

THE CONSTRUCTION OF MY PERSPECTIVE

K. P. Hari

The Beanpod, No. 18 Convent, Richmond town, Bangalore, India – 560025.

Email: khari.rao@gmail.com

In this paper, I reflect on my long immersion in textual materials from diverse domains of cognitive sciences, philosophy of mind, neuroscience, biology, social sciences, architecture, technology and design, on my thinking about these complex subjects and finally on the process of constructing my perspective by visual means.

“We help ourselves with all sorts of tools — models, books, conversations — all of which free the individual from the prison of his own immediate here and now by bringing to life the perspectives of other times, places, people” — Howard E Gruber, Development psychologist.

Keywords: Creativity, Complexity, Design, Thinking.

1. SEMINAL ENCOUNTERS

My journey began 18 years ago when I got an opportunity to attend a week-long leadership training workshop. On the second day of the workshop, a criminal lawyer gave a wonderful talk on ‘ecology’. The talk was packed with concepts of natural capital, conservation, mobilization, sustainability and a broad-based ecological relationship. It struck a deep chord within me. It introduced me to a way of thinking about the world. After the workshop, I underwent a period of intense reflection. I started frequenting used-book stores in the vicinity of my neighborhood to flip through the inexpensive books and magazines scattered around. Steadily this casual browsing began taking the form of a serious passion. I began developing a keen eye for noteworthy books, features and articles in magazines like Harvard Business Review, The Economist, Time, Fortune and Newsweek. The insights gleaned from these sources on politics, strategy, management science and the global economy generated a new awareness in me. I began to sense a novel purpose for my life.

2. ACTIVE SEARCH AND INQUIRY: FROM COGNITION TO COMPLEX SYSTEMS

2.1. My Discovery of ‘Cognition’

Taking my baby steps into the unknown, I continued to spend time on searching, reveling in books and periodicals. Once, on one of my regular visits to the bookstore, my eyes fell on a book titled “Seeds of Discovery — A Sequel to the Art of Scientific Investigation” by W.I.B. Beveridge. I became absorbed in its contents, on producing ideas, ways of thinking, the art of research, and the role of chance in discovery. I became fascinated with ‘cognition’. A few days later, reading a cover story in Fortune magazine (January 1995) on Bill Gates and his new-found interest in understanding complex processes of organizations, the human brain, technology and biotechnology stoked my allure further.

2.2. Raw Materials for my Inquiry

I immersed myself completely in texts (magazine articles, research papers, essays, books, interviews, biographies) mined from esoteric domains of cognitive sciences, artificial intelligence, the philosophy of mind, and neurosciences. The search was never linear; materials were often discovered through serendipitous connections in used-book stores and by using the bibliography as a reference to locate them in libraries. On a typical day, I would be reading a book by noted educationist John Holt titled “How Children Fail?” On another day, I would be assimilating the writings of the AI pioneer and economist Herbert Simon on human problem solving. The following day would find me absorbing the essays of the cognitive science philosopher Margaret Boden on computational psychology and artificial intelligence.

These materials led to insights into mental machinery: the physical features of our brain, distribution of memories, organization of our psychological system, how we think and make decisions, how do neural connections happen in the brain, how experts think and solve problems, the different kinds of thinking we employ to a task, the role of emotions, organization of knowledge, creative problem solving, the act of learning and how intelligence can be embedded in machines.

2.3. Capturing Complexity

The intense process of search, assimilation and reflection had begun to change my thoughts on mind, cognition and behavior. I began perceiving them as being ‘complex’. Following a compulsive need to articulate this ‘complexity’, I began doodling on loose sheets of paper and in notebooks. The resultant images were chaotic and composed of overlapping lines; I drew them on a daily basis, thus becoming an integral part of my thinking process (Figure 1).

2.4. Explorations in Complexity

Concurrently, I began to wonder if the aspect of ‘complexity’ was evident across other domains. This began to broaden the scope of my thought and inquiry. To begin with, I picked up materials from biology to read: mathematical models of biology, the survey of the human genome, structural genomics, and so on. Later, I quickly transitioned into other disciplines such as ecology, technology, cybernetics, social sciences and architecture. A sample of titles would include: complexity and economy, systems science for networked organization, social insects’ colony as complex adaptive systems, the size, shape and scale of cities, the curvilinear architecture of Frank Gehry, design and the elastic mind, ecology, asymmetry and stability, the architecture of markets.

