This article is based on an extract from Philip Harland's book,
The Power of Six, A Six Part Guide to Self Knowledge (Wayfinder Press 2009, 2012)

EUREKA!

The Emergence of the Simple Solution

Philip Harland

Rumour has it that Archimedes' discovery of a formula for calculating volume and density came to him while he was on one of his visits to the local baths. His sudden realization about a body's displacement of water may have come about when he slipped on a bar of soap, but we can be sure that the actual mathematics involved were the result of a great deal of earlier brainwork.

When we add one idea to another, things can get knotty (or slippery) and intricate. Complexity builds over time, then tends to reorganize suddenly, when simple solutions emerge. If you have ever woken in the morning with an idea about something you gave up on the night before, you will have experienced emergence in action. When enough separate but related components have the time and opportunity to interact, something new happens.

Archimedes legendary cry of "Eureka!", by the way ("I have found it!"), comes from the same root as 'heuristic', a strategy for working your way towards the solution to a problem. Take the prescribed steps over and over again in an iterative process and you are likely to get the results. Eureka. You can *expect* emergence to occur.

What is an iterative process?

My client COLIN is having trouble trying to communicate with his girlfriend. They are very much involved, but driving each other round the bend, because she is very expressive emotionally and Colin is not. He struggles to recognize his feelings, never mind express them. What Colin wants, as he puts it, is "To know what is inside". If I were to ask him a succession of "What do you know about that?" questions, he would probably not get much further than his first answer ("Nothing"), because my questions, being simply repetitive, would likely produce more of the same. However, if my second question is, "And what *else* do you know about that?" Colin is obliged to find new information that incorporates and allows for the first response. "Nothing" is no longer sufficient.

"And what else?" is an iterative question. Through a succession of these, Colin is able to build on what he knows and to get successively closer to discovering "what is inside". It turns out to be not only a cozy mixture of love and joy, but also a bunch of disagreeable feelings like shame, guilt, and fear. Iterative questioning helps him find out a great deal more about what he had hidden from himself.

What are the differences between iteration, interaction, and integration? And what are their places in the chain of events that lead to emergence (Figure 1)?

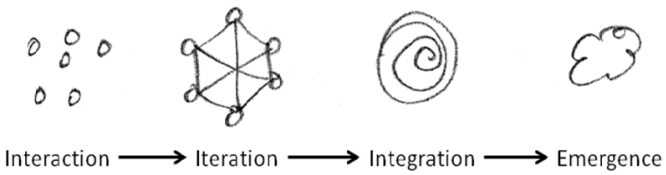
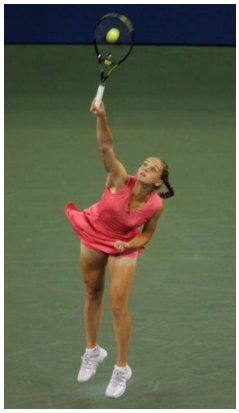


Figure 1 Nodes of information interact, leading to iteration, integration, and eventual emergence

Interaction is the lower-level behaviour from which a higher-level pattern, integration, emerges, and in the living organisms we are talking about here (you, me, and Colin), it does so via an intermediate process of iteration. Iteration is the repetition of a rule or procedure applied to the result of the previous application, a means of obtaining successively closer approximations to the solution of a problem or of generating something new. As Colin *interacts* with the Power of Six questioning, the information his bodymind generates *iterates* with everything else that he knows, consciously or not, about himself and the world … *integrates* in some very personal way … and *emerges* as a learning that enables him to improve his relationship with his girlfriend and to enhance his life as a whole.

Colin is thus *enabled*. He *can do*. The word 'can' has the same root as 'know'. They come from a nice Old English verb, 'cnawan', which meant both 'can' and 'know'. *To know is to be able.* Knowledge, as Francis Bacon reminds us, is power.

