when people act in a certain way there's no need for extensive socialization & normalization to create the behaviours.

the louder the society screams that people are this way, the more you're looking at a shaped learned behaviour.
Schools do this. Ads. Tv, workplace.

Desert dwellers vs rainforest people.
More violence in the desert folks,
Pastaralists tend to be more monotheism
historical association which continues to this day.

All theory aside, Southerners are more polite than Northerners. Whether it's an outgrowth of colonization, socialization, cultural beliefs or parenting, the South trumps the North when it comes to manners and respecting others.

Altruistic punishing. Spend your resources to punish someone else for cheating. Participants across cultures were similar in willingness to punish participants for cheating. But they differed in their willingness to punish others for being too generous. Happily, the US and UK students were the least likely to do this (and, of course, the Scandanavians).

In between, Slav countries, Middle East plus Turkey. Worst rates went to Greece and the Arabic Emirates. [As a side note, a theory presented in The Wisdom of Crowds is that trust is necessary to make a market economy work. Greece is having a lot of success with their market economy these days.]

they didn't want to up the ante. or so they said. The levels of trust in society were lower in the societies that were more likely to punish antisocially.

The profile of a terrorist. Isolated nothing to lose. Young. Male. Right?

Wrong if we're describing Muslim fundamentalist terrorists. Instead the profile turns out to be a socially connected, educated and middle classy type of person.

Even worse and more confusingly, they tend to not have actually experienced the oppression. And shockingly, not very high levels of religiosity. So wtf?

Is this true?

Stanford prison experiment?

One argument comes from Professor Zimbardo (Stanford Prison Study guy) - under the right social context, virtually anybody can be convinced to act in bizarre ways. (The Lucifer Effect details the Stanford Prison Study and goes into elaborate depth on these topics. Over elaborate actually. Basically it's 300+ pages that state the same thing as the sentence above, plus a chapter or two on how great his girlfriend is/was. Not recommended.)

Another selection element comes from the nature of international terrorism - you've got to work within the network and be able to travel, plan and execute effectively. This calls on different skills than a socially isolated loner with nothing to lose may have. So you might get a natural selection that doesn't tell us about the actual characteristics so much as it indicates a framework.

To wit, relative to the population as a whole, there aren't that many terrorists. So is it possible for us to find a screwed up dude who comes from a middle class family, has a family of his own and has significant education? Is 1/1,000 possible? 1/10,000?

In many cases this make more sense than the violence arising out of conditions of affluence & education.

After all, a dominant theme throughout hum-bio is that the expression of the genes is typically based on gene-environment interaction.

The profile above seems to violate that theme, but that presumes that we have a full picture and that the listed external trappings mean what we think they do. Or that the external data is real (not that a terrorist organization would ever think to dummy up a history for a bomber that would confound anyone that researched him as well as get him access to the target zone.)

Most common cause of aggression?

(1) Male vs Male aggression over reproductive success, to female

(2) Males attacking females over denial of access to reproductive activities.

In chimps societies females heads out when they hit their mating years, Thus chimps have related males & warfare cooperation, genocidal behaviours.

⊘ Pseudo kinship: People we feel are like our relatives, Band of brothers, Special living arrangement. Special terms. Creation of pseudo kinship identities.

⊘ Pseudo Speciation: Making others seem more different than YOU than they are. So different that killing them hardly even counts. Example Rawanda & the Hutu war cry- kill the cockroaches.

Prior to Congressional authorization of the Gulf War, a nurse "refugee" from Kuwait city gave testimony about appalling behavior she'd witnessed at her hospital.

Allegedly, Iraqi troops had raided the hospital, killing off patients, stealing equipment, so on and so forth. Allegedly they took neonates out of their incubators, set them on the counter and stole the equipment.

So Congress responded to the story by authorizing the war. It was a close vote and several Senators indicated this story was a crucial factor in their decision. *But it was a hoax. The nurse was not a nurse; she was the daughter of the Kuwaiti ambassador to the US and she had been trained by a US government paid PR firm to say what needed to be said.*

Naturally after selling this drama to the public, the media didn't make abig to do of it when it turned out to be false.

https://en.m.wikipedia.org/wiki/Nayirah_testimony

Put someone in an FMRI scanner & flash pictures quickly enough to get sub-concious responses & the amygdala activates when pictures of someone from a different race are shown.

also depending on background people were more likely to have the amygdala effect. Grow up with multicultural background & you'd not have the same response.

Research by Susan Fisk provided alternate findings when the studies were tweaked. Add dots to the pictures and tell the subjects to look for dots and you do not see the same activity in the amygdala.

Ask them to give their opinion on whether the person is older than 35 (categorical thinking) and the amygdala gets even more activated.
Finally she primes them to think of the person as an individual - would this person like coke or pepsi? Then the amygdala doesn't activate. The difference is in whether the subject is thinking of people as part of a category or as individuals.

Contact theory also suggest that contact with other social groups reduce aggression. But mere contact isn't

Sufficient. Spatial characteristics matter Get just enough of one group to the battle another & instead of getting cooperation, you are more likely to get conflict.

Robert Axelrod of the U of Michigan and the importance of symbols in peacemaking. Respect others' symbols, get respect and cooperation that goes beyond expected issues (such as resources).

Nelson Mandela and Invictus. Conflict in the Middle East and issues of Hamas folks that represent the Palestinians making statements along the lines of "If they'd just acknowledge we got screwed in 1948 [when the UN created Israel on top of Palestine] we could get serious about peace" and Israeli hawks saying they could consider it if the anti-semitic talk would stop in Palestinian schools - taking the emotions, symbols and feelings of the so called opponent seriously as opposed to material elements or only your own concerns.

maybe it's not about water rights or land. Maybe it's more about respecting each other as people, as evidence through respect for valued symbols.

Reciprocal altruism, game theory & better results. Repetition (number of rounds unknown). open book play (people know your reputation). punishment, especially second party altrustic punishment. opt out clauses also select for cooperation

Trench warfare and intentional misses as a way to negotiate peace.

LECTURE 21

https://m.youtube.com/watch?v=uGy-JG2i4BA&list=PLQg3jbNWckEU-oP9MZyqXBxzpkKdcQw1M&index=4&t=4s

https://m.youtube.com/watch?v=ovJcsL7vyrk&list=PLQg3jbNWckEU-oP9MZyqXBxzpkKdcQw1M&index=12

Today's lecture focuses on Chaos theory. The assigned book is Chaos by James Gleick. Part of what's analyzed is reductive science,

which is basically the concept that we can dig deeper and to ever smaller portions of a thing and ultimately gain knowledge about that thing.

So we can go from saying people have feelings, to people have limbic systems to people have neurotransmitters and on down the line and at each level we come closer to the fundamental building blocks.

These blocks are then believed to be consistent - figure them out scientifically and you can reproduce the results. Part of chaos theory is that there is no end to the potential for reducing (think quarks) and that at a certain point we hit the Heisenberg Uncertainty Principle and end up with randomness.

As he goes through the lecture, prior themes will come to mind, such as the earlier points about the frontal cortex, the most complex part of humans, being the least constrained by genes.

