



Figure 6-1. Photons or electrons fly through the slits and should logically create detectable “hits” behind each opening.



Figure 6-2. In actuality, an interference pattern materializes, indicating the presence of interacting waves. This pattern is reliably seen even if only one photon or electron at a time is allowed to pass through the openings. But how is this possible? With what is this lone photon or electron interfering?



Figure 6-3. Polarized lenses let observers determine which slit each photon passes through. This which-way knowledge in the scientists' minds somehow causes each bit of light to lose its freedom of simultaneously taking both paths, and forces it to materialize into an actual object (photon) *before* entering the slits. This in turn makes the interference pattern vanish. Instead, we now see simple hits behind each opening.



Figure 8-1

But might it have been the polarizing filters that caused the wave nature of the light to vanish? Maybe filters do something to light, and it has nothing to do with ourselves as observers. No! Introducing a different polarizer in front of the detector with an axis of  $45^\circ$  relative to both slits “erases” all useful information about polarization, since now random photons get through both openings and we have no usable which-way information. The moment this “scrambling” filter was inserted, the interference pattern reappears, and now looks identical to what we see when there’s no which-way measurements at all, as in Figure 8-2.



Figure 8-2

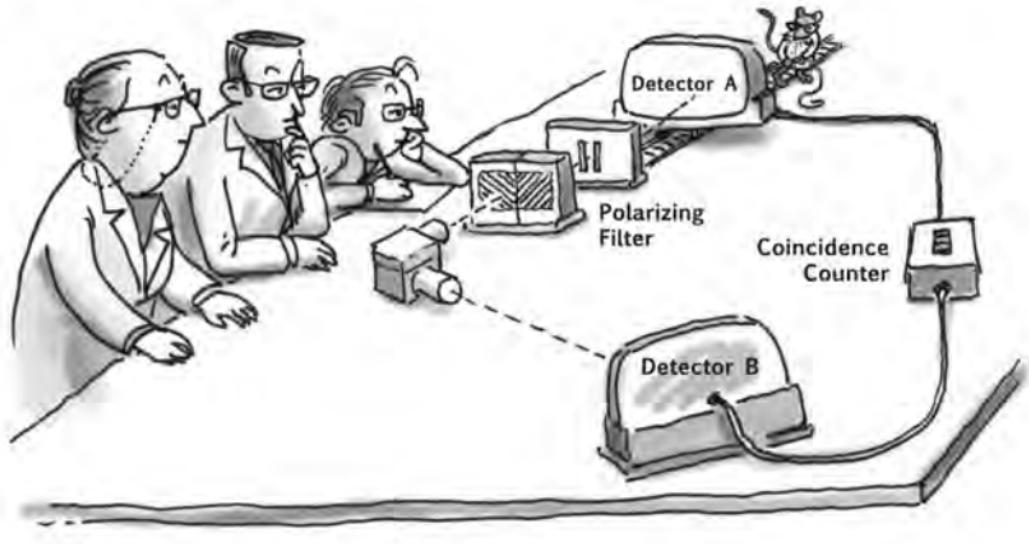


Figure 8-3. Adding a coincidence counter allows us to either gain knowledge of the experimental results, or else shuts off our data before we can learn anything—without meddling with the rest of the apparatus in any way. The movable distance to detector A (top) allows a further inquiry: By reducing the distance to the detector, and thus the time required for the A photons to reach it, we can learn what happens when the B photons complete the journey to their own detector (bottom) *after* the A photons have finished their own trip. The results indicate that time has no reality in the quantum world.