As recently as the mid-twentieth century, many scientists still believed that knowledge had some kind of independent metaphysical existence. Science philosopher Michael Polanyi went to some lengths to point out that knowledge is in fact personal, constructed of patterns of neural activity within individual brains. As the question "And what else do you know?" is repeated, the client's brain is obliged to cast around for a new response while making allowance for its earlier answers. It is this cyclical, largely unconscious, 'taking into account' that gives the questions their iterative power.



Tennis players attempt to optimize the serve by taking into account what happened in the earlier serves, what is happening now, and what they want to happen next. Each bounce of the ball, each shift of the hips, each thought about the importance of the point, are all part of the act of serving as a whole. When enough of these separate but related components interact, iterate, and integrate, an emergent system, the serve, occurs, with properties unlike those of its contributory components.

Life itself is an emergent feature of the history of the planet. Our individual identities derive from a legion of conflicting needs and desires combining so that the perception of a single, unified 'self' emerges.

Or, rather, continues to emerge. We are in a continual state of emergence, as the self-determining system that is you or I acquires self-knowledge and learns from itself.

Acquiring knowledge is like accumulating capital: it increases at compound interest. In fact, knowledge goes one better, as 19th century mathematician Charles Babbage pointed out:

> The increase of knowledge produces a more rapid rate of progress, whilst the accumulation of capital leads to a lower rate of interest. Capital thus checks its own accumulation; *knowledge thus accelerates its own advance* [my italics].

What advances is an intelligence with novel but consistent qualities that seemed not to exist before. It is an *embodied* experience, which makes it more of a challenge to unravel than a purely intellectual or material event. Once David Grove and I were musing on the felt experience of emergence:

DG It's as if something is missing which then reappears.

PH Like the French for "I miss you" is actually, *"Tu me manques*", literally, "You are missing **in** me."

DG That's it. The thing that was missing in me has returned. The Maori say, *"Aroha noa."* The Aroha noa, the *grace* I lacked has re-emerged. It is now, as the French say, *reconnue,* re-cognized, known again.

The emergence of knowledge has many metaphors. It has been likened to:

crossing a threshold
a bringing to light
an unfolding
a blossoming
a collapse of complexity
a moment of grace
an epiphany.

An epiphany is a forth- (*epi*) -showing (*phany*), a sudden intuitive insight into the essential meaning of something. My client Colin, struggling with acknowledging his feelings and trying to "look inside", has a sudden memory of a little box he owned as a child. He remembers that as a six-year old he had decided to lock his distress at losing his mother into this box. He has been locking away his difficult feelings ever since.

An epiphany is often initiated by some simple, commonplace occurrence, like finding the one piece of the puzzle that makes the picture complete. As a small child, I used to enjoy building things from wooden blocks. To construct a pyramid, I learned to place three blocks in a line, add a layer of two, and top it off with one (Figure 2).

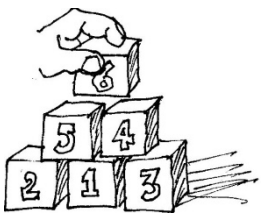


Figure 2 A system solution: emergence in action

Six simple operations, but the thrill of positioning the sixth could only be achieved if the first five were in place. At that moment the whole became more than the sum of its parts. This was a system solution: emergence in action.

One of the first to conceive of the *idea* of emergence was the philosopher Plato, who pointed out that the meaning of a word was more than the sum of its individual letters. But it was not until the 1940s that the modern 'discoverer' of emergence, the Latvian-German philosopher Nicolai Hartmann, would declare unequivocally that:

> An emergent property of a system is one that is not a property of any component part of that system.

A theme taken up by many scientists and philosophers since. In a 2002 paper, *The Re-Emergence of 'Emergence'* (recommended for an historical and theoretical overview of the subject), complexity researcher Peter A. Corning writes of the evolution of emergent systems in which:

> quantitive, incremental changes can lead to qualitative changes that are different from, and irreducible to, their parts.