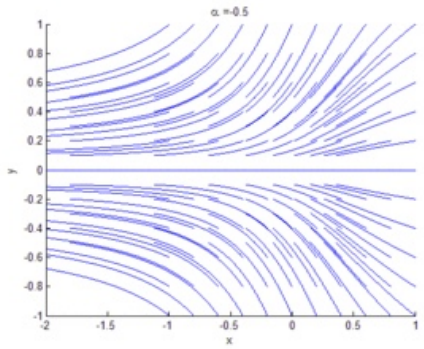
https://m.youtube.com/watch?v=TQKELOE9eY4&list=PLQg3jbNWckEU-oP9MZyqXBxzpkKdcQw1M&index=9

https://m.youtube.com/watch?v=aAJkLh76QnM&list=PLQg3jbNWckEU-oP9MZyqXBxzpkKdcQw1M&index=5

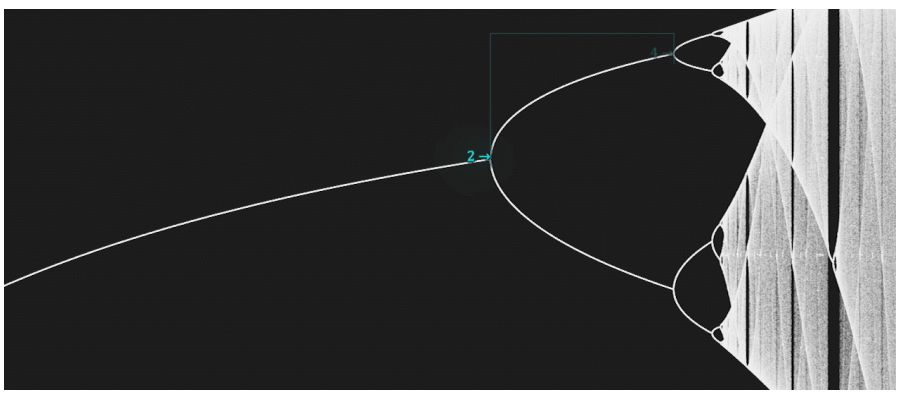
genes are reductionism

Jumping genes, transcription factors, epigenetic influence etc.

are chaos like in that fundamental patterns are altered in unpridictable ways, or at least in ways that aren't controlled & determined in traditional sense.



bifrication graph



bifrication diagram

Science over religion. The Universe as ordered with absolutes. & we have the introduction of reductionism. Understand a complex system by breaking it down into it's parts.

Thomas Aquinas.
3 things god cannot do.

(I) Sin
(II) Make a copy of himself
(III) make a triangle with more than 180°

understand it & those & you get the whole

This is core to science.

if $x+y=z$

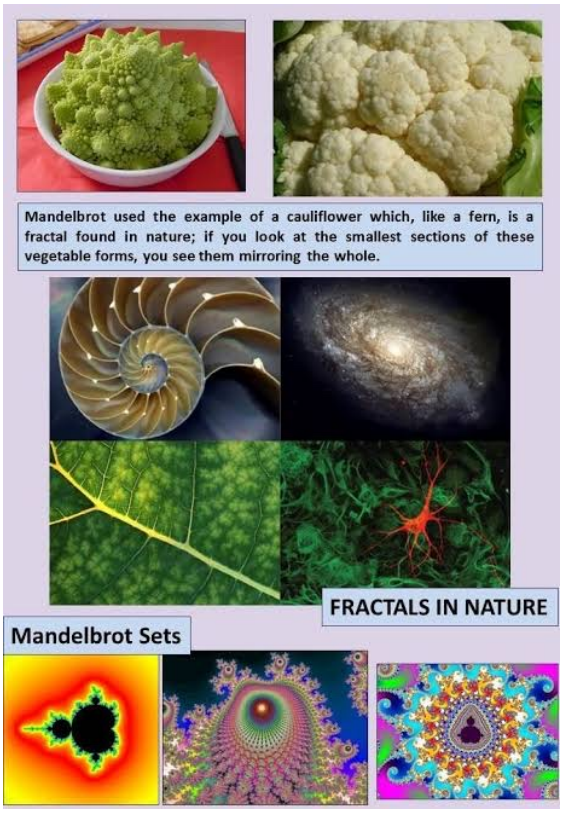
$(x+1)+y=z+1$

$(x+2)+y=z+2$

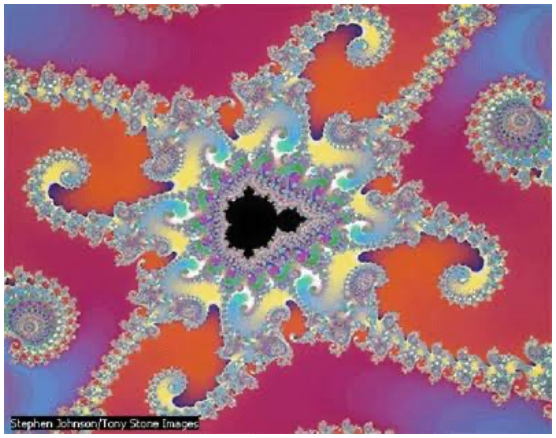
$\left[\frac{2}{3}+4^{6}-\sqrt{17\cdot82'867}\times3.2^{n}\right]$

the closer we look to anything the closer you will get you will realise noise in the pattern.

Lineavity, Additivity, add component parts together & you can produce the end result. if you know the starting state you can figure out what the end result will be.



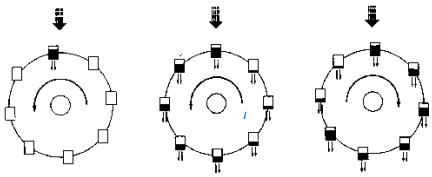
& if it's reductive then there's a blue print that system towards what it should end up looking like.



Significantly, the variability that emerges in data is viewed as junk, noise, instrument error something to be gotten rid of. And the thinking is that the way to get rid of it is to be more reductive; the closer you get, the less variability there should be. Eventually you should be able to measure the true, iconic norm. In Chaos, Gleick points out that hard to measure systems were basically ignored and considered to be unscientific.

In HumBiO, think back to the heritability segment- science reduces down to one controllable variable in the lab, gets result & then calls those scientific truth.

A lot of room for innaccuracy there since real system are much more likely to be variable.



Lorenz's waterwheel

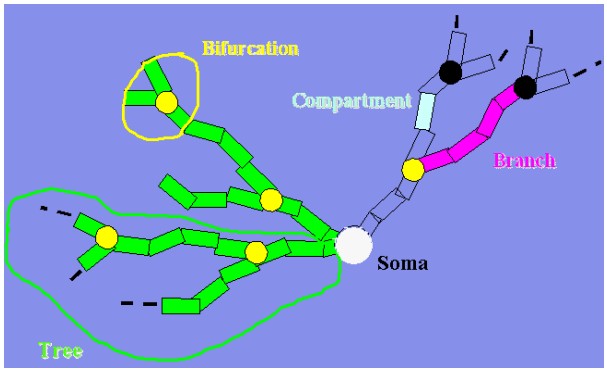
The Human body thus goes down levels. Body, organs, cells, etc.

