Running head: A New Paradigm

Shifting toward a New Paradigm of Science in the Western World

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Abstract

We live in an amazingly complex world, one in which events can have a myriad of interrelated causes and an infinite number of possible results. Yet we humans, especially in the Western world, tend to live as though a single cause results in a single event. The dominant worldview is one of a mechanistic universe but this perspective is no longer viable due to the known complexity of the world.

The current scientific paradigm, which informs the Western worldview, is based on linear cause and effect and the whole only being a sum of the parts. Many believe that this paradigm reflects a masculine understanding of the world, which may have contributed to the lack of women at the higher levels of science and the higher attrition rate for women scientists. There is a call for a more inclusive science, one that transcends the current perspective to enfold qualities such as subjectivity, cooperation, intuition, and relatedness.

The worldview that has dominated the Western world for the past few centuries is in the midst of change. Our current perspective is being transcended by a global, or even cosmological, view that embraces complexity and appreciates the interconnectedness of the universe. We can support this shift by deliberately and consciously rising above our differences, shifting our perspective to one in which we understand that the whole is greater than the sum of its parts and that diversity is to be celebrated.

Introduction

We live in an amazingly complex world, one in which events can have a myriad of interrelated causes and an infinite number of possible results. Yet we humans, especially in the Western world, tend to live as though a single cause results in a single event. The dominant paradigm that informs our culture is based on a science of linear cause and effect; wholes equal only to the sum of their parts; a mechanistic universe. This worldview is so pervasive that we often don't recognize the complexities, the interconnectedness, and the interrelatedness of the world.

Unfortunately this perspective also blinds us to many of the catastrophic issues facing our world today -- pollution, extinction of species, depletion of natural resources, climate change, threat of nuclear war, pandemics, and more. Our primary focus is on the short-term with a fragmentary view of the parts, while potential long-term effects on the whole are ignored. This view of the world permeates our organizations and our schools; it is ingrained in our culture. "Our everyday experience tells us that nature and society are very definitely not mechanistic, but the problem is that in many ways we continue to behave as if they were" (Peat, 2008, p. 20).

My journey

Looking back at my own journey, it seems that my experience highlights, albeit on a small scale, some of the effects of this dominant worldview. After receiving an undergraduate degree in electrical engineering, I began working at an aerospace company where I stayed for eighteen years. During my time there, I gradually became

aware of areas of inefficiency and ineffectiveness. It seemed as though relatively small

changes in the way that business was being performed would alleviate many of the

issues and would likely lead to a substantial savings of company funds being spent to

keep certain programs afloat, vastly improved employee morale, significantly better

customer and supplier relations, and an influx of ideas and innovation. More specifically,

I perceived the following issues:

- Larger scale programs were typically vastly overspent and significantly behind

   schedule, usually within two years after program kick-off.

- The majority of people recognized with accolades and awards were working on

   these same problem programs. Conversely those people and teams whose

   programs consistently were completed within schedule, under budget, and with

   satisfied customers ready to contract for more business were virtually ignored.

- Decisions were often made without consulting the affected parties, whether they

   were employees, customers, or suppliers.

- Knowledge and ideas from the lower levels of the organization were often not

   heard or were ignored, which resulted in employee frustration, apathy, and

   cynicism.

- The company's organization was a hierarchical structure where employees were

   encouraged to perform only the work necessary to meet their job description.

   Work above and beyond this was actively discouraged and could possibly lead to

   reprimand.

- Many people who had moved up the hierarchy were quick to personally accept credit for a (team) job well done and equally as quick to deflect blame to the team.

- Problems were often not perceived until they had become significant and team members were subsequently forced to respond reactively.

- There was an overall lack of communication flow throughout the organization.

These issues and others like them brought about a number of less than positive results – successful teams did not receive the recognition they deserved; company representatives often offended customers and much time was subsequently spent making amends; employee morale was very low; stress levels were high, and people within the organization were cynical and often depressed.

Over the years, I discussed many of these items with top-level executives within the company but change was not forthcoming. Eventually I became so frustrated with the "business as usual" approach that I left the company. I returned to school with the intention of exploring new ways to think about and address these issues.

