

CHAPTER NINETEEN

CREATIVITY IN ORGANIZATIONS: COGNITION, LEADERSHIP, AND MULTILEVEL ISSUES – THE WORK OF MICHAEL D. MUMFORD

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Biography

After growing up near West Chester, Pennsylvania in Brandywine Hills, Mike Mumford earned his Bachelor's degree from Bucknell University in 1979 before advancing to earn his Ph.D. in Industrial and Organizational Psychology from the University of Georgia in 1983. He began his career at Advanced Research Resources Organization, and then joined the faculty at Georgia Institute of Technology in 1985, before moving to George Mason University (GMU) in 1989. He was granted tenure and promoted to Associate Professor, and was at GMU until 1994, when he joined American Institutes for Research (AIR). During his time at AIR he worked on a number of projects including O*NET. He joined the faculty in the psychology department at the University of Oklahoma in 1999 where he currently holds the George Lynn Cross Distinguished Research Professorship. Throughout his career, Mike (or Mumford as his students fondly refer to him), has published over 300 articles on creativity, leadership, ethical decision making, and planning. The overwhelming majority of these articles are with student coauthors, indicating his penchant for mentoring and development of emerging scholars. His h-index is 102, and his i10-index is 333. His work has been cited 44,416 times to date, and over half of those citations have occurred in the past five years. He served as Editor of *The Leadership Quarterly* from 2005-2010 and currently serves as the Editor of *The Creativity Research Journal*. Mumford is a fellow of the American Psychological Association (Divisions 3, 5, 10, and 14), the American Psychological Society, and the Society for Industrial and Organizational Psychology. In 2002, he received the Society for Industrial and Organizational Psychologies' Myers Applied Research Award. Mumford has received more than \$20 million in research funding from government and corporate sponsors, such as the Department of Defense, the Department of State, the Department of Labor, the National Institutes of Health, the Office of Naval Research, General Electric, Home Depot, and Duracell. He serves on the Corporate Advisory Boards of ePredix, Previsor, and Skills-NET. Mumford also serves on Fellowship committees of major scientific organizations in the field of psychology.

On a personal note, Mumford married Mary Shane Connelly in June of 1994, another high impact industrial and organizational psychologist who studies leadership, emotions, and the spread of terrorist propaganda. They have two children Quin, who is at Pitzer College, and Kennis, who will be a high school junior in Norman, Oklahoma. The family makes time to play with their English Setters, and they vacation where fly fishing is the best such as Vermont, Colorado, Pennsylvania, Washington State, and, of course, Oklahoma.

Cognitive Processes of Creativity

Mumford's early work on creativity has focused primarily on the cognitive processes that facilitate creative production. In 1991 he published an influential paper in *Creativity Research Journal* (Mumford et al., 1991), where he integrated the existing literature on creative cognitive processes and expanded one these models to develop a unified framework (e.g., Basadur, 1995; Dewey, 1910; Guilford, 1967; Newell & Simon, 1972). This unified framework included multiple creative processes and went beyond just idea generation, which has been the focus of his research.

Problem Construction

Prior to his work on problem construction, the work in this area was limited (Getzels & Csikzenmihalyi, 1975; Okuda, Runco, & Berger, 1991). While the creative process model (Mumford et al., 1991) suggested that problem construction was a critical aspect of creativity, additional work was necessary. The first step was to develop a separate process model of problem construction (Mumford et al., 1994). The problem construction model provides a nuanced understanding of how individuals identify and define ill-defined problems that facilitate creative thought. Problem construction starts with attention to external cues that signal to the individual that a problem exists and must be solved. Attention and perception of environmental cues trigger problem representations, which are knowledge structures based on past problem-solving efforts and include four types of information (a) the goals and outcomes associated with the problem-solving effort, (b) information required to define and solve the problem, (c) procedures and operations performed on the information in order to solve the problem, and (d) constraints and restrictions on the problem solving effort (Holyoak, 1984). Elements from problem representations are then selected and recombined in new ways that leads to a novel way of viewing the problem.

Early work by Mumford on problem construction has focused on determining the effect of problem construction on creativity through active engagement (Redmond et al., 1993; Reiter-Palmon et al., 1997), and personality characteristics related to effective problem construction (Mumford et al., 1993; Reiter-Palmon et al., 1998). In addition, elements of the problem construction were tested. Specifically, the role of cues in problem construction creativity (Reiter-Palmon et al., 1997) and the effect of selecting specific elements from the problem representation (Mumford et al., 1996). The findings provided initial support for the model by suggesting that inconsistent cues

lead to increased creativity, likely as a result of eliciting multiple and divergent problem representations. Further, the selection of high quality and high originality elements, specifically constraints, was critical for creative problem solving. More recently, Mumford has focused on the role of constraints in creative problem solving (Medeiros et al., 2014; 2018).

Importance of Problem Construction. While previous models of creative problem solving have all acknowledged the importance of this process, empirical work in this area was limited. Since the publication of the Mumford et al. (1991) process model, research focusing on problem construction has grown significantly. A recent meta-analysis (Abdulla et al., 2020) indicates the problem construction is a good predictor of creative performance across a variety of measures. Similarly, Ma (2009) identified problem construction as one of the best predictors of creativity. The increase in empirical research on problem construction is directly tied to Mumford's interest and theoretical and empirical work, which then revived interest in this process. Current work has focused on the conditions that make problem construction more effective and will lead to greater creativity (Vernon & Hocking, 2014, 2016), team problem construction (Reiter-Palmon & Murugavel, 2018), and problem construction within specific domains such as science or music (Barbot & Lubart, 2012; Hu et al., 2010).

Idea Evaluation

Similar to the work on problem construction, the importance of idea evaluation and understanding of the process was limited. Creative process models included idea evaluation, but empirical work was focused on idea generation. Mumford, Lonergan, and Scott (2002) proposed that idea evaluation and selection include three major activities: forecasting possible consequences and outcomes of selecting and implementing an idea, judging how well the characteristics of an idea fit with specific standards and criteria, and choosing, revising, or rejecting the idea as a solution. The idea evaluation and selection process is typically viewed as more convergent, but also includes divergent elements, due to the need to forecast and planning (see next section). The idea evaluation and selection process is considered part of the late cycle processes associated with creativity, which allow the transition for creativity to innovation. This process is critical for organizations, as many ideas can be generated but only a few can actually be implemented, making the idea evaluation and selection important (Sharma, 1999).

One important issue that Mumford has focused on is how people evaluate creative ideas and the errors they make when doing so. Blair and Mumford (2007) found that individuals are more likely to reject creative ideas as they are perceived as riskier, and that ideas that conform to social norms are more likely to be chosen. This finding has been replicated and extended (Benedek et al., 2016; Berg, 2016). Another error identified is that individuals underestimate the originality of the creative idea (Licuanan et al., 2007) or the resources required for implementation (Dailey & Mumford, 2006). These studies indicate that one important difficulty with creativity is the reluctance of individuals to choose those ideas for implementation. If organizations want to have creative products or solutions, it is therefore important to identify

how individuals can be encouraged to choose creative ideas instead of avoiding them. Thus, it is not surprising that a significant amount of work by Mumford has focused on understanding how we can encourage choosing creative ideas. For example, individuals are more likely to select creative ideas if they are instructed to choose creative ideas (Lonergan et al., 2004).

Importance of Idea Evaluation. As indicated, idea evaluation and idea selection have important implications for organizations, as most ideas never get past this stage and to the implementation stage. Accurately predicting which ideas will be creative and beneficial for the organization is critical for organizational survival and success. However, this process has been neglected relative to the significant amount of research focusing on idea generation. The work by Mumford has indicated that attention to this process is critical.

Planning (implementation planning)

As creativity research made headway in the late 1990's and early 2000's on expanding and understanding the creative processes supporting idea generation, Mumford began to consider a more complex and rich perspective of creativity, one that went beyond generative processes alone. In particular, he began work on the study of planning and establishing operations to *implement* those ideas that had been generated.

