Dr. Art Markman

How expert Generalist can think of problems differently with analogies

Speakers:

Nick Skillicorn – Innovation and Creativity Expert and Host of Innovation & Creativity Summit

Dr. Art Markman

Expert Interview transcript:

Nick Skillicorn: Hello, everyone. We've got another amazing interview expert with us today on the Innovation & Creativity Summit 2017. A real border between arts and academia, we've got Dr. Art Markman from the University of Texas and he is the author of *Smart Thinking* and *Brain Briefs* and a whole other collection of psychology insights into how creativity works.

Dr. Markman, lovely to have you here.

Dr. Art Markman: Oh Nick, thanks so much. Great to be talking to you.

Nick Skillicorn: So for people who don't know who you are, can you give them a brief background into what you do at your university and how you got into understanding creativity?

Dr. Art Markman: Sure. I'm a cognitive psychologist by training. I have spent 25 years studying the way the mind works broadly. I've written about 150 papers that are read by 30 of my closest colleagues on topics like reasoning, decision-making, motivation, all of which relate to creativity.

I've studied how people form and use analogies. And I've done this both in the basic research context as well as in thinking about applications. So I've worked with people in mechanical engineering to study idea generation techniques.

And then I try to bring all of these to broader audiences on a regular basis. So, I blog for Psychology Today, Fast Company Inc., Harvard Business Review. I have a podcast and radio show called Two Guys on Your Head which is sort of like car talk but for the mind.

And I run a program here at UT called The Human Dimensions of Organizations. So we try to take people in business, government, non-profits, and the military to teach them about people. And among the things that are foremost in understanding people is really how innovation works from the generation of ideas all the way through the execution of those ideas.

Nick Skillicorn: And let's stop there. Obviously, you're in the summit because you've got some very unique insights into how creativity works. And one of the things you mentioned just now is about analogies. What do you mean by analogies and how do they fit into your view of creativity?

Dr. Art Markman: Yeah. So, the thing about most of our lives is that we live in a world of what we could call literal similarity. So if you're driving your car, you're thinking about roads. And if you are a doctor, you're thinking about medicine. And if you are an engineer, you're thinking about the engineering task in front of you.

But when you're really trying to do something creative, often what that means is that the boundaries of what's known inside your discipline are not really working for you anymore. The knowledge that you have is not allowing you to go beyond what has been done before.

And one of the most profound ways of going beyond what has been done before is drawing knowledge from one area of your expertise to another. And so, the most creative people aren't just expert in a particular area. They're what I call the Expert Generalists. They know perhaps a tremendous amount about a particular area but they also have wide expertise. And what they end up doing is drawing knowledge from a completely different area to give them insights into what they're working on.

So, I mean one of the examples of creativity and innovation that's often used is James Dyson and his vacuum. If you ask how did Dyson figure out that you could get rid of a bag in a vacuum, well, what he really did was to ask a different question which is, what is the essence of a vacuum cleaner?

The essence of a vacuum cleaner is it takes in a combination of dirt and air and it has to separate the dirt from the air, the bag does that by filtration. But by asking what is this essence and thinking of it in terms of separation of dirt and air, he was then led to think about something completely different, which is the sawmill. And in sawmills, you also have to suck sawdust out of the air.

But generally speaking, you don't then separate the dirt from the air or the sawdust from the air by filtration. You do it instead with a device called an industrial cyclone, which the air comes in, it swirls around and then the sawdust gets thrown to the side and runs down into a hopper.

And so, his insight was you could take that solution that's used on a grand scale in sawmills and put it down into a very small solution in a home vacuum cleaner.

And then another piece of the story of course that's often missing is he then spent five years working on prototypes before he had one that worked. And I think both of those components are actually quite important for real innovation.

Nick Skillicorn: And how does that fit into how your mind actually thinks through ideas when it comes to analogies? Why is it something that a lot of people struggle with?

Dr. Art Markman: Yeah. So the fascinating thing about analogies is let's take a step back and recognize that that creativity is not bringing to bear some unknown cognitive process that nobody is any good at except for the really creative people. The most creative people are actually thinking exactly the same way as everybody else. They have two things that are different.

