

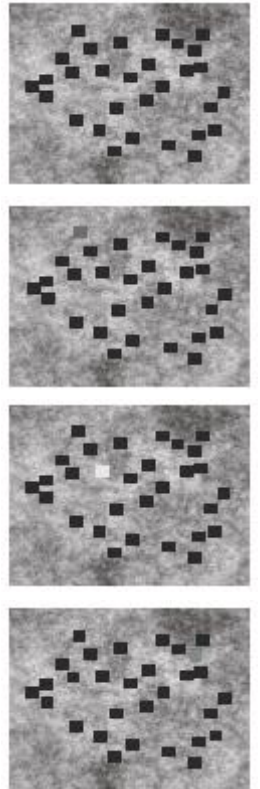
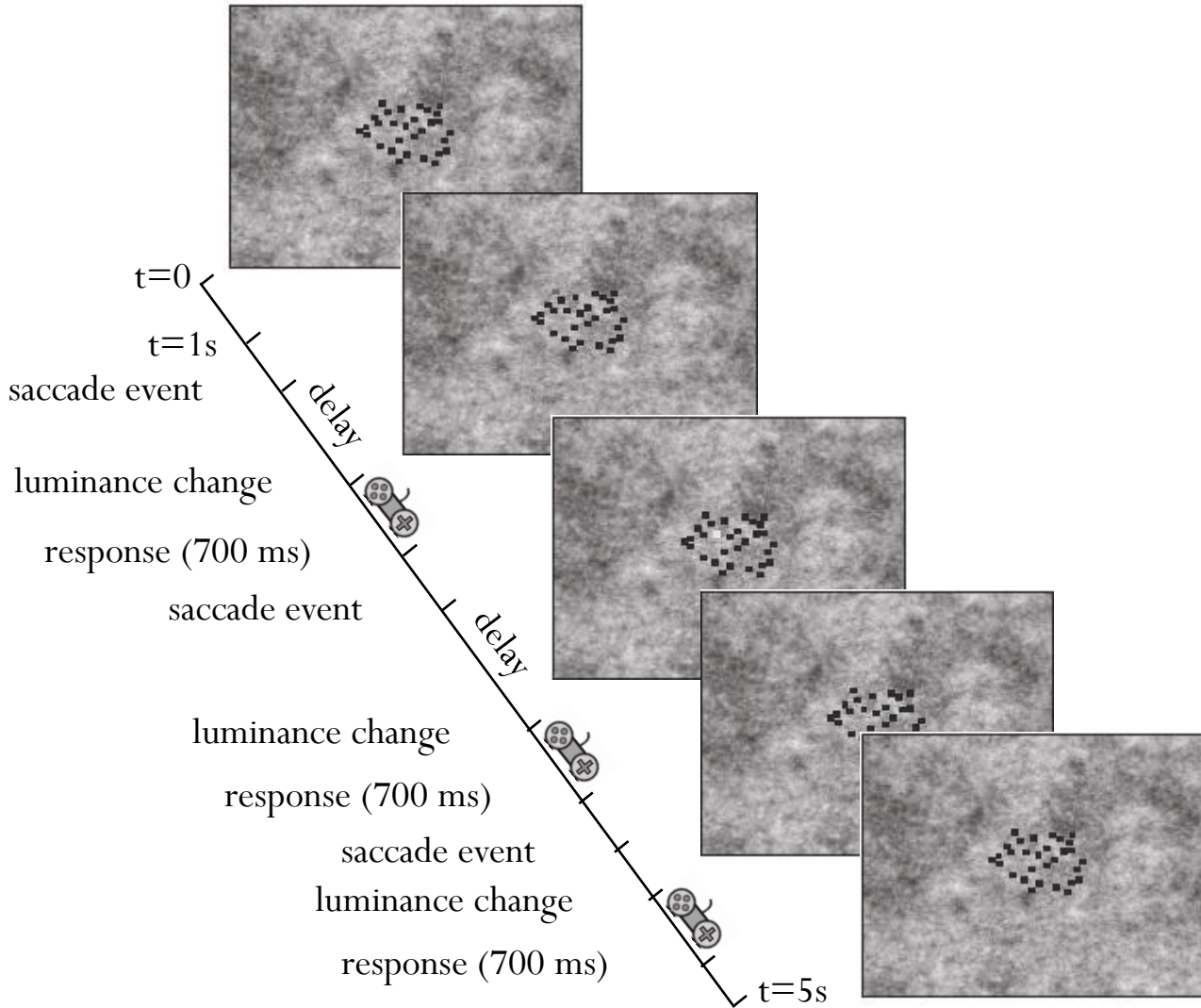
Peri-microsaccadic vision

7-22-15

Study objectives:

- Examine the Spatiotemporal profile of peri-microsaccadic detection thresholds.
- Examine the homogeneity of visual thresholds across the retina.
- Study the dynamics of saccadic suppression phenomena across the retina.

Experimental design

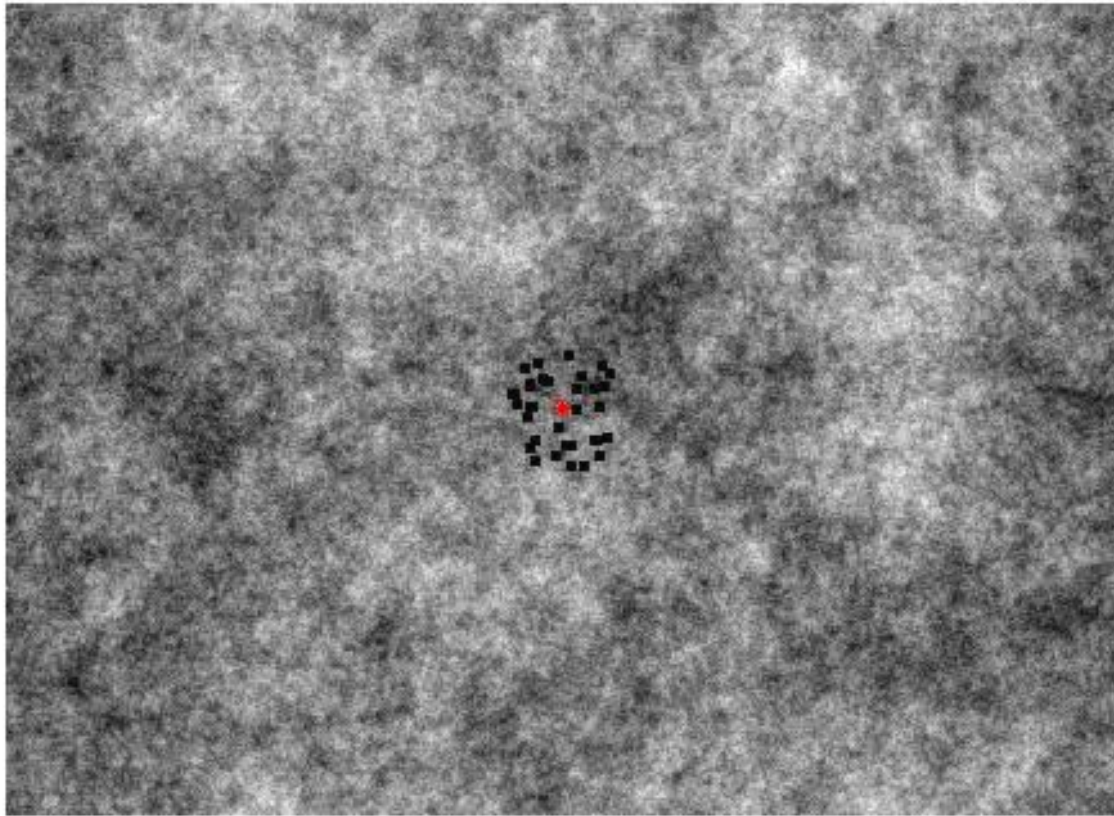


Experiment paradigm

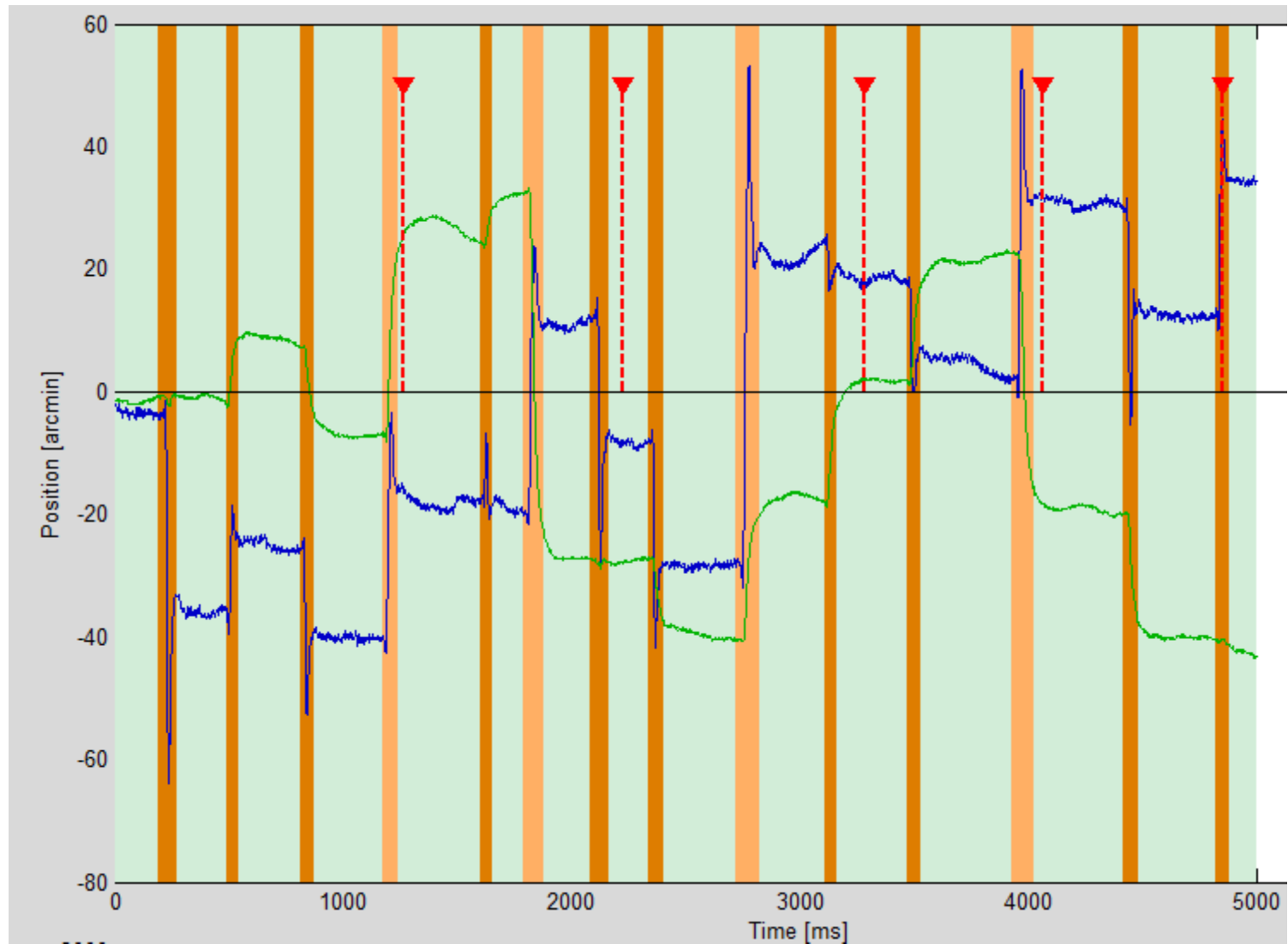
- Each session consists of 5 blocks of 40 trials.
- Objects (squares) are uniformly distributed within 1 deg radius from the center of the screen.
- Upon occurrence of a microsaccade or small saccade (< 1 deg), a luminance change occurs after a delay.
 - The delay varies between 0-400 ms.
- The change occurs at a randomly selected location within ± 15 deg from the center of gaze.
- Based on the distance from the center of gaze, the level of change is chosen randomly from 8 values varying between 60-200.
- The duration of change is 10 ms.
- The minimum distance between each two objects is 5 arcmin.
- There is a calibration trial after each trial.

