gone. There is no recovery of nerve cells, at this moment in time. Once these cells die, they're gone.
After they die: process called **autolysis.** They rupture and spill out toxic chemicals which start damaging their neighboring cells.
Takes few hours for this to happen, so we now have drugs to prevent the next level of damage – those cells that would have been damaged (the anyways compromised cells) by the autolysis.

- If you think someone had a stroke, you're better off being wrong and taking them to the hospital, than not. Because if it's not treated the person is dead within a few hours

- Compromised cells – not doing anything
- The blockage: at a certain time, the blood supply will regrow. When it returns, you'll see the compromised cells come back to action.
- The moment someone has a stroke: what you see will be the worst it will ever be. It always will get better because the other cells will eventually kick in, usually within 3-6 months.

<u>Brain has two circulations</u>:

1. Blood
    a. Brings fuel and oxygen to parts of brain
    b. Moved around by your heart
    c. Resists gravity
2. CSF
    a. Relies on gravity – starts at top and goes down
    b. Gets reabsorbed by blood system, gets clean, and then starts again from top of head.

<u>Lining of brain:</u>

- Everything in our bodies is gift-wrapped. It always has lining and layers of things around it, so you can differentiate it from different things
- Lining around brain: **meninges**
- They refer to three layers of lining around brain.
    1. **Dura**: outermost layer
        a. Tough membrane, if sliced: CSF comes out
        b. doesn't have indentations or grooves because it covers everything
    2. **Achrachniod Space**
        a. Achrachniod: spidery like fill-ins that connect floor to ceiling. In the rest of the room is CSF, but the connection – this Achrachiod space, connects Dura to Pia. Why do you need CSF to go through it? Packing peanuts – to protect. Between the two, you reduce impact of injury
    3. **Pia**
        a. Intimate with top of brain – it's the floor, follows everything. It's closest to the groove
        b. This lining is susceptible to infection

- There are fibers that protect the spine. It leaves and enters whenever it makes sense. There are separate entrances and exits – it's very neat. This is all about getting information to your brain
- Spine: bony structure. Has entrances, exits. The bone around it is called **Lamina** – supportive rings around it that allow nerves to leave. When people get older; sometimes it can crush. The Lamina can put pressure on the fibers that leave.
- Calcium at our age is stored, in upper twenties you stop storing and then it's starting to be used. And calcium holds up your spine and bones.
- Spine also within itself has connections, not only is it a connection between other functions and brain. It also has muscles and nerves.
- If you bang hammer on knee, your knee jerks, it has a **reflex. =** behavior that is organized at the level of your spinal cord. You need something that automatically programs how you're going to land – when you fall. You're trying to find your center of gravity, and any position which results in stopping a fall, will be preserved. And essentially, the different levels of your spinal cord are communicating with each other. This is all automatically balanced in your brain
- Example: a whole bunch of people are holding a canoe on top of their heads. One person in the back loses go and the rest of the people figure out to adjust holding the canoe so it doesn't fall.. it's just natural that they do that. That's exactly what the spinal cord does. It calculates all this..
- Brain is able to override spinal cord and reflexes – it has to send special information as an override.
- If there is a disconnect between brain and spinal cord, you can still have some type of reflexes. You can put them on their legs, they can stand if you situate them that way. The thing is they can move.

- pns comes from specialized sensory receptors – they're not that specialized, but they feel pain. And other fibers that live in muscles tell the brain what the position is – those travel back and forth from body to spinal cord.

ANS (Autonomic Nervous System) i.e.: automatic=outside of your voluntary control (some discrepancy though)

- consists of Sympathetic and Parasympathetic nervous systems

⇒ **sympathetic –** gas

- fight or flight (when a bear is in front of you and you have to get away from it_
- your pupils dilate, your heart pounds because the blood goes all over the place
- liver releases sugar so can be used as fuel
- lungs takes in loads of oxygen =
- superficial blood vessels goes away from you skin (it's why you go white as a sheet) goes deep into your muscles where they are needed
- stop digesting food because it's not that important –

