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The Creative Thinker's Toolkit

Course Guidebook

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Professor Gerard Puccio is Department Chair and Professor at Buffalo State's International Center for Studies in Creativity, a unique academic department that offers the world's first and leading master of science degree in creativity. Professor Puccio holds a Ph.D. in Organizational Psychology from The University of Manchester in England.

Professor Puccio has written more than 50 articles, chapters, and books. He has coauthored three recent books—*The Innovative Team: Unleashing Creative Potential for Breakthrough Results*; *Creativity Rising: Creative Thinking and Creative Problem Solving in the 21st Century*; and *Creative Leadership: Skills That Drive Change*—and is under contract to write a new book on preparing students to join the innovation economy.

In recognition of his outstanding work as a scholar, Professor Puccio received The State University of New York's Research and Scholarship Award in 2004 and the Buffalo State President's Award for Excellence in Research, Scholarship, and Creativity in 2007.

Professor Puccio is an accomplished speaker and consultant; he has worked with major corporations, universities, and numerous school districts to deliver training programs and keynote speeches. Some of his clients include the British Broadcasting Corporation (BBC), Fisher-Price brands, Sun Life Financial, Blue Cross and Blue Shield, Kraft Foods, Coca-Cola, Rochester Institute of Technology, and Oklahoma State University. Recently, Professor Puccio was a featured speaker at TEDxGramercy on the topic of creative thinking as a life skill. He has delivered creativity workshops and presentations in such countries as France, England, Spain, Italy, Tanzania, Hong Kong, Singapore, the Dominican Republic, and Canada.

Professor Puccio's research interests include the identification of creative thinking preferences, person-environment fit, and the efficacy of creativity training. He is currently working on an impact study of a creative leadership training program at the BBC. ■

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The Creative Thinker's Toolkit

Scope:

The highest level of human thought is creativity. Rather than being a skill that is exclusive to a rare gifted few, it is a way of thinking and behaving that can be achieved by all. However, many see creativity as mysterious, intuitive, or strictly innate. To the contrary, creative thinking is a skill that can be examined, practiced, and deliberately developed.

Scientific study demonstrates that, like other skills, creative thinking can be enhanced. This course draws on the more than 60 years of research and practice in the field of creativity studies and creativity education. Research and practice has highlighted the programs, approaches, and tools that are most effective in moving creativity from a chance occurrence to a more predictable outcome. Additionally, lectures throughout this course make direct connections between deliberate creative methods used by great creators—such as Mozart, Spielberg, Picasso, Jobs, Angelou, Wright, Rowling, Edison—and learnable tools that can be applied to a range of creative challenges, from everyday to grand. By the end of this course, you will have acquired a toolkit of creative methods usable in a variety of contexts, from professional to personal, and across all disciplines, from more artistic endeavors to business applications.

The course follows the waves of research associated with the scientific study of creativity. The first three lectures explore what it means to be a creative person. The first lecture examines the importance of play, passion, and purpose as the necessary fuel to individual creativity. In this lecture, you are encouraged to apply your first tool, "yes and," in place of the more commonly used "yes but" reaction to new ideas. The second lecture examines how creativity is a natural human phenomenon, drawing on information from evolution that highlights the fact that our ability to creatively solve problems provides the human species with a necessary competitive advantage. The ability to think in lateral ways, being flexible in thought—as opposed to vertical thinking, which is digging deeper into the same line of reasoning—is essential to the generation of breakthrough ideas.

The third lecture takes a contemporary look at the creative person, shifting from identifying characteristics of highly creative people to looking at the different ways in which people express their creativity.

The next wave of investigation in the field of creativity explored whether creative thinking was teachable and trainable. The fourth lecture lays the foundation for the fundamental thinking skills that unleash imagination, known as divergent thinking, and those skills that help to improve the retention and development of the most promising options, referred to as convergent thinking. The effective balance between divergent thinking and convergent thinking is the heartbeat of the creative process. Lectures 5 and 6 delve deeply into these two skill areas, providing specific principles proven to enhance divergent and convergent thinking abilities.

The seventh lecture introduces the complete creative process and explores how individuals report different degrees of preference for the thinking associated with the four areas found in the universal creative process: clarify, ideate, develop, and implement. Lectures 8 through 19 move you sequentially through the stages of the creative process, adding a large set of tools designed to improve problem clarification, idea generation, solution development, and implementation planning. A range of tools, from basic to advanced, are provided for each step—tools that can be applied immediately, either when working alone or to help improve creative thinking in groups.

Creativity involves both the head and the heart. In Lecture 20, the emotional side of creativity is explored; without the right emotional attitude, the cognitive tools become rather limited. Emotions can be thought of as the internal climate for creativity. The next lecture identifies aspects of the external environment, both physical and psychological, that promote creative thinking. Whether a manager, parent, teacher, or someone who decides to exert influence, creative thinking is now considered a core leadership competence, and effective leadership, in turn, fosters an environment conducive for creative thinking (see Lecture 22).

Life is fraught with challenges, and thus, many consider creative thinking to be a life skill. As such, the ways in which you can apply the material from this course is limited only by your imagination. Lecture 23 provides

strategies to overcome blocks that creative thinking learners might face in the future. The final lecture lays out six universal principles for making creative thinking a way of life. Many report that developing their creativity is a life-changing experience; the principles and tools taught in this course have the power to be transformative. ■

The Creative Person—Practice and Passion

Lecture 1

Creativity is not just about innate talent—what you come into the world with. In fact, research shows that innate talent is a weak predictor of creativity. Instead, creativity is a teachable and learnable skill that can be enhanced through practice and hard work. This course is about sharpening your creative thinking skills by giving you more tools and enhancing the mindset that acts as a lubricant for your creative thinking. Learning without application achieves the same end as ignorance, so you are encouraged to practice your creativity, and as a result, you will raise your creative ability.

Creativity Is a Skill

- Creativity is a skill like all other skills, and as such, it's something that we can practice and something that we can learn. What's slightly different about creativity is that it's a life skill. It's a skill that cuts across all areas of our lives.

- We're surrounded by creativity. Our world was constructed on human imagination. What we see, what we touch, what we interact with in our world were once ideas. They were once in someone's imagination. The buildings that surround us, the books we read, the music we listen to, the products we purchase, the services we use all came from human creativity. However, although we're surrounded by creativity, sometimes we really aren't very clear in terms of understanding how creativity happens.

- Perhaps the first to explore the meaning of creativity were the Greeks, who attributed their creativity to a muse. They felt that creativity must come from some outside source—that a breakthrough brilliant idea couldn't come from a human being. It must have come from the gods, and therefore, they believed creativity started at Mount Olympus.

- Creativity is an interesting area of research. It's been primarily undertaken by psychologists, and it had an interesting beginning. In fact, some of the scientific foundation for looking at creativity had its start during World War II, when psychologists studied Air Force pilots and their survival skills. Additionally, psychologists worked with spies at the Office of Strategic Services, looking at the kinds of skills that would predict survival out in the field.

- Psychologist J. P. Guilford discovered that when looking at these kinds of survival skills, it wasn't IQ that predicted survival; it was creativity, especially divergent thinking—the ability to see many options, to be able to create alternatives for yourself. This promoted survival and good problem-solving skills.

Misconceptions of Creativity

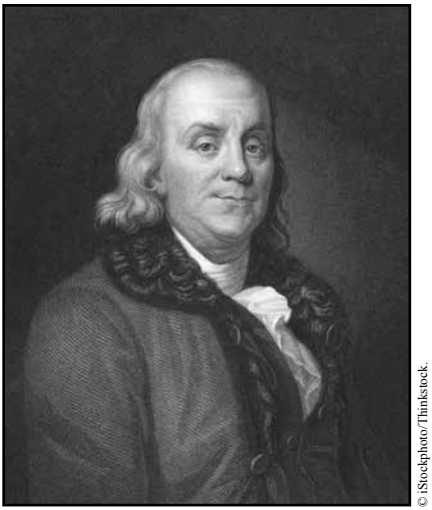
- **Fiction: Creativity results from innate talent.** The belief that creativity comes to a few special people is incorrect. The fact is that creativity is the result of hard work.

- The 10,000-hour rule—popularized by Malcolm Gladwell in his book *Outliers*, based on research by Benjamin Bloom and Anders Ericsson—states that it takes 10,000 hours in order to achieve mastery of a domain or task. It takes even more time to be creative.

- Harvard's Howard Gardner studied seven great creators—Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi—and he observed a consistent pattern that, on average, it took 10 years before they came to their first major creative breakthrough, and it wasn't just practice that happened during this 10-year period. They experimented and explored; they failed and learned from their failure. They borrowed ideas, cross-fertilized, and revised their thinking.

- Benjamin Franklin was an inventor, businessman, and Founding Father. We could assume that he was born to be creative, but this is not so. Benjamin Franklin is an exemplar of how to deliberately develop one's creativity.

- To develop his creative writing skills, Benjamin Franklin began by studying his favorite articles in a popular British publication called *The Spectator*. Days later, he reconstructed the article in his own words, and then he compared his work to the original piece and corrected his faults. But he didn't stop there. He translated these favorite articles into rhyme and then from rhyme back to essay in his own words.



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Benjamin Franklin (1706–1790), one of the Founding Fathers, is still recognized for his elegant writing.

- Geoffrey Colvin's book *Talent Is Overrated* gives a wonderful description of deliberate practice. The following is a description of some of the components of deliberate practice.

- The first attribute of deliberate practice is that it involves lots of repetition—and not things that are already comfortable to you, but always going a little further and trying something new. However, it's important not to do this during the performance because it's not effective.

- The next attribute of deliberate practice is to get a coach or a mentor—someone who knows that domain well, who can share strategies with you and provide details in terms of best practices that work.

- In addition, when dealing with deliberate practice, we need to have feedback continuously available to us so that we can correct what

we're doing wrong, so that we're not practicing bad habits. This is crucial to deliberate practice.

- In his book *Creativity and Problem Solving at Work*, Tudor Rickards introduces a tool that can be used to deliberately practice creativity. When people are presented with a new idea, often the immediate reaction—especially when it's a novel, original idea—is "yes but …". This indicates that there's something terminally wrong with the idea.

- Instead, Rickards recommends using "yes and …". This helps to prevent premature judgment. When we say "yes and," we're suggesting that there's something good about the idea and that it can be improved.

- "Yes and" promotes more creative thinking. It encourages creative thinking to be applied to the idea to further refine and enhance it. It keeps creative momentum going forward.

- To apply this tool, you'll first have to become self-aware, recognizing when that reflexive "yes but" is coming up. Notice if and how often you use it; then, when you find that phrase coming up, redirect your thinking from "yes but" to "yes and" and then seek feedback. See how others respond to it. Empathize with them. See how they react differently to you when you say "yes and" versus "yes but."

- **Fiction: Creativity is about being different.** When someone says the phrase "Oh, that's creative" usually what is meant is "Wow, that's bizarre." The fact is that creativity is the ability to produce ideas that are both original and valuable. It's not about just being different; it's both. It's the union of what may feel like two opposites—novelty that has value.

- Creativity needs to be rooted in reality; it is not merely bizarre. When we develop ideas that are both new and useful, original and valuable, they can come in tangible forms and intangible

forms. They can also occur at different levels. We might create for ourselves, solve our own problems, developing interesting things that are new and valuable for us, and that's perfectly fine.

- Sometimes we share our creativity with others and affect some group, such as our family. Sometimes our creativity impacts our organizations: We create new and valuable ideas that are adopted in our organizations. Then, some of us create new and valuable ideas that are adopted into society and impact all of humankind.

What Makes People Creative?

- In the field of creativity, there happens to be a lot of consensus on what makes people creative. Teresa Amabile from Harvard has a model that gets at the essence of what's required for someone to be creative.

- In her model, creative people have three overlapping attributes. Picture a Venn diagram. One of the circles—one of the components in this Venn diagram—she refers to as domain-relevant skills. This involves practice and expertise; we have to master our domain.

- However, if you've mastered your domain, you've been able to know what everyone else knows—to think like everyone else. How do you go beyond that? That's the second component. Amabile refers to this as creativity-relevant skills. This allows us to add to our domain, to create new knowledge.

- In creativity-relevant skills, we have cognitive skills—thinking skills—and attitudes that put us in a better position to challenge our domain and contribute to it in new ways. Throughout this course, we will practice using tools to enhance skills specific to thinking creatively.

- The third component is motivation. Amabile and others have discovered that there's a particular kind of motivation that predicts creativity: intrinsic motivation. This is the kind of motivation that

comes from the inside. It's engaging in a task for the love of that task, for the reward that you get from merely doing the task itself.

- How do you know when you're intrinsically motivated? There are three indicators, known as the three Ps: play, passion, and purpose.
    - In your life, where do you play? Where do you show a childlike wonder? Where do you get lost in your curiosity? Where do you have fun?

    - What are you passionate about? What drives you? What gives you energy and gets you excited?

    - What is your purpose? What gives you meaning? What's your mission? What's your legacy? You could have more than one purpose.

- When you experience play, passion, and purpose, you get to that flow state—the optimal psychological experience where your creativity pours out of you and you lose the sense of time. There are no boundaries on your imagination. That's when you're going to be most creative.

- Creativity is like all other abilities, which implies that we all possess it to varying degrees. Research shows that whatever your level of ability is, it can be enhanced.

Suggested Reading

Brown, *Play*.

Colvin, *Talent Is Overrated*.

Rickards, *Creativity and Problem Solving at Work*.

Activities

Activity 1: "Yes And" Thinking
Recall that when faced with a less-than-perfect solution, it is helpful to use "yes and" thinking. This requires that you be self-aware, use empathy, and redirect your thinking.

How might you use "yes and" thinking in the following scenarios?

- You are planning an elaborate dinner on a strict budget. When the caterer suggests some delicious appetizers that would put you over budget, you say ….

- You and your coworkers have spent hours waiting for tech support to solve a problem, and you are about to miss an important deadline. One coworker says, "Let's ask for more time." You say ….

Think of a recent situation where you said "yes but …". Now imagine that you replied using "yes and" thinking instead. What might have been your response, and how might that have changed the direction of the conversation?

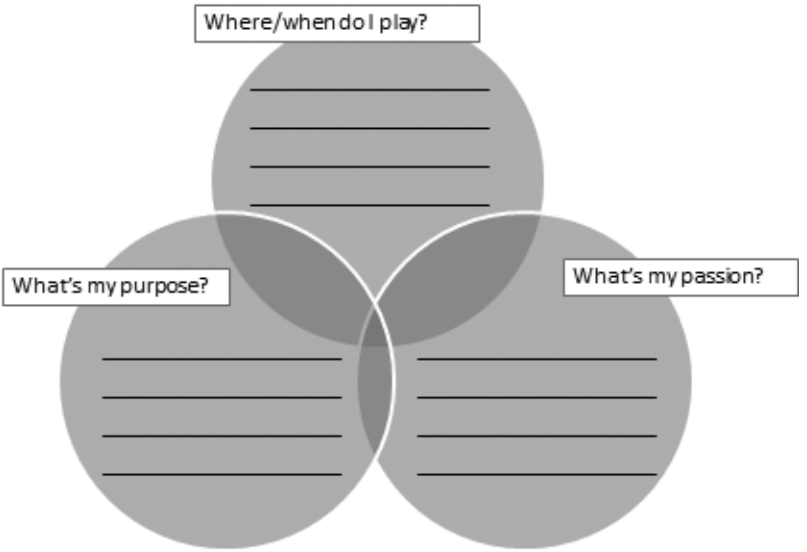
Activity 2: Intrinsic Motivation
Take some time to respond thoughtfully to these questions from the closing of Lecture 1 about play, passion, and purpose. It might be helpful to fill in the diagram below with your responses.

- In my life, right now, where do I play?

- What am I passionate about?

- What is my purpose? (It's fine to have more than one.)

- Are there any commonalities among these areas? If so, what does that tell you about where your intrinsic motivation lies?


Where/when do I play?
What's my purpose?
What's my passion?

Lateral Thinking Is a Survival Skill

Lecture 2

Humans have evolved by getting creative and by communicating and working together. In general, working together trumps individual creativity. As you will learn in this lecture, provocation encourages us to find a new pathway. It encourages playful thinking. When we force our minds to take a new neural path, we discover new connections. This path leads to creativity. There are many lateral-thinking tools that can help you start on this path to creativity.

Conformity and Creativity

- There are several benefits to conformity.
  - First, conformity lends to collaboration—solving problems together. You have a woolly mammoth and you need to take it down. Get some buddies.
  - Second, it aids in learning. We observe others; we watch what they do. We pick up what works for them, and then we use it ourselves.
  - Third, it forms culture, as in accepted norms, practices, morals, and rituals.
  - Finally, it saves us energy. When we're conforming, we're in our comfort zone, so we save energy. We don't have to think about what we're doing. We simply continue to do what we're already comfortable with.
- However, there's a downside to conformity: If that were all we ever did, there'd be no change and little growth. Conformity and creativity, a necessary paradox in our evolution, had to work together.

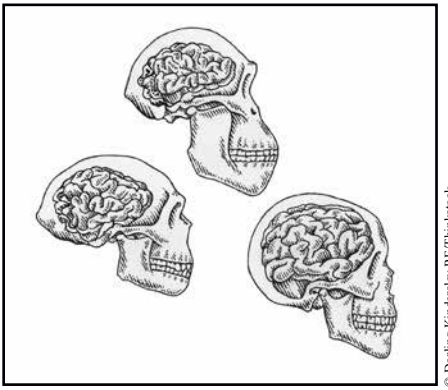
- Evolutionary psychologists say that we all have this internal tension between conformity and creativity and that people will vary in terms of the strength of their conformity bias.

- Those who are less likely to conform are more sensitive to the changing conditions of their environment, and as a result, they can spot opportunities. They're more likely to develop new solutions, adaptive responses to a changing environment.

- That's hugely valuable, but so is conformity, because as others see these new ideas, they learn. They replicate. They repeat. They imitate. In this way, these creative ideas get spread. A new paradigm is created. And then, the process repeats itself.

- Creativity was an important partner, alongside conformity, in human evolution. If we look back through history, even to prehumans, we can see problem solving. Prehumans found objects, such as sticks, that they used for tools.

- The first *Homo* species, *Homo habilis*, about 2.5 million years ago, had the first manufactured tool—the first purpose-built tool, called the flake tool. *Homo habilis* had a brain size that was roughly 50 percent that of modern humans.



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The human brain has evolved over time, developing the capacity for creativity.

- *Homo erectus* appeared about 1.8 million years ago, with a brain size that was roughly 75 percent that of modern human brains. They developed the hand axe, which took greater skill to create, manually and mentally.

- About 150,000 years ago, *Homo sapiens*, the modern human, appeared. Creativity continued to expand slowly with the appearance of *Homo sapiens*, and then about 40,000 years ago, something remarkable happened. There was a creative explosion. Suddenly, there were throwing weapons, body decorations and cave paintings, burial rituals, clothing, shelter, and so forth.

- Creative thinking is a survival skill. Some call it creative problem solving, and it helped early humans in a very functional way to survive in hostile environments. However, once we had the skill known as imagination, as it grew, as humans evolved, that imagination grew to be applied in other ways. We went from functional to aesthetic—from allowing us to survive to creating such things as art. And perhaps art depicting large animals contributed in some way to our survival as well.

- Brain size and development correlated with creativity. As our brains developed, we were able to generate more complex products as our brains got larger. However, humans don't have the biggest brains—elephants and some whales do—so it's not just size that makes a difference. It's greater information-processing capacity. Creativity is associated with mental flexibility and novel solutions.

- It's not just cognition, or thinking, that led to the creative explosion. We also needed the right attitude. We had the cognitive skills in place about 100,000 years ago, but we needed something else to enhance these thinking skills. And here we can look at play.

- The offspring of all mammals engage in some type of play. When you look at human play, young children engage in pretend play. It's supposition. This is crucial in our evolution. This developed an important attitude—the attitude of being able to suspend judgment. This allowed our imagination to roam freely.

Why People Say They're Not Creative

- It appears that humans were born to be creative. But many say, "I'm not creative." There seem to be two reasons why people say that. First, we mix up a distinction that's made in the literature of creativity between two different kinds of creativity: special talent versus self-actualized creativity, which is creativity in daily life. Sometimes it's referred to as "big-C" versus "little-c" creativity, or eminent superstar creativity versus everyday creativity.

- Everyday creativity is about reaching your creative potential. Creative problem solving is used to address everyday life. When people say, "I'm not creative," it's often because they're comparing themselves to the superstar eminent creators. But here's the truth: The same thought process that we use for everyday creativity is what's used in big-C creativity.

- The second reason why people say they're not creative is that we lose our imagination over time as we grow from children to adults, but it's something we can relearn, and we can turn to people like Edward de Bono.

- Some refer to Edward de Bono as "the father of creativity." He has written many books on the subject, especially around and focused on applied creativity. He makes a distinction between vertical thinking and lateral thinking. Vertical thinking is when you follow one line of thought. Lateral thinking is when you move in a different direction with your thinking; you're looking for a solution to a problem. Lateral thinking is the movement away from a pattern.

- De Bono created a tool whimsically called PO, which stands for provocative operation. Our brain creates patterns. We build neural networks. This increases the speed of our thinking, which can make us very efficient thinkers, except when it comes to creativity. Creativity requires, in a way, slowing down our thinking, looking at unexplored pathways.

- PO is a made-up word, like "suppose," but it's deliberately silly and playful sounding. It indicates movement—a shift, the backing off of judgment. The way it works is you create a provocative statement. It can be even illogical. POs are created by exaggeration, wishful thinking. It can even be outrageous.

- For example, consider the following statement: "PO schools had no teachers." You create a PO, and then you capture new ideas—new lines of thought that come from that provocation. What might this statement suggest? Well, the kids could be responsible for their own learning. Teachers might be replaced by project managers. You could have computer-assisted learning only.

Creativity Testing

- In the 21st century, many educational and business leaders put creativity, creative thinking, and creative problem solving at the top of the skills necessary for success, but do schools promote this kind of thinking, or do they focus mainly on vertical thinking, helping you to learn to think like everyone else?

- Some would suggest that schools are undermining creativity. Creativity is a crucial skill. We're born with it. But there seems to be a creativity crisis in America.

- A measure of creativity called the Torrance Test of Creative Thinking (TTCT) was used on nearly 300,000 students over a long period of time, between 1974 and 2008, and across all grade levels from kindergarten through grade 12, and it clearly showed a creativity loss over time.

- This creativity measure possesses open-ended tasks such as product improvement. You're presented with a product and you're asked to think of other ways that this product might be made more interesting or fun to play with. There's also a visual format in which you're presented with figures and you have to complete figures in an interesting way.

- The TTCT is focused on divergent thinking, which includes such skills as fluency, which is the ability to generate many responses when you're faced with a challenge; flexibility, which is the ability to generate different kinds of responses; originality, which is the ability to generate a response that's infrequent and novel; and elaboration, which is the ability to expound on one's thinking.

- When researchers looked at students over grade levels, they found that they increased in their ability to think fluently until third grade, and then it continuously dropped dramatically after fifth grade. When we look at the divergent thinking ability of originality, it increased up to about fifth grade, and then it suddenly dropped significantly thereafter. Creative attitudes such as curiosity and open-mindedness followed the same path.

- Creative thinking is considered a 21st-century skill and is seen as being crucial to be able to survive and be productive in times with rampant change, but perhaps education undermines it. Conformity pressures help to dilute it as well, and kids have less free time. While divergent thinking is a skill that's highly touted, it's rarely taught in schools.

- The TTCT is a predictor of adult success. People who score higher on the TTCT are more likely to be entrepreneurs, inventors, college presidents, authors, doctors, and so on. Childhood creativity measures like the TTCT are three times stronger predictors of lifetime creative achievement than childhood IQ.

- To reinvigorate your imagination, the first thing you can do is identify what you find intrinsically interesting—what intrinsically motivates you—and then pursue it. Encourage divergent thinking and idea generation. Don't worry about whether answers are right or wrong. Ask yourself open-ended questions, and use tools to encourage lateral thinking.

- Edward de Bono created many lateral-thinking tools. The one that he says is the easiest to apply is random word, which involves

using a random word to shift your thinking to solve a problem. It's important that the word be randomly selected. It forces new thinking, because it kind of creates a provocation. Injecting a random word into your thinking requires thoughts to take a new neural pathway.

Suggested Reading

Amabile, *Growing Up Creative*.

Wagner, *Creating Innovators*.

———, *The Global Achievement Gap*.

Activities

Activity 1: Random Words

Use the random word provided to generate unusual ideas for the situation.

- Random word: tire — Situation: studying for an exam
- Random word: stove — Situation: planting a garden
- Random word: pillow — Situation: debugging a computer
- Random word: shampoo — Situation: planning for retirement
- Random word: necklace — Situation: preventing an asteroid from hitting the Earth

Activity 2: PO Statements

Use PO to provoke your childlike ability to pretend. For example, "PO people can fly." You could think of PO as a part of the word "supPOse," as in "Suppose things were different." Try creating five or more statements starting with PO. Choose one and expand on what new insights or ideas you get from that provocative statement.

Creative Styles—Adaptors and Innovators

Lecture 3

When applying the adaptor-innovator theory, you must first understand yourself. You also need to be flexible; use the thinking necessary for that situation. And make sure you're in the right circumstance: If you need adaptive thinking, think like an adaptor. If you need innovative thinking, think like an innovator. The six hats tool, which helps people shift their thinking, is a simple and effective tool that can be used to minimize egos and to create a solution-oriented discussion among differing perspectives.

The Adaptor-Innovator Theory

- There are two views in terms of examining creativity in people. The classic way, the traditional way, is to think about one's level of creativity—how much creativity someone possesses. In fact, this is where the early research focused, on identifying highly creative people, examining them closely to determine what traits they had that distinguished them from less creative counterparts.

- From this, we learned that creativity is normally distributed along a bell curve, where most people fall in the middle; some are at the extreme high end, and a few others are at the extreme low end. When we talk about level, we're answering the question, "How creative are you?"

- But there's another way to think about creativity. More recently, researchers have begun to ask, "How do people express their creativity in different ways?" This is called the style approach.

- In theory, style is unrelated to level. Your style does not determine how far you can go in terms of being creative. A theory in the field of creativity, called adaptors and innovators, specifically examines this. Developed by British researcher Michael Kirton, this theory suggests that all people fall along a style continuum. At one end,

we have a more adaptive approach to creativity; at the other end, we have a more innovative approach. Wherever you are along this continuum does not determine how creative you are.

- The origins of Kirton's theory were the result of his observations in organizations. He found that some managers were much more comfortable with introducing change that perfected, improved, and extended current operations and systems. By contrast, there was another kind of manager—a manager who tended to generate more radical change, change that threatened the existing operations.

- Kirton called the kind of manager who generated ideas that improved current systems the "adapter." This is a more evolutionary style of creativity. The manager who tended to generate more radical change he called an "innovator," a more revolutionary kind of creativity.

- Adaptors are described as focusing on the details. They are precise. They are reliable. They are predictable. They can be original. They can engage in original thinking. Their kind of originality is applied to finding new ways to improve traditional ways of working.

- Innovators, by contrast, are described as focusing on novelty. They approach problems from unsuspected angles. They challenge assumptions. They are irreverent of consensual views. They're original, just like adaptors are, but in a different kind of way. Their originality comes in paradigm-breaking forms.

- According to Kirton, all people fall on this adaptor-innovator continuum, and he has a measure that people respond to that identifies their preferences. Kirton suggests that both styles, or anywhere you fall along this continuum, can be highly creative. It's just two different ways of being creative.

- People can be high-creative innovators. You can also have low-creative innovators. You can have people who are highly creative that have an adaptive orientation. You can have people who are

low creative who have an adaptive orientation. It doesn't matter where you fall on the style continuum; in theory, it's not related to your level.

- However, we might have subjective preferences for the kind of style of creativity we appreciate. The risk is not so much having a preference—it's when those preferences for what you like become pejorative labels, when you start to label a style of creativity in a negative way, because it's a style of creativity that you don't appreciate. When it becomes particularly problematic is when people with a certain preference along this continuum judge those on the other end of the continuum.

- For example, adaptors might see innovators as "those crazy dreamers." Innovators may see adaptors as rigid and being stuck in the rut. And it might just be that our culture has an overall bias, at least in terms of how we think about high creators. That is, it seems that we have a preference as a culture to assuming that innovators, not adaptors, are highly creative.

- The consequence is that sometimes we may underappreciate the adaptive style and, as a consequence, erode the confidence of adaptors. The reality is we need both adaptors and innovators, especially in organizations. Adaptors improve practices, and innovators change practices. They complement one another.

- The adaptor-innovator theory challenges us to expand our view of creativity beyond just level and to recognize that there are different styles. It might also help to highlight and help us to recognize and appreciate both styles, and perhaps to understand our style of creativity.

- You should play to your style. In fact, you might even find someone who creates in a way that's similar to your way of creating. Find a paragon. But be cautious. You may need to adopt different ways of thinking, as necessary.

