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Haunted Quantum Entanglement, Quantum Erasure, and Orthogonality DOUGLAS SNYDER — Both haunted quantum entanglement (hqe) and quantum erasure (qe) demonstrate interference. For interference, overlapping waves are needed which are likely supplied by equations such as $1/\sqrt{2}$ [|P_u> +|P_l>] = |P_s> and $1/\sqrt{2}$ [|P_u> −|P_l>] = |P_a> where |P_u> and |P_l> are generally considered orthogonal (i.e., no overlap) and |P_s> and |P_a> are symmetric and anti-symmetric wave functions. The conventional consideration of orthogonality in hqe and qe may need adjustment given empirical support for the presence of fringes and anti-fringes in qe. Orthogonality as regards hqe and qe is tied to the possibility of obtaining which way information. If this possibility is lost, it would appear that orthogonality which is based on this possibility may be lost. A completed measurement appears central to establishing orthogonality as regards hqe and qe. In hqe, this completed measurement could be for example an atom passing through a double slit arrangement after having emitted a photon in one of two micromaser cavities, thus providing general which way information without specifying through which specific slit the atom passed. In qe, the completed measurement could be this atom subsequently striking a detection screen, providing the ability to obtain information regarding through which specific slit the atom passed. Hqe and qe occur when which way information is lost before their respective completed measurements are made.

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