- Tongue, voice box, fingers, enormous here. This homunculus is drawn in proportion other motor representation to motor in brain
- When you look at homunculus you see how motor has exquisite control over the body.
- When people have no arms, no legs, they use whatever is left. That has all the areas that represent what needs to be used/done.
- **Motor Homunculus:** you're touched in the parietal, and the motor knows to move it. getting touched is the stimulus to move on. You need to feel something to register that you need to move. Touch keeps on going back and forth over motor area
- Connection goes across the divide.
- Why do we have such a big area for fingers?
    - Imagine control panel in theater/lights in classroom. Each switch has its own function. If you want to control all parts of room, you need all three switches, if you only want one area, you use only one, etc.
    - If you have more switches, you can more finely control things. If you have fingers, you'll play pick-up sticks better than playing it with your nose
- You need Broca's Area: has even more fine tuning you need for language. Because you don't have enough room to represent language on motor strip. So you buy some room on broca's area to set up shop for additional speech. This part is "expressive and motor speech." Ability to *articulate.* Allows you to say spaghetti instead of pisgeti.
- Wenicke's is in the temporal lobe and that's responsible for the recepting, you receive everything.
- If people seem to understand you but they can't articulate well, they have an issue with the Broca's area. It's a language area, in motor mostly, not exclusively. It's more complex than just motor.
- People who have damage to Broca's area do **spoonerism:** instead of "put your hat on the table" they say "put your tat on the hable" motor coordination issue. Spoonerism is the name of the syndrome you see when you have mild impairment in broca's area.
- **Frontal eye fields:** motor special because they move your eyes. They're involved in finding things that are interesting to you. Like the camera crew.
- you have motor function on motor strip and next to it, which is close to parietal lobe. But as you get close to frontal lobe, it's getting to the area of:
- **prefrontal lobe:** ours is larger than any other species. That explains the difference between us and any other species. It's also the area that is most likely to be injured in a car accident.
- Prefrontal lobe is an inhibitory area: it's capable of shutting off other areas.
    - If you have disturbing thought, you need it to say "stop thinking about it"
    - Inhibition is related to motion.
    - If you have issues here, you can't restrain yourself: therefore, kids can have:

ADHD:

- Problem with attention and hyperactivity
- They can't sit still. They have an inability to restrain themselves.

But with MS, it's progressive, so many slow down, and then overall all activity slows down. Like degeneration continues. Lets say there are 8 cells responsible for activation AP, 2 can be degenerative and still be fine because you only need 6 functional. But once you have 3 droping out /less myelin, it begins degeneration. But once that 6th and 7th get better, then the person enters **Remission** – symptoms disappear. But when someone gets back to regular, they don't get back to best place. Like coming out of wheel chair to walking slow. But before went to wheel chair they were walking *fast*
You don't lose all myelin at once, you lose it gradually.
Reduction of function – when you 'delay a train so all slow ones can catch this'

Aging: getting **methyl group** inactivated. You made all your teeth before you were born, (you see teeth if you take x-ray of baby's teeth) if you use them up=ruin them/don't take care, a methyl group sits on them and doesn't allow you to use it – stopping the gene from being useful. Can't activate them later. Only a shark can remake their teeth..
Working on science now to be able to remove methyl group. But don't want to remove too much, because we need our other limbs and stuff.
Another problem with myelin is not only building but attacking it in MS. Body attacks itself. When you eat meat, you don't attack it. you digest it and make it user friendly, you don't inject it in your blood as a foreign invader that needs to be fought off.
Pattern of methyl groups differ in identical twins even, which accounts for the differences between them.
Myelin is critical, necessary for nerves to conduct at fastest possible speed. When they can't, you lose function. Loss of function is like freeze of hand

Myelin functions like a **glia**
Cross talk: electrical field. If you're close to electrical field, something close will have action potential also , even if not intended.
To prevent cross talk, myelin insulates it. so myelin confines AP for each event and things don't involve each other. i.e.: you're playing pickup sticks, you don't want cross talk to accidentally make you move the wrong nerves/muscles. Myelin: keeps electrical field where it is. Doesn't let it jump.
Myelin is a **Glia cell.** Glia cells include astrocytes, myelin, ogliodendrites
Basic idea of glia cells: essentially they are a support network. They would give mechanical support = nerves can sit on them/pass through them. When there's an injury in a glial cell, they are 'behind the scene' clean up, make sure things are smooth.. etc.
Myelin: white matter in brain.
Gray matter= nerve cells that generate AP.
Now they know that glial cells are critically important.
Glial cells are like "dark matter in the world – 96%." Glial cells really run the show, so they're now trying to find out exactly what it does.
When they studied Einstein's brain, they found more glial cells. So we're thinking intelligence is more glial cells, not nerve cells. They also think glial cells regulate the overall tone of the brain.