The behaviour of every dynamic system arises from the interaction of its parts and cannot be predicted from what we know of the parts in isolation. An ant's nest is a fully emergent system. Ants as individuals are not very bright, at least not by our anthropocentric standards, yet they develop hugely intelligent, self-sustaining communities. In sharing *information*, they generate *intelligence*.

Bees too. Biologist-engineer Kevin M. Passino describes what happens:

The swarm knows more than the sum of what every bee knows.

Effective agreement between two or more people does not follow from a recapitulation of their separate positions, but from applying the result of their last discussion to the next discussion until agreement emerges. Single brain cells are largely autonomous, but their interactions form larger entities from which complex functions way beyond the competence of single neurons emerge. A supreme example of emergence is human consciousness, a property of bodymind iterations with very different qualities to its contributory components of sensory processing, electrical signalling, chemical exchange, and neural synchrony – a whole at a higher level of self-organization that is not only unpredictably more than, but also distinctly different to, the sum of its parts.

How do iteration and emergence apply in therapy, coaching, teaching, and training, where it may only take one or two small changes to produce life-changing effects? Systems theorist Fritjof Capra explains in *The Web of Life* how small differences are amplified into large ones through a process of "self-reinforcing feedback". A small difference feeds into the system → the system performs better → the difference is confirmed → the rewards are reinforced. Here is a simple example: a state of tension can be reduced easily and quickly by taking a deep diaphragmatic breath, which relaxes the body, which makes it less tense, which makes it easier to take more deep diaphragmatic breaths. The effect accelerates its own cause. Just as laughter, an emergent effect of feeling good, releases endorphins, a cause of feeling good, and a good dose of endorphins produces a buoyant feeling that makes us more likely to laugh.

Emergence will not arise if its various parts simply co-exist. They must meet and unite in some way. They must *affect* each other. In the late 1960s, the American biologist Dr. John Bonner Buck made a study of *Photinus pyralis*, a species of fireflies found at night on a tidal river in Thailand. He showed that after a period of interaction, the independent, self-seeking flashing of individual fireflies would gradually synchronize to light up the whole riverbank.

I have seen the effect for myself at a smaller scale on the Greek island of Paxos. Buck explained the phenomenon as beginning with nothing more complex than a mating display. A male firefly would flash to attract a female. A female or two would flash back. More fireflies would be attracted, leading to the emergence of synchronous flashing, which maximized the light output of the whole group, which attracted more fireflies, resulting in more flashing, more mating, and so on. Each small part of the system affected the others until something larger than their totality emerged. Buck called the process 'voluntary synchrony'.

His finding opened up a new branch of science and gave rise to a large number of studies of 'bottom-up' phenomena and the importance accorded to rhythmic neural processes and consistency in what became known as 'small-world networks'. The term was coined by mathematician Steven Strogatz and sociologist Duncan Watts in a 1998 paper, *Collective Dynamics of Small-World Networks*. They concluded that very few 'weak links' (or 'social bridges', or 'short cuts') were needed to make a given world small and predicted that small-world architecture would turn out to be prevalent across a wide variety of technical, social, and biological systems.

And so it turned out. In the biological system we know as a human being, the procedures of the Emergent Knowledge process 'The Power of Six' help create the links and build the bridges between adjacent bits of a person's information so that they interact and affect each other ... to form a small-world network ... whose parts iterate ... resulting in a collective intelligence from which something novel emerges.

Interaction, iteration, and emergence are complex events, but in the context of therapeutic intervention, we can define the simple behaviors necessary for them to take place as

> **Repeatedly applying a set of questions enabling the information that ensues from the responses to be added to the result of the previous application until new knowledge emerges or healing takes place.**

Rhythmic (repetitive) neural activity prompted by the persistent application of the same question results in voluntary (self-organizing) synchrony: a harmonization of the simultaneous activity of bodymind components to produce a dynamic, emergent, consistent effect. People get better. They solve their problems. They transform their symptoms. And surprisingly (or not, depending on your point of view) they do it themselves. Eureka!

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