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MSI Reports (ISSN 1545-5041) is published quarterly by the Marketing Science Institute. It is not to be reproduced or published, in any form or by any means, electronic or mechanical, without written permission.

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Innovation: The Case of the Fosbury Flop

Jacob Goldenberg, Oded Lowengart, Shaul Oreg, Michael Bar-Eli, Shmuel Epstein, and Richard D. Fosbury

A study of Richard Fosbury's gold-medal-winning high jump at the 1968 Olympics sheds light on how an evolutionary process can result in discontinuity and extreme innovation.

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The 1968 Mexico City Olympics are remembered for two phenomenal achievements. With an 8.90-meter jump, Bob Beamon shattered the world's long-jump record by 55 centimeters. Then, unknown high-jumper Richard Fosbury won a gold medal with a back-first flop he had invented himself.

These two achievements could both be described as examples of extreme innovation. While Beamon used a current concept, pushing the envelope in excellence in execution, Fosbury used a technique that had never been seen before. Within 10 years, Fosbury's approach revolutionized the sport of high jumping.

There are two schools of thought regarding the process of radical invention. The first posits a sudden stroke of ingenuity that follows an extraordinary style of thought. The second views even extraordinary developments as a "day-to-day" continuous and rigorous process of development.

In this report, we examine the case of the "Fosbury flop" as an example of the latter: a revolutionary and discontinuous invention that is actually the result of a continuous process.

We posit that the "discontinuity" of the Fosbury invention was reflected in its rapid adoption by high jumpers.

Through a content analysis of this remarkable case of innovation, Fosbury's story adds new dimensions to the literature on innovation. Our research encompassed historical qualitative analyses, as well as empirical analysis, in three studies.

The first study examined the extent to which the Fosbury flop constituted an innovation. Six experts were asked to assess innovations in the general area of sports. Innovations were grouped along three major lines: (1) "hardware" technology (e.g., development of synthetic tracks), (2) competitive structure (e.g., the introduction of new games), and (3) "software" technology (e.g., technical innovations such as Fosbury's). From this exploratory study, it emerged that the Fosbury flop was one of the most innovative events in sports history across fields.

Our second study examined the development process, as reported by Fosbury himself. At age 10, Fosbury learned to jump with an inefficient "scissors" technique that he copied from watching

other children. A year later, he learned the classic “straddle” roll, but continued to use the scissors technique until high school. In high school, Fosbury began again with the straddle style, but when he fell behind the other jumpers, Fosbury asked his coach if he could revert to the old scissors style.

With the older technique, a jumper typically hits the bar, so Fosbury adjusted by raising his hips in order to clear the height. In the course of the next two years, he slowly evolved this technique. Each attempt was slightly different. Using a curved approach to the bar, Fosbury intuitively began to turn his inside shoulder away from the bar to get his head over the bar sooner. By the second year, Fosbury fully evolved to clearing the bar with his back to the bar, arching his hips over, then unarching to kick his heels over and land with his back in the pit.

Interestingly, Fosbury continued to use the straddle during practice. His incremental process of developing and testing a winning style occurred only in the pressured environment of competition, when he was more intense and focused on getting over the bar.

Adoption and Diffusion Rates

Despite Fosbury’s medal-winning performance at the 1968 Olympics, other elite-level jumpers were not quick to change to the new style; they had too many hours invested in practicing their own techniques to simply abandon them. Most of the early adopters came from secondary-level jumpers who could risk learning a new style (a finding consistent with innovation research that finds that first-adopters tend to be novices).

Nevertheless, by the next Olympic Games in 1972, nearly all the high jumpers had adopted the Fosbury flop, and within 10 years it had become the standard approach to high jumping.

Fosbury’s case also offered an opportunity to incorporate an analysis of the performances of

users. Thus, in a third study, we assessed the superiority of the new “technology” to that already existing. Regression-type analyses of the rate of change in world record over time reveals that the Fosbury flop technique resulted in a higher pace of record setting as compared with the previous technique.