After midterm:

about cones only now) if you put electrode in bipolar cell, shining light, you get an electrical response in bipolar cell, it keeps increasing the size of response in bipolar cell until you get out of the area which has nothing to do with the cell.

- **Receptive field (RF)**: that portion of space or surface of skin or sounds, (has to do with range of input) which can affect the given cell. so the cell has a receptor field, and that means if you put light anywhere in area above you'll get response in bipolar area, because they're connected.
- **Horizontal cell:** connected between bipolar cell and photo receptor.
- **image #1 on legal paper**
- horizontal cell was found because you make light larger or smaller, and it will still affect BPC (bipolar cell).
- horizontal cell: they have little, that reach out (inverted umbrellas) and some are huge (image #2) they are all round. Funnel part are connecting to BPC. Since they come in diff sizes, the number of PR coming down to BPC is based on size. Bigger the HC, more is coming down.
- Given PR will participate in many responses.
- But how do you get these images in brain when studying eye?
- RF in eye are circles
- Hc = reach out and collect input from a number of receptors
- The round shape of HC gives BPC called **center.** There are **on and off centers.**
- Some BPC respond to light by turning it on and some respond by turning it off – that's the off or on centers. Has to do with the way in which they connect with PR and layout of biochemical. (don't have to do know it)
- In nervous system, shutting on or off are both responses. Turning things off is as meaningful as turning it on.
- HC are umbrellas of all diff sizes.
- Next level, **ganglian cell** (image #3)
- Idea of PR: it's on hundreds of mailing lists. The mailing list is the HC.
- Ganglian celli s a nerve cell, apr to the Optic nerve, will have an action potential (AP)
- GC (ganglian cell) will have same center as BPC.
- All of sudden, when you move light out on top by PR will affect the GC.
- **Amacrine cell** has a net, which connects to the BPC (like big umbrella) it's same idea of HC, second level of that.
- Whatever the center is, the **surround** image #4)
- each cell only responds to a given size center and surround
- the only difference between all these cells is size.
- So it gets set up by all these diff layers.

Off center on surround: turns light when light is off = type of big black bug walking along a white surface, because it responds to dark part of object. It's size related. Dark center = black object. You need cells to see dark as well as light.

- Best target for this particular cell is exactly the size of the RF if target is bigger than size of cell, it gets shut off, but some other cell will respond to it. size of umbrellas set the shape of cell it will respond to
- Idea of: bigger your foot, the more people can step on your foot. If it's tiny, less ppl can step on it.
- There will be a foot that doesn't get you because it's off the size or shape of your foot. Sam with HC, there will be lights that are coming in but they wont get it because they're not there.
- You have another opportunity to get stimulated because the amacrine cell
- Every cell has its own amacrine, and has its own HC.
- So the GC sees circular field of on/off center, off/on surround.
- Best processing is in center of eye: fovia. It sees smallest things, you have to move your eye to track it.
- GC =optic nerve. That's what leaves your eye to go to your brain. From this, first stop:
- **Thalamus:** structure here: **lateral geniculate body/nucleus.** So it's LGB or LGN. (looks like knee on its side)
- Info from retina goes in. layers are in LG. some from left eye, some from right. 3 inputs from each eye, go into its own docking place. In total the LG has 6 layers. (don't worry about this info) some responds to detail analysis, and some responds to moving things
- We have different kinds of visual systems. It goes to diff places, idea of making cookies: first you make dough. You take some and make it red. Some you add walnuts. Others you process regular
- You have all the input from retina, goes into many docking station ins thalamus.
- Image #5 all the same type: on center off surround. No space between cells. But stip away the surround, imagine it's just center,
- This is on the eye
- Bunch of RF of same size.
- On eye, put bar of light. In thalamus, there's a cell that responds best to light 1,4,7,10. When light hits only these numbers, you get response in cell. if you move the bar of light, to move to middle, you get cells that see 2,5,8,11. It's another cell that sees these new numbers, cell sees bar of light that has line like quality, and if you move it over you get different cells
- And you can tilt it, so the cell that responds to numbers 1,4,8,12
- And if you tilt it another way, it will be another cell
- You can change orientation and there will be cell in thalamus that res ponds to it
- But the RF in thalamus is no longer a circle of light, it's a stretched oval.
- When you get to brain, and have three different lines, there's also a particular cell that connects to like 12 different numbers, we have three different strips lets say, of 4 numbers each. Image #6
- The above is all you see in visual cortex. There are rows and rows of cells where you see a particular width.
- Our visual systems/in our brain there are patterns of stripes.

