A reflection on the differences between incremental and breakthrough innovation

Of peeled carrots and ‘the Fosbury Flop’

Insights from Kuhn’s *The Structures of Scientific Revolutions* applied to corporate innovation

The table at the top of this essay illustrates one aspect of this, identifying a number of paradigm shifts of breakthrough innovation experienced over the past fifty years. In each case the same product concept existed before and after the breakthrough while the products themselves were remarkably different before and after the breakthrough.

Some examples – applying these concepts to innovation

**Example 1:** Consider the development of peeling carrots for home use. One hundred or more years ago, this would have required using a simple, single-blade knife. As people cut their fingers peeling with knives and as manufacturing technology advanced, consumer safety rose in importance. Today, you can buy a simple safety blade peeler (with a pair of blades facing themselves, not outward) for about a dollar – a nice, incremental innovation improvement on the single-blade knife. The next incremental innovation was the ergonomic peeler, a safety blade peeler on a handle designed for extended periods of comfortable use. Ultimately, however, breakthrough innovation occurred with a paradigm shift from the consumer peeling carrots to the consumer buying pre-peeled carrots, and, with that, the manufactured baby carrot was born.

Kuhn’s views also comfortably apply to a description of the progression of corporate innovation, with a paradigm shift corresponding to breakthrough innovation and normal science corresponding to incremental innovation.

**Example 2:** As noted in the previous essay in this series, in our recent book, we tell the story of breakthrough innovation exemplar Tom Osborn of P&G. Here I re-tell the story with an emphasis on applying Kuhn’s insights.

Working in the feminine hygiene products business, Tom recognized that many of his colleagues came from the diaper paradigm. In many respects this was not an unreasonable paradigm for them to assume, as both feminine hygiene pads and diapers were employed to catch fluid. More importantly, products based on the diaper paradigm sold well in the marketplace and it also lent itself to opportunities for incremental...
innovation, improvements such as increased absorbancy. Tom, however, believed that the diaper paradigm could be improved upon in a more powerful way. After studying the problem in detail, Tom began to believe that an improved way of thinking about a feminine hygiene product was, instead, a garment paradigm.

However, management initially believed that it was best to remain in production with the diaper-paradigm products. Ultimately, Tom was able to successfully convince them to shift paradigms – not an easy task. P&G was rewarded in the marketplace for making this move that led to the 'billion-dollar brand', Always® Ultra.

**Example 3:** To illustrate that these complementary concepts of incremental and breakthrough innovation – defined in a manner consistent with Kuhn’s insights – apply to innovation quite broadly, here is an example from athletics.⁴

![Olympic gold medal heights in high jump](image)

In the figure above, we observe the Olympic gold-medal-winning heights (in meters) in high jump for each of the Olympic games. Over this 100-plus year history, four distinct paradigms of high jumping were embraced by competitors, with the eras of dominance of each paradigm noted. What we can discern from this data is that incremental innovation occurred within each era while breakthrough innovation (paradigm shifts) occurred between eras.

Of interest is how one could not successfully implement ‘the Fosbury Flop’ without associated improvements in technology that had to take place in order for the paradigm shift to occur. In particular, a high jumper would have broken their neck had they attempted this move into a sawdust pit of the type used only a few years earlier. It was the advent of thick, foam landing pads that enabled Dick Fosbury to jump and land backwards, rather than forward – a move that, by lowering his center of mass during a jump, gave him a small, but clear competitive edge in attaining greater height.

**Example 4:** I’ll conclude these reflections on paradigms, paradigm shifts, and the incremental innovations that occur within a paradigm with the link to a video shared by Terry Grapentine, vi comparing two paradigms of banana peeling – that done by a monkey contrasted with that done by a human. Since hearing about this from Terry, I’ve been amused by just how easy it is to work within the monkey’s paradigm! ■

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² See [http://www.carrotmuseum.co.uk/babycarrot.html](http://www.carrotmuseum.co.uk/babycarrot.html) for a history of baby carrot innovation.
⁴ This illustration was shared by Vijay Govindarajan in a presentation at the IRI 2012 Annual Meeting.
⁵ [http://www.youtube.com/watch?feature=player_embedded&v=n8Jv56WUDng](http://www.youtube.com/watch?feature=player_embedded&v=n8Jv56WUDng) (how to peel a banana like a monkey).

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