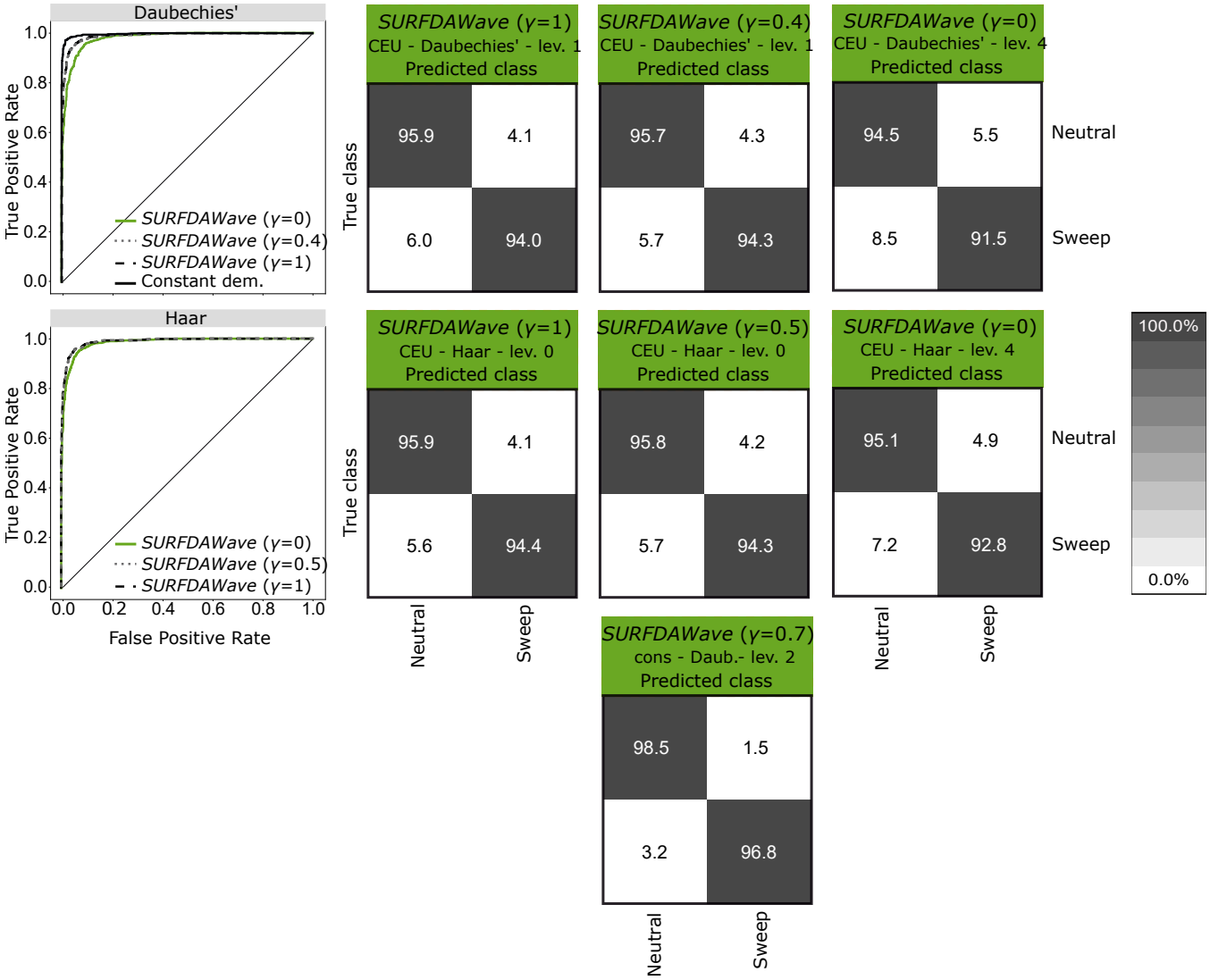

Figure S3: *SURFDAWave* classifier performance on simulated data. (Left column) Power to differentiate between sweep and neutrality by comparing the probability of a sweep under sweep simulations with the same probability in simulations of neutrality when using varying γ penalties, wavelet types, and demographic histories. (Top row confusion matrices) Confusion matrices comparing classification rates of *SURFDAWave* when trained and tested with the CEU demographic history when using Daubechies' least-Asymmetric wavelets to estimate spatial distributions of summary statistics when using either $\gamma = 1$, $\gamma = 0$, or γ chosen through cross validation (see *Training the models*). (Middle row confusion matrices) Confusion matrices comparing classification rates of *SURFDAWave* when trained and tested with the CEU demographic history when using Haar wavelets to estimate spatial distributions of summary statistics when using either $\gamma = 1$, $\gamma = 0$, or γ chosen through cross validation. (Bottom) Confusion matrix showing classification rates of *SURFDAWave* when trained and tested with constant demographic history when using Daubechies' least-Asymmetric wavelets.