

# A Cybernetic Perspective on Design and Creativity: a Conversation with Dr. Paul Pangaro

Danah Henriksen<sup>1</sup> · Punya Mishra<sup>1</sup> · Melissa Warr<sup>1</sup> · The Deep-Play Research Group

© Association for Educational Communications & Technology 2017

Reflective practice is a dialogue of thinking and doing through which I become more skillful. —Donald Schön  
Creativity is seeing anew—creating new distinctions, new relations, and developing their values. — Paul Pangaro

## Introduction

Throughout this article series we have explored issues of creativity and technology along multiple dimensions. Most recently, this series has highlighted notable creativity scholars and thinkers through interviews about their work and ideas. Our aim has been to capture the richness and diversity around the construct of creativity. We have traversed the broad applicability and the disciplinary eclecticism of the topic—spanning perspectives on social justice, psychology, neuroscience, collaborative improvisation, organizational creativity, and more. Yet, we know that this merely scratches the surface of this rich and complex topic. Creativity connects to what it means to be human—at individual and societal levels, at macro

and micro scales in our lives, and across disciplinary viewpoints.

We continue this exploration into creativity, and its intersection with technology, by profiling Dr. Paul Pangaro, Associate Professor & Chair of the Master of Fine Arts in Interaction Design program at the College for Creative Studies. Dr. Pangaro began his career with a background in humanities and computer science and a minor in drama from MIT, where he made award-winning computer-generated films and wrote his thesis in film criticism. He received the MIT Stewart Award for his undergraduate contributions to the MIT Drama Program. In his early work, he was part of the research staff of the MIT Architecture Machine Group, which later morphed into the MIT Media Lab. While in the MIT Ph.D. program, Dr. Pangaro met Gordon Pask, a noted scholar of cybernetics and originator of conversation theory. These ideas profoundly affected his views and prompted him to leave MIT and join a Ph.D. program at Brunel University in England with Dr. Pask as his advisor. Since that time, Dr. Pangaro has supported numerous start-ups. He also taught systems and cybernetics for design at School for Visual Arts, New York, and at Stanford University in Terry Winograd's Human-Computer Interface program, prior to coming to the College for Creative Studies. His work has been published in venues such as *Interactions Magazine*, *Journal of Digital & Social Media Marketing*, *Cybernetics & Human Knowing*, the *London Guardian Newspaper*, and many others.

This rich, multi-dimensional background allows Dr. Pangaro to provide a unique perspective on creativity, design, and technology. His views, influenced by his early work in humanities, computer science, and film, and driven by cybernetics and conversation theory, are a lens for everything he has done and continue to frame the way he sees the world. Our

---

✉ Danah Henriksen  
Danah.Henriksen@asu.edu

Punya Mishra  
punya.mishra@asu.edu

Melissa Warr  
mcwarr@asu.edu

<sup>1</sup> Arizona State University, Tempe, AZ, USA

discussion with Dr. Pangaro highlighted several themes that characterize his current work and perspective on creativity. These themes include: creativity as an act of “re-seeing” the world; cybernetics and design; and the evolving role of technology, creativity, and conversation in our world. We take each in turn, beginning with his definition of creativity as a way of seeing something anew.

### Defining Creativity: a Way of “Re-Seeing”

Dr. Pangaro’s perspective on creativity and design is deeply influenced by his training and interest in cybernetics. He is quick to point out, though, that this cybernetic perspective should not be confused with cyborgs, or robots, or artificial intelligence. Rather, he described that, it is “the cybernetics of the original field, which came out of a transdisciplinary conversation with anthropologists and linguists and philosophers and psychiatrists and engineers and mathematicians as a way to imagine systems that have a purpose.”

This cybernetic perspective informs his definition of creativity. In order to understand this approach, we need to understand that there are many possible definitions of creativity in scholarly and popular discourse. Many definitions highlight novelty and effectiveness as core elements of creativity (Oldham and Cummings 1996). Creative works and acts must, almost by definition, have elements of newness and divergence from what has come before. At the same time, creativity must also be effective or have value for stakeholders or users. But while this gives us a baseline of what creative works offer, it does not tell us much about how they happen. Dr. Pangaro’s view, influenced by his cybernetic training, illustrates a core aspect of how creativity comes about. His definition considers creativity as a way or an act of “re-seeing” from a fresh perspective. In this, creative works offer us a chance to re-envision or re-imagine what we see, and then offer something new and useful to the situation. He elaborated:

There are many different ways to think about creativity—a wide swath of hues—I won’t comment on that swath so much as say the way I think about creativity, and from a cybernetic viewpoint, is that creativity is a matter of seeing something anew—seeing in a new way. It’s seeing something in a way that you hadn’t seen it before, and that new way is effective; it’s something that helps you get to where you want to be.