- Kirton's theory also tells us about when communication breaks down between people. In fact, on his continuum, when you find people are more than a standard deviation apart from each other, he suggests that you'll see communication break down between adaptors and innovators.

- He has also suggested that in organizations we create certain cognitive climates—when you get a group of people together, their preferences may slide one way or another on the scale.

- For example, engineering and accounting tend to be more adaptive. R & D and marketing tend to be more innovative. As a consequence, if someone is in that kind of environment, that kind of cognitive climate, and his or her preferences are different than the prevailing cognitive climate, that might create a little stress for him or her.

- Kirton also talks about teams and how it's natural that in certain areas, you may slide in one direction or the other because of the responsibilities that you have.

- This makes sense in terms of accounting. Accountants tend to be more adaptive. And in R & D, where they're looking to the future and often trying to break the paradigm, there's a more innovative bias.

- In terms of a personal implication to consider, Kirton talks about coping skills, and he suggests that when we're in a situation that requires us to adopt a style of thinking that's foreign to us, we have to move our adaptor or innovator preference that, over the short term, might cause a little tension. But if you're caught in a situation over a long term, where you have to adopt a different way of thinking, that will result in stress.

The Six Hats

- A tool called the six hats, developed by Edward de Bono, helps us shift our thinking. It's designed to help, especially in groups, to get parallel thinking to occur from different perspectives.

- Each hat, which has a different color, represents a different way of thinking. The six hats are white, red, black, yellow, green, and blue.
    - The white hat is objective—facts and figures.
    - The red hat is for emotions—bringing emotions into the discussion. It's fiery.
    - Black is for evaluation—critical thinking. It's careful and cautious. It's the devil's advocate.
    - Yellow is sunny—positive outlook.
    - The green hat—green for growth—is for creativity and new ideas.
    - The blue hat is a special hat. The blue hat is like the sky; it stands above the others. It's the organizing hat. It's the hat that helps you determine which hat should be worn.

- The hats can be used individually, or they can be used in teams. Using the six hats helps, especially, groups to have more productive conversations. It creates parallel thinking.

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The six-hats tool is used to engage people in discussions.

- In meetings, discussions break down because often people are using a different way of thinking. Meetings have different kinds of thinking happening at the same time, and that can create frustration and argument. One person is talking about facts; he or she has the white hat on. Another is talking about feelings; he or she is coming from an emotional perspective, wearing the red hat. A third is generating possibilities; he or she is using a green

hat. How could you ever get to consensus when you have people thinking in very different ways?

- The six-hats tool creates a more focused and orderly discussion, and it's useful to appoint someone to wear the blue hat, who determines and controls the sequence—helps to keep people focused. In other words, this person facilitates the meeting.

Suggested Reading

de Bono, *Serious Creativity*.

———, *Six Thinking Hats*.

Kirton, *Adaptors and Innovators*.

Activities

Activity 1: Innovative versus Adaptive Creativity
Identify someone you know who appears to have an innovative creativity style and someone who appears to have an adaptive creative style. In what ways are both people able to be creative?

How does knowledge of creativity styles affect your implicit understanding of who is creative and how people express their creativity?

Activity 2: Six Thinking Hats
Think about a problem you want to solve. Write down some steps you would normally take. Do any of the steps correspond to one of the six types of thinking (below)? Which types might be missing? Deliberately use each type of thinking at least once (meaning, try wearing all of the hats, but not at the same time) and make a note of the result. Use the blue hat to think through the order of the different thinking hats that will work best for you.

- Blue (sky, above everything else, organizing hat)
- White (objective, facts and figures)
- Red (emotional view)

- Green (growth, creativity, new ideas)
- Black (careful, cautious, devil's advocate)
- Yellow (sunny, positive)

When you are done, consider how the six types of thinking worked together to help solve the problem. What are the advantages of this approach?

Combining Opposites—Diverge, Then Converge

Lecture 4

In this lecture, you will learn about the importance of striking a balance between divergent and convergent thinking—two forms of thinking that often seem to be at contrast with one another. The focus of this lecture is on the nature of creative thinking and ways of improving it. In terms of the creative process, there are multiple right answers, and the more shots you take, there is a greater chance of a breakthrough.

Bloom's Taxonomy

- Not all thinking is the same. Bloom's taxonomy provides us an excellent description of different levels of thought. It's an organization of thinking along a hierarchy from the least complex forms of thinking to more complex forms of thinking.

- At the lowest level, we have remembering, which is simple recall—being able to list facts. At the next level, we have understanding, which is an ability to explain, to make meaning. The next level up, we have applying, which is an ability to implement, to use procedures. Then, we have analyzing, which is an ability to differentiate, organize, and categorize. The next level up, we have evaluating, which is the ability to critique and make recommendations. Then, at the highest level of human thought, we have creating, which is an ability to generate something new.

- What can we learn from Bloom's taxonomy? What does it tell us about thinking? First of all, there are different forms of thinking. Not all thinking is the same, and thinking has a range. When we look at different forms of thinking, they vary in terms of the amount of complexity.

- The next point is that in 2001, when Bloom's taxonomy was updated, the creative thinking component was moved to the highest

level of thought. Before this revision, it was at the second level, and evaluating was considered to be the most complex form of thinking.

- Evaluating is reacting to something that already exists whereas creating is more proactive—it's producing something that hadn't existed before. This is in keeping with talk about the necessity for creative thinking as a professional and personal skill in the 21st century.

- If creative thinking is the most complex form of thinking, then shouldn't our goal always be to get people to the highest level of thinking—whether it's in schools, in businesses, in organizations, or in our own family?

- There is one more thing we can learn from Bloom's taxonomy. As we look at these higher-order thinking skills—more complex thinking skills—what we realize is that more complex kinds of thinking must be made up of subskills: There must be lower-order skills that, when added together, create a higher-order thinking skill. This is true for creativity.

Bad versus Good Thinking Habits

- Typically, when we generate ideas, the first set of ideas that we think of are already familiar to us. They travel along neural pathways that are already well developed. They're not terribly novel. This is within an area of what we call familiarity. It's only until we exhaust what is familiar to us that we start to really generate novel and unusual options. This is known in the literature as the extended effort principle.

- Research has shown that if you take a list of ideas generated by a person or by a group and break it into the first third, the second third, and the third third and then evaluate those three blocks for novelty, the most novel ideas generally come in the last third, and the least original come in the first third.

- This is because when we are initially responding to a problem, we sort of go through a brain dump. We generate first what we've already thought of. Many people stop thinking there. Rather, that's when you need to continue to push your thinking into new areas of discovery.

- Another mistake that people often make is to mix divergent and convergent thinking. They might generate an idea and then immediately critique and evaluate it. In some cases, the idea is dismissed.

- A better thinking habit is to separate these two forms of thinking. We're all born to be able to engage in these two forms of thinking and to shift between them—to be able to engage in divergent thinking and then to engage in convergent thinking. However, although we've come into the world already wired to be able to engage in divergent and convergent thinking, we often don't apply it to the best of our ability.

- The ability to shift our thinking and to direct our thinking is called contextual focus. We can vary our cognitive receptive field. We can cast a wide or narrow net. We can defocus or focus our attention.

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The creative thinking process evolves from divergent to convergent thinking.

- Stuck? Start searching for a solution. We begin by defocusing. We activate a broad region of our memory. This allows us to remotely search for original connections. Then, we shift our thinking from defocused to focused attention. We've struck on an

insight. We see a possibility that has some value. We restrict our attention then. We engage in logical mental operations, and we isolate aspects of it, and we evaluate the aspects of that concept to see if it's workable.

- This is how we move from divergent to convergent thinking. It's fundamental to the creative process. Divergent thinking is making new connections. Convergent thinking is selecting and developing the most promising connections.

- Peter Carruthers, who has looked at evaluation and creativity, says that this is the universal cognitive underpinning of normal, everyday human creativity. It's kind of like evolution, in fact. Evolution has a marriage between novel variation, the search for and the generation of variation, and then the selective retention of those novel variations that are most adaptable.

- Gabora and Kaufman talk about contextual focus as a breakthrough in human evolution. They say that the fruits of one mode of thought provide the ingredients for another. And it's not just applicable for individuals; we see this in businesses as well.

- Successful companies try a lot of stuff and keep what works; they experiment and accept failure. Organizations have to experiment all the time, testing new ideas. The conditions in our environment are always changing, and companies need to vary. Otherwise, they run the risk of extinction.

Combinations of Convergence and Divergence

- Let's explore the ways that thinking can go wrong. The following seven different combinations of divergence help us to examine the consequences of divergent and convergent thinking and when the balance isn't there. We'll look at the result and the risk associated with each of these combinations.

- In the first scenario, there is no divergent thinking—no exploration of novelty. The result of this is status quo; you're in the same place you were before. The risk of this is stagnation and extinction.

- In the next scenario, you've diverged—you've explored novelty. But no convergent thinking, no systematic convergence, has occurred, and the idea was blindly accepted. If that idea proves to be ineffective, that's reckless novelty. The risk is disastrous change.

- In the next scenario, you've generated novelty, but once again, there is no systematic convergence. The novelty was blindly accepted. Let's say it ended up being effective. We call this blind creativity. In other words, you were just lucky. The risk with this is overconfidence.

- In our next example, we have a combination of divergence. Someone has decided to intentionally stretch and come up with a novel idea. We've gone through a systematic evaluation process, so we used convergent thinking, and as a result, the idea was rejected. If it turns out that the new idea was ineffective, then this is actually a positive scenario. We call this noncreativity. You didn't make things worse. The risk with this is complacency.

- In the next scenario, we've engaged in divergent thinking, and we've also been systematic in evaluating the idea. Let's say that the idea is rejected, but it turns out that the new idea would have been effective. We call this stifled creativity. In other words, you missed a great opportunity. The risk is a lost chance.

- In the next scenario, you've engaged in divergent thinking and convergent thinking. You were systematic in exploring novelty. The idea is accepted, but if it turns out that the new idea is ineffective, we call this mistaken creativity. When at first you fail, try, try again. The risk is loss of confidence.

- In our next scenario, we've generated ideas; we've deliberately diverged. We've gone through a systematic convergent process. The

idea is accepted. This is the ideal scenario. If it turns that out the idea is effective, we've been creative. We've produced something new that works. It sounds wonderful, and it is, but there's also a risk of falling in love with what you've created and not challenging yourself to generate new ideas in the future.

- Separating divergent and convergent thinking can immediately make you a better thinker. It can immediately make meetings more effective. We're born with an ability to shift our thinking and direct it, but often we're not very effective at this. We might shift prematurely.

- We can improve this by separating these two forms of thinking, first beginning with divergent thinking, and then knowing when it's time to shift. We can improve by learning the right mindset for divergent and convergent thinking, so we can learn to shift these two forms of thinking. We can also enhance the abilities to engage in divergent and convergent thinking.

Suggested Reading

Collins and Porras, *Built to Last*.

Gabora and Kaufman, "Evolutionary Approaches to Creativity."

Sawyer, *Zig Zag*.

Activities

Activity 1: Diverging and Converging
Think of a scenario at work or elsewhere in which you saw real creative potential, but the most creative solution was not accepted. Consider the following areas and how they played a role in determining the final outcome.

- Divergent thinking: Were many options generated?

- Convergent thinking: Were new and unusual options considered?

- Were good ideas produced that were ultimately rejected?

- Was a good idea selected but poorly executed?

Activity 2: Writing Challenge

Write a funny, clever, or intriguing sentence that uses these three words: blue, square, sweet. First, take the time to apply divergent thinking by coming up with 20 or more complete sentences. Then, use a deliberate process to converge so that you choose the three best sentences. How did using explicit—and separate—divergent and convergent thinking phases assist your creative thinking?

Principles for Unleashing Your Imagination

Lecture 5

We can deliberately enhance our ability to think divergently. The principles that you will learn about in this lecture are sort of the lubricant to enhance our ability to engage in divergent thinking, creating more fluidity in our thinking. Make these principles a way of life—or use them as guidelines in a formal meeting where you're looking to generate options. The goal is to remove your creativity from chance to on demand, and as with evolution, by following these principles, you can breed greater levels of creativity.

Mindset and Creativity

- Ruth Noller, a founding faculty member at Buffalo State, developed a mathematical formula that helps us to understand how attitude—mindset—engages with other variables to predict high levels of creativity. She suggested that creativity is a function of attitude as well as knowledge, imagination, and evaluation.

- The three main elements of this formula are knowledge, imagination, and evaluation. Children are naturally strong in imagination and weaker in knowledge and evaluation; for adults, it's the opposite. Part of what this formula suggests to us is that it's tricky getting the balance right. We need equal amounts of knowledge, imagination, and evaluation.

- The second point behind this model is that creativity is a function of knowledge, imagination, and evaluation—and attitude. Without the right attitude, we can't capitalize on our knowledge, imagination, and evaluation.

- Evolution can occur naturally, and evolution can be sped up through breeding. Creativity is the same way. Creativity occurs naturally, and creativity can be directed.

- Creativity is like breathing. No one has to teach us how to breathe. We come into the world knowing how to breathe. It is natural. But there are times when we want to be more deliberate about our breathing. If we're playing a musical instrument or we're involved in sports, it's important and valuable to us to be more conscious about our breathing and to learn strategies to be more deliberate.

- With creativity, we want to move it from natural to deliberate, just like with breathing. Why leave our creativity up to chance? There are times when we want to be creative on demand.

- To move creativity from chance to on demand, we begin by looking at the fundamental skill of divergent thinking. We'll examine four proven principles for improving divergent thinking, ways to improve your mindset. These come from eminent creators and have been supported by research. It turns out that creativity training has been demonstrated to have a profound impact on our divergent thinking skills.

Principles for Divergent Thinking: Defer Judgment

- The key principle for divergent thinking is to defer judgment, which means to temporarily suspend one's evaluation. This is the key principle because it's required for all the others. You've got to get this one right or it's very difficult to be able to adhere to the other principles and guidelines.

- Neuroscience gives us some insight into how deferring judgment works. We're most creative when our prefrontal lobe, the self-monitoring part of our brain, is less active.

- There is research that has demonstrated the profound positive effects of deferred judgment. In fact, one of the earliest studies of the creative process was conducted by another founding faculty member at Buffalo State, Sid Parnes, who conducted a simple yet elegant study.

- Parnes had two groups of students. They were given a real-life challenge to solve and were asked to generate ideas, but the two sets of students were given different instructions. One set was told to suspend judgment—not to evaluate their ideas as they were generating them. The second group was told to come up with good ideas—to generate good ideas. "Good ideas" suggested the need to evaluate.

- When they evaluated the sets of ideas generated by these students, the researchers found that those who deferred judgment, who followed that principle, ended up generating twice as many good ideas as those who were told to generate good ideas.

- Judgment kills momentum. When we use judgment prematurely as an individual or in meetings, after judgment occurs, all the creative momentum is lost in a meeting. Meetings are often conducted in the following way: Someone asks for ideas, an idea is shared, and then it's immediately met with a criticism. What happens then? The momentum dies because as those individuals sit in that meeting and see that idea being judged, often harshly and critically, they stop their thinking.

Principles for Divergent Thinking: Go for Quantity

- The second principle for divergent thinking is called go for quantity. Nobel Laureate Linus Pauling perhaps said it best when he said, "The best way to have a good idea is to have a lot of ideas." The notion is that quantity will lead to quality. We want to leverage probability: The more options you have, the more probable you are to have a breakthrough.

- This has been demonstrated through creativity researcher Dean Simonton's research. He has studied eminently creative individuals, and he has found that the number of creative breakthroughs they generate is directly related to the amount of work they produce.

- For example, Nobel Prize scientists published twice as many papers as nonwinners. Einstein had 248 publications. Edison had

1,093 patents. Mozart had over 600 compositions. J. S. Bach had 1,000 compositions. Picasso completed more than 20,000 works in his life.

- This doesn't just apply to individuals; this is also true for businesses. When it comes to a successful product, innovation, or service—one that got to the marketplace and was adopted—a recent study showed that, on average, it took 3,000 initial ideas to get to that one successful new product or service.

- IDEO is a well-known design company in California. They have a toy unit, and in one year, this toy unit generated 4,000 new ideas—230 of which were deemed to be promising and went to the prototype stage. Of those 230, eventually 12 were deemed to have commercial potential and were sold to clients.

- What are some of the benefits of this go-for-quantity principle? First of all, when you go for quantity, you're exercising one of the fundamental abilities of divergent thinking—fluency, which is the ability to generate many options when faced with a challenge.

- Another benefit is that you create more choices, and when you create more choices, you make yourself more powerful in terms of reaching your goal.

- Finally, more choices equate to more originality. The more we stretch our thinking, the more we get outside of that narrow area of familiarity, and the more we get into those areas of new discovery.

Principles for Divergent Thinking: Make Connections

- The next principle for divergent thinking is making connections. Our minds are wired to make associations. Our minds link ideas together, and this is a powerful source for creativity. Hearing a song brings back a memory if you had an experience referenced, or as you look around and see something, it reminds you of something that you have to do. This occurs all the time.

- New ideas don't come from thin air. If there is a muse to creativity, the muse is past ideas. The mobile phone, the car, and the Internet are all clearly creative ideas. But they didn't pop up in full and complete and perfect form. They built off of past ideas. They came from ideas that were borrowed and synthesized.

- There are many examples of real-life people—superstar creators—who made connections. Salvador Dali's painting, *Persistence of Memory*, in which a number of clock faces appear to be melting, came from a dream he had about runny Camembert cheese. George Lucas was inspired by mythology and his love for westerns when he created *Star Wars*. Think of Han Solo as sort of a cowboy in a sci-fi movie.

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You can stimulate ideas simply by looking at pictures in a magazine.

- How might you make connections in your life? How might you make it a habit? Look at something you normally avoid or overlook. Flip through a magazine. What ideas do you get by looking at the photographs? Save those photographs that are most striking to you and return to them later and see what ideas it stimulates. Attend conferences, both within your field and outside of your field. Travel widely. Meet different people.

Principles for Divergent Thinking: Seek Novelty

- The fourth principle for divergent thinking is seeking novelty, which is about having dreams. It's blue-sky thinking. It's going big. It's trying out new things.

- Alex Osborn, who created these four principles for divergent thinking, said, "It's easier to tame down a wild idea than it is to invigorate a weak idea."

- What seems impractical today can be reality tomorrow. Science fiction is full of examples. Think of *Star Trek* in the 1960s and their then-futuristic communicators. Today, we have mobile phones.

Applying the Four Principles

- The first way that you can apply the four principles for divergent thinking is to manage your own thinking—to make them rules to follow. So when you're explicitly engaging in divergent thinking, use these to guide your thinking.

- The second way to apply these principles is to apply them as general principles as you go through your life. Make them habits. Defer judgment on your ideas and others, just naturally. Learn to be less critical, less self-critical. When challenged, generate many options. When you're confronted with an obstacle, ask yourself, "What else might I do?" Force your mind to make connections. Expose yourself to lots of stimuli. Intentionally look outside of your area to stimulate new thinking.

Suggested Reading

Carruthers, "Human Creativity."

Dunbar, et al., *Evolutionary Psychology*.

Mithen, *The Singing Neanderthals*.

Parnes, *Source Book for Creative Problem Solving*.

Activities

Activity 1: Applying Divergent Thinking

In what areas of your life might you deliberately practice using the principles of divergent thinking (defer judgment, go for quantity, make connections, seek novelty)? Choose one of the areas below and stretch yourself by generating a list of at least 50 ideas. When you get stuck, review the principles of divergent thinking and actively apply them.

- A theme for a party
- A list of places to go on a vacation
- Ideas for a new business venture
- A new hobby
- Personal or professional goals
- Improvements for a product you use
- Ideas for solving a particular problem

Activity 2: Making Connections

Develop your ability to make connections so that you can find fresh ideas when you need them. First, choose one of the areas above and write it down. Then, deliberately seek new stimulation. You can simply try looking around in your current environment, taking a walk, having a conversation with someone, or looking at images. Ask yourself, what new ideas do I get from this challenge by forcing a connection with _____? Add the ideas to your list.

Principles for Converging on the Best Ideas

Lecture 6

In this lecture, you will learn about the mindset for convergence—the attitudes that enhance convergent thinking. In divergent thinking, the key principle is deferring judgment, which is learning to suspend evaluation. When we converge, we bring judgment back in. We get real. We introduce judgment, but in a productive way. When faced with an original idea, generally, the most immediate response is to judge it in terms of what's wrong with it. This kind of critical thinking kills novelty. The principles for convergent thinking that you will learn about in this lecture create the mindset for effective convergence within a creative process.

Principles for Convergent Thinking: Use Affirmative Judgment

- Like deferring judgment for divergence, the key principle for convergent thinking is to use affirmative judgment. Research shows that when given too early, negative feedback hinders scientific creativity.

- Premature criticism results in creative people withdrawing their ideas, especially when ideas are in the formative stage. And neuroscience shows us that we're more creative when we're in a good mood. We're more open to new connections.

- We need to take a balanced approach to evaluation. When we're done diverging, it's not time to come in and rip out all the novel ideas. Rather, we need to take an affirmative, open-minded approach, first looking for the positives and then looking for the shortcomings.

- We resist the all-too-often tendency to prematurely criticize an original idea. Shortcomings are viewed as ways to improve. Remember the tool "yes and" and how that focuses on improving the idea.

Principles for Convergent Thinking: Keep Novelty Alive

- The second principle for convergent thinking—the second attitude that helps us to converge effectively in a creative process—is to keep novelty alive, not to ignore original concepts and immediately move to the safe and not terribly risky solutions. Instead, it's staying open. After all, in divergent thinking, we've left that zone of familiarity. We went into the zone of new discovery.

- What happens when you engage in divergent thinking but you never select the novel options in convergent thinking is that you teach people that there's no point in dreaming, that there's no point engaging in divergent thinking—no point in pursuing new thoughts—and this is risky because without variation, without novelty, there can be no evolution, no growth.

- Keeping novelty alive also refers to staying open to unexpected experiences, and exploring the value of that unexpected experience. Microwave ovens are everywhere. But the discovery of the microwave oven was an accident. It was an unexpected incident that was not ignored.

- The magnetron was invented during World War II in England. A magnetron tube, which emits microwaves, was installed in the radar system, and this was useful in spotting German warplanes. A few years later, while working with magnetron tubes, a scientist named Percy LeBaron Spencer found a melted chocolate bar in his pocket. He didn't ignore that. This was a novel surprise. He got curious, and he deduced that the microwaves were the cause of this. Further investigation showed that microwaves cooked faster than conventional ovens.

Principles for Convergent Thinking: Check Your Objectives

- The next principle for convergent thinking is called check your objectives. During divergent thinking, we're escaping from reality, ignoring the constraints of reality. When we begin to converge, however, we have to bring ideas and our options back into reality. We need to be conscious of reality.

- Creativity is the production of original ideas that are made useful or have value. To ensure that ideas are useful, we need to evaluate potential solutions against success criteria. What will make it work in reality?

- While intuition can bring insight, ultimately novel ideas must work in reality. In order to stick, they must meet the needs of that reality. Sometimes our objectives to screen these promising options are subjective; sometimes our objectives can be more concrete, taking money, cost, time, space, and resources into account.

Principles for Convergent Thinking: Stay Focused

- The fourth principle for convergent thinking is to stay focused. Divergent thinking is playful. It's fun. There's lots of energy. Convergent thinking has a different feel to it. It requires close scrutiny and persistence. Creative ideas rarely come complete and well formed. We need to evaluate and use critical thinking to test and refine them.

- Creativity is hard work. Having an idea sometimes is easy. The hard work is making an interesting, novel idea a great solution. Staying focused helps us to ensure that the best alternatives are selected and developed.

- The poet William Wordsworth spent 40 years revising and rewriting *The Prelude*. The lines about nature in this poem were eloquent, so much so that it seems they must have been natural for him to pen—but they weren't. It really came through brute force. In fact, one critic observed that this naturalism was not achieved by simple spontaneity. It required a great deal of deliberate knowing, self-criticism, and revision.

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William Wordsworth (1770–1850) was an English poet.

- There's a misconception about creativity that's popular and often embraced by many individuals—that all we need is that aha moment. We need that bolt of lightning to hit us, and we're creative. The reality is that the aha moment, in order for creativity to really happen, must be followed by hard work.

Tools for Convergent Thinking

- There are three tools that move our convergent process from a more intuitive process to a more deliberate, systematic process. The first tool is called hits. We review our divergent list, identifying the most promising options, and we mark those options that are most appealing to us. We mark the ones that we think will be successful—the ones that hold the greatest value. This tool can be used as a group and individually.

- Hits can also be used as a tool to help teams converge. Naturally, when you're using it as a team, it's more complicated, and it will take more time. A recommendation is if you use hits to evaluate a list of divergent ideas, marking the ones that seem most promising, you might want to limit the number of hits that you give members of the team. The general rule of thumb is the 10-percent rule: If you've generated 100 options, you take 10 percent and give each individual 10 votes, or 10 hits.

- When you do this, be careful of groupthink. We want to avoid people selecting options because someone else has selected that option, so you might first want to allow people to review the options, the list of ideas that were generated through divergent thinking, and to make their choices independently, and then later show them publicly.

- Hits can be expanded to a second tool: clustering. We begin by identifying our hits, and sometimes when we identify our hits, we notice that there are some themes that emerge—that there are options that naturally relate to one another—and we can categorize them, or put them into clusters. To ensure that these clusters really

hang together, put labels on the cluster. Identify what the theme is and give some descriptive theme to that cluster.

- When you use this clustering tool, be sure that the clusters remain independent. They shouldn't overlap. Also, be sure that all of the items in that cluster really belong to that cluster. That's the importance of having the theme. We don't want to force all of our options or all of our ideas into clusters, and if there's one that's unique, we lose the uniqueness if we force it into a group. It's OK to leave unique items alone.

- The third tool is called blue-sky voting, in which we use codes to help us to understand our reaction to our hits. We use coding labels or electronic bullets. We use two colors: green and blue. When we go through and identify our hits, we use these two colors to represent two different reactions to these options that we're evaluating.

- For some hits, we use green dots or green bullets—green meaning that we're green-lighting that idea or option. It's fairly straightforward, and we're excited about it. It's easy to implement; we can just do it. Then, in the spirit of staying open to novelty, we reserve some of our hits for those blue-sky ideas, and we use blue dots or blue bullets. These are options that are highly novel. We're excited about these options, but we're not sure how to implement them. But if we could, they would be dynamite.

- We split our hits between these two sets. When we do this, if we're giving 10 hits to group members, we might want to give more dots to the green-lighted ideas (for example, seven) and less for the blue-sky ideas (for example, three). In fact, you can do the same thing yourself, and in this way, you're intentionally staying open to those novel options.

- There are some further things to be thinking about in terms of divergent and convergent thinking. A common question is: "How do you balance? How do you split your time between divergent and convergent thinking?" There's no right answer to this, but

it's a common mistake to spend too much time on divergent thinking. After all, it's fun and people enjoy it, and they get lost in the divergent thinking, and suddenly they realize that they need to come to a decision, and they will often make a quick convergent decision.

Suggested Reading

Arnold, *The Art of Decision Making*.

Cropley, "In Praise of Convergent Thinking."

Proctor, *Creative Problem Solving for Managers*.

Activities

Activity 1: Using Affirmative Judgment
Recall a time when you or someone else in a group responded to a new idea by saying, "That will never work." Formulate an alternative response to the idea, making sure to apply affirmative judgment by first finding something positive to say about the idea.

Activity 2: Individual and Group Practice

- Find a challenge you want to work on (work or personal). Use divergent thinking; then, afterward, apply one of the convergent tools (hits, cluster, blue-sky voting).

- Find a challenge that you can solve in a group (family, friends, coworkers). First, identify a challenge, such as what to do this weekend, where to go on vacation, some goals for next year, etc. Use divergent thinking, and then apply one of the convergent tools (hits, highlighting, blue-sky voting).

Stages of the Creative Process—and You

Lecture 7

This lecture examines a universal process known as creative problem solving, the steps and stages of thought that we move through to close the gap between what we have and what we want. Research shows that everyone goes through these steps, whether it's in regard to superstar creativity or everyday creativity. Graphic analysis of people who have created drawings of the process that they move through to solve problems in their professional and personal lives reflect these stages that you will be introduced to in this lecture.

Creative Problem Solving

- In the model known as creative problem solving, there are four steps that we move through. The first is called clarify, in which we're identifying the challenge or challenges that need to be worked on. The second step is called ideate, in which we begin to generate ideas. These are tentative solutions. In the third step of the process, called develop, we take those initial concepts and ideas, and we turn them from good, promising ideas into really great solutions. Finally, in the fourth step, called implement, we have to move our solutions from our own head into reality.

- Creative problem solving is intuitive and natural. It's not designed to replace our natural creative process; rather, it builds on this process.