My repertoire of insights now consisted of: economic systems and the interactions of diverse players within it, the multiple levels of organization within a biological system, the relationships of species in ecosystems, the organization of insect societies, the organization of human societies and social networks, the organization of markets, the evolution of technology, the way architecture projects are

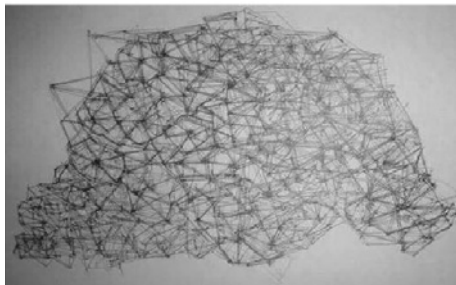


Figure 1. Early doodles on paper with pen.

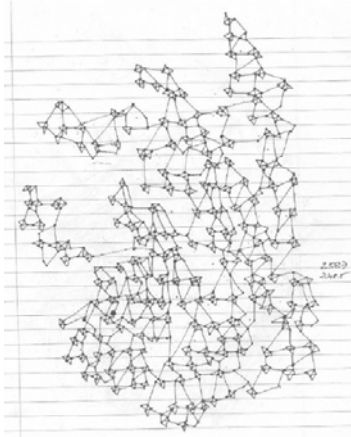


Figure 2. Network like forms on paper using micro-tip pen.

conceptualized and built, the process of design. A sample list of my diverse readings during this period is presented under the References section [1–47].

2.5. Evolution and Structure

My ideas of complexity had now begun to evolve, taking an abstract structure of its own. It changed the way I looked at living beings, road traffic, urban sprawl, the economy, technology and other social and cultural systems. This was having an impact on my sketches too. The chaotic and obscure characteristics of my doodles were now assuming network-like forms. I continued to produce a new configuration almost every day. However, at that point, I never ascribed any aesthetic value to my sketches. I was happy to draw and keep my drawings private. I was imagining myself more as engaged in synthesizing ideas to construct a theoretical perspective out of my long rumination (Figure 2).

3. CHANCE AND TRANSFORMATION

3.1. Scrawling on Mud

A chance event occurred in my journey when one day, outside my house, I saw a child playing in the wet mud with a few wooden laminates lying around. Seizing the moment, I started applying the wet mud on the smooth surface and instinctively started scrawling ‘lines’ all over it using my finger. The smoothness of the surface offered fluidity of movement. The images were very striking to me. All of a sudden, I realized that I had found a novel technique and a medium to translate my evolving thought. I tacitly began to see subtle traces of artistic leaning in my current renderings (Figure 3).

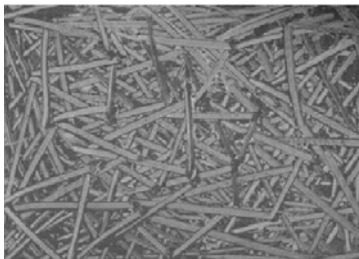


Figure 3. Wet mud on sun mica sheet (Size: 40 cms × 25 cms).

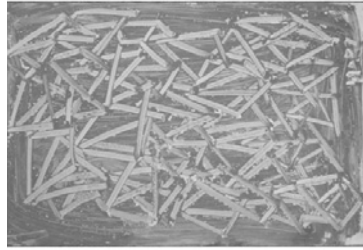


Figure 4. Wet mud mixed with poster colors on the rear surface of a conference poster (Size: 40 cms × 25 cms).

3.2. Experimenting With Color

After scrawling on more laminate surfaces, I tucked them away in a trunk and forgot about them. In the meantime, I continued to dive into the stream of textual materials flowing from diverse sources, shaping my ideas, and drawing network-like forms on paper. After an interval of two years, I felt the need to revisit my experimental work on laminated surfaces, but this time I could not find any more discarded sheets around me. Instead, I found a few discarded sheets of posters advertising conferences. The unused, reverse side offered me another opportunity to experiment. I coated the whole surface with wet mud mixed with poster colors and etched lines on it with a pen knife. To my surprise, the images still retained their striking character. The addition of poster colors lent them a more colorful look (Figure 4).

