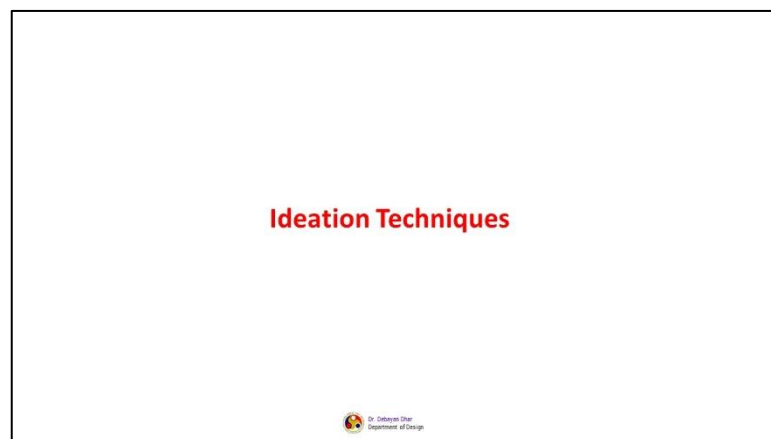


**Usability Engineering
Dr. Debayan Dhar
Department of Design
Indian Institute of Technology, Guwahati**

**Module - 09
Lecture - 31
Conceptualization and Prototyping I**

Welcome to module 9, lecture number 31. In this session, we are going to continue discussion on various ideation techniques. In our last lecture you have observed, we have talked about a very specific technique which is this scamper technique. Now, from being more specific, we would now talk about the various approaches and you would understand that one of the techniques that we have already discussed that is scamper is part of one of the approaches that we are going to discuss today.

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So, let us start discussing about these various approaches.

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Divergent Thinking

- Divergent thinking is an ideation mode which designers use to widen their design space as they begin to search for potential solutions. They generate as many new ideas as they can using various methods (e.g., oxymorons) to explore possibilities, and then use convergent thinking to analyze these to isolate useful ideas.



Dr. Debprasad Ghose
Department of Design

We start by discussing about divergent thinking. Now, you would often hear designer's talk about divergent thinking. So, by divergent thinking, it is meant that it is a technique, it is an ideation technique wherein designers use to widen the design space as they begin to search for potential solutions.

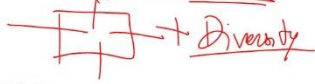
Now, when we see designed space, you remember that we are referring to the space that we have already talked about, the aesthetic space, the functional space and the human factor space and we are talking about this space where the intervention has to happen right. So, now, designers generate as many new ideas as they can using various methods to explore possibilities and then, use convergent thinking to analyze these to isolate useful ideas.

See if you remember in the initial stages of this module, we did discuss about that the core philosophy behind the ideation phase, the first ideation phase is that we need to come up with as many ideas as possible. The focus is not on the quality of the ideas, rather the focus is on quantity of the ideas. Once we are assured of the quantity of the ideas, then we can go selectively focusing on individual ideas and use convergent thinking to further detail out those ideas for useful intervention.

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Divergent Thinking

- The formula for creativity is structure plus diversity, and **divergent thinking is how you stretch to explore a diverse range of possibilities for ideas that might lead to the best solution to your design problem.** Divergent thinking is valuable when there's no tried-and-tested solution readily available or adaptable. To find all the angles to a problem, gain the best insights and be truly innovative, you'll need to explore your design space exhaustively. Divergent thinking is horizontal thinking, and you typically do it early in the ideation stage of a project.



Dr. Ashish Shah
Department of Design

Now, the formula for creativity is structure plus diversity so, there needs to be a structure and that is what we are going to talk about, a structure plus diversity that is what we are focusing on when we say we are talking about creativity and divergent thinking is how you stretch to explore diverse range of possibilities for ideas that might lead to the best solution to your design problem.

See the situation before the designed team is very critical and why it is critical? Because we have defined a problem, the requirement that we have identified has presented us with an opportunity where we intend to intervene and conceive a solution that is our objective.

Now, solution does not come instantaneously, solution will come only when we start the process of ideation, we enter into the creativity phase, we start using our creative potential to come up with various ideas and then, we need to take baby steps in seeing those ideas for identifying the potential candidate for fitting into those problem statement right. So, therefore, the idea is to identify diverse range of possibilities of ideas that might lead to the best solution, the focus is best solution.

