Normal Science verses Revolutionary Science: Where Does Scientific Thinking Draw the Line?

In Kuhn's *The Structure of Scientific Revolutions*, he argues that small groups of specialized scientists are responsible for scientific development.  Kuhn states that during a period of 'normal science,' scientists were guided by a preexisting paradigm, a widely accepted view. When scientists observe something that does not fit the paradigm, this area of science enters a time of 'revolutionary science' in which a possible new paradigm is created. David A. Hollinger wrote a response to Kuhn, *Paradigms Lost*, in which Hollinger states that Kuhn's "pivotal distinction between revolutionary and normal science was hard to sustain."[1] While Kuhn's description of individual scientific thought is accurate and his structure of science fits to describe many scientific revolutions, to try to fit every scientific development into his model of either normal or revolutionary science is oversimplifying the scientific method.

Hollinger stated that, "Kuhn went on to suggest that scientific development is best seen not as progress toward a fixed goal set by nature but as progress from existing knowledge toward more fully confirmed answers to questions scientists put into nature. Since the questions themselves sometimes change, the progress of science is discontinuous."[2] If science grows from "existing knowledge," then how did science begin? Kuhn does not answer this. Moreover, Kuhn's idea that nature does not cause science to progress discounts the power of the natural world. What if the scientists are wrong? Then, the entire cycle of revolutionary and normal science would also be wrong.

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[1] Hollinger, David A. "Paradigms Lost." New York Times Book Review 28 May 2000: 23.
[2] Hollinger.

Kuhn's scientific model seems especially vague in describing the early stages of paradigms. For example, the revolutionary idea that the earth is round is forced into Kuhn's model of science. Aristotle did not think that the earth was spherical because he was "confirming" other scientists' beliefs that the earth was flat. His concept of a spherical earth did not originate from a preexisting paradigm because there was no widely believed idea of a spherical earth. Instead, scientists for centuries had been studying the shape of the earth, the stars, and the other planets, and they too had believed that the earth was spherical. The problem was that the idea of a spherical earth was so massive a change for people to accept, that the old paradigm of a flat earth was still accepted in Aristotle's time. Aristotle could not have known about scientists who believed that the earth was spherical centuries before he was born. Thus, the natural world must have caused this revolution in science. After people were convinced of a spherical earth, this paradigm did enter the phase of 'normal science' it is still in. However, to say that other scientists are the only factors that help new scientists promote a paradigm is not correct. The natural world must create scientific progress.

The way in which Kuhn describes individual scientific thought is accurate and further debunks his scientific model. Hollinger stated that, "what made [*The Structure of Scientific Revolutions*] so important was the widespread presumption that scientists, rather than being bound by preconceptions, were open-minded in the sense of always questioning inherited ideas."[3] Scientists must open their minds to ideas that are beyond the scope of general knowledge in order to create revolutionary science, and thus do not just rely on each other. Scientists often look for an anomaly within a paradigm, hoping to

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[3] Hollinger.

create revolutionary science. When such a bold scientist embarks on trying to break a paradigm, he is not merely building on the knowledge of normal science as Kuhn describes. More so, he is being open-minded to nature, personal observation and intuition. In this way, ‘normal science’ and ‘revolutionary science’ can blend together. During periods of ‘normal science,’ scientists are actually performing ‘revolutionary science’ in the form of experiments and observations. No scientist wants to stay within the constraints of a preexisting idea because no recognition will come of his work. Instead, by constantly questioning preexisting ideas and performing revolutionary experiments, scientists are innately revolutionary, not ‘normal’. Today, scientists want to be revolutionary. For example, scientists search for life on other planets, research cures for cancer and AIDS, attempt cloning, and try to match human characteristics to particular genes.

Paradigms are tricky because they are limited. Hollinger claims that, “Kuhn’s signature concept of the paradigm was frustratingly vague.”[4] While scientists often work within preexisting paradigms and use evidence of past scientists, they must rely not just on each other, but also on nature, to make revolutionary claims. Moreover, because scientists desire to be revolutionary and well known for new ideas, by principle they do not want to be guided by existing knowledge or other scientists. As Hollinger clearly states, “[*The Structure of Scientific Revolutions*] showed us that scientists, within their

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[4] Hollinger.

own domain, behaved very much like the rest of us."[5] Indeed, scientists exhibit very human qualities in their search for recognition and a scientific revolution.

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[5] Hollinger.