- In addition, it's research based. The creative problem solving process has, perhaps, been the most widely researched deliberate creative process model, and it has been found to be one of the most effective methods used in creativity training. The most effective methods are cognitive models, models in which we're given thinking strategies or tools that help us to guide and direct our thinking.

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Solving a problem is like solving a puzzle. It causes you to think about different pieces of the problem, which then come together into a solution.

- Furthermore, creative problem solving is highly generalizable. It can be used in all areas of life. Some creative process models are a bit more domain specific.

- Creative problem solving requires the use of different mental operations, and in this way, because creative thinking is a higher-order thinking skill that has subskills to it, we're taking those subskills and improving those skills in order to achieve this complex form of thinking.

- Because creative problem solving involves different ways of thinking, we can look at how people connect to that process. Psychologists call it cognitive style, a preference for how we process and organize information—how we engage in thinking.

- Research has shown that we don't all move through creative problem solving in the same way. While we all use creative problem solving and it's natural for us to be creative problem solvers, we may have a preference for some of the mental operations, or steps in the process, over others.

Preferences for Ways of Thinking

- Like handedness, we have different preferences for ways of thinking. There are areas within this creative process that will meet our preferences, just as most of us have a preference for the right hand over the left hand, and when we're using that way of thinking, it will flow. It will feel natural and comfortable.

- But you can use different preferences. You can switch your hands, and you can write with the other hand. It might feel a little uncomfortable because it's not preferred, but you can do it.

- The clarifier is the person in the meeting who's calling a halt to the discussion and saying, "Are we really solving the right problem?" Clarifiers tend not to be too quick to move to solutions. They enjoy doing research and gathering information. They attend to the details. They're methodical in making sure they do their homework. They tend to ask lots of questions because they need information.

- If you take any of these preferences to an extreme, there can be a liability, and the liability for a clarifier is analysis paralysis. They may overanalyze. Clarifiers annoy others by asking too many questions, being realistic to a fault, or overloading people with information.

- The next preference is the ideator, who looks at the big picture. Ideators dream of possibilities. They toy with ideas. They're highly fluent. You need an idea? Go to an ideator. They don't know where the stop button is. They stretch their imagination. They will offer out-of-the-box ideas. They take an intuitive approach to problem solving. They jump from A to Z. They can't tell you how they did that, but they often do that. They're adventurous, and they're dreamers.

- Take this to an extreme, and the potential liability for an ideator is that they may overlook the details. They might annoy others by drawing attention to themselves, by not being able to stick to one idea, by being abstract, or by offering ideas that are off the wall. Sometimes, in fact, they offer ideas that are off the wall just to get a reaction from other people.

- The third preference is the developer preference. A developer takes an idea and tinkers with it. Developers improve upon ideas. Developers put together workable solutions. They analyze and compare competing solutions, looking at the pros and the cons. They can get lost in a single idea, going very deeply into it. They craft and refine and perfect a single idea, working it up into a fantastic solution.

- The potential liability for developers is that they're perfectionists. They may get stuck developing the perfect solution. How they may annoy others is by being too nitpicky—finding flaws in others' ideas or getting locked into one approach.

- The fourth preference is the implementer. Implementers are individuals who are quick to action, always moving forward. They love to see ideas brought to fruition. They want to see things happen. They're decisive and determined.

- The potential liability for implementers is that they sometimes leap to action too quickly. They might annoy others by being too pushy, expressing their frustration readily when others do not move as quickly as they're moving, and overselling their ideas.

- There are some people who struggle to rank these four preferences—clarifier, ideator, developer, implementer—and they struggle in that they like all four stages of the creative process. Their energy is equally distributed across all four. There aren't peak preferences or low preferences in their profile. We call these individuals integrators.

- Integrators have some unique qualities. Something that's unique to the integrator when they work on teams is that they like to focus on harmony and relationships and collaboration and cooperation. They're excellent team members, because team chemistry is important to them. They easily relate to the other preferences.

The Value of Understanding Your Preferences

- Understanding where you flow and excel in the creative process and where you come up short can improve your creative performance. Where you don't have preferences, you might tend to skip those steps of thinking. If something doesn't come naturally to you, you can learn a tool.

- We have tools in the creative process and creative problem solving that make tasks easier. We have tools for clarify, tools for ideate, tools for develop, and tools for implement.

- There are also implications for teams. Sometimes when we're working with others who have a different preference from us, there's friction and conflict, and by understanding these differences, we can hopefully move to a place where we begin to appreciate the differences. Ultimately, strong teams have a mix of these preferences, and they're able to complement one another.

- One of the benefits of understanding your preferences is individual management—managing yourself and managing your development by learning tools that make up for your preferences. You can't use your low preferences as a shield.

- Consider doing this, and consider sharing your results with others, because there are individual implications—understanding ourselves and managing ourselves—but this also has massive implications for relationships. Compare your results. Identify differences and similarities. Discuss how this might impact your relationship.

- A main activity we do with others is to solve problems together, and by understanding these different preferences, or these similar

preferences, it might help us to be more effective in terms of how we solve problems together.

- Finally, don't stop there. Share your individual results with others, as many as you can, so that they can better understand you. Knowing your preference will help you to maximize the benefit of these tools so that you can practice those areas that either complement what you already do naturally or to use tools that help to fill in areas that may not naturally come to you. Understanding your process preferences, along with someone else in your life, just might help you to have an even stronger relationship.

Suggested Reading

Grivas and Puccio, *The Innovative Team*.

Puccio, et al., *Creativity Rising*.

VanGundy, *Idea Power*.

Activities

Activity 1: Your Creative Thinking Preference
Based on the descriptions of the four creative thinking preferences—clarifier, ideator, developer, and implementer—for which area(s) do you have a preference? Or, if you took the FourSight measure, how have the results helped you to understand your creativity?

Activity 2: Comparing Preferences
Encourage others to reflect on their preferences within the creative problem solving process, or have them complete the FourSight measure. Share your results; then, discuss differences and similarities. Consider how they might impact your relationship.

Clarifying the Challenge

Lecture 8

This lecture focuses on the role of problem clarification in creative thinking and the importance of how we see the problem and how that determines all of the thinking that occurs afterward. In this lecture, you will learn tools for clarification. To clarify, we generate wishes and goals. We start by diverging on goals, and then we converge. We explore the data by diverging and converging. We use our data to move us to identify challenge statements using statement starters.

Tools for Clarification

- There is a natural sequence that we move through as we go from the initial challenge through to implementation. We first begin by problem identification.

- In the clarify step, we do three things. We begin by defining our goal. What's our wish? Then, we gather data; we examine the situation. The third aspect is to formulate a challenge or challenges that we need to address in order to get to our goal.

- Each step of creative problem solving involves a different kind of thinking, and in clarify, we suggest that the kind of thinking that's being used is strategic thinking.

- Strategic thinking can be defined as the ability to sense the problem, to identify the key issues, and to see the paths that will move you toward your desired future.

- Robert Fritz created a model for creativity called the creative tension model, which states when we create a desired future, a goal or a wish, and we understand what our current reality is, it creates tension between where we want to go and where we are. In other words, we have a problem.

- There are two ways to reduce that tension. One way is to forget all about our desired future. That's probably not a productive way to resolve the tension. A more productive way to resolve that tension is to change our current reality—to move it toward our desired future, resolving those challenges. As we overcome those challenges that stop us from our wish, we turn our current reality into our future.

- In clarify, we're attempting to define where we want to go, creating an understanding of where we are, and then identifying in a strategic way of thinking those challenges that, if we could overcome them, we would be able to realize our vision. In creative problem solving, we diverge and converge in all of the steps and all of the major aspects within the steps of the process.

Influence, Imagination, Interest

- Generate a list of wishes by answering the following questions. What's been on your mind lately? What have you done lately that you wish you could do better? What challenges have been on your mind lately? What opportunities have you been thinking about? What are some goals that you would like to accomplish in the next six months? What are some goals that you would like to accomplish within a year? Finally, what are your big dreams? What are your wishes?

- Convergent thinking follows divergent thinking. We're going to use the tool known as hits. The three criteria that are most appropriate for creative problem solving for this activity are influence, imagination, and interest.

- Look over your list of wishes that you've generated, and identify first which ones you have influence over. Where are you the chief decision maker? You can execute any decision that you make. You can change the situation. You clearly have some influence. In reviewing your list, place an X or some other symbol next to those that you believe you have influence.

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Writing down your goals once you set them is a great way for you to see the path to completing your goals that lies ahead of you.

- For only those wishes and goals that you have influence, forgetting the others, now examine those for imagination—meaning you need new thinking. The solution isn't apparent. You can't simply just look it up, find it in a book, or find it on the Internet. You need to apply your creative thinking in order to make this happen, and place a second X or other symbol next to those for which you have influence and you need imagination.

- Go through the wishes, only those for which you have two Xs already, and circle those for which you have interest—those that you're motivated to work on. It's important to you. Through this, hopefully you sorted your list down from a larger list to a shorter list, and these wishes and goals are the kinds of wishes and goals that really benefit from creative problem solving.

- In creative problem solving, we use specific language. Language guides thinking. How we phrase things influences how we think about things. Phrase your wish statements that have the two Xs and

a circle in the following form: “I wish,” or “It would be great if,” and now it begins to open it up for possibilities.

The Five W’s and the H

- Identifying the goal or wish is the first part of the clarify step. The second part is to look at the current reality—to gather data. Where does data come from? What are sources of data?

- One source of data is facts. What do we know? What do we know as truth, for certain, relative to this situation? Another source of data is observations. What do we see happening? Another source is feelings. How do we feel about the situation? What emotions are involved in the situation? What are our impressions and hunches about the situation? Finally, another source of data is to recognize what you don’t know. What questions need to be answered? What are we uncertain about?

- To help us gather data, we use an old journalism tool called the five W’s and the H: who, what, why, when, where, and how. Journalists use it to get at the details of a story.

- “Who” stands for individuals or groups that are involved in the situation. “What” stands for examining the history. What has occurred? What have you already thought of or tried? “Why” helps us to understand the reasons behind what’s occurring. Why is this an issue for you? Why do you want to take care of it? Why is this important for you?

- When we think of “when,” we’re thinking of timing issues. Are there particular times when you might want to get started or times when this is more problematic than others? “Where” gets us to think about locations, either physical locations or a location within a process. “How” gets us to think about operations. How might this be resolved? How has this been dealt with in the past? How have others thought about this?

- We use the five W's and the H to provoke our thinking—to make sure that we cover a range of data. It's important that we diverge on data so that we don't miss any important data, and then we converge, using tools like hits and clustering and selecting the most important data.

Challenge Statements

- It's important to understand your current reality. The better we understand our current reality, the better we can go on to the next phase of clarify—to identify the pathways that will help us to move to our desired future. We call these challenge statements because they challenge us, and they challenge our thinking.

- Why identify challenge statements? Why not leap right into the massive goal and begin to generate ideas? You've already looked at the current situation. Isn't it time to get on to ideas? There's a limitation in that. It's impossible. It's too large. It's too vague and too abstract, so it's valuable to take that broad goal and break it into smaller parts that we're more easily able to address.

- What's the formula for a good challenge statement? We start with a statement starter, such as "how might …" We have an owner, for example, "I"; a verb, such as "obtain"; and an object, such as "funding for my idea." Put it all together, and the challenge statement is: "How might I obtain funding for my idea?"

- There are a variety of statement starters that you can use when creating challenge statements. "How to," "how might," "in what ways might," and "what might" are the ones that are recommended. There's power in language, and these statement starters invite multiple responses. When we phrase it in this way, we're assuming that there are multiple ways to attack the challenge.

Is Clarifying Important?

- A classic research study carried out by Jacob Getzels looked at artists' behavior. He had 31 fine artists draw a still life. He brought them into a room, and there were two tables. On one table, he

had 27 different objects laid out. They were to select one or more objects and then move them to the second table to construct their still life scene.

- The artists were observed by psychologists, and they were rated on their problem clarification behavior. They were rated on the following variables: breadth, the number of objects that they examined; depth, the amount of time taken to explore the objects; and uniqueness, the extent to which they selected unusual objects.

- Their artwork was then displayed, and it was rated by expert art critics. The result was that the greater the problem clarification behavior, the more positively the art was judged. In fact, there was a rather large correlation.

- What's really interesting is that this was a longitudinal study. Seven years later, they looked at the professional success of these fine artists, and they still found significant relationships between those problem identification behaviors from when they were students and their real-life accomplishments as fine artists.

Suggested Reading

Kanji and Asher, *100 Methods for Total Quality Management.*

Weisberg, *Creativity*.

Activities

Activity 1: Writing Challenge Statements
Practice stating problems in good challenge statement form—for example, open-ended questions that begin with a statement starter (How to …, How might …, In what ways might …, What might be all the …) and include an owner, verb, and object.

Activity 2: Problem Clarification and Reflection

1. Generate 20 or more wish statements.

2. Use the three I's to determine where to invest your creative thinking efforts.

3. After selecting an area to focus on, use the five W's and H to gather data.

4. Use your data to help generate challenge statements that begin with statement starters.

5. Reflect: American educator and philosopher John Dewey said that a problem properly stated is already half solved. How did the clarify step of the creative process help you? What insights did it give you?

Clarify Even More—Webbing and Storyboarding

Lecture 9

In this lecture, you will learn about a few advanced tools for clarifying. These are more structured approaches to problem clarification. They're helpful in moving us from the problem as given to really understanding the true nature of the problem that needs to be addressed. They will take more practice, but once learned, they're powerful. The two tools that you will learn about in this lecture are called webbing and storyboarding. By the end of the lecture, you should be able to apply them to your wishes or goals.

Advanced Tools for Clarifying: Webbing

- Webbing leverages two fundamental questions. The first question is why. When we ask this question, it forces us to think in more abstract terms—to broaden our perspective. The second basic question in webbing is what's stopping you. When you ask this question, it forces you to take a more concrete view. We use these two questions to fully scope out the problem space.

- Let's say our initial challenge is the fact that someone is not getting to work consistently on time. We ask, what's stopping you from being able to arrive on time? The response might be not leaving the house on time. What's stopping you from being able to leave your house on time? I have too many responsibilities in the morning. What's stopping you from finding ways to reduce those responsibilities? I do everything; I'm not able to delegate. What stops you from being able to delegate? I need to assign appropriate tasks to others. And what's stopping you from doing that? I just haven't made a checklist. Maybe I need to make a checklist for my family and review it to see who might be able to do which chore.

- By asking the question what's stopping you, we moved from our initial problem, which is not getting to work on time, to something very concrete—making a checklist. As we ask the question what's

stopping you consecutively, we drive the response to a more concrete action-oriented frame.

- By asking these two questions, we've moved vertically, in a way. But Edward de Bono talks about lateral thinking and the ability to move sideways. In the webbing tool, we simply don't move up with the why question once without exploring, in a lateral fashion, nor do we do the same with the question what's stopping you—simply taking one line of thought and drilling down.

- The way to move sideways, or laterally, is to tag the word "else" onto these two basic questions: Why else is this important to you, or why else is this a problem? What else is stopping you? In this fashion, we begin to spread out, fully scoping out the problem space. The goal is to move from the problem as given, assuming that it is the issue that needs to be resolved, and to a problem as understood.

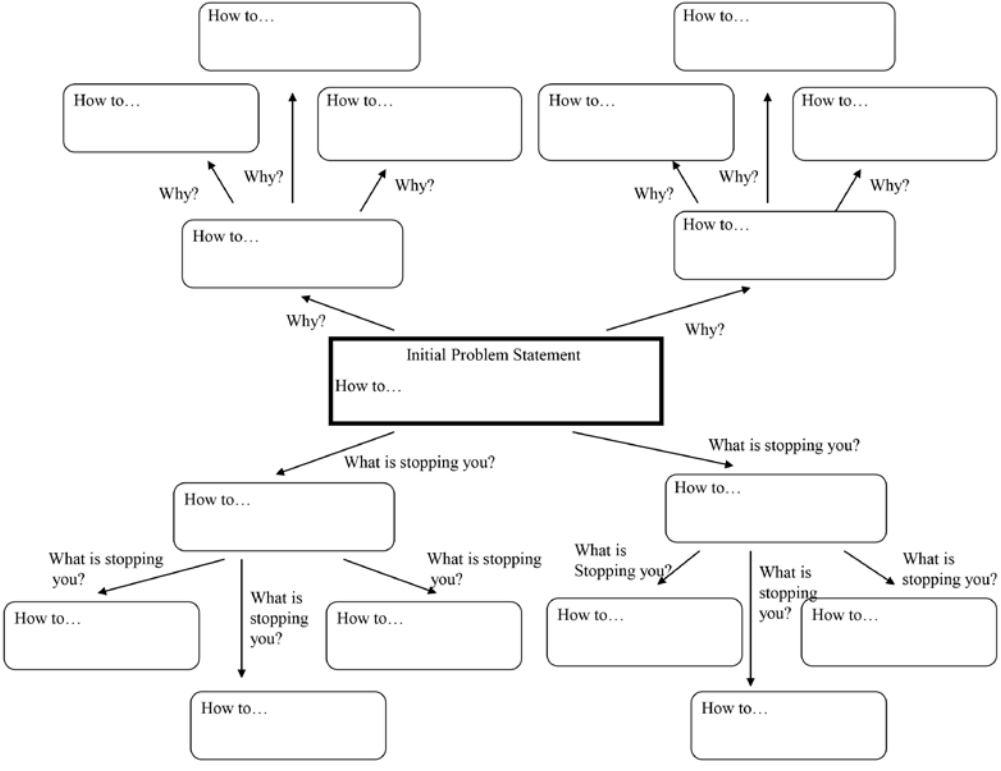
- In the webbing tool, we engage in divergent thinking. The questions help us respond, but we need to use that mindset of divergent thinking to fully explore all the alternative ways of looking at the problem—all of the alternative challenge statements that help us better understand our situation.

- We start with an initial problem statement, the problem as it's initially presented to us. Our goal is to branch out, to fully scope out the problem space by asking the following questions: Why? Why else? What's stopping you? What else is stopping you?

- One of the benefits of using this tool is that we're revealing the full breadth of challenges related to the problem. Another benefit is that it forces you to look at the problem from different angles and different perspectives. It may uncover the true problem.

- Sometimes, the initial problem really isn't the problem you are trying to solve. Sometimes, when you're webbing, a different challenge statement comes up. If you accept the new challenge

Webbing Worksheet



statement as the challenge statement to focus on, it opens up different possibilities and different solutions. It also gives you an order of attack.

- In order to resolve a complex problem, there are sometimes multiple challenges that need to be addressed, and by looking at the web, you can perhaps begin to identify a sequence. It also shows the relationships among the challenges, so if you tackle one challenge and resolve that challenge, it may have a positive, knock-on effect and solve other challenges.

- When we're using the webbing tool, in order for the webbing tool to work, we have to look at all the options. Therefore, when we first begin using the webbing tool, we're putting evaluation off to the side, suspending our judgment. We're striving for quantity, trying to generate many challenge statements. We're seeking novelty, so we're looking for unusual perspectives.

- The first phase in terms of using the webbing tool is to engage in divergent thinking. Then, when we think we've fully fleshed out the problem space, we move on to convergent thinking and, hopefully, by fully exploring this, move from the problem as initially given to a better understanding of the problem.

Advanced Tools for Clarifying: Storyboarding

- Storyboarding is a visual tool designed to tell a story in a visual sequence. Many credit Walt Disney with creating this tool, and certainly Disney used this tool, but he credits an animator, Webb Smith, who sketched scenes on separate pieces of paper and posted them on a bulletin board in a sequence. That's how it became known as a storyboard. When you think of a storyboard, think of a cartoon strip with panels.

- Others say that it started with silent movies and soon became the industry standard for previsualization to help create the scene in our

minds before going to actual filming. *Gone with the Wind* was the first live-action film to be completely storyboarded.

- Storyboarding is still in use today. In fact, it's very popular. Pixar uses tens of thousands of storyboards when they create their films in order to be deliberately creative. They've had a terrific track record in producing wonderful animated films like *A Bug's Life*, *Finding Nemo*, *Ratatouille*, and *Wall-E*. They use storyboards to explore the possibilities, the characters, the plots, the scenes, and to identify unforeseen problems.

- We can use storyboarding to help us clarify in the creative problem solving step. To use storyboarding, you need at least six panels. You can have more, but start with six.

- In the last panel, you begin by telling the end of the story. This is a visual tool, so use images, not words. We're trying to see that which we wish to create, so we start with the sixth panel. This is our desired future—our goal, our wish. Your image for what it would look like if you accomplished that goal goes into the sixth panel.

- Then, we jump back to the first panel, in which we draw a picture of our current reality. Relative to this goal, where are we now? What does the current situation look like? Now we have our desired future, where we wish to go, and our current reality, where we are.

- In a way, this is like the Robert Fritz creative tension model. How do we resolve that tension? On one end is the desired future, our destiny, and on another is our current reality. We fill in the panels in between. We resolve the tension by identifying the challenges that we have to address in order to get to our goal.

- In the four panels in between the desired future and the current reality, in sequence, we draw images of the milestones we have to hit. In this way, we start to tell the story from the beginning, the middle, and the end.

Sample Storyboard Template

Project Name: **Class:**

X	X	X
Narration:		Narration:
X	X	X
Narration:		Narration:

- This mirrors the clarify step of the process, because our desired future is our goal. The current reality exemplifies the data related to the current situation, and the four panels in between give us insight into the challenges that we have to address in order to get to our desired future.

- You can use storyboarding for personal goal setting. You can also use it for strategic planning with teams by having individuals draw their desired futures in terms of the organization or the unit that they're in. Individuals draw their current reality and the milestones that they have to hit in order to move from their current reality to the goals that they have for the team or their organization. Then,

individuals compare storyboards and create one master storyboard by synthesizing the team members into one organizational storyboard. Then, this is converted into a strategic plan.

- Applications of storyboarding include planning a presentation or writing a book. In fact, it's becoming increasingly more popular among novelists to storyboard before they write a book. In addition, it can be used for planning a trip or laying out a project.

Applying These Tools

- Webbing and storyboarding are more advanced tools, and they require practice to develop proficiency. Start by applying webbing to one of your goals. Put a goal or wish into the middle of a webbing worksheet and ask yourself why and why else—in order to branch out and to look at it on a more global, abstract level. Then, return and ask yourself what's stopping you, and what else is stopping you, to get a more concrete view of that challenge.

- With storyboards, put one of your goals into the sixth panel. Create an image for what that future will look like if you accomplished it, and then complete the storyboard.

- These tools can be applied formally, but they can also be applied informally. They can be applied in discussions. For example, a coworker comes to you and says, "I'm having a really difficult time with project X." You can facilitate that coworker's thinking by asking what's stopping them and what else is stopping them, and in this way, you can give him or her some insight into the challenges that he or she needs to specifically address in order to move forward.

Suggested Reading

Forsha, *Show Me*.

Fritz, *Creating*.

Runco, *Problem Finding, Problem Solving, and Creativity*.

Activities

Activity 1: Webbing
Practice the webbing tool. Start by choosing a goal, wish, or challenge statement and writing it in the center of the webbing worksheet (see page 61). After applying the webbing tool, look over the range of challenge statements you generated and converge on the ones that you think, if solved, would help you most in attaining your goal.

Activity 2: Storyboarding
Practice storyboarding using the template on page 64. Instructions: Start by choosing a goal, wish, or challenge statement and drawing or writing about it in the last square. Then, draw or write about your current state in the first square. Finally, use pictures to illustrate four steps, in chronological order, that will take you from your current state to your desired future state.

Classic Brainstorming and Brainwriting

Lecture 10

In the creative problem solving process, we've gone through the clarify step, where we've identified a goal or wish. We've gone through some data, and as a result, we've identified a challenge or challenges to work on. We're now in the ideate step. We need some tentative solutions to address the challenge. In ideate, we think about lots of options, we explore new combinations, and we build on ideas. We're using the thinking skill of ideational thinking—the ability to produce a variety of original options, images, and thoughts that address our challenges. This lecture focuses on brainstorming and brainwriting.

Brainstorming

- In his book *Applied Imagination*, Alex Osborn introduced the tool known as brainstorming, as well as creative problem solving. The first organized ideation sessions using brainstorming took place in 1938. This tool has been well diffused, but often it's poorly understood.

- Some people believe that brainstorming is just a session where you're just going to have chitchat and idle discussion. In some cases, the group runs with and begins to implement the first good idea that's struck upon in brainstorming sessions. Many individuals don't know that there are rules to a brainstorming session.

- Others see brainstorming as a panacea. It's often talked about as if it were the full creative process instead of one tool within the creative process, and often people neglect the fact that a brainstorming session needs to be facilitated.

- There's a heavy emphasis on divergent thinking in the ideate step of the creative process. The four guidelines for divergent thinking are to suspend judgment, then strive for quantity, then make

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The process of brainstorming benefits groups by helping members' divergent thinking transform into convergent thinking.

connections, and finally push for novelty. You can use divergent thinking individually or you can use it in groups.

- The benefit of group divergent thinking is that we can stimulate each other's thinking. We discover new perspectives, and there's lots of energy as we listen to others share their ideas.

- In a conventional meeting, where we're looking for ideas, an idea is suggested and is often immediately evaluated. If it's acceptable, we run off and implement it. If it's rejected, we wait for another idea to come out.

- There are some consequences with this kind of a meeting. First of all, we suggest an idea only if it's good. It's risky unless we believe it's a good idea, so there's a lot of evaluation that happens in our minds before we share the idea.

- Another consequence of this kind of meeting is we attack or defend. Ideas are under attack, or we defend our ideas. We're looking to get that home run, to score big, and if we don't, if an idea is not accepted, we might withdraw.

- A brainstorming meeting looks and feels quite different from a traditional meeting. In a brainstorming meeting, we apply the divergent thinking guidelines as a group. Multiple ideas are suggested, and they're recorded in public view, which makes it easier to build off of those ideas. We ensure that evaluation is suspended temporarily. Then, when we've generated many alternatives and we're satisfied that we've got a sufficient array of options to play with, we converge and use evaluation.

- In a classic brainstorming session, there are three roles. The facilitator is there to guide the process, not to give input in terms of the content. The client brings the challenge to the group and is also responsible for evaluating the ideas afterward and deciding which ones to take forward. The resource group members are there to bring diversity in thought, to engage in divergent thinking, and to help provide the client with many ideas and many options.

- In addition to classic brainstorming, you can also use a tool called brainstorming with Post-its. Each member of a discussion has a large Post-it pad and a large marker to record his or her own ideas, consisting of maybe four to eight words. Call out your ideas to the group so that others can hear and build off of your idea. Then, hand your pad to the group leader, who will put the ideas on a flip chart.

Brainwriting

- Brainwriting is a silent form of idea generation in which each member of the team gets a sheet of paper—a brainwriting form. On the sheet of paper are three columns and three rows. There's a blank sheet in the center of the table. Each person silently writes three ideas across the first row. When he or she is done, to encourage cross-fertilization, each person swaps his or her sheet with the sheet that's in the center.

- Team members continue to do this. As they take the sheet out of the center, they look at ideas that have already been written on that sheet and see if they can build on those ideas, or if they can't, then they continue to add new ideas. The goal is that every time, there are three more ideas—that either build on another idea or are new ideas.

- The advantage of the brainwriting tool is that sometimes you may have a vocal person who dominates a discussion, and brainwriting allows for reflection—silent idea generation. In a way, if you have a dominant person, it sort of neutralizes that effect.

- Also, because people are working independently, brainwriting tends to generate more ideas. When you're using brainstorming with Post-its, or classic brainstorming, you have to wait and listen to each other speak. Sometimes while you're waiting, you're shutting down your thinking because you're listening to someone else.

- One of the other advantages of brainwriting is that people tend to have more elaborate ideas, because they have time to reflect. Of course, we have the benefit of the fact that as they take a sheet and read it, they still are able to connect to other people's ideas. They're still able to use other people's ideas as stimulants—as springboards to their thinking.

Identifying Promising Ideas

- After we've completed the divergent part of the ideate step of the process, the ideas would go to the client, who would review them and begin to move through the converging part, identifying the ideas that look most promising.

- In the ideate step of the creative process, there's a heavy emphasis on divergent thinking. When you follow the guidelines for divergent thinking, you're going to generate many ideas, among which there will be unusual ideas—especially if you're following the principle of seeking novelty—ideas that are bizarre or may seem to be off-the-wall, deviant ideas. These have a value.

- It's important to allow these ideas to come out in an ideation session. Sometimes we can use them as springboards; they spur other ideas. They help to create a more relaxed atmosphere, because when people hear these ideas, sometimes they laugh. There's joking that occurs often after a deviant idea or an unusual idea is shared.

- It's important that we're open to all ideas, mainly because it reinforces the guideline of suspending judgment. Sometimes those really novel ideas lead to a practical, workable solution. Wild ideas can also spur something that can work.