Now, divergent thinking is valuable when there is no tried and tested solution readily available or adaptable. To find all the angles to a problem gain the best insights and be truly innovative, you will need to explore your design space exhaustively, exhaustively means it is not preliminary stages of ideation, but you need to spend all the available avenues through which you can come up with ideas.

Divergent thinking is horizontal thinking. So, this is where I would like to draw your attention. Divergent thinking means horizontal thinking and you typically do it early in the

stage of ideation. So, whenever you start your ideation phase, you go for a horizontal thinking's right and this is at the initial stage of the ideation process.

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Divergent Thinking

- Divergent thinking is characterized by:
- **Quantity over quality** – Generate ideas without fear of judgement (critically evaluating them comes later). *quantity vs. quality*
- **Novel ideas** – Use disruptive and lateral thinking to break away from linear thinking and strive for original, unique ideas. *UX*
- **Creating choices** – *The freedom to explore the design space helps you maximize your options, not only regarding potential solutions but also about how you understand the problem itself.*

Dr. Siddhant Dhar
Department of Design

Now, divergent thinking is characterized by these important characteristics, and these are quantity over quality, the first preamble of ideation that we have discussed long back. Generate ideas without fear of judgement critically evaluating them comes later. So, this will come later not now, the focus is on quantity, numbers of ideas and not quality right now, I am not saying that we would not go for quality, what I am trying to mean is that the current objective as the initial stage is to go for quantity.

Second, novel ideas. Use disruptive and then lateral thinking to break away from linear thinking and strive for original unique ideas. See once you have a variety of ideas, you have a lot of ideas, you can then start identifying one idea at a time and go into the depth of its detailed characteristics. You can also use that is what we are calling us you know lateral thinking to break away and focus on that particular aspect and strive for original and unique ideas, we will discuss about that later in the subsequent slides.

Then, creating choices. So, the freedom to explore the design space helps you maximize your options, not only regarding potential solutions, but also about how you understand the problem itself.

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Divergent Thinking

Techniques

- ↑ *Bad Ideas* – You deliberately think up ideas that seem ridiculous, but which can show you why they're bad and what might be good in them. *understanding*
- *Oxymorons* – You explore what happens when you negate or remove the most vital part of a product or concept to generate new ideas for that product/concept: e.g., a word processor without a cursor.
- *Random Metaphors* – You pick something (an item, word, etc.) randomly and associate it with your project to find qualities they share, which you might then build into your design.

won't work

Dr. Debashis Ghose
Department of Design

Now, some of the techniques that are often used at this early stage of divergent thinking are the first one is listed here is the bad ideas, the name itself is very familiar, I mean you would be able to understand what do we mean by these bad ideas.

Now, you deliberately think up ideas that seem ridiculous, that is the objective you know you start with thinking ideas that are absolutely disastrous, absolutely ridiculous, but which can show you why they are bad so, the idea is to get yourself with a unique understanding about why that idea would not work right.

See so, we are going from an antithesis perspective, we are working here as the devil's advocate, we are we are striving towards gets getting an idea that is essentially bad that is what we consider as bad. So, the moment we consider something as bad, we know why it is bad isn't it? We know the characteristics of that product or that concept that makes it being categorized as bad. So, we want to know and define those characteristics.

So, when I mean define it means that all these are internal approach and processes that happen simultaneously. I essentially do not mean that you would use a paper and write down what do you mean by defining the characteristics no, that is not the goal, the goal is the moment you start identifying bad ideas, you realize the weak links, the weak characteristics that make an idea fall flat, you know evoke negative experience.

So, and you then know that what might be good in them, you also know. So, the moment you have a idea that is not working or that you feel bad, you know that you know that these are the characteristics that are making this idea bad, you are also aware of the

characteristics which are not making them bad; that means, that potentially may lie in the good zone ok.

Then, we have the oxymorons. Now, you explore what happens when you negate or remove the most vital part of a product or concept to generate new ideas for that product concept example, a word processor with a cursor. Now, see the oxymorons are a very very interesting technique to generate ideas. You probably have a product, you probably have an existing product and you know that in this product, this is the unique feature of the product.

