FALLEN FENCING IN MEDICINE BOW STATE PARK

Reuben M. Haas

First Lesson: The Most Beautiful of Theories

"You would need, of course, to study and digest Reimann's mathematics in order to master the technique to read and use this equation. It takes a little commitment and effort. But less than is necessary to come to appreciate the rarefied beauty of a late Beethoven string quartet. In both cases the reward is sheer beauty and new eyes with which to see the world."
Rovelli, pg. 12

On "Mathematical Beauty": As Rovelli points out, this world is not a simple one, and this photo emphasizes the simplicity of the fence being disrupted by something of natural beauty, as the presence of the juniper bush and pine tree interrupt the fence in this photo. Everything seems simple and plain until it is investigated deeper, and this is the moment when most things explode into unmatched beauty.

Second Lesson: Quanta

"Heisenberg imagined that electrons do not always exist. They only exist when someone or something watches them, or better, when they are interacting with something else. They materialize in a place, with a calculable probability, when colliding with something else. The 'quantum leaps' from one orbit to another are the only means they have of being "real": an electron is a set of jumps from one interaction to another. When nothing disturbs it, it is not in any precise place."
Rovelli, pg. 17

On "Set of Jumps": The split frame here represents two points of existence, and the eye must make jumps from one side to the other, much like the electrons Rovelli describes. And yet, they are the same particle in both moments of existence.

Third Lesson: The Architecture of the Cosmos

"Space is not flat, but curved. We have to imagine the texture of the universe, with its splashes of galaxies, being moved by waves similar to those of the sea, sometimes so agitated as to create the gaps that are black holes." Rovelli, pg. 29

On "Fabric of Spacetime": This NPS wildlife fence has been crushed by a tree and bent into a shape which looks like I would imagine the fabric of spacetime to look. It was difficult capturing the whole scene on film, but the darkness creates the mysterious feeling of space and the fence falling away into said darkness recalls the idea of time and timelines.

"Mathematical Beauty"

First Lesson: The Most Beautiful of Theories

"Set of Jumps"

Second Lesson: Quanta

"Fabric of Spacetime"

Third Lesson: The Architecture of the Cosmos

FALLEN FENCING IN MEDICINE BOW STATE PARK

Reuben M. Haas

"Hidden Simplicity"

Fourth Lesson: Particles

Fourth Lesson: Particles

"A handful of types of elementary particles, which vibrate and fluctuate constantly between existence and nonexistence and swarm in space, even when it seems that there is nothing there, combine together to infinity like letters of a cosmic alphabet to tell the immense history of galaxies." Rovelli, pg. 38

On "Hidden Simplicity": I see the singular sagebrush which has grown in the crux of the fencepost as a particle. It is its own object, but is also a part of the larger object—or in this case—image, which includes both fences; new and old. It is both its own, and in need of a wider world to provide it with a purpose.

"Contradictions"

Fifth Lesson: Grains of Space

Fifth Lesson: Grains of Space

"General relativity and quantum mechanics. Two theories, profligate in their gifts, which are fundamental to todays technology and have transformed the way we live. And yet, the two theories cannot both be right, at least in their current forms, because they contradict eachother." Rovelli, pg. 40

On "Contradictions": It is difficult to see in this picture, but these two fenceposts are connected by two lengths of barbed wire. This creates the effect of one fencepost holding up the other, but we are unsure of which is doing the holding. Almost perfectly, a sagebrush rests balanced between the two fences, just as the particle rests between the two theories.

"Flow of Heat"

Sixth Lesson: Probability, Time, and the Heat of Black Holes

Sixth Lesson: Probability, Time, and the Heat of Black Holes

"There is a detectable difference between the past and the future only when there is the flow of heat. Heat is linked to probability; and probability in turn is linked to the fact that our interactions with the rest of the world do not register the fine details of reality." Rovelli, pg. 62

On "Flow of Heat": The seed pods of this thistle can be seen as particles, and the stems as lines of motion as the particles transfer from the warm earth into the cold, blue expanse of the sky. As this represents the flow of heat and therefor, according to Rovelli, the passing of time, there is great irony in the actual thistle being a kind of frozen sculpture of the passing of time in its stillness. Its blowing in the wind is its only movement, and even that is lost in photography.

FALLEN FENCING IN MEDICINE BOW STATE PARK

Reuben M. Haas

In Closing: Ourselves

"The world is complex, and we capture it with different languages, each appropriate to the process we are describing. Every complex process can be addressed and understood at different levels. These diverse languages intersect intertwine, and reciprocally enhance one another, like the processes themselves. The study of our psychology becomes more sophisticated through our understanding of the brain. The study of theoretical physics is nourished by the passions and emotions that animate our lives." *Rovelli, pg. 75*

On "Nature": Rovelli's seventh lesson on physics is barely a lesson on physics at all. Similarly, this photo of Fallen Fencing in Medicine Bow State Park is not of fencing in Medicine Bow. Rovelli's final chapter is about so much more than just physics, as is this photo. It is fallen fencing, just like we can find in a well-curated state park, but is found in our literal backyards. Physics, while occasionally being theoretical, are in the end the basis of reality, and we can see examples of the unmatched beauty of physics every day—if we just know where to look for them.