There are a number of definitions for planning as a process (e.g., Read, 1987; Hayes-Roth & Hayes-Roth, 1979; Simons & Galotti, 1992) but Mumford identified a series of themes common to the range of approaches. One theme that was consistent across operationalizations was that planning was a largely cognitive act of mental simulation whereby goals are considered and refined to minimize competition among those goals. Ultimately, he defined planning as "the active, conscious construction or mental simulation of future action sequences intended to direct action and optimize the attainment of certain outcomes" (Mumford, Shultz, & Van Doorn, 2001, p. 214).

Mumford also introduced a planning process model that provides a detailed description of the activities comprising planning. The process is theorized to begin with scanning, moving to monitoring models, leading to gathering information and then the activation of broader or global mental models. With these mental models triggered, an individual's cases are activated and analyzed, leading to the formation of a more specific or localized mental model. This is where the mental simulation largely begins with forecasting of ideas and how they may play out, including evaluating those forecasts. Specific actions are considered and sequenced ultimately resulting in a plan that is remembered and stored for future utilization. These basic steps are also influenced by monitoring activities, the development of alternatives and back-up plans and consideration of key causes and drivers at each stage. The model is rich and detailed, providing scholars with a peek inside the "black box" of planning. Mumford has been adept at a number of scholarly activities, with making the implicit or mysterious explicit and known.

Despite such detailed model development, on the surface the very notion of planning and *creativity* as partner activities may seem contradictory (Hunter, Gutworth, Crayne, & Jayne, 2015). Indeed, planning evokes images

of structure and rigidity while creativity conjures up notions that are dynamic, organic, and spontaneous. This conceptual tension, however, reconciled with a careful consideration of how planning is defined. As outlined above, planning is a cognitive simulation and as such, is an essential partner to more generative processes. More specifically, generated ideas can be simulated to explore potential flaws that allow for revision and refinement in the generative process (Osburn & Mumford, 2006). Planning also allows for contingencies or “back-up plans” to be made, further expanding idea generation opportunities that may result novel solutions. That is, planning is a form of idea generation where possible routes to implementation are considered and, in that process, novel approaches to implementation may be identified. Thus planning, although seemingly a rigid activity, is actually quite fluid, dynamic, and organic. As such, planning is a critical partner to creative idea generation.

Why planning was important to the study of creativity: Linkages to innovation. Implicit in the exploration of planning as both a more general activity critical to all types of performance (Mumford, Shultz, & Van Doorn, 2001) as well as creative performance specifically (Osburn & Mumford, 2006; Mumford, Mecca, & Watts, 2015) is that planning represents a key process linking early-stage activities and late-stage activities in performance. Specific to creativity, planning is a core component of innovation or the implementation of creative ideas.

To understand how impactful Mumford’s work on planning was, and continues to be, it is important to bear in mind that most work on creativity has largely focused on earlier stage generative processes. Topics such as divergent thinking, brainstorming, and individual difference predictors of creativity have all focused on identifying who and under what conditions novel and useful ideas are generated. Mumford’s work was critical and impactful in how it moved the focus from idea generation to idea implementation. His work on planning was an essential bridge in developing a more applied focus in the field of creativity. Such effort may seem intuitive now but was quite groundbreaking in the early days of his work.

Leadership and Creativity

As Mumford expanded our scientific understanding of the essential processes of creative problem solving, he also expanded our understanding of *who* needs to be creative. In a time when a large majority of creative scholarship remained focused on creativity in the arts, sciences, and technology, Mumford began arguing for the need for business and organizational leaders to demonstrate and develop their creative problem-solving capabilities (e.g., Mumford et al., 2000). This mental model for how leaders think was shaped in Mumford’s late teens, when through a family friend, he was allowed to read some of the private letters and writing of Benjamin Franklin. Reading hundreds of pages of Franklin’s thinking--from creating the first library to establishing a diverse team of elites to influence social change--established Mumford’s early views that to be create enduring social structures, creative problem solving was a necessary (but perhaps not sufficient, as his later work on planning and decision making would show) component of leadership.

Almost twenty years after he read these primary, archival documents of Franklin's thinking, he published a seminal work analyzing them, "Social innovation: ten cases from Benjamin Franklin," in *The Creativity Research Journal* (Mumford, 2002). During this period, which coincided with the leadership field conflating interpersonal appeal with leadership, Mumford quietly advanced the literature on the equifinality of leadership as he published "The leadership of pragmatism: reconsidering Franklin in the age of charisma," in *The Leadership Quarterly Journal* (Mumford & Van Doorn, 2001). However, his work on leader cognition began ten years prior as he conceptually combined literature on creative problem solving and leadership.

As early as 1991, Mumford argued that organizational leaders face a range of complex, ill-defined problems that require creative solutions, necessitating creative thinking for effective leadership (Mumford & Connelly, 1991). Mumford summarized leader creative problem solving in his 2017 paper on the nine critical cognitive skills for leaders – highlighting the key role of creative problem solving (Mumford, Todd, Higgs, & McIntosh, 2017), advancing the notion that leadership is not solely what leaders say and do, but also what they think about. Perhaps his most significant impact, however, lies with this emphasis on the role of leader cognition in creative efforts. Known for his contributions to the leadership cognition literature more broadly, he characteristically underscored the need to understand creativity, and the leadership of creativity, through a cognitive framework (Mumford et al., 2009). It is through this lens that we emphasized the importance of leader expertise and sensemaking capabilities. Given the complexity and ill-defined nature of creativity, he argued that leaders must be experts in both the domain of exploration, as well as creative problem solving.

Further, he highlighted the impactful role of sensemaking in forming a coherent problem definition that could guide the problem-solving effort (Mumford et al., 2002). In 2009, he addressed the question, *what do leaders of creative efforts think about?*, presenting a complex model of cognitive processes (Mumford et al., 2007; Byrne et al., 2009). He summarized these cognitive activities in 3 key categories: 1) defining problems, 2) structuring creative problem solving, and 3) managing idea development. Since his initial read of Ben Franklin's decision making and planning, the view that leader creative problem solving is an essential part of performance has gained significant traction, with his publications on leader cognition specifically cited over 15,000 times. This literature endures as leader scholars advance the work on the cognitive processes that underlie leader strategic decision making, planning, and ultimately, organizational performance (Reiter-Palmon and Illies, 2004; Hunter and Cushenbery, 2011; Lovelace & Hunter, 2013; Fairchild & Hunter, 2014; Watts, Steele, and Mumford, 2019).

While expanding the reach of creative problem solving to leadership more generally, Mumford also dug deeper into how leaders *facilitate* creativity of others. A pioneer in this line of work, Mumford has systematically investigated and revealed the leadership necessities for successful creative efforts. Mumford broadened the discussion of creative leadership from one simply about what we can see leaders *do*, to a conversation about both the observable factors of creative leadership *and* the unseen cognitive processes required for effective creative leadership. It was through this broader perspec-

tive that he wove a complex yet elegant tapestry of leader behaviors, skills, and cognitive processes required for successful creative efforts.

In his now groundbreaking work on the subject of creative leadership behaviors that facilitate employee creativity, Redmond, Mumford, and Teach (1993) identified leader activities that led to decades of research on each: problem construction, information gathering, concept selection, conceptual combination, idea generation, idea evaluation, implementation planning and solution monitoring. In 2002, he extended this model with one of his most highly cited publications, “Leading creative people: orchestrating expertise and relationships,” which was nominated for Best Paper in *The Leadership Quarterly* (Mumford, Scott, Gaddis, and Strange, 2002). This paper described the job responsibilities of such leaders as, 1) leading the work, 2) leading the people, and 3) managing the organization. For example, not only did Mumford define behaviors such as those involved with project selection to ensure the work was intellectually stimulating and allowed for autonomy, he also emphasized the role of the leader in *protecting* creative employees from organizational constraints, politics, and resource decisions. Mumford later went on to discuss the importance of interpersonal behaviors such as mission definition, support, structure, feedback, and outreach (Byrne et al., 2009). It is here where he places a large emphasis on the social skills demanded of leaders of creative efforts, arguing that leaders must possess the requisite social skills needed to build support for creative endeavors with organizational stakeholders, as well as the social discernment required to identify problems and evaluate potential solutions.

