Mixed-metal hemoglobin (Hb) hybrids \([(\text{ZnP}), \text{Fe}(\text{L})\text{P})^2\] (P = protoporphyrin IX) exhibit long range photoinitiated electron transfer (ET) between redox centers which are held at fixed and crystallographically known distance and orientation. Even in this most “static” of protein-protein ET systems we nonetheless find strong differential influences of dynamic processes on the forward and reverse reactions of the ET photocycle.\(^1\) The dynamics of ET in hybrid Hbs are probed by varying viscosity and temperature, as well as embedding the hybrid Hbs in a trehalose glass.