- Tom and David Kelley, founders of IDEO, a well-known design company, wrote an article in the *Harvard Business Review* in which they explored what stops people from being more creative. In this article, they suggest that the main obstacle to creativity is the fear of judgment. They use brainstorming in their sessions with their clients to address this obstacle, and they use the main principle in brainstorming, deferred judgment, to overcome this fear of evaluation.

- IDEO was recently working with Air New Zealand, who was trying to solve the problem of making long-haul flights more comfortable for passengers, so they ran an ideation session with the executives, and they pushed on the crazy ideas that came up—ideas like harnessing people while they're standing, putting hammocks inside the airplane, having bunk beds, etc. This kind of thinking eventually led to the idea of Skycouch, which is a heavily padded section that swings up, and then a couple can lie down comfortably together.

The Nominal Group Technique

- There's a derivation of brainstorming called the nominal group technique in which individuals brainstorm alone, and then the ideas are pooled together. Nominal brainstorming will often generate more ideas than group brainstorming because individuals are working separately, and then, rather than having to wait for each other to talk, they're free to generate as many ideas as they wish without being restrained by having to listen to others.

- When deciding between classic brainstorming and this nominal approach to brainstorming, use what fits the situation. One of the benefits of classic brainstorming is that it encourages team building and allows for cross-fertilization of ideas because we begin to bounce off of other people's ideas. We can use them as springboards to jog our own thoughts.

- When you're done brainstorming, remember that you have to converge. We've demonstrated only the divergent thinking phase of the ideate step. Remember to generally split your time roughly 50/50, or if you're working in a group environment, 40/60, spending about 60 percent of your time on the convergent thinking parts of the ideate step and 40 percent on divergent thinking.

Suggested Reading

Kelley and Kelley, "Reclaim Your Creative Confidence."

Osborn, *Applied Imagination*.

Parnes and Meadow, "Evaluation of Training in Creative Problem Solving."

Ness, *Innovation Generation*.

Activities

Activity 1: Generating Ideas
Look for opportunities to practice using brainstorming or brainwriting in everyday situations, initially with people you are comfortable around.

Activity 2: Raise the Stakes
Work toward increasing the level of challenge when using brainstorming and brainwriting. Work with groups of people you are less familiar with or on problems that are more complex. Be open to opportunities with higher stakes that stretch your level of skill. Try leading brainstorming and brainwriting sessions with these groups.

Tools for Enhanced Brainstorming

Lecture 11

Brainstorming is well diffused; it's familiar to many people. In this lecture, you will learn about more advanced tools for ideation. They can be thought of as brainstorming enhancers. In brainstorming and brainwriting, ideas come from your head and the heads of others. These advanced tools use deliberate springboards that boost your imagination. They feed you stimuli from which you can springboard off of to generate ideas. They're typically used after brainstorming, when you want to reenergize your ideation.

Reverse Brainstorming

- Reverse brainstorming is good to use when you've used brainstorming and you're looking for a different kind of ideation tool. It's a fun variation, and it's particularly useful when there are groups who have judgmental participants.

- We take the same initial approach as we did with brainstorming. We begin by identifying a specific challenge statement and making sure that it's well constructed. For example, we'll use the following statement: how to ensure customer loyalty for a new Internet business.

- Next, we take our challenge statement and reverse it into a negative form. For example: how to decrease customer loyalty or how to increase mistrust between our business and our customers. We've taken our initial challenge, our goal of ensuring customer loyalty, and reversed it into what we don't want to happen.

- Once we've diverged on various reversed challenge statements, we then converge on one that comes the closest to capturing the exact opposite of what we wish to do. Then, we generate ideas on that reversed challenge statement, following the guidelines for divergent

thinking. We're deferring judgment, striving for quantity, making connections, and remaining open to novelty.

- After the ideas have been generated for this negative statement, we then reverse them, turning the negative ideas into positive ideas and, thus, hopefully responding to our real challenge. Because you are diverging, one negative idea can stimulate multiple positive ideas.

- Starting with the challenge statement—how to ensure customer loyalty for a new Internet business—let's say that we've selected the following reverse challenge statement: In what ways might we frustrate our customers?

- Perhaps one idea that is generated on that negative statement is to ensure that there are many layers to the purchasing process. That's the negative idea. How do we now reverse that to address our original challenge, our goal of ensuring customer loyalty?

- Having many layers to a purchasing process might lead to make the process fun. Use a story as a backdrop to the ordering process. Use a visual dashboard to show progress as the customer moves through the system. Have access to a live person during the ordering process, either via phone or computer camera.

- Let's say that another reversed negative idea was to deliver the product late. Again, we take the negative idea and use that as a springboard to reverse it and generate positive potential solutions. "Deliver product late" might lead to "create a simple tracking system," "give future discounts if an item's not received on time," or perhaps "make all deliveries special—use gift wrap, add a balloon, include a cookie."

- Reverse brainstorming takes a bit more time than classic brainstorming because of the reversals—reversing our initial challenge statement into a negative statement, and then reversing the negative ideas back to positive ideas—so plan on a bit more time.

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Reverse brainstorming involves reversing challenge statements into their negative forms so that you view them differently.

- One advantage of reverse brainstorming is that it can be humorous and playful and often generates lots of laughter when you hear these negative ideas come up. It's also beneficial because it can get individuals who always view the problem from a pessimistic perspective on board.

- When using reverse brainstorming, you may not generate highly novel ideas. This can be avoided by simply doing straightforward reversals. The negative idea comes up—deliver a product late to the customer—and we reverse that in a straightforward manner to the statement "make sure the product is delivered on time," and then you move on to the next idea.

- Instead of doing this, you should take one negative idea and spend a little time with it. Don't just reverse it into the obvious positive idea. Play with it a little bit. See what lateral ideas come up from that one negative idea.

- Some people find this tool easier to use, especially when there's a need to be more playful or a need to shut down some of the pessimistic negative thinking. Also, because you have the negative ideas to build off of, you've got a built-in springboard. We don't have that as much in classic brainstorming, and by having that springboard, you allow ideas to bounce.

Associative Thinking

- Our mind naturally makes connections. You see something, and it jogs a memory or stimulates an idea. Thoughts don't occur in a vacuum. They line up in a chain, one idea linked to another. We call this associative thinking, which refers to how ideas, feelings, and movements are connected in such a way to determine their succession in the mind.

- Sarnoff Mednick believed that the creative process happened as a result of associative thinking. He suggested that the creative process is an ability to form new associative elements that are recognized as being useful. There are a few main tenets to his theory.

- First, he says that when we create, the larger the set of associations, the greater the probability of developing creative solutions. He also suggests that the more remote the association—the more novel the association—the more creative the outcome.

- Mednick created a measure to test his associative thinking theory. The name of this measure is called the remote associates test (RAT).

- The respondent is presented with three words, and they are to make a connection among those three words. For example, what connects these three words? *Rat*, *blue*, and *cottage*. The answer is *cheese*: cottage cheese, blue cheese, and we often associate cheese with rats.

- There are two forms of associative thinking. There are free associations, which are unguided—without purpose or design—and, as a result, are unpredictable. There are also facilitated associations,

which is thinking that's regulated by some desire, design, intention, or strategy. It's more predictable.

- In deliberate creativity, we link to the second form of associative thinking, creating facilitated associations. But, of course, this naturally leverages the free associations we make.

Forced Relationships

- The forced relationships tool is a way of facilitating associative thoughts, and it's often used after a group has initially done some brainstorming or ideation. It's used to recharge their thinking. The tool works by selecting an object and asking yourself, what ideas do I get for my challenge by looking at this object?

- We're going to return to the following statement: how to ensure customer loyalty for a new Internet business. We use a magic marker to generate new ideas. We look at the marker to consider attributes. The marker has nothing to do with customer loyalty, so we're forcing associations. We're following the guidelines for divergent thinking, and we're exploring all possibilities.

- What suggestions might we get by looking at a marker, by forcing it into this challenge? We might be able to make it easier for customers to provide feedback. We could have a hidden prize somewhere along in the ordering process that's stimulated by the fact that the marker top hides the top of the marker itself. We might have a wall in the website for customers to leave their graffiti. When you run out of ideas using one object, you select another object.

- You can use the forced connections tool individually or as a group. You can use objects immediately available to you, or you can collect thought-provoking pieces. However, be sure that the object is not related to the challenge. We're going after remote associations, and if the object is too close to the problem that you're working on, it doesn't force you to think in new pathways. We use it after brainstorming. It serves as a springboard, a brainstorming enhancer.

Visually Identifying Relationships (VIR)

- In forced connections, we use objects. In a tool called visually identifying relationships (VIR), we use images, photographs, and pictures to stimulate ideas. We also add to it an excursion. We take a mental break; we distance ourselves from the challenge. Neuroscience research shows that distancing yourself allows your mind to wander. As a result, your thoughts can travel down new neural pathways. It can create new connections.

- In VIR, we take a break. We move away from our challenge, and then we present images to our mind, and we use those images to create, first, random associations, and then, later, we use those images to facilitate direct associations.

- To use VIR, you'll need four pictures. The first picture is designed to take you away, to relax you, to allow your mind to decompress, to take a short vacation. Then, the next three photographs are used as stimulants. We look at the first picture. We relax. We gain some distance. We slow our thinking down, and then we look at the next three and record our observations. We still are distant from the challenge. We're not intentionally thinking about the challenge. We write down our observations, free associations, memories, feelings, and facts related to the photographs. Then, we reintroduce the challenge. We generate ideas using facilitated associations.

- One of the benefits of VIR is that it slows our thinking down. In a brainstorming session, it's often fast paced, and we're throwing out many ideas quickly. When we go to VIR, it changes that pace. It forces us to be more reflective. It forces our mind to take detours, and as a result, we may use new neural pathways.

- VIR works as well individually as it does for a group. In fact, for an individual, the benefit is when you don't have a group, you have these photographs to be a stimulant, a springboard, for you. You don't hear others' ideas, but you use the photographs to create associations.

- It can also be used as a group. In a group application, participants work individually at first, through the entire tool. Then, when they begin to share their observations and new connections—these new associations—they listen to one another and continue to engage in divergent thinking to see if they can now cross-fertilize the ideas that they each had generated.

- If you're going to use VIR, it would be helpful to build up an inventory of photographs. When you select photographs, much like when using the forced connections tool, make sure that the images that you use aren't related to the task that you're working on.

- Use images only. Avoid words, and stay away from well-known brands because we already have associations with well-known brands. We want to force some new thinking.

- Forced connections in VIR are advanced tools. They take practice. We don't spring them on people the first time they're engaging in an ideation session. It's important to warm them up before using these advanced tools.

Suggested Reading

King and Schlicksupp, *The Idea Edge*.

Michalko, *Thinkertoys*.

Activities

Activity 1: Visually Identifying Relationships (VIR)
Find a personal or professional challenge that requires some imagination to resolve. Locate at least four photos, and go through them in a quiet, relaxing atmosphere. The first one should allow you to relax. The rest should be stimulating. For these, record at least three observations for each photo. Finally, generate new ideas by making associations with your observations.

Activity 2: VIR Scenario

Imagine that you parked your car in a deserted parking lot and accidently locked your keys, wallet, and cell phone in your car. You also notice that there is a large advertisement nearby with the following picture.

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Use the visually identifying relationships (VIR) tool to generate ideas to get inside your car. Record your observations about the picture in the advertisement, including free associations, memories, feelings, or facts. Then, connect these observations to the challenge of getting inside your car.

Borrowing and Modifying Ideas

Lecture 12

Great creators don't work in isolation. Instead, they borrow and build on others' thinking. In this lecture, you will learn how to incorporate other people's solutions, as well as solutions from nature, into your situation. Specifically, you will learn about two Synectics tools: direct analogy and personal analogy. Analogical thinking is a complex form of thinking, and it takes practice. Once perfected, it will open up a rich range of ideas and solutions. It's important to keep in mind that borrowing and modifying is not stealing; it's just good creative thinking. Perhaps the best muse for future ideas is past ideas.

Synectics

- Synectics is a process in the field of creativity that is based on the notion of borrowing ideas. Synectics was originated by W. J. J. Gordon and George Prince and, later, colleague Tony Poze.

- Gordon got partial inspiration for Synectics from his experiences in World War II, where he worked with an emergency group charged with removing a sunken ship blocking the Tripoli Harbor. The colonel in this group imagined his mother raking the dirt in the garden, and this metaphor led to a solution. The solution was to blow up the ship, and then to rake it flat so that other ships could safely pass over this ship.

- The Synectics process is based on the use of metaphors. It also grew out of hours of analysis of audiotapes of business meetings, where they found that a nonjudgmental climate paired with the use of analogies and metaphors ensured the most creative outcomes.

- There are four operating principles behind the Synectics process. First, according to Synectics, creativity is important to problem solving. We use creativity in problem solving when we're unsure what strategy or solution can help us move from where we are now

to where we wish to be. We refer to these as heuristic problems, meaning that they're open ended, versus algorithmic problems, which have a known process and a single solution.

- We don't use creative problem solving on algorithmic problems. Creative problem solving is designed for those more complex, open-ended problems—heuristic problems.

- The second principle of Synectics is that creativity is not mysterious. Rather, creativity is understandable. It's something that we can deliberately provoke.

- Third, creative invention is similar across all fields. In fact, creative problem solving can be used in many, many disciplines.

- Finally, individual and group invention are similar. The processes that individuals use to invent are identical to the processes that groups use.

Synectics Tools: Direct Analogy

- When using direct analogy with groups, there are five steps to take them through. According to the developers of Synectics, Pringles potato chips were invented as a result of the Synectics process. The following is a hypothetical walk-through of how it might have happened.

- In the first step, we identify the challenge; we come up with a description of the issue that needs to be resolved. The problem they were working on dealt with packaging chips in bags that ended up breaking the chips. The chips got destroyed, for example, in shipping.

- In the second step, we diverge on direct analogies; we generate situations that are similar to the challenge we're working on. How do we pack potato chips in such a way that they don't break? What are some other areas that are analogous to this? Perhaps packing a suitcase, eggs in a carton, golf balls in sleeves, bagging leaves, etc.

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Using analogies, such as comparing the process of packing leaves in a bag to packing potato chips in a container, can help you consider new possibilities.

- Once we've identified a list of direct analogies, we then have to choose an analogy to work with—this is the third step. In the Pringles potato chips example, they chose packing leaves in a bag. They thought that was similar to packaging chips in a bag.

- In step four, you then explore ideas that are suggested by the analogy that's been selected. Imagine that it's fall and you've raked the leaves, and you're putting the leaves into a bag. As you think about that situation as they did when they were working on this problem, they recognized that dry leaves take up more space, and when leaves are wet, they conform to one another and sort of mold together. They take up much less space in the bag.

- In step five, we apply the ideas that came to our mind through this analogy. We apply it to our original challenge, and we examine what solutions might occur to us in terms of our challenge. If our

challenge is packing potato chips in a way that they don't break, what the wet leaves might suggest is a process in which the chips form to one another as they're being produced—like the leaves when they're wet. In this way, they take up less space and are harder to break.

- In step 5, you use those ideas as springboards to go back to your original challenge to see what solutions might come to mind. How do you find a good analogy? In order for this tool to work, we have to be effective at coming up with analogies.

- In Synectics, they talk about a compressed conflict, which involves using a pair of words to capture a contradiction—two words that get at the essence of the challenge that you're working on.

- Being able to generate a compressed conflict gets at the heart of what many theorists and scholars believe is a trait that highly creative people possess: an ability to hold opposing thoughts in their mind at the same time.

- Let's return to the challenge that we used in a previous lecture: how to ensure customer loyalty for a new Internet business. Perhaps one compressed conflict might be viewed as building relationships via distance. Boiling that down to two words, some possibilities include "distant intimacy," "loose bonds," and "unrestricted commitment." The compressed conflict summarizes the essence of the challenge.

- If "distant intimacy" is a direct analogy we use, we then think about other places where this compressed conflict may have been resolved successfully. Perhaps online dating services might help us. That might be analogous to our challenge of enhancing customer loyalty. So we take this direct analogy, which was based on our compressed conflict, and we ask ourselves, what does online dating suggest for ensuring customer loyalty?

Synectics Tools: Personal Analogy

- With the Synectics tool known as personal analogy, you imagine that you are the challenge—you use empathy to place yourself in the situation.

- For example, imagine that your challenge is to increase sales of a candy bar. When we use personal analogy, we imagine that we're the candy bar. Look around you. What do you notice? What's in your surroundings? How do you feel as people pass you by? How do different people react to you? We record our thoughts and feelings, and then we use those thoughts and feelings to generate ideas that go after our challenge of increasing sales.

- Personal analogy works on a range of challenges, from selling, to improving a patient's experience in a hospital, to erecting a new building in a historical district.

Biomimicry

- David Kord Murray has recast the spotlight on the value of borrowing ideas. In 2009, he released a book called *Borrowing Brilliance* in which he provides a range of places that we can go to borrow ideas: We can borrow from competitors; we can borrow from a similar place; we can borrow from an opposite place; we can borrow from other people.

- Like Sarnoff Mednick, who created the remote associates test, David Kord Murray recommends going to a distant place to borrow. An example of a distant place is nature. Nature has been used as an analogy to solve many problems.

- For example, Qualcomm is creating rich color displays that use less energy by mimicking the photonic microstructures found in butterfly wings. Nature is an expert designer and problem solver. Humans are not the first to figure out how to build homes, make paper, resist water, or insulate.

- Biomimicry is a disciplined creative process that intentionally draws inspiration from nature. The concept is old, but biomimicry was popularized in the 1997 book *Biomimicry: Innovation Inspired by Nature*. The key focus with biomimicry is to create environmentally sensitive solutions, just as nature does.

- When using biomimicry, the first question you ask yourself when you begin a creative problem solving effort is, what would nature do? How would nature solve this problem? For assistance, go to www.asknature.org, and once you've defined your problem, you can search for analogies in nature. This Web site is mainly based on engineering problems.

- Many challenges require only a single metaphor. If you're working on a complex product, however, you may need multiple metaphors.

Suggested Reading

Benyus, *Biomimicry.*

Gordon, *Synectics*.

Martin, *The Opposable Mind*.

Murray, *Borrowing Brilliance*.

Activities

Activity 1: Direct Analogy
Identify a challenge you want to solve. Then, record your thoughts about the compressed conflict inherent in this challenge; generate a number of different forms of compressed conflicts (i.e., which two words capture the essence of the challenge inherent in your situation). Choose the compressed conflict that does the best job of capturing the essence of the challenge you face. Finally, in considering this compressed conflict, ask yourself which other situations share the same compressed conflict. What new ideas for your challenge do you get from thinking about these analogous situations?

Activity 2: Biomimicry

Identify a challenge you want to solve. Next, look to nature for an analogous situation. Examine how nature solved the problem, and make connections to your own challenge. See what new ideas this helps you to generate.

Systematic Tools to Generate New Ideas

Lecture 13

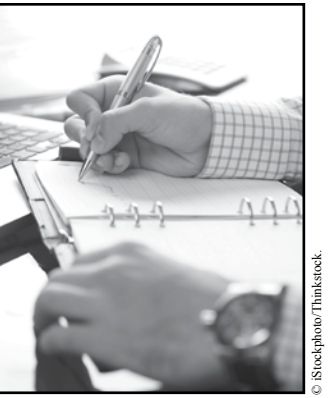
Different tools do different things: They appeal to different people, and they generate different kinds of ideas. You can choose a tool to help you reach the kinds of ideas you desire. For example, brainstorming helps to generate both adaptive and innovative ideas while brainwriting is more adaptive. If you want more innovative responses, you can use a tool like visually identifying relationships. The three tools that you will learn about in the lecture—attribute listing, morphological matrix, and SCAMPER—are more systematic and more structured, and they will tend to generate more adaptive solutions.

Attribute Listing

- Attribute listing is a systematic tool designed to make variations. It was conceived at the University of Nebraska by Robert Crawford, who may have taught the first university course on creativity in the United States in 1931. He saw creativity as taking steps to modify the present conditions.

- In attribute listing, there are a number of steps. The first step is to list the attributes, or components, of the challenge, breaking it down into elements. In the second step, you generate ideas to improve each attribute, and then, you select the best ideas.

- Attribute listing can be used on any challenge that has attributes or components. When those are identifiable, you can use attribute listing.



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When you list attributes, you break down your challenge into its elements.

- For example, let's say that our challenge is to reduce employee turnover in an organization. In step one, we list the attributes associated with employee turnover. We've identified three: the physical work conditions, the psychological work conditions, and employee engagement.

- In step two, we now take each of those attributes and generate ideas to see if we can improve each attribute. Let's start with physical work conditions. What ideas might we have for improving physical work conditions? We can make the space cleaner, brighter. We can add health care. We can have an on-premise coffee shop. We could have child-care facilities or personalized office space. We can remove corporate-wide policies and replace them with unit policies.

- In terms of the psychological work conditions, we could have weekly raffles. We could have counseling services available. We could enhance the leadership skills of the management team to improve the psychological work conditions.

- Finally, what ideas might we have to improve employee engagement? One possibility is job rotation. We could have shadow days where you follow different people around and find out what their job responsibilities are. We could have a bring-your-guest-to-work day and have opportunities to expand responsibilities. We could celebrate employees' anniversaries. We can begin an employee-of-the-month recognition program. We can make senior leadership more visible, including having executive leaders hand-deliver birthday cards.

- At the end, we go into each of these components and choose the ideas that we think will best help to address our challenge—the ones that would be the most viable solutions.

- Attribute listing is a systematic idea-generation tool that is in a way like the other tools that provide springboards. The components become your springboard. They isolate specific areas to generate ideas. So there's a clear structure to the tool.

Morphological Matrix

- Attribute listing works on one dimension at a time, but the tool called morphological matrix works across dimensions. It cross-fertilizes ideas. It is a deliberate creativity tool.

- Morphological matrix is an idea-generation tool that extends attribute listing. We generate ideas for an attribute along one axis of the matrix, and ideas for a second attribute along a second axis, and then we can combine these ideas to create new outcomes.

- For example, let's say that we wish to make a new kind of sandwich. The two dimensions, or two axes, will be the kinds of spread, and the other axis will be meats. We can place the spreads along the top of the matrix. Mayo might be a possible spread, so we create a column for mayo. Then, we create three more columns for guacamole, peanut butter, and brown mustard. We then list meats in the very first column: turkey, chicken, roast beef, and ostrich. With this matrix, we can cross these two dimensions and create interesting combinations.

- For example, we might cross turkey with mayo, or turkey with guacamole, or turkey with peanut butter. We might cross chicken with mayo or chicken with guacamole. We could cross roast beef with peanut butter or roast beef with brown mustard. We could combine ostrich with mayo, peanut butter, or brown mustard. In this way, we're taking our two dimensions and crossing every possible combination.

- One of the benefits of morphological matrix is that it's flexible. It can be used on any challenge with multiple dimensions. This tool generates many combinations. A matrix with four dimensions and 10 ideas listed in each dimension yields 10,000 possible combinations.

SCAMPER

- Alex Osborn created brainstorming. He also created idea-spurring questions to enhance these sessions. He would ask questions, when people would run out of ideas, like, what can we add?

What can we take away? What can we modify? In fact, he had 70 idea-spurring questions.

- Bob Eberle organized these questions into a mnemonic that made it easier to remember these questions: SCAMPER, which stands for Substitute, Combine, Adapt, Modify (which should also be Magnify or Minify), Put to other uses, Eliminate, and Rearrange. Each of these has questions that can be used to spur further ideas.
    - Substitute: Who else instead? What else instead? Are there other ingredients, other materials, other processes?

    - Combine: How about a blend? What can we bring together? Can we combine purposes? Can we combine units? Can we combine appeals?

    - Adapt: What else is like this? What can you adapt for use as a solution? What does the past offer as a parallel? What could I copy?

    - Modify: Can you change the item in some way—its meaning, color, motion, sound, smell, or shape?
        - Magnify: What can you add? Can you have greater frequency of something? Can something be stronger, larger, thicker? How might we duplicate it?

        - Minify: What might be subtracted? What could we make smaller or lighter? How might we streamline it?

    - Put to other uses: What might be a different use, or other uses, if we modified this item?

    - Eliminate: What can you eliminate or remove? Eliminate waste, and reduce effort. Can you cut costs?

    - Rearrange: Can we interchange components? Is there another pattern, another layout? Can we transpose cause and effect?

- This is useful on any challenge. The questions are generic enough that SCAMPER can be flexibly applied, from concrete challenges—such as graphic design and interior design or improving machines—to intangible things—such as improving a service or process, writing a story, or making new music. In fact, this kind of creative thinking has been widely used in the music industry.

- **Substitute**. American singer-songwriter Weird Al Yankovic has made a career out of writing musical parodies that comment on popular culture. This is a kind of way of substituting. For example, he used the melody from "American Pie" to create a song he called "The Saga Begins," which is a parody on *Star Wars*.

- **Combine**. Considered to be one of the greatest stadium rock bands in history, Queen began in 1971 and became massively successful. "Bohemian Rhapsody," one of their biggest hits, combined opera and hard rock. The song stayed at number one in the United Kingdom for nine weeks.

- **Adapt**. Colleen Ann Fitzpatrick, known by her stage name, Vitamin C, provides a good example of this. Her hit song, "Graduation (Friends Forever)," adapts a popular classical piece of music, "Pachelbel's Canon," into a hip-hop song style.

- **Modify**. Jazz legend Dave Brubeck heard an unusual time signature while listening to street performers in Turkey. He modified the traditional 4-4 beat in jazz to the more exotic style he experienced overseas. The result is his well-known album *Take 5*.
    - **Magnify**. The great composer Aaron Copland's "Appalachian Spring" provides a good example of magnification within a single piece of music. In this piece, the basic melody, borrowed from a folk song, "Simple Gifts," grows from a more upbeat, lilting tempo and light orchestration to a more majestic tempo with heavier instrumentation.

- **Minify**. Overtures provide an excellent example of this. In an overture, the composer cobbles together short pieces drawn from the overall performance.

- **Put to other uses**. In the musical *Mama Mia*, 1970s and 1980s ABBA hits are strung together into an interesting story. When *Mama Mia* was turned into a movie in 2008, it was the top-grossing motion picture in England for the year. Perhaps it shouldn't be a surprise; ABBA has sold more than 370 million albums.

- **Eliminate**. Copland's "Appalachian Spring" was originally written for the ballet. He partnered with famous choreographer Martha Graham. When it was performed, the ballet was removed, as well as about 10 minutes of the music, which created the well-known orchestral suite.

- **Rearrange**. *Glee*, a television show featuring a high school glee club, performs mostly rearrangements of past songs, and many times, they mash up two pieces of music into a new combination. Some critics suggest that some of these rearrangements were even better than the originals.

Suggested Reading

Altshuller, *And Suddenly the Inventor Appeared*.

Goldenberg and Mazursky, *Creativity in Product Innovation*.

Activities

Activity 1: Attribute Listing and SCAMPER
Look around you for an object, process, or system that you use for work. Use attribute listing or SCAMPER to generate new ideas and combinations to improve the object, process, or system.

Activity 2: Morphological Matrix

Invent a new pasta dish by completing the matrix below. Generate options for each of the categories, and then combine items. Feel free to add additional categories or modify an existing category—i.e., switching vegetable 2 for a meat category. (Or, create a new matrix by selecting a different challenge and using your own categories.)

Pasta	Sauce	Vegetable 1	Vegetable 2
ziti	tomato basil	tomato	zucchini

Developing Ideas—Toward Great Solutions

Lecture 14

In this lecture, you will learn how to take good ideas and turn them into great solutions. It's not enough to have a good idea. What really makes great creators stand out is their ability to polish and refine their ideas into gems. In a way, this comes naturally for those who have a developer preference. With tools like POINT, which you will learn about in this lecture, we can make this even more efficient—we can make this kind of thinking easier, even for those who may not have the developer preference.

Convergent Thinking: The Develop Step

- In the develop step of the creative process, we're looking at an ability to evaluate and transform a broad idea into a specific, workable solution—one that resolves the challenge that we intended to address.

- Evaluative thinking isn't simply rejecting the bad ideas. In the ideate step, we're generating novelty. In the develop step, we explore the value of that novelty, trying to retain it into something that's workable.

- Because we are exploring novelty in the develop step, this step of the process has more of a convergent orientation that reminds you of the principles of convergent thinking.

- The principle that's key to convergent thinking, much like suspending judgment is for divergent thinking, is to use affirmative judgment. The first thing we see should be something that's positive.

- The second principle is to keep novelty alive; stay open to original thinking and unexpected outcomes. Don't just reject an idea simply because it doesn't fit the old or existing paradigm.

- The next guideline is to check your objectives. The previous guideline focuses on novelty and that side of the creativity equation, but we have to balance novelty with usefulness, appropriateness, and value. We evaluate and screen our ideas against our success criteria to get at the most promising solution.

- The fourth principle for convergent thinking is to stay focused, which is a willingness to work with the idea, to embrace its imperfections, and to refine the idea over time. We recognize that sometimes it takes hard work to make something that you've fallen in love with really work. The principles are important for both developing our ideas and when reacting to others' ideas.