The first is they know a lot. It turns out, you can't draw analogies and you can't be creative unless you have a very broad base of knowledge. So it isn't about playing brain games and maximizing working memory capacity or anything like that. It's actually about good old fashion learning things and really understanding the way the world works.

After you've done that though, the problem is, the brain really is wired for this world of literal similarity. So the information that's most likely to come to mind is the information that seems most relevant to the context you're in. So when you get stuck and are trying to do something creative, the problem is that the world as it is, is not helping you to retrieve information from memory that's going to help you to solve the problem.

And it turns out, the only thing you can do to bring other information to mind is to frame the question in a different way because when you ask the question in a different way, that is when you bring different information to mind. That is, you don't think differently. You think about different things.

And the way to do that is to develop strategies for redescribing the problem. So when I mentioned that what the really the fundamental thing that Dyson did was to ask the question, what is the essence of a vacuum. What he was doing was not thinking about bags, which is what most people would do when they're thinking about vacuums. He asked – he really framed it as the separation of the dirt from the air, which doesn't mention a specific solution. And now, your mind is free to be reminded of other things you might know about that help you to separate things out.

And so that means that in order to be maximally creative, you want to have great knowledge and then you want to have strategies for finding essences of problems you're trying to solve. And the people who are most creative have developed skills on both of those ends of the problem.

Nick Skillicorn: I like this concept of expert generalists. And in other companies, they might be referred to as T-shaped people because they've got very deep understanding of one subject but then they've also got an interest and curiosity about a much wider range of things. Yeah, go ahead.

Dr. Art Markman: Yeah. I just want to jump in because the funny thing is, so I studied expert generalists for Procter & Gamble a while back. They have some serial innovators who work for them that belong to what's called the Victor Mills Society, named after a great serial innovator who worked for many years at Procter & Gamble.

And the interest thing about the people who have that designation, they are all expert generalists. They all like to think about things.

The interesting thing about all of them is they tend to be moderate to low in a personality characteristic called conscientiousness. Conscientiousness is the stuff that forces you to finish a task you've started.

Now, the reason why they are moderate to low in conscientiousness is because they tend to go down rabbit holes to read up on other things and talk to other people that aren't strictly speaking what they're supposed to be doing right now.

And the reason that I mentioned this is because almost all of them said, "I succeeded at this company despite the system not because of it." And that's because in many large organizations, you actually reward the conscientious people, the people …

Nick Skillicorn: The people who do what they are meant to be doing.

Dr. Art Markman: That's right. And so, you have to actually nurture a certain number of your conscientious people who are the ones who are very high in another characteristic called need for cognitions. They love to think about stuff and they are very open to new ideas. Those people are accumulating vast stores of knowledge that are going to be incredibly useful later in their careers. And if you ding them for not finishing every single task you gave them, you end up losing some of the people who are going to be your greatest innovators later.

Nick Skillicorn: It really fits into something. I wrote an article a couple of years ago about how human resources can improve innovation in companies. And one of the main ways that relates to what you're talking about is this concept of how you review performance by individuals. And I think you just mentioned some people are going to be trying out new things and not finishing tasks. And from an HR perspective, that's a big, big red flag.

Dr. Art Markman: Yeah, that's absolutely right. And of course, as you know, HR gets in the way of innovation in all sorts of ways. Of course, the other thing is even when you've given someone the task of innovating, unlike loading a program on your computer where you have a progress bar that moves up steadily and you know where you are, innovation doesn't really progress like that.

For long periods of time as I like to say, it's hard to tell the difference between someone who has worked in the innovation process and someone who has just loafing. From an output

standpoint, only the person who is working that process eventually has a great breakthrough whereas everybody else doesn't ever have one.

And so, you have to really look at what people are doing and not what they're outcome was because for long periods of time, they're going to look like they're wandering in the desert and only later will you discover that they actually came up with something that was really valuable.

