Video 12-5 Creativity

Hello everyone, welcome to the last video of the design segment. In the previous video lecture, we tried into get into Prof Holbo's head and mapped out what might have transpired in his mind as he was trying to solve the interpretation of his wife's version of a romantic poem. We also learnt that the ability to reframe problems is an important tool for creativity because it unlocks a vast possibilities of solution.

Well, lets end the design segment by putting your reframing and lateral thinking skills to the test, shall we?

Here's the problem you have to solve:

Imagine you are given the following items.

1. A candle
2. A box of thumbtacks
3. Matches

You are tasked to **fix and light a candle on a corkboard wall near you, in a way that the candle wax will not drip onto the floor.** How will you do it?

Pause the video now and give yourself some time to work out a good solution. Take as much time as you like. It's the last video after all!

Once you have a good solution, continue with the video.

What is your solution? Did you imagine trying to melt the candle with the matches and stick it to the wall? What a mess that would that have made!

Well, this test is called the **Duncker's Candle Problem**, created by Gestalt psychologist Karl Duncker in the mid 1940s. Most people who try to solve this problem get trapped in what is known as **"functional fixedness"** – a term he coined to describe the tendency to see things in terms of their conventional uses.

Functional Fixedness is another type of cognitive bias, like the Framing Effect in the previous video, which leads to difficulties in visual perception and problem solving. In this case it predicts that you will have viewed the box for the thumbtack only as a container for thumbtacks, and not perceived it as a separate functional component available to be used in solving the task. Here's the solution to Duncker's candle problem:

The solution is to empty the box of thumbtacks, use the thumbtacks to nail the box to the wall, put the candle into the box, and light the candle with the match.

Did you managed to (literally) "think out of the box" and achieved the solution? If you got solution you deserve an ice-cream. Go get one for yourself. Not now, after this video lecture please. If you did not managed to achieve the solution, not worries, don't judge yourself, failure is a route to success.

In the philosophy lecture (video 1-7), you were presented with a quote from Sylvain Bromberger, a philosopher of science and professor at MIT. It's from the introduction to his book *On What We Know We Don't Know* (1992), and I like to reiterate that here.

However, in seeking its goal science repeatedly runs into difficulties. Many of these difficulties are physical in nature and call for the design of new and more powerful instruments.
Others are psychological and call for the invention of devices that supplement our memory and our computational powers.
Still others, and those are the ones that are relevant here, are intellectual and pertain to our ability to conceive, formulate, consider, connect, and assess questions, and to our ability to conceive, formulate, consider, connect and assess answers.
These sorts of difficulties often call for inspiration and creative intelligence.
Careful observation and description are not enough.

In a nutshell (and pardon my simplification here), Sylvain Bromberger proposes that the different difficulties in science call for inspiration and creative intelligence as the solution. Creativity may help to design more powerful instruments, invent devices with computational powers, help us frames questions, and help us find answers.

Creativity is the key!

So what is creativity?

Well, creativity can be quite a mystery - academics who study it cannot fully agree with its definition and makeup, and almost every successful person in any domain as their unique take on it. Therefore, the descriptions used for creativity in the design lectures are not definitive, and the tests used to measure creativity are nothing short of limitations and assumptions.

Nonetheless, I hope that the previous lectures in the design segment has given you at least some clues and cues, and I believe its for you to uncover creativity best by taking a personal journey with it.

Ok ok, I hear your enthusiastic cry of insatiable questioning.

Since this is the last lecture of the Q pillar, I'll make one more move. Let me point out how an esteemed person in the area of creativity and education reforms, and who is still alive, describes creativity. In his book "Out of Our Minds, Learning to be Creative", Ken Robinson first describes imagination as being made up of two parts, the imaginal and the imaginative.

When we bring to mind some mental image, which is drawn from real experiences, they are **imaginal.**

But if you bring to mind something that you have no direct experience, creating a mental image that is composed in your mind rather than recalled, they are **imaginative**.

Imagination covers both imaginal thoughts and imaginative thoughts.

