

course, may not be satisfied and is limited only by his stamina and his attention span. We could follow Junior and Dad as they probe the scientific understanding of the beautiful blue sky by looking deeper at each type of cause, but it is worth making a few more general comments on the idea of causality.

First, the idea of the four causes, formal, material, efficient and final, dates back to the ancient Greek philosopher Aristotle (384 B.C.–322 B.C.) and inspired a greater interest in nature when it was rediscovered in the thirteenth century. In this view a cause is an explanation for how a thing comes into being, how it remains in being, and eventually, how it ceases to be, by becoming something else.¹ This classical understanding of causality, where causes explain the being of things, is not the structure modern science generally approaches its work with, but it is not contrary to modern finding and methods either. Any fully satisfying scientific explanation will touch on all four classical causes. Second, two of these causes, efficient and final, deserve a closer look because of their importance for the disputed questions that follow.

In efficient causality it is often possible to point to one particular cause that is the immediate agent of an effect. However, we often ask about the cause of this immediate cause. Sometimes, this means tracing a chain of events back in time, for instance tracing sunlight back to the sun and the nuclear fusion that powers it. Other times we notice that the immediate agent is directly moved a moving agent, as when a saw cuts wood because it is moved by my hand. In this second case we find an example of instrumental causality where something acts as a cause, but only because it is empowered to act by another higher cause. The saw is an instrumental cause because it only cuts wood while being moved to do so by me.

Second, the final causality Dad ascribes to the sky is fairly simple: It involves the return of

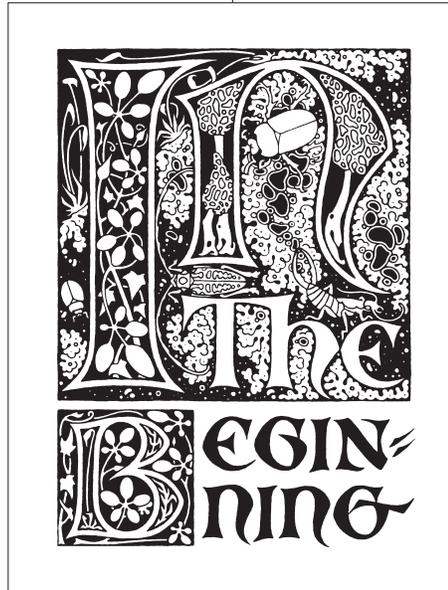
excited air molecules to their stable rest states. While this aspect of stability is the basis of final causality, it is easier to recognize ends and goal in more complicated things. In living things we

see a tendency not towards any rest state, but towards specific states of perfection. A puppy tends to become a mature dog which in turn can produce more puppies and dogs. An even higher aspect of final causality appears in human acts.

We act with particular goals in mind; particular stable states in ourselves and in the world which we think will make us happy. Thus even the world of ethics and morality is rooted in final causality, the tendency toward a stable and perfective state.

Sometimes when people hear the phrase final causality, also known as teleology, they assume that it refers only to this highest form of final causality, the imposition of a rational will on things. To many it seems like this is contrary to the very goal of our study of nature, the study of the inner working of the world around us, even the inanimate. If teleology is only viewed as the external imposition of an intelligent will, they are right that it is contrary to this study. However, at its root, teleology begins with the basic natural tendency of things to move towards particular stable states. Indeed, if it were not for this basic internal tendency of natural things to move towards stability, the whole project of science would be impossible because there would be no consistency or order to make nature intelligible. **THE**

¹ St. Thomas Aquinas *De Principiis Naturae*, 18.



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