Nick Skillicorn: Have you got any tips for companies on how you can encourage that and to a degree, measure it so that you can see whether or not outputs are happening even if there are failed experiments or whatever compared to people who are just loafing around doing nothing?

Dr. Art Markman: Yeah. I think there are several things you can do. So, one of them is you can monitor what people are learning, right? I mean what are they actually reading about? You can encourage those people who are building up that knowledge base and trying things to teach that to other people in the company where now, you have a product that gave these three very well-received launch and learns over the course of the quarter and now, you've got a tangible thing you can put a marker on but it's related to maximizing that quality of knowledge.

And people should be talking about what it is that they've tried and the solution to problems. That if they – that they may have worked out a particular solution and then discovered it didn't quite worked, well you know, write that out at least in some detail so that you recognize they were doing something even though the thing that they did turn into a blind out.

Nick Skillicorn: So you talked about expert generalists but these are – not everyone in the world is an expert generalist or has this – is it compassion recognition that you talked about, the lower levels?

Dr. Art Markman: Sorry. Say that again?

Nick Skillicorn: The personality trait that they possess.

Dr. Art Markman: Oh, they have a need for cognition.

Nick Skillicorn: Need for cognition, yeah.

Dr. Art Markman: So they need to think about stuff.

Nick Skillicorn: If not everyone in the company is going to have that set of traits, then are you suggesting that certain people are treated differently than other people when it comes to innovation? And I don't know, like companies like Google, they give everyone 20% of their

time to innovate. Other companies have a set number of people in the research and development team and it's their job to innovate. What's your view on that sort of distinction?

Dr. Art Markman: So I think that innovation should be distributed broadly in organizations. But expert generalists, when you find them, are really great catalysts for innovation. So they themselves actually may not always be the one who comes up with the great idea. Sometimes what they do is to help to translate between two different groups of people that they've recognized are basically working on a similar problem even though it looks different on the surface.

And so, part of what you want to do with your expert generalists is to set them free to just have conversations with people from different groups so that they could say, "Oh, wait a second. Actually, I think I know someone else who you should be talking to." And then the three people get in the room and the expert generalist translates between them. So, I think that the expert generalist isn't going to know everything about everything.

The other thing that's really important is that everyone should be working to maximize the quality of whatever knowledge they've got. One of the things I talk about in *Smart Thinking* is there are all these studies that have been done first by a guy named, Frank Keil at Yale on something called *The Illusion of Explanatory Depth*, which is this idea that we think we understand the world better than we actually understand the world.

So we have systematic gaps in our ability to explain what's happening. Now, those gaps are a problem because you can't solve a new problem in a new way unless you understand how the system works. And if you have gaps in that knowledge then you have gaps that are limiting your creativity.

What expert generalists are good at is explaining things back to themselves as they learn them so that they make sure they really understand the knowledge. And everyone can develop a habit to try to explain something back to themselves.

So for example, after somebody watches this video, they should assume that they understand everything we talked about. They should understand – they should assume we understand it. So after watching it, they should actually try to repeat the main points back to themselves because if they can't do that then the knowledge isn't really there.

And that process of explaining things to yourself is actually critical for any kind of learning and it's something we tend not to do often enough.

Nick Skillicorn: Let's take the conversation to the next step then. So we've talked about creativity at an individual level and the different types of people there are. Let's take it into creativity within a company, and usually that doesn't happen at an individual level. It's more like a group level, brainstorming sessions, open plan offices, all of those things.

What does your research taught you about how you can improve that ability to generate breakthrough new ideas?

Dr. Art Markman: Yeah. So, an observation that goes back to the 1960s of course is that when you get groups together and you just say, "Hey, let's start throwing out ideas using essentially a version of the original rules of brainstorming that Alex Osborn formulated in the 1950s ." What you discover is that groups suffer what's called productivity loss. Meaning, they come up with fewer ideas and fewer good ideas than the individuals would have come up with working alone.