4. CONSTRUCTING MY PERSPECTIVE

A bigger shift was now happening inside me. My understanding of the materials of complex systems, structures and processes reached a new peak. My earlier intention of constructing a theoretical perspective had begun to fade. In an apparent shift, I started thinking in terms of artistic media, materials and how they affect the overall perception of my evolving imagery. My thoughts started finding spontaneous expression through diverse media of earthy pigments (red ochre, ash), plastic pipette tips used in biological experiments, enamel paints, granite chips, broomsticks and matchsticks.

4.1. Red Ochre on Flex Poster

I felt a deep urge to scale from my earlier laminate and conference poster surfaces. I continued to search for a larger format on which to convert my earlier technique of representing lines on wooden laminates and conference posters. It struck me that flex posters used for outdoor publicity offered a potent surface to work on. The texture of the reverse surface of the flex poster resembled a waterproof canvas. I imagined wet mud holding on to the surface and me scrawling on it. But then, it occurred to me that mud as a medium has the potential to develop cracks after it dries. Dwelling on this a little more, I was reminded of the use of red ochre in Indian homes during traditional festivals for refurbishing floors. This added a cultural meaning to my work. Moreover, red ochre does not crack on drying. I brought a packet of it, added water, and began layering it with my foot on the entire surface of the poster of size: 252.5 cms × 107 cms. I then started etching on it with my finger. Nothing came of it. I left the surface to go for a walk. During my walk, my foot accidentally hit a piece of rubber lying on the road. I picked it up, brought it to my studio and started etching on the still-wet surface. The results were striking. In what could be termed as a form of ‘action painting’, I began inscribing all over the surface. Even ‘mistakes’ made during the painting process would transform themselves into opportunities and reorganize themselves. During the process, I used to pause for a few minutes in between to reflect on the unfolding imagery. The execution brought into play all my physical and mental energies. The danger of the wet red ochre drying up before my painting was complete made my actions all the more urgent. Finally, I would stop after I felt that that the work was aesthetically pleasing. The whole process took around two hours to complete (Figure 5).

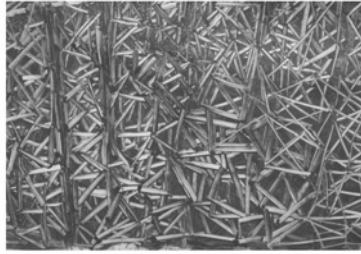


Figure 5. Red ochre on flex poster (Size: 252.5cms × 107 cms).



Figure 6. Sculpture made out of discarded Plastic pipette tips.

4.2. Plastic Pipette Tips

As a biologist, my wife uses a lot of plastic pipette tips for her biological experiments. One day, she brought home a few discarded tips from her laboratory. The shape of the tips fascinated me. Tinkering with the tips for a while I began gluing them together using heat to construct sculptures. They followed the pattern of my sketches on a three-dimensional plane. They kept growing and surprisingly began to find their own shape and stability (Figure 6).

4.3. Enamel paint on Flex Poster

I have never painted using a brush. During an exhibition at the National Center for Biological Sciences, Bangalore, the organizer asked me if I would like to paint my imagery on the iron barricades around their campus. I found that the corrugated surface was an impediment to brush strokes. Then I decided to paint on the reverse side of a flex poster and hang it on the barricade. In my neighborhood, several shopkeepers were using enamel to paint figures of deities on their walls. I thought I could replicate the same on the flex posters. I randomly picked up three colors from a hardware shop and bought a flex poster of size 304.8 cms × 121.92 cms. I spread the sheet on the floor and started layering black and green enamel all over it. Then, I allowed the paint to dry. Subsequently, using a brush, I started



Figure 7. Enamel on flex poster (Size: 304.8 cms × 121.92 cms).



Figure 8. Granite chips on green lawns (Size: 360cms × 360cms).

randomly dripping enamel on the surface (as Jackson Pollock did). I, then, used brush strokes to paint my recurring geometric images (Figure 7).

4.4. Granite Chips

In May 2009, I got my first opportunity to exhibit my body of work, at the National Center for Biological Sciences, Bangalore. Moving around the campus site, I came across a building under construction. I found pieces of granite chips scattered on the ground. I felt that the rectangular shapes could be used to construct my structures. I collected chips of different sizes and shapes, and assembled them on the green lawns of the campus. When I began my work, I never thought in terms of a pre-determined form. The image emerged as I continued to assemble the pieces (Figure 8).

