applied optics

Lesson in creativity: editorial

RON DRIGGERS AND HAROLD SZU

Editor-in-Chief Ron Driggers shares lessons in creativity from Dr. Harold Szu.   © 2015 Optical Society of America

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I am humbled by the number of "giants" in optics and electro-optics who have mentored me in my career. Many of my successful colleagues have had similar experiences. I encourage younger folks to seek out the experts in your specialized field and get to know them. Chances are good that they will provide you with outstanding guidance.

One particular mentor of mine is Dr. Harold Szu. When I met Harold in 1990 he was already famous and was considered the father of modern day wavelets. He was also well-known for his work in neural networks, image processing, and nontraditional imaging techniques. I liked him immediately because, even though he was smarter and had more energy than me, he was always patient and treated me like a favorite nephew. While he taught me important concepts, he teased me with jokes and always had a smile and a wink to emphasize the fun of science and engineering.

I ran into Harold a few weeks ago and we had the chance to discuss one of his favorite topics: how to be creative. Below, I'd like to share Harold's guidance with you.

Harold's methodology for "thinking differently and working out one's thoughts diligently" was inherited from Ludwig Boltzmann, Paul Ehrenfest, and George Uhlenbeck, who taught Harold at Rockefeller University, New York.

There are 10 rules for creativity in a group setting, most of which focus on communication skills that enable synergistic collaboration. Communication is critical to successful group interactions. For example, coherently a group can achieve an order of magnitude larger impact: $1 + 1 \geq 11$; incoherently they interfere with each other achieving sum $1 + 1 \leq 2$.

When broken out from a modern neurophysiology point of view, there are four rules for the right-hand emotional-brain hemisphere, four rules for the left-hand logical-brain hemisphere, and two rules for the integration claustrum brain.

A. Emotional brain

1. Praise in public and criticize in private.
2. Be patient with immature ideas.
3. Be the most positive member of the team.
4. Be a mentor to junior team members.

B. Logical brain

1. Develop multiple resolution talks about the project/proposal/etc.: one-minute (elevator), three-minute (office), and ten-minute (seminar).
2. Practice cooperation during at least one interaction daily.
3. Remember and recognize individual contributions.
4. Keep two notebooks: one to document research and another as a to-do list.

C. Claustrum brain

1. Sharpen public speaking and writing skills as well as social skills.
2. Take the initiative to celebrate a team members' important days and events.

These ten creativity communication rules are accompanied by four creativity principles for individuals, also known as "the four Cs." These principles are helpful in a group setting but should be followed in one's individual work as well:

1. Courage (e.g., the ½ quantum number associated with the electron spin).
2. Comprehensiveness (e.g., Maxwell's field equations).
3. Complementarity (e.g., quantum and classical mechanics).
4. Conscientiousness (e.g., Edison's one inspiration and nine perspirations).

Harold's students are expected to adhere to these guidelines, and according to him, those students who practice them well achieve a greater level of creativity. I can tell you that Harold himself continues to live by these rules and principles. He still has very creative ideas, the energy to express them with excitement, and a laugh and a wink to punctuate the discussion!

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