Now, instantaneously, if you start thinking that what happens if I remove this unique feature, what would happen with this product, how it would be used by people, you would see the entire concept of this product would start gradually changing that is what we are calling as oxymoron.

Example, you have opened the word file, but you do not have a cursor; you do not have a cursor so, you are not sure in which line in which sentence you are there to type you know the guiding, the guiding structure or the scaffolding technique that is there to guide you to write for the sentences are not there right.

So, these are very powerful techniques for you to come up with alternative concepts of products, products that might you know be very very powerful, I am not saying that it always it will be a useful way to come up with ideas, but you can try it out and see if that gives you a lot of ways to come up with unique and novel ideas.

Third one is one of the most interesting and fascinating personal to me is random metaphors. See you pick something an item, it may be a word, it may be a concept, it may be a picture, whatever it may be randomly and associate it with your project to find qualities they share which you might then build into your design.

Say for example, I am designing a pen ok, I intend to design a pen, I want to design a writing instrument essentially. Suddenly, I there is a flower that comes in my mind and then, I want to associate that flower or the qualities of the flower with the writing instrument and I would try to see what are the essential qualities of flower, how we can interpret flower, how I can interpret you know writing and then, how I can forge


relationship between them or how can associate them in order to make a meaningful product out of it, these are called random metaphors.

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Divergent Thinking

Techniques

- *Brilliant Designer of Awful Things* – When working to improve a problematic design, you look for the positive side effects of the problem and understand them fully. You can then ideate beyond merely fixing the design's apparent faults.
- *Arbitrary Constraints* – The search for design ideas can sometimes mean you get lost in the sea of what-ifs. By putting restrictions on your idea—e.g., “users must be able to use the interface while bicycling”—you push yourself to find ideas that conform to that constraint.

 Dr. Debayan Dhar
Department of Design

Brilliant designer of awful things very interesting. So, when working to improve a problematic design, you look for the positive side effects of the problem and understand them fully. You can then ideate beyond merely fixing the designs apparent fault.

So, what happens that when you are looking at it problem situation, a scenario that has the problem, you are not essentially looking at the problem with its negative effects, but you are looking at the problem with the positive aspect of the situation that is being brought into, there is an issue with the way somebody or an interface a ticket is booked or an online transaction is made.

Now, we know the frustrations and the negative experiences it may cause, but if we look at this situation at this problem statement from positive aspect, from positive perspective that what does it add value in. If I look it to it in and that way, how does it bring in value, this may also give you a lot of ideas to come up with meaningful innovative ideas.

Then, arbitrary constraints. See the search for design ideas can sometimes mean you get lost in the sea of what ifs. So, this question many a time you would see the designers asking this question what if this does not work? What if this happens? What if that changes into this? What if this absolutely vanishes? So, what if questions are very powerful ways to come up with ideas. So, by putting restrictions on your idea, example user must be able to use the interface while bicycling.

So, now you have a constraint, you know there is there are ample literatures that suggest that when you give constraints, when you have constraints, there are novel ideas or unique ideas are generated much frequently, irrespective to a situation which does not have constraints.

So, if you put a constraint to the situation that ok, I have the problem now, for me the problem is I want a ticket booking interface that can be used for people who have problems in the vision or who are semi-blind or you know colour-blind or any issues with their vision, these kind of forced constraints would lead you, would lead to much more insightful ideas and you actually push yourself to find ideas that conform to that constraint right that is about arbitrary constraints.

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Convergent Thinking

Convergent thinking is an ideation mode which designers use to analyze, filter, evaluate, clarify and modify ideas they have generated in divergent thinking. They use analytical, vertical and linear thinking to find novel and useful ideas, understand the design space possibilities and get closer to potential solutions.

Dr. Siddhant Dhar
Department of Design

Now, from divergent thinking, the next technique that we are going to discuss is convergent thinking. See at the initial stage, we start with divergent thinking because the focus is on more ideas and now, the next stage is convergent thinking. So, convergent thinking is an ideation mode which designers use to analyze, filter, evaluate, clarify and modify ideas.