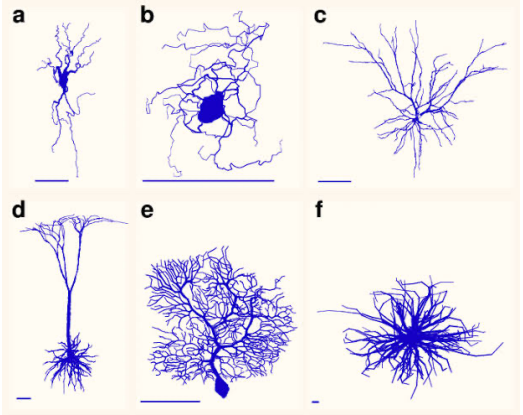
But it doesn't work this way for every thing. Hubel & Weisel - theory of individual grandmother neurons, dot,

line curves..... The thinking being that one neuron stores one thing. from simple to complex.

But the cortex seems to work in systems & networks.

Bifurcating systems. Scale free. All the branch points on neurons are bifurcating (dendritic trees). The circulatory system is also bifurcating. As is the pulmonary system.





Just like with neurons, there aren't enough genes to code for the bifurcating system gene by gene. It cannot be a reductive, point for point solution.

Chance!

Brownian Motion. Cellular material differs from the first division.

The takeway is that the most interesting stuff can't be regulated in a simple, reductive way.

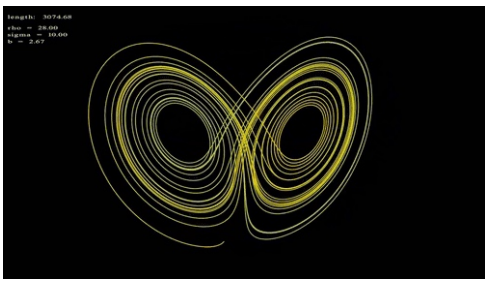
Deterministic + Periodic

Deterministic + Aperiodic. This is where our waterwheel comes in. It's not ostensibly linear, but it is periodic; the pattern is simply complicated.

Non-deterministic (random elements).

Chaotic: a pattern that never repeats. when the amount of force added crosses a threshold, it goes from a periodic or aperiodic pattern to one that no longer has a repeating, observable structure. the magic number seems to be 3. have 3 distinct patterns on a repetitive structure & you're closing in a chaotic system.

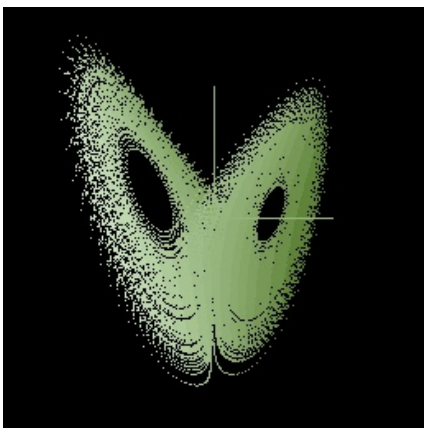
With these strange attractors, the pattern doesn't really repeat - somewhere at that millionth decimal mark, there's a minor change which in turn leads to a slightly different next value. These differences amplify with each new value; this is the so called butterfly effect (marginal impact of the wings changes the environment slightly...)



butterfly effect

Fractal :

Information that codes for a pattern & has similar features to the prior elements with the same type of complexity & variability. Think bifuractions

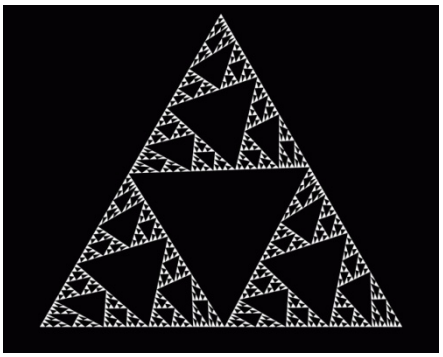


fractals

Thus science encounters the problem that variability is the system & only way to produce accurate, true data is to include "noise". Reductive approaches can still be very effective, the data just won't refelect an absolute reality.

LECTURE 22

Emergence relates to the way in which complex behaviour can be coded for with the right simple rules.

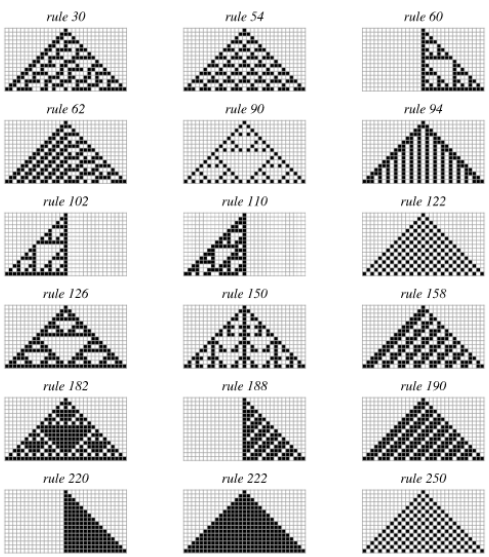


Neural networks. Monet, Impressionist paintings, pastels. Varying degrees of understanding - parallel processing, similarities. Groups of neurons that come together and can produce info from associations, partial knowledge. Neurons kind of team up to produce the information.

Divergent wiring, creativity, Association cortex
- bulk of cortical neurons, they respond to all sorts of prompts.

At the biginning, alzheimer's pops up as difficulty in recalling info. likely that some of the associational pathways have been cut off.

This is the weakening of the network as the tau protines choke off connections. Stronger Priming can still pull the info.



Fractal genes – grow this tube until it is 5 times longer than it is wide then bifurcate. Rinse & repeat.

No cell in the body is more than 5 cells away from a blood vessel, but the circulatory system takes up less than 5% of the body.

Wisdom of crowds.
Galton, country fairs & weight of the cows.
Millionaire tv show, ask crowd, they're right 91% of the time.

Fractal distribution makes it possible to jam all that into a small space. With these fractals you can create a seeming impossibility - an object with infinite surface area within a finite area.

The slightest gene mutation can wreak havoc. If the division is off by just a little bit, the end result will be the cells not reaching their destination, overall function would then be disrupted, perhaps fatally.

As long as the crowd is reasonably well informed variences in opinion balance out & the average answer is right at a surprisingly high rate. Sadly this is also why it's difficult to win the office football pool.

Traveling salesman and swarm intelligence. As the ants travel, they lay down a pheromone trail. The shorter the path, the stronger the scent. The scent dissipates over time, so as second and third generations come by, they'll be more and more likely to follow stronger (and shorter) trails.

wisdom in the crowd thing going on.

Neurons are arrenged in a power law style. In autisties, there are unusual clusters, local & very powerful. fewer long connections. Thus you see a lack of in-trigation with corresponding increases in processing power in certain areas.

Male have fewer long range connection than females. Again, the hyper male hypothesis with autism

Bottom up systems, such as wikipedia and amazon, provide good info about the world and products.