Dr. Pangaro’s definition of creativity as a way of “seeing something anew” reflects the transdisciplinary origin of cybernetics, aligning it with transdisciplinary views of creativity. As we have noted in previous columns on transdisciplinary thinking skills (Henriksen et al. 2014), the first habit of mind

needed for creative work is observation, including how we see the world. Root-Bernstein and Root-Bernstein (1999) emphasized that the ability to observe our world, and then translate it in interesting or meaningful ways, is foremost for creativity. It is human nature to form our own unique perceptions of the world around us based on who we are and our experiences. Dr. Pangaro described these perceptions as a kind of personal language for looking at and making sense of the world around us. This language involves distinctions, values, and relationships, and promotes a multi-faceted perception:

I could describe, for example, a visual language in what I see. I see a person. I see a background. I see a vent in the upper right of the room. Some of these things are relevant, and some are not, to what our purpose may be. But I could also say I see shapes, or I see black against white and foreground and background. These are different frames or different languages in the sense of distinctions, values, and relationships. And we always have these frames or languages when we look at anything. As we look at a problem that we have in front of us, we have these lenses.

Dr. Pangaro noted that these lenses are not objective or simple, and creativity requires us to see outside of our lenses or break out of immediate perceptions to allow for novel and interesting viewpoints. He described this as a shift in perspective, or paradigm:

We have a paradigm which suggests a way to look at the world. So, for me, creativity is breaking out of that paradigm and seeing anew—creating new distinctions, new relations, and developing their values. And this is very consistent with a lot of ideas in design and design methods, and also, in the distinction between problem-solving and problem-framing.

It is at this point of problem framing that Dr. Pangaro’s views on creativity connect to the world of design, another area that characterizes his work and viewpoint. The issue of problem framing is one that spans creativity and design. He described:

We tend to think of creativity as problem solving, but if I tell you what the problem is, I’ve already narrowed how I am seeing it, and therefore, I narrow what possibly may come from it. So, for me, in teaching students and also in thinking about design, how do I look at the world and what is the language with which I look at the world? And therefore, within that language, what is possible? To me, the creative act is seeing anew, and then acts of combining of what I see in ways that allow me to act effectively.

Design scholars have consistently noted that being able to find or frame a problem is often the most important part of the process of creating anything. Design involves complexity, iteration, alternate stakeholder perspectives, and sensitivity to context—all of which necessitate continuous re-framing of problems (Schön 1983; Simon 1969). The importance of re-framing problems has been highlighted as central to all design processes (Schaffer and Douglas 2004), and, as Dr. Pangaro pointed out, this aligns with the foundations of creative work.

In addition to the importance of framing the problem, Dr. Pangaro spoke of processes and preparation used by designers to come up with creative work. An emphasis on process, he said, is one way that individuals can strengthen their creative capacity. For instance, the approach of “observe, reflect, make” when applied repeatedly to the same problem allows for a spiral-like process of both exploring and narrowing towards a creative solution. It is also important that the mind be prepared for creativity. Some of the ways he suggested include “an immersion in ideas, a willingness to try different things, allowing yourself to be distracted, meditating, using intuition... these serendipitous ways in which things happen.” What is important is preparing the mind to help cross-pollinate ideas and strategies that allow us to slow down and rethink.

## Cybernetics and Design

Central to the cybernetic approach is the idea of intentionality or purpose. Dr. Pangaro described cybernetics as:

A universal theory that aims to explain all kinds of interaction... If the system has a purpose, is it necessary to distinguish it from a cell or a human body or thermostat or an auto-pilot or any of these other things? And it [cybernetics] became the universal language of systems that have a purpose, and the models that come from it are very, very general.

This overarching construct of imagining purposive systems ties into design and creativity in multiple ways. It places cybernetics in a position slightly different from, though not antithetical to, science, with a clear relationship to creative work. Dr. Pangaro described:

Science has its goal to accumulate knowledge. Cybernetics has as its goal to understand how to act effectively, so it's about action. It's not about knowing. And in that sense, so is creativity. It's about an action toward getting somewhere where you want to be, other than where you are now. You want to make some progress.