POINT

- Imagine that you've come up with an idea and you've proposed that idea to someone, and you want him or her to give you feedback—to react to your idea. How would you like the person to react?

- In answer to this question, people ask for constructive feedback. They want to improve their thinking. They want to be given a balanced approach, both the positives and the negatives. They want the other person to be honest with them, but not harsh, and to ask questions.

- A tool that sort of takes this advice and puts it into action is POINT, which is an acronym, and it's important that we follow this acronym in the order suggested. P stands for Pluses, so when evaluating an idea and looking to develop an idea, the first thing we do is look for the strengths, the good points, the positives. We should come up with at least three.

- Then, we move on to the O in POINT, which stands for Opportunities. Often, when we evaluate an idea, we only look at what it delivers here and today. We don't think about the future—future scenarios and future possibilities. Opportunities gets us to think like futurists. If we pursued this solution or change, what

might happen? What would be future potentials? What would be some spin-offs? What would be some possibilities?

- To help us think about opportunities, we use the invitational stem *it might*. If we implemented this idea, solution, or change, *it might*—and then we fill in the blank.

- We can't be naïve and ignore any possible shortcomings or limitations, so the I in POINT helps us look at the Issues. These are the concerns, drawbacks, the shortcomings of the idea. To invite a problem-solving form of thinking, we phrase these in the form of a challenge. So, the issue begins with *how to*, *how might*, *what might*.

- When we phrase these as questions, they invoke a response. When someone asks us a question, what's our natural reaction? We look to answer the question. So it's important that you phrase the issues in the form of a *how to* or *how might*.

- The next element within the POINT tool, NT, stands for New Thinking. We use new thinking now to address our issues. We begin by prioritizing them. We start with the biggest issue, and we generate ideas to overcome that issue. Then, we go on to the next biggest issue, and so forth—generating ideas, engaging in divergent thinking, with the hope of coming up with ideas that will address the *how to*, the *how might*, that will overcome that challenge that we identified during the Issue phase of this tool.

- You then evaluate your analysis—what you've generated through the POINT—and you make a decision to keep it as is or to change it or to not go forward with it. If you decide to keep it as is, you're ready to move on to the next step of the creative problem-solving process.

- But you might decide that there are some ideas that you generated when you were applying new thinking that might suggest ways to refine the idea, to develop it into an even stronger solution. Or,

on balance after doing this evaluation, you might decide to not go forward with it. But at least you've given it a fair analysis.

- Imagine that schools had no teachers. The only adults in the building with the students are project managers, not teachers. What might be three pluses of this idea? What might be three opportunities? What might be three issues?

- So, if schools had no teachers, if there were only project managers, can you think of three strengths to this idea—three advantages that this might pose? How about opportunities? If schools had no teachers, what might happen? Can you think of three *it mights*, three spin-offs, three potentials?

- Then, apply good critical thinking. Identify some issues. What concerns might you have? What might be some shortcomings with this idea? Can you phrase these issues in the form of a challenge statement (*how to*, *how might*, *what might*)?

- Finally, the next step of this tool is NT—New Thinking. Can you think of one big issue that might really get in the way of this idea being effective? Think of that in your mind or capture it on a piece of paper, and then generate ideas. What new thoughts do you have that will help you address this issue?

- Now, evaluate the proposed idea. Once you've generated these pluses and opportunities, step back and look to see if you can refine the idea or if it's good as it is. Probably this highly novel idea in terms of eliminating teachers and having project managers would require some refinement. On balance, you step back and analyze what you have generated. You might decide not to go forward.

Benefits of POINT

- One of the benefits of POINT is that it takes an idea that's really novel, and it can transform it into something that actually is workable. POINT is a tool that is incredibly flexible and can be

used in many ways. It doesn't have to be used in a formal way; it can be used in an informal discussion.

- As a team, you can use POINT when you're reviewing a proposed idea. You can go through POINT together, with each person moving through the each part of the acronym. Even school-age children can use POINT.

- POINT is also a wonderful tool for capturing lessons learned from a project. What are some opportunities for the future? What were some of the issues that we need to address? And, while it's still fresh in our minds, what new thinking can we come up with?

- As part of the review process, people receive feedback through the POINT tool during performance reviews or when coming up for a promotion. In addition, it can be used to develop a product concept that you're toying with and thinking about launching into the marketplace. Before launching it, you can use POINT to develop that idea.

- Before you present an idea to a group, you can use POINT with the idea, and then as you're doing the presentation, you can use POINT as the framework to underscore the pluses; the opportunities if the idea were pursued; and some issues and how some of those issues, through your anticipation, could be addressed.

- Finally, POINT can be used to enhance team effectiveness. Michael West, a business school professor who has tracked teams over time, has observed that those teams that are able to sustain their innovation have a quality that he calls reflexivity—that is, that teams stop occasionally and evaluate their performance.

Suggested Reading

Basadur, *Simplex®*.

LeGault, *Think*.

Activities

Activity 1: POINT

- Work through the POINT tool to develop an idea you generated during one of the previous activities.

- Use POINT to evaluate the product featured in the picture below.

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Activity 2:
More Ways to Use POINT

Look for opportunities to use POINT informally while responding to someone else's idea. Don't announce that you are using the tool; simply try it out and see how the other person responds to you.

Prototypes—How Designers Test Ideas

Lecture 15

This lecture goes more deeply into the develop step of the process. Designers are very good at refining ideas. To help them, they create prototypes. The process and tools in this course have already addressed most of the principles of the design thinking process, especially reframing, collaboration, and ideation. We're in the develop step of creative problem solving, and as such, we will borrow the principles of prototyping and user understanding for this lecture.

The Design Thinking Process

- Design thinking has become very popular. It's a model for the creative process, a deliberate way of engaging in creative thinking. Many companies now have design thinking incorporated into their work. Many universities and their business schools now teach design thinking. The strength of design thinking is that it takes what's called a user-centered approach.

- The first principle of the design thinking process is reframing, which is all about stepping back and looking at the situation differently. Are there assumptions that stop you from identifying the real business challenge? What are the hidden opportunities? We're moving from the problem as initially given to a deeper understanding.

- Collaborating is all about appreciating diversity, working in cross-disciplinary teams, drawing inspiration from many settings to gain different perspectives.

- User understanding is the next principle. Really get to know your user, his or her real behaviors and real needs, digging deeply into both the needs that you see as well as the unarticulated needs.

- Ideation is the belief that no idea is too wild. In design thinking, we generate many human-centered solutions. We create many choices, and then we work from there.

- Finally, prototyping is all about testing it out. We use simple and inexpensive materials to quickly test the idea. Role-plays and other methods can be used to get into the user's mindset and also to share with users and to get their feedback on what we've created. This involves the user early on in the development process.

- Like creative problem solving, design thinking has a process, and it has tools. The first step of design thinking is to understand—it's observation, problem identification. Sometimes designers go out and engage in ethnographic research, where they closely observe the users, trying to understand their real frustrations and needs, sometimes uncovering needs that the user is not even aware of but that the designer can see.

- The next step of this process is to ideate. This information is then taken, and brainstorming occurs—the third step of design thinking. Many alternatives are generated in terms of concepts for products and services that might meet the user's needs.

- The fourth step is prototyping, which involves quickly testing ideas, trying to create working models. In the next step, the testing step, we get feedback from the users and we iterate, working until our solution really works—getting feedback, making modifications, testing again.

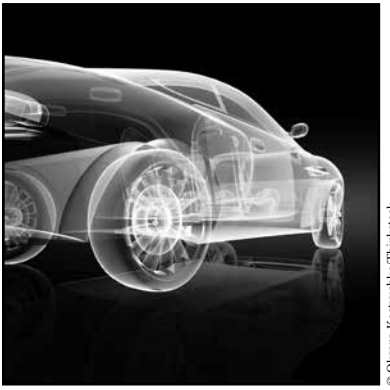
Solution Prototyping

- Solution prototyping involves creating a working model of the solution. It generally goes beyond a sketch. If possible, it's an actual working model that can then be given to users. We observe the users interacting with the prototype so that we can improve our concept.

- Actual working models vary from field to field. Solution prototyping can be done in any field, but it'll vary in terms of what an actual working model means. For example, television programs run pilots. These are prototypes. Architects make 3-D models. These are prototypes. Biologists Watson and Crick built enormous stick models to refine their understanding of DNA.

- A physical creation significantly enhances the development. You get to interact with the idea. Many businesses now have rooms for design thinking where they can do rapid prototyping.

- Even at the prototype stage, beware of premature convergence. Automakers use prototypes all the time, but a study found that if engineers focus only on the prototype, it can shut down their creative development of the product. They begin to merely defend and attack the prototype, and this is a risk for high developers.



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Having a prototype for a product is useful, but focusing only on the prototype can constrict creativity.

- Some developers get stuck in developing the perfect solution. They might not want to move away from the prototype because they've already put so much energy into developing it. Instead, use prototypes to focus on asking questions and developing solutions.

Foresight Scenario

- Foresight scenario is another design thinking tool. This tool uses trends to generate future solutions to a situation.

- Foresight scenario has six steps to it. First, you list the trends and select the most important. You're trying to see where trends will take you into the future.

- You then identify two trends that you think are most likely to occur. You use these two trends to create a two-by-two box, and then for each box, you write a scenario. What would this look like? You're projecting yourself into the future, looking around to see if these trends were to come true. What would that look and feel like?

- Then, you create a label for each quadrant. You take your ideas from the ideate step, and you then place them into these scenarios. The idea is that you identify, maybe from doing hits, the ones that you've culled down—the ones that seem most promising—and you place them into one of the boxes or scenarios that best fits that idea.

- Then, you look across the ideas, and you combine the ideas within quadrants—and sometimes across quadrants. Then, you write a brief summary for each solution.

Solution Storyboard

- The next tool is called solution storyboard. You already learned about storyboarding in the clarify step, clarifying the challenges that must be addressed to move from the current reality to your desired future. We use the storyboard tool like a cartoon strip, with six panels, to capture the story that looked at how we might overcome the challenges to get to our desired future.

- Now we're going to look at storyboarding in a slightly different way—as a way of refining solutions. We're going to look at storyboard as a way of prototyping. With solution storyboard, you are storyboarding the user's experience as he or she interacts with your proposed solution.

- The story is told from the perspective of the individual who is using this proposed change—what you want to bring into the world—

and the panels in the story show the user's experience of the intended solution.

- The solution storyboard tool helps us create empathy. It gets us out of our own heads and into the user's experience. For example, Walt Disney used storyboarding to understand how families would experience Disneyland. The insights gained from the storyboard helped Disney to understand better how he wanted guests to enter and move through the park.

Solution Enactment

- Another tool is called solution enactment, which is a kind of dress rehearsal: We act out our proposed solution to see how we might improve it. Before going fully live, we want to see the solution in action. Solution enactment is a kind of storytelling that allows developers to communicate abstract ideas to potential users, whereas storyboarding puts the users into the whole context.

- Solution enactment takes the audience through specific scenes. This has five steps, including a number of preparatory steps before we actually get into the enactment.

- We envision the user's journey. We visualize the user's experience. We identify key areas in which the user is benefiting from the proposed solution, and we sketch this out.

- Then, we explore a range of possible encounters. We explore different experiences that might occur. We record a range of possibilities, and we decide which ones we want to focus on in the enactment. We select those, and then we highlight them. We highlight the solution's value relative to those, and we display engaging interactions.

- Then, it's important to rehearse the dramatization. We conduct practice sessions. We videotape them, and we improve upon them. We then present the enactment to the stakeholders. We carry out

a brief presentation to an audience. If there's time, we solicit feedback, and we insert suggestions immediately.

- Even novelists have used this kind of approach, from Charles Dickens to Franz Kafka. Writers have gathered with a group of friends to read drafts of their work out loud, and then they solicit feedback. We capture this feedback and discuss the next step. We gather formal and informal feedback from our audience, and we revise our solution, and if we have enough time, we present it again and make adjustments.

- Solution enactment allows us to go for a test drive, and it helps to broaden design thinking beyond tangible products. It can be easily used for proposed new services. Another benefit is that it helps us to build empathy with our user. How often do we assume that something is clear, and then we're surprised when others don't get it? Finally, it gets our stakeholders involved in the development process early.

Suggested Reading

Brown, *Change by Design*.

Kumar, *101 Design Methods*.

Activities

Activity 1: Design Thinking Tools
Apply any of the tools discussed in this lecture (solution prototype, foresight scenarios, solution storyboard, or solution enactment) to a real solution you are considering.

Alternatively, practice on this imagined scenario: Project into the future 20 years from now. Think about current forms of energy or emerging forms of energy. Identify important themes related to energy, and put the current and emerging options through the foresight scenario tool to see how these forms of energy might be combined and refined into future solutions.

Activity 2: Prototyping

Look around your home and identify a product that might be improved. Think about what frustrates you about that product and consider ways you might modify it to reduce these areas of frustration. Construct a physical prototype and share it with others. Ask for their feedback. How did constructing a prototype help to refine and develop the idea?

Evaluating Creative Solutions and Making Decisions

Lecture 16

Criteria can help us choose among the creative alternatives we create. It's common practice to use criteria, which are standards for evaluating our choices. Most often, though, they remain implicit. In other words, we're not aware of our criteria, but they're there, influencing us as we look at the choices before us. The tools in this lecture help us move our criteria from implicit to a more explicit state so that we can direct our choice by using and leveraging these criteria.

The Evaluation Matrix

- The evaluation matrix is a tool that makes the natural process of utilizing criteria more formal and systematic and, therefore, helps us to make better choices. It's also useful at developing our solutions.

- In the evaluation matrix, there are seven steps. The first step is to develop your criteria. We diverge on our criteria, and criteria answer the question *will it or does it?* You can include both tangible and intangible criteria, objective and subjective. Then, afterward, you select the most important criteria.

- In step two, we have to check our criteria. We check them in two important ways. First, the criteria need to be distinct. In other words, there's no overlap. The question *will it fit my budget?* is too close to *will it be affordable?* They're too similar. In addition, don't have one criterion be subsumed by another; they need to be independent from one another.

- Second, we need to make sure that they're positive. The criteria should point you in the direction of what you want, not what you don't want. So they should all go in the same direction. The question *will it make my spouse upset?* isn't probably what you want. It would be better to phrase that as *will it make my spouse happy?*

- In the third step, we build our evaluation matrix. We place our criteria into the matrix, adding choices—the ideas or solutions that one wishes to evaluate. The spreadsheet has choices listed down the first column, and then the criteria are listed across the top of the remaining columns.

- We then need to select an evaluation system. We decide on a system for rating these choices as we look at the criteria against each choice. We can use numbers, number of stars, smiley faces, etc. Some people find numbers easier, but others, perhaps more visual learners, like to use symbols.

- In the fifth step, we evaluate our choices. When we evaluate our choices, we work down each criterion, rating each choice against that criterion. In other words, we're holding that one standard against all options as we move through them.

- In step six, we review the matrix. We look across our ratings. We don't total the numbers, even if you may have used numbers. When we do this, we might get locked into just the highest number. After we do this, we look across the evaluation. If we have a total, it draws our eye just to the total and, therefore, we might miss some subtleties, and we might miss the chance to improve because the evaluation matrix is designed to also help us improve.

- Once we look across these ratings, we make a decision to accept that option; to modify it by looking at where it might be improved, where it might have fallen short against a criterion; or, if it doesn't do well against many criteria, we might decide to reject it.

- In the seventh step, we develop the options, and we make our final decision. We see if options that were identified for improvement can indeed be improved. We refine these solutions, and then we make our final decision.

- When we use the evaluation matrix, we want to make sure that we diverge on our criteria before we converge so that we don't miss

any important criteria. In addition, we work down the columns rather than across, using a criterion as a constant reference point.

- The evaluation matrix is great for making explicit decisions, whether they are creative solutions or everyday decisions. It's good for when you need to go with one option—when you can't use multiple solutions.

Musts and Wants

- There's a twist on how you might use the evaluation matrix. You can sort your criteria into musts and wants. Musts are those criteria that are absolutely necessary in order for the choice to be acceptable. Then, we have our wants. These are important, and they add value, or they make the option even more attractive.

- It can be awkward if you mix musts and wants in the evaluation matrix. Musts can be tough to rate. They can be either zeroes or fives if you're using a scale of one to five. Plus, why include an option in the matrix if it doesn't meet a must? Musts can serve as an initial screen to choose your short list of ideas that then go into the matrix, and then the matrix can be used to evaluate those choices based on the wants.

- In this tool, we generate our criteria. Next, we converge and sort those criteria into musts and wants. Next, we use the musts to screen the ideas. In the fourth step, we place the converged ideas into the evaluation matrix. Only those ideas that met the musts go into our matrix, where we have our wants, and we use our wants to then evaluate that short list. Then, we evaluate and develop those solutions.

Solution Evaluation and Solution Map

- Design thinking provides us with a variation of the evaluation matrix. In design thinking, one of the principles is a user-centered focus. In the design thinking version of the evaluation matrix, we use products and services to help us generate criteria, because

ultimately the product needs to fit the producer's needs as well as the user's needs.

- There are a few differences between the evaluation matrix and the one that's often applied by design thinkers. Thinking like a designer, you have to satisfy two basic stakeholders: You have to be concerned about producing a product that delights the user and producing a product that the producer can create. The second difference is that the one used by design thinkers is more visual.

- There are six steps to this evaluation tool, which is called the solution evaluation and solution map. The solution evaluation piece looks very similar to the evaluation matrix. The solution map brings in the visual component, where we identify those ideas that do the best against those two sets of criteria: producer and user.

- The first step is to create your user value and provider value criteria. We diverge on criteria in these two sets. For the users, we consider information gathered during our user research phase—the observation phase. User value criteria might be things like ease of use, ease of storage, or whether it is aesthetically pleasing. Producer value criteria might involve questions like the following: Will it be profitable? Will it be easy for us to implement? Will it maintain our brand integrity?

- In the second step, we create a solution evaluation matrix and a spreadsheet. The solutions are listed in the left column, and the criteria are listed across the top. However, this time, the criteria are sorted into two areas: the user value criteria and the producer value categories.

- As with the evaluation matrix, we use a spreadsheet to evaluate our options. But this spreadsheet is broken up. We have columns for criteria that are reserved for user value criteria, and we have columns that are reserved for producer value criteria. In this case, we also have total columns, because the total columns allow us to then plot the options in the solution map, which visually communicates to us which solutions are most promising to pursue.

- One of the benefits of this design thinking approach to evaluating options is that it explicitly takes stakeholders into account. You're specifically looking at end users, and you're also thinking about the producers. This is highly valuable, because in order to sell an option, you need to be thinking about what's acceptable to them. It also gives us a visual representation of the evaluation of the solutions. However, be careful not to get locked in to the totals, missing the development of other really good ideas.

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Targeting is a tool that helps you see how close your options or solutions come to your goal.

Targeting

- In targeting, the matrices are structured. They sort of feel objective; they're systematic. Targeting was developed with several goals in mind—to be a tool that was more visual, more intuitive, more fun, and more dynamic. It includes movement in it.

- Imagine a large archery target, in which we have the bull's-eye, usually red, that represents our ideal outcome or solution, for example. We want to see how close our options come to that bull's-eye, sort of like firing arrows at the target. The solutions are the arrows, and if the solution is really on target, then it'll end up on the bull's-eye. If it's not so much on target, then it'll end up in one of the outer rings.

- The first step for targeting is to define the bull's-eye. What does that red zone in the center represent?

- Once we've defined the bull's-eye, we then put our options, ideas, or solutions on Post-its, and in a way, we fire them at the target,

locating them on the target relative to how close they come to hitting the bull's-eye.

- In step three, we identify the pulls and pushes—those forces that pull the option in the direction of the bull's-eye and those forces that push it away.

- In step four, we turn our pushes into challenges, much like we do using the POINT tool, where we identify issues. We transform the pushes into *how to*, *how might*, or *what might* statements.

- In step five, we overcome the challenges. We generate ideas to address those pushes, and then we ask ourselves: If we can address this push, where does that now move that idea? Then, you're able to relocate that Post-it. If you were able to overcome that push, does it now move the idea all the way onto the bull's-eye, or are there still some pushes that need to be addressed? At the end of this, we identify the key insights as we look at where all the ideas end up. We make our decision, and then we move to the next step.

Suggested Reading

Jones, *The Thinker's Toolkit*.

VanGundy, *Creative Problem Solving*.

Activities

Activity 1: Using Advanced Tools for Solution Development
Practice using one or all of the tools on a challenge: evaluation matrix, solution evaluation and solution map, must and want criteria, or targeting.

Activity 2: Must and Want Criteria
Develop "must and want" criteria to evaluate options associated with a decision you need to make this week. If the situation involves another person, generate and apply musts and wants together.

Giving Ideas Legs—Implementation Planning

Lecture 17

Creativity is about pursuing something new; you're like an explorer. To ensure success, it's critical to make a solid plan. If you're going someplace new, you have to be ready. A plan isn't so important if you're going someplace you've already been. When venturing into a new territory, it's helpful to go in with a clear plan in place. In this lecture, you will learn about a number of tools that help you create a plan, and then you go into action, and you monitor yourself as you're rolling out your plan—making adjustments and applying creative thinking as necessary.

The Implement Step

- Following the natural flow of creative problem solving, we move from the develop step to the implement step. Why include implement in a creative process? Is it enough just to have the solution? Where's the creativity in implementation? There are three reasons why we include implement in a creative process, such as creative problem solving.

- First, the develop step helps to yield novel solutions or a new change. We're leaving our comfort zone, so it's useful to have an action step that guides us as we go into this new direction. Second, sometimes we need to get creative and imaginative in creating an action plan.

- The third reason is that selling or pursuing something novel may require imagination to gain buy-in. When we create, we're intentionally introducing a change, and change is not always warmly embraced by others, so we may need to get creative in selling our idea, which requires imagination.

- In the implement step, we're going to do a number of things. We're going to explore acceptance. Up to this point, we've not really thought about the environment in which we're introducing the

proposed solution or change. We have to scan this environment and think about what we need to consider in order to have the solution or change accepted. We make a plan.

Action Plan

- At this point in the process, we're using tactical thinking, which is the ability to devise and carry out a plan that includes specific, measurable steps for attaining the desired state.

- The first tool we're going to use is called action plan, and it has five steps. The first step is to describe a solution, change, or destination you wish to reach. You write out the solution or the proposed change so that it's clear in your mind. We use a statement starter, such as "I, or we, are committed to …."

- This part is important because it needs to be taken into consideration as we create our action plan. We need to prepare to overcome any risk by making sure that we've anticipated the risky aspects of the journey.

- In the next step, we diverge on action steps. We use divergent thinking tools like brainstorming or brainwriting—tools that help us generate many action steps that will guide our tactics, the concrete things that need to be done to successfully realize the solution or change. It's very important to diverge here. It's important that you examine all of the action steps.

- In the third step, we converge on the most important action steps. We use hits to identify those action steps that are going to be most important and valuable to us to achieve our desired end.

- In our next step, we determine the time horizon, and we create a timetable. We organize our action steps, and then we apply them and follow those action steps. We begin by identifying an end date—when we need to have the solution or change fully implemented—and then we create four blocks of time: immediate, short term,

intermediate, and long term. We suggest that the immediate block of time begins within 24 to 48 hours in order to create momentum.

- Then, finally, we organize our action steps into a timetable, and we follow that timetable. We place our selected action steps in a sequence in the timetable that we've created, organizing the action steps in a sequence over time, moving from immediate to short term to intermediate and long term. It's important to look this over to make sure that there aren't gaps, steps that are crucial but overlooked.

- You can expand the action step if you want to add more detail to it. You can have action steps along a timeline, and that may be sufficient, but there are times when you want more detail. Detail can be added to make this tool even more systematic. Detail is important, especially when you have a group action plan.

- Beyond the action steps, you can add accountability factors. This is especially helpful when you have a group. You can have a specific deadline instead of large blocks of time. You can have someone who is identified as being responsible for that particular action step, and you can identify to whom the completion of that action step will be reported.

How-How Diagram

- Another tool for implementation is called the how-how diagram. The previous approach to create an action plan was more intuitive. It relied on our ability to think in divergent ways of action steps. The how-how diagram is more structured; it drills down into specific action steps, to move our solution forward.

- This is sort of like the webbing tool that we used in the clarify step, where we asked basic questions to shift our perspective: why and what's stopping you. With the how-how diagram, we ask: How do we achieve the solution? How do we achieve this end goal? How do we get to this end state? We repeatedly ask this, and every time we ask it, it forces us to be more concrete.

- We begin by identifying a solution or a proposed change. We write a summary stating, "I, or we, are committed to fulfilling X, Y, or Z." Then, we ask how, and we record our responses. Considering this proposed solution, how will we accomplish this? We record our responses, and we can add on the word *else* to move us laterally.

- We ask how again and record those responses to the initial set of actions that have been written, and we consider each option that's been created and ask how every time, continuing to drill down. We continue to ask and record until we reach the natural end of this thread of thinking.

- This systematic, deliberate tool has a significant advantage in that it really clearly lays out the things that we need to do. By drilling down, you might ensure that no action step is overlooked. This is particularly good for low implementers or people who are high ideators that tend to think in more global and abstract ways. One of the nice things about this tool is that it's visual, and it shows relationships among the action steps.

Performance Dashboard

- Performance dashboard is a creative and visual way that we can monitor an action plan as we're implementing it. Picture your car dashboard. What are the benefits of these visual metrics? What

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In the same way that your car's dashboard gives you information about your progress, the performance dashboard can help you along the way to your goal.

do they do for you? Compare your current car dashboard to a past dashboard. What's useful? What do you have now that you didn't have then?

- The purpose of the performance dashboard is to provide a visual monitor for our progress by giving us dynamic feedback mechanisms. It's based on a simple metaphor—the car dashboard.

- Performance dashboard can be employed individually. It can also be designed for team application. You can come up with a common set of measures and a common language that the team agrees to, and you can monitor the success of a team as they roll out some action steps.

- As a team, there are four steps that you can go through when using the performance dashboard. First, you generate a set of indicators that can be effective for monitoring the progress of your plan. This can include soft measures such as motivation, commitment, ownership, and resistance to change. You pick the measures that are most useful for the stakeholders in the scenario, and then you design those.

- You select and combine the most important indicators, and check that all the critical objectives are being tracked. You transform these indicators into a visual dashboard. You create a visual dashboard, and you make it public. Finally, you meet regularly with the team to review the metrics, updating the dashboard. Use the dashboard to spark conversation with the team, to act proactively, and perhaps to make adjustments.

- One of the benefits of the performance dashboard is that it's a deliberate approach for monitoring the action steps as you're executing and pursuing the solution. As a team, it helps to build consensus upon what metrics are most important. It provides dynamic feedback and real-time feedback. It's visible or posted publicly. It helps to keep people focused on moving forward. It improves communication and coordination. Bring the metrics in to meetings for discussion and update progress regularly.

Suggested Reading

Allen, *Getting Things Done*.

Belsky, *Making Ideas Happen*.

Lumsdaine and Lumsdaine, *Creative Problem Solving*.

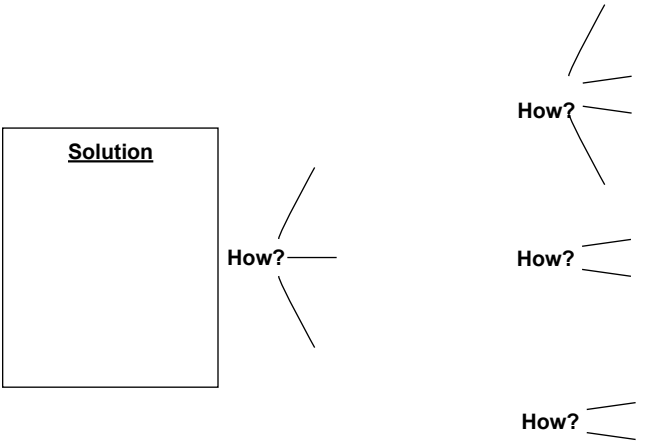
Activities

Activity 1: How-How Diagram
Create an action plan for a proposed change using a timetable or how-how diagram. Start by writing a statement that begins like this: "I am committed to …". Select an area that requires real action on your part, perhaps something that you need to implement within the next three to six months.

Plan of Action

Time Frame	Action	By Whom?	By When?	Report to Whom?
Immediate				
Short Term				
Intermediate				
Long Term				

How-How Diagram



Activity 2: Performance Dashboard

Find an area of your life in which you wish to improve performance (personal, professional, hobby, sport, etc.). Identify specific things that need to be improved and draw visual metrics to track performance. Keep it accessible and use it for a period of time.

Persuasion and the Selling of New Ideas

Lecture 18

In the universal creative process that we call creative problem solving, we're in the implement step. At this point, we're looking out to the context in which we will introduce our idea, solution, or change, and we're exploring it to make sure that what we're proposing will, in fact, be accepted. To help us with that, we create a plan, and then we put that plan into action. In the last lecture, you learned how to create an action plan. Before you leap to action, as this lecture will teach you, you should check your environment for forces that will help or hinder your success.

