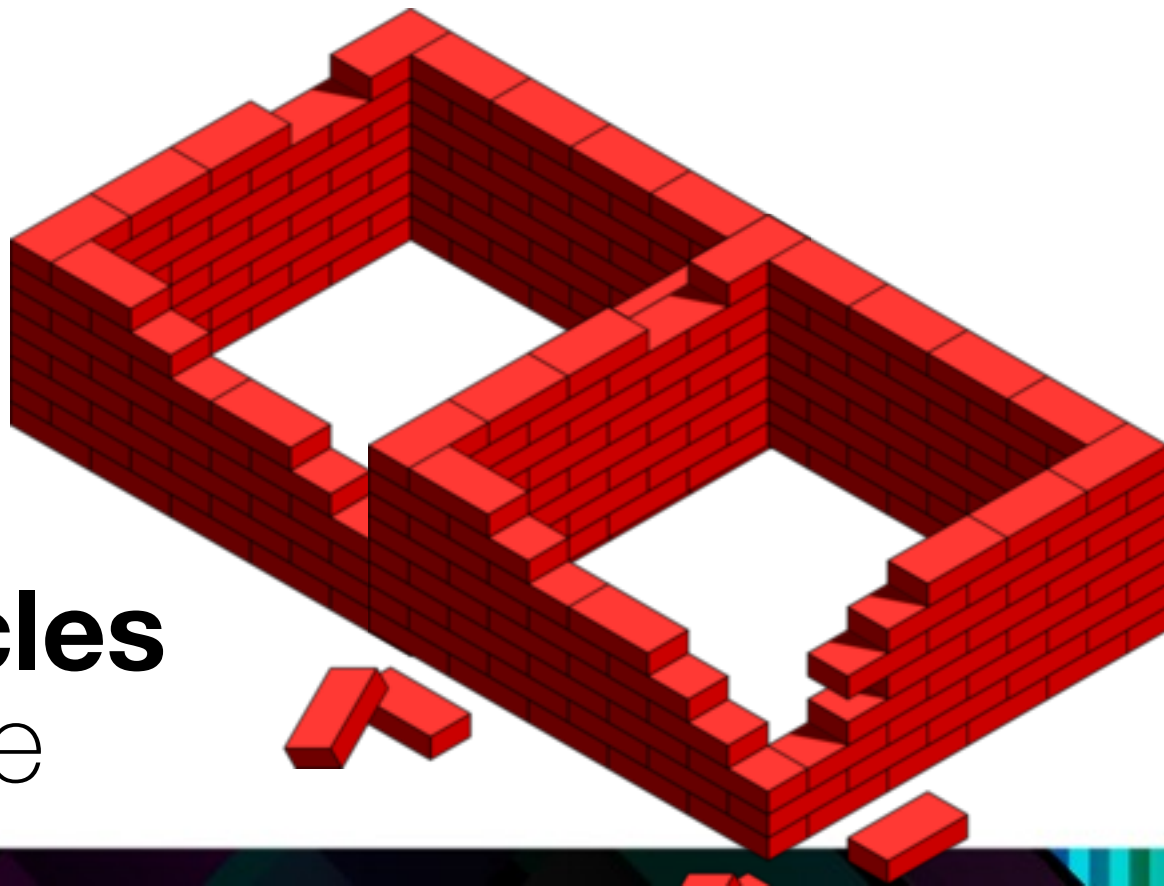
Not to mention

**Playtesting** (well) in VR is hard

# Reality **tether**



# Real obstacles in space





**“whitecoat”**  
effect



Searched “free  
VR clipart”



what is left  
when the  
**wow factor**  
wears off?

Today...



Brains

Presence & engagement

Fidelity contract

Movement and nausea

The player

**Trust and safe spaces**

# Trust and safe spaces



"Sunshine Baby" by Eduardo Merille licensed under CC BY-SA 2.0

“It’s not real!”





It's not real!  
but **we're trying**  
to **make it real**





And the potential for  
**psychological trauma**  
is  
**real**



Our players  
**place their trust in us**  
when they  
place themselves  
**in the rig**

We **share**  
**responsibility** in  
**creating awareness**  
around our experiences

# Summary



Brains

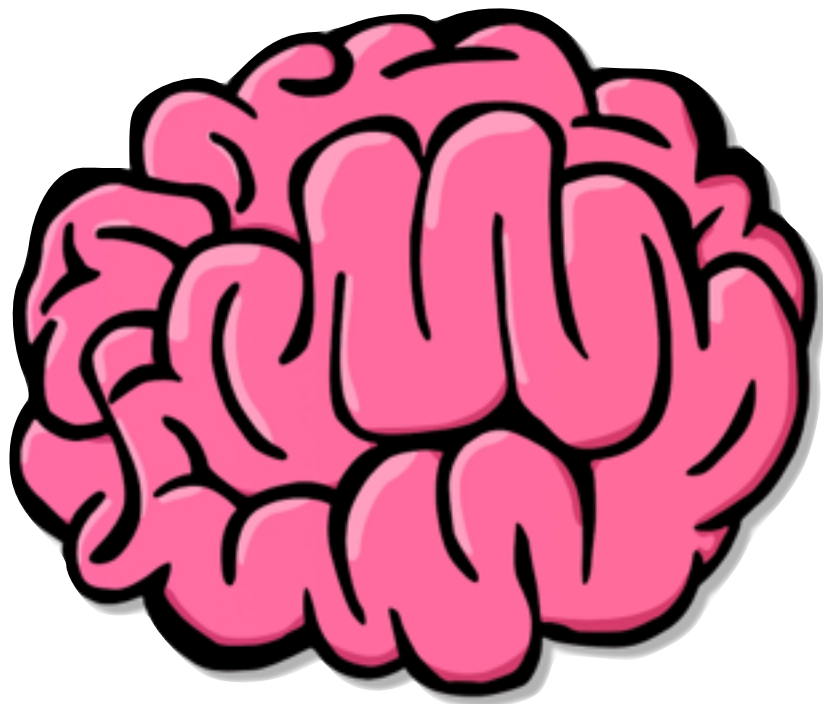
Presence & engagement

Fidelity contract & agency

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+ **VR**



**Thank you!**  
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