Multilevel efforts: Creativity & Innovation

As research efforts were made to understand how creative ideas were generated and what caused individual ideas to be generated, Mumford took a more expansive approach. In particular, he integrated growing interest in multilevel phenomenon with the study of creativity. As a start to this process, he introduced a comprehensive chapter on multilevel influences of creativity (Mumford & Hunter, 2005) that Sternberg (2005) referred to as a “*tour de force* regarding the prickly subject of creativity in organizational settings” (p. 93). In the chapter, Mumford outlined creative antecedents at the individual, group, organization, and environment levels of analysis. In providing this comprehensive review, something rather profound occurred. He recognized that what predicts creative performance at one level of analysis would often conflict with that predicted creativity at another level of analysis. Consider, as an example, individual differences associated with creativity that are often a bit prickly and not particularly social (e.g., competitiveness, domineering styles). These trends contrasted with predictors at the group level (e.g., cohesion) indicated that organizations pursuing creative efforts will experience tension across levels of analysis. This observation would only emerge when viewing creativity and innovation through a multilevel lens. In doing so, he opened up an area of research that continues to evolve and lead to new discoveries (e.g., Hunter, Thoroughgood, Meyer, & Ligon, 2011; Steele, Hardy, Day, Watts, & Mumford, 2021).

The multilevel approach to studying creativity has had a notable rippling effect in the study of creativity and innovation. More specifically, three general trends have emerged based on this work. First, as scholars think about the phenomena of creativity and innovation, they now include a more comprehensive lens in that process. Consider, as an example, recent work by To and colleagues (2015) who examined transformational leadership, affect and creativity. In their framing, the authors reference the comprehensive framework outlined by Mumford. Second, the notion of paradox and tension has emerged as a central theme in modern creativity research (Beghetto, 2019; Miron-Spektor, & Erez, 2017). Although a number of influences are at play here, Mumford's work on multilevel creativity and innovation are clear driving forces. Third and finally, the discovery of paradox using a multilevel lens was impactful and, as such, has led several researchers to apply a multilevel lens to similarly complex phenomena. Consider, as illustrations, Mumford's recent work on ethics education (Mumford, Steele, & Watts, 2015) and Hunter's work on leader error (Hunter, Tate, Dzielwczynski, & Bedell-Avers, 2011). On the whole, Mumford's work on multilevel issues in innovation have resulted in direct outcomes linked the study of creativity as well as more diffuse but nonetheless impactful, influences.

Conclusion

In this chapter we have tried to summarize a research career that spans 40 years and collaborations with numerous colleagues and students. Mike Mumford has made significant contributions to a number of areas of creativity in general and in I-O Psychology specifically. His work on creative cognition spans both basic research and applied work, while his work on leadership and creativity and multi-level issues is of particular significance to organizations due to its important implications.

An Interview with Dr. Michael D. Mumford

Roni: *What led to your interest in creativity? How did your research start?*

Mike: This is a long story, believe it or not. Where I grew up at the time I grew up was little North of Wilmington, Delaware. That's significant because of DuPont, 30-40 miles West of Philadelphia. So, a rather large number of artists and scientists lived in the area. It was a major arts colony and a major scientific colony because of DuPont. Having said that, we also had a lot of DuPont's in the area and we also had a lot of mushroom pickers and steelworkers, there was exposure to creative people regardless of where you went and it was respected. Particularly among the scientists and the creative and the artists. That's kind of a latent thing that kind of hovers in the background. I had no class in creativity and innovation in college. But when I walked into grad school, I had half a master's degree because of where I went to undergrad, which was Bucknell. So Bill Owens being Doc (AKA Bill Owens), decides, he's going to give me a large stack of articles that he knew I knew nothing about. This was intentionally designed to humble me, and it was very effective. And I recommend that as a teaching strategy, by the way. However, sitting in that pile of articles was an old study he had done looking at creativi-

ty amongst mechanical engineers and conceptual combination vis-a-vis machine parts, which produced very large relationships and was thoroughly ignored by everybody else in the world. But that article stuck in my mind. Then I'm in individual differences and Doc was going through divergent thinking, which aggravated me to no end, because I said I can offer a kid a lollipop and get lots of divergent answers, which Doc thought was a rude comment, but I meant it, which gave me an opinion, which was a contrast thing between his old study and divergent thinking. So that got me interested.

Then the next part of this was being at IBM. At IBM, I was developing tests to select computer techs and you got to bear in mind, this goes back a ways. IBM was going to pay for two years in college, at full salary for each computer tech. This is expensive and they get a big raise afterwards as they get in the program. So they're doing a systematic selection thing where the sponsor was the research and development vice president. My supervisor at headquarters tells me to go down and talk to the VP for R&D who is a really nice guy and really helpful. Meeting went great. He looks at me and says, look, anything you need, talk to Sandy. She's my administrative assistant. She will make sure no one harasses you and that you get everything you need. I go great, thanks. And I'm walking out the door and he goes, one thing there's Mike, I don't go to headquarters. My jaw dropped. And I say but you are R&D. He goes, I don't go to headquarters. I'm still young. If I was older, I just would've left. I go, why? And he goes, because there are too many suits there. I put my head down laughing. He goes, I appreciate your laughter. I walked out and left, but that stuck with me. The R&D VP really was trying to keep away from corporate headquarters. And he meant it. Later actually I saw him again. I asked him how he integrated with corporate headquarters and his comment was, the president comes here. I'm like, wow. I mean, he really does not want to talk to these people. From there, is still not doing much with creativity until I got to my generals. I had been reading on it, particularly career development and creativity because of background data. I had a question the gist of which is take a look at Lehman's findings on agent creativity, critique his findings, explain how they would influence the development of creativity theory. I wrote a bang up answer. I mean, it was the best answer I wrote in my generals questions. I mean, far and away. The generals go real well. And everybody gives me fives and everything, except Doc who gave me a four on that particular question. So I'm mad about this. Now I go and I go Doc, come on, man. That was my best answer. He goes "Yeah, it was". I go, well you gave me a four. He goes, well, you missed the bias. I go, what bias? So he spews the bias. I go, yeah, I missed it. All right. At this point I'm annoyed. I decided I would write up my general's answer as an article and submit it and see if it got published, which it did with basically no revisions.

At that point, I had a defined interest in creativity, but then I had to go off and work with Fleishman in DC, which was a different deal because that was doing a study for the air force, doing a study of leadership for the army, and then a revision of Sergeant major's Academy curriculum. Nothing really came with the officer development program at that point. And that particular project died. There was an inkling in my mind that creativity is clearly important to this because the other side is trying to out creative you. And if they out creative you, they will kill you, and therefore they have won. I know

that sounds simple, but that was way too non-traditional to bring up in an army meeting. Then when I went to Georgia Tech, Larry James asked me, Mumford, what are you going to study? And I, at this point, because of that one paper on conceptual combination, a memory of IBM, and the inklings from the army, I looked at James and I said, I'm studying creativity. Period. The first year at Georgia Tech was great. I mean, department ran smoothly, everything functioned pretty well. And I spent about nine months of that year in the library because Georgia Tech had everything that had ever been written on creativity at that time. If it had been written on creativity, it was in their library. And I read it all. Every, every piece of it. It's complicated. I do admit it is a complicated career history. Part of it is that mechanical article. And part of it is the generals. And then part of it is IBM, that IBM really kind of upset me. That was weird.