Now, the work that we've done points out that the reason for this is because groups when they get together tend to converge in their thinking. As soon as somebody in the group says something, it infects the memory of everyone else and it starts to narrow the range of possibilities they consider. So that by the time two or three people have thrown in idea out, the entire group is thinking about the problem in exactly the same way.

What we know is that individuals when they work alone diverge in their thinking. And groups when they are working together converge.

And so, group leaders who are trying to make a group more creative need to manage that. Whenever they want the group to vary in what they're thinking, they need those people to work alone. And whenever they want the group to converge on a particular solution of a couple of potential great avenues, then they want them to work together.

And so, we've done research on a variety of techniques that really help you to do that. For example, you get a group of people together and you have each of them generate at least three ideas written, given anonymously to the group member, and then they get passed into the group leader. Now, you pass those ideas around one at a time to everybody and have them build on those ideas again working alone so that they're still diverging.

And now, after you've had a chance for everyone to build on all of the ideas, now you get everyone together for a discussion and they begin to converge on what are some of the best ideas that might be possible to merge elements of some of the things that they've seem. What that does is actually to lead groups to come up with more ideas and more good ideas than they would have come up with had they all just worked alone.

Nick Skillicorn: It's a fascinating concept which it's not really talked about in a lot of the brainstorming research out there. But it reminds me of a game that my brother and I used to play, and it's a version of the challenge, Don't Think of a Polar Bear.

Dr. Art Markman: Right.

Nick Skillicorn: And the second you hear that, what's the first thing that comes into your mind? Obviously, it's the image of a polar bear. And I just – I've been in many, many

brainstorming sessions myself and as you say, once one person starts talking about something, it's more or less impossible to hold two trains of thought to listen to one person and to still be able to have your own version of ideas in your own head.

Dr. Art Markman: That's right. That's right. And this serves the human species really well in lots of ways. It creates consensus and allows groups to cooperate. But it's really bad for idea generation.

And so, what we need to do is to be better at managing that process. And you can do it. Again, if you just remember that individuals diverge, groups converge. You can actually play this game several times. Imagine you have a group that you're getting together for several days to work on a problem together. You can actually have them diverge on their beliefs about the problem statement for a while because a lot of times, groups actually disagree on exactly what they mean by the problem they're trying to solve.

And that problem statement is crucial in the end because that's the thing that serves as a cue into memory. What you're going to pull out of memory depends on what problem you've stated. So let the group diverge on that. Get them together and have them discuss and converge on here's the way we want to frame the problem. Now, send everybody away again to develop ideas about how to solve that problem. Go through this process of building on those ideas and then come back and converge.

So every time that you need divergence, let everybody take a walk around for a while and clear their heads and then start generating some ideas individually.

Nick Skillicorn: Now, you and I had a quick chat before we started this session. And one of the things that I found really interesting is your research and your views into the link between creativity and productivity.

Dr. Art Markman: Yes.

Nick Skillicorn: And it's a scary topic for some people to talk about but why don't you tell us about what you found?

Dr. Art Markman: Yeah. So – and this really comes up of a lot of the work that I do with the program and The Human Dimensions of Organizations that I run. One of the things about being creative is that it is inherently something in which you spend time wandering in the desert on. And there's a reason why Google for example talks about its 20% time. Again, we can leave aside whether Google actually implements 20% time as 20% of the actual work time that they've allocated for people.

But the reason that they're doing that 20% time is to give people this opportunity to work on things that are above and beyond the billable hours. The problem is, that if you are really going to do this right, one of the things you have to do is actually to over hire. You have to – I

mean in order for every employee to have 20% of their time doing something else, you need to have 20% more employees than you would strictly speaking need just to complete the tasks that are in front of you today.

So, the organization has to be somewhat inefficiently organized if you're going to be innovative at the organizational level. And of course, most of our management structures, HR, Management Reviews, are actually focused on efficiency because if you think about where our management structures came from, they largely came from situations in which you were trying to maximize the capacity of a factory.

It turns out, what you need to do to maximize the capacity of a factory is actually often diametrically opposed from what you need to do to maximize the creativity of the people who are working in a knowledge setting.

