Plausibility measures: a uniform approach to counterfactual reasoning, default reasoning, and belief change

Counterfactual reasoning involves reasoning about events that are counter to fact, as in ``If my brakes weren't defective, I wouldn't have had the accident''.  Default reasoning involves reasoning about typicality, as in ``Drunk drivers typically have accidents''.  Belief change involves characterizing how beliefs should change, particularly when you discover that something that you believed was false is actually true.
While these may seem to be very different notions, they are in fact closely related.  I discuss the three notions, and present one uniform approach to modeling all three.  Central to the approach is a new formalism for reasoning about uncertainty called a plausibility measure. Plausibility is a generalization of probability: the plausibility of a set is just an element of some arbitrary partial order (instead of being an element of [0,1], as in the case of probability).  As the framework shows, plausibility is a reasonable generalization of probability that allows more qualitative reasoning.   Most of this talk represents joint work with Nir Friedman.