An example trial

1 ms
Trial No.2



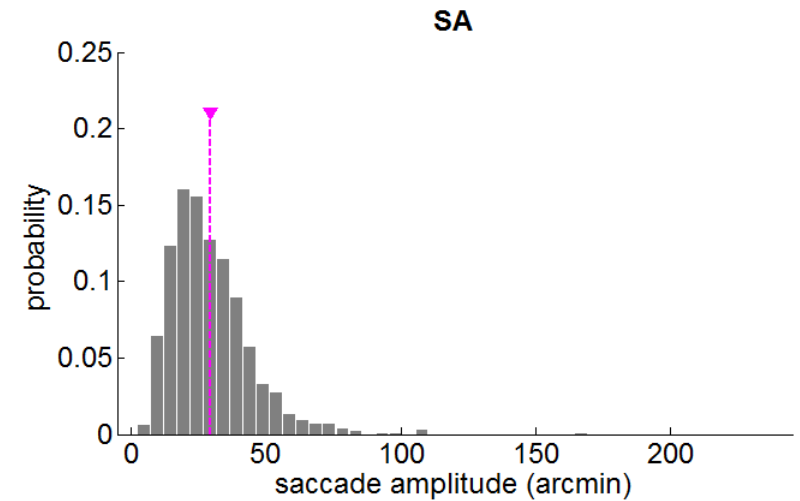
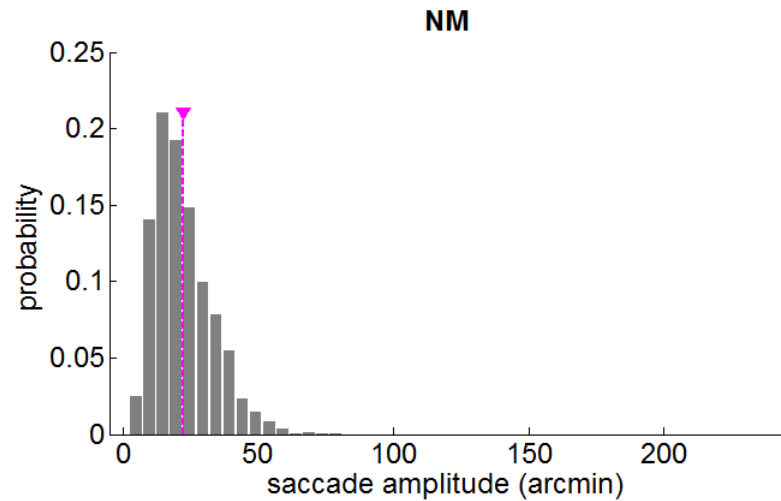
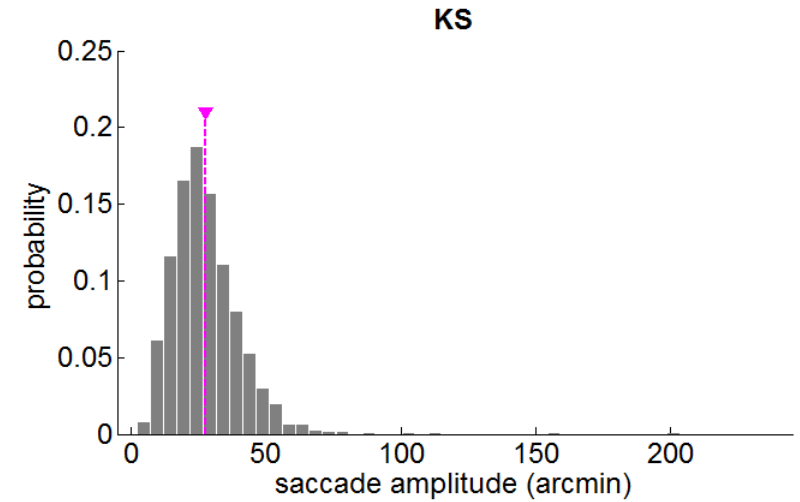
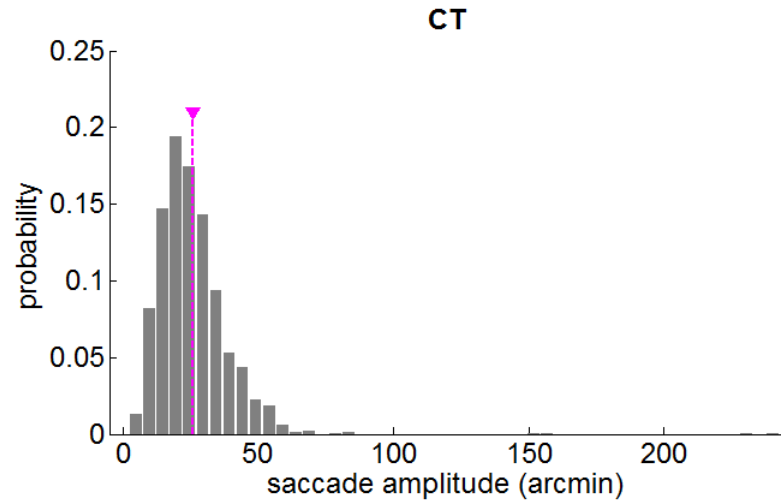
An example trial



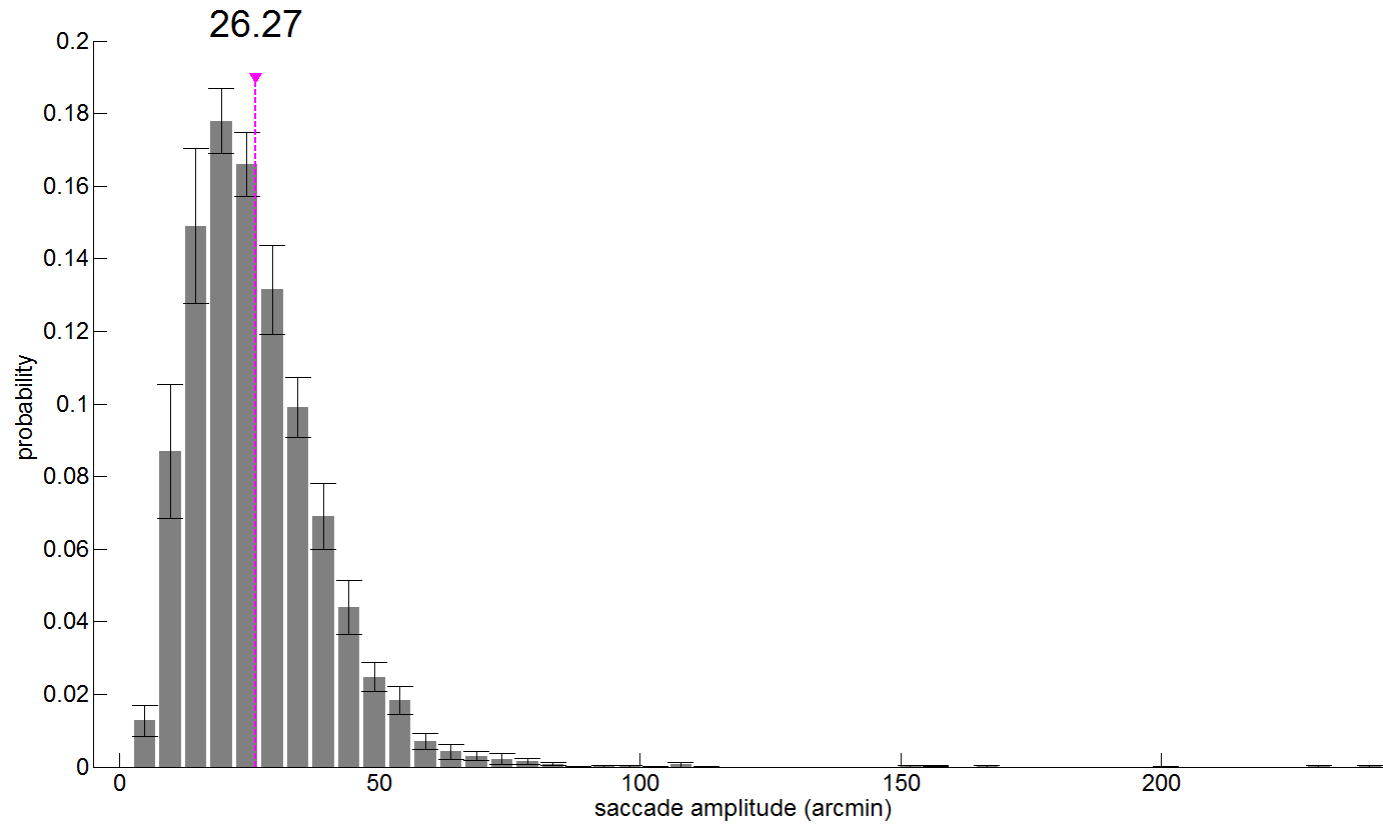
Data summary

	# chng	# hor chng	#used chng		-200 to -100	-100 to -50	-50 to -25	-25 to 0	0 to 25	25 to 50	50 to 100	100 to 200
CT (6)	3464	2048	1595	0-15	0	0	0	0	6	16	25	32
				15-30	1	4	0	0	19	88	138	95
				30-60	12	5	2	2	40	323	336	208
				60-180	3	0	0	0	8	112	66	52
KS (9)	5338	4473	3486	0-15	0	1	1	1	2	36	80	89
				15-30	6	1	1	1	17	187	362	295
				30-60	21	7	2	6	42	554	702	541
				60-180	6	2	2	2	10	268	150	91
NM (10)	6654	4489	3200	0-15	2	0	0	0	8	48	108	55
				15-30	7	2	2	1	36	167	367	191
				30-60	20	7	4	6	102	451	793	444
				60-180	4	5	3	1	12	136	152	66
SA (6)	3052	2400	1530	0-15	0	0	0	0	3	11	65	31
				15-30	3	0	0	0	14	84	120	134
				30-60	9	2	2	1	27	231	295	233
				60-180	3	1	0	0	8	111	70	72

