

**Supplemental Figure S1.** Extraction of the phase of the STRF temporal profile. **(1)** For separable STRFs, singular value decomposition (SVD) separates the STRF into the product of a spectral profile  $rf(x)$  and a temporal profile  $ir(\tau)$ . **(2)** In order to compute the phase of the temporal profile, we first compute its Fourier transform (FFT) in order to obtain  $\tilde{IR}(w)$ , a complex valued function which specifies the amplitude  $A(w)$  and phase  $\phi(w)$  for each harmonic  $w$  component of the temporal profile. **(3)** A linear regression is then fit to  $\phi(w)$  using the phases of the first six harmonics. The phase of the temporal profile is extracted as the phase intercept along the ordinate.