See what you see here is designers used to analyze, filter, evaluate, clarify, modify ideas; that means, this has already been generated, generated by can you guess? By the technique that we have already discussed divergent thinking right. So, the first stage when we are focusing on quantities is about divergent thinking, the second phase is focusing on quality which is on convergent thinking. These are the essential differences between or approaches to ideation techniques right.


So, at this stage where we are concerned about the quality, what we do? We analyze, we filter, we evaluate, we compare, clarify, modify, we use all these approaches to ensure that we are working towards more detailed informed ideas right. So, designers use analytical, vertical and linear thinking to find novel and useful ideas, understand the design space possibilities and get closer to potential solutions.

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Convergent Thinking

After design teams generate as many ideas as possible in the divergent thinking part of ideation sessions, convergent thinking helps them systematically see whether their ideas might work as real-world solutions. The structure is to:

- **Sift** through ideas.
- **Group** them into themes.
- **Find** common threads.
- **Decide** on winners and losers.

 Dr. Debayem Dhar
Department of Design

So, after the design teams, generate as many ideas as possible in the divergent thinking part of ideation sessions, convergent thinking helps them systematically see whether their ideas might work as real-world solutions, or they do not work. So, here the focus is on the concepts whether the concepts are reliable enough to be implemented, whether they can be detailed out and can be taken into the realization state that means, when the product is developed.

So, the structure for convergent thinking is this sift through the ideas that means, you take the best one filtration, group them into themes now, you are grouping them into themes according to the functions, according to the characteristics, according to the their genres who can group them, affinitize them, find common threads, decide on winners and losers, you can use some markers to do that.

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Convergent Thinking

Convergent thinking helps tighten your focus when evaluating each idea. → *quality* → *parameter*

Examine your ideas from the perspectives of:

1. **Desirability** – “Would users want this?” (Or would they fear accidents, hacking, theft, etc.?)
2. **Viability** – “Could a brand mass-produce and support it?” (Or would it be unsustainable/too expensive?)
3. **Feasibility** – “Is it doable?” (Or would security, sensory and emergency-backup features take years/decades to perfect?)

Then, considering state-of-the-art technology and other factors, you might abandon this idea as impracticable or shelve it for future consideration.

Dr. Siddhesh Shear
Department of Design

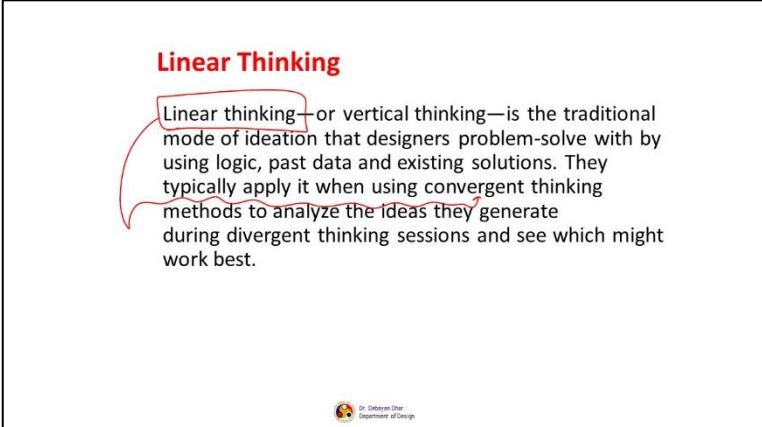
Now, convergent thinking helps tighten your focus when you when evaluating each idea. So, the focus is tightened while you are evaluating each idea in terms of its quality. So, the parameter of focus is the quality. So, how do you do that? Now, you examine your ideas from the perspective of what? Some of these parameter's: desirability, viability and feasibility. By desirability we mean what? Would my users want this product? Want this idea or would they fear of accidents or hacking or theft? We evaluate ourselves; we ask these questions.

Viability, could a brand mass produce and support it? Can this; can this product be sustained, is it serviceable? Can this entire system architecture be taken up and maintained and if any errors happen, can it be supported? Feasibility, is it doable? Or would security sensory and emergency backup features will take years, decades to get perfect?

So, the feasibility concept. So, these are some of the most important characteristics rather parameters I can say that you use to identify the quality attribute of your ideas at the convergent thinking stage.