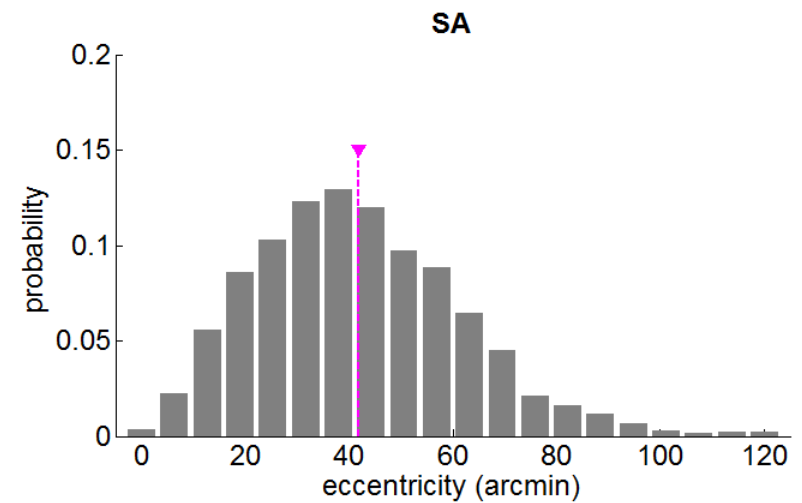
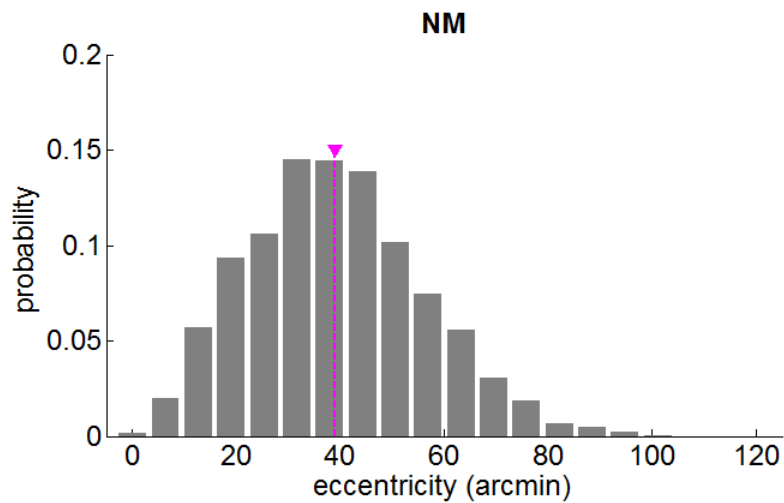
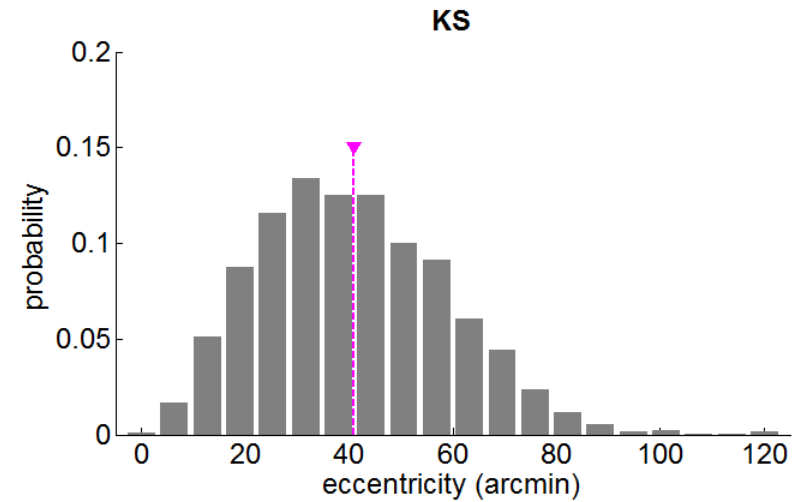
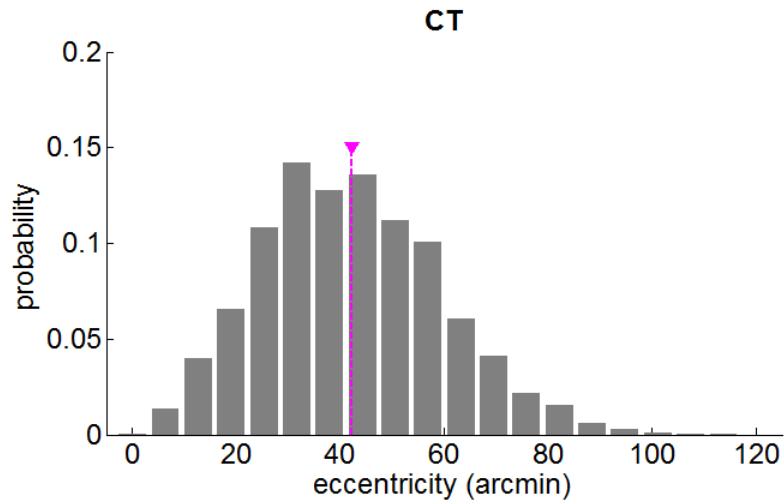
Distribution of saccade amplitudes



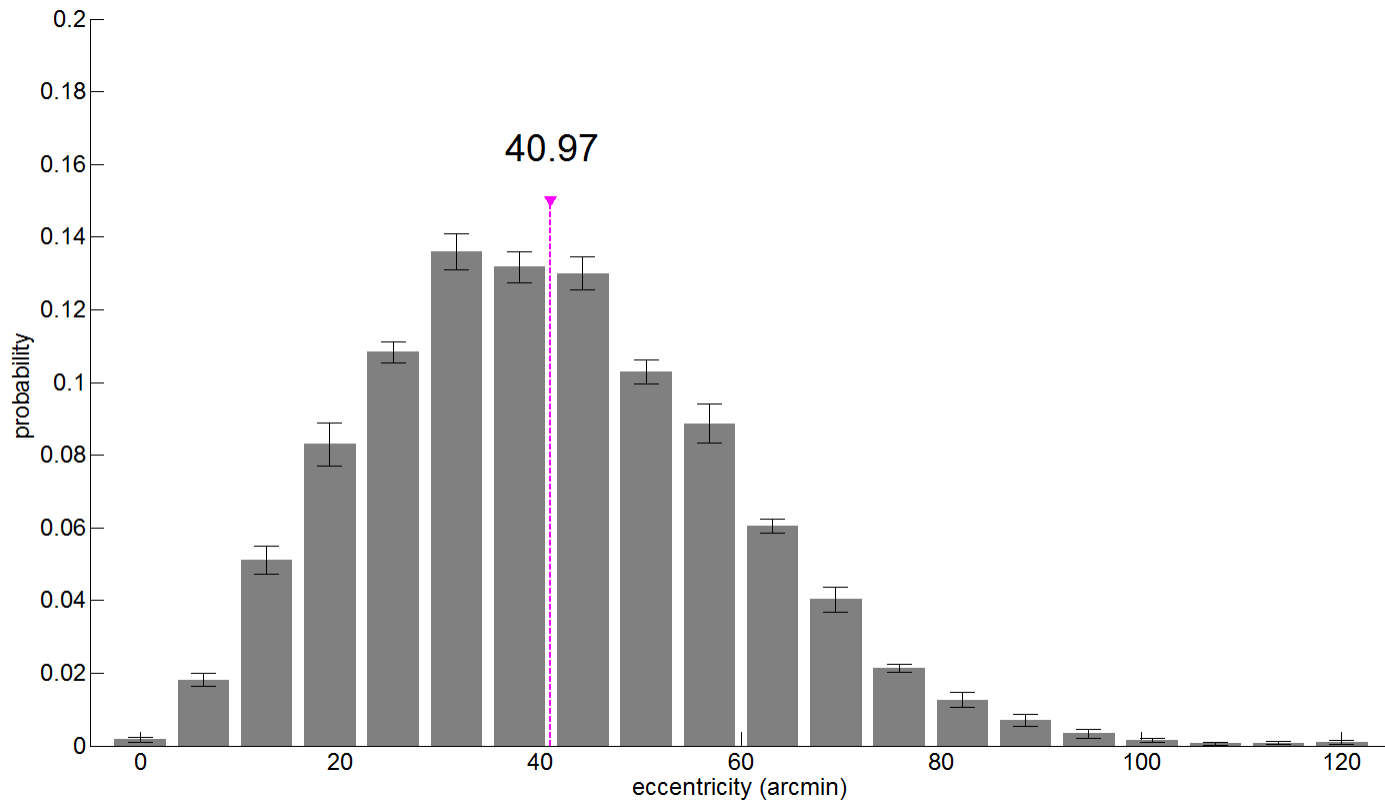
Distribution of saccade amplitudes



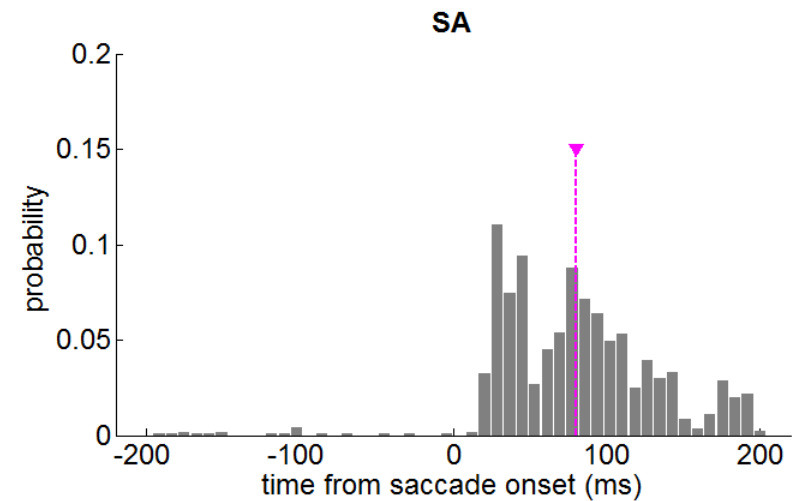
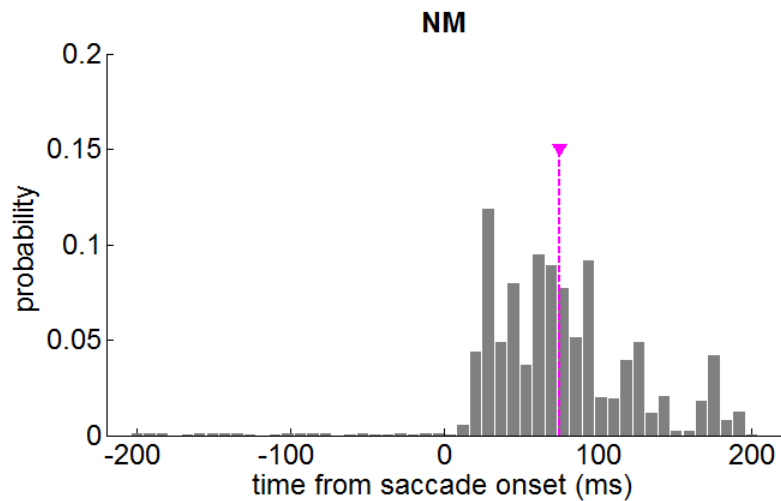
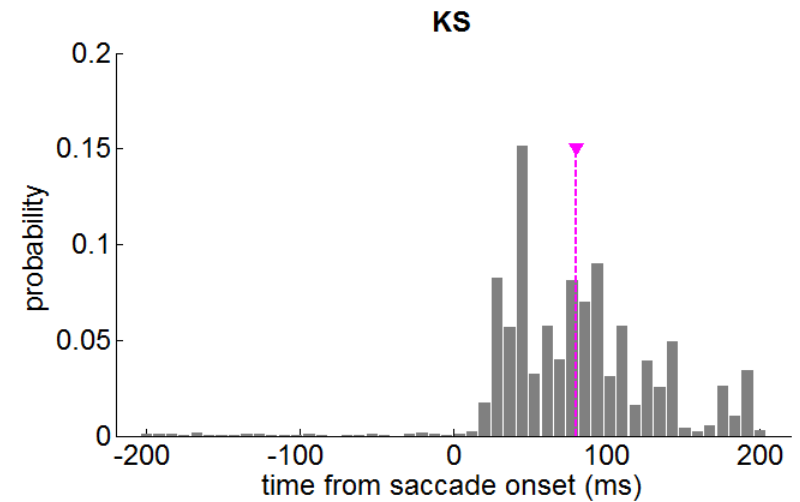
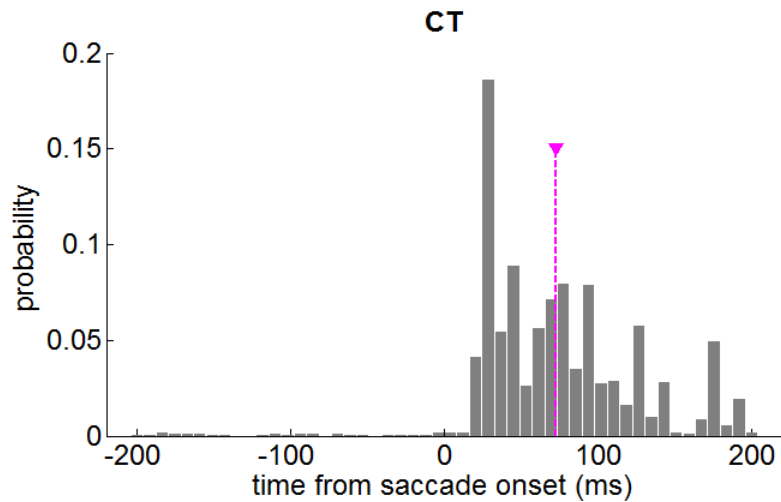
Distribution of change spatial distance from the center of gaze