- When nerve ends, it ends in axon terminals, but that's because it connects to another nerve. When it is connected to muscle, it's shaped in a specific way
- All muscles use a NT called **acetylcholine (ACH)**
- Once the ACH is spit out, so the answer is the ChE (cholinesterase) – and the ACH is denatured by ChE.
- We have NT coming in this area which will either excite or inhibit the muscle. It goes back to neuron after and then resynthesizes
- At this level lots of poisons work
- If you cause flood of ACH, you're guaranteed it will contract. But if you can't contract, you'll die. Or if you block ACH, you can't inhale, so you die. You're dead if you block ACH or ChE, you're dead. You need them both
- Because once you get rid of ACH, muscle relaxes. If you don't get rid of it, muscle remains contracted and you can't exhale.

Golgi tendon organs: have extremely high threshold, at the insertion of the muscle to the bone, and they are activated only at the point where you're about to rip muscle out. It inhibits all muscle action, so muscle just shuts down. That's why when you're losing in a wrestle, when you give up you can't really move your muscle for a bit: it's a reflex. It shuts the muscle down, it's the "straw that broke the camel down"

12.10.12

Stretch reflex: what puts the motor system together.

Muscles are connected to nerves (alpha MN) when excited, sends action potential (AP) to motor end plate which connects it to end plate

Neutrative relationship: more you use your muscles the more flexible and better they are.

Don't want limbs to attrify: waste away so you need to exercise the limbs

- There are diseases where receptors fail.
- Image on legal paper
- How does this come about/start?
- Muscle spindle is connected in parallel with a receptor, causing intrafusal fibar (IF)
- That means if one muscle contracts, so does the IF
- Only need one receptor. The one receptor is the IF we are going to focus on.
- Idea of chinese finger cuffs
- The IF is chinese finger cuff. If muscle contracts, it sets up actiavation of IF nerve to connect to alpha MN
    - stimulating the AMN will make muscle contract, which takes tension of IF, so that it can relax again.
    - You pull on the toy because your muscle is relaxing, it communicates to AMN and makes the muscle tighten.
    - Responsible for muscle tone
    - This goes on at all times
    - Nothing to do with volition – or voluntary movement
    - How do you decide you want to move?

- Your brain – motor cortex also synapses on AMN. You override stretch reflex, communicate directly to AMN and make muscle contract. It wont relax as long as you wish it to remain contracted. i.e.: carrying a baby. You continue to hold the baby until you don't need to anymore. You're sending messages to AMN to say "stay retracted. I need to hold the baby."

BASAL GANGLIA (BG)

- Whole bunch of structures
- Connected with motor behavior
- When there are diseases with the BG, there are motor related issues.
- They synapse on Gama MN. How does this affect motor system? How does it get into the action?
- There are little muscles in the IF that are connected to the gamma system, and therefore the muscles can be tightened independently.
- BG can control IF system.
    - One way to stretch on it by making it shorter by tightening the muscles
    - Or tightening rom muscle spindle.

Problem: disease in AMN, you get nothing. GAMA system will be destroyed too.

Also connected to this is your cerebellum (like steering wheel) without your cerebellum, you have a tremor. But as you get closer to the object, it acts on the AMN. Cerebellum does all the flips/turns, and coordinates it in your motor system.
When you drink too much alcohol, you'll see their cerebellum won't be fully in tact, they can't function properly.

LEARNING & MEMORY

- Clive wearing – man who has absolutely no memory, worst case of amnesia ever known.
- We learned a lot from men like Wearing. They were essentially the basis of memory.

Memory: relatively permanent change in behavior.
Learning: not unitary phenomenon. There are different kinds of learning. It's not a homogenous phenomenon, you could learn jokes, music, faces, acrobats, etc. for each type of challenge you think of, there are different processes and challenges you use. One person may remember one type of info but not others, while others can remember different types.

