

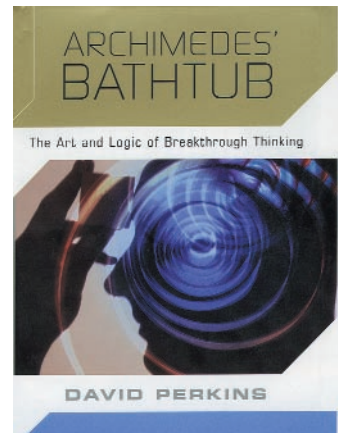
Puzzling thoughts

Archimedes' Bathtub: The Art and Logic of Breakthrough Thinking

by David Perkins

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Matthew J. O'Connell



Archimedes, when challenged by King Hiero II of Syracuse to determine if his crown was indeed made of gold, retired to his bath to think. As he settled in to relax, the waters rose, and “Eureka!” — with a breakthrough thought he realised water displacement could be used to measure volume, and hence the density of an object, and therein lay his answer.

Archimedes was not alone in applying breakthrough thinking, coming from ground shifting inspiration, to solve a complex problem. It has been behind many of the great advances in science, technology and culture. Beethoven, da Vinci, Newton, Einstein, Darwin and the Wright Brothers used it, as does the current crop of cell biologists, though perhaps to a more modest extent.

In his most recent work, David Perkins, the co-director of the Project Zero research group at the Harvard Graduate School of Education, describes breakthrough thinking as structured with five discernable phases. These include a long search involving a significant question, with little apparent progress over what can be considerable time. Next comes the all-important precipitating physical or mental event leading to a cognitive snap, and then a real transformation in our physical or mental world. The precipitating events often involve a degree of luck, such as an episode of being in the right place at the right time. Although Perkins discusses ways in which we can increase the chance of such luck events, it is not entirely luck, and the long search can prepare us for the moments of connection—as Pasteur noted, “Chance favours the prepared mind”.

Perkins argues that such breakthrough thinking is distinct from a more sequential and incremental approach to a problem. Indeed problems that benefit from breakthrough thinking are generally resistant to sequential reasoning. Throughout this well written book, intriguing and entertaining puzzles are used to illustrate specific points, showing the reader how to think outside

the square and to avoid false clues and assumptions. In many ways, these puzzles serve as somewhat of a “mental gymnasium”, in which it is argued that one can develop skills in breakthrough thinking. For example, there is the story of the man who brings a coin stamped 540 BC to sell to a museum. On inspection, the director immediately calls the police—why?

To further demonstrate that breakthrough thinking is a distinct problem solving approach, Perkins uses the analogy of searching for gold in the Alaskan Klondike. The problems encountered in the search for gold in such a large area serve well to highlight dangers and potential solutions to use in breakthrough thinking. First of all, there is generally a vast “wilderness of possibilities”, which presents the trap of many tempting directions, though only a few if any will prove fruitful and so we need to rove though the possibilities. There is also the danger of reaching a “clueless plateau”, a lack of apparent clues, though we need to search for hidden clues in what we have. “Narrow canyons of exploration” may have us looking in the wrong place or direction, or suffering from a poor assumption. Here, reframing the problem, stepping back and taking a fresh approach can be very beneficial. Finally, Perkins describes “oases of false promise”, when answers are almost, but not quite, good enough. We all know the feeling of being very close to the answer, but are perhaps as far away as we began; like getting out of the canyon, we need to move on, decentre our position, and look elsewhere for the solution.

Perkins proposes that nature, through evolution, has also used principles of breakthrough thought, in which perhaps the “cognitive snap” is substituted by a “rapid breakthrough”, itself brought on by a precipitating event such as a change in habitat or climate. The transformation this brings about, Perkins argues, leads to advances that are essentially breakthrough evolution, sudden and substantial changes. Using the example of the evolution of flight, an inter-

esting and persuasive argument supporting this model is presented.

This book will be of interest to a wide audience who are engaged in creative pursuits. For scientists, for whom creativity is paramount, it offers much in terms of how we can structure, develop and interpret our research. Many of us have experienced the feeling so well demonstrated in a cartoon published some years ago in *Punch*. A mathematician, in a generic and Larsonesque lab coat and glasses is working at a board full of equations. He quips to his colleague “I’m getting closer to the answer, but I can’t for the life of me remember what the problem was”. Boggled down by the daily routine, perhaps chipping away at our topic of interest, applying some of the strategies of breakthrough thinking suggested by Perkins may promote the cognitive snap, our own Eureka!

Getting back to the problem of the coin, many would have recognized that the problem lies in the date—in 540 BC, how did people know it was 540 years before the birth of Christ? Hence, the coin is a fake and its seller a fraud...but what if I was to tell you that there is nothing wrong with the date, but the museum director still calls the police? □

Matthew J. O'Connell is in the Peter MacCallum Cancer Institute, Melbourne, VIC 3002, Australia.
e-mail: m.oconnell@pmci.unimelb.edu.au

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