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Chapter 6

Spatiotemporal priority as a fundamental principle of object persistence

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6.1 Introduction

The impoverished and rapidly changing stimulation on the retina looks very different from the stable world of discrete persisting objects that populate our visual experience. To get from the features on the retina to the objects that we experience, the visual system must solve several correspondence problems. One of these problems has to do with *sameness*: the visual system must decide whether each bit of stimulation reflects an object that has already been encountered (which might occasion the *updating* of an existing object representation) or a new one (which might occasion the *creation* of a new object representation). This problem of object persistence has been studied with a wide array of visual phenomena and paradigms, and in several disciplines in cognitive science—including vision science, developmental psychology, and comparative cognition.

The study of object persistence in these different fields has progressed largely independently. Yet strikingly, they have converged on a core principle that guides the creation and maintenance of persisting object representations: the principle of *spatiotemporal priority*. When identifying objects as the same individuals over the time, the visual system appears to rely on their spatiotemporal histories—that is, where, when, and how they were encountered—to a greater degree than their visual surface features. In this chapter, we review the many contexts in which spatiotemporal priority drives computations of object persistence, and we propose explanations at several levels for why spatiotemporal priority plays this dominant role.

