Anomalous suppression of the orthorhombic distortion in superconducting $\text{Ba(Fe}_{1-x}\text{Co}_x\text{)}_2\text{As}_2$ S. NANDI, M.G. KIM, A. KREYSSIG, R.M. FERNANDES, D.K. PRATT, A. THALER, N. NI, S.L. BUD’KO, P.C. CANFIELD, J. SCHMALIAN, R.J. MCQUEENEY, A.I. GOLDMAN, Ames Laboratory; Dep. of Physics and Astronomy, Iowa State University, Ames — The interplay between superconductivity, magnetism and structure has become a major theme of research in the iron arsenide families of superconductors. Here we report high-resolution x-ray diffraction measurements that reveal an unusually strong response of the lattice to superconductivity in Ba(Fe$_{1-x}$Co$_x$)$_2$As$_2$ single crystals. Below $T_C$ the orthorhombic distortion of the lattice is suppressed and, for Co-doping near $x \sim 0.063$, the orthorhombic structure evolves smoothly to a reentrant tetragonal structure. We propose that the coupling between orthorhombicity and superconductivity is indirect and arises due to the magneto-elastic coupling, in the form of emergent nematic order, and the strong competition between magnetism and superconductivity. – The work at the Ames Laboratory was supported by the US DOE, Office of Science, under contract No. DE-AC02-07CH11358.