But they have a bias toward conformity. Outlying opinions and ideas drop by the wayside.

audio 2-23-10

pheromone — a chemicals capable of acting like hormone outside the body.

https://www.medicalnewstoday.com/articles/232635

Kasparov VS Deep Blue :

computer AI being able to outthink grandmaster. not really so impressive. In constructing the software programs the engineers plug in as many matches as are possible in order to cue the computer program in how to respond. So the program can draw on nearly any possible scenario imaginable while playing within a confined board with limited range of motion & a small set of rules

You first get quantity then quality. with enough quantity you get quality.

& that's how we've got smarter cause we have more neurons than any other species.

This is the chess equivalent of playing the original Tecmo Bowl when your opponent picked the same play as you. You get a few BO Jackson runs for TD, but in the end, you'd lose.

Kasparov noted that with enough quantity, you develop quality. Our off the rack neurons are similar to other living beings' neurons, but we have way more in quantity.

So what's the diffrence between other species & human's

we share 98% of our DNA with chimps
The 2% amplification factors, trans-
-cription factor, transposons. About
1000 fewer genes for olfactory receptors.
Hair, morphology, bipedal Punchline

the big difference in human versions have something to do with cell division, specifically the number of rounds of division. & these are relatievly free from deterministic control since they don't specify what goes in or how they should be wired.

close note
2035.00

Simple - good. Random - good. This is how you stumble onto good stuff.

He closes in typical Sapolsky style, highlighting that while we all have different "failings" that make us feel inadequate or not quite right, the truth is that life revolves around strange attractors, that we are ourselves one of these in many good ways, and that the notion of a correct standard is a myth.

LECTURE 23

In this lecture, Professor Sapolsky discusses the neurological foundation of language, with particular focus on aphasias within **Broca's and Wernicke's areas.** He discusses elements of sign language and what that demonstrates about the nature of language itself, which is that the structures operate for linguistic purposes, not only for the motoric purpose of coordinating the muscles of the tongue and jaw. He also discusses elements of language from an evolutionary perspective and talks about some of the most famous primate subjects, including Nim Chimpsky and Koko the ape.

first in the lecture he talks about (how to get to all the sales stops in most efficient way possible) Salesman problem involves radia glia extending out & then neuron tracing & forming patterns from there.

The goal is to form as many connections as possible while creating the shortest distance possible among all the axons.

Semanticity is coverd, by which he means there is an endless array of possible human sounds, but all of the known human language - approximately 6000 at the time of me writing this - involve the creation of rules that constrain the sounds into meaning & establish which sounds are language.

All language have embedded clauses, which means there are different conditions that will impact meaning (Similar to an if-then structure).

they will also have recursion, or generativity, meaning there are finite number of words but an infinite potential for generating new combinations.

Lateralization

Human split-brain studies have helped develop knowledge about language and lateralization. In split-brain studies, the cutting of the corpus callosum (a group of nerve fibers connecting the two brain hemispheres) is cut. These studies have proven that the left and the right brain hemispheres have specific language functions. https://m.youtube.com/watch?v=FsM1IQ9d2pw

Displacement is another feature of all human language. People can talk about things from past or future or that are happening elsewhere. That is distinguished from other animals in that animals' communicatio is driven by emotions & tied up in then here & now.

Human also have the ability to use language arbitrarily, for example we can express emotions in whatever way we choose.

All languages feature "motherese" - speaking in a high pitched voice, focusing on the melody and tone and emphasizing pronunciation. He notes that when people speak this way to pets they usually don't provide the close clarity whereas they do when speaking to children.

Now whether the structure for language are primarily motoric or are about the under-lying cognition. He indicate that it's primarily the latter & provides examples from American Sign Language to establish this point.

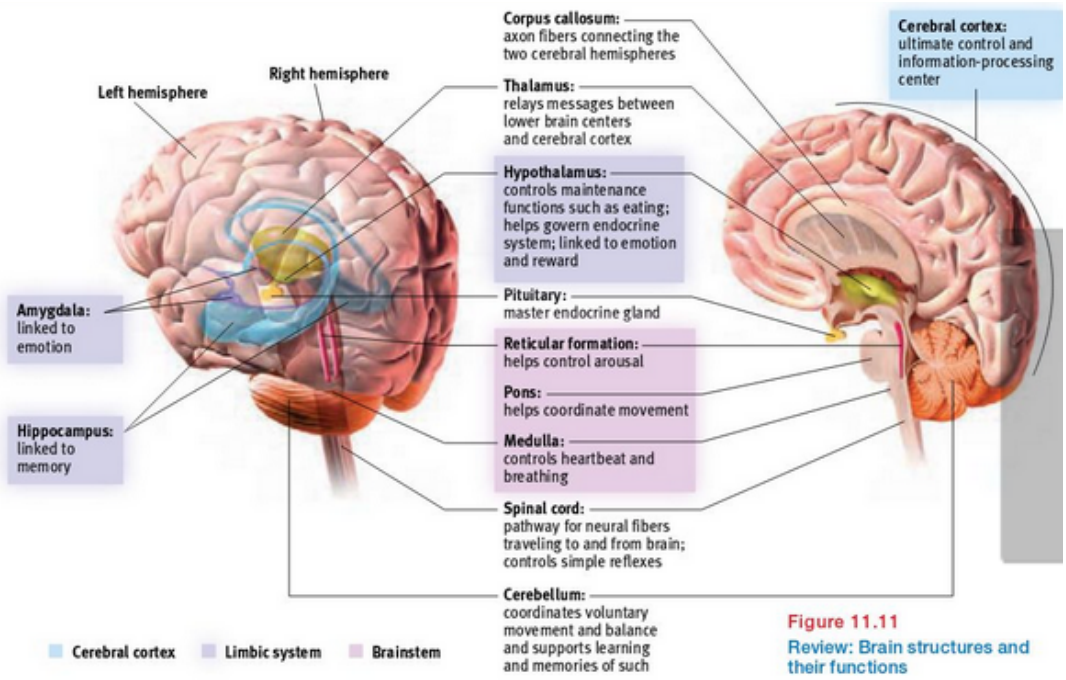


Figure 11.11
Review: Brain structures and their functions

your lymbic system has nothing to do with your language. it has to do with when you're terrified, you're singing, emotion etc. but cursing is all about limbic stuff.

& vocalization comes from left hemisphere & pulling in more motoric stuff

Do Deaf babies that are learing ASL (amarican sign language) begin with ba-bbling with sign language at same developmental time (around 9 months age) that baby begin to babble, with both doing

this the most night before going to sleep.

2. Older individuals that speak ASL experience similar communication difficulties as a non-deaf person after a stroke depending on which area of the brain was hit.

3. Both spoken & ASL have prosody, which is the meaning & emotional tone of a massage that is seperate from the words itself. ie. tone, irony, humor etc. all the ways in which the ultimate meaning comes from more than just the words. in ASL facial expressions are important, as well as shifting the body one way & then the other when relating dialogue.

