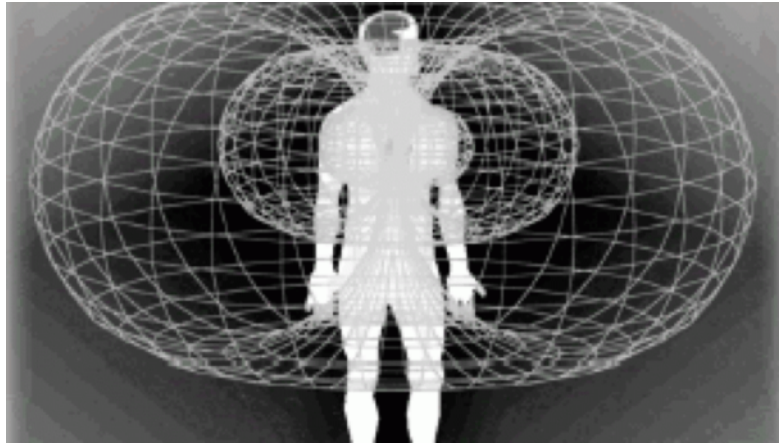


Foundations of Learning I

AI, Chaos, Dragons and Whales

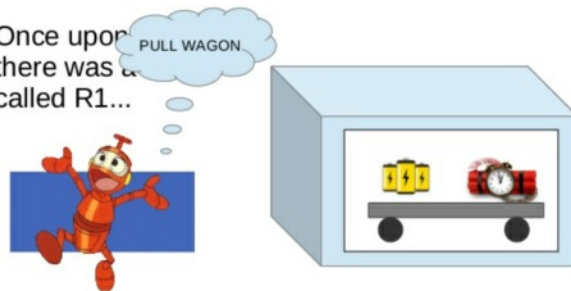


Frames - There has been a transformation in the last 40 years of how we look at the world. One view is that the world is made of objects. When you look at the world, you see the objects. As a consequence of seeing the objects, you think about what to do. After you think about what to do, you act. Now this seems self-evident, but there's a real problem with this idea. The first problem is that seeing is actually impossible....

You use half your brain to see. The visual cortex is a large part of your brain. As far as we can tell, the reason it's so large is that seeing is actually impossible. This fact wasn't discovered by psychologists or philosophers, it was discovered by people who were working on artificial intelligence (AI). Their presupposition was what to do once you see objects. However, it turned out that making machines that could "see" objects was impossible. The reason for that is that the boundaries between objects are not obvious. It's difficult to understand how we separate out things.

The frame problem in AI – part I (Daniel C. Dennett)

- Once upon a time there was a robot called R1...



"Cognitive Wheels: The Frame Problem of AI,"
in C. Hookway, ed., *Minds, Machines and Evolution*,
Cambridge University Press 1984, 129-151.

Consider what you do see when you look in the mirror. Do you see reality? Do you see the quantum level, the atomic level, the molecular level, the organ level, the interactions between you and your family, friends, society? When you look at yourself, you only see a certain level of

resolution. But all those other levels are equally real. How is that you see what you do see?

Almost nothing has obvious boundaries. The name for this problem, of how to limit and bound your perceptions, is called the **Frame Problem**. (Look up McCarthy and Hayes in 1969 and others such as Dennett, Fodor and finally Thielscher whom some believed “solved” the problem using fluent calculus in 2001). Everything is more complicated than what you see, so why do you see what you see?



The frame problem in AI – part III (Daniel C. Dennett)

- In sum, any action requires a large, a priori unknown, amount of world knowledge
- Hard to predict for the system designer
- Hard to deduce by symbolically by the system
- → need for common sense associations

For vision: it is hard to predetermine a priori the features and detectors that will be required.



The world isn't made out of objects, it is made out of relevance - things that you use (tools) and things that get in your way. When you look at the world, you see it through your frame of relevance, what you can do with it. In skiing, an expert may look at a black run and see a great line through the bumps. An intermediate

learner, might see impossible obstacles that are going to swallow him up and then shoot him into the trees. Understanding perception is foundational for understanding and helping people learn. What is relevant to them, in their world, is what they will see. Skiing is an open skilled sport and so much depends on awareness and perception - your experience will depend on how you can see things and what you do with them. Experience is real.



Chaos and Order - Chaos is all those things you don't understand, that exist outside your perceptual precondition. Order is the things that you do understand, the things that you do that produce the results that you intend. Everywhere you go, you have both. It's the chaotic things that attract your attention. Think about this in teaching skiing from the learners perspective. What can they do, what have they experienced and what is their chaos?

If something unexpected happens, your nervous system automatically reacts and orients to it. Your brain knows what to do. It stops thinking about the future, it puts you in emergency preparation mode, so you are ready to do anything because you do not know what to do. It shifts your cortisol levels up, activates your right and left cortices, your limbic and motivational systems are disinhibited and turned on. The orderly structure that you thought you inhabited, that provided you with security and direction, has disappeared. We don't want our clients to go into chaos to this extent... This is not setting up a learning environment!

The world is always this interplay between chaos and order. Learning is making order out of chaos that we voluntarily choose to approach. We all need to stand with one foot in order and one foot in chaos. There, we are secure enough to be confident, but not so secure to be bored. We are interested enough to be awake, but not so interested to be terrified. When you are in a state like

that, engaged, you find things meaningful, time slips by, you are no longer self-conscious. It is a place. We want to go there with our clients.

Dragons and Whales - How do you approach chaos if there is fear? You can get over fear by voluntarily approaching things you are afraid of. Physiologically, if I force you to accept a challenge, your body goes into that emergency preparation mode and you will become stressed. If I present you with the same challenge and you accept it voluntarily, your brain doesn't produce stress hormones and a completely different physiological system kicks in. Humans evolved two modes for dealing with the unknown. One is a voluntary approach, and the other is panic, paralysis and flight. We help people approach chaos by starting where they are, in their now, their reality, and having them decide how close to their chaos they can get. What can they add to what they can already do that will help them approach their chaos?

St. George and the Dragon - Dragons are strange creatures. First of all, they don't exist, or do they? They hoard gold and trap virgins in their lairs... very strange for a reptile. St. George goes out to confront the dragon. If you confront your dragon, you can get the gold! Sometimes a story like this is great for clients.



Another great story for you clients is **Jonah and the Whale**. The whale is what lurks underneath that can come up and swallow you. However, if you fall into the belly of the whale, you can come out the other side transformed. This is how we learn. Every time you learn something, it's because something you did didn't work. People have an incredible capacity to face and overcome things - like skiing a steep bump run or even the beginner slope.



(Next Up - Foundations of Learning II -*The gods that inhabit all of us*)