Finally, we examined the influence of the environment on innovation, and vice versa. To do so, we divided the period of examination into four eras, as follows.

Era 1: Prior to 1935, a variety of styles were used by jumpers. Rules dictated that an athlete’s feet had to cross the bar before his or her head.

Era 2: From 1935-60, the dominant style was the straddle, used by seven different jumpers to improve the world record from 2.06 to 2.16 meters.

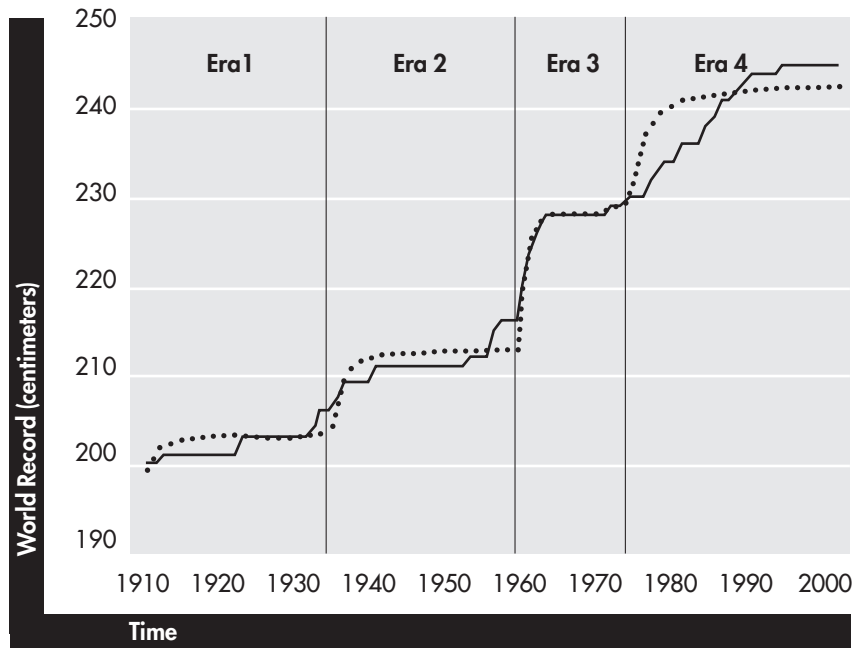
Era 3: From 1960-73, the world record was improved from 2.06 to 2.16, primarily by two jumpers. That is, the era was dominated by two jumpers who mastered the technique (the technology) better than others, and thus, created a competitive advantage over other jumpers.

Era 4: Beginning in 1973, the Fosbury flop became the dominant style.

In Figure 1, a solid line represents actual world records, and the dotted line represents estimated values. Thus, it can be seen that the developments in high-jump world records exhibit the general characteristics of a generic technological innovation S-shaped curve. That is, in each era the dynamics of the innovation starts with a rapid increase in the world records and reaches a stage of diminishing returns that results in a plateau stage in the development curve. Further, the rate of change increases with the various technologies, i.e., a new technology is superior to its predecessor.

It is interesting to speculate on the future of the development of the high jump technique based

Figure 1
High-Jump World Records 1935-2000



on this analysis. Keeping in mind that the world record has not been broken for the last nine years, we would postulate that the next evolution would be the case of one or several jumpers who master the technique better than others, and improve the world record. The era of many jumpers equally mastering the technique and improving the record interchangeably is probably over. In other words, the innovation is now at the plateau stage of diminishing returns. ■

Acknowledgements

The authors thank Don Lehmann for his helpful comments and suggestions.

Report No. 04-106

“Innovation: The Case of the Fosbury Flop” © 2004 Jacob Goldenberg, Oded Lowengart, Shaul Oreg, Michael Bar-Eli, Shmuel Epstein, and Richard D. Fosbury