Nick Skillicorn: Yeah. Management in many cases and in many cases what's taught at MBA level, it's all about removing the risks, removing the inefficiencies at getting everything as you said, as a well-oiled machine that runs like clockwork. And those are machines that do the same thing over and over and over again. And that is unfortunately the opposite of what innovation requires.

Dr. Art Markman: That's right. And of course, we spend a lot of time punishing failure in organizations, which the funny thing is, that's even a bad idea when you're trying to be repeatable and reliable on what you're doing. You should never punish mistakes.

The FAA, the Federal Aviation Administration, has succeeded in keeping the absolute number of aircraft fatalities flat over the last 50 years despite an exponential increase in the number of people traveling. And the way they've done that is actually by embracing mistakes.

If you are a pilot or anyone actually who works in the aviation industry and you make a mistake, if you report that error within 24 hours, by law in the United States, that report cannot affect your employment history. And you might think, "Well, that's horrible. Why would you do that? We want everyone to minimize the number of mistakes they make."

But the thing is that in any situation, whether it's innovation or doing something that has to be repeated, absolute failure, catastrophe, is usually the result of a cascade of errors, not the result of a single error. And so what they do is actually embrace the individual errors that people are making. They catalogue them. They look for patterns. And then they use those patterns to try to correct procedures and even cockpit designs to make sure that those errors don't happen again.

And so, even organizations that are trying to be repeatable and reliable should embrace errors. And then that goes doubly so for organizations that actually want to be innovative.

Nick Skillicorn: Art, it has been fantastic speaking with you. One thing I like ask all of the experts is for the listener and viewers out there, have you got one tip, one actionable insight that people can try out to either this afternoon or this week to become better at generating ideas?

Dr. Art Markman: Sure. So I think that that one thing that you can practice is to find essences of problems. And here's how you're going to do it. You're going to start by recognizing that everything in the world is sort of like proverb. Proverbs are these beautiful statements of cultural wisdom. So, the noise of the wheels doesn't measure the load in the wagon.

Now, on the surface, that's about wheels and wagons. And if I just said, "Does that remind you of any other proverbs?" You might say, "The squeaky wheel gets the grease," which doesn't actually mean the same thing.

But there's an essence to every proverb. So the essence of, "The noise of the wheels doesn't measure the load in the wagon," is that the surface properties of something are not a good reflection of its inner essence.

When you say it that way, you might realize you do know other proverbs that also mean the same thing like, "You can't judge a book by its cover."

So here' the actionable thing you can do today. Go to Google or your favorite search engine. Look up list of proverbs. And for reasons I don't understand, people have helpfully put lists of proverbs up on the internet and titled them List of Proverbs.

Now, bookmark that page. And whenever you find yourself sitting at your desk doing what I affectionately call "fake work" I want you to go back to that page and take five of the proverbs and give them their definitions and look for the essence of the proverb. And do that starting today every day for a week or two.

What you will discover is that that practice of looking beyond the surface of proverbs will start to infect your daily thinking. You'll start looking beyond the surface of everyday problems as well and asking what is the essence of this problem. And as you begin to find those essences, you'll discover that you start being reminded of other stuff you know about that will help you to give you leverage on a creative problem that you're struggling with.

Nick Skillicorn: Dr. Markman, it has been wonderful speaking with you. If people want to find out more, we're going to have links to all of your sites on the screen, where are those links going to take them?

Dr. Art Markman: Sure. So, you can find out more about a lot of the books I've written and some of the blogs that I do from SmartThinkingBook.com. That's a great place. If you want to find out more about The Human Dimensions of Organizations program, you can go to

HDO.utexas.edu. And of course, you can find out what I'm working on these days on Twitter, LinkedIn, Facebook, even Pinterest, for crying out loud.

Nick Skillicorn: Perfect. It has been wonderful having you and I look forward to speaking with you again soon.

Dr. Art Markman: Thanks so much, Nick. It has been a pleasure.

To find out how Nick Skillicorn can help you build your innovation and creativity capabilities, go to
www.improvides.com