So, then, considering state of the art technology. So, you might like to consider a discussion with some of the technologist, some of your development team also and other factors because it might help you abandon probably, a particular idea which may not be which may be impracticable now or you may keep it for future consideration right.

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Linear Thinking

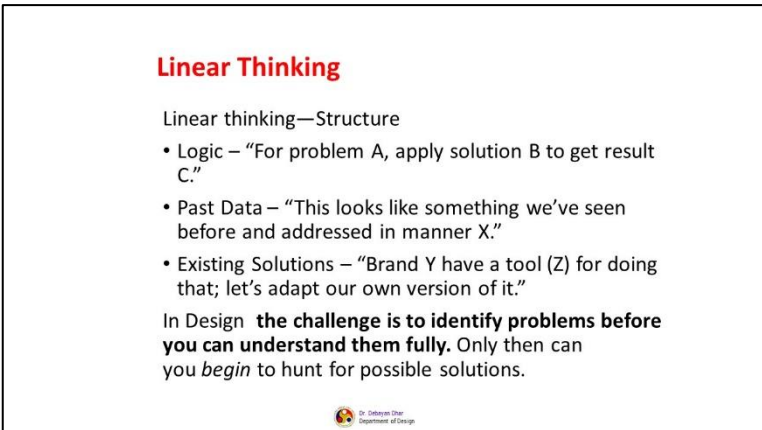
Linear thinking—or vertical thinking—is the traditional mode of ideation that designers problem-solve with by using logic, past data and existing solutions. They typically apply it when using convergent thinking methods to analyze the ideas they generate during divergent thinking sessions and see which might work best.

Dr. Debanshu Shee
Department of Design

So, until now, what we discussed was the first stage divergent one, the second stage being the convergent thinking. Now, we are entering into more specific zones which we call as linear thinking or vertical thinking, more specific convergent thinking stages, these are part of convergent thinking stages.

Now, linear thinking or vertical thinking is the traditional mode of ideation that designer's problem solve with by using logic, past data and existing solutions. They typically apply it when using convergent; convergent thinking methods to analyze the ideas they generate during divergent thinking and see which might work the best. So, linear thinking is a technique of is an approach that is used in convergent thinking.

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Linear Thinking

Linear thinking—Structure

- Logic – “For problem A, apply solution B to get result C.”
- Past Data – “This looks like something we’ve seen before and addressed in manner X.”
- Existing Solutions – “Brand Y have a tool (Z) for doing that; let’s adapt our own version of it.”

In Design **the challenge is to identify problems before you can understand them fully.** Only then can you *begin* to hunt for possible solutions.

Dr. Debanshu Shee
Department of Design

Now, what is the structure of linear thinking? The first one is logic. So, logic by logic I mean say for problem A, apply solution B to get result C that is a logic. It can also be

dependent on past data say this looks like something we have seen before and addressed in manner X. So, you remember to a past situation and then, you define how what needs to be done. Existing solutions brand Y have a tool for doing that let us adapt our own version of it that is getting inspired from existing solutions and trying out in your own design space.

So, in design, the challenge is to identify problems before you can understand them fully. See there is a saying in design that if the problem is correctly defined more than half of your solution is achieved. Correct definition, correct perspective to the problem is very important.

So, the challenge here is to see or identify your problem from the correct perspective, then only you would be able to capitalize on that perspective to come up with ideas so, only then you can begin to hunt for possible solutions so, the word is hunting for possible solutions.

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Linear Thinking

How to include it ?

1. Get disruptive to maximize your views of a situation and explore all possible angles and options through these closely related ideation modes and the methods they involve:
 - Divergent thinking – Go for quantity over quality, novel ideas and creating choices.
 - Lateral thinking – Focus on overlooked aspects, challenge assumptions and find alternatives.
 - Outside-the-box thinking – Understand what's limiting you and why, find new strategies to approach the problem and explore the edges of the design space.

Dr. Debayan Dhar
Department of Design

And how do you include linear thinking? You include by getting disruptive see. So, the word is you get disruptive to maximize your views of a situation and explore all possible angles and options through these closely related ideation modes and the methods that involve; that involve divergent thinking that we discussed earlier.