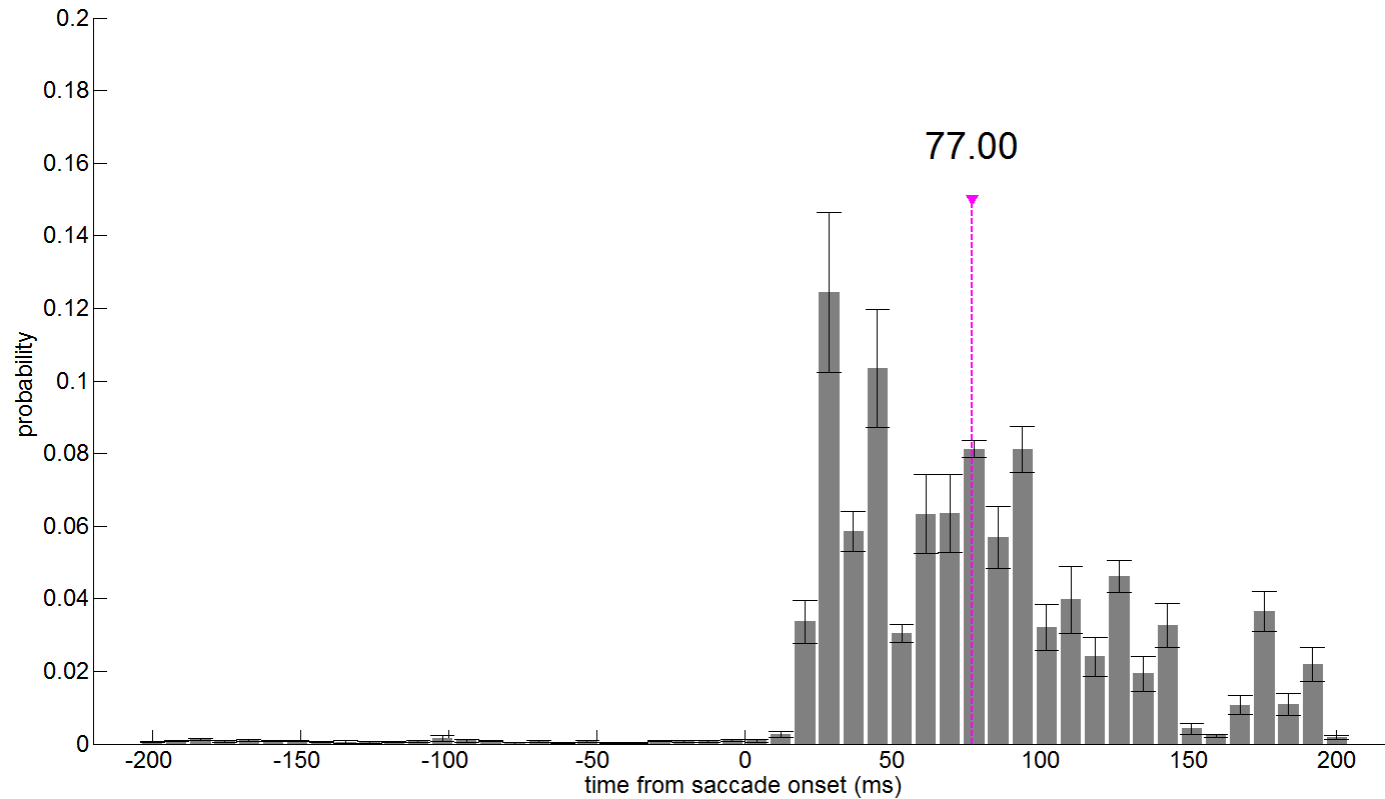
Distribution of change spatial distance from the center of gaze



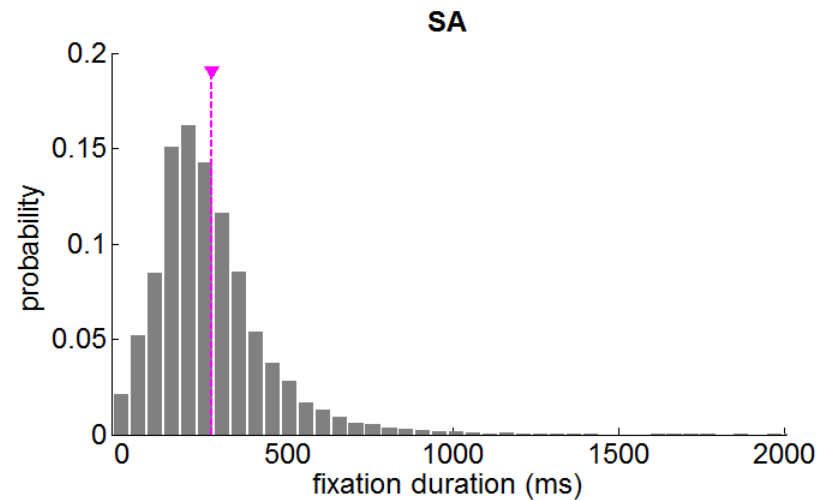
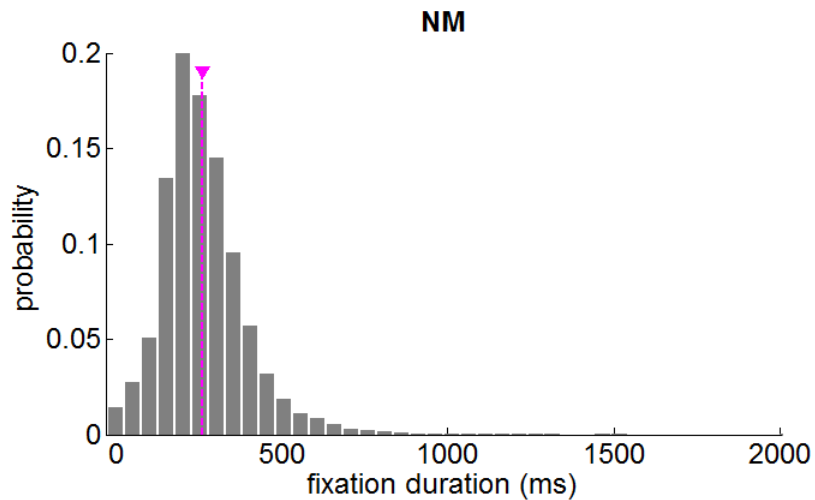
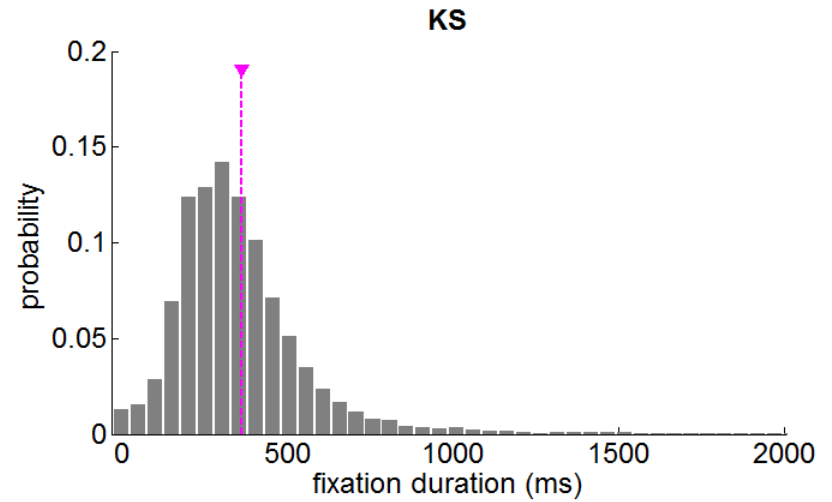
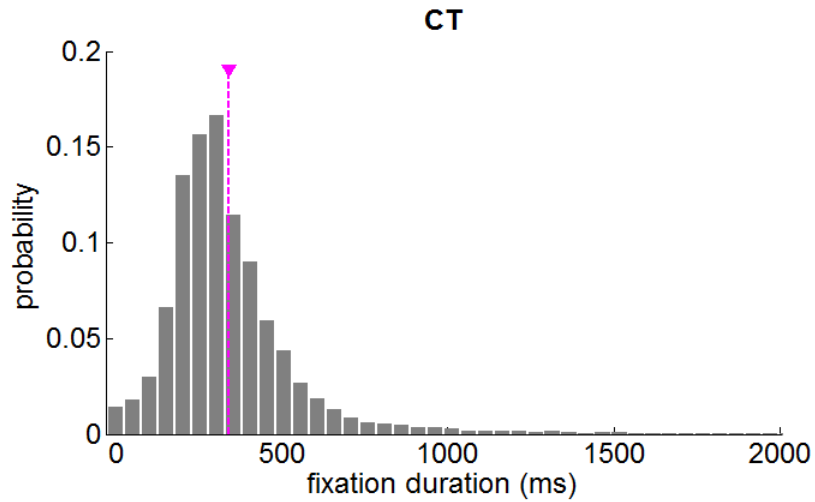
Distribution of change temporal delay from the saccade onset



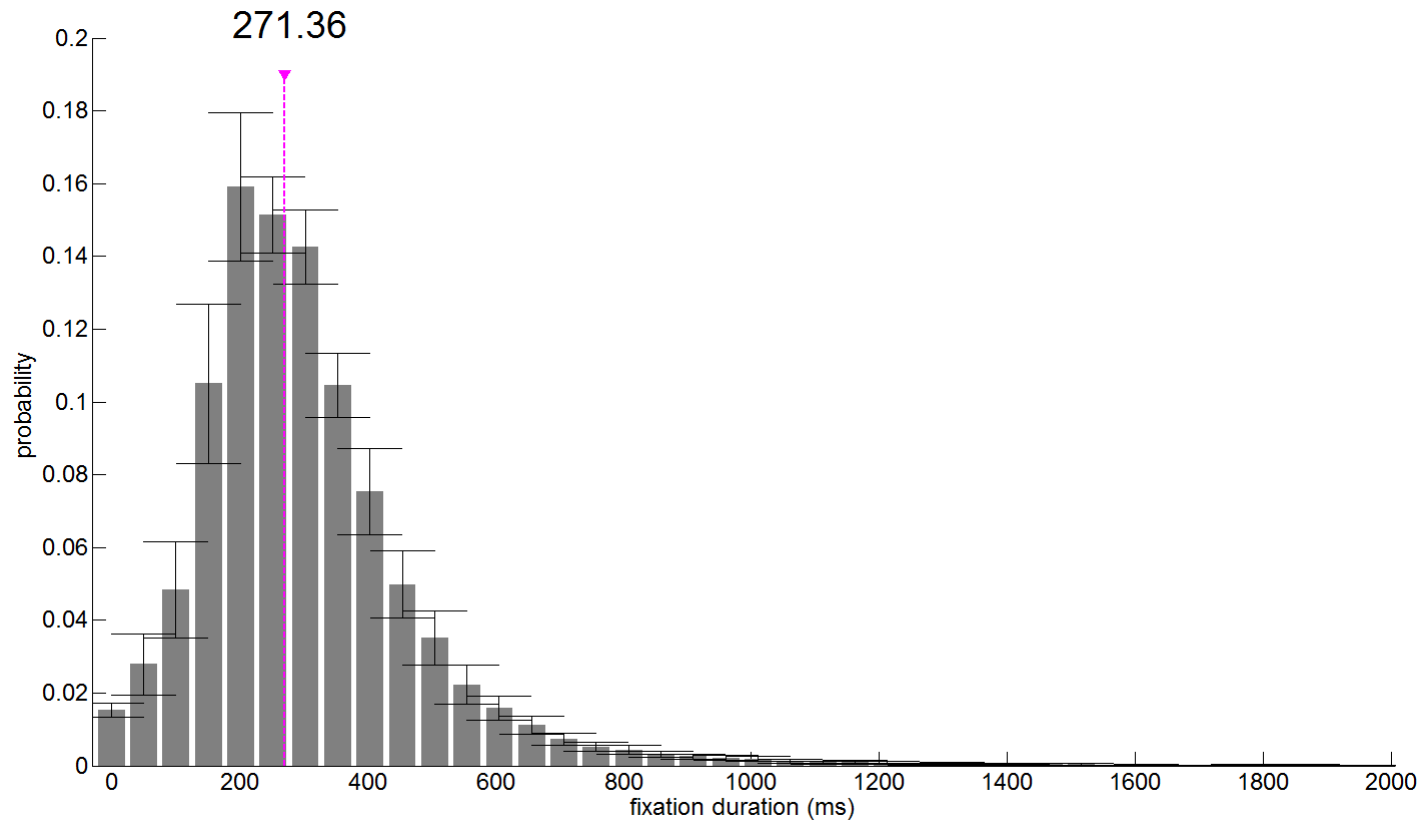
Distribution of change temporal delay from the saccade onset