Roni: *Looking at your research history, it seems that you began your career by exploring monkey urine. Can you share more about how you found your way from monkey urine to creativity and how that influenced you as a researcher?*

Mike: For the purposes of this discussion, I have had many comments over the years about, about the monkey scent marking study technically, one of which by Barry Tenopir who is one of Bob Gilford students. Barry's comment was "Mike remove that article from your vita". Which I have not done because believe it or not, it is relevant. So, I had two advisors at Bucknell. One was David Milner, who did a lot of stats at Bucknell. The other was Douglas Candland, who did animal behavior, which was mostly with monkeys, some in the lab, some in the field. I'm in Florida in the field and you're chasing monkeys through the trees. Literally chasing them through the trees because the monkeys moved through the trees in this reserve. It's a primate reserve in South Florida, and your eyes are up, you know, you've got binoculars and you're watching monkeys dance through the trees, right? You know the paths well, you know, like I've been in this path 20 times before, so you don't even look down, you just keep your eyes up. I step in this little stream, and the thing I stepped on, which should have been mud moved and I jumped back fortunately, and the alligator went away fortunately. No, I'm not kidding, this really happened. The alligator goes away and I continue to chase monkeys, but my take, and this is twofold. One, a job that requires you to step on alligators might be quite physically dangerous. Part one. Part two. I am not sure that I want to spend the rest of my life studying monkeys because it's not especially practical. Where I went to college though, they didn't do applied psychology, no one taught applied psychology, the closest they came was statistical analysis. When I was applying to grad school, I got into Harvard in urban and regional planning. I got into Columbia communications, I got to Carnegie Mellon in quant. University of Georgia was the only place I applied in I/O psychology. And the only reason I applied to Georgia was because it said applied psychology, which clearly fit with my preference at this point. Doc took me, as a student, but I don't really know if I knew what I was getting into until I took my first class in individual differences, which was my first semester, which I absolutely adored. I loved that class, everything after that was absolutely great. It was the right field for me. It was the right thing to

do. And creativity is clearly a big part of individual differences, so I was fine after that. What I did want to do is do something that made a difference in the world. Simply chasing monkeys, despite my alligator adventures, you know, it, it has some vague value, but it's very vague. It is not like improving the effectiveness of R & D organizations. It's not like making art galleries function better. I've got no questions on the career path. It is a strange way to get there. It's still a problem by the way. I have had students from Harvard. I've had students from Columbia. I've had students from Bates at OU part-time because no one is teaching applied psychology at their schools.

Roni: *When I tell people that, um, there are no I/O programs in like the major Ivy leagues, like Harvard, Yale, Stanford, they don't believe me.*

Mike: No, there are none. Never have been. It's foolish on their part by the way, but probably makes life a little easier for all of us too.

Roni: *Who were your mentors and inspirations and how did they influence your research interest and research trajectory?*

Mike: First one here is going to sound weird. That was Mr. Riley at an amusement park I worked at, but if it was a slow day, he would allow me to read. And we had a lot of slow days at amusement parks in the summer. I mean, it can get slow, it's usually like four days at least. I had to sit there and take tickets and I'd read with my hand out and turn the page. That was important by the way, partly because I had a lot of free time to read, but partly because Mr. Riley's view was as long as I can keep every machine operating for 15 minutes, I was doing my job. And I can keep a machine operating for 15 minutes with duct tape, glue, popsicle sticks, et cetera. The machine might not work permanently after my things, but I could get it to work for 15 minutes. His trust and him letting me do stuff on my own intellectually. That was important. David Milner at Bucknell, gave me a great appreciation of numbers, big appreciation of numbers, big appreciation of what you could do with numbers, and was incredibly kind. He would put up with stuff from me that I would never put up with from any of my own students, incredibly kind man. Doc, I'm going to go through these guys in chains, I've talked a little bit about already, but the thing to realize about Doc is he was an academic Bear Bryant. He dressed like Bear Bryant with a little hat like Bear Bryant, who was an old football coach. My first week in grad school, the older graduate students had not really been doing anything for a few years. And it was an NIH grant. Doc was very upset with them. I walk into the, I think it was the first grant meeting is on. He walks in, looks at me. He says, Mumford, you're new. You're out of this. His eyes then narrow and he has very light blue eyes. And when they narrowed, it looked like he was going to kill you. And he proceeded to pretty much, ream out all of the other graduate students in graphic terms for all of their failures and scared me to death. What I did take from that, though, it is a good thing to get your work done. With Doc, you got your work done. If you didn't, there would be a problem. As a major professor though, he was very supportive, very good. He was, though, demanding. Remember I got two degrees, I got a degree in psychometrics and I got a degree in IO psych. They did that intentionally to keep me busy, but it was excessively good training.

Next one is Fleishman. Ed is an ambiguous person. He really is. At one level I adore Ed, and Ed introduced me to operations in applied psych by which I mean granting operations, who to talk to, who should talk to you, why should they talk to you, et cetera, all of which has turned out to be incredibly important career wise.

[I wouldn't] say Larry James was a mentor. I would say Larry James was a friend. Which is a very different statement.

While working with Ed, Colonel Reid Wallace who was absolutely a true Southern gentleman, but a Southern gentlemen who introduced me to the intricacies of working in large organizations and pretty much bailed me out with the army Sergeant majors. We're doing the revision of Sergeant majors Academy, we're meeting with our panel of Sergeant majors. Your average Sergeant major is like 5' 8", and very mesomorphic. They're all like late forties to mid-fifties and they're all very physically fit. This is important by the way. I walk in with Reid and at this point, I'm two inches shorter than I am now. I was still growing till I was 30. I weigh 115 pounds. His sergeants look at Reid and one of them had been a master Sergeant with him and he looks up and goes, Colonel Wallace. What the hell are you doing bringing a shave tail from Westpoint here. Reid's face drops. He goes, Mike, leave the room. I go, okay. I leave the room. Half hour later, Reid comes out and he looks at me, goes, they're going to give you a chance, but I hope to God, you don't screw this up. I go in. I run the SME panel. Apparently, it went okay, because they then took me to Juarez, Mexico. We didn't need passports in those days to go to Mexico, where they decided that second lieutenant initiation processes were in play. And I would be drinking tequila with that. These are very big guys. I'm a very little guy. I hurt for three days after that adventure, on the other hand, Reid looks up the next day. Every time I started to turn green, he would take over the meeting until I stop turning green and the Sergeants stopped snickering. That sort of stuff, particularly with creative organizations is critical to learn.

When I'm working with Volvo, when I'm working with Pfizer, I want to know the people in the plant. I want to know the people in the R & D unit, how they operate, what they're doing. And Reid taught me that and it was important. It hurt a lot, but it was important. Frank, very different. Frank was operations for how you get grant work done. And Frank was skilled at it, I do not think the second large army grant would have gone anywhere near as well if Frank hadn't been there. He did the same with all you guys actually, he really did.

The final person was Mary Tenopyr, very quiet in the background. Mary was always very supportive. Always was there, if there was an issue or a question I couldn't deal with. It was a sad thing when she died. Actually, we named, we gave Kennis, my daughter, the middle name Mary because of that. Those are my mentors. They were all important. Mr. Robinson important, David Milner was important. Ed was important. Doc was important. Frank, Reid, and Mary, all of them.

Roni: *You conducted research on creativity in organizations at a time when that was not a major topic of study or of interest. What were your early experiences with creativity research? I remember those days.*

Mike: Here would be the gist. No one in I/O Psychology cared anything about creativity in any way, shape or form. In fact, for studying creativity, I was considered strange. I was. They liked my background data work, they liked the job analysis work, but they thought my fascination with creativity was an absolute waste of time. And people would tell me it's a waste of time. I was once in a job interview and someone, and the person who did this will remain nameless by the way, they're dead now, but I'll still keep them nameless. And he looks at me and he goes, you seem like a bright young man, why don't you study something useful? I go useful like how. He goes, like performance appraisal. At which point I grabbed the side of the car door and I went in my head. I didn't even make campus yet. And I go, this interview's over. There is no way I'm working for this man. That's how bad it was though. They viewed creativity as a technical waste of talent. They did. I did not care actually, and I did not believe the feedback actually at all. And it is a function, I think of two or three things. One, at this point I'm working with, for Larry James and Larry had done some very good creativity work very early in his career, so he was supportive.