Then, that means, we are going over quantity, then we are going for lateral thinking which we are going to discuss focus on overlooked aspects, challenging assumptions and finding alternatives and then, thinking outside of the box that means, understand what is limiting


you and why, find new strategies to approach the problem and explore the edges of the design space.

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Linear Thinking

How to include it ?

2. **Arrive at a place where you can reframe the problem** and see the many factors affecting the situation, your users, other actors, etc., in a new light. This happens after you've harvested vast quantities of ideas through methods such as brainstorming. You have your novel ideas; it's time to leverage convergent thinking to:
 - Divergent thinking – Go for quantity over quality, novel ideas and creating choices.
 - Lateral thinking – Focus on overlooked aspects, challenge assumptions and find alternatives.
 - Outside-the-box thinking – Understand what's limiting you and why, find new strategies to approach the problem and explore the edges of the design space.

 Dr. Debayan Dhar
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2nd, arrive at a place where you can reframe the problem. See we have discussed about reframing perspective. You if you remember the four quadrants that we talked about, the four P's and see the many factors affecting the situation, your users, your actor's etcetera in a new light and this happens after you have harvested vast quantities of ideas through methods such as brainstorming or brain dumping if you are doing an individual project.

You have your novel ideas now; it is time to leverage convergent thinking to do what focus on these characteristics. Many a time, what happens you have say unique ideas, you again repeat divergent thinking so, taking one aspect, one attribute of a particular idea or a strain of that particular attribute, you again go for divergent thinking techniques. You can mix again the lateral thinking ability also and can think out of the box approaches so, again this is repeated.


So, the idea is you can mix all these techniques in a way that it becomes going for quantities at sometimes and going for qualities, going for quantities and going for qualities, a mix of convergent and divergent techniques, until it becomes exhaustive in nature.

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Linear Thinking

How to include it ?

3. **Look past logical norms** (e.g., when you notice yourself thinking “This solution won’t work because the world doesn’t work that way.” and reconsider the idea.)
4. **See how an idea stands in relation to the problem.** (E.g., “A jamming app will treat one symptom of voice-controlled device spying.”)
5. **Understand the reality/dimensions of that problem.** (E.g., “The user’s location, which can change relatively easily, should be the focus.”)
6. **Determine the best criteria to judge the idea with.** (E.g., “What would we be demanding of the phone user to do versus what inconveniences would be imposed on others nearby?”)

 Dr. Debprasad Ghose
Department of Design

Look past logical norms. So, when you notice yourself thinking that this solution would not work because the world does not work because the world does not work that way, you need to reconsider the idea because you were stuck by a window, an idea which is being influenced by the society, relook at that idea. See how an idea stands in relation to the problem. For example, a jamming application will treat one symptom of voice control device spying. So, you need to see these kinds of ideas in relation to the problem context.


Understand the reality, dimensions of that problem, a problem can be identified in multiple dimensions. For example, the user’s location which can change relatively easily, should be the focus. So, if somebody is in a particular location, this context is different. If he is changing the location, that context is getting different, how the change in context affects the experiential state of the person, how does that environment changes, how do the problem itself changes dynamically because of the spatial changes right.

Determine the best criteria to judge the idea with. Example, what would we be demanding of the phone user to do versus what inconveniences would be imposed on others nearby? See from the from a individual user to a community of user right from a network of user. So, looking from one user perspective, one persona and then, you are also looking from the effect it will have in the community where the system will operate and you need to be the best judge to decide on these criteria’s, to decide on the various perspectives that would allow you to come up with ideas.

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Lateral Thinking

Lateral thinking (horizontal thinking) is a form of ideation where designers approach problems by using reasoning that is disruptive or not immediately obvious. They use indirect and creative methods to think outside the box and see problems from radically new angles, gaining insights to help find innovative solutions.




We will now talk about lateral thinking very quickly. See lateral thinking means horizontal thinking, it is a form of ideation where designers approach problems by using reasoning that is disruptive or not immediately obvious. So, designers use indirect and creative methods to think outside of the box and see problems from radically new perspectives, absolutely new dimensions and angles, gaining insights to help find innovative solutions.