- We have different learning abilities
- It means there are different place sin brain
- Learning is helped by understanding. If you understand something, it's moor meaningful than when you don't. if you're watching a movie that's in another language, you won't remember.
- When you're learning something that you don't understand, you repeat it back verbatim
- When you do understand something – you can break it down in little pieces and resynthesize it in any way you want to.

STM is envisioned like this: bunch of nerve cells sending info to each other but they come back. This concept is called **reverberatory look, Hebb's theory.** like a volleyball game. One person catches the ball, throws it to another, who throws it to another, they're all in a straight line. So as long as the "ball is in the air, the memory is in tact, you're keeping it alive" another example: when you hear a phone number, as long as you keep saying it, you don't forget it because you keep repeating it. but if you forget, five minutes later you won't remember probably.

- It's an actual neural response
- While info is in this state – that it only exists as a round in volleyball game, you know that when ball drops, nothing remains.
- Info in this state is vulnerable to erasure
- Examples of things that will erase short term memory: head trauma (severe bang on head), or ECS
- So before info is truly encoded, it can be disrupted. It gets encoded when it becomes long term memory.
- Format of ECS is 2/3 shots a week, for people who are severely depressed and can't wait for the anti-depressants kick in.
- When you get ECS, your memory of what you have done right before (STM) is disrupted.

Robbins & Myer study

- Had animals do 2 diff tasks on 3 diff days
- Shock related task: animal did something and got shock
- Food related task: animal did something and got food
- So different sequences: some got food, all three shocks all three, or food-shock-food, etc. a bunch of different orders
- On day 3 after the animal finished the task, it got ECS that wiped out STM, so whatever they just learned will be obliterated. But what about what they learned on 2nd and 1st day? They lost whatever is similar what they just learned. If they just learned shock related task, they lost shock from 1st and 2nd days too. But if they just lost food related task, they also lost food related tasks from 1st and 2nd days.
    - i.e.: you have a notebook for one class. Spill coffee on biopsych notes. Coffee spilled will damage also yesterday's notes. While I have this class's notebook out, this notebook is vulnerable to damage. If I take out another class's notebook, it will be vulnerable to damage as long as it's out.
    - when you're remembering something, when animal finishes something it, it "takes out the right notebook to store the info – it take out LTM and store the STM there because its the right notebook

so first stage of memory is short term; it can be damaged, altered, etc.
when someone witnesses traumatic events, do they want it to go into long term memory? We can block memories. We can also develop **dissociations** - where we block some things but remember others.
Drug: **propanelol** people take that you can't retrieve a memory. People take this when they can be traumatized.

- As estrogen levels drop, you see more depressing feelings
- When women go through menopause, you see really depressed women (they used to think it's **empty nest syndrome)**
- Estrogen is also a precursor for serotonin
- When you increase these levels, you're happier
- NE, DA, 5HT (serotonin) – when you increase these, you're dealing with mood elevation. It's because each of these NTs target a different aspect of the emotion. All these are catecholamine's. Problem: there are side effects. Because your intestines also use the same NTs as your brain. So when you give to your brain, there are effects in your body…
- AcH (acetylcholine) also a NT in the brain, doesn't pass the BBB, the amount in brain ha nothing to do with your muscles. People with a lot of AcH in the brain are very violent. They find you get high levels in people who are abused/beaten as children.
- Can't ignore world of hormones and NT in emotions.

12.24.12

DEPRESSION

depression in biopsych isn't like someone broke your heart.. you're in despair. Depression is a subjective feeling about life. Others say get a grip, but something is wrong with their mechanism of feeling joy, I.E.: ability to feel joy

anhedonia: inability to pursue pleasure

depression isn't a feeling that lifts in a short amount of time.

- **Reactive Depression:** when you can describe a feeling. But what makes it pathological is the amount of item it goes on. Reactive depression is normal, but if it lasts too long, it becomes real depression,
- Seasonal Affective Disorder. SAD: people who get depressed when there isn't enough sunlight.
- Two things: what do you see in the person?
    a. Little motor – may be crying, thoughts of despair, internally they have a high stress reaction/lot of stress hormones going on. **Vegetative**. Don't eat much/ say much
    b. **Agitated**: someone who's very nervous anxious
- They can't get into happy feeling since they're not feeling happy now. i.e.: when its cold its hart to imagine what it feels like to be hot. Because you're so cold.
- There's a genetic basis, but people who have the gene to be depressed won't necessarily express it. it has to do with life events, it's a mixture of nature and nurture. Among the factors: accidents, loss of parents, early childhood trauma…

Different kinds of depression:

A. **Unipolar depression**: one pole. There's a self-littling amount of depression: people who are depressed will snap out of it. Duration will vary. You don't know the extent to which it will affect their lives.