9. For those born deaf, when they learn sign language their auditory cortex lights up. even though it's not being physically stimulated via sounds.

5. There are accents in ASL, as well as puns & poetry.

Neurobiology. He begins by discussing the question of how modular the language activities are within the cortex. This comes down to whether it's a specialized function or one that is generally similar to other elements within the cortex.

1. Kids with williams Syndrome who are very fluent in their creation & Uses of words, but who generally have IQ's in the borderline retarded area. He queries — How can it be functional

when the rest of the brain is a mess?

2. there are genetic disorders in which people with normal IQ's (& no stroke damage) will have a harder time Producing certain elements of language.

Both points are used to demonstrate that it's a separate module that is not readily comparable to the other functions of the brain.

The Swiss Army knife analogy is probably a bad one since it's confusing in nature - you can view each part of the knife as a specific function or each part as being part of the Swiss Army knife and thus similar (for example, similar properties of tensile strength and construction). In the end the conclusion is reached that language is its own cognitive function.

However, much of what the kids with williams kids say doesn't make sense & folks with genetic impairments turnout to not have normal IQ's.

This remains a controversial issue & clearly has major implications because of the impact of Stroke damage -

if it's not modular & only those areas can handle the function, then what's lost may be gone for good. But if it is modular (i.e. can be moved around) then other brain areas may be able to adapt & take on it's functions.

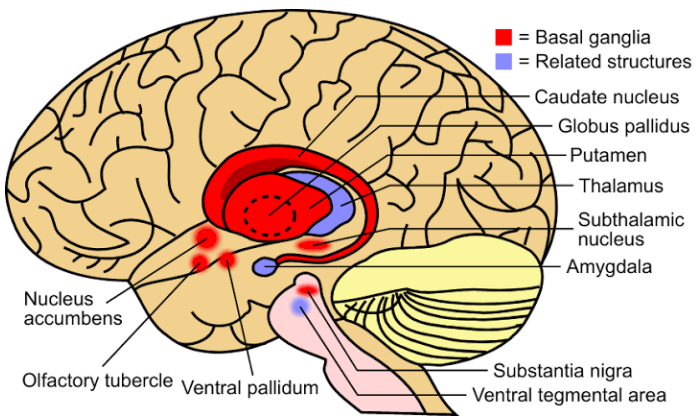
Here it's worth noting that Chomsky has argued that language development is similar to any other bodily function, such as the growth of kidneys. From the standpoint of it being an inherent process, odds are that it's more likely to be a unique structure. The deficits mentioned in the Williams kids may not be meaning so much as understanding. To wit they may be expressing what they want to, but the general IQ deficits restrict the accuracy of those comments. This is different than someone with an aphasia who cannot express what they mean to.)

Language is lateralized that is it's handed by only one side of the brain usually (90%) the left side of the brain. early evidence of this come from the wada test, in which one hemisphere is anesthetized. people undergoing this brief test would lose language function when the left side was frozen. The wada test was done prior to surgery on intractable

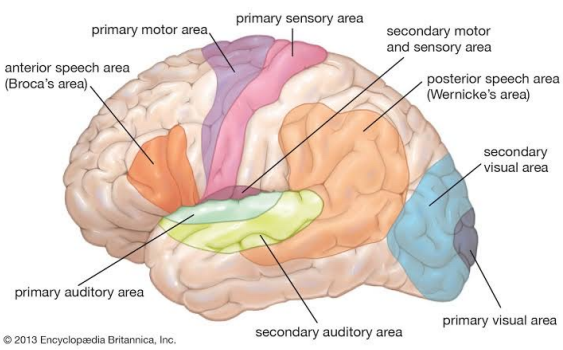
epilepsist as the surgeons wanted to make sure the site wasn't too close to language centers.

These days brain imaging enables doctors to research this without using barbiturates.

Broca's area is on the cortex in the parietal lobe. Broca's area is responsible for language production, moving lips, jaw, larynx. It handles motoric regulation. When damage occurs, you get an aphasia. This becomes a production aphasia. They will then have trouble generating (physically generating) meaningful words and speech. They remain good at language comprehension.



when you talk on phone it's activated



Wernicke's area is responsible for language comprehension. People with a Wernicke's aphasia will remain able to fluidly generate words and speech, but the speech will often resemble a word salad and make little sense to the listener.

the arcuate fasciculus connects posterior receptive areas with premotor / motor areas. Professor Sapolsky notes that it connects Broca's area to wernicke's area, but we have a recent wiki article which encounter this.

http://en.scientificcommons.org/50118943

'It was previously taught to be a connecting bundle. In this end his example still makes sense because the connection relates to motoric activity, so one could comprehend but not produce if the arcuate fasciculus is responsible for connecting to motoric areas. He mentions that generally stroke victims suffer deficits in both areas.

Similar deficits are experienced in deaf individuals who suffer strokes. It's not about the physical production of speech; it's about the underlying cognition. Broca's and Wernicke's light up when a deaf individual is listening to ASL.

there are also function specific aphasias & alexias. These are caused by smaller strokes that hit specific segments within the language center.

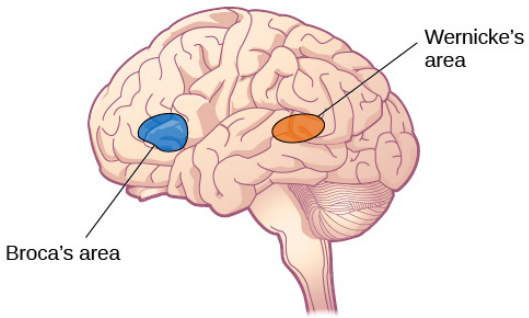
example include agerund aphasia, an inability to write dispite understanding words & a sailor that lost his ability to comprehend semaphores.

The limbic system is also involved in communication, especially of emotional elements. Stroke victims will sometimes have huge sucess singing thoughts that they struggled to produce due to aphasias Accuracy is not high but it's better than spoken speech.

Broca's and Wernicke's areas have slightly different activation patterns in pictograph languages, such as Chinese.

He notes that although language is lateralized to the left hemisphere most of the time, the prosody comes in from the right hemisphere. Prosody damage is seen in some stroke victims.

Tourette's Syndrome is an example of the limbic system gone wrong, as seen in its most well known feature - uncontrolled emotional outbursts, especially cursing. So the limbic system is intertwined with language production. This is further seen in cases where subcortical areas are stimulated and the subject says something emotionally loaded. The limbic system also communicates with the right hemisphere and effects prosody.



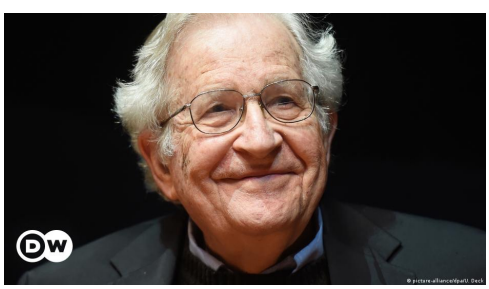
humans are the only species that has Broca & Wernicke areas, but you can see the begginnings of this structure in other primates, including apes, chimps orangutans & rhesus monkey (there is cortical thickening). He notes evidence of lateralization in monkey, including a tendency to show more facial features & movement on the right side of the body when expressing an emotion, Studies of Australopi- -thecus skulls show some asymmetry

through it's hard to infer much from a skull given that the brain is long gone. the points toward a long timeline in the development of this skill.