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Lateral Thinking

- lateral thinking comes in – essentially thinking outside the box. “The box” refers to the *apparent* constraints of the design space and our limited perspective from habitually meeting problems head-on and linearly. Designers often don’t realize what their limitations are when considering problems. Rather than be trapped by logic and assumptions, you learn to stand back and use your imagination to see the *big picture*. For this you should
- **Focus on overlooked aspects of a situation/problem.**
- **Challenge assumptions** – to break free from traditional ways of understanding a problem/concept/solution.
- **Seek alternatives** – not just alternative potential solutions, but alternative ways of *thinking about problems*.



See lateral thinking comes especially you know means thinking outside of the box and the box that we are saying is the way you have defined your reality. So, it refers to the apparent constructs or the constraints of the design space and our limited perspective from habitually meeting problems head on and linearly.

See designers often do not realize what their limitations are when considering problems. So, rather than be trapped by logic and assumptions, you learn to stand back and use your

imagination to see the big picture. Now, this is a very important aspect based from a situation that being a designer you in months, in years, in quarterly times you come up with multiple projects, you work in multiple projects and it becomes a random activity.

So, because of this randomness in this activity, the idea of reality around you, the way you solve the problem becomes so generic that the concept of novelty is lost. So, you tend to solve a problem almost in the same project in the same way. So, during this time, it is important for you is to stand out, take some break from that situation and look at the situation from a bigger perspective, different dimensions and see how the entire definition of the concept of the problem changes.


Focus on overlooked aspects of a situation or problem. Challenge assumptions, to break free from traditional ways of understanding a problem, concept, or a solution. Seek alternatives, not just alternative potential solutions, but alternatives ways of thinking about the problems.

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Lateral Thinking

When you do this, you tap into **disruptive thinking** and can turn an existing paradigm on its head

- Uber – Instead of investing in a fleet of taxicabs, *have drivers use their own cars.*
- Rather than focus on channeling more resources into established solutions to improve them, these innovators assessed their problems creatively and uncovered game-changing (and life-changing) insights.

 Dr. Debayan Dhar
Department of Design

And when you do this, you tap into the concept of disruptive thinking, and you can turn an existing paradigm on its head example Uber. Instead of investing in a fleet of taxicabs, hiring taxis or buying taxis, you they have invested on drivers because drivers have their own cars so, you connect the drivers and you will get the cars automatically.

So, rather than focus on channeling more resources into established solutions to improve them, these innovators assessed their problems creatively and uncovered game-changing or life changing insights. The same example can be applied for here b and b. They did not targeted acquiring brick and mortar hotels or living spaces, they targeted people who own

these spaces and the targeted people by looking at them how they can earn revenue from the space they own and that is what the magic happened.


So, if you tend to look at the situation from different dimensions, from different perspectives, that may lead to the concept of what we have been discussing about that is disruptive thinking.

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Lateral Thinking

Stages of ideation

- **Understand what's constraining you and why.**
- **Find new strategies to solutions and places/angles to start exploring.**
- **Find the apparent edges of your design space and push beyond them** – to reveal the bigger picture.
- You can use various methods. A main approach is **provocations**: namely, to **make deliberately false statements about an aspect of the problem/situation**. This could be to **question the norms through contradiction, distortion, reversal** (i.e., of assumptions), **wishful thinking or escapism**, for example:

 Dr. Debayem Dhar
Department of Design

Now, stages of ideation for this is understand what is constraining you, what are your constraints and I am talking about the ideation process and why do you think it is a constraint. Find new strategies to solutions and place perspectives or angles to start exploring the problem space from multiple dimension.

Find apparent edges of your design space and push beyond them to reveal the bigger picture. You can use various methods. A main approach in provocations namely, you know to make deliberately false statements about an aspect of the problem situation, you make a false statement and this could be a question, this would lead to question the norms through contradiction, distortion, reversal, wishful thinking or escapism.

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Lateral Thinking

Problem: Educating kids is expensive, labor-intensive, time-consuming and hard to forecast a good curriculum for in a volatile job market.

Provocations:

- Just let them read textbooks at home and evaluate/grade/mark their own work.
- Invent computer biochips that contain everything they'll need to know and surgically implant these in their heads.
- Ask them what career they want when they're 5-year-olds and guide their studies so they can start (e.g.) technical college as 10-year-olds.