Assistors and Resistors

- Psychologist Kurt Lewin indicated that proposed change will meet two forces: those forces that will help it be successful and those forces that will hinder success. Wise action plans take these forces into consideration. As you go out to execute the idea, solution, plan, or change that you propose, it's best to anticipate resistance beforehand than to meet it head-on in the field.

- Assistors and resistors is a kind of way of doing a 360-degree force field analysis. It uses contextual thinking. It involves putting ourselves into the future, examining our context, and thinking about how this idea will be received. It uses that kind of projection to influence our plan as we create it now, before we execute it.

- With assistors and resistors, we begin by writing a summary of the proposed solution or change so that it's clear in our mind what we wish to do. Then, we diverge on sources of assistance and resistance. We create two columns, or two areas, to record all of the sources of assistance and resistance that we can think of.

- As always, when you begin with this tool, it's important to engage in divergent thinking. We don't want to overlook a source that might assist us—that can help us to be successful—and we certainly

don't want to overlook a potential source of resistance. It's better to anticipate it.

- To help us out, we use the five W's and the H to generate sources of assistance and resistance. As you may recall, the five W's and the H are who, what, when, where, why, and how. Each one of these words jogs our thinking to consider possible sources of assistance and resistance.
  - **Who**: As you think about the plan, what you wish to carry forward, you want to make sure that the world embraces it. We think about individuals or groups that will either help or hinder us.
  - **What**: What are the things that might help or hinder us?
  - **When**: Are there issues related to timing? Are there times where it's, perhaps, best to suggest or advance this idea—to put it into action? Are there times that should be avoided?
  - **Where**: This refers to the physical or process locations that can help or hinder us as we try to advance the solution.
  - **Why**: This refers to reasons that might come up to support this idea or reasons that others might come up with to block the progress of this idea.
  - **How**: This refers to actions that others might take to either help you or hinder or block your success as you move forward.
- In the third step, we select the most important sources of assistance and resistance. We converge. We prioritize. We make sure we zero in on those sources of assistance that we want to make sure that we call in to support us, and we identify the sources of resistance that are likely to resist us.
- In the fourth step of the tool, we generate action steps that take advantage of the assistors. How can we leverage the assistors? We don't overlook the assistors and assume that they're there to

support us. Instead, we want to actively engage assistors, and we want to use our divergent thinking to also consider action steps to take to overcome the resistors.

- In some cases, this step involves leveraging our assistors to address some of the resistors. We then select the action steps that we think will be most helpful as we've looked at our assistors and resistors, and then we create an action plan. We build out action steps along a timeline from immediate to short term to intermediate and long term (as you learned in the last lecture), but this time, when we create our action plan, it's fueled with this knowledge of those forces of assistance and sources of resistance.

- It's important not to just address one source of resistance. When you converge on sources of resistance, you prioritize and examine all of the important sources of resistance, and you generate actions steps that will help to address all of the important sources of resistance. You use this information to then create your final action plan.

- People resist even brilliant ideas. Imagination can be used to generate ideas, but we also need to use imagination to convince others to accept our ideas. Sometimes it's not the brilliance in generating the idea that makes a difference in terms of our success; instead, it's the imagination we use to sell the idea that allows us to achieve success.

Stakeholder Analysis

- Stakeholder analysis is a deliberate tool that is designed to identify the key people that will support or hinder the success of any given solution, plan of action, or desired change.

- With this tool, we identify and examine the positions of people or groups that have a stake in the plan. We look at how these people might affect the outcomes, and then we decide where they need to be in order to support the desired change. Then, we devise a set of actions aimed at gaining support from these key players.

- How do you know who the key stakeholders are? The following are some questions that might help you identify these key individuals that you need to take into consideration. Who is affected by the plan or the proposed change? Who has an interest in the plan and its outcomes? Who can affect the plan's adoption or implementation? Who might express discontent to what is being proposed? Who can shape or influence the opinions about the issues involved? Which people have clear roles in the plan?

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Stakeholder analysis is a tool that can help you strengthen your action plan for a particular solution.

- Once we've identified our stakeholders, we can move through this tool. We begin by diverging on a list of key stakeholders. We select the key stakeholders, and then we list them in the first column of a six-column chart.

- For each stakeholder, we have to then identify, where are they now? Where do we believe they are now in regard to this proposed plan? Are they strongly opposed? Are they moderately opposed? Are they neutral? Are they moderately supportive, or are they strongly supportive? We mark the position with an X.

- Now we know where they are, but next we need to consider, in order to go forward, do we need to move them along? Where do we need them to be in regard to the proposed plan? We mark this position on our worksheet with an O. We connect these two, the X and the O—where we believe they are now and where we need

them to be—with an arrow to represent where they are and how far we have to move them to get to where we need them to be.

- This helps us to then move to the next step in this tool, which is to list the actions required in order to gain support for the implementation of the plan. Then, we include those actions later in our final plan.

- Once we've gone through the stakeholder analysis, we begin to look at how that can enhance our action plan, and in this way, much like assistors and resistors, our action plan is informed by going through this kind of analysis, and it should, as a result, strengthen our action plan.

- It not only takes imagination to create a novel idea, but it also takes imagination to sell it. In fact, it may take more imagination to sell people on the reasons to accept your proposed change. To do this, you may need to use imagination to show others that a better way of doing things has arrived.

Suggested Reading

Lewin, *Field Theory in Social Science*.

Senge, et al., *The Dance Of Change*.

Activities

Activity 1: Assistors and Resistors
Identify something you wish to do in the next six months. Generate assistors and resistors using the five W's and H. Select the most significant resister, and then generate action steps to address this resistor.

Activity 2: Stakeholder Analysis
What initiatives do you need to complete in the next 90 days? Select one initiative that involves others. Generate a list of stakeholders, and use the stakeholder analysis diagram to indicate where they are in relation to the initiative. See how this thinking influences your plan of action.

Tools for Bringing It All Together

Lecture 19

At this point, we've explored each step of the universal creative process, from identifying goals to making plans and implementing. The goal all along the way is to improve your creative thinking by learning and practicing deliberate cognitive strategies, adding a variety of thinking tools to your toolkit. But how do you make decisions about which tools to use? The goal of this lecture is to develop higher-level thinking skills—metacognitive skills. In this lecture, you will learn about a few tools known as searching for success zones and assessing a situation.

Assessing the Situation

- Metacognition is the ability to think about your thinking. By being able to stand above the process and look at it, we can better manage our way through it. In de Bono's six hats, he has a metacognitive hat. It's called the blue hat, which stands above the other hats, and we use it to organize the other hats.

- In this universal creative process—creative problem solving—we use something called diagnostic thinking, which is gathering data and then determining where to begin in the creative problem solving process, and then how to move around in this process.

- There is a meta-step in creative problem solving—a fifth step that stands above the others. It's called assessing the situation. This is where we use diagnostic thinking to be more conscious about how we move around in this process.

- In assessing the situation, we do two things. We first determine whether creative problem solving is a fit; we don't use creative problem solving or creative thinking for every problem.

- Then, if we decide that our problem does require creative thinking, the next element within this step is diagnosing the entry point.

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Metacognition, which is the ability to think about your thinking, is engaged in the creative problem solving process—specifically in assessing the situation.

We're committed to using creative thinking, but what's the best way to use this process? You have many tools, and it's best to choose the tool that best fits the task.

- To help us choose whether creative problem solving is a good fit for the problem at hand, we can use three criteria, the three I's: Influence, Imagination, and Interest.
    - **Influence**. Do you own the problem? Are you the chief decision maker?
    - **Imagination**. This is the crucial question in terms of creativity. Are you really looking for something new? Is the answer already out there? If it's already out there, you don't need creative thinking. Are you really looking for novelty? That helps us figure out whether you are, indeed, looking for imagination.

- **Interest**. Is it a priority? Do you want to work on this? Are you motivated?

- If you have goals that meet these three I's, an additional sorter can be immediacy: How urgent is it for you?

Searching for Success Zones

- A more advanced tool is called searching for success zones. The purpose of this tool is to identify wishes and goals with the greatest probability of success. It informs us which goal will be most likely to bring success.

- With this tool, we evaluate the options against the degree of importance. On a scale of one to nine—one being not important to nine being extremely important to you. Then, we evaluate the options against the probability of success on the same kind of scale—one to nine, where one means that success will be unlikely and nine means that success is highly likely.

- Then, we plot these results on a grid so that we have a visual map of where they fall. As we plot them, there's information on the grid that helps us determine whether it's a goal we should pursue or not. We can consider the results of this, and then we make a decision.

- The success zones graph is organized along the bottom for probability of success. We take our number, and it fits into one of three areas: low, moderate, or high—meaning low probability of success, moderate probability of success, or high probability of success. Low would be a score of one to three, moderate is four to six, and high is seven to nine.

- We do the same thing for degree of importance, which we place along the vertical axis from low to high—low, moderate, and high. This creates a three-by-three matrix.

- When we have a situation that has a low probability of success and the degree of importance is low as well, we call this kind of a

scenario self-abuse. Why do it? Why pursue it? If you put energy into it, it's going to be a waste.

- If we have a scenario, or goal, that has a low probability of success and a moderate degree of importance, this is what we refer to as a difficult endeavor. It's not very likely to be successful, and it's moderately important or valuable to you. It's going to take some energy to do.

- If you have something that's low in terms of probability of success and high in terms of degree of importance, that's a creative challenge. It's something that needs to happen. It's highly important, but it's going to take a lot of imagination to make it happen.

- If the probability of success is moderate and the degree of importance is low, why bother? You might be successful, but why put energy into it? It's really not that important to you.

- If we have a moderate probability of success and a moderate degree of importance, it sort of falls right in between all of the others—into the gray area. That scenario can be pushed in any direction.

- If you have moderate probability of success and a high degree of importance, that's a stretch goal. It's moderately probable that we're going to be successful, and we're really seeing it as something that is important—that moves us out of our comfort zone into a learning zone.

- If the probability of success is really high and the degree of importance is low, you can be successful, but why pursue it? It's a distraction. It's not really that important to you. It's a waste of energy. It takes you away from other more important things that you can be doing.

- If the probability of success is high and the degree of importance is moderate, we call that low-hanging fruit. It's likely to be successful, and it's sort of valuable to you. You can easily pick that off the tree.

- In the last scenario, we have what we call promising opportunities. These are scenarios, goals, or wishes that are both high in probability of success and high in degree of importance.

- Those areas within this success zone that really require the most creative thinking are the creative challenges, the stretch goals, and the promising opportunities.

- This tool helps you set priorities so that you are focusing on what's really important. Sometimes we pursue something only to find out later that it was a waste of our time—that our time would have been better spent elsewhere. This tool helps us to overcome that.

- This tool can be used individually, and it can be used in teams as well. In fact, it's a terrific way to build consensus and commitment toward goals.

Cheat Sheet for Diagnostic Thinking

- There is a tool within assessing the situation called the cheat sheet for diagnostic thinking. The following are four different scenarios, and by looking at those scenarios, you'll be able to determine if that is the place to start in creative problem solving.
    - If the problem is unclear and you need to identify the specific barriers or obstacles that are in the way of achieving a goal, you begin in the clarify step. You start with a goal statement beginning with "Wouldn't it be great if …" or "I, or we, wish …." Then, you move through that step of the process.

    - If you have identified a specific challenge that must be addressed in order to achieve the goal, then you're ready for the ideate step. You start on this step with a challenge statement that begins with "How to …" "How might …" "In what ways might …" or "What might …."

    - If you have an idea and you need to have it transformed into a workable solution, then you can enter this process at

the develop step. You start with a summary of the tentative solution: "What I see myself doing is …" or "What we see ourselves doing is …."

  - If you have a proposed solution and you wish to carry it forward—you're committed to it, and you're ready to go—you don't need to explore any other options. You're in the implement step. You start with the description of the proposed solution: "I, or we, are committed to …."

- There are some common metacognition mistakes that beginning learners tend to make when they do this kind of diagnosis. They tend to see almost all situations as though they need ideas. They tend to diagnose the situation, or problem, into the ideate step. It's a problem, so we need ideas.

- Beginning learners also make assumptions that the problem as initially presented is the true problem, and they tend not to challenge what others say or how the problem presents itself to them.

- The third mistake is accepting the challenge statement that's too vague or too broad. When you have a very vague problem statement or challenge statement, you have, therefore, vague ideas—your ideas are everywhere.

- The consequence of any of these three mistakes is wasted time, often requiring the need to cycle back into the process, generally going back to clarify.

Suggested Reading

Flavell, "Metacognitive Aspects of Problem Solving."

———, "Speculations about the Nature and Development of Metacognition."

Activities

Activity 1: Success Zones
Generate a list of goals/wishes/challenges and practice using the success zones tool.

Activity 2: Metacognition
Practice metacognition at your next meeting or family conversation when a problem is being described. Ask yourself the following.

- Does this require creative thinking?
- Where would it be in the creative problem solving process?
- What tools might be applied?

Lifting the Emotional Lid on Creativity

Lecture 20

Creativity is more than thinking. It's also a feeling—an attitude. Much of this course has focused on cognitive skills, especially the tools that are provided to you for your toolkit. They're thinking tools; they're cognitive strategies. Early in this course, a distinction was made between skills, tools, and mindset. Lectures on process focused on tools to improve our skills. This lecture focuses on mindset. The mindset we have serves as a lid for our skills, and it limits our success in using the tools. We need the right mindset to maximize the power of creative thinking.

Emotional Quotient (EQ)

- To improve mindset for creativity, we will explore an increasingly popular topic, emotional intelligence, also referred to as emotional quotient (EQ).

- IQ focuses on an ability to process information. It's fallen short of its promise to predict success. In contrast, emotional intelligence looks at how we relate to ourselves—our inner world—and to others.

- Emotional intelligence was popularized by Daniel Goleman, and it's based on sound psychological study. Put simply, emotional intelligence is about three things: being self-aware, understanding your emotions, and then learning to facilitate and work with those emotions. In other words, it's about self-awareness, self-control, and empathy (being able to connect to others readily, to understand their emotional states).

- Some psychologists have attributed presidential creativity and success to EQ. Case studies of presidents highlight the impact of emotional intelligence on success. Empirical studies provide similar evidence.

Emotional Hijacking

- Looking at the evolution of the brain gives us hints to our emotional intelligence and how it works. The brain evolved over time to add layers to its structure and function, and it evolved in three stages. First was the autonomic brain, responsible for basic physical functions that occur naturally and automatically for us, such as breathing.

- Then came the limbic brain, which is responsible for emotions. It helps us to sense danger and to react quickly—the freeze, flight, or fight response.

- Then came, more recently, the cortex and neocortex, referred to as the rational brain. Learning is recorded here. This area of the brain is responsible for higher thought, such as creativity and problem solving.

- Emotional intelligence is about managing ourselves and our relationships in order to achieve our intentions, or goals. The interplay between our emotions and our thinking, then, translates into behavior.

- Low emotional intelligence allows our emotions—reactions in our limbic brain—to override our rational brain. We become so emotional that we no longer think. Daniel Goleman coined a term that describes when our emotions get in the way of our ability to achieve our goals, when our emotions get in the way of allowing us to be successful at solving problems or being creative. He called it emotional hijacking.

- When discussing emotional intelligence, we're not talking about getting rid of our emotions. When we talk about emotional intelligence, rather, we're trying to minimize the degree to which emotions hijack our thinking and stop us from achieving our goals, such as when we wish to create.

- Certainly, passion and love are indicators of intrinsic motivation, and this is good for creativity. It creates a commitment to what we're working on and persistence. The problem is when emotions overrun our ability to create.

- It's not about shutting down our emotions but, rather, working with them. The suffering artist cliché has a germ of truth. Fierce, lucid resistance to what hurts or disappoints us can be risky. Practice emotional jujitsu.

- Emotional hijacking occurs because our limbic brain responds much faster than our emotional brain. We have an emotional reaction before we're able to fully process it in our rational minds. In fact, the limbic brain responds 80 to 100 times faster than our rational brain.

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Practice emotional jujitsu instead of resisting to whatever hurts or disappoints you.

- When threatened, the limbic system takes over; the rational brain is not consulted. This is not necessarily a bad thing; it's part of our evolution. We sense danger quickly before we can even think. Our limbic brain takes over. It reacts much faster through emotion than through thought.

- However, the downside to this is that we become susceptible to emotional hijacking, allowing quick reaction to derail us, and especially in situations where there's no real physical threat.

- This course has focused on giving you cognitive tools. Creativity involves thinking and feeling. Fear, anger, stress, and other emotions can override your emotional brain. It makes it difficult to fulfill your creative potential. Runaway emotion stops our thinking.

Improving Emotional Intelligence

- Recent brain research has shown that a good mood improves creativity. Good mood activates the anterior cingulate. When anxious, it's not activated. As a result, we limit our options. The anterior cingulate is divided into an emotional and a cognitive component. When we're in a good mood, both parts are activated, and this enhances our emotional intelligence.

- We can deliberately improve our emotional intelligence by learning some strategies. We can use metacognition, and we can become more mindful. There are two specific ways that we can use metacognition and become more mindful: We can reflect and redirect.

- Reflection improves our self-awareness. This is mindfulness. We use our rational brain to process our experience, and then we can redirect. Once we become aware of how we're responding and how we're feeling, we can choose to redirect in a purposeful direction.

- Over time, once you become successful at doing this, you can build new patterns. In fact, you can learn to shift from your panic zone quickly back into your learning zone.

- We can use the power of emotional intelligence to set our own mindset for creativity. We begin with self-awareness, becoming aware of our internal climate for creativity—setting our own mood. We begin by becoming aware of the psychological attitudes that affect our creative problem solving abilities, looking at what attitudes we can adopt and control in ourselves that enhance our creative problem solving.

Internal Climate

- Arthur VanGundy refers to our internal world as the internal climate, and he says that we should begin here first, because this is something we can control. Also, when we create a positive internal climate, it helps us to combat a negative external climate. VanGundy talks about several internal attitudes.
    - Openness to new ideas: Do you demonstrate a willingness to hold off judging ideas and judging others?
    - Curiosity: Do you constantly ask questions or express wonder about things in your environment?
    - Independence: Are you willing to express your own opinion, independent of others' views?
    - Perseverance: Do you press on even in the face of resistance?
    - Risk taking: Do you engage in situations for which there is some degree of uncertainty?
    - Discipline: Do you take structured approaches to problems? Do you have a sense of calm about you?
    - Playfulness: Do you toy with possibilities?
- To VanGundy's elements we can add an internal locus of control, which refers to a belief that success is personally determined. This is in opposition to an external locus of control, in which you believe that your fate is controlled by things outside of you—by chance and external factors.
- We can also add tolerance for ambiguity—which is an ability to deal with uncertainty and to avoid leaping to conclusions—to VanGundy's list. When facing novel situations, there's going to be more ambiguity, and in a world that's changing quickly, we will be facing more novel situations and, therefore, more ambiguous situations.

- Low tolerance for ambiguity causes people to become overwhelmed and anxious. People like this want the answer now, prematurely leaping to a solution or conclusion. This is an example of another form of emotional hijacking. For some, tolerance for ambiguity comes a bit more naturally.

Facts, Feelings, and Hunches

- We can learn a tool that will help us improve tolerance for ambiguity. The tool is called facts, feelings, and hunches. Whether tolerance for ambiguity is kind of natural for you or it's an area that you struggle with, this structured tool can help you deal with ambiguity.

- This tool involves a series of clarifying questions designed to organize an ambiguous situation.
    - Facts: What do you know about the situation? What are the facts related to this problem? Who is involved? When did it start? Where is it happening? How have you handled similar situations? Why is this a challenge?

    - Feelings: What are your emotions as they relate to the situation? In a way, we're practicing the self-awareness component of emotional intelligence. What are your feelings about that situation? What excites you? What are you afraid of? What makes you anxious? How does the situation affect your emotions?

    - Hunches: What do you believe is contributing to the situation? What does your gut tell you about the situation? What makes you curious? What questions do you have that you would like to have answered?

- This is a structured way to deal with ambiguity. We organize our thinking along these three areas—facts, feelings, and hunches. We capture our responses to these questions in three categories.

- This tool is useful for team discussion, especially where assumptions are being made. It allows for a 360-degree view of the situation. It helps to clear up assumptions. What is a fact may actually be a hunch or a feeling, and we're able to discuss it and recognize what really is a fact versus a hunch or a feeling.

Suggested Reading

Goleman, *The Brain and Emotional Intelligence*.

Lynn, *The EQ Difference*.

Activities

Activity 1: Facts, Feelings, and Hunches

- Take a difficult, ambiguous situation and apply the facts, feelings, and hunches tool.

- Take a shared situation with a trusted friend, family member, or coworker and together apply facts, feelings, and hunches.

Activity 2: Emotional Intelligence—Reflection and Redirection

- Reflect on your emotional triggers. What situations tend to hijack you? Make a list.

- Practice modifying your response to those triggers.

- Practice shifting from the panic zone to the learning zone.

The Environment—Physical and Psychological

Lecture 21

This lecture focuses on the environment for creativity. Environment encompasses and affects all the stages and processes you've been learning about so far. When we create, there are three important elements that interact to produce a creative outcome. First, we have the person—the skills, abilities, knowledge, creative thinking, and attitudes that the person might possess. Then, we have the process that he or she goes through to be creative. In addition, we have the surrounding environment—the conditions for creativity. In this lecture, you will learn about the creative environment.

Creativity Research

- The first wave of creativity research focused on the person. The fundamental question was, can you identify creative people? The second wave focused on the process. In this case, we were asking the question, can you develop creative people? You can have creative people, and you can have a creative process—but does that guarantee that creativity will be produced?

- A third wave of research has occurred that recognized that even when you have creative people and a creative process, it's not a guarantee that creativity will occur. You can have people who have the ingredients to be creative inside of them, but if you put them into the conditions that don't support their creativity, it's not likely to emerge.

- When we talk about the environment that supports creativity, we can talk about it in terms of the physical setting that we're in, as well as the psychological setting.

- There's no one right answer for the physical environment that facilitates creativity. Why doesn't a one-size-fits-all solution for

physical work space exist? We can turn to a theory about learning styles for the answer.

Learning Styles

- Learning styles, at least how education specialists Rita and Ken Dunn define it, are preferred ways and conditions you need when engaging in a difficult task—processing new and difficult information, such as we have to do when we're engaged in creativity and creative thinking. These educational leaders have a framework for their theory about learning styles. In it, they suggest that there are different components that make up one's learning style.

- One of the components they talk about is time of day. In their theory, they say that people will create at different times of the day. Some people will prefer morning; others will be best in the afternoon and some at night.

- Another dimension is called structure. The theory says that people will prefer different kinds of physical settings in which to work—some will prefer a more formal structure while others prefer an informal structure.

- The next is sound. The theory, according to the Dunns, is that people will vary in preference to sound. Some can work terrifically well when they're surrounded by sound, yet others will need absolute quiet in order to create.

- Another dimension is intake. The theory says that people will vary in terms of the need to ingest—to eat and drink—while creating.

- Another dimension is light, which refers to the level of lighting that you like to work in. Some people prefer to work under bright light. Others prefer to work in dim light.

- The theory seems to hold. There seems to not be one precise formula that fits all creators—one formula that you can follow to ensure your creativity in terms of a physical setting and a physical

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When you are in a group setting, it is important to understand other members' learning styles so that you can more productively communicate with each other.

ritual. It's best to figure out your own learning style and your own creating style.

- Some research recently published looked at the physical work setting and other variables that contributed to creativity with knowledge workers, and they found that when they looked at the creativity that these knowledge workers produced, it was predicted best by their personality, the psychosocial climate, and then the physical work setting—in that order.

- Psychological climate refers to the atmosphere in the workplace, home, or classroom. It relates to the feelings, attitudes, and behaviors that you have in that atmosphere. Just like the physical climate has an impact on our attitudes, feelings, and behaviors, so does the psychological climate.

10 Predictors of Creativity

- Göran Ekvall, a Swedish researcher, was perhaps the first to study climate in relationship to creativity. He noticed that there were 10 dimensions in the psychological climate that predicted high levels of creativity.

- The first dimension is challenge, which refers to meaningfulness. To what degree are you engaged in the work in a particular location? To what degree do you find purpose in what you do? Are you stimulated by what you do?

- The next is freedom, which refers to autonomy—having some discretion. Are you able to determine how you'll carry out procedures and work? Or, in a low-freedom environment, everything is prescribed to you. You do A, B, and C without deviating, and when you're done, you go back to A and start over again.

- The next dimension is idea support, which refers to how ideas are received. When an idea is put forward, is it listened to in a generous way? Is there a sense that there's an openness to receiving ideas, or is there a concern for sharing ideas—concern for how they'll be reacted to because often they're reacted to in a negative way?

- The next dimension looks at relationships. It's called trust. In a high-trust environment, there's a sense that you can open yourself up, that you can share who you are at work rather than hiding yourself. In a low-trust environment, there's a concern for people in the situation talking behind each other's backs—gossiping and backstabbing.

- The next dimension is called dynamism, which refers to eventfulness and energy. In a high-dynamic situation, you gain energy. The day moves quickly. In a low-dynamic situation, the day moves slowly. It feels like drudgery. Rather than gaining energy, you lose energy.

- The next dimension is playfulness, which refers to good-natured joking and humor. Is it okay to be playful, or is it a highly restricted, buttoned-up environment? The advantage of playfulness is that it helps people to relax.

- The next two are debate and conflict. They're both a sort of clash, but they are two very different kinds of clashes. In a debate, it's a clash of opinions or different perspectives. We want this kind of clash, but in this kind of clash, there's still mutual respect. We can disagree. We can have very different views. We can be vehement in those different views, but we're open to being influenced. As we debate, we hopefully get to some greater level of insight through that debate.

- According to Ekvall, conflict is not good for creativity. In fact, of these 10 dimensions, conflict is the only one you want low amounts of. Ekvall describes conflict in a very particular way. He refers to it as personal tension. We're not debating the issue—it becomes more personal. We're not attacking ideas; we are attacking each other. It's an environment in which there isn't respect for one another. In such cases, people tend to withdraw. They sort of work or live or operate in fear.

- The next dimension is risk taking, which refers to how uncertainty is dealt with in this environment. In an environment where there are low levels of risk taking, people are concerned about trying something new, about making a mistake. They tried to be perfect, and as a result, they don't try new things; it's more difficult to engage in novel behavior and thinking. In an environment that supports risk taking, it's OK to experiment. It's an environment in which experimentation is demand and expected, and failure is dealt with as a learning opportunity.

- The next dimension is idea time, which refers to, simply, time to think. Remember, with creativity, we need to slow our thinking down. In an environment that's moving quickly, where there isn't time to think, we tend not to think of new ideas because we tend to

go with the old, familiar ideas. In an environment that allows for idea time, people can slow down their thinking. They can think in longer-term ways. They have more time to experiment, reflect, and look for alternatives.

- Through various studies, Ekvall has validated his theory. It clearly predicts innovation—and not just in corporations, but in universities as well.

Myths about the Creative Environment

- Teresa Amabile of the Harvard Business School has also examined climate. Her dimensions are very similar to Göran Ekvall's. As a result of her research, she shattered or challenged some myths about the organizational environment for creativity.

- One of the myths that was challenged was the myth that creativity comes from creative types. Instead, she found that people throughout the organization, not just in research and development, were producing creative ideas.

- The second myth that she challenged was that money is a creativity motivator. The participants that she studied focused on finding passion in the work that they did; they hardly talked about money and reward. They felt most creative when they were making genuine progress on projects, when they were making contributions.

- Another myth is that time pressure helps creativity. She found that deadlines tend to seize people up.

- A final myth is that fear forces breakthrough. She found that people tended to not be creative when they were angry or in fear. In fact, she found that when people expressed happiness, shortly after that they tended to be more creative.

Suggested Reading

Doorley and Witthoft, *Make Space*.

Ekvall, "Organizational Climate for Creativity and Innovation."

Grant, et al., *Who Killed Creativity?*

Activities

Activity 1: Creative Environment
How can you use information on the physical and psychological environment to evaluate current situations and build more creative environments for yourself? How might you change your physical space to facilitate your creative thinking? How do you support or contribute to the creative environments of others?

Activity 2: Creative Rituals
Evaluate your learning style. How might you refine your creative ritual in light of your learning style preferences or initiate a new creative ritual to promote effective creative thinking?

Creative Leadership—Regardless of Title

Lecture 22

In this lecture, you will explore three ideas. The first idea is how the evolving theories of leadership have begun to move in the direction of embracing creativity—merging, in some ways, with creativity. The second idea you will explore is that leadership's role is crucial in promoting creativity. The third idea that you will examine is creativity specifically as a leadership skill, as a leadership competence. Keep in mind that contemporary theories of leadership do not limit leadership to position or power. It's not about the title that you have; it's about what you do.