Distribution of fixation duration

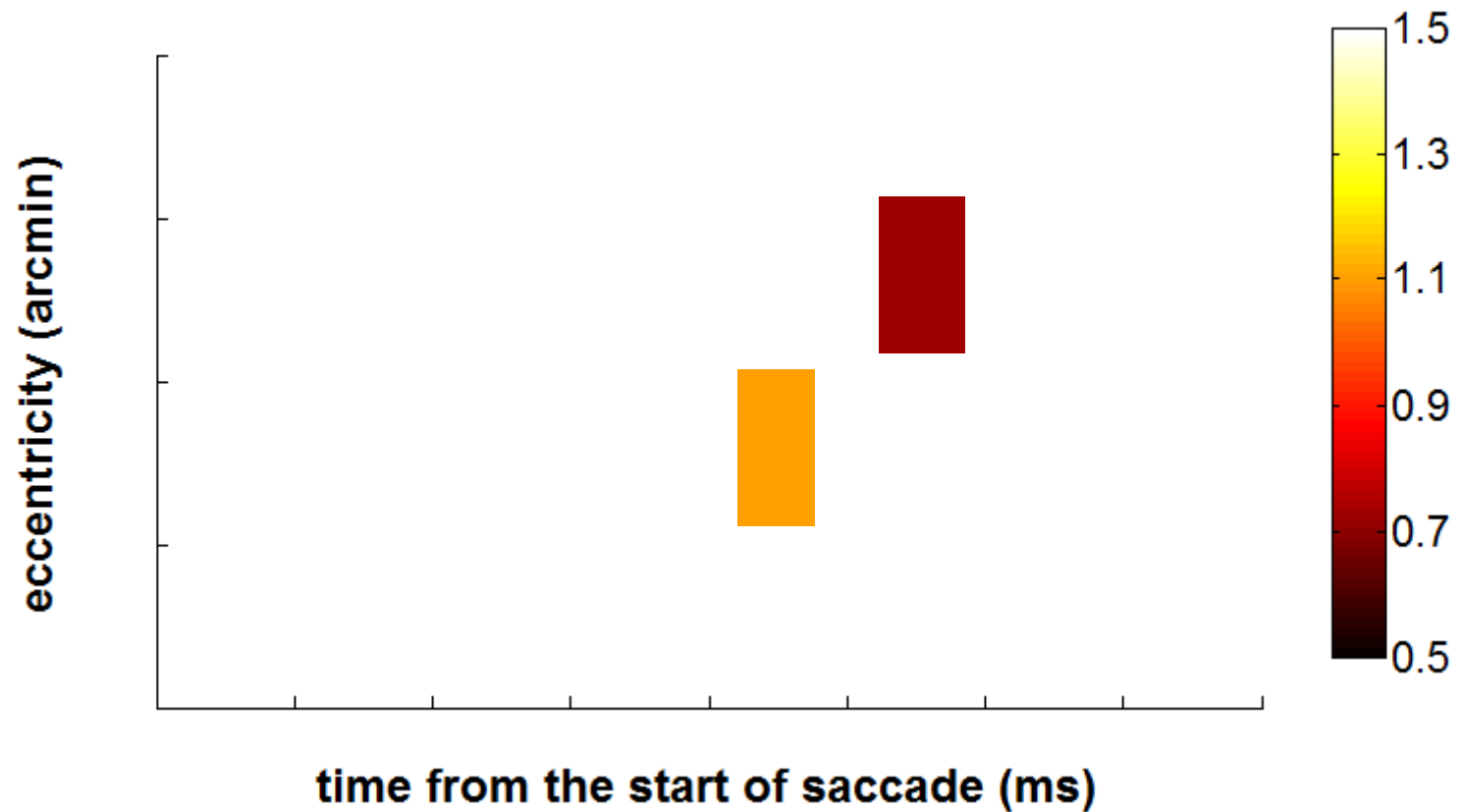


Distribution of fixation duration

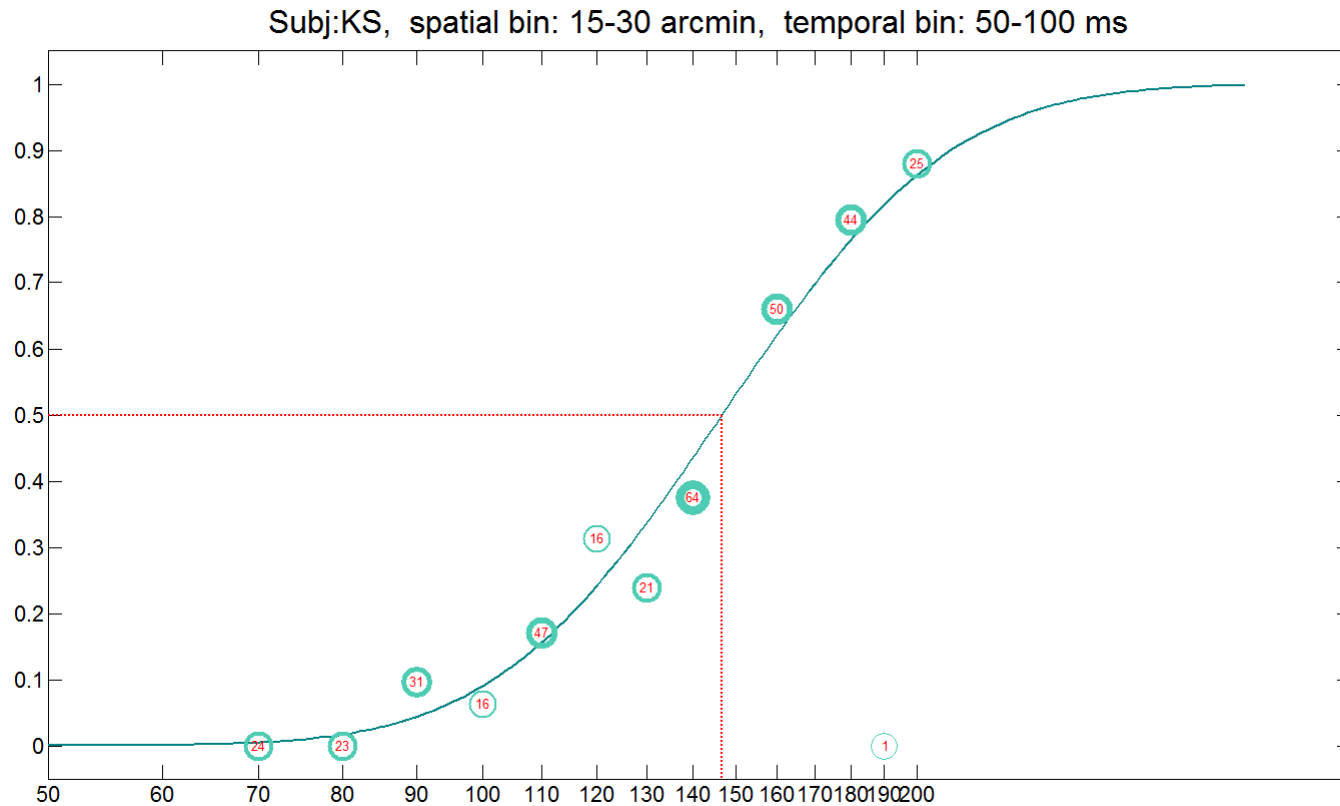


Study objectives:

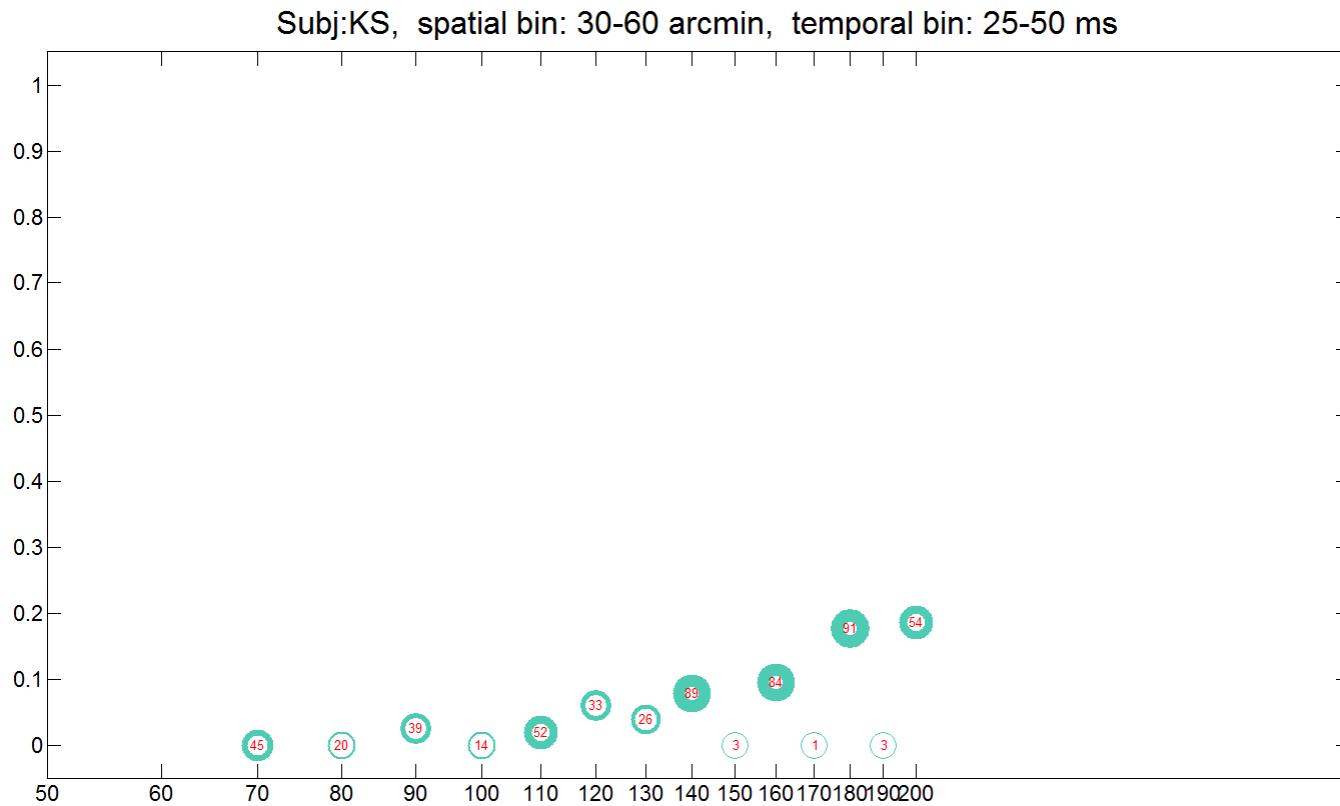
Construct the map of visibility relative to saccade onset:



Contrast sensitivity estimation



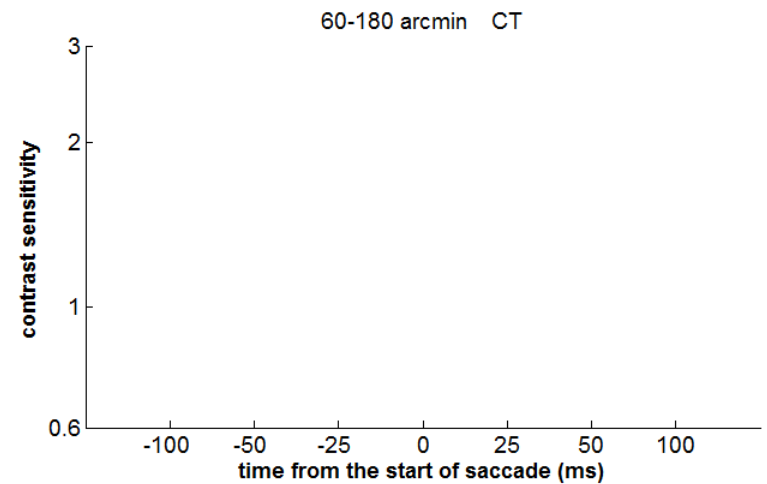
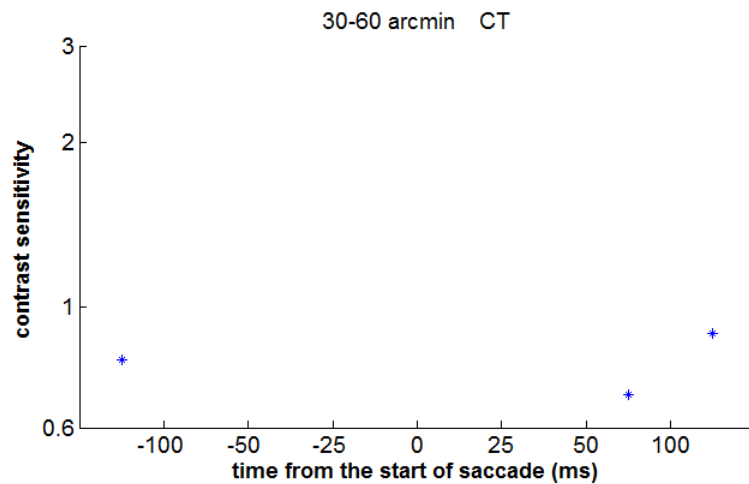
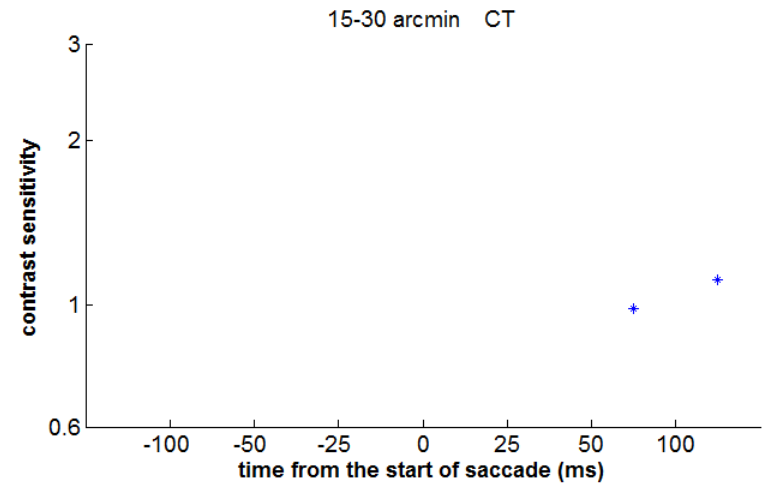
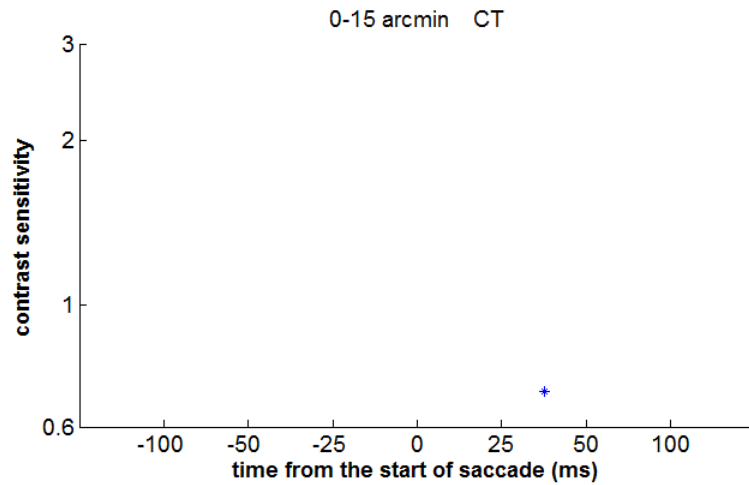
Contrast sensitivity estimation



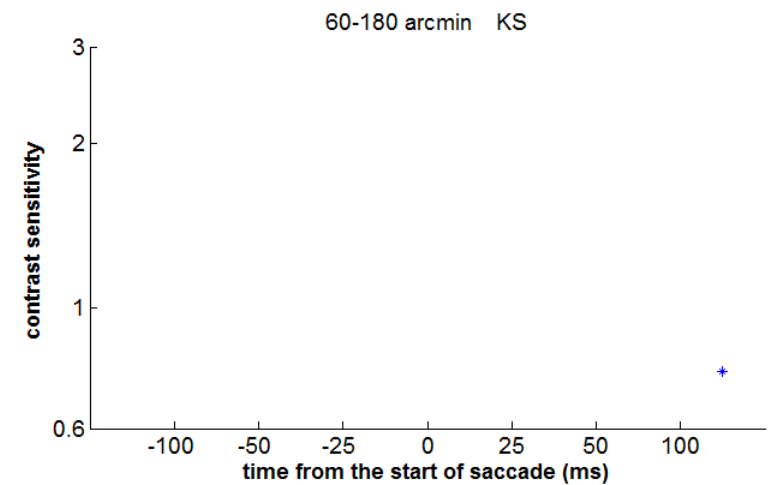
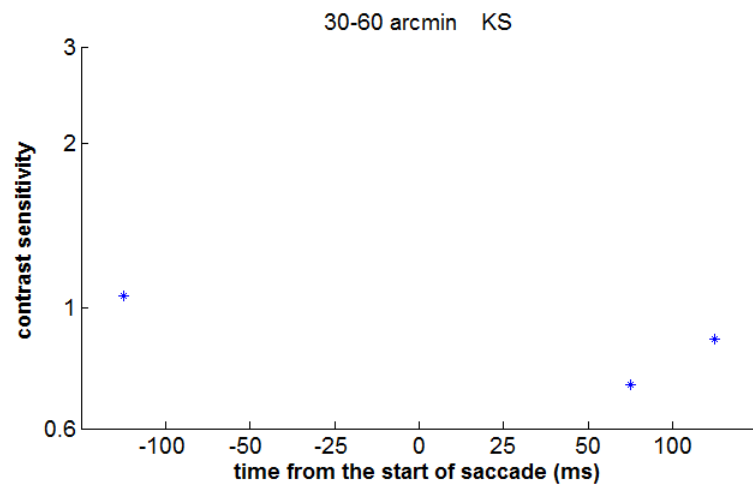
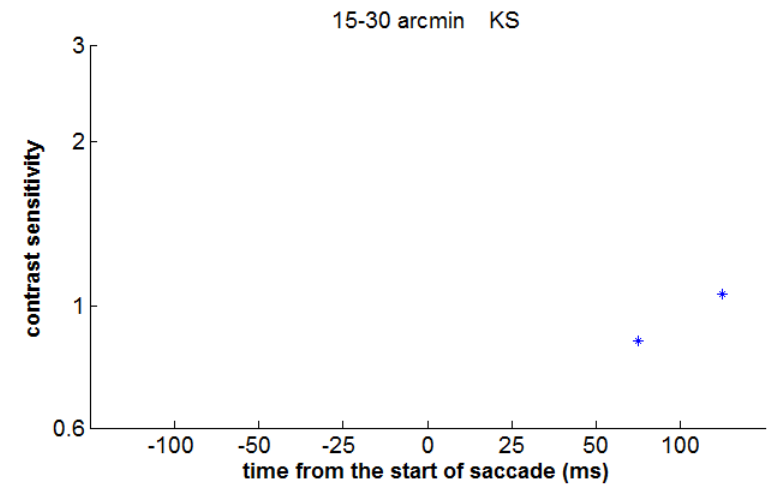
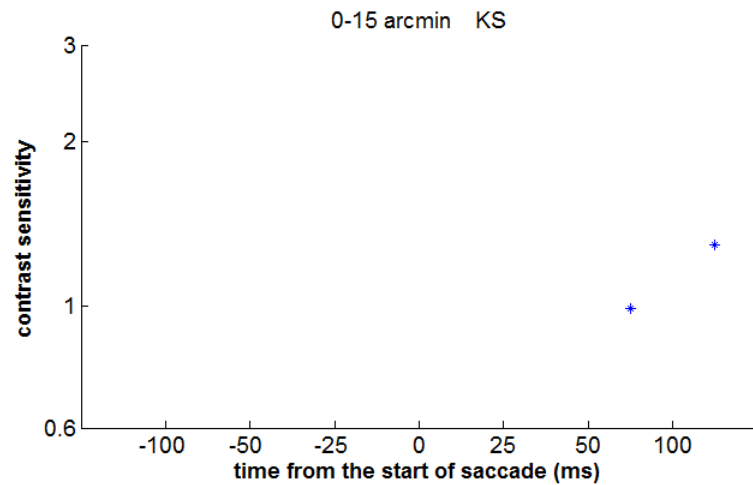
Data summary

	# chng	# hor chng	#used chng		-200 to -100	-100 to -50	-50 to -25	-25 to 0	0 to 25	25 to 50	50 to 100	100 to 200
CT	3464	2048	1595	0-15	0	0	0	0	6	16	25	32
				15-30	1	4	0	0	19	88	138	95
				30-60	12	5	2	2	40	323	336	208
				60-180	3	0	0	0	8	112	66	52
KS	5338	4473	3486	0-15	0	1	1	1	2	36	80	89
				15-30	6	1	1	1	17	187	362	295
				30-60	21	7	2	6	42	554	702	541
				60-180	6	2	2	2	10	268	150	91
NM	6654	4489	3200	0-15	2	0	0	0	8	48	108	55
				15-30	7	2	2	1	36	167	367	191
				30-60	20	7	4	6	102	451	793	444
				60-180	4	5	3	1	12	136	152	66
SA	3052	2400	1530	0-15	0	0	0	0	3	11	65	31
				15-30	3	0	0	0	14	84	120	134
				30-60	9	2	2	1	27	231	295	233
				60-180	3	1	0	0	8	111	70	72

