This is a book about the psychology and sociology of innovation and research. It is organized into seven chapters, apart from a separate introduction and conclusion section. Though the coverage of the book is broad, the topic discussed is important for researchers in science and engineering.

In the introduction, the author points out the importance of cities and the internet in fostering innovation. While living organisms tend to slow down as they become large, networked systems become more productive as they increase in size. For example, a city which is 10 times larger than its neighbour is 17 times more innovative. Here innovation was measured in terms of patents, R&D budgets, etc. This superlinear scaling is due in part to the abilities of cities to nurture subcultures of innovative people. The author compares this productivity of cities to the plethora of life seen in coral reefs which he uses as an example of a fertile ecosystem for biological innovation throughout the book. The World Wide Web offers similar advantages for networks. It provides access to information through search engines and promotes global subcultures of individuals who may be working in narrow and esoteric areas. Scientists will certainly appreciate how much easier it has become to take part as an author, reviewer and editor in the post-internet world.

Chapter 1 is entitled 'The adjacent possible'. The popular perception of research is that it comes from big breakthroughs. However, the reality is that most discoveries emanate from discoveries in the 'near field' of the known. The theory of the adjacent possible can also be used to explain the theory of 'multiples', which is the event where more than one researcher discovers a fact at about the same time, while working independently of each other. This fairly common phenomenon occurs because the accumulated knowledge-base obtained by other researchers reaches a point where a move into the adjacent possible by anyone will yield a new idea. The adjacent possible can also act as a constraint on ideas. For example, the discovery of oxygen required not only the knowledge that air is made of a variety of gases, but also advanced scales which could measure minute changes in weight caused by oxidation.

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The second chapter is titled 'Liquid networks'. The power of networks comes not only from their numbers, but also from their interconnections with each other. The author mentions that innovative systems exist at the 'edge of chaos', which separates the orderly state (akin to solids) from the chaotic state (akin to gases). The liquid network thus facilitates existence at the edge of chaos where exploring of the adjacent possible is the easiest. The author mentions an interesting experiment where the laboratory environment of scientists was studied by sociologists by recording all the action taking place. The surprising finding was that most discoveries took place not at the microscopes or computers, but during discussions at the weekly laboratory meetings. The liquid network of the research group was instrumental for completing the thought of individual members and creating new ideas. It is inspiring to note that a network of thinking minds has considerable potential even in these days of big science and technology projects.

The third chapter is titled 'The slow hunch'. Large cities and the internet are dense liquid networks which provide the possibility of completing an idea which exists in a mind in a formative stage. The author calls this rudimentary idea a 'slow hunch'. According to him, 'most great ideas come into the world half baked, more hunch than revelation'. The hunch needs access to other minds to complete itself and hence the importance of the liquid network. The author details the hunches of Darwin and Newton revealed in their personal writings, which existed long before their ideas were published formally. The book reveals that during the early days of the enlightenment in Europe, scholars maintained a 'commonplace book', where they noted down various ideas which came to them and also took notes from their readings. This kind of notebook appears to be a good idea for researchers. The commonplace book should be periodically reread to see the evolution of past hunches. One suggestion in this chapter is to devote 20% of one's time for pursuing a 'pet project', totally guided by one's hunches.

The fourth chapter entitled 'Serendipity', which is the process of accidentally discovering something which we are not in quest of. A striking example in this chapter is of a chemist who discovered the molecular structure of benzene while daydreaming about Ouroboros, a serpent from Greek mythology which devours its own tail. One way to enhance serendipity is through dream inspiration during which the 'dreaming brain stumbles across a valuable link that has escaped waking consciousness'. Sleeping over problems is a simple way to invoke dream inspiration. Other methods to increase the change of serendipitous encounters include going for a walk, eclectic reading, sabbaticals, etc. It seems to me that while the exploration of the adjacent possible reveals the 'known unknowns', serendipity can reveal the 'unknown unknowns'.

The fifth chapter is titled 'Error'. Here the author points out that many inventions involve a series of mistakes. According to the author, 'a shocking number of transformative ideas in the annals of science can be attributed to contaminated laboratory environments'. For example, penicillin was discovered by the accidental infiltration of the mould into a culture of Staphylococcus which was left near an open window of the laboratory. Errors create a path which deviates from the typically held assumptions, and being wrong forces one to explore. The author suggests that experiments which produce unexpected findings should be carefully studied for breakthrough ideas. He links errors to mutation in biology which can occasionally produce a good solution, but is generally undesirable. The capacity to tolerate mistakes and move forward is a hallmark of innovation.

The sixth chapter, 'Exaptation', describes a trait developed for a specific purpose that ends up being used for a completely different and unintended function. For example, bird feathers were

This book attempts the impossible task of integrating science, philosophy, consciousness and religious thought within one single treatise. Since one has specialized only as a physicist, one is conscious of one’s limitations in reviewing such a book. The word ‘philosophy’ literally means the love of truth. Therefore, it includes science, since science is a quest for the truth about how Nature functions. The author quotes Einstein saying, ‘If philosophy is interpreted as the quest for the most general and comprehensive knowledge, it obviously becomes the mother of all scientific enquiry’. Perhaps this is why those who do scientific research are still awarded the degree of ‘Doctor of Philosophy’. However, science deals mainly with the measurable, whereas philosophy, consciousness and religious inquiry deal essentially with the immeasurable. Basic science, so far as I know, is unable to define what consciousness is or explain how it originated, if at all. The scientist speculates that both life and consciousness are generated as an emergent property when the atoms of matter come into a particular configuration. Erwin Schroedinger made an interesting statement about the ultimate aim of science. He wrote, ‘I consider science an integrating part of our endeavour to understand the one great philosophical question which embraces all others: WHO ARE WE? I consider this not one of the tasks but THE task of science, the only one that counts.’

According to the standard model of the origin of the universe, it began with a Big Bang explosion in which energy was in the form of a plasma consisting of quarks, photons, electrons and such elementary particles in random motion. The explosion led to a rapid expansion of the universe and it has continued to expand till now. There could be no life at the origin of the universe since there was no structure and consequently, no consciousness either. The universe of the physicist is a dead universe and the laws of physics do not predict or require the origin of either life or consciousness. According to present scientific knowledge, life appears to have originated accidentally and not intentionally. Consciousness as we know it is believed to have evolved gradually in the course of biological evolution as the structure of the brain became more and more complex.

Religious thinkers fundamentally disagree with this scenario. According to them it is impossible to generate the visible structure in the universe, including life-forms such as our own body, without any intelligence directing the phenomenon. They argue that if it takes intelligence and directed ingenuity to build a computer or a space-vehicle, does it not take intelligence to build a tree or a human body out of the chaotic state of the early universe? So according to religious philosophers intelligence was there first, in the form of a universal consciousness (as distinct from our personal psyche).