Transformational Leadership

- Transformational leadership refers to leaders who are able to draw the fullest potential out of others. They transform others that they interact with and work with.

- In transformational leadership theories, there are four factors that are often talked about. Many of these factors tie into creativity. Idealized influence is one of those factors—that's where the transformational leader presents a strong role model for others.

- The next factor is inspirational motivation, in which the leader inspires a shared vision and gets people to come together and fuse their energy as they advance on some vision.

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Transformational leaders inspire and motivate those they work with.

- The next factor is called intellectual stimulation. When leadership theorists talk about intellectual stimulation, they in fact use the words *creativity*, *innovation*, *creative thinking*, and *problem solving*.

- Intellectual stimulation is about leaders who stimulate their followers to be creative and innovative. It's recognizing that as a leader in a complex world, you can't have all the answers—that you need to draw ideas out of others in order for a team or organization to be successful. It's also about challenging followers' beliefs and assumptions, challenging them to think in new ways.

- This kind of approach promotes followers to think in different ways and to engage in careful problem solving, which is essential in the 21st century. Intellectual stimulation also encourages followers to try approaches and to think of innovative ways to handle issues.

- The fourth factor of transformational leadership, individualized consideration, is all about leadership that creates a supportive environment, an environment that allows individuals to think in creative ways.

- The three facets that predict creativity are person, process, and environment. If we think about these three facets like gears interacting with one another, leadership in a way becomes the lubricant that allows these gears to work—to not stick, to flow.

- When you look at the environment for creativity, research has shown that anywhere from 40 to 70 percent of the psychological environment—the climate for creativity—is directly linked to leadership behavior.

The Three-Legged-Stool Model

- The three-legged-stool model can be referred to as such because if you remove any one of the legs, it collapses. We might think about it as a Venn diagram.

- The three elements, the three legs in this model, are creativity, innovation, and leadership. They all intersect and reinforce one another. What combines all three of them is change. When we decide to be creative, we're intentionally going after change. It's a process that leads to change. Innovation is the successful adoption of change, and we often look to leaders to be a catalyst for change.

- Where does creativity intersect with innovation? In order for innovation to happen, we need creative ideas. In the United States, 88 percent of organizations include innovation in their mission, vision, or values, but innovation just doesn't happen because you put it in your value statement or on your Web site. We first need creativity; it's the stimulant to innovation.

- Where do innovation and leadership overlap? Leaders set the climate for change and for innovation. Leadership can put the cap on an environment for creative thinking and, ultimately, for innovation.

- Where do leadership and creativity overlap? It's being argued that creative problem solving, this universal creative thinking process, is in fact now a core leadership ability—an ability that can be developed and that needs to be deployed in a more complex world.

A Capabilities Model of Leadership

- Michael Mumford from the University of Oklahoma has an eloquent argument for why creative problem solving is now considered a core leadership skill. He has a theory of leadership that he calls a capabilities model of leadership, in which he lays out a solid case for why leaders need to be creative problem solvers.

- Mumford says that as opposed to thinking about specific behaviors, leadership can be framed in terms of capabilities, knowledge, and skills that contribute to effective leadership. If you want to understand what these capabilities are, you have to look at what leaders do.

- Leaders are required to facilitate others toward meaningful goals. As they do this, it doesn't always go smoothly. Mumford

says that successful goal attainment depends on an ability to circumvent and resolve issues that impede progress. The selection and implementation of actions to bring goals to fruition involves problem solving.

- As we pursue goals, we can anticipate that we're going to run into challenges, especially goals that are more innovative. Mumford concludes that leadership performance, therefore, is directly related to an individual's capacity to use his or her creative problem solving skills to resolve complex social problems.

- He says that complex social problems are made up of three characteristics: They're ill defined, novel, and ambiguous. He suggests that in a fast-paced world, we are contending with these complex social problems more and more.

- When Mumford says that complex social problems are ill defined, he means that there's no single solution path—no right or wrong answer. The problem can be defined in any number of ways, and solutions have to be invented or discovered.

- In a fast-moving world, we face increasingly more frequent novel challenges, meaning that our past experience and knowledge is not sufficient to resolve the present situation. We simply can't go into our solution bank and find the answer to a problem that we recently solved that was just like the current problem.

- These complex social problems are also ambiguous. There are gaps in information, or there is a plethora of information of which only some of is relevant, that require clarification and diagnosis.

- Mumford has found that the available evidence indicates that creative problem solving may indeed represent an important influence on leader performance. In fact, he has longitudinal research that demonstrates that.

- That's research, but what about the real world? IBM conducted a recent survey of about 1,550 executives around the world. The study asked these CEOs to describe the world that they live in and work in now, and they said that they operate in a world that's substantially more volatile, uncertain, and complex, and they suggest that it will become even more complex.

- Today's complexity is only expected to rise, and more than half of these CEOs in the face of that doubted their ability to manage this kind of complexity. When asked, in the face of this complexity, what leadership skills are going to be most important in the future, they said that creativity is the most important leadership quality.

Developing Creative Leadership

- There is a model that describes our movement toward becoming a creative leader. At the lowest level of development, we have what is called a spectator, which is someone who is unconsciously unskilled about their creativity. They leave it up to chance. They don't know about facilitating their own creativity through deliberate practices like the ones that you've learned.

- Through awareness, recognizing the importance of creativity, we might move to the second level of development. We call this person a student of creativity. This is where we become consciously aware of our deficiencies—consciously unskilled. We know what we don't know. We're at the beginning stages of learning.

- Through deliberate practice in terms of trying out the tools, moving our creativity from chance to being able to deploy it on demand, we move to a third level of development. At the third level, we become consciously skilled. We refer to this person as a skilled practitioner, someone who is able to efficiently and effectively, with some mastery, use the tools and process of creativity.

- At the fourth level, we have the highest level of development. Not everyone reaches this level of development. We call this person the creative leader, because at this level, the individual is unconsciously

skilled. Creativity is simply a way of life—a way of being. The spirit and the tools and the skills and the attitudes have become so internalized that it's second nature.

- As we move up in these levels of development, our breadth of impact becomes broader. As a skilled practitioner, using a tool and using the process on a task is terrific. It helps to resolve that task, hopefully reaching a creative breakthrough.

- But the breadth of our impact is even greater as we move up to the highest level of development, as a creative leader. When we're a creative leader, we carry this with us all the time, and we transform the context that we're in. We model creative behavior. We create climates that encourage others to be creative.

Suggested Reading

Abrashoff, *It's Your Ship*.

Northouse, *Leadership*.

Puccio, et al., *Creative Leadership*.

Activities

Activity 1: Self-Evaluation
Evaluate yourself against the four principles of divergent thinking: defer judgment, go for quantity, make connections, seek novelty. To what degree have you internalized these principles? Do some of the principles come easier for you? In what ways do you still need to grow?

Activity 2: Creative Leadership
Evaluate yourself as a creative leader and make a plan for how to improve your internalization of creativity. How might you be a better model for others of creative leadership behaviors? After completing activity 1, honestly ask yourself to what degree you readily support other people's creativity, especially creating a climate for creativity. Generate four or five action steps for what you can do to support others' creativity.

Overcoming Blocks and Barriers

Lecture 23

Creativity is the ability to modify self-imposed constraints. In this lecture, you will explore the factors that get in the way of creativity, beginning with those that are internal and moving to the external. Tools for deliberate creativity move creativity beyond chance to creativity on demand. There are many deliberate tools that will likely be useful for you in the future to overcome potential barriers and blocks. In this lecture, you will learn some strategies for overcoming blocks. Information from neuroscience, the study of how the brain works, gives us insights into how these strategies help us overcome these blocks.

Internal Blocks

- Internal blocks happen in our minds. We're going to look at three particular blocks to creative thinking. One is perceptual. This is rigidity in terms of how we see things. The next is habitual blocks, which are fixed patterns that we might get into. The third block is mental blocks. This is when the idea is elusive to us. Our creativity just doesn't seem to come.

- Perceptual blocks are getting locked into viewing things in a familiar way, making it difficult to see something in a new or different way.

- There are three consequences to this block. One is jumping to premature solutions, not seeing other possibilities. The next is limited flexibility in seeing alternative solutions, which is also known as functional fixity—seeing something as if it could only be used for one purpose and not seeing other potential in terms of how it might be used.

- When we get caught in a perceptual block, we fail to get an accurate picture of our environment. We might miss opportunities. The schoolteacher or parent who has a restricted view of a child might

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In addition to external blocks to creativity, there are many internal blocks that prevent people from thinking creatively.

miss his or her talents. A salesperson might successfully sell a product to someone but might not recognize other needs that could have led to more sales.

- Great creators use simple habits, even very strange habits, to get themselves going. But a habitual way of thinking can interfere with our creativity.

- As a consequence of this block, getting into habitual ways of thinking, we may not change. We go down the same pattern again and again, and when conditions in our environment change, we run the risk of becoming extinct. We see this happen with organizations.

- The next block, the mental block, is that moment when the idea, or aha moment, simply just doesn't come. Think of the classic writer's block, where you struggle to find the solution. You can't break through. The idea that you want so desperately just isn't coming. The consequence of this block is frustration, emotional hijacking,

derailing yourself even further from your goal of creating. We lose confidence as another consequence of this kind of mental block.

Defer Judgment, Defocus, Distance

- Neuroscience shows us that we can engage in activities that alter our brain function. This improves the probability of coming up with a breakthrough. The strategies aren't new. In fact, humans have experimented with and developed these over centuries, but neuroscience now gives us some sense for why they work.

- The successful strategies follow the three D's: defer judgment, defocus, and distance. We can use these three strategies to help combat internal blocks.

- When we defer our judgment, we're opening up our minds. People who are good divergent thinkers are turning down their self-monitoring brain, the prefrontal cortex, which serves as a gatekeeper between our rational and irrational thinking. Therefore, by deferring judgment, we open up new thoughts, new ideas, and new possibilities.

- The next strategy is defocus. When we slow our brain down, we allow the mind to wander. Your thinking occurs along different neural networks. This allows for new pathways to be explored and new combinations of ideas.

- As a neural strategy, distancing involves stepping away, shifting from vertical to lateral thinking, forcing connections, deliberately introducing a new stimulus into our thinking. That stimulus can then act as a springboard.

- There are five specific strategies that you can employ that are based on the three D's. The first is to vary your routine. Research shows that even slight changes from what you typically do can improve divergent thinking by 10 to 15 percent. When we vary our routine, it creates new connections for us. But you do need to be cautious: Varying your routine during work can also be distracting.

- The next strategy is to take an incubation break, which is when you go away from the problem. Where are you, and what are you doing, when you get your best ideas? Familiar responses include when running, when shaving, just before falling asleep, and while driving. When you're working hard on trying to get to that breakthrough, and then you move away from the problem, it's during this time of incubation that the idea presents itself.

- Research shows that the best kind of incubation break to take is to take a break that involves a nondemanding task. The kinds of incubation time that work best seem to be times when our body is occupied but our mind is able to wander. In this way, our prefrontal cortex is less active. Our minds are wandering and finding new neural pathways, and in this way, we create new connections.

- The third strategy for overcoming internal blocks is forced connections. You've learned some tools that help you make forced connections—for example, visually identifying relationships, where we look at photographs to stimulate our thinking, and random word entry, where we choose a word randomly and force it into our thinking.

- These kinds of tools shake up our thinking; they require our minds to take a new route. You can use deliberate distancing tools such as this that shift your focus, and you can use springboards such as objects and photographs. This allows your mind to travel along new neural pathways, and it reinforces deferral of judgment.

- The fourth strategy for overcoming internal blocks is called in-and-out note taking. Have you ever noticed that when you're in a meeting, your mind wanders? You might start to think about something that you have to do or something that you forgot to do. It is natural for our minds to wander.

- With in-and-out note taking, we take advantage of what our minds naturally do. When you're in a meeting, draw a line down the

center of your piece of paper that you're taking notes on, or on your computer, create a Word document that has two columns in it.

- The left column should be labeled "in thoughts," which are the notes that you take that are directly related to the content—the things that you want to remember. The right column should be labeled "out thoughts," which is where you capture the connections you're making—those random thoughts that get spurred, perhaps, by what's being said in the meeting.

- One of the biggest benefits of in-and-out note taking is it helps us tune in to what's happening in our minds, this natural mind wandering that happens, and it helps us keep track of those new ideas that present themselves to us. It's a way of keeping track of your creativity.

- The fifth solution for overcoming internal blocks can be referred to as the Hemingway system. Hemingway would work through his writer's blocks, and he would only stop when he knew where he would start when he began next to write. He never walked away when he had a writing block. Instead, he would push through it, and when he got to a point where he was picking up momentum again, when he knew where he would start next, that's when he would stop.

External Killers of Creativity

- Teresa Amabile has looked at more external killers to creativity. She has more than a decade of research that highlights a range of creativity obstacles. The following are a few examples of her creativity blocks, or killers. They can be referred to as being external because they are situational; however, they then influence us internally, especially in that they undermine our intrinsic motivation.

- First, expected evaluation is when you know that your ideas or products will be judged by others. The creator then becomes preoccupied by future evaluation. Rather than doing his or her

most creative work, the focus is on pleasing others. This moves the focus from doing the task for pure pleasure to doing it for external reasons.

- Next, she talks about competition, which is not a good thing when it comes to creative work. When we compete, we start to focus on others versus the work that we're doing. It makes us do things quickly; thus, we are less likely to pursue other options and explore. It focuses us on winning, and as a result, we are less likely to try something original when the outcome is unknown. If we're concerned with winning, we know that trying something new is risky—that there's a chance of failure while we're less likely to try the original idea.

- B. F. Skinner and other behaviorists showed how rewards reinforce behavior, but do rewards promote creative behavior? Amabile has demonstrated that external rewards and the promise of a reward undermine creative thinking. A reward moves our focus to something that is external to the creator. Time and time again, great creators say that they create out of their own interest and pleasure.

- Expected evaluation, competition, and rewards kill creativity. They erode our intrinsic motivation. Extrinsic motivation is fine for many tasks, but not for creativity. It is recommended that you avoid or downplay these situational factors and try not to impose them on others.

Suggested Reading

Adams, *Conceptual Blockbusting.*

Currey, *Daily Rituals*.

Activities

Activity 1: In-and-Out Note Taking

Over the course of a week, while you attend meetings or participate in presentations, practice in-and-out note taking. Afterward, look over your notes to see what you generated. In particular, when looking at your "out" notes, do you see new ideas, new insights, and new possibilities?

Activity 2: Overcoming Blocks

Pick another one of the four strategies for overcoming blocks: vary your routine, incubation break, forced connection, Hemingway system. Make this strategy a regular practice, just like the great creators.

Living a Creative Life

Lecture 24

Creative thinking skills can help anyone, whether making contributions to a larger field or overcoming daily challenges and living in a more creative way. This concluding lecture examines principles for living a creative life. You are encouraged to apply these themes in your life and to examine ways that you can internalize them. This lecture will also expose you to things that undermine our creativity, that stop us from being more effective—things that we, perhaps, should pay attention to that may rob our creativity.

Losing Creative Power

- There are some things that people do that undermine their creative power. The first is letting others' approval be more important than their own—sort of checking to see how others are reacting to them before they dive into the work, being overly cautious about how others will react to them.

- This tends to take us away from our own intrinsic drive or internal interests. As we become less concerned about others, we can focus more on what's important to us.

- The next way in which we can lose our creative power is by running ourselves down, always putting other people first. By nurturing and actualizing our own creativity, enhancing our creative power, we're in a better position to then enhance others and to share that power with others.

- The next way in which we can give up our power is asking for permission inappropriately, looking to make sure that before we do something we have the permission of someone else. In this way, we're trying to avoid making mistakes.

- The next is credentializing. This involves looking at a field you wish to get into or something that you wish to embark on and

talking yourself down by thinking that you don't have the right things on your resume, the right credentials, to prove your validity in the field.

- The next is demanding guarantees. Looking for 100 percent guarantees of success will always stop us from pursuing something, especially something that's new to us.

- The final way in which we give up our power is being unwilling to say no, stretching ourselves too far—saying yes to everything, not taking control of decisions in our lives. As a result, we are running our energy down.

Gaining Creative Power

- In contrast to the principles that cause us to lose creative power, there are principles that give us creative power. These are habits to continue to grow or to initiate anew in your life.

- The first principle is to live your life. As Amabile has shown in her research, intrinsic motivation is a strong predictor of those who will ultimately show high levels of creativity. It doesn't matter what intrinsically motivates you; what really matters is finding what intrinsically motivates you. Pursue what you love, and this is where you'll find your greatest creativity—your flow, your peak psychological experiences.

- The next principle is to reclaim your creativity. Creativity is natural; we're born to create. Evolution has wired us to be creative. In order to be creative, we have to recognize, though, how we get in the way of our own creativity—those self-imposed constraints. Sure, we can blame others, but we need to first reclaim what is a natural gift that we all have.

- When you create, you actualize your potential. You expand yourself. You discover yourself. When you create an idea, it's like seeing part of yourself grow. It helps you to become a larger self.

- There are some legends and myths about how creativity comes along with mental illness. In fact, research by many psychologists show the opposite. Research shows that when we reclaim our creativity, we have greater coping skills and resiliency—resiliency to deal with life's challenges, because creativity just doesn't happen in our professional lives between 9 and 5. We're required to be creative in other aspects of our lives as well, so it's important that wherever we go, we bring our imagination along.

- The next principle is to go big or go home. Remember, creativity is made up of knowledge, imagination, and evaluation. Children have lots of imagination. Adults, however, seem to stop dreaming. They limit their imagination. This is crucial, as Fritz says in his creative tension model.

- In order to create change in our lives, we have to begin by first looking at what we want. What's our desired future state? The more the goal is a stretch, the more it takes us out of our comfort zone, the more compelling it becomes. It's important to be clear and unapologetic about what you want, just like children. It's how children get their way.

- In their book, which looked at the habits that make corporations successful over time, Collins and Porras identified a number of things that organizations did that were habitual. One of the important habits was what they called a BHAG—a big hairy audacious goal.

- Here's a description of a BHAG: 46-year-old businessman Henry Ford's big hairy audacious goal was to democratize the automobile. He was very clear in describing what this desired future state would be. He wanted to build a motorcar for the great multitude. It would be so low in price that no man making a good salary would be unable to own one. The horse will have disappeared from our highways, and the automobile will be taken for granted.

- In order to dream big, we have to be able to engage in the next principle, which is called suspend disbelief. When we hold on to

an idea or make a conclusion and are not willing to be flexible—not willing to suspend our disbelief—even when an opportunity comes knocking on our door, we just might miss it. So it's crucial for us to see opportunities, to be able to suspend our disbelief and to be able to play with possibilities. We need to manage our judgment, to not edit our thinking prematurely.

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In order to dream, you must suspend your disbelief.

- Principle five is to create options. In order to achieve the goal you are pursuing, it's helpful to have multiple options. When solving a problem, it's helpful to have multiple options. Great creators do this. They don't create just one option for themselves. Picasso, for example, generated 20,000 works over his lifetime.

- When we have a problem to solve and we have one option, it really doesn't give us a choice—it's either succeed or fail. When you create two options, then you're in a better place, but that forces choices into a black-and-white scenario. When we create more choices for ourselves, we maximize our power. It allows for greater flexibility, and it increases the probability of getting to our end goal.

- The sixth and final principle is to do it again and again. Creating is hard work. It takes practice and persistence. It takes 10 years, on average, before great creators have their breakthrough. Franklin Delano Roosevelt called this "a time of persistent experimentation." Be willing to learn from your mistakes. Failure is just another way of learning.

Practice, Practice, Practice

- As you practice, as you do it again and again, find a teacher to guide you—someone who will grow with you. Tennis players and golfers,

even at the highest level, have coaches. Today, many executives even have coaches. Find a paragon that you can emulate, someone you can look to who has a similar approach in terms of creativity, and look at what they've done. Learn from them as well.

- It is important to keep in mind that learning without application achieves the same end as ignorance. Practice what you've learned in this course, applying the tools to your everyday life.

- If we wish to see change, we have to be the change we wish to see. We have to model the way for others to see. Embrace your creativity as you go forward. Model it for others. For yourself and for others, be a creative force in your work and all that you do, and live a more creative life.

Suggested Reading

Amabile and Kramer, *The Progress Principle*.

Csikszentmihalyi, *Creativity*.

Robinson, *Out of Our Minds*.

Activities

Activity 1: Identifying a Vision
Take some time to read and reflect on the following questions.

- What are your goals?

- What are your passions?

- What is something you would like to accomplish by the end of the year?

- What is something you would like to accomplish by this time next year?

- What are some of your long-term wishes?

- What's on your bucket list?
- What have you not done that you would like to do?
- What opportunities have been on your mind?

Select one question, phrase it into a wish statement starting with "It would be great if …", and then complete a cartoon storyboard.

Activity 2: Taking It Forward
Look back over your notes and at the list of activities above. What did you find interesting? What tools and concepts do you want to use and retain? Place these items in the first column below. Then, in the second column, diverge on a list of potential uses for each of those items.

Interesting Content (Tools and Concepts)	Potential Uses

Bibliography

Abrashoff, D. M. *It's Your Ship: Management Techniques from the Best Damn Ship in the Navy*. New York: Warner Brothers, Inc., 2002. An in-depth description of how distributed leadership was successfully used to turn around a poor-performing naval ship.

Adams, J. *Conceptual Blockbusting*. 4th ed. New York: Basic Books, 2001. A true classic book in the field of creativity, this book provides a description of how such blocks as perceptual, emotional, cultural, environmental, intellectual, and expressive get in the way of individual creativity.

Allen, D. *Getting Things Done: The Art of Stress-Free Productivity*. New York: Penguin Books, 2001. Allen provides readers with methods aimed at reducing stress and clearing their minds so that they can be more productive.

Altshuller, G. *And Suddenly the Inventor Appeared: TRIZ, the Theory of Inventive Problem Solving*. Worcester, Massachusetts: Technical Innovation Center, Inc., 1996. Altshuller's analysis of patent filings in the former Soviet Union led to the creation of systematic tools useful for invention and innovation; this is the book that introduced TRIZ, the Russian inventive thinking process, to the world.

Amabile, T. M. *Growing Up Creative: Nurturing a Lifetime of Creativity*. Buffalo, NY: Creative Education Foundation, Inc., 1992. Written by one of the preeminent scholars in the field of creativity, this book explores factors shown to enhance individual creativity and provides practical advice for parents and teachers.

Amabile, T. M., and S. J. Kramer. *The Progress Principle: Using Small Wins to Ignite Joy, Engagement, and Creativity at Work*. Boston: Harvard Business School Publishing, 2011. Based on analysis of more than 12,000 diary entries of workers, the authors describe what managers can do to enhance employees' inner work lives.

Arnold, J. D. *The Art of Decision Making*. New York: AMACOM, 1978. The author describes a seven-step process for making better decisions.

Basadur, M. *Simplex®: A Flight to Creativity*. Buffalo, NY: The Creative Education Foundation, Inc., 1994. Basadur provides a detailed description of how to apply his creative problem solving process, called *Simplex*, in organizational contexts.

Belsky, S. *Making Ideas Happen: Overcoming the Obstacles between Vision & Reality*. New York: Penguin, 2010. The author uses his studies of highly productive individuals and teams to provide the reader with practical principles and techniques to move ideas from the drawing board to reality.

Benyus, J. *Biomimicry: Innovation Inspired by Nature.* New York: HarperCollins Publishers, Inc., 1997. Detailed description of a creative process based on ways to borrow ideas from nature to solve human problems.

Brown, S. *Play: How It Shapes the Brain, Opens the Imagination, and Invigorates the Soul.* New York: Penguin Group, Inc., 2009. Brown uses the science of play to make the case that play is crucial to happiness, sustained social relationships, and higher levels of creativity.

Brown, T. *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation.* New York: HarperCollins, 2009. Brown provides a description of design thinking, a collaborative systematic process through which designers' ideas are matched to people's needs.

Carruthers, P. "Human Creativity: Its Cognitive Basis, Its Evolution, and Its Connections with Childhood Pretence." *British Journal for the Philosophy of Science* 53, no. 2 (June 2002): 225–249. A fascinating journal article written by a philosopher who offers an eloquent argument that the attitude of "suspended disbelief" was a necessary partner to creative cognition that, together, brought about the creative explosion in human civilization approximately 50,000 years ago.

Collins, J. C., and J. I. Porras. *Built to Last: Successful Habits of Visionary Companies*. New York: HarperCollins, 1994. The authors report on their

detailed analysis of the factors that distinguish companies that have been able to sustain themselves over time, compared to those that have been much less successful; a number of these habits are excellent organizational examples of principles described in the field of creativity.

Colvin, G. *Talent Is Overrated: What Really Separates World-Class Performers from Everybody Else.* New York: Penguin Group, Inc., 2008. An engaging book, based on the science of expertise, that describes how deliberate practice can be used to achieve high levels of accomplishment in any skill area, including examples of creativity.

Cropley, A. "In Praise of Convergent Thinking." *Creativity Research Journal* 18 (2006): 391–404. The author makes a strong case for the role of convergent thinking in the creative process; a useful schema is shared in which the consequences of right and wrong combinations of divergent and convergent thinking are explored.

Csikszentmihalyi, M. *Creativity: Flow and the Psychology of Discovery and Invention*. New York: HarperCollins Publishers, Inc., 1996. Drawn from interviews with creative people, the author describes the factors that lead to a peak creative experience; moreover, Csikszentmihalyi provides an eloquent case for why creativity needs to be cultivated in today's complex world.

Currey, J. *Daily Rituals: How Artists Work.* New York: Alfred A. Knopf, 2013. Detailed descriptions of the daily practices and habits adopted by well-known artists, scientists, writers, and other great creators.

de Bono, E. *Serious Creativity: Using the Power of Lateral Thinking to Create New Ideas.* Toronto, Canada: Harper Perennial, 1992. Articulate description of creativity that replaces popular misconceptions of creativity with an argument that creativity is a skill that is crucial for success in life, a skill that can be developed principally by learning to shift from vertical modes of thinking to lateral ways of thinking.

———. *Six Thinking Hats*. Revised and updated. Boston: Little, Brown and Company, 1999. Author Edward de Bono, perhaps one of the most well-known global experts on deliberate creativity, explains how to apply one of

his most popular methods, called the six thinking hats, for both individual and group use.

Doorley, S., and S. Witthoft. *Make Space: How to Set the Stage for Creative Collaboration*. Hoboken, NY: Wiley, 2012. This book highlights how to design physical workspace that promotes collaboration and creativity and draws the best out of people.

Dunbar, R., et al. *Evolutionary Psychology: A Beginner's Guide to Human Behaviour, Evolution and the Mind*. Oxford, England: Oneworld Publications, 2007. Introduction to evolutionary psychology; of particular relevance to individual creativity is the description of humans' built-in conformity bias and how this interfaces with our innate ability to engage in creative thinking.

Ekvall, G. "Organizational Climate for Creativity and Innovation." *European Journal of Work and Organizational Psychology* 5 (1996): 105–123. Journal article by a leading researcher on the climate for creativity; in this paper, Ekvall provides a detailed description of his theory, the dimensions of creative climate, and the research that highlights the relationship between climate and innovation.

Flavell, J. H. "Metacognitive Aspects of Problem Solving." In *The Nature of Intelligence,* edited by L. B. Resnick, 231–296. Hillside, NJ: Lawrence Erlbaum Associates, 1987. In this chapter, written by one of the leading experts on metacognition, the author explores how effective problem solving and metacognition intersect.

———. "Speculations about the Nature and Development of Metacognition." In *Metacognition, Motivation, and Understanding,* edited by F. E. Weinert and R. H. Kluwe, 21–29. Hillside, NJ: Lawrence Erlbaum Associates, 1987. In this chapter, Flavell updates his model of metacognition, originally described in his class article published in 1979; included in the more current piece is a series of speculative thoughts about the development of metacognition.

Forsha, H. I. *Show Me: The Complete Guide to Storyboarding and Problem Solving*. Milwaukee, WI: ASQC Quality Press, 1995. Historical review of the development of the storyboarding tool and examples of how to use storyboarding in a variety of ways.

Fritz, R. *Creating: A Guide to the Creative Process*. New York: Fawcett Columbine, 1991. Writer, composer, and entrepreneur Robert Fritz focuses the reader on "creating," the ability to bring into existence that which you desire; the purpose of the book is to help people create what they want in their lives, which begins by recognizing what you love.

Gabora, L., and S. B. Kaufman. "Evolutionary Approaches to Creativity." In *The Cambridge Handbook of Creativity*, edited by James C. Kaufman and Robert J. Sternberg, 279–300. Cambridge: Cambridge University Press, 2010. This chapter, which is included in a collection of works authored by some of the most esteemed contemporary creativity researchers, explores how humans, and especially their brains, evolved to be creative.