This pragmatism, and direction toward “action” and “progress,” inherent in this view also ties into the work of design, which scholars have emphasized is inherently a purposeful act (Schön 1983; Simon 1969). Mishra et al. (1999) suggested that one of the key characteristics of design work is that “design is purposeful” (p. 224). This is the defining factor that separates designerly creativity from pure artistic creativity. The latter allows for a greater emphasis for the artist's expression of self, as opposed to design's requirement that it create something that suits a need or purpose for others. On this point, Dr. Pangaro cited Simon's definition of design that emphasized design's clear and purposeful nature centered on people and situations. Simon (1969) stated:

Everyone designs who devises courses of action aimed at changing existing situations into preferred ones. The intellectual activity that produces material artifacts is no different fundamentally from the one that prescribes remedies for a sick patient or the one that devises a new sales plan for a company or a social welfare policy for a state. (p. 130)

Dr. Pangaro asserted that not only does this definition give a clear mission to design, with applicability to a range of professions, but it is also a cybernetic definition. This is because, as he described:

Acting cybernetically is seeing a goal in the distance... seeing a goal and then thinking, “I'm here, I want to go there—So I'm going to move in that direction.” And then realizing, “Oh! I got blown off course.” So, I have to correct and reimagine, “That is where I want to be and this is how going to get there.”

In fact, he suggests that the very etymology of the word *cybernetics* shows its connection to design. Cybernetics, at its root, is related to the idea of “steering” or “steering well,” and this, he suggests, is “what design is, even in Herb Simon's definition. This is how I think about design, and how I like to teach design—in terms of these cybernetic models. So, my view of creativity is grounded in these ideas.”

It is important to understand, Dr. Pangaro argues, that thinking of design as steering does not necessarily mean having a pre-determined, specific goal in mind. He suggests that design lies in a connection between action and reflection.

This is the cybernetic loop. Let's start with observing, but this is only one place in the loop where you might start. I observe something, and then I reflect on that and I say, “I can make this better” per our definition of design from Herb Simon. Then we make something, but having made it, we again observe, “How did that

go?” And then we come back to reflecting on that and then we might make it again.

This is the reiterative loop or better a spiral because I'm going forward in time and I'm making progress. I'm not repeating myself, hopefully. That's really the core process, and in that process I would claim, the creative acts are those in which we see new things and in new ways. And to emphasize, you might start anywhere; the important thing is that you go around the loop, each time making progress, operating recursively in order to refine.

A key part of Dr. Pangaro's approach is the critical role played by action in the design process. This is why he is somewhat critical of the popular term *design thinking* as it suggests a focus on thinking only, and seems to separate action from thinking. He quotes Heinz von Foerster, who said, “if you desire to see, learn how to act.” Along this vein he continues:

We *see* as a result of action. We don't “first ‘see’ and then know and then act. This is because I don't always know what my goal is – I don't always know where I want to be – so it's not about pre-thinking and then acting.

This idea of a loop (or spiral) resonates with Schon's idea of design as being a dialogue—a dialogue between the designer and his or her stakeholders, materials, environment, and the evolving design itself (Schön 1983). This idea of design as conversation resonates deeply with Dr. Pangaro. In fact, from his cybernetic world-view, conversation could be seen as the foundation of society itself:

Collaboration comes from agreement, which comes from conversation. So, without conversation, we wouldn't have effective collaboration and coordinated action, and we wouldn't have society. So, knowing that as a designer, my goal has to be to enable others to converse... When designers work together, they are conversing about what to do and how to do it. My colleagues and I call this, design *as* conversation... But also, we're designing *for* conversation so that others can converse. So, if I'm designing a text chat interface or if I'm using AI to do a chat bot, I should know what it means to have an effective conversation and then try to allow people—users—in that interface to achieve that.

What is interesting in this example is that a “chat bot” is as much an agent in the process of design as the human designers. This reinforces both the wide range of agents

that engage in the design conversation, so to speak, as to the importance of technology to the design process. Technology in this sense is both the object being designed and part of the design conversation itself. Thus, while technology, design, and creativity can be examined independent of each other, the reality of the world we live in often situates them in relation to each other, as co-participants in the conversation.

### Technology and Creativity: the Evolving Conversation

Dr. Pangaro takes a cautious and critical mindset when asked about the role of technology on creativity and conversation. The rapid pace of change of technology has dramatically changed our lives, but our ways of thinking and our values have not been able to keep up. For instance, he wonders about the effects of the ubiquitous presence of internet and networking technologies on our lives, asking if “we have the language to think about it or to properly understand how it's changing our values.” He highlights the simple, everyday example of texting, and the “extraordinary absorption of our attention” to it, as being detrimental to conversation.

The dumbing down of conversation to texting back and forth can be very effective sometimes. If I know somebody really well, it works well, but a lot of it is not really conversation... So this is taking up a resource that we have a limited amount of, which is our attention and our ability to think and to interact creatively—not just for me to try to invent something—but in a conversation to invent something or go somewhere different together.