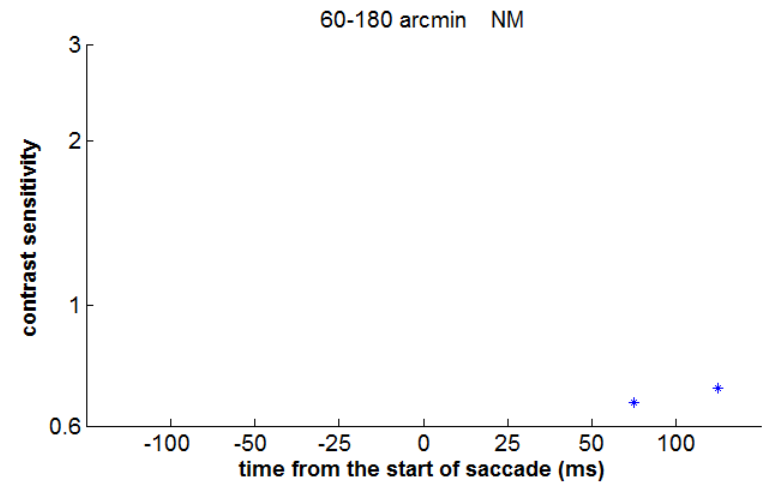
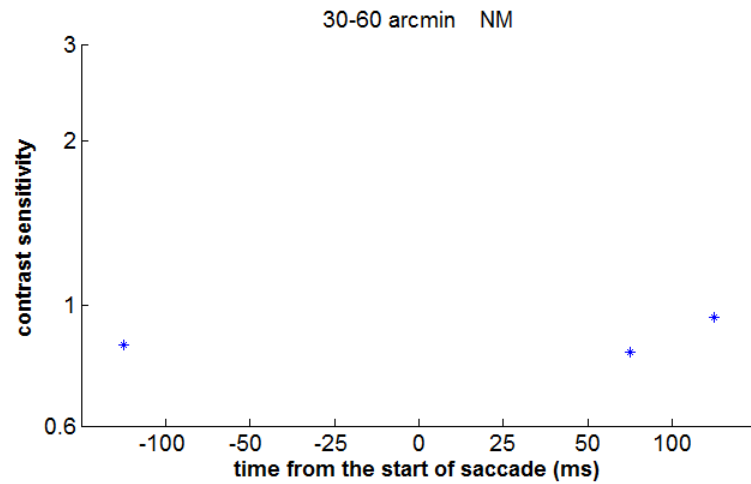
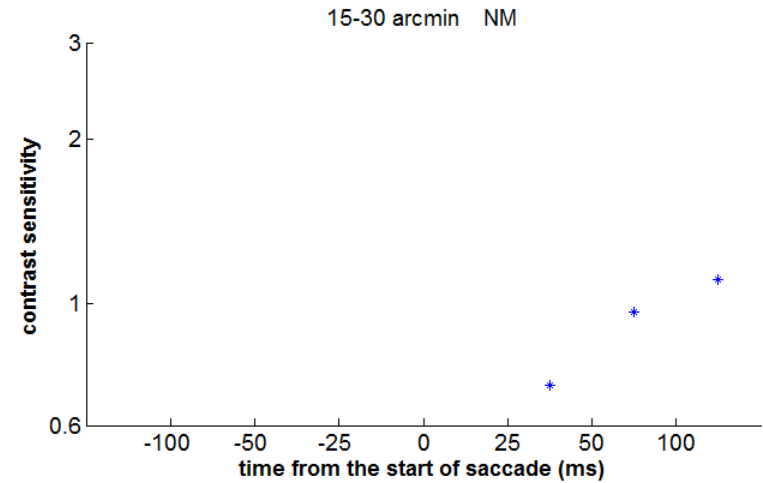
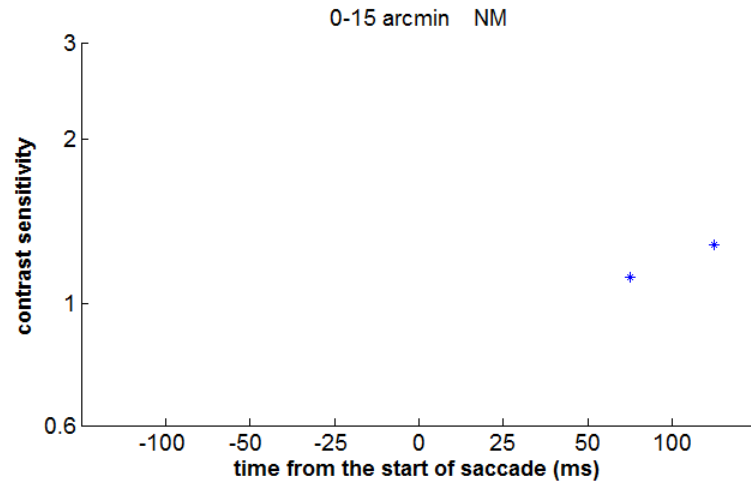
Contrast sensitivity estimation



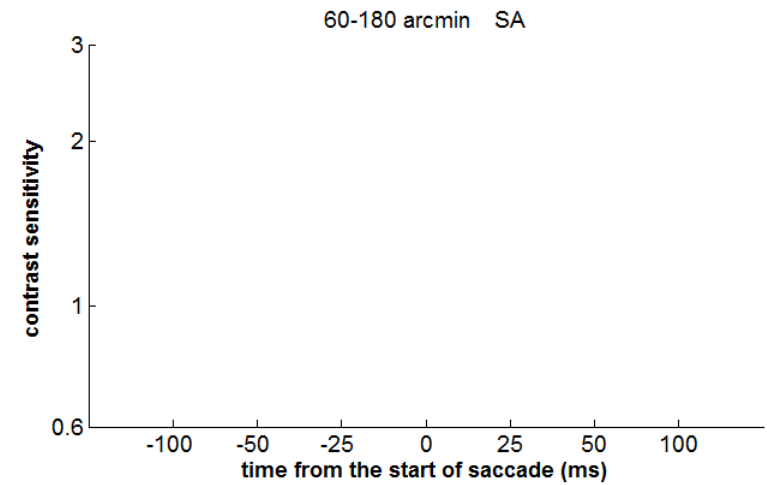
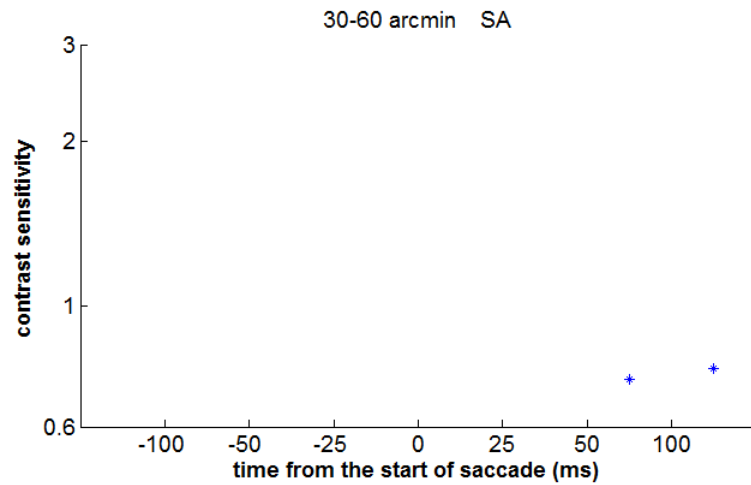
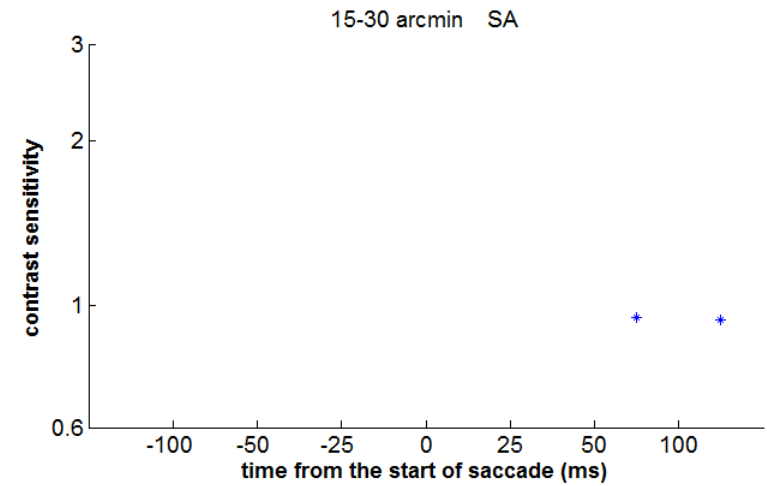
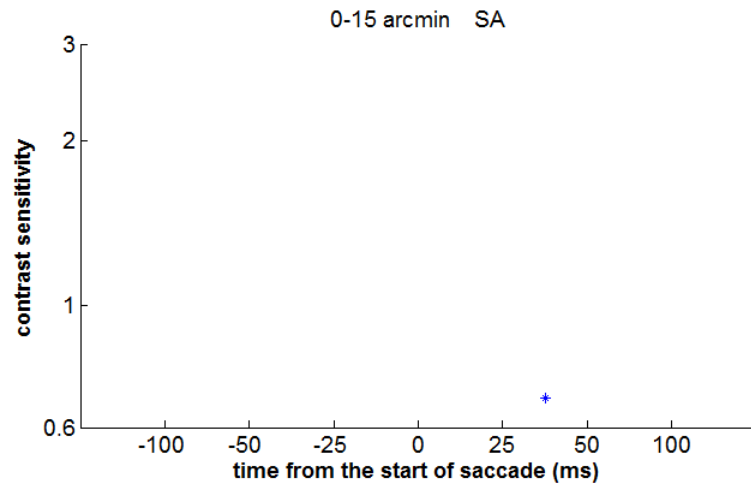
Contrast sensitivity estimation



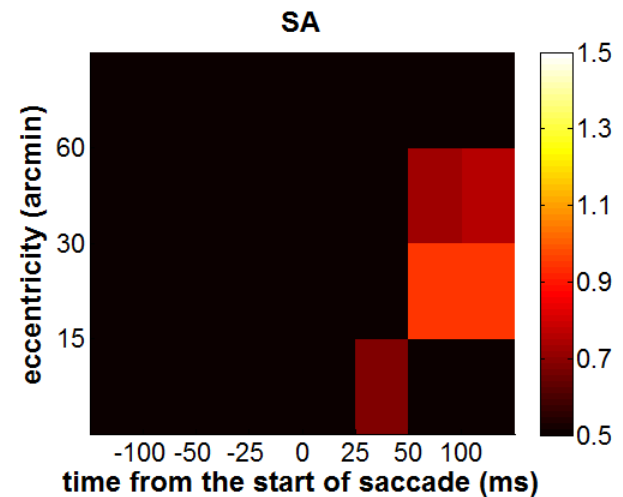
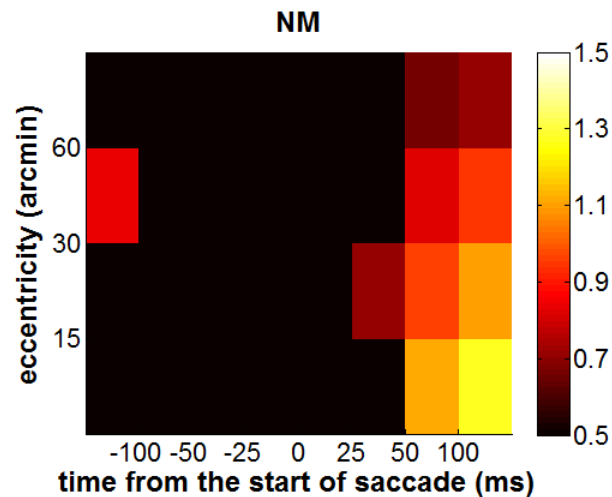
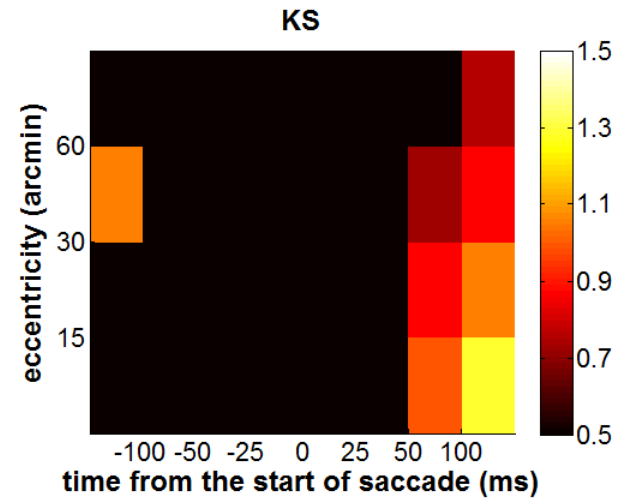
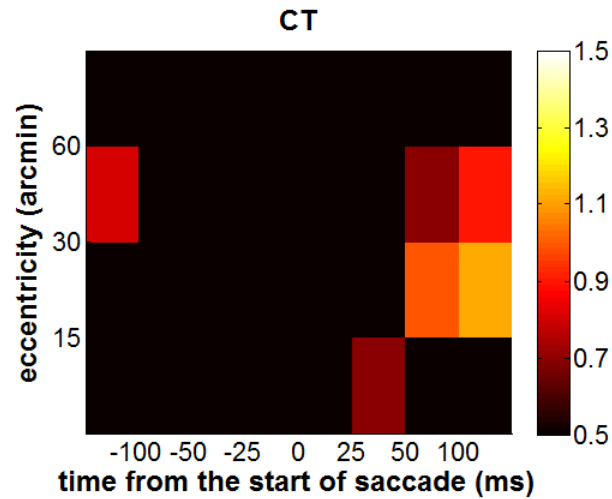
Contrast sensitivity estimation