The other thing that hovered in the back of my head was IBM. Why is the VP for R & D trying to keep his people away from HR because I'm supposed to be an HR person. And this guy who was very effective and who I had a great deal of respect for would not let HR near his people. In a certain sense that, between those two things my response was, you guys were wrong. It, and that's the personal part. The technical part is also important because there's a technical issue I had here. All of I/O psychology at that point in time was basically focused on lower level production workers, particularly selection, job analysis, and bias in selection. They cared not at all about creativity or creative workers. They didn't care about engineers. They didn't care about scientists. They viewed them as special people who, HR did not need to be concerned about. And I did not buy that. I had too many friends from growing up who were scientists, who were engineers, telling me nightmares of their lives, even when I was a kid. I, literally just did not buy the litany. I mean, it was fortunate I turned out to be right in the long run, but I don't know that the field was especially receptive. And in fairness to IO psych, let us remember. This is the period where a journal of creative behavior is publishing the infamous ninja secrets of creativity article. The creativity literature had in a sense, gone into a spin, coming out of the late seventies and was at the nadir of that spin. At that point in time, there was me, there was Teresa Amabile, there was Tom Ward, there's Mark Runco, there as Bob Albert. There is Dean Simon-ton.

I mean that might've been the whole pool of people doing anything significant. What I will say is that pool of people have been dedicated to the field and dedicate, and Bonnie Cramond I'm forgetting Bonnie, have been dedicated to the field and cleaning up the field to make it a technically sophisticated field with a very strong belief that unless you protect the people who are building the original stuff, there isn't going to be any economic progress. And I, you know, the shift from Dean Simon-ton to me and Mark to Teresa, that's a big joke. I mean, we all do very different stuff, but with that group of seven or so people, I think there was a very, very real concern with how do we protect and develop those who are doing creative work.

Roni: *You've done a lot of work on the cognitive processes of creativity. What are some of your more interesting or meaningful findings?*

Mike: Wow. That's a big question. The first key finding here is the process model and that's because it organizes creative cognition. We, the field now knows exactly what are the key processes in creative problem solving. Nobody at this point argues with that model. You know, they don't cite the Friedrich and Mumford study enough, but no one really debates that. And that's important. That is very important. The second part of that is the conceptual combination studies, really all four of them, because that is the fundamental basis for producing new ideas. The third is problem definition, problem construction, which is often ignored in creativity.

I wouldn't say that it's not ignored at this point, but it was years ago. Oddly enough, the next contribution here is most studies of creativity actually had nothing to do with initial idea generation. Because before you get to idea generation, you have to define the problem, gather the information, identify core concepts/core cases, combine and reorganize those concepts before you get to idea generation. The net of the creativity literature was focusing really on a late cycle process, not the early cycle processes that allow you to be creative in the first place, which is a contribution. I really do believe that is a contribution. The skills work is just as important. Actually, is the process work. You know, causal analysis, sort of everybody kind of quickly accepts. They go creative people must know key causes, and they all go, yes. And that's fine, but it's not quite that simple. There are other skills involved and those other skills are critical. Forecasting, absolutely critical. It has big effects on creative performance. We know that those who lead creative efforts, we know those who do creative efforts forecast downstream, big time. All our creative efforts are heavily constrained. We know that people who are creative, obsess, literally obsess about constraints. We've got maybe 15, 20 studies on constraints, maybe 15 or 20. They all are important by the way.

I think the two meta-analyses, both the education meta-analysis and the climate meta-analysis were important content wise, but I would also say they were important methodologically because prior to that, no one was really doing meta-analyses in the creativity area, and those have proved to be quite productive when they're done. Final thing it's more recent, but significant, most creative work fails. I mean, it's absolutely clear most creative efforts fail and fail pretty miserably.

I forgot one. Sorry, I got jumped back. The leadership of creative efforts and the organizational planning for creative efforts, both the planning part and the leadership part have proved to be incredibly pragmatically important. Bear in mind, they didn't think you could plan for creativity in the old days, which was not good for organizations by the way. They didn't think you needed to lead creative people where the data says that's probably more important than anything else. Um, wanted to segue back to those particular topics. The other area is errors. Creative efforts often fail, and the work we've done on errors, the work we've done on biases, it's new. I believe in the long term it's important. Partly because the biases don't always mess up creativity, some biases do, some don't, um, people can control errors they make in creative work if they're given appropriate training. So that work is valuable.

Roni: *What paper or chapter are you most proud of? I know it's like asking, which of your children do you love the best, right?*

Mike: There's like 400 some of them. I mean, it's not quite that easy. Probably the Scott Lonergan and Mumford piece. Partly because it was a conceptual combination study, partly because it's the clearest example, tying conceptual combination strategies to knowledge structures that's been done. It tends to get cited for conceptual combination. Oddly enough, it doesn't get cited enough for knowledge and, what knowledge base you're using, but I am particularly proud of that paper to this day.

Roni: *A lot of people find planning to be boring and to some, an obvious topic. What led you to focus on this process in particular?*

Mike: I realized they'd find it to be boring. and the most amazing part of this is the article Sven Hemlin did and just the article, very simple article, he was doing a critical incident study in academic labs and commercial labs and microbiome. So, part of the study was they asked the leaders which activities they would delegate. They would delegate everything. And I mean, everything, except planning. That is the only thing they would not delegate if they were not involved in a plan, they were not going to do it. Planning is boring, but it is also critical. That is the first issue. And it is literally so critical that someone who's leading a creative effort will under no circumstances delegate it. Part one. Part two, all creative efforts in the real world are, ultimately become very large efforts involving multiple parties in multiple ways. That has to be planned. The mistake the creativity literature has been making is you just have to lead the creative people. The creative people actually have to go educate the other functional units. They have to consult with the other functional units. Somebody in the creative team has to sell top management to invest in the creative effort. The creative people have to sell other people in the firm to bring them in at the right time, in the right way, such that the cross-functional teaming occurs at exactly the right time with exactly the right people. This is a very, very complex planning process. And it plays out, bear in mind, the timeframe of most creative efforts, which is, you know, on average, probably about seven years to play out, from initial development to full fielding. you're talking about seven-year timeframe with constant sales, constant education, constant recruitment, and replacement. If you don't plan, there's no creative product. None. Zero. And the creativity people have been arrogant about that. And they're ignoring that the requirements for implementing and developing creative ideas in an organizational context go well beyond the creative thinking processes per se. And what is clear is planning, part one and part two forecasting again. The O'Connor study is quite real. If you look at people who've led creative R & D efforts producing radical innovations, the clearest finding was the people running those efforts could forecast downstream. And that means they're planning. If you look at the history of AT&T's bell labs, the planning of the research was exceptional. And this has led me to a very basic view, by the way, anybody studying creativity should go out and read Walt Disney's biography. Anybody studying creativity should go read the history, which is now quite well written, by Gertner on bell labs. Anybody studying creativity should go out and read Isaacson's book on Steve Jobs. Those three books all make the same point. There's creativity

involved, but that creativity requires planning. It requires effective execution. It requires effective execution over very long periods of time. It requires systematic introduction of people at certain points. It requires systematic introduction of technology at certain points. In reading what actually has to happen in the real world would be very, very good for many people studying creativity. I admit not everybody is as fascinated with engineering planning as I am. But look, Disney planned. He was really good at it too, by the way. He used to sit in parks and play in his amusement parks as he watched his daughters on a merry-go-round. I realize not everybody's going to be fascinated with engineering planning. I don't think you can ignore the planning of execution of creative ideas in organizations, the evidence doesn't say you can. And the problem here is the creativity people don't want to think about development of the idea. They do not. And the IO people think planning is boring. There's this big vacuum area, and people need to start filling the vacuum area. Sorry. I'm on a roll about this.