B.F. Skinner and Noam Chomsky are covered next. Skinner argued that language developed through behavioral techniques, essentially positing that correct language usage was positively reinforced and thus became more likely in the future. This argument makes very little sense and is undermined by the pace of language acquisition, natural developmental timelines that normal kids go through, production of entirely new combinations of words and sentences. Chomsky, thankfully, countered this argument and put an end to a lot of the behaviorism nonsense.

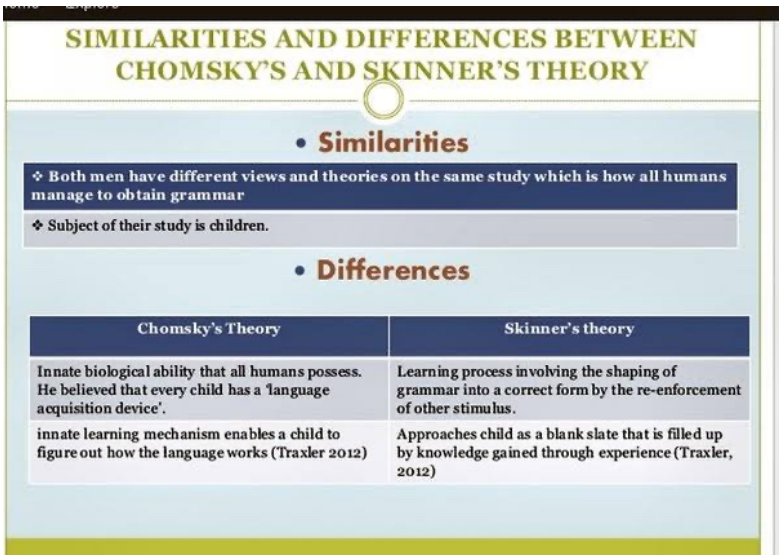
https://chomsky.info/1967____/

his famous article reviewing B.F. Skinner language acquisition theory,



the debate was less significant because of the merits of the case - chomsky always had the edge there - than because

behaviorism had been dominating the field of psychology for an extended period of time.



SIMILARITIES AND DIFFERENCES BETWEEN CHOMSKY'S AND SKINNER'S THEORY

- **Similarities**

❖ Both men have different views and theories on the same study which is how all humans manage to obtain grammar

❖ Subject of their study is children.

- **Differences**

Chomsky's Theory	Skinner's theory
Innate biological ability that all humans possess. He believed that every child has a 'language acquisition device'.	Learning process involving the shaping of grammar into a correct form by the re-enforcement of other stimulus.
innate learning mechanism enables a child to figure out how the language works (Traxler 2012)	Approaches child as a blank slate that is filled up by knowledge gained through experience (Traxler, 2012)

Professor Sapolsky points out that chomsky's argument included the ability to create new language constructions which could not have been previously reinforced.

The battle between Skinner and Chomsky highlighted many of the problematic issues with behaviorism, especially the difference between shaping and internal development. Behaviorists had little to say about the internal workings of the mind, a weakness that left them ill suited to provide the leading theories in the field of psychology. This battle over language was a symbolic Waterloo for Skinner and enabled psychology to move forward in more constructive, scientific directions.

This is evidence of internal workings that are not shaped and molded by rewards. This is referred to as generativity of language. New sentences, words, creations.

He also argues that there is an innate structure of language in that kids are able to generalize the rules of language, such as grammar and syntax. Language acquisition is further supported along the Chomsky model based on the Poverty of Stimulus model, which suggests that more language is generated than heard or rewarded.

Important to see in the chomsky model is the differential development of language. not only do people differ in their language skill but language aqusition has different stages. (Professor Sapolsky does note that young kids pick up about 10 words a day but end up with a vocabulary around 60,000 at college age - clearly a change in pace)

& of course, the brain studies that show specific centers for language production & meaning further chomsky's point that it's an internal thing.

kids pick up language from the ambient environment, accents, difficulties learning a second language. as you get older & other elements points to an internal mechanism that is set to develop on it's own & has critical learning stages.

As kids age they lose the ability distinguish between phonemes that aren't relevant to their own language. Brain imaging studies show that Wernicke's area does not light up when these subtle phonemic differences are tested. A child in the other culture would notice these.

if you learn a language past age 12 you're likely to have an accent. if you learn a second language before 6, both language are coded for in a similar pattern within Broca's & Wernicke's. learn it after 6 & the language sections are more peripheral. There are some bizzre cases in which a stroke victim will lose one language but not the other.

Professor Sapolsky states that new languages are invented by kids.

As an example, deaf kids in Nicaragua generated a system of their own when they were left to work each other in the school.

This evolved into Nicaraguan sign language. In other words, the possibility of language is inherent - if they do not have language, kids will naturally create communication systems.

It took about three generations for the sign language to evolve rules, embedded clauses, etc. So words are primary but structure soon follows.

at roughly 12-16 weeks of age you begin to see different development in the fetus on the left side where Broca's & Wernicke's areas are compared to the right side, which doesn't thiken the same way the thickening is seen by about 30 weeks. enhanced metabolic activity is not seen within the first couple of years of the kid's life, but begins to emerge afterwards.

Judith Rich Harris, argues that peer influence is more important than parental influence in the development of language. A key example of this is that kids grow up with the accent of the neighborhood around them, not the accent of their immediate family. This is most conspicuous when examining first generation immigrants.

language is also laden with cultural meaning. For example, some languages include a formal & informal you.

additionally kinship languages & even how stories are told depend on cultural values inherent in that language system.

This goes back to the Sapir-Whorf hypothesis that language constrains thought & shapes thought.

The counter argument is that the nature of a cultures thoughts shape it's language.

He cites two amazonian tribes that have limited numbers in their number counting system, so they have a word for 1,2,3 and more than 3. The second tribe has words for 1,2,3,4,5 and more than 5. Their accuracy is fine up to those numbers, but beyond that 8 looks like 10 to them. The people are smart with vocabularies that include thousands of names for edible plants, so they function well within the domain of things that the culture is concerned with.

animals have the beginning of semanticity

(in this case, meaning that a particular sound has an actual consistent meaning)

for example vervet monkey have vocaliza-
-tions that mean - "something scary above"
which are used to tell the troop whether
to climb up or down a tree to be safe.
clearly getting this wrong would
lead to trouble, at the same time, the
underlying emotions are similar but the
meanings are different.

Rhesus monkeys have been tested with clips of facial expressions with matching and not matching vocalizations. They become very intrigued when they do not match up.

Both vervets and squirrels give more alarm calls when relatives are around. Squirrels are even less likely to warn another squirrel they've been bickering with than one they haven't.

Humans alone has the capacity to lie. Other animals can't fully do this and have to resort to tricks, such as a dog tucking it's tail to try to prevent scared scents from escaping.