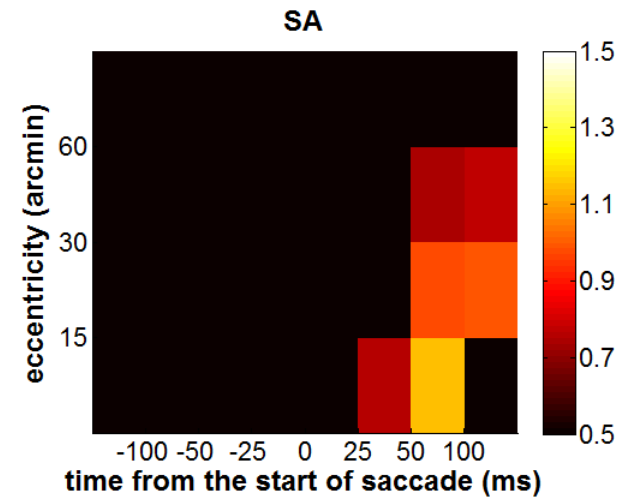
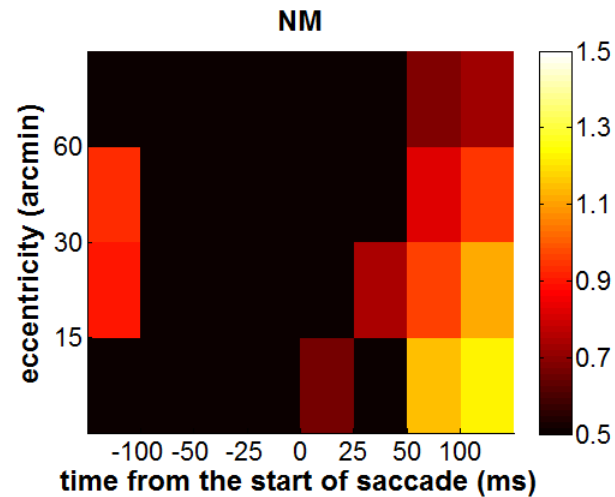
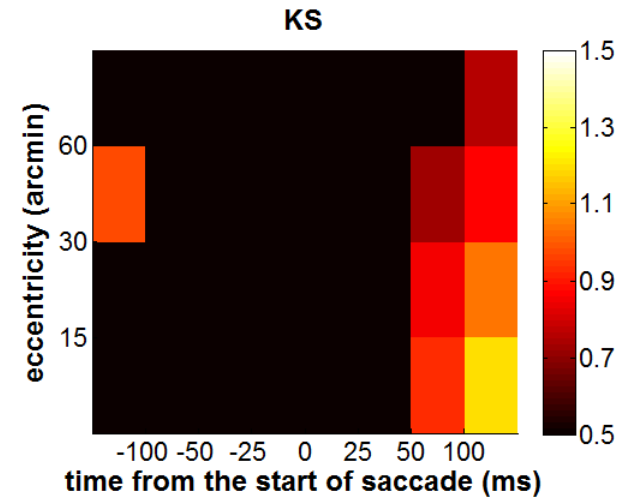
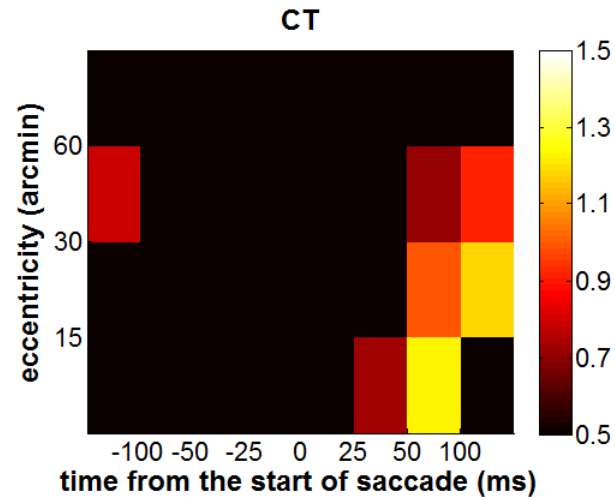
Contrast sensitivity estimation



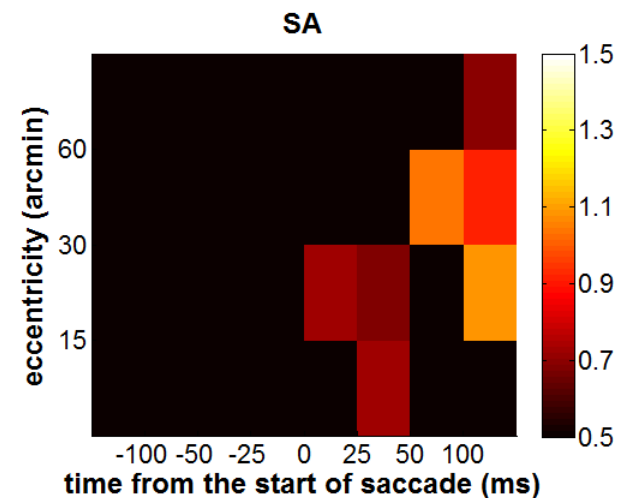
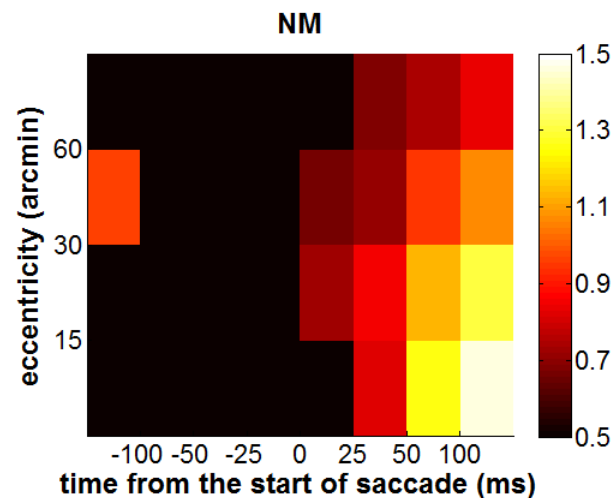
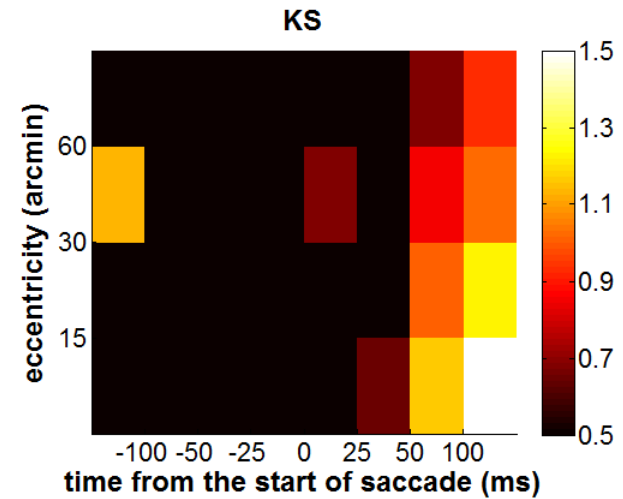
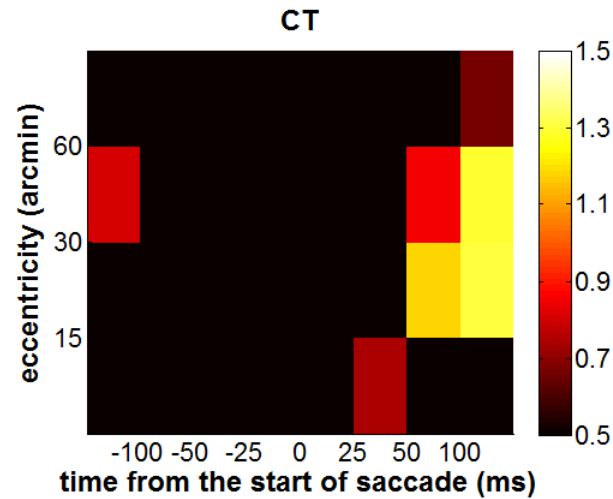
Spatiotemporal contrast sensitivity map



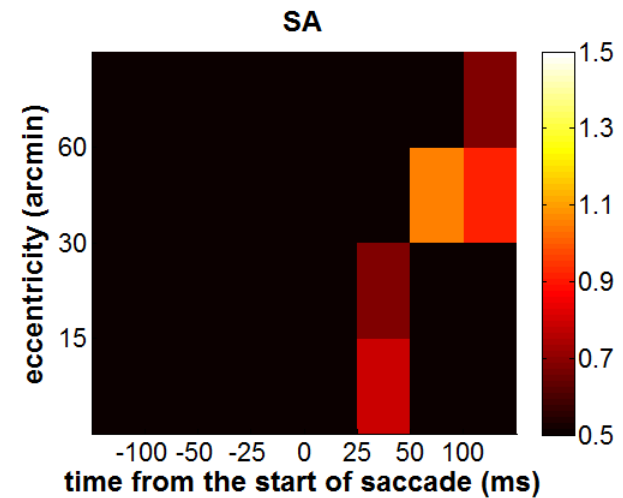
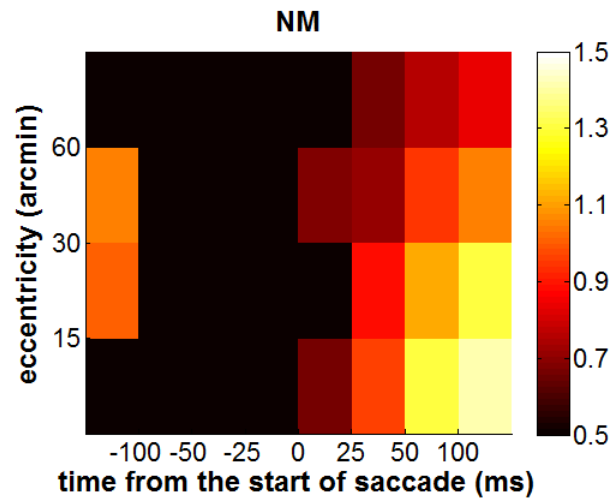
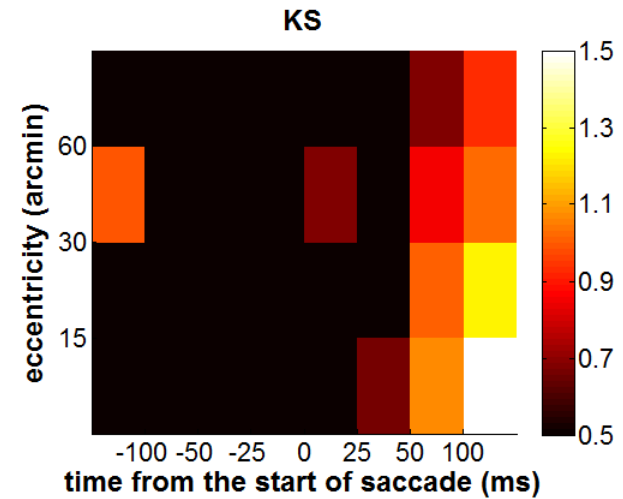
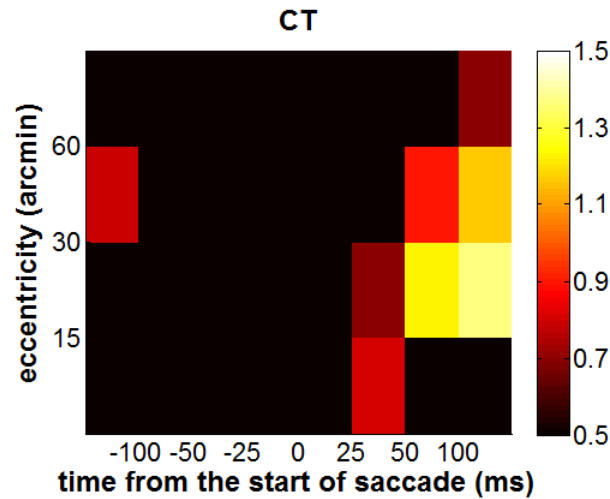
Spatiotemporal contrast sensitivity map (± 30 deg horizontal criteria)



Spatiotemporal contrast sensitivity map (± 15 deg horizontal criteria, 30% performance thresholds)



Spatiotemporal contrast sensitivity map (± 30 deg horizontal criteria, 30% performance thresholds)



Summary

- Construct the full spatiotemporal map of contrast sensitivity relative to occurrence of microsaccades.
- Contrast sensitivity is not homogenous within the fovea and parafovea and decreases with increasing eccentricity.
- “Microsaccadic suppression” of visual thresholds with similar time course to saccadic suppression phenomena.
- **To do:**
 - Complete the map by collecting more data with different delays.
 - Collect data from 2 more subjects.
 - Look at the effect of microsaccade/saccade amplitudes if data allows.