



**Supplementary Fig. 6. Timing-related modulation of STN neurons. Related to Fig. 4.** A) STN neurons displayed time-related ramping activity consistent with encoding the passage of time. An exemplar ramping neuron is shown. Red line is the mean response time. B) Heat map of z-scored activity of all 36 recorded human STN single neurons in 10 patients scaled in time to the mean behavioral response (red line). Each row is data from a single STN neuron; population sorted by the first principal component. Across our population of 36 STN neurons, many had time-dependent modulations around starting cue or response.  $*=p<0.05$ ; see also Supplementary Fig. 5. C) STN neuron aligned to response and the next trial's starting cue. D) STN neurons classified by cue-related, response-related, or ramping activity patterns. Some showed multiple response patterns. Three neurons were modulated by cues, responses, and had ramping activity. E-F) Ramping neurons were not strictly modulated by response/motor activity (same neuron as in (E) plotted around response).