Chimp Vickie had the unfortunate task of needing to learn to speak.

This 1950s research required her to make a controlled vocalization for anything she wanted, such as food or water. Naturally this was a difficult, if not impossible, task for her. Even worse, another researched, Kellogg from Yale, thought it would be a great idea to raise their child Donald with a chimp named Gua, maintaining the same environment for both.

The thought was that the chimp would learn language from Donald. Instead, Donald began mimicking the chimp.

language isn't just communication. it's a whole emotions altogether.

Finally researcher caught on that chimps lack the physiological structures to speak english. So the next subject up was Washo, a chimp that the gardners began teaching ASL. Washo would babble in sign language used words like "waterbird" stole plants & blamed others. She & another chimp, Bowie communicated, with both signalling "tickle me" until they both got frustrated & walked away from each other.

Penny Patterson & Koko

Next up, Penny Patterson and Koko the Gorilla. Penny got a loan from the San Francisco zoo. This research began at Stanford, with Patterson teaching Koko ASL. Koko could report dreams and gossip. In one humorous anecdote, Koko ate a plant and when questioned by Patterson, responded that "Bill ate it." Bill was another person working on the project. Patterson told Koko that Bill didn't do it, that only gorillas do. So Koko responded that some other gorilla ate the plant.

Around 1980, Herb Terrace at Columbia set out to prove Chomsky wrong and establish that chimps could, in fact, generate real language. So he got a chimp, named him Nim Chimpsky, and taught him ASL. A few years into it, Terrace and others published a landmark paper arguing that Nim Chimpsky was not producing language. He wasn't creating words, or getting word order right.

Additionally, a fundamental element of language is that the more words there are, the more meaning. But with Nim's ASL efforts, his sentences were basically babbling. The utterances were not spontaneous (responses for Fruit Loops). Terrace ran the other projects through the same tests and concluded that none of the others were passing them either, including Washo and Koko.

Herb terrace & Nim

Terrace & Patterson then engaged in a battle over the meaning. She'd long since run off with koko, leaving the San Francisco Zoo shy one gorilla. At this point in time, the views argued by Terrace & by extension chomsky, remain in a central view

But, of course, we keep looking and now a Bonobo chimp named Kanzi is being taught language and may be showing some signs of actual language use. (Bonobos are highly"social" and may be better adapted for communication).

LECTURE 24 part - 1

READ Depression

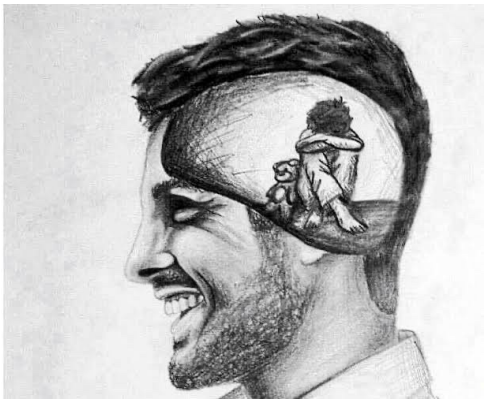
In this lecture, Dr. Sapolsky discusses depression. He provides a history of the biological elements, touching on the role of neurotransmitters (epinephrine, dopamine and serotonin) in depression, and an overview of the psychological elements (and their tie-in to the biological).

Sapolsky opens up by offering an unusal viewpoint – when it comes to human disease there are a few disease out there that are as bad as depression. It is crippling. It is pervasive. It wipes out any capacity for joy, hope or pleasure.

Cancer victims will often express gratitude for their disease. It woke them up, gave them a new perspective helped them rebuild important relationship & get to the meaning of life.

This is not depression.

Depression distroys perspeetive, undermines relationship, steals joy. Depression isn't a disease that you've greatful for having. It doesn't open doors it closes them for you.



And in this lecture Sapolsky will show that it's every bit as real as diabetes. You don't tell someone without insulin to just get over it, but this is exactly what happens with depression. Yet both diseases are characterized by hormones and chemical reactions that are way out of control.

We humans have an astonishing capacity to derive joy, hope & meaning from the most difficult circumstances. what could be worse than a disease whose defining characteristic is the inability to feel pleasure?

(Here one should pause and set aside questions of mortality for a moment. Sapolsky's meaning is crystal clear when we think of the disease as it is - what's day to day life like with cancer, congestive heart failure, depression? It's within this context that it can be the worst experience imaginable. As for the mortality issue, people with cancer fear death; people with depression wish for it.)

Symptoms

Anhedonia - the absence of pleasure. This is where nothing brings joy or pleasure. Not good fortune, not a promotion, not an achievement.

Grief - sorrow. Loss. Hopelessness. Obsessing over actions that went wrong. Delusional thinking.

Guilt - blaming yourself for failures both perceived and real. Blaming yourself for blaming yourself. Blaming yourself for feeling sad and unable to do what you should be doing.

Self-injury - injuring oneself, be it cutting, suicide, or some other form of self-inflicted pain. Suicide is one of the top causes of death in teenagers.

Psychomotor retardation - everything is exhausting to do, to think, to move. Getting going is unbelievably hard. At a chemical level this likely has a lot to do with insufficient dopamine. Dopamine isn't so much the reward chemical as it is the chemical that motivates you to take an action that will lead to a reward. Doubt that the reward will happen and you get no dopamine.

as side notes he points out that the probability of suicide goes up when the psychomotor retadation alleviates. The person may then have enough oomph to kill him/herself.

⇒ Some people who have depression get rethemic pattern to depression.

⇒ Some people feels depression only season SADs.

⇒ there are 100s of neurotransmitter out there but communicating with one neuron to other but in depression there's just a handful of them that seem to be implicated.

Vegetative symptoms - here he again stresses that this is a real disease with biological underpinnings. There's a sense that everyone goes through hard times and feels sad and bounces back, so those that don't bounce back must be milking it for their own pleasure, or because they're weak or selfish. Here he's establishing that actual medical info, not people's common sense, establishes that it's a disease as real as diabetes. Why? The physiological data from people suffering a major depression demonstrates a strong stress response and does so even when the person is sleeping (and thus not able to be blamed for deliberately thinking sad thoughts).

Sleep changes - often wake up early. Remain in stress response during sleep. The sleep cycles are totally screwed up. This is not get over it. This is biology.

Loss of appetite is common.

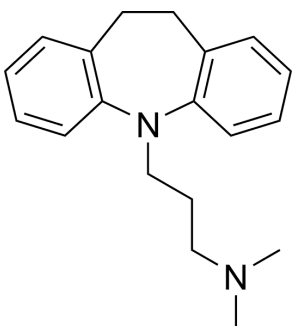
Activation of stress response. Sympathetic nervous system gets fired up (adrenaline). Glucocorticoids pouring out. Outwardly the person looks lazy and tired and like nothing's going on. Inside the body is going through a massive stress response that is similar to what your body would be doing if you were fleeing an armed assailant. All the time.

Now on to the chemistry of it.

Neurons communicate with chemical messengers, neurotransmitters.