4.5. Broomsticks

In January 2010, I got an opportunity to showcase my works at an international meeting on the Evolution of Complex Systems at the Indian Institute of Science, Bangalore. I felt the meeting also offered an excellent opportunity to attempt an art work at the venue, where the delegates could view my process of creating art. The broomsticks at home had always intrigued me. To me, they represented 'straight lines'. As the exhibition was indoors, the sticks were apt raw material for my art. I contacted a broomstick factory owner in my neighborhood, who gladly parted with his wastage. I brought the sticks to the exhibition venue and arranged the broken sticks on the floor (Figure 9).

4.6. Matchsticks

Recently, I was part of an art workshop held in Bangalore. The objective was public engagement and how art can be built out of simple basic materials. For me, 'matchsticks' symbolized everyday objects that people use. The material defined the moment. By placing the matchsticks adjacent to each other, I began to translate the material into an evolving geometry (Figure 10).



Figure 9. Broomsticks on wooden floor (Size: 210cms × 210cms).



Figure 10. Matchsticks on the ground.

5. THE CONNECTION TO DESIGN

Rather than addressing the formal qualities of my art and artistic practice, I wish to approach it as a dimension of design thinking. Right from the start, there has been a consistent effort on my part to translate my abstract ideas into tangible forms. Therefore, in design terms, my approach echoes the ‘form follows function’ principle. The visual constructs that I have evolved are based on the elements that stem from a purely functional activity —making doodles that fix complexity on paper.

ACKNOWLEDGMENTS

I thank my family and friends, Ilango Nadar, Ashish Dalvi, Ashish Srivastava, Nagarajan Narasimhan, Girish Shenoy, and Nilkanth Keshavan for their contribution and support in finding my way to the goal. I specially thank my wife, Neeraja, for her unconditional love and support, and my friend, Unnikrishnan Bhaskaran for his help in shaping this manuscript.

REFERENCES & ESSENTIAL BIBLIOGRAPHY

1. Feibleman, J. and Friend, J.W., “The structure and function of organization”, *The Philosophical Review*, Vol. 54, pp. 19–44, 1945.
2. Krugman, P., “Complex landscapes in economic geography”, *The American Economic Review*, Vol. 84, pp. 412–416, 1994.
3. Gerencser, M., Napolitano, F. and Lee, R.V., “The megacommunity manifesto”, *Strategy+Business*, Summer 2006/Issue 43, pp. 1–9, May 30, 2006.
4. Page, S., “Uncertainty, difficulty, and complexity”, *Journal of Theoretical Politics*, Vol. 20, pp. 115–149, 2008.
5. Clark, W., “Economist Steven Durlauf applies complexity to the study of inequality”, *SFI Bulletin Winter Edition*, Vol. 12, pp. 3–6, 1996–97.
6. Stites, J., “The future of agent-based modeling of financial markets”, *SFI Bulletin Winter Edition*, Vol. 21, pp. 30–35, 2006.
7. Lobo, J., “Bringing cities into complexity science”, *SFI Bulletin Winter Edition*, Vol. 19, pp. 8–10, 2004.
8. Shalizi, C., “The logic of diversity: the complexity of a controversial concept”, *SFI Bulletin Spring Edition*, Vol. 20, pp. 34–38, 2005.
9. Stites, J., “Heterarchy: the organization of diversity travels with sociologist David Stark”, *SFI Bulletin Fall Edition*, Vol. 14, pp. 2–5, 1999.
10. Arthur, B., “Complexity and the economy”, *Science*, Vol. 284, pp. 107–109, 1999.
11. Boden, M., “Creativity and unpredictability”, *Stanford Humanities Review*, Vol. 4, pp. 123–139, 1995.
12. Antonelli, P., “Design and the elastic mind”, *The Museum of Modern Art*, New York, 2008.
13. Dawkins, R., “God’s utility function”, *Scientific American*, November, pp. 80–85, 1995.
14. Bower, J.M., “Rethinking the lesser brain”, *Scientific American*, August, pp. 51–58, 2003.
15. Berners-Lee, T., Hendlar, J. and Lassila, O., “The semantic web”, *Scientific American*, May, pp. 4–8, 2001.
16. Horgan, J., “From complexity to perplexity”, *Scientific American*, June, pp. 74–79, 1995.
17. Hickock, G., “Neuroscience: sign language in the brain”, *Scientific American*, June, pp. 58–65, 2001.
18. Wallace, D., “Mitochondria DNA in aging and disease”, *Scientific American*, August, pp. 40–47, 1997.
19. Bonabeau, E., “Scale free networks”, *Scientific American*, May, pp. 50–59, 2003.
20. Arthur, B.W., “Why do things become more complex?”, *Scientific American*, May, pp. 94–94, 1993.
21. Kay, A.C., “Computers, networks and education”, *Scientific American*, September, pp. 138–148, 1991.