Roni: *Your work also evaluated the role of the leader on creativity. What are some important implications of your work for leaders?*

Mike: That's, this is actually interesting. I teach a class at MIT and Stanford, it's a continuing ed class for R and D VPs. In a sense that class is about leading for creative efforts. That class makes a big difference to those R and D VPs. And these are people who've been around a long time. These are all people with PhDs. It is very hard to manage creative projects. One thing that comes out of the creativity literature is it's a real finding and it goes to Feist's work. Let's face reality here. Creative people are not nice people. They're arrogant, they're driven, they're competitive, they're ambitious, they're domineering. Domineering gets better as you get older. That I do believe is true, but that is true. These are not the ideal employees. They really are not, no one wants to manage these people. Part two, the organizations righteously are suspicious of any creative efforts and they should be. Most of them fail. They're very expensive. They're often even if successful, incredibly disruptive of organizational processes. You have suspicion on the part of the organization, you have a group of people who are very difficult to manage under the best of circumstances. And then you have to plan out a series of projects, where any project single project is going to take seven years, but you have to build a portfolio of projects where those projects have to interact with each other in a timely and effective fashion. This is a big problem. This is very difficult for people to do.

Where the creative leadership literature is at the moment is itself problematic though. I will say this. There are three basic models of creative leadership. One is leader behavioral styles. The second model is leader functions. The third model is leader skills. Almost all the attention on creative leadership has gone to leadership styles. That's 90% of the studies. And what they're doing is they're handing out transformational leadership measures. They're handing out leader member exchange measures. They're handing out servant leadership measures. They're correlating that with usually managerial reports, surveys on creative performance. The findings are routine. In that area, pretty much you get what you would expect from a basic understanding of creativity. Leaders supporting a creative climate is good. Leaders having a

positive style leads to people employing creative processes more. None of this is surprising. The functional model though describes what the leaders have to do. That is surprising and it is very important. They have to plan those little different activities. They have to advocate for certain fundamental themes. They have to recruit literally 50 to a 100 million dollars from the top management team to support the work. Please note that means they have to be able to champion the creative effort. That champion thing is very important. They have to be able to educate the rest of the organization on what the creative project means. They have to recruit people from those units. They have to know how their creative efforts will disrupt the normal process in those units. We need to get far more attention, not to leadership styles, but to what the leaders actually have to do. Leading a creative effort. The second thing is the skills here are complicated. These people are, have to be technically as good or better than their creative people. They have to have more expertise because the creative people will only respond to expertise. They need wisdom. They need to know what they can sell, where they can sell it, how they can help people, how they can't. We don't commonly think of creative leaders being wise. Wisdom is important for them. What I hope to see in that literature is a dramatic shift away from behavioral styles to functional requirements placed on creative leaders and to the skills that leaders have.

The other reason for that shift is something that comes up all the time when you train R and D VPs. And that is, where at, Mumford? Where am I supposed to get these people from? Every time. It's the common question at the end of the class. Where can I get these people from? Because my HR department is not helping me and you're telling me they need to do all this stuff, and I agree with you, but I don't know how I got this job and no one prepared me for it. We have to start taking the development of creative people in the real world seriously. You are not done when you get a PhD, you are not done when you get an engineering degree. And I hope that work sets a framework up for doing that, but there certainly have not been enough studies on it. There's not enough work done. You know, the only exception there is really the old army study, and that study is important. But it is looked at as a leader development study, but in the context of the army, it's creative development. We're not doing enough with development. And I hope ultimately the people reading the leadership of creative efforts literature take it to mean we have to do a lot more for real world development of creative talent than we're currently doing. To see how significant this is, this goes back to the IBM comment actually. One of the common things that comes up when you teach these guys is, man we hate the organization. We don't want to talk to them, we just want to go do our thing and I'll send someone out to talk to them. So after the end of this session, they'll often go, you know, we've been doing okay with that, but we got to do better and I go good. But then they go, where can I get support? Where can I get intervention techniques? Where can I get guidance for this? And my answer is, I don't know, guys, it's not out there and it should be.

Roni: *There are a lot of misconceptions about creativity. What are the most common, with an emphasis on those that annoy or upset you?*

Mike: I can give you a lot of these. Creativity only involves the production of multiple ideas. In organizations, that doesn't work that way. Let's remember what the definition of creativity is. It is the production of, note the wording here, quality, original, and elegant solutions, and this is the important part, to complex novel ill-defined problems. What this means is that a well done, high quality solution and only one idea behind it works just great. And it's highly creative. Stop ignoring quality, start focusing on the problems. Stop worrying about multiple solutions, focus on solutions that are to complex, novel ill-defined problems. Second thing that annoys me, creativity is in everyone and everyone should be creative. Really? I have seen no hard evidence of that ever. There are many judgments of creativity. There are Oscars. There are Pulitzer prizes, there are biographies. All of these things are markers you have been creative, not many people get any of those awards. Now having said that, that tells you most people are not going to be creative, externally. Saying that everybody is creative basically says, you don't educate for creativity. It says you don't manage for creativity because everybody can be creative. No, most people can't be creative. And that is a reality because ultimately creative products are also competitive products. If you don't believe me in this, go talk to any five real-world, and I'm not using business here, any five real-world artists. And they will tell you how competitive the arts world is, in graphic terms often with swearing.

A second issue ignoring how competitive is to be creative is problematic. This third issue here is, creativity is a spontaneous and wonderful thing. Something that happens to you, and a mystical experience. Now I figured this was done with Weisberg's work and Emily Dickinson. I just figured that and put this to rest. No, it's still out there. They're all out there having mystical experiences. The problem with that is as long as that hovers there, no, one's going to systematically develop the self to be creative. I'm on a roll now. It is very important for creative people to succeed. No, not really. It's important for creative people to succeed every once in a while, but what's way more important is to learn from your failures to be creative. But the field focuses predominantly on success, not on what people are learning from their failures. Again, a problem. My favorite one, this is my absolute favorite one. We must motivate creative people because motivation is very important. No, absolutely incorrect technical statement. Creative people are already highly motivated. They're already highly disciplined. They're already very well-educated. These are not people who need motivation. They have ample motivation. From the perspective of the real world, the issue is not motivating creative people, it is channeling their motivation along productive lines. But, the bulk of the research on motivation and creativity is about level of motivation. That's a mistake. It really is a mistake. It drives me crazy, actually.

My next favorite flaw, [is the statement that] I am studying creativity. Creativity is one overall thing. Not true at all. There is a general set of processes involved in creativity. Everybody agrees with that. However, some processes are important for some fields. Other processes are important for other fields. Doing a global assessment and calling creativity one thing is a terrible, tragic error because you actually don't know the specifics about what you're making the statements about, but that gets translated through the whole literature. The conditions that promote effective problem definition are not

the conditions that promote effective idea gap. They are different conditions. Failure to specify exactly, precisely what you mean by creativity in this particular piece of work is not a good idea. A final thing, and I have applied this at CRJ and I mean it. If you don't show me the creative product, I am not publishing your manuscript. PACA applies the same rule. If I can't see your creative product, I am not publishing your manuscript. Well, there was real good reasons for that because given the fact that it is very difficult to get people to specify exactly what they're studying vis-a-vis what processes, at least if the reviewers can see the product, they can draw reasonable inferences in that regard.