- Mednick and Schvlsinger researched and saw that relatives of those with schiz are weird. May not be schiz but not socially normal. The gene is in the population. They can be influential with their magical theories, so they attract schizos, and that's why they keep the genes in the same pool because they are attracted to each other.
- M and S also looked at adopted children.
    - Biological parents with schiz – and adapted parent, huge number of schiz kids.
    - Biological parents without schiz – and adopted parents – not as much kids with schiz.
    - Biological parent schiz, adopted parent not – still a lot of schiz
    - Adopted parents aren't schiz, there's less
    - Biology seemed to explain most of data. If you carry gene for schiz, you're more likely to express it regardless of who your acting parents are.

Toxoplasmosis: parasitic type of creature that lives in cats. Starts in rats, picked up by eating infected stuffs, takes over brain of rat, and makes rat like the smell of cats (usually doesn't like cats because cats eat rats), which results in cats eating the rat. Once Toxoplasmosis is in cats, it can affect humans. That's why pregnant women must stay away from cats because they could have been affected with it. It's most damaging with fetuses – incidences of schizo goes up with being affected by toxoplasmosis.

LANGUAGE

- First feature of language: it's **acquired, system of symbols** (word doesn't have to have relationship to what it represents) we know this because different languages have different words for same thing. Rules for arrangement: grammar. Every language has it. people who study rules say they are standard, everyone picks up the rules.
- Many different forms
- Words being arbitrary: from Ramashandrin. You can say that words have some relationship to the object, he drew two pictures, named them Kiki and Booba, and most people picked the picture with more sharp edges for kiki, and the round one for booba.
- What constitutes language is more than what's spoken
    - Written
    - Auditory
    - Language you read – picture message (smiley faces)
    - Say
    - Gesture language – body language (sign language) there's even humor that can be incorporated into sign language
- Hall wrote book about body language. People communicate things by where they sit, set up their rooms, etc.

Advantages of language

- Can share knowledge
- Discuss things that are not in the present moment/physically here
- Corroborate with people/make tools

Some languages don't have anything more than 2, some don't have more than 5. They have lots of trouble in American society.

Does language shape your thoughts?

- Yes, the words you use do make a difference.

12.31.12

- People want to know if language is innate
- **Skinner & Chomsky:**
- Skinner- we learn it the same way we learn any other skill – being rewarded. Child gets rewarded with bottle by simply saying "ba" not the whole world "bottle"
- Chomsky: we have propensity to speak certain way. All babies babble, even if they're deaf. They pick up deep structure of language. They make the same mistakes: say mouses instead of mice. Fact that they learn these rules them and imply shows they're innate.
- Gene called **Fox P2** – different in animals and humans. There's a belief there's at least one gene that increases tendency to speak.
- Can you teach other species to talk? Not really. When they make sounds, it's sound bites – they may be intelligent but they don't have the capacity to manipulate words into a sentence.
- We know that in terms of language, the **brokers area (in frontal lobe, a motor cortex) carries out the sounds of speech. Further on Wernickes area in auditory (ears), it defines speech.** Unless 2 languages learned at same time and there is an overlap of area. This question of whether or not there are 2 areas and their functions re so discrete, has been challenged.
- Why? man named Marie looked at brains that broca looked at, and realized the damage is deeper. Maybe damage is due to **aphasia** = inability to speak. But what you see clinically is more likely **dysphasia =** speech is crumby. In brocas, they tend to have many other issues.
- In vernices, they use speech (babble) and then when you start to speak, they're silent. But when you ask a question they can't really understand if it requires deep understanding, if you ask them which pen has ink. To get a real lack of
- Interruption of fibers from one to another – some people have. So they can hear what you said but they can't generate an answer unless they used another circuitous root. Like if you ask where milk comes form, but they can do an intermediary step with your hands and then the word cow comes out. Some people can answer direct questions but they can't initiate answers.
- Many times if language is lost in a person young enough, they can redevelop speech int eh right side of the brain and start all over from babbling. If you reach adulthood and lose language, can't really get it back. If you learn a second language adult age, you'll always have an accent.