22. Wakefield, J., "Complexity's business model", *Scientific American*, January, pp. 31–32, 2001.
23. Lenat, D., "Artificial intelligence", *Scientific American*, September, pp. 80–85, 1995.
24. Batty, M., "The size, scale, and shape of cities", *Science*, Vol. 319, pp. 769–771, 2008.
25. Norman, D., "Designing the future", *Scientific American*, September, pp. 186–187, 1995.
26. Helmuth, L., "Fear and trembling in the amygdala", *Science*, Vol. 300, pp. 568–569, 2003.
27. Koch, C. and Laurent, G., "Complexity and the nervous system", *Science*, Vol. 284, pp. 96–98, 2007.
28. Kleinberg, J. and Lawrence, S., "Network analysis: the structure of the web", *Science*, Vol. 294, pp. 1849–1850, 2001.
29. Tyrann, J.-R., "Money illusion and the market", *Science*, Vol. 317, pp. 1042–1043, 2007.
30. Csete, M.E. and Doyle, J.C., "Reverse engineering of biological complexity", *Science*, Vol. 295, pp. 1664–1669, 2002.
31. Morgan, G., "Images of organization", SAGE publications, 2006.
32. Goldenfield, N. and Kadanof, L.P., "Simple lessons from complexity", *Science*, Vol. 284, pp. 87–89, 1999.
33. Boden, M., "Précis: creative mind and mechanisms", *Behavioral and Brain Sciences*, Vol. 17, pp. 519–570, 1994.
34. Carlson, J.M. and Doyle, J., "Complexity and robustness", *Proceedings of the National Academy of Sciences USA*, Vol. 99, pp. 2538–2545, 2002.
35. Simon, H., "Discovery, invention, and development: human creative thinking", *Proceedings of the National Academy of Sciences USA*, Vol. 80, pp. 4569–4571, 1983.
36. Toledo, B.A., Cerda, E., Rogan, J., Muñoz, V., Tenreiro, C., Zarama, R. and Valdivia, J.A., "Universal and non universal features in a model city traffic", *Physical Review E*, Vol. 75, pp. 1–10, 2007.
37. Sendova-Franks, A.B. and Franks, N.R., "Assembly, self-organization and division of labour", *Philosophical Transactions of the Royal Society B: Biological Sciences*, Vol. 354, pp. 1395–1405, 1999.
38. Gooding, D., "Visual cognition: where cognition and culture meet", *Philosophy of Science*, Vol. 73, pp. 688–698, 2006.
39. McDermott, R., "The feeling of rationality: the meaning of neuroscientific advances for political science", *Perspectives on Politics*, Vol. 2, pp. 691–706, 2004.
40. Day, R.L., Laland, K.N. and Odling-Smee, F.J., "Rethinking adaptation, the niche construction perspective", *Perspectives in Biology and Medicine*, Vol. 46, pp. 80–95, 2003.
41. Davies, B., "Networking the brain", *OMNI magazine*, Fall Edition, pp. 20, 1995.
42. Levy, S., "Tangled in deep blue", *Newsweek*, February 26, 1996.
43. Griffin, T., "Your child's brain", *Newsweek*, February 19, 1996.
44. Barabási, A.L., "Taming complexity", *Nature Physics*, Vol. 1, pp. 68–70, 2005.
45. Holt, R., "Ecology, asymmetry and stability", *Nature*, Vol. 442, pp. 252–253, 2006.
46. Adolph, R., "Cognitive neuroscience of human social behavior", *Nature Reviews Neuroscience*, Vol. 4, pp. 165–178, 2003.
47. Viscek, T., "Complexity: the bigger picture", *Nature*, Vol. 418, pp. 131, 2002.
48. Strogatz, S.H., "Exploring complex networks", *Nature*, Vol. 410, pp. 268–276, 2001.
49. May, R., Levin, S.A. and Sugihara, G., "Ecology for bankers", *Nature*, Vol. 451, pp. 893–895, 2008.
50. Harvey, J., "The natural economy", *Nature*, Vol. 413, pp. 463, 2001.