Worked Examples

To make clear what I mean by *play exemplars*, consider another notion that is, in some ways, a polar opposite of the sorts of exemplars that have historically formed new areas, namely worked examples (Atkinson et al. 2000). Worked examples commonly are used to teach things like science and math. In a worked example, an "expert" takes a well-formed problem and publically displays for learners how that problem is approached, thought about, worked over, and solved. The worked example is meant to model for newcomers how an expert thinks, values, and acts in a given and well-established domain. In turn, newcomers can then try this and perhaps eventually find novel ways to solve problems in the domain as they "play" with various modeled approaches, because the model also can serve as a reference point from which to try variations.

Worked examples do not display just the individual thought of the expert. Rather, they exemplify the conventions of a discipline—the ways people in the area approach problems, how they recruit theories, and how they choose to continue when they face difficulties and dilemmas. Thus, worked examples are

not associated with new emerging areas, areas still looking for exemplars that can serve as flags for new members of the emerging area to salute. They are associated with established areas.

So exemplars are things that eventually come to be seen as exemplary forms of work for a new area or a new approach to an old one. Worked examples are teaching devices used with students studying well-established areas. At first, then, these two things seem quite different. However, later in history, exemplars often come to be used as worked examples that serve as foundations for the area, not just for newcomers, but for full members (Kuhn 1970b, 187). At that point, once the new area is established, exemplars are both historically founding moments and, in the present, core examples of what counts as central and defining work in the area.

In a sense, exemplars, as they historically engendered the discussions and debates that eventually led to their acceptance as exemplars, served in the process as proposed worked examples for an area that did not yet exist. They were proposed worked examples (where the commentary on them was not just from their authors but from debates in the emerging area) not for students but for experts trying to build a new area in which there were as yet, in fact, no real experts. This is why, for instance, once an area is well established, teachers often use exemplary work in the area as worked examples for new students, displaying the thinking of the exemplar's author (thinking that often is discovered via historical research and which was, in actuality, a product of debate) as now "the discipline's" thinking.

What follows is a now-classic example of a proposed exemplar turning into fodder for common worked examples for students.

Thomas Kuhn (1970a) famously discussed how Galileo's ideas about motion introduced a new paradigm into physics. In people's everyday experience, an object set in motion always comes to a halt. Aristotle had argued that this was a fundamental property of nature: For motion to be sustained, an object must continue to be pushed.

Galileo proposed that we always observe objects coming to a halt simply because some friction is always present. He then proposed that without any friction to slow it down, an object in motion's inherent tendency is to maintain its speed without the application of any additional force. This bold idea about motion eventually reorganized physics and came to be seen as an exemplar that constituted modern physics as a discipline (and distinguished it from earlier physics). Today, of course, Galileo's ideas about force and motion are among the common material for worked examples in high school physics classes.