He noted that we are probably not yet enough aware what technology is doing to us. For instance, companies such as Facebook or Google see users as products or data-points to be manipulated for profit. Dr. Pangaro believes that these are serious issues that the culture is not really yet prepared to take on, partly because Silicon Valley, and the technologies themselves, are so powerful. That said, he emphasized that while he is clearly not a utopian in his views of technology, he does not count himself a pure dystopian either:

I love to hack—I've been writing code all my life, and I'm fascinated always by the newest iPhone, but I also want to hear the discourse that is questioning what is changing and what is not changing, and what we want to conserve as people. As a society—what are our values

and what do we want? And the technology is so overwhelming and so amazing and fascinating that you sit in a restaurant and you can count—nearly everybody has something in front of their face, even if they're with three other people.

This brings Dr. Pangaro back to the importance of conversation, and its central role in establishing our human values. When technology restricts or diminishes those values, it becomes worrisome or problematic. But there are also new possibilities and potentials that support creativity and conversation. This is possible only if we can begin to ask difficult questions about how we are interacting with these new technologies, such as:

What are your beliefs? How do you operate in the world? What do you want? What kind of a world do you want? Whether that's a world at large, or a world between the two of you—because every pairing or small group of people has their own private world in which they interact.

And in every case, Dr. Pangaro noted that it is about going back to the values and distinctions that we want to honor. At the end of the day, in terms of design, creativity, and what it means to be human, it still comes down to value judgments and a transdisciplinary awareness of the effects of the designs we create. This, according to him, has significant implications for how we train and educate the next generation of programmers and designers. He said:

In all of these things, it's about using the technology in service of the human values, and going toward the technology, rather than starting from the technology and saying, "Hey, I can connect people", "Hey, I can deliver personalized advertisements, "Hey, I can let someone take a selfie and make it last five seconds and disappear," or whatever. So, the reason why coders should study philosophy and ethics and other humanistic domains, is again about creativity and fostering new insight, but also to be conscious of their values and to know that every line of code they write has some value implicit in it. And is that the value that they want?

This brings the design of technology itself back to the idea of transdisciplinarity and creativity, by suggesting that the technologies we create are informed by who we are. Thus, who we are must reflect a broad range of ideas and disciplines. Through such cross-pollination of inspiration,

we expand our capabilities for enhancing our skills for creative re-seeing of the world. In bringing diverse perspectives and disciplines into how we design, create, and use technologies, we provide ourselves greater opportunities for multiple (and maybe even new) ways of seeing.

## Conclusion

The purpose of our interviews with creativity researchers is to provide a glimpse into the scope and range of the field. Creativity research has traditionally been located in psychology, which, though important as a perspective, is also limiting. There are unique disciplinary differences in, for example, education, or design, or cybernetics (in this interview) that enrich and deepen our understanding, adding to the rich fabric of creativity. These differences reiterate the inherently transdisciplinary nature of the field and allow us to see bigger commonalities, such as the importance of reframing problems, for a creative "re-seeing" of the world.

Dr. Pangaro's interview demonstrates just what we gain when we take a transdisciplinary approach to creativity. It affords the opportunity to move between the big picture connections of disciplines and the unique or specific ways of knowing that characterize creativity across the disciplines. This puts creative thinking both within disciplines and across them, for a truly (in)disciplined way of knowing.

**Acknowledgements** The Deep-Play Research group is a collective of faculty and students from Arizona State University and Michigan State University. Participants include: Kristin Elwood, Danah Henriksen, Sarah Keenan, Rohit Mehta, Punya Mishra, Carmen Richardson, and Melissa Warr. Address all communication to Punya Mishra: <punya.mishra@asu.edu>.

## References

- Henriksen, D., Mehta, R., Mishra, P., & the Deep-Play Research Group. (2014). Learning to see: Perceiving as a trans-disciplinary habit of mind. *TechTrends*, 58(4), 9–12.
- Mishra, P., Zhao, Y., & Tan, S. (1999). From concept to software: developing a framework for understanding the process of software design. *Journal of Research on Computing in Education*, 32(2), 220–238.
- Oldham, G. R., & Cummings, A. (1996). Employee creativity: personal and contextual factors at work. *Academy of Management Journal*, 39(3), 607–634.
- Root-Bernstein, R., & Root-Bernstein, M. (1999). *Sparks of genius*. Boston: Houghton Mifflin.
- Schaffer, S., & Douglas, I. (2004). Performance support for performance analysis. *TechTrends*, 48(2), 34–39.
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.
- Simon, H. A. (1969). *The sciences of the artificial* (1st ed.). Cambridge: The MIT Press.