Jahn-Teller distortions -- first or second order, local or cooperative -- play a crucial role in determining the ground states of a number of different functional oxide materials. We have for many years been fascinated by the phenomenon of second order Jahn-Teller distortions in crystalline systems containing ions such as Pb\textsuperscript{2+} and Bi\textsuperscript{3+}, that possess stereochemically active lone pairs. The talk will develop the theme of lone pairs and the role they play in determining structure and dielectric properties. The question of whether certain structural topologies (most notably the pyrochlore structure) can frustrate cooperative ordering of lone pairs (second order Jahn-Teller distortions) will be probed. Finally, the spinel compound CuMn\textsubscript{2}O\textsubscript{4}, which contains two Jahn-Teller active ions, will be probed from a local structure perspective.