It was Einstein who so eloquently noted that, “the most incomprehensible thing about the universe is that it is comprehensible.” This statement would be true, if it weren’t for one significant detail— that no one actually understands how the universe works. Thus, the most sought after knowledge in current physics is the discovery of a unifying Theory of Everything (T.O.E.), which will unite all pillars of physics underneath the same fundamental laws. Superstring theory is probably the leading candidate for this job, assuming the position actually exists. Brian Greene, through writing *The Elegant Universe*, attempts to describe this theory, of which he is a large contributor, to the rest of the world.

Superstring theory, or simply just string theory, strives to connect quantum mechanics and general relativity, which are in constant conflict with one another. The former revolves around the physics of extremely tiny particles, such as protons, electrons, and quarks, while the latter includes enormous objects, such as stars and galaxies. The essence of the theory is that the smallest constituents of everything in the universe are really, really small vibrating strings. These strings vibrate at certain allowed frequencies, each of which correspond a known elementary particle. Deriving physics as we know it through this central principle, string theory is able to explain all of the current discrepancies plaguing physicists around the world. However, what looks like an absolutely beautiful and elegant way of describing how the universe works has no experimental proof whatsoever. The theoretical strings are too small to detect with any current technology.
Perhaps the most astounding aspect of Greene’s book is its ability to take concepts that are indescribable even in the minds of some top physicists, and translate them into simple words and visions that are clear to almost anyone. He opens with a straightforward discussion of the problems that physicists wish to resolve, then immediately jumps into relativity, a much more ambiguous idea. Although anyone interested in physics has probably encountered several examples explaining relativity, the scenarios used here are exceptionally effective at conveying concepts such as time dilation, length contraction, and spacetime. They also offer a new and humorous twist to the principles discovered by Einstein nearly a century ago.

In addition to examples, Greene constructs seemingly ridiculous analogies to simplify hard-to-grasp physical concepts. For example, in attempting to explain the photoelectric effect, he makes a comparison to a hot warehouse basement filled with an infinite amount of children who have coins thrown at them by adults from above. It is necessary to read the book to get a full idea of what the author is illustrating, but it can at least be noted that this example has no relation to quantum mechanics. Not only does Greene give his readers hilarious mental visualizations, but his analogies are remarkably effective at conveying ambiguous ideas.

One of the most enjoyable aspects about reading this work was that it required constant mental effort. In fact, it is probably accurate to say that the reader’s mind is continuously worked and stretched beyond all possible comprehension from beginning to end. Greene starts out “slowly” by introducing basic quantum mechanical principles, which generally require a good amount of abstract thinking to obtain even a vague understanding of. Although no one can visualize a particle traveling along all possible
paths, this concept, along with others, becomes at least acceptable to the reader in the end. This general introduction sets the stage for the explanation of superstring theory, which consists of several of these “theoretical headaches” rolled into one.

Most mind-boggling to think about is the concept of multiple dimensions. One of the essential components of string theory is that the universe consists of 11 dimensions: three normal special dimensions that we observe, one time dimension, and then 7 others that are crumpled up into what theorists call Calabi-Yau shapes. Anyone who seriously tries to comprehend this idea for more than 30 seconds will surely need a couple of Advil. But the excitement doesn’t stop there. Greene elaborates further on the beauty of string theory by introducing the dynamic properties of the fabric of space, which can randomly tear, and subsequently repair itself. Once the fabric is restored, it creates what is known as a wormhole, essentially a “shortcut” from one end of the universe to another. In addition to wormholes, some even more radical theories are discussed, in which there are multiple universes, each with its own specialized fundamental laws of physics! Most remarkable is that string theory includes several of the most radical, mentally incomprehensible ideas out there; yet it makes perfect sense.

Although extremely abstract and seemingly complex, Brian Greene was able to make the magnificence of string theory accessible to everyone. It may be slightly difficult for someone with no physics background to grasp various concepts in a single reading, but the use of examples and analogies is an extremely useful aid in this case. On the other hand, a reader having a background in physics will gain a new sense of appreciation for the field. Green’s vivid descriptions and extensive use of metaphorical language offer an entirely new perspective for even the scientifically inclined reader.