Ken Robinson goes on to propose that:
"the creative process is rooted in imaginative thought, in envisaging new possibilities. But creativity goes further. Imagination can be an entirely private process of internal consciousness. …and may have no impact in the public world at all. But creativity does. In a sense, it is applied imagination.

To call somebody creative suggests they are actively producing something in a deliberate way. A first definition of creativity then is imaginative processes with outcomes in the public world."

Let me make some points following this chain of thought. First of all, you are a creative person as long as you have an imagination. Unlike popular belief, creativity is not an exclusive ability restricted to a special set of people.
Secondly, creativity does not happen in a vacuum of inactivity. Your ideas, however brilliant, if they stay in your mind you will be considered imaginative at most. To be creative you will have to apply your imaginativeness to produce an outcome in the public world.

Throughout the segment lectures and tutorials in the Q pillar, you must have observed instances of people being creative in different fields. In philosophy, physics, computing, engineering, economics and in design. In each of these areas, creativity has brought forth breakthroughs, invention, and innovation.

In Physics, for a long time Isaac Newton and everyone thought that time is an absolute concept. This means that time is the same for everywhere for everyone. People in all places share the same time. Don't you agree? Well, Einstein questioned this principle and discovered that this idea is wrong. Time is a relative concept and not absolute at all! And this has been verified many times by experiments. For instance, a person's watch at rest (on the MRT platform) will show a different time when compared to a watch worn by a person moving smoothly in a MRT train!

In the field of computational thinking, Chris Chia at the National Library Board (NLB) in Singapore invented EliMS. I'm not sure if you are too young to remember, but before 1988 there were often long queues at library counters to borrow and return books, and this problem was compounded near closing time. Instead of regarding this problem as a service, manpower or scheduling issue, the NLB looked to radio frequency technology and tagged every book with a RFID chip, so that it can be scanned quickly or returned to a book drop, with the Electronic Library Management System (EliMS) managing the lending and returning of books. Wala!

In the field of Engineering, the quest of flight has been a dream of mankind to conquer the third dimension. Although Leonardo da Vinci drew many sketches of flying machines, they were never created, at a time when nobody imagined man could take to the skies. However, the Wright brothers (Orville and Wilbur), after trying to control the flight of kites by twisting their wings, invented the first plane with a propulsion system that would create the thrust needed to fly. Modern airplanes are all based on the first flights by the American Brothers.

In the field of economics, Alvin Roth is an economist who moved into designing markets for matching people. Kidneys for transplant are in short supply because you can't buy or sell them or create binding contracts for transplants. For each patient there is often a willing donor, usually a spouse or a relative, who may not be compatible. However, by using two pairs of incompatible donors, Roth helped design ways to make matching these pairs of donor-patients – such that Patient A gets donor B's kidney while Patient B gets donor A's kidney. The transplant operations were done simultaneously. He won the 2012 Economics Nobel Prize along with mathematical economist Lloyd Shapley who wrote the algorithm on which Roth first adapted.

In design, there's a story of Doug Dietz, an industrial designer at GE healthcare for more than 20 years. He leads the design and development of high-tech medical imaging systems. One day, he got a chance to witness the use of a new magnetic resonance imaging (MRI) machine that he has just spent two and a half years working on. On this occasion he saw a little girl crying on her way to the scanner with worried looking parents. For the first time, he saw the MRI experience through the eyes of the little girl. Rather that a big, sleek piece of complex technological wonder, the MRI was one big scary machine she had to go inside.

Inspired by this experience, Doug redesigned a new MRI machine for pediatrics by transforming the MRI suite and experience into a kid's adventure story with young patients in a starring role. The redesign made big impacts. Patient satisfaction scores went up 90 percent and children do not suffer the anxiety before scans anymore. Scans became more successful with less scans needing to be repeated as children could hold still during the procedure, and it reduced the need for anesthesiologists which means more patients could get scanned each day. In fact, Doug's biggest reward came while talking with a mother whose six-year-old daughter had just been scanned in the MRI "pirate ship." The little girl came over and tugged on her mother's skirt. "Mommy," she asked, "can we come back tomorrow?" That simple question made all his effort worthwhile.

With that, I shall end the last video lecture of the Questioning Pillar.

Any Questions?