Reuben M. Haas

(Fewer Than) Seven Brief Lessons on Fallen Fencing

In my previous synthesis essay, I mention briefly in closing "an uncountably infinite web of ideas," but hesitate in venturing beyond the idea of a triangle where two points are things and the third is the relationship between two things. Rovelli also keeps things simple, beautifully so, but still calls to my mind a mesh of ideas. In six of his *Seven Brief Lessons on Physics* Carlo Rovelli presents an idea of which, at the very least, one element is dualistic in nature. Whether that be the conflict between theories in his Fifth Lesson, or the phenomenon of heat transfer in the next lesson, one could read Rovelli's (simplified) reality as one of twos—and therefore of threes, according to my previous essay. This is just one idea which I sought to represent in my photographs and their relationships to Rovelli's writing. Four of the seven photographs contain an element of duality. The frame of *"Set of Jumps"* is split clearly in two, and the inclusion of "Nature" in the set exists in dualistic contrast to the rest of the photos. Of course, having the highly entangled mind that I do, I found a way to relate this project to my previous ones, and as a result I built further upon my own concept of reality.

Expressing the grand and often abstract notions of theoretical physics through debatably mundane subject matter is exactly the kind of contrast that is hallmark of art. At least I hope this to be true. Besides the obvious aesthetic reasoning behind using Polaroids, I also found their forced simplicity and lack of detail to only assist in connecting two things which initially seem so unrelated. *Seven Brief Lessons on Physics* and *Fallen Fencing in Medicine Bow State Park* consist of very different subject matter, but this is exactly what drew me to pursuing the project in the first place. Rovelli's explanations of physics are invaluable to me because they allow the everyman access to the wonderful world of the theoretical, without having to either jump through the endless hoops of traditional learning or simply stare at lifeless numbers and symbols. Everything in *Seven Brief Lessons* has real-world relevancy and meaning, and what better to express that than a simple truth of the real world?

Fences, when constructed by humans, often become damaged, degrade and/or are replaced. All of these things happen within this set of seven photographs, almost all taken within one relatively small area of Medicine Bow State Park in southern Wyoming. Physics, adversely, often has the primary effect of defacing, denouncing and/or replacing our previous notions. In this way, my photos can be seen as depicting more the 'fallen' than the 'fencing,' as Rovelli's lessons in physics could be symbolized by the flora, weather and newer fences which cause numerous breaks in the miles and miles of fencing within one state park. Therefore, the fencing itself can be seen as our previous attempts to control and understand nature. Sometimes, those ideas are built upon and grow into something beautiful (ex. "Mathematical Beauty"), and sometimes the old ideas are entirely scrapped and ran straight through with new ones (ex. "Set of Jumps").

Reuben M. Haas

The challenge inherent in capturing the reality I imagine while restricted by film is itself memetic of the study of theoretical physics (and intensely rewarding). I know what I see, and I know what I expect to receive as a result. From there I can set parameters and limit my variables, but the result is inevitably of its own making. It's beautiful to be able to say that the photos come naturally. Like magnets attract opposite poles or like music comes naturally to some, the images that come from a film camera come naturally to the film. Almost. This is where the science of film photography and the art of dissecting nature come even closer together; to the point where naturality is called into question. If we must interfere—even just to observe—is a process truly natural anymore? In narrowing down the variables of an experiment, or even sending light through the trials of a camera lens, we may find ourselves effecting more than we know, or are even capable of knowing. Of course, how can we know what we don't know? I am not yet again doubting science, but am simply calling into question the methods with which we place almost all of our faith and upon which we base our understanding of reality. If we do not explore these basic methods fully, then how can we fully trust any of the results?

But I digress. Sometimes the natural beauty (which Rovelli discusses and I found for myself through this project) can be lost in all the thorny, interconnected thoughts that line the path leading thither. Little more beauty can be found anywhere other than nature, but the juxtaposition of a fence can have its own effect. One can be wholly lost in the woods, but a fence does something to the subconscious to remind it that it is never entirely alone. And when that fence has ceased to serve its purpose and fallen or been fallen upon, there is also a sense of wonder at nature. Wonder in being lost. Wonder in not understanding. Wonder in something comfortable. Wonder in finding answers. Wonder in knowing our place. Wonder in physics and in nature. It is exactly as Rovelli says; knowledge and our nature need not be at odds, for they are one in the same. Two theories of the same reality, two subjects in the same photograph.