Chapter IX
The Nature of Constraints

ABSTRACT

This chapter wraps up the discussion by describing how normalized components of information are carved out of inchoate information by constraints, and manifested as objects with specific properties and meanings. It describes the essential identity between a law and its outcome.

"The very small is the very large when boundaries are forgotten;
The very large is the very small when its outline is not seen"
- Seng ts'an, 6th-century Zen patriarch

A constraint is like a prism through which we can view the inchoate and bring order to it. Constraints split the clear light of information into the rainbow shards of objects and meanings we have discussed earlier and those we will discuss ahead. We have seen how constraints add information and metamorphose into objects of different kinds—objects and relationships we have discussed throughout this book. Now we will unify them into an integral whole by subsuming them into the ultimate constraint—a generic concept that will sunder information space to make the inchoate choate.

THE SHAPING OF OBJECTS

Usually when we think of constraints, we think of constraints on attribute values.[1] However, "Constraint" is a broader concept; it subsumes value constraints and more. Constraints surge through information space, sculpting and shaping islands of meaning, sundering and merging as they ebb and flow through patterns of information. They fashion all that is, all that is not, and all that cannot be from the inchoate information shimmering through information space. To understand how this happens, put this book down on a clear night, go out and look up at the sky.

On a clear night, the sky is full of stars, each an instance of a star. How do you tell one instance from another? By its position, of course. The position of each star distinguishes it from its neighbors. The position of an object is one aspect of its state. To the naked eye, each star is distinguished by its state in physical space. Look for Jupiter. Your newspaper may contain a star chart that will show you where it is. Some stars twinkle and others burn steadily in the night sky. If Jupiter has risen, it will be the brightest star burning steadily in the sky. If you have a powerful telescope, look at Jupiter through the telescope. Jupiter is a single spark seen with the naked eye—a single instance of an object. Seen through a good telescope, you will see Jupiter resolved into many sparks. Each new spark is a satellite of Jupiter—each a distinct and different instance of an object.

Seen with the naked eye, Jupiter was a single spark, a single instance of a star because of its unique position—its state—in the night sky. This location—a state—was the pattern of information that made Jupiter a unique instance of an object. The telescope made finer distinctions than the unaided eye could. It added information. It resolved smaller differences in positions to make them distinctly different. It could make finer distinctions between states. Thereby, the telescope split what appeared to be a single object into distinct object instances. The resolution of the telescope was far finer than the resolution of the naked eye, and it resolved a single instance of an object into many instances by adding information on the state of an object. It reduced the degrees of freedom of the pattern—the region of the sky—that a spark could occupy and still be considered a single occurrence of an object. It constrained the law that made the pattern a pattern and made it more restrictive. That is how a single instance of an object was resolved into several distinct instances of objects and a single state split into many. The pattern sculpted stars from amorphous and inchoate information. That law was a constraint.

In previous chapters, we have seen how an instance of an object is a unique pattern of information that captures its essence—a meaning. The state of a pattern of information determines its unique identity and distinguishes it from others of its kind. The instance identifier represents this identity; the law that makes the pattern a pattern also shapes an instance of an object in information space. This law creates the pattern by constraining its degrees of freedom.

The law that makes a pattern a pattern is indeed a constraint. We may resolve a pattern into additional distinct patterns by making the constraint even more restrictive. Each pattern may be an instance of an object, a relationship, an object class, or any of the other metaobjects we have discussed so far. The spark seen with the unaided eye subsumed the sparks seen with the telescope. If we considered the original spark an object class, the sparks through the telescope would be its subtypes. If the original spark was an object instance, each spark resolved by the telescope would be its polymorphism.

Conversely, if we remove information, boundaries of patterns may blur. Patterns may then lose their identities and become indistinguishable from each other. They may merge into one pattern that will subsume them all. Thus, many sparks may become one; object instances could lose their distinct identities and merge into one, an object that subsumes them all.

It can happen to any object instance—any pattern. Even object instances like colors and values could blur and melt into each other or split into distinct object instances just as the spark of Jupiter did (see Box 4.4). Consider the impact of this on polymorphisms of idempotent and antisymmetrical (or reflexive) relationships. An instance of an idempotent relationship loops back to an instance of an object (as an instance of a reflexive relationship also might). If we add information to this object, it could resolve into multiple objects, just like the single spark of Jupiter did. Some subtypes (polymorphisms) of the original