## Massive Galaxy Warps Spacetime

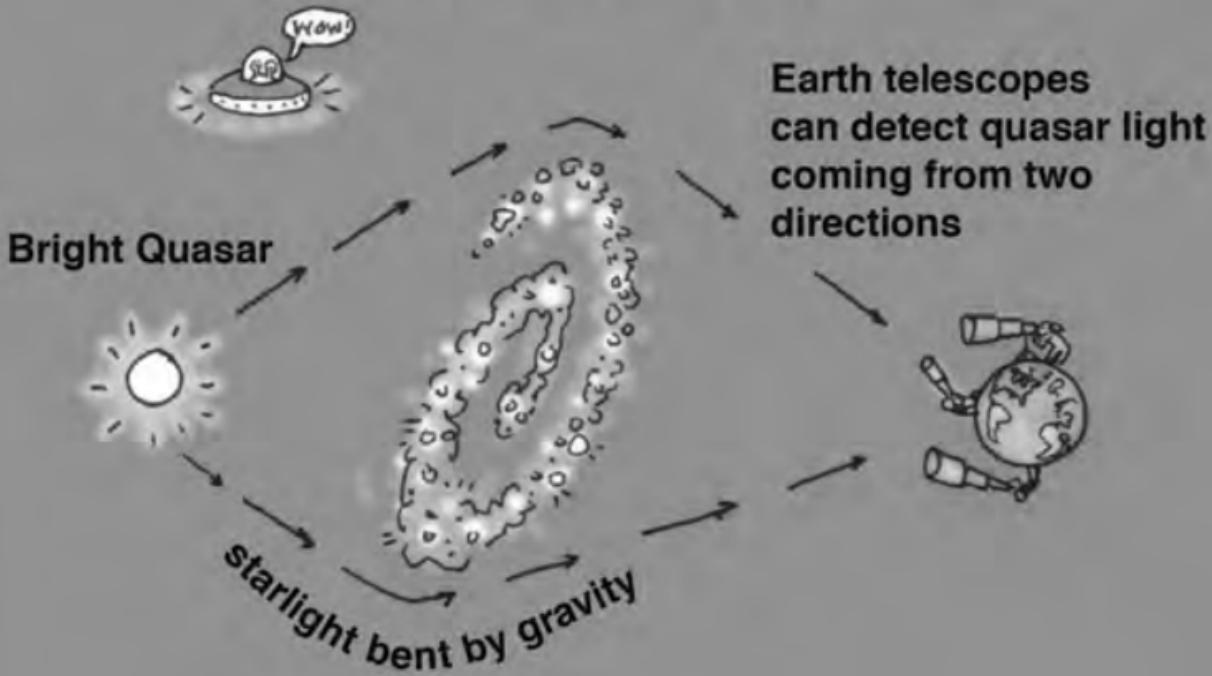
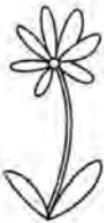
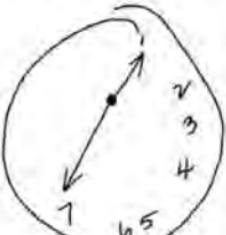


Figure 8-4. Our observations right now determine which path through space was taken by a photon from a distant quasar billions of years ago.

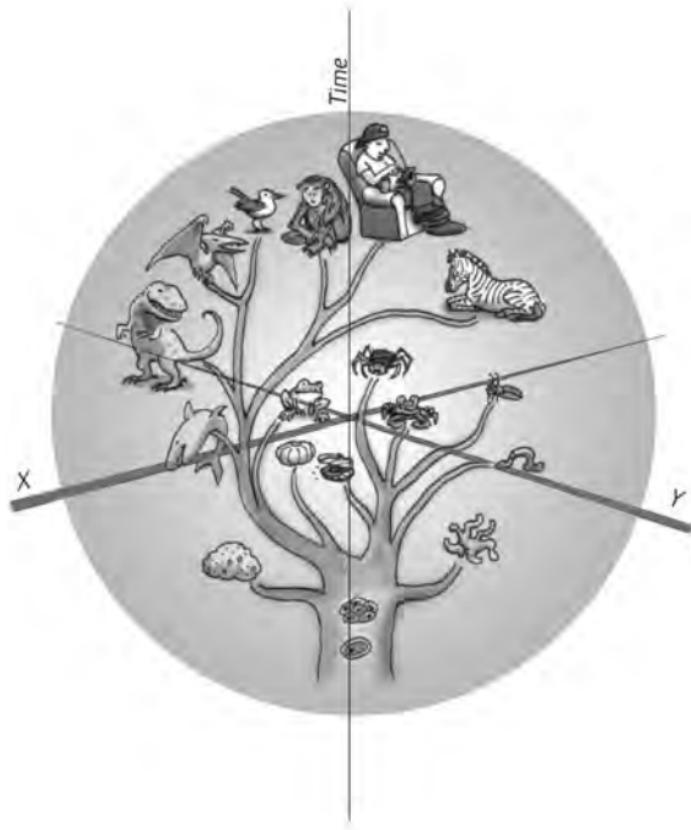
Model



Patient's copy



Numerous medical disorders demonstrate how subjective is our view of the world. Any tampering with the brain's hardwiring/neurocircuitry can radically change our sense of reality. For instance, in this case, a patient with hemispatial neglect (resulting from damage to the right parietal lobe of the brain) only perceives one side of the world and ignores the other half when doing tasks. The drawings on the right were made as the patient attempted to reproduce the models on the left.



Space and time are not the hard, cold walls we think. Our individual separateness is an illusion. Ultimately, we are all melted together, parts of a single entity that transcends space and time.