

What is reality ?

How does biological wetware of the brain give rise to our experience?
Outside our brain is just energy and matter, but our brain turns it into rich sensory experience of being in the world. How?

p. 40-53

dark theatre - making reality
(from signals outside my head)

Experience of reality

all sensory experiences take place in neuronal storms inside brain
senses detect information outside brain and convert it into electrochemical signals
=> all we see etc is a rendering in the dark theater of our skull
brain guesses what's out there and it all seems effortless

Synchronizing the senses

Seeing, hearing, touch are processed by brain at different speeds
runners start with flash instead of gun sound - but they react slower

since senses are processed at different speeds, why does it all seem in sync?
brain serves delayed version of reality and decides what story to serve us

one of the aspects

one of the senses

Sensory transduction

About how brain translates information about outside world into electrochemical signals
Binding problem

p. 42-50

seeing is not only about vision

main fact

a third of brain is dedicated to vision

Seeing requires more than the eyes

experiment with 2 kittens in drum - the kitten who couldn't walk didn't develop functioning vision - to do that, signals from eyes have to be cross-referenced with inputs from another senses and actions towards the world, it's the whole body experience

Vision feels effortless but it's not

experiment with prism goggles who flip left-right vision
it's really hard to do ordinary things like break an egg and bake a cake, also David feels nervous and like vomiting
- it takes 1 week to move around space normally
- it takes 2 weeks to re-learn to read & write and function like people without goggles

=> brain doesn't care about details, processing happens under the hood

illustration

another illustration

I was blind but now I see

Mike May got blind and doctors restored his vision many years later - he sees flood of visual information but brain couldn't make sense of it - his visual brain was taken over by other senses and unlearned to see

fixing eyes didn't help

to learn to see, youngsters validate input from one sense by another

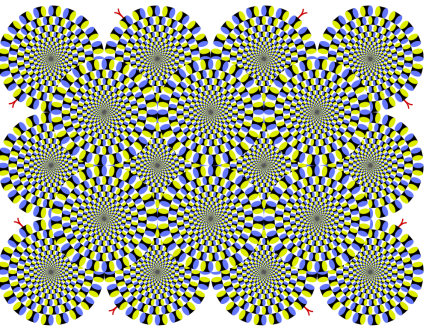
brain needs combination of inputs to understand world well

The brain is like the city

Whole versus parts problem, Analogy: where in the city is economy located? There's no good answer to this in terms of parts

The illusion of reality

- snakes or chessboard examples show that reality has less to do with what is out there but with what goes on inside our heads



example

each has it different

making reality

sensing reality

constructing the model

perception of time

p.53-63

internal model of reality

When the senses are cut off, does the show stop?

Alcatraz prison cell without any light or sound
Robert Luke's mind made up the world - he saw flying a kite, another guy saw TV show
=> it was not imagined, it was seen

same happens when we dream or go to isolation tanks

internal model idea - brain generates its reality even before it gets sensory inputs, what we see is a combo of brain expectations (based on previous experiences) more and less what senses send

=> when sensory input is removed, the show doesn't stop

prediction vs. data

AKA wireframe with details

Seeing our expectations

mind holds a model of what's going on and constantly updates, refines, corrects the idea it holds

- example with mask shows how powerful the model is - it fuels the senses and we see face that sticks to us instead of away

Our internal model is low resolution but upgradeable

it all works to get basic idea about the world so we can live in it, but brain leaves out lots of details

Visitor painting - people don't know how many paintings are on wall, how many children are in room, is carpet or wood on floor

Details are added on need-to-know basis, whole is usually an approximation
Why? Because brain needs lots of energy to work with so many operations - this way brain saves calories, works on minimum

p. 63-68

Trapped on a thin slice of reality

- we see only one ten-trillionth of electromagnetic waves
- thick's only sense temperature and body odor
- black ghost kiefish only senses changes in electrical field

each creature perceives only what it evolved to perceive but we think we see reality objectively

Your reality, my reality

3% of people have **synesthesia** - J is purple, T is red, Iain looks like vomit

syn. shows that someones experience of reality is measurably different from someone else's
=> it's caused by microscopic changes in brain but leads to different inner reality

Believing what our brains tell us

1% of people have **schizophrenia** - houses say "You're bad. Stop. Go." or person believes that her brain is going to escape from head and drown people.
- caused by imbalance of chemicals in brain, it nevertheless makes person completely believe what's going on

p. 68-73

Time warp

time can feel very slow or very fast - wingsuit flyer Jeb hits the rock and his subjective time slowed down a lot

=> when amygdala kicks in, perception is more detailed (we want to remember it for next time) - the perception of time is given by moment when memories are read-out from storage (time distortion happens in retrospect)

it's one more trick that memory plays on us

Measuring the speed of sight: The Perceptual chronometer

More on experiment - Could people have "timewarp" perception when in danger?

The storyteller

Chapter sum-up (p. 73)

Brain scripts reality and we believe it; different brains have slightly different experiences

=> it's a TV show only you can see and cannot turn it off