1st generation Anti

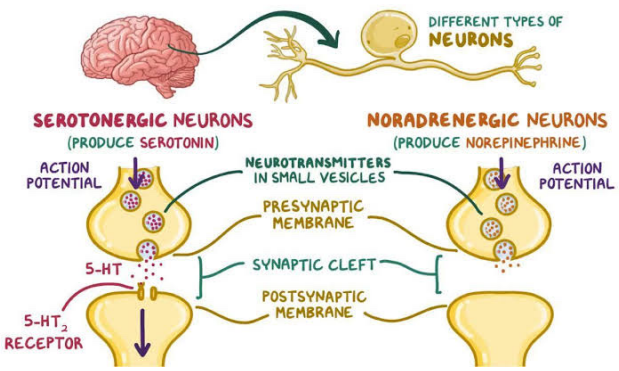
Norepinephrine: MAO inhabiters. after a neurotransmitter has been dumped into the synapse, it needs to be cleaned up. It can be recycled or flushed out of the body via the cerebrospinal fluid, blood stream urine etc.



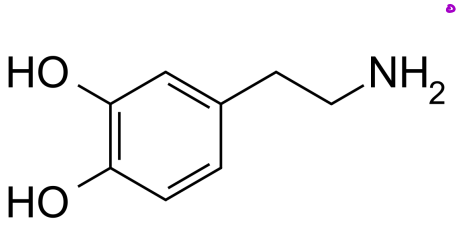
tricyclic

MAOI drugs inhibit the activity of the enzyme that breaks down norepinephrine. Since it's just sitting there in the synapse, it goes ahead and pings the receptor a second and third time. Thus the theory is that if the person gets better, the problem was likely caused by too little norepinephrine.

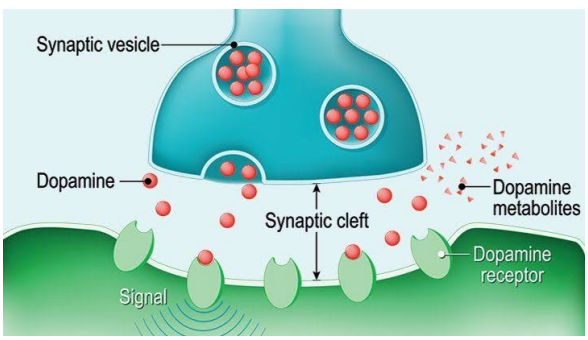
In the late 1960's the tricylics emerged these do basically the same thing – they gum up the pump that removes the neurotransmitter. Futher evidence comes from drugs that inhibit norepinephrine production.



The side effect of these? Depression. The original theory was that it's related to the anhedonia in depression since it was believed to be part of the pleasure pathway. The theory is good, but the catch is that the neurotransmitter involved isn't norepinephrine, it's dopamine.



absence of dopamine anhadonia
" " serotonin, a sense of grief. Dopamine is the neurotransmitter involved in the pleasure pathways however, Dopamine is not the reward; this is what lead to you a reward. dopamine is what leads to pleasure. thus when there's a flood of dopamine, the brain is expecting a very good result & become happy.



2nd generation anti-dep

SSRI drugs such as Prozac increase serotonin signalling / block reuptake of Serotonin from the synapse.

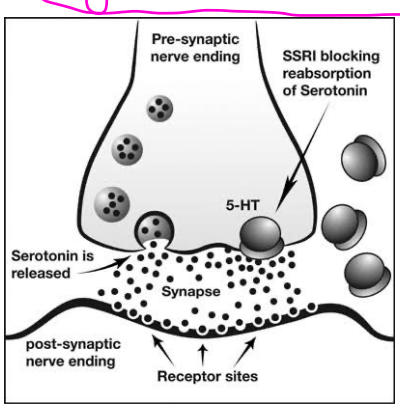


Table 1. FDA-Approved SSRIs

Generic	Trade Name	Approved Uses
Citalopram	Celexa	Depression
Escitalopram	Lexapro	Depression, generalized anxiety
Fluoxetine	Prozac	Depression, OCD, bulimia, panic disorder
	Sarafem	PMDD
Fluvoxamine	Luvox	OCD
Paroxetine	Paxil	Depression, OCD, generalized anxiety, panic disorder, social anxiety, PTSD
Sertraline	Zoloft	Depression, OCD, panic disorder, social anxiety, PTSD, PMDD
Vilazodone	Viibryd	Depression

OCD: obsessive-compulsive disorder; PMDD: premenstrual dysphoric disorder; PTSD: posttraumatic stress disorder; SSRI: selective serotonin reuptake inhibitor.

The current thinking is this.

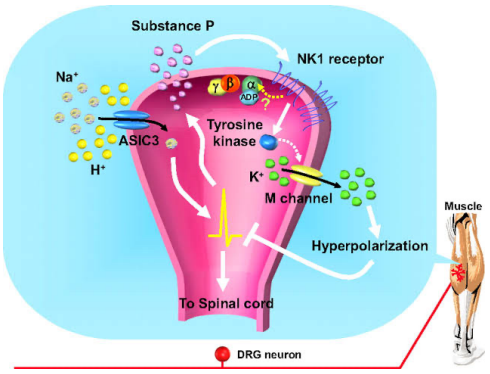
Dopamine -> Anhedonia. The absence of pleasure via the route of hopelessness. If you're hopeless, there's not a whole lot of this is going to be great let's do it signalling in your brain. Lack that, and you won't take action. And you won't get results, which confirms the original hopelessness.

Norepinephrine -> Psychomotor retardation. Norepinephrine is essentially a stimulant (which is why it would raise blood pressure). A deficit leads to a lack of stimulation and thus less movement and less energy directed toward movement (and toward feeling energized).

Serotonin -> The grief and guilt thing. The obsessive part of the actions is majorly implicated, as is seen by evidence that OCD can be alleviated with SSRI drugs.

the remaining symptoms result from the toxic mixture of combined deficits among these 3 key neurotransmitters.

Substance p is another neurotransmitter that tells us about the biological nature of depression. It's released when the body encounters pain (acute or chronic). Drugs that inhibit substance p signalling can relieve depression, again demonstrating that the body is using real pain pathways to experience psychic pain.



Now what about neuroanatomy?

⇒ the triune brain theory.

the back portion handles the day to day affairs- resperation, blood pressure, circulation

, that's why it's called repetilia brain & while it's aboslutely vital for l however, it doesn't a whole lot to do with advanced emotions & thinking.

Sitting atop the reptilian brain is the limbic system. This is the main section for emotions. And it talks to the other sections of the brain. To wit, it triggers responses in the body. Finally there's the cortex up top. This is the thinking center. And it's capable of triggering a full-on stress response in the rest of the brain and body through thoughts, which are simply neurotransmitters being dumped over and over again (especially when there's an obsessive quality to them).

The more the thoughts happen, the stronger the pathway and the more effective the signalling. Thus a depression is, at some level, simply the cortex whispering endless sad thoughts to the rest of the brain. And once this starts, the biochemistry shifts until the cortex gets caught in its own trap and can't not think the thoughts because all the signalling is already repeating them endlessly.