Are there any other global things that really set me off here? Yes. And I do not care about your opinions about the beauties of creativity. That one also sets me off. Actually, if you talk to most creative people, they suffer a lot. It's hard work. It's very painful. And talking about the beauties of the creative product, doesn't address the pain and agony of getting to the creative product. Put differently, let's remember, Van Gogh cut off his ear. Now, well I would not recommend cutting off your ears routinely to be creative. I would recommend study, not looking at creativity as something inherently beautiful, I would look at it as something inherently difficult. And whenever I hear the words, beauty and creativity I cringe. Related to this is actually intuition, which I also find problematic. Intuition is predominantly an impact of expertise vis-à-vis the discipline. And the people who say creativity is beautiful will also say it's highly intuitive. And there isn't much evidence to support either of these views. I think I'm done with the things that really set me off. Motivation thing really sets me off by the way, I actually get so upset with that I block on it.

Roni: *You have trained a number of researchers on the topic of creativity, many of whom are continuing this work. Why do you think this topic resonates so strongly with students and potential students?*

Mike: The very short answer to that is students are dumb. I mean, they are dumb vis-a-vis the field, which they are naturally, that's why they're students. But they're not, about the world. Frequently students actually perceive creativity innovation to be more important than say I/O psychologists in general. And I think it's because they actually see the world a bit more as it actually is, as opposed to a discipline they're involved in. That's one answer. I think the world has changed, and I really do mean changed. It is apparent that the educational system, it is apparent that the business system, it is apparent that the government system all place a much higher weight on creative work than they used to. And the incoming students are aware of that. The third reason is frequently the students that land in my shop, unsurprisingly often have professional parents and they're used to hearing their parents talk about the demands of creativity or used to watching their parents work it through and they actually do want, go, wow, this is hard, how can I help them? I think it's all three things. They don't want, you know, well I'll take that back. Some of them do like emotions, which always troubles me. We do have a few of those, but I would say they are more disciplined than people give them credit for. The students studying creativity at this point are far more serious, far more disciplined then generally speaking, they were when I started.

Roni: *You served on an editorial as an editorial board member, associate editor, and now editor of many, if not all of the creativity journals, what publishing trends and creativity have you noticed behind the scenes?*

Mike: There's less work done on divergent thinking than we used to be, a lot less, which surprises me. I think that might be a mistake because there are an awful lot of divergent thinking tests out there, and those tests are not being thoroughly explored, and that does trouble me, but there's a lot less divergent thinking stuff. There is less creative processing stuff, and again, that troubles me, but for very different reasons. There's sort of this view of what we now know that these are the creative processes and then they sort of go, well, we're done. We don't know anything about how people select cases. We don't know how they select concepts. We know concept selection and case selection is important, but we don't know the contents creative people use. I mean, that's an obvious gap. We know conceptual combination is important. We have some feel for the key strategies in conceptual combination, but we don't know much about how elaboration occurs. We don't know why people choose to elaborate A as opposed to B. Those are key issues in conceptual combination. We know adaptive monitoring is absolutely critical, but we have absolutely no studies that I can identify that have looked at how creative people monitor their environment, what types of cues they use, et cetera. My point being, I don't see creative processing work being anywhere near finished. I just think we have a good baseline. I don't think we have enough work on what directs people to pursue certain types of creative work and when they're willing to pursue it. I don't know that we have enough work on intellectual stimulation techniques, which appears to be a key attribute of climate. We have enough work in peer support, but we don't have enough work in intellectual stimulation.

We don't have enough work on development of creative potential broadly speaking. It's very good up to 10th grade. There's actually a lot of studies on gifted kids and development of gifted kids up to 10th grade. Then it stops. There's this big black hole for the rest of their lives. That gap has to be fixed. We have to look at what is creative development in high schools. We have to look at what is creative development in college. We have to look at what is creative development once you're within an expertise field and those studies are not being done. Anything else really? We don't have enough time series studies of creativity. I mean, Teresa Amabile's diary study was a good idea, but it's one study. We need a lot more diary studies than we have, and we need to have them look that in time series models, because you're not per se, what we know with regard to creative production is it emerges over time with very different conditions with varying mark shifts, and we simply don't have enough evidence there, and none of those studies are coming across my desk. And I doubt they're coming PACA.

I did the negative trends is actually where I went to. The positive trends are, it's gotten much more domain based, at least within the creativity literature people are looking at creativity within specific domains, and they're sometimes drawing specific cross domain comparisons, which is good. I'm seeing more articles than traditionally was the case on the arts. That bothers me a little bit because I'm not seeing as many articles on engineers. I'm not seeing as many articles on scientists, but I'm seeing a lot in the arts. There is

more historiometric work being done, because it used to be Dean Simonton was the only person who really did that. And it was a great work, but Aaron Kozbelt's doing that. I wish some of my Doctoral students would do that, but very few do. There is a good literature in the history of science and we should be looking at that more in studies of creativity. We should. What other stuff are people doing well these days? There's more neuroscience stuff going on, but, and I say this with impression, there's more going on than there was, I don't think they're making any substantive progress, bluntly put. The effects are small, they're inconsistent. I realize people are fascinated by MRI machines, but I'm not sure that creativity is ever going to lend itself to one area of the brain consistently lighting up. I just don't think that's going to be the case. We are finally, which is good news, seeing the national science foundation finally rolling over and playing dead, and are accepting the fact that creativity might be required and might be important in STEM education. This is relatively recent. It's really only in the last three to five years, but that is important. That sets up a stable funding stream. That is very important. We are seeing far more methodological studies of creativity than we have in the past. A lot more, and generally they're well done and they're informative. Silvia's work has been very formative for divergent thinking. Reiter-Palmon and Kaufman's work has been very informative for like background data, life history, measures of creative performance. The methods for studying creativity have been much better worked out. What else are we seeing a lot of? We're seeing enormous number of poorly conducted studies on organizational creativity. Occasionally there's a good one, don't get me wrong. There are occasionally some that are decent, but I would say that's the largest incoming to CRJ, far and away, is organizational studies. The other area that's very active is personalities of creative people, specifically looking at more narrowly defined traits than Big Five traits. I'm seeing a lot of that come in the door. And then education, particularly not as much in the US, much more European, middle Eastern, but I'm seeing a lot of creative education efforts come out of Europe, a lot coming out of the middle East. That'd be a fair summary, that's probably not as informative as you would like it to be.

No, it's just you get a very different mindset when you're doing the senior editor gig, because it's like read the manuscript, you'll know where I started with was where the really bad things coming from. And what's missing was the other issue. Senior editors default to do I send this thing out for review or do I desk reject it? I actually think it destroys our minds. I do, I think it does great damage to it. You read a lot, but I'm not sure you process it quite the same way the associate editors do.

Roni: *Our last question, and you started a little bit in the previous one, so what's next? What does the field need to address? Where should we go?*

Mike: I'll reiterate a couple things I said there. I would like to see all motivation research drop level of motivation and focus on directional motivation measures. Level was ridiculous here. It's just, why are you doing this? And the problem organizations have is what direction to get people to go in on creative projects and how do you get them to go in that direction? The second issue is the creative process stuff I talked about. It's not that there are no studies on it, but there are fewer. And the assumption is, well, we have a nice