The shift toward a new perspective

With my initial explorations into the literature on organizational culture and science, I began to wonder whether many of the issues that I'd encountered at the aerospace company had resulted from the dominant Western worldview and its related business model. Since this perspective has its roots in science, logically it seemed it would be more pervasive within science and technology organizations. I felt a sense of familiarity

with statements such as "The American drive to attain impact has led to the cultivation of a variety of approaches to problem solving, decision making, and conflict resolution intended to avoid the deficiencies of intuition and common sense" (Stewart and Bennett, 1991, p. 32) and "Americans anticipate future problems by searching for a single factor with which to explain events . . . This kind of thinking stands in contrast to a more integrated approach, sometimes called "holistic" or "synthetic"" (Stewart and Bennett, 1991, p. 41). Unfortunately, this way of thinking also leads us to "apply approaches that . . . are not really appropriate to all the subtleties and complexities of most real-life situations" (Peat, 2008, p. 19).

Exploring further, I found there are those who argue that, within America and the Western world, "[d]espite claiming to be objective, sciences are heavily biased towards a masculine understanding of the world" (Kamerāde, 2007, p. 165), that objective knowledge, universal laws, and scientific truths of Western reductionist science (and Western civilization since the eighteenth century), although touted to apply to all peoples, have been developed by men with a focus on men (McCarthy, 1996). Linda Shepherd (1983) wrote about the need to enfold new characteristics within science such as feeling, subjectivity, receptivity, multiplicity, nurturing, cooperation, intuition, and relatedness. Bringing these qualities into science would enhance the entire community and support a more holistic perspective.

Perhaps in part because of the purported masculine focus of science, there has been a steady decline in the number of women entering the higher levels of science, technology, engineering and math (STEM) fields. And not only are fewer women

entering these fields but those who do often leave prematurely (Rosser, 2004; Besecke and Reilly, 2006). "[T]he sciences (science and engineering, excluding the social sciences) . . . [are] by far more systematically exclusionary of women than the other disciplines [in academia]" (McCarthy, 1996, p. 90).

It is believed that more women in the STEM fields could lead to a more feminine science, where intuition and collaboration would be readily accepted. And there is hope that the addition of more women to STEM fields may also lead to institutional change. Many hold the social and organizational environments responsible for structural barriers to women and believe that a critical mass of women would effect change within these environments (Rosser, 2004; Powell et al, 2004; Callister, 2006; Lemons and Parzinger, 2008).

The National Science Foundation (NSF) and other funding agencies have been very interested in determining and subsequently mitigating the specific factors responsible for the perceived lack of a level-playing field for women within science in order to obtain more skilled scientists. Women are the "single most undervalued and therefore, underused human resource" (Trenfield, 1995) and there is an "obligation, both for [institutions] and for the nation, to fully develop and utilize all the creative talent available" (Rosser, 2004, p. 50).

Various studies, many performed with NSF grants, have pointed to the following factors as issues for women in science (Rosser, 2004; Lemons and Parzinger, 2008;

Powell et al, 2004; Rosser and Montgomery, 2000; Franks, 2000; Callister, 2006; Kamerāde, 2007; Stephan and Levin, 2005; Besecke and Reilly, 2006):

- Balancing family and career

- Time management issues

- Isolation and lack of camaraderie

- Lack of mentoring

- Gaining credibility and respectability from peers

- Two career placements

- Overt harassment and discrimination

Now that these factors have been identified, research directed at potential solutions is underway. Have these solutions brought about a more inclusive science? If so, is it possible to apply these practices to more organizations with the goal of bringing forth a new paradigm within Western culture? If not, how do we transform our work environments, particularly within the technical realm, to embrace the complexity of our world? How do we shift the paradigm of science, and thereby Western culture, to one that is more holistic, transparent, communicative, empathic, nurturing, and inclusive? It's important to realize that this new worldview would not negate the currently dominant perspective but instead would transcend it. There would be a blending of seemingly disparate elements, a rising above the current paradigm to one of inclusion.

Next steps

I believe that the worldview that has dominated the Western world for the past few centuries is in the midst of significant change. Growing numbers of people, within both industry and academia, are unhappy with the current cultural climate and are voicing their concerns and calling for action. The literature on issues is growing. Various approaches to support change are being identified, implemented, and assessed for impact.

Our Western worldview is being transcended by a global, or even cosmological, perspective that embraces complexity and appreciates the creativity inherent within the tension of opposites (for example, relationship and autonomy, subjectivity and objectivity, analytical reasoning and intuition) (Morin, 1996). This new view acknowledges the complexity and the interconnectedness of the universe.

Let us support this shift by taking action to deliberately and consciously transcend our differences, to shift our perspective to one in which we understand that the whole is greater than the sum of its parts and that diversity is to be celebrated. Looking at the issues facing our world today, it is clear that more of the same can no longer be justified or tolerated. A new worldview is needed.

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