Dr. Debashis Ghose
Department of Design

I will give you an example. Like this say the problem is educating kids is expensive, labor-intensive, time-consuming and hard to forecast a good curriculum for in a volatile job market. Now, the provocations can be just let them read textbooks at home and evaluate grade mark their own.

So, this is a; this is this problem if you see the way the problem has been defined is what we have been talking about provocations, making deliberately false statements about an aspect of the problem of the situation or the norms through contradiction, distortion, reversal, wishful thinking.

Yes, education is costly, is expensive, but then, these are wishful thinking's that have been used to define the problem and you see what provocations can come up now thus, let them read textbooks at home and evaluate grade mark their own mark work. Invent computer biochips that contain everything they will need to know and surgically implant these in their heads you know weird ideas.

Ask them what career they want when they are 5-year-old olds and then guide their studies so that they can start example technical college or go for a technical degree as early as when they are 10-year-old.


See when you look at the provocations, they give you an entirely different perspective on how if you do not use that the way you have defined the problem or these provocations may lead to further new ideas you know necessarily not the provocation has to be accepted as an idea, but they can lead to further unique ideas that can be implemented.

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Lateral Thinking

Techniques:

Bad Ideas – You think up as many bad or crazy ideas as possible, but these might have potentially *good* aspects (e.g., helping children specialize in desired subjects earlier). You also establish *why* bad aspects are bad (e.g., inserting biochips would be a gross violation of human rights).




Some of the other techniques such as bad ideas which we have discussed earlier also. So, you think up as many as bad or crazy ideas as possible and this might have potentially good aspects. So, you also become aware of the bad aspects, you also become aware of the good aspects and you also establish why bad aspects are bad like you know we talked about inserting biochips would be a gross violation of the human rights right.

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Lateral Thinking

Techniques:

- Random Metaphors
 - Randomly pick an item near you or word from a dictionary and write down as many aspects/associations about it as possible. E.g., “Exhibition” – “visitors walk around enjoying paintings”; “learn about cultures”; “pleasant environment”.
 - Pretend some genius in your field told you this item/word is a good metaphor for your project. E.g., you can organize information, tips and images for your travel-related app to also act like an art/museum exhibition, so anyone can enjoy an interesting tour of a given location.
 - Use the metaphors you think of to improve your design/product.




And then, we also talk about the random metaphors using metaphoric way of associations to improve the design and the products.

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Lateral Thinking

Techniques:

- **SCAMPER** – To help generate ideas for new solutions, ask 7 different types of questions to help understand how you might innovate and improve existing products, services, concepts, etc. SCAMPER is remarkably easy to learn and efficient in ideation sessions.
- **Six Thinking Hats** – To reach for alternative viewpoints, you examine problems from 6 perspectives, one at a time (e.g., white hat = focusing on available data; black hat = focusing on potentially negative outcomes).

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The other techniques that we have discussed in our earlier lectures are similarly in lateral thinking is this scamper, how scampers provide you with different types of question, the 7 different types of questions to help you understand how you might innovate and improve existing products, services, concepts etcetera. It is a remarkably easy to learn and efficient in ideation sessions.

And finally, this is one of the most exciting one which is known as the six thinking hats, you can read the book of Edward de Bono, he is the founder of this approach and the team member when you have, you can the team members can adorn hats from each perspective one can be a you know somebody who is cheering for a particular thing, somebody who is the devil's advocate, who is the antithesis guy of it and who is not very comfortable in working in a situation so, emotional, negative emotional all these traits can be classified across the hats.

And the idea is to look from different perspectives, six perspectives, it can be positive as well as negative one at a time. So, at each time you take up one hat which may talk about one positive attitude or a negative attitude and the entire team start thinking in that perspective.

So, white hat means focusing on available data, whatever data you have you focus on that and come up with a concept. Black data means focusing only on negative outcomes so, whatever negative outcomes you can think about, focus on that and come up with a solution.

So, these are some of the; some of the techniques that are used during conceptualization. Once you use these techniques, the next important technique that we are going to discuss is about evaluating your ideas because you need to know which one actually you are going with, and you would go for detailing so, how do you do that? So, designers have figured out some of their own way of coming up with evaluating their ideas. We will discuss about those techniques in the subsequent lectures.