outline of the processes, well we do, as an outline of the processes, but we don't know enough about the specifics of what's going on in each and every one of those processes. Related to the above fact, we need to stop studying, pretending that everyone will be creative. It's one reason I don't trust many of the articles published in the IO literature and actually, it's a common reaction with you guys, actually. I can watch someone go from an entry-level grad student say it's a creativity article in JAP to five years later they go, oh, Mike, they've written a stupid JAP article on creativity. This one's really bad. And then I go compared to what? The reason they're going there, is two reasons frequently. One, the creative product isn't clear, which is the first issue. The second issue though, and it's literally a fair number of the studies. It is not clear that they're actually studying creative work. McKay is right about this, this is the McKay Kaufman piece. If you're going to study creativity, you got to isolate what are the creative tasks on the job? I know literally personally of no study, none, that has isolated the critical creative tasks on any job. The exception that maybe the army to a certain extent, but outside of that, I haven't seen it. We don't really know exactly what the creative tasks are, how those tasks are being executed, what are the contingencies on those tasks? We have a global impression, the wording impression, of creativity. That's problematic to me. This is going to get very random. I'm going to give you good things and bad things now. I do want see more work on specific, I do want to see more historiometric work on creativity. I do. Every time we've had a well done historiometrics study and I'll use Bob Weisberg as an example, that work has turned out to be very important. For some reason, people don't seem to want to go to library or execute historiometric research. I don't understand it cause we all got libraries. I think we need more studies realizing the difficulty of being creative, which covers a lot of sins. It's studies of errors and creativity. We don't have enough of them. It's studies of constraints and creative work. It, bearing in mind that constraints stimulate as well as inhibit creativity. We don't have enough studies of criticism of creativity and or self-criticism, but every step of the five studies that have been done, they all say it's real important. How does that relate to creative self-efficacy? I don't know, the studies haven't really looked at it. How does that relate to openness? Don't know. How does that relate to the source of the criticism? I don't know. The point here being, we need studies that look at the harder parts of creativity, but also the specific production requirements people deal with in the real world. To illustrate, when, and this has been key to the work I've done in creativity. If you remember, when we were making up the initial process model, one thing I did is call my brother [ed note: Dr. Mumford's brother is an artist]. I did. And I go, Mark, we think this applies pretty well to engineers. Do you think it works for you guys at all? That was my question. I had no idea. I am not an artist, so I really had no idea. My brother stopped dead and said, no this is deadly accurate, works great for us because when we stare at things, we're doing problem definition. But we don't have enough direct contact with people actually doing creative work. And I think that would improve things a lot if we did. The historiometric stuff actually might serve very similar purposes actually. I don't think we've effectively covered what I would call real world contingencies on creative efforts. I think what we do is we take, it's a lot like the process stuff actually. We'll get one or two findings.

They'll make pretty good sense. And then we drop the topic because we assume it's the same everywhere, and it's not. [When] I talked to leaders of creative efforts, they'll tell me frequently, we typically under resource creative efforts a little bit, because we use it as a trick to force them to think creatively. There's still enough there. We came a little short. We know it's a little short because they'll think more creatively. It seems to work for them. But do I have evidence to support that? No.

Similarly, I try to be supportive of my people, up to a point. And the point is when we have production pressures and when we go into prototyping, I'm not going to be indulgent. When we go to prototyping, it's gotta work. So yeah, it's gotta be supportive. But, it's tricky how that's conducted in the real world at different points in time. We need to be researching that.

Next thing, which really does trouble me a great deal. We tend to look at creative performance as being isolated in a single performance, part one. Or part two, isolated from the rest of the world. Both of these are mistakes. Creative people are always working on programs. It's always a program. Artists are always programmatic. They're far more programmatic than we give them credit for by the way. They're trying to execute a style vis-a-vis a certain image and they're trying to manipulate that and improve it over time. Scientific research, always programmatic. Engineering work, always programmatic. But I don't have studies of those programmatics, and that troubles me. We're isolating to create a product, but we're not looking at the programmatics that let you get to that creative product. The opposite end of that is we isolate the creative effort from the real world. Meaning the big world. Csikszentmihalyi was right about this. I've got no studies, like zip, on the impact of professions on creative performance. And there literally is nothing out there. Once you get done with the mentoring literature, that's the closest you get. The impact of professional norms, the impact of professional expectations, the impact of professional review demands. There's nothing on that. Similarly, in the artistic world, my brother tells me they all hate art gallery dealers. They all detest them because they're critics of their work and their view is they take money from them. but we don't know studies of the impact of gallery operators on artistic creativity. Why we don't? I don't know. What I do think we isolate ourselves too much and don't look at those external influences. The third example of this is life space. We're not, bearing in mind, I am not known for my gender sensitivity since I treat pretty much all you guys the same. Having said that, there's an absolute consistency among my female students. That is, they're always 10 years behind my male students in careers. Always. Every one of you has been. And what happens is, you have kids, and for the first 10, until that kid can drive a car, you are spending a tremendous amount of time with the kid. So you get this divergence, you guys' careers pick up late after little kiddies go out of the house. As my male students, creativity goes down as the kids get out of the house. Now my point with this is not to be completely and utterly sexist about this. My point is the life space, we're not looking at people's life spaces and how they influence creative performance. Remember creative performance comes in cycles. The other thing we need more work on, although I'm not sure if it's creativity, people can do it on their own, is create, the possibility of creative production and the type of creative productions that can occur, seems to be timed in a rather specific

way, actually, and Maxwell's initial development principles of magnetism and electricity, uh, done late 1850s. You don't see Edison coming along until the 1880s. Then you don't see widespread distribution of electrical products till the 1920s. But this isn't that different then medical genetics. The timing almost looks identical actually. You know as the 1950s, you get a feel for DNA. It's the 1970s, 1980s when you start to see initial genetic therapies, it's the early two thousands when you see them actually being applied in medicine. We need more studies of the timing, but we need more studies of what type of creative effort is possible at what point in time, given where things are. That, by the way, would be highly useful. Um, related to that, uh, when you can accelerate those development cycles and when you can decelerate them. Studies along those lines would be very valuable. What I hope the field does not do, and I'll criticize my other field. Fran Yammarino makes a good comment. It's an accurate comment. And he goes, you know, Mike, the problem with leadership is leadership theories don't die until the person who made them up dies. It was bad, told me that I started to laugh and I go, yeah, that's so true. There's going to be another LMX study until George Grean, Bob Liden and Mary Uhl-Bien all die. And then after that point, we might have fewer LMX studies. Although I doubt that. But I would like to see more creativity amongst creativity researchers. When I say more creativity that should not be taken as being undisciplined. It should not be taken as doing poor method. It should be taken as thinking outside the standard box, hate to use that analogy, but I will here, and applying the best methods to understanding new phenomenon because we frankly haven't really. The way creativity research progressed is a very brief burst of it in the 1910s to the 1920s. It's pretty good work. It was early work. It adds some value. Then it dies through the depression of World War II. Then from 1950 to about 1967, lot of very good studies done. Then it dies again. Literally this time almost went off the cliff. What has happened since really 1990, is over 30 years of creativity, field has pretty much totally rebuilt itself. It's much more effective, much more timely, much more objective, much more practical. I hope that continues. I mean, the fear I always have is that we will do another one of these productive and death scenarios. Get 10 years of productivity that will die for 15 years. We have 10 years of productivity and die for 15 years. Systematic, well done, methodological research that builds incrementally on the work done, is what's gonna allow the field to become stable and effective. And I hope that's the case. I do. I mean, I think it probably will be. That's the word. You can hear the fear in my voice. I hope it will be, but I am somewhat, I don't trust people and systems. I just don't. And I hope it will because that is what has allowed it to become very successful over the last 30 years. And another way to see this is, if you look back 40 years ago. R & D VPs didn't go to courses on creativity and creativity leadership. They did not. They do now. National Institutes of Health did not ask for policy studies to support and encourage medical creativity like Mike West. The army did not think its officers had to be creative. And that has really changed. It really has changed. And I think the one thing we have to do as a field as well, is we have to be responsible and respond to those changes with both viable research and development and viable practical programs. If I had a good practical program research coming into CRJ, I would publish it immediately. I would. It just doesn't come in the door.

Roni: *Those were my questions. Anything you want to add? Any questions I didn't ask that I should have?*

Mike: Ah, my brother, he wants acknowledgement.

Roni: *Your brother wants acknowledgement. You referred to him a number of times in this interview so.*

Mike: His full name is Mark Mumford. And I will point out that in the Seattle art museum on their entryway, the words of one of his pictures are on their entryway, but you must give my brother some acknowledgement.

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