Goldenberg, J., and D. Mazursky. *Creativity in Product Innovation*. Cambridge: Cambridge University Press, 2002. Complete with many examples from industry, this book provides creativity templates useful in creating a systematic approach to product improvement and creation.

Goleman, D. *The Brain and Emotional Intelligence: New Insights*. Northampton, MA: More Than Sound LLC, 2011. This popular book made the concept of emotional intelligence clear and accessible to all; Goleman makes a strong argument for the predictive value of emotional intelligence along with ways to boost emotional intelligence.

Gordon, W. J. J. *Synectics*. New York: Harper & Row, 1961. A classic book in which one of the original developers of the Synectics process provides strategies for using analogies to creatively solve problems.

Grant, A., et al. *Who Killed Creativity? And How Can We Get It Back?: Seven Essential Strategies to Make Yourself, Your Team and Your Organisation More Innovative*. Melbourne, Australia: John Wiley & Sons Australia, Ltd., 2012. This book playfully examines the death of creativity as if it were set

in a crime scene; particular focus is given to the factors in the setting that undermine creative thinking.

Grivas, C., and G. J. Puccio. *The Innovative Team: Unleashing Creative Potential for Breakthrough Results*. San Francisco: Jossey-Bass, 2012. A two-part book whose first section features a fable of a team that used their understanding of FourSight preferences and creative problem solving to overcome dysfunctional team behaviors to achieve creative results; the second section explains how to use creative problem solving.

Jones, M. D. *The Thinker's Toolkit: 14 Powerful Techniques For Problem Solving*. New York: Three Rivers Press, 1995. Former CIA analyst presents detailed descriptions of creativity tools and decision-making tools, such as divergent-convergent thinking, the probability tree, devil's advocacy, hypothesis testing, and advanced utility analysis.

Kanji, G. K., and M. Asher. *100 Methods for Total Quality Management.* London: Sage Publications, 1996. A tool book filled with 100 examples, complete with detailed steps, for applying total quality methods individually and in teams.

Kelley, T., and D. Kelley. "Reclaim Your Creative Confidence: How to Get Over the Fears That Block Your Best Ideas." *Harvard Business Review,* December 2012. Accessed February 18, 2013. http://hbr.org/2012/12/reclaim-your-creative-confidence. Creativity experts from the design firm IDEO describe how fear and judgment undermine creative thinking among organizational members; Kelley and Kelley provide business examples of how creative methods have been used successfully to overcome these barriers to creativity.

King, B., and H. Schlicksupp. *The Idea Edge: Transforming Creative Thought into Organizational Excellence.* Methuen, MA: Goal/QPC, 1998. A tool book filled with step-by-step how-to instructions for using a wide range of creative thinking methods.

Kirton, M. *Adaptors and Innovators: Styles of Creativity and Problem Solving.* New York: Routledge, 1989. A detailed description of Kirton's

theory of adaptive and innovative styles of creativity, with examples and implications aimed at promoting deeper insight into individual and organizational creativity.

Kumar, V. *101 Design Methods: A Structured Approach for Driving Innovation in Your Organization.* Hoboken, NJ: Wiley & Sons, 2013. A tool book that contains short, but detailed, descriptions, along with visual examples, of how to use 101 different design tools.

LeGault, M. R. *Think: Why Crucial Decisions Can't Be Made in the Blink of an Eye*. New York: Threshold Editions, 2006. The author makes the case that, despite the position taken in the book *Blink*, our best decisions are made after careful analysis and incisive reasoning.

Lewin, K. *Field Theory in Social Science*. New York: Harper & Row, 1951. A classic book in which psychologist Kurt Lewin describes the forces that interact to either undermine or promote change.

Lumsdaine, E., and M. Lumsdaine. *Creative Problem Solving: Thinking Skills for a Changing World*. New York: McGraw-Hill. 1995. The author introduces a whole-brain approach to greater success at work and life in general; the book includes case studies, team activities, and assignments.

Lynn, A. *The EQ Difference: A Powerful Plan for Putting Emotional Intelligence to Work*. New York: The American Management Association, 2005. A hands-on book that presents a practical model for developing emotional intelligence, mainly aimed at those who wish to employ greater levels of emotional intelligence in their professional lives.

Martin, R. *The Opposable Mind: Winning through Integrative Thinking*. Boston, MA: Harvard Business School Press, 2009. The author, Roger Martin, argues that to be an effective leader, people should learn to emulate how great leaders think (not how they are); with this in mind, Martin suggests that leaders are able to integrate what appear to be opposing data, models, and perspectives.

Michalko, M. *Thinkertoys: A Handbook of Business Creativity for the 90's*. Berkeley, CA: Ten Speed Press, 1991. An engaging book focused on the practical application of creativity tools, from those tools that are more linear to those that are much more intuitive; the book includes useful instructions for a variety of idea-generation techniques.

Mithen, S. *The Singing Neanderthals: The Origins of Music, Language, Mind, and Body*. Cambridge, MA: Harvard University Press, 2006. The author uses cognitive archeology to examine developments in brain function that led to the creative explosion; special attention is given to humans' ability to combine thoughts across domains and to the fact that such intersections of thought promote higher levels of creative thinking.

Murray, D. K. *Borrowing Brilliance: The Six Steps to Business Innovation by Building on the Ideas of Others.* New York: Penguin Group, Inc., 2009. Murray, corporate innovation officer, presents a strong case, along with an easy-to-follow process model, for how borrowing ideas can be used to drive creative breakthroughs.

Ness, R. *Innovation Generation: How to Produce Creative and Useful Scientific Ideas*. New York: Oxford University Press, 2012. The author provides readers with ways to escape habitual approaches to everyday life and to learn to apply proven methods for enhancing the generation of original ideas.

Northouse, P. G. *Leadership: Theory and Practice*. 6th ed. Los Angeles, CA: Sage, 2013. A comprehensive review of a wide-ranging set of theories and models of leadership, from historical to contemporary.

Osborn, A. *Applied Imagination: Principles and Procedures of Creative Problem-Solving.* 3rd ed. New York: Scribner, 1963. A pioneering book that is credited with being a catalyst to practices aimed at promoting creativity, and to the field of creativity at large; in this book, Osborn introduces creative problem solving and describes how to use the creativity tool he invented called brainstorming.

Parnes, S. J. *Source Book for Creative Problem Solving*. Buffalo, NY: Creative Education Foundation, 1992. A collection of papers, written by historically recognized creativity experts, that explore a variety of issues and applications relative to the use of creative problem solving.

Parnes, S. J., and A. Meadow. "Evaluation of Training in Creative Problem Solving." *Journal of Applied Psychology* 43 (1959): 189–194. One of the early classic studies that demonstrated that creative thinking, particularly idea generation, could be taught.

Proctor, T. *Creative Problem Solving for Managers: Developing Skills for Decision Making and Innovation*. New York: Routledge, 2010. A wide-ranging survey of various creative processes and tools, including creative problem solving, Synectics, decision-making models, and computer-aided creativity.

Puccio, G., et al. *Creative Leadership: Skills That Drive Change.* 2nd ed. Thousand Oaks, CA: Sage, 2011. This book positions creativity and creative problem solving as core leadership skills; it is filled with practical creativity tools aimed at helping leaders be more effective creative thinkers.

———. *Creativity Rising: Creative Thinking and Creative Problem Solving in the 21st Century*. Buffalo, NY: ICSC Press, 2012. This book places creative thinking into the context of the 21st century by highlighting current trends that render creativity an essential life skill, followed by a detailed review of creative problem solving, both the process and some of its tools.

Rickards, T. *Creativity and Problem Solving at Work*. Aldershot, UK: Gower Publishing, 1990. An introduction to creativity and to a range of creative problem solving tools that are easily applied in organizational settings.

Robinson, K. *Out of Our Minds: Learning to Be Creative*. Chichester, UK: Capstone Publishing, Ltd., 2011. A highly accessible book that makes a strong case for the importance of creativity in business, yet emphasizes how our educational practices undermine individual creativity; the core point of the book is that tapping into one's creativity is essential for anyone who wants to reach his or her fullest potential and that creativity is a teachable skill.

Runco, M. A. *Problem Finding, Problem Solving, and Creativity*. Norwood, NJ: Ablex, 1994. A scholarly book aimed at sorting out the distinctions and relationships among the concepts of problem finding, problem solving, and creativity.

Sawyer, K. *Zig Zag: The Surprising Path to Greater Creativity.* San Francisco, CA: Jossey-Bass, 2013. A research-based book that outlines an eight-step process to increase creative potential, from how to ask better questions to strategies for manifesting your ideas.

Senge, P., et al. *The Dance Of Change: The Challenge of Sustaining Momentum in Learning Organizations*. New York: Doubleday, 1999. Senge uses his vast experience with organizations to help business leaders recognize how to develop personal and organizational capabilities that will sustain change.

VanGundy, A. B. *Creative Problem Solving: A Guide for Trainers and Management.* Westport, CN: Quorum Books, 1987. A detailed description of how to employ creative problem solving in a business environment.

———. *Idea Power: Techniques & Resources to Unleash the Creativity in Your Organization.* New York: AMACOM, 1992. Creativity expert Arthur VanGundy provides practical approaches to business creativity, highlighting tools that can range in application from group use to use across the entire organization.

Wagner, T. *Creating Innovators: The Making of Young People Who Will Change the World*. New York: Simon & Schuster, Inc., 2012. A Harvard professor of education makes the case that creativity and innovation are essential 21st-century skills; the book includes stories and recommendations aimed at enhancing innovation skills in young people.

———. *The Global Achievement Gap*. New York: Basic Books, 2008. An in-depth examination and description of the skills young people need to get a good job in a global knowledge economy.

Weisberg, R. W. *Creativity: Understanding Innovation in Problem Solving, Science, Invention, and the Arts*. Hoboken, NY: Wiley, 2006. A broad review of the field of creativity that covers a diverse range of creativity topics, including psychometric, personality, and cognitive approaches to creativity; there is a strong focus on creative processes that include case studies, research, reviews, and models.

FourSight® Thinking Profile

Discover your preferences as a creative thinker

The FourSight® Thinking Profile is an in-depth problem-solving assessment, based on 10 years of research. It reveals what parts of the creative process naturally align with your thinking style.

A universal process

Humans are naturally creative. Every day we solve new problems, meet new challenges, and pursue new opportunities. We do it, whether we know it or not, by following the universal steps of the creative process.

Discover your profile

The FourSight® Thinking Profile reveals your preference for each of the four distinct steps of the creative problem-solving process. Knowing your preference(s) unlocks your ability to solve problems, collaborate, and lead with better results.

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Directions:

The 36 statements on the following pages describe various activities associated with solving problems or dealing with challenging situations. **For each statement indicate the extent to which you feel the statement describes you.** Do not worry about how effective you are in regard to that activity; instead, simply consider the extent to which it sounds like you. Respond to each statement by indicating how descriptive that statement is of you. **Indicate your response by placing an "X" through one of the dots that follow each statement.** The response scale ranges from "Not like me at all" to "Very much like me." Remember, there are no right or wrong answers, just opinions about yourself—not the way you wish you were, but the way you honestly are.

Examples:

	Not like me at all		*Like me*		*Very much like me*
29 I am a tall person.	○○	✗○	○○	○○	○○
30 I enjoy eating salad.	○○	○○	○○	○○	✗○

Please complete the whole four-page survey (on pages 179, 181, 183, and 185) before you begin scoring your results. You'll find scoring directions on pages 187-189.

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Name:_____	*Not like me at all*		*Like me*		*Very much like me*	Scoring Only ↓
1 I like testing and revising my ideas before coming up with the final solution or product.	○○	○○	○○	○○	○○	1____
2 I like taking the time to clarify the exact nature of the problem.	○○	○○	○○	○○	○○	2____
3 I enjoy taking the necessary steps to put my ideas into action.	○○	○○	○○	○○	○○	3____
4 I like to break a broad problem apart and examine it from all angles.	○○	○○	○○	○○	○○	4____
5 I find it difficult to come up with unusual ideas for solving a problem.	○○	○○	○○	○○	○○	5____
6 I like identifying the most relevant facts pertaining to a problem.	○○	○○	○○	○○	○○	6____
7 I don't have the temperament to sit back and isolate the specific causes of a problem.	○○	○○	○○	○○	○○	7____
8 I enjoy coming up with unique ways of looking at a problem.	○○	○○	○○	○○	○○	8____
9 I like to generate all the pluses and minuses of a potential solution.	○○	○○	○○	○○	○○	9____
Scoring key for ____ :	**1**	**2**	**3**	**4**	**5**	
Scoring key for ○:	**5**	**4**	**3**	**2**	**1**	

Don't score yet. Turn to page 181 and continue the assessment.

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FOR SCORING USE ONLY:
Transfer the score for each item to the white box on the corresponding line

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
Total each column then transfer column totals to page 189				

FourSight® Thinking Profile

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	Not like me at all		Like me		Very much like me	Scoring Only ↓
10 Before implementing a solution I like to break it down into steps.	○○	○○	○○	○○	○○	10____
11 Transforming ideas into action is not what I enjoy most.	○○	○○	○○	○○	○○	11____
12 I like to generate criteria that can be used to identify the best option(s).	○○	○○	○○	○○	○○	12____
13 I enjoy spending time looking beyond the initial view of the problem.	○○	○○	○○	○○	○○	13____
14 I don't naturally spend much time focusing on defining the exact problem to be solved.	○○	○○	○○	○○	○○	14____
15 I like to take in a situation by looking at the big picture.	○○	○○	○○	○○	○○	15____
16 I enjoy working on ill-defined, novel problems.	○○	○○	○○	○○	○○	16____
17 When working on a problem I like to come up with the best way of stating it.	○○	○○	○○	○○	○○	17____
18 I enjoy making things happen.	○○	○○	○○	○○	○○	18____
Scoring key for ____ :	**1**	**2**	**3**	**4**	**5**	
Scoring key for ◯:	**5**	**4**	**3**	**2**	**1**	

Don't score yet. Turn to page 183 and continue the assessment.

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FOR SCORING USE ONLY:
Transfer the score for each item to the white box on the corresponding line

	A	B	C	D
10				
11				
12				
13				
14				
15				
16				
17				
18				
Total each column then transfer column totals to page 189				

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	Not like me at all		Like me		Very much like me	Scoring Only ↓
19 I like to focus on creating a precisely stated problem.	○○	○○	○○	○○	○○	19____
20 I enjoy stretching my imagination to produce many ideas.	○○	○○	○○	○○	○○	20____
21 I like to focus on the key information within a challenging situation.	○○	○○	○○	○○	○○	21____
22 I enjoy taking the time to perfect an idea.	○○	○○	○○	○○	○○	22____
23 I find it difficult to bring my ideas to fruition.	○○	○○	○○	○○	○○	23____
24 I enjoy turning rough ideas into concrete solutions.	○○	○○	○○	○○	○○	24____
25 I like to think about all the things I need to do to implement an idea.	○○	○○	○○	○○	○○	25____
26 I really enjoy implementing an idea.	○○	○○	○○	○○	○○	26____
27 Before moving forward I like to have a clear understanding of the problem.	○○	○○	○○	○○	○○	27____
Scoring key for ____ :	**1**	**2**	**3**	**4**	**5**	
Scoring key for ○:	**5**	**4**	**3**	**2**	**1**	

Don't score yet. Turn to page 185 and continue the assessment.

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FOR SCORING USE ONLY:
Transfer the score for each item to the white box on the corresponding line

	A	B	C	D
19				
20				
21				
22				
23				
24				
25				
26				
27				
Total each column then transfer column totals to page 189				

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	Not like me at all		Like me		Very much like me	Scoring Only ↓
28 I like to work with unique ideas.	○○	○○	○○	○○	○○	28____
29 I enjoy putting my ideas into action.	○○	○○	○○	○○	○○	29____
30 I like to explore the strengths and weaknesses of a potential solution.	○○	○○	○○	○○	○○	30____
31 I enjoy gathering information to identify the root causes of a particular problem.	○○	○○	○○	○○	○○	31____
32 I enjoy the analysis and effort it takes to transform a rough concept into a workable idea.	○○	○○	○○	○○	○○	32____
33 My natural tendency is not to generate lots and lots of ideas for problems.	○○	○○	○○	○○	○○	33____
34 I enjoy using metaphors and analogies to come up with new ideas for problems.	○○	○○	○○	○○	○○	34____
35 I have little patience for the effort it takes to refine or polish an idea.	○○	○○	○○	○○	○○	35____
36 I tend to look for a quick solution and then fly with it.	○○	○○	○○	○○	○○	36____
Scoring key for ____ :	**1**	**2**	**3**	**4**	**5**	
Scoring key for ◯:	**5**	**4**	**3**	**2**	**1**	

Finished! Turn to page 187 for scoring instructions.

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FOR SCORING USE ONLY:
Transfer the score for each item to the white box on the corresponding line

	A	B	C	D
28				
29				
30				
31				
32				
33				
34				
35				
36				
Total each column then transfer column totals to page 189				

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Directions for graphing your score

Now that you have completed the FourSight® Thinking Profile, it's time to calculate your score. You can do this in 12 steps:

1. Use the two scoring keys at the bottom of pages 179, 181, 183, and 185 to score each of your responses. (*Note that the circled items use a different scoring key.*)

34 I enjoy using metaphors and analogies to come up with new ideas for problems.	○○	○○	○○	○○	○○	34 5
35 I have little patience for the effort it takes to refine or polish an idea.	○○	○○	○○	○○	○○	35 5
36 I tend to look for a quick solution and then fly with it.	○○	○○	○○	○○	○○	36 4
Scoring key for ___ :	1	2	3	4	5	
Scoring key for ◯:	5	4	3	2	1	

2. Fold page at the dotted line and transfer each score to the corresponding white box on that row of the scoring grid.

3. At the bottom of each scoring grid on pages 180, 182, 184, and 186, total the scores for each column.

Scoring Only ↓	R SCORING USE ONLY: the corresponding line				
28 5	28		5		
29 3	29				3
30 3	30			3	
31 4	31	4			
32 2	32			2	
33 4	33		4		
34 5	34		5		
35 5	35			5	
36 4	36				4
	umn totals to page 13	4	14	10	7
		A	B	C	D

(*continued*)

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4. Transfer your totals to the graph on page 189.

5. Add each column for a cumulative total for each preference.

6. Graph each of your four results in the appropriate column.

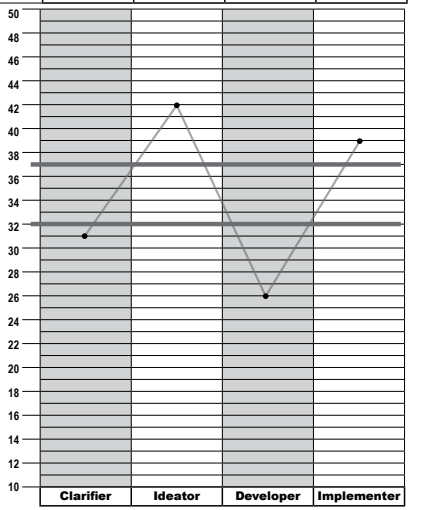
7. Draw a connector line between the dots.

8. Find your highest score and count down 5 — draw a horizontal line.

9. Find your lowest score and count up 5 — draw a horizontal line.*

Individual results for:_____

results from...	A	B	C	D
page 180				
page 182				
page 184				
page 186				
TOTAL				
	Clarifier	Ideator	Developer	Implementer



What are your preferences?

10. Anything above the highest line is a high preference for you.

11. Anything below the lowest line is a low preference for you.

12. Anything between the lines is a non-preference.

*If these lines end up on the same value, count up 3 and down 3 and redraw the lines.

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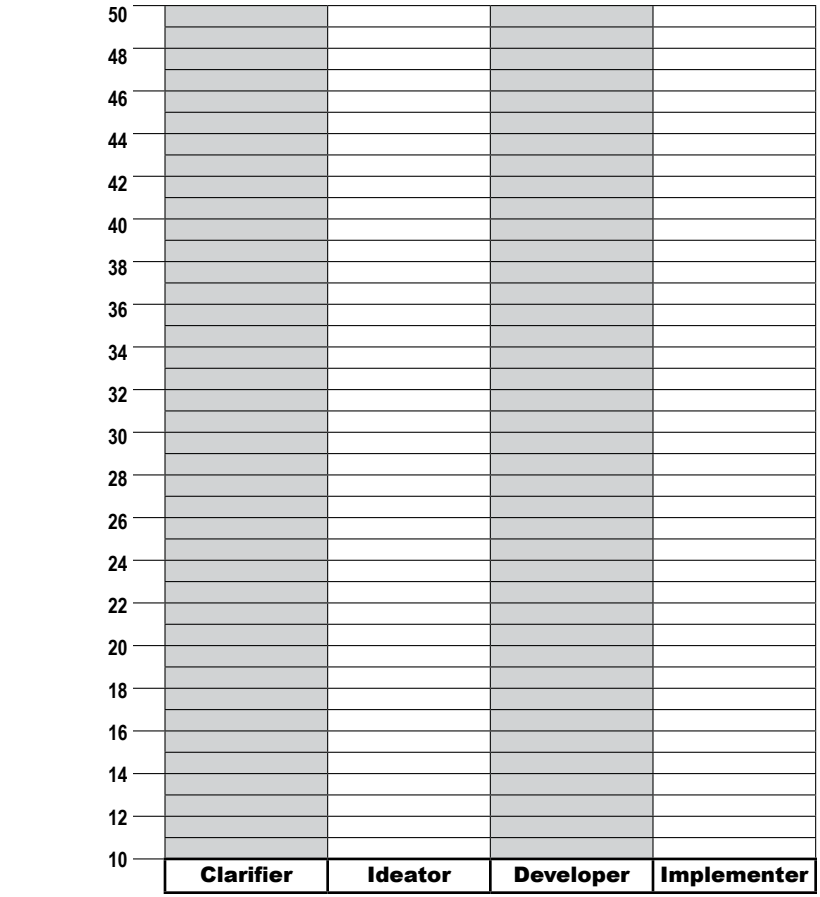
Individual results for:_____

results from…	A	B	C	D
page 180				
page 182				
page 184				
page 186				
TOTAL				
	Clarifier	**Ideator**	**Developer**	**Implementer**



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There are no “good” or “bad” scores

Each of these four preferences has its own strengths and potential weaknesses. The high points on your graph reflect the types of thinking you most prefer.

Preference is not ability

Preference does not guarantee ability, nor does lack of preference suggest lack of ability. Creative thinking skills can be learned. The brain, like a muscle, can be developed. Growing more aware of your own preferences may help you anticipate where you’ll need additional tools or more practice and where you might be of assistance to others.

What are your preferences?

For each preference, write whether you scored HIGH, LOW, or have NP (no preference)

Clarify: _____

Ideate: _____

Develop: _____

Implement: _____

Learn more about it

Now read the descriptions about each preference on the following pages and learn how to improve your skills at every stage of the creative process.

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The preferences at a glance

Clarifier-at-a-glance

Enjoys exploring challenges and opportunities

Likes to examine the details

Wants a clear understanding of the issue

Prefers a methodical approach to solving problems

May suffer from "analysis paralysis"

Ideator-at-a-glance

Likes to look at the big picture

Enjoys toying with ideas and possibilities

Likes to stretch his or her imagination

Enjoys thinking in more global and abstract terms

Takes an intuitive approach to innovation

May overlook details

Developer-at-a-glance

Enjoys putting together workable solutions

Likes to examine the pluses and minuses of an idea

Likes to compare competing solutions

Enjoys analyzing potential solutions

Enjoys planning the steps to implement an idea

May get stuck in developing the perfect solution

Implementer-at-a-glance

Likes to see things happen

Enjoys giving structure to ideas so they become a reality

Enjoys seeing ideas come to fruition

Likes to focus on "workable" ideas and solutions

Takes the Nike approach to innovation (i.e., "Just Do It")

May leap to action too quickly

The Integrator

While most people have high and low preferences, roughly 20 percent of FourSight® respondents take a very even approach to the breakthrough thinking process. These so-called integrators show no particular peaks or valleys. Integrators' energies stay rather steady as they work through the breakthrough thinking process. They can be very flexible team players, easily accommodating whatever the task requires. They may lose their voice in a group.

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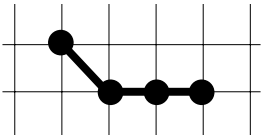
Clarifier



Clarifiers are...

Focused Methodical
Orderly Deliberate
Serious Organized

Give Clarifiers...

Order
The facts
An understanding of history
Access to information
Permission to ask questions

Clarifiers annoy others by...

Asking too many questions
Pointing out obstacles
Identifying areas that haven't been well thought out
Overloading people with information
Being too realistic

Clarifier in action

Albert Einstein was once asked, if some imminent disaster threatened the world and he had one hour to address the crisis, how would he spend his time. Einstein thought for a minute and then replied, "I would spend the first 55 minutes identifying the problem and the last five minutes solving it. For the formulation of a problem is often far more essential than its solution, which may be merely a matter of mathematical or experimental skill."

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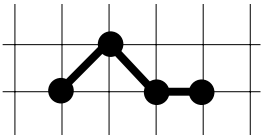
The four preferences

Ideator



Ideators are...

Playful
Imaginative
Social
Adaptable
Flexible
Adventurous
Independent

Give Ideators...

Room to be playful
Constant stimulation
Variety and change
The big picture

Ideators annoy others by...

Drawing attention to themselves
Being impatient when others don't get their ideas
Offering ideas that are too off-the-wall
Being too abstract
Not sticking to one idea

Ideator in action

Edwin Land was an ideator. Like all ideators, he had the big picture. In fact, he made a fortune off the big picture, because Edwin Land was the inventor of the Polaroid camera. The story goes that after taking photographs for a full day in 1943, Land's three-year-old daughter asked why she had to wait for the film to be processed. Land considered her question, and, after much experimentation, he came up with the Polaroid camera, which made photographs that developed almost instantly.

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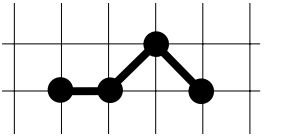
Developer

Developers are...



Reflective Cautious
Pragmatic Structured
Planful

Give Developers...

Time to consider the options
Time to evaluate
Time to develop ideas

Developers annoy others by...

Being too nit-picky
Finding flaws in others' ideas
Getting locked into one approach

Developer in action

Thomas Edison was not actually the first to invent the light bulb, but he routinely gets the credit. That's because Edison did all the testing and retesting necessary to discover the materials for making the optimal light bulb. Then he purchased all the patents related to its development. Edison and his team tested literally thousands of different materials to find the ones that would burn brightest and longest. In fact one story goes that after 1,000 attempts to discover the perfect light bulb, Edison was asked, "What does it feel like to be a failure so late in your career?" And Edison replied, "Young man, you know little of how the world works. Where you see failure after 1,000 trials, I see that we're that much closer to a solution."

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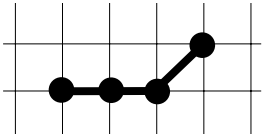
Implementer

Implementers are...



Persistent Decisive

Determined Assertive

Action-oriented

Give Implementers...

The sense that others are moving just as quickly

Control

Timely responses to their ideas

Implementers annoy others by...

Being too pushy

Readily expressing their frustration when others do not move as quickly

Overselling their ideas

Implementer in action

Alexander the Great, who brought nearly the entire known world under his rule before he died at age 32, may have been among history's greatest implementers. Like every other global aspirant in the 4th century BC, he knew the prophecy of the Gordion knot—that the person who could untangle it was fated to conquer the world. When one of his conquests actually brought him face to face with the cryptic knot, Alexander simply hefted his sword and cut it in two. You can almost imagine him looking up and saying, "Can we get on with the business of conquering the world now?"

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Creating with others

FourSight has given you a look at your own strengths and potential pitfalls as a creative thinker. Now consider how you might collaborate more effectively with others. Then answer the questions on the following page to devise your individual plan.

Remember, when working with other preferences:

Give Clarifiers...

- Order
- The facts
- An understanding of history
- Access to information
- Permission to ask questions

Give Ideators...

- Room to be playful
- Constant stimulation
- Variety and change
- The big picture

Give Developers...

- Time to consider the options
- Time to evaluate
- Time to develop ideas

Give Implementers...

- The sense that others are moving just as quickly
- Control
- Timely responses to their ideas

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Devise your individual plan

1	Who are the people you work with? What are their preferences?
2	Who do you find it easiest to collaborate with? Who do you find it most difficult to collaborate with? What factors are operating there?
3	What steps might you take to shore up your weakest preferences to become a more creative thinker? How might you better exploit your strongest preferences?
4	What do you need to keep in mind to make it easier for others to collaborate with you?
5	Who would be good to collaborate with on a project that called on your strengths? Who would be good to collaborate with on a project that leaned on your weak points?
6	With whom do you find it easiest to share your ideas? With whom do you have difficulty communicating? What strategies can you use to overcome that?
7	What do you need to keep in mind when managing others?
8	What are the preferences of the people you admire? What can you learn from them?

To learn more about creativity and FourSight, visit: foursightonline.com

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