

Lab Meeting

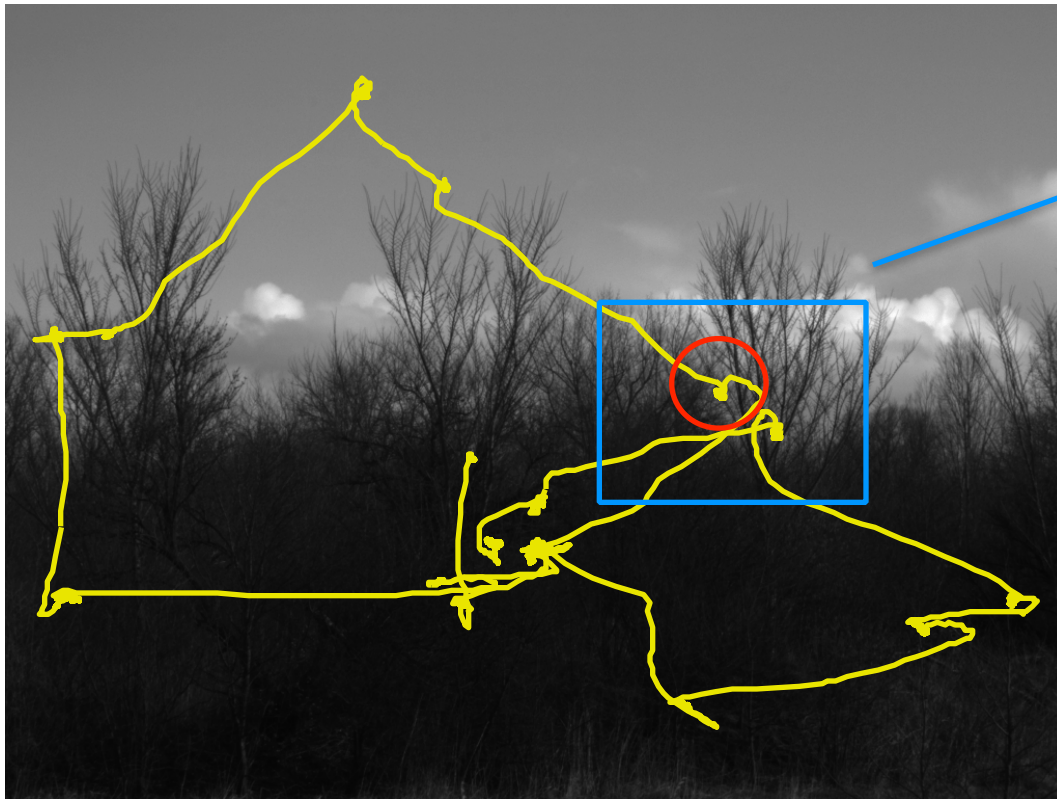
4/14/2015

Eye Movement and Fixational Patches

- Data from 11 subjects from three different tasks:
 - Free Viewing
 - Visual Search with Low frequency target
 - Visual Search with High frequency target
- Objective:
 - Any differences between tasks
 - Any relation between characteristics of drifts and the visited patch

Analysis

1024*768



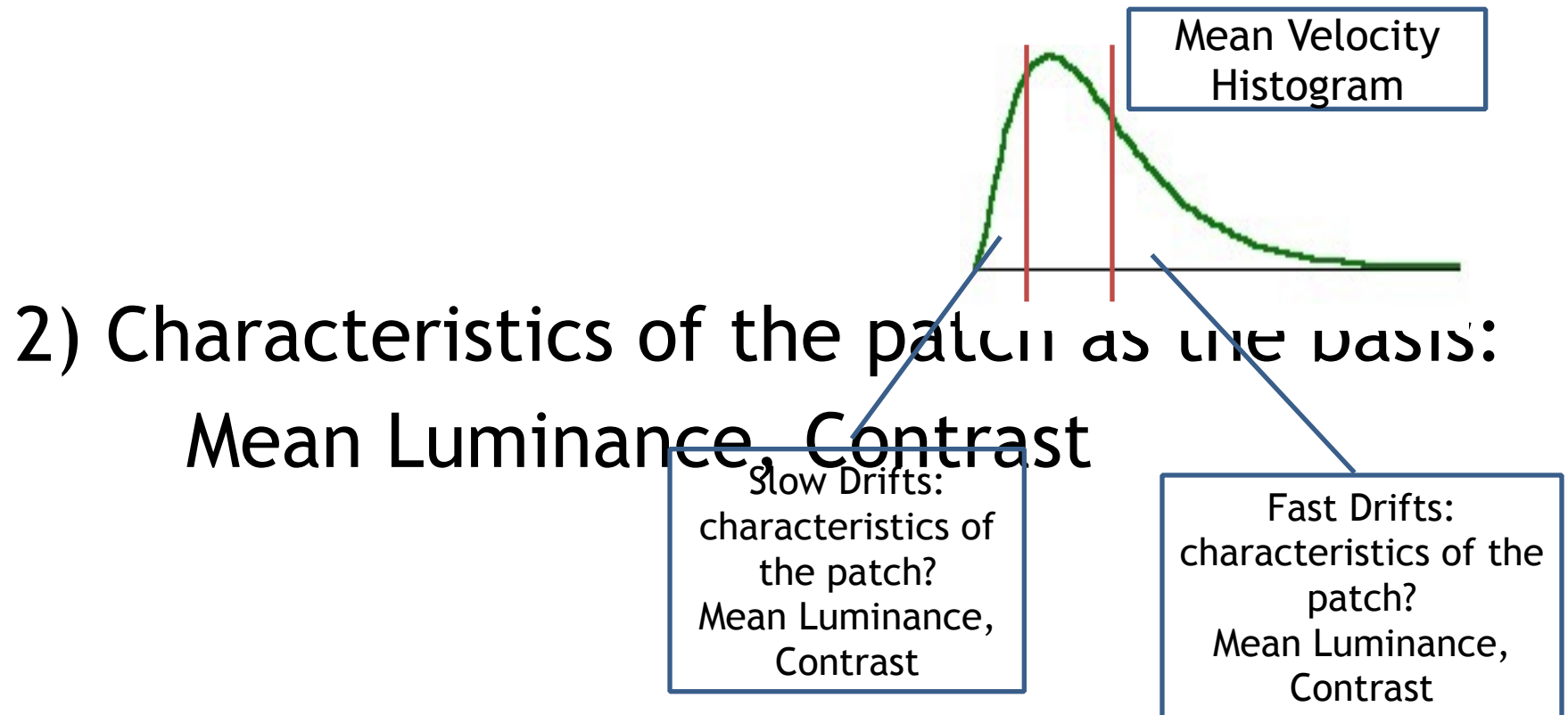
1 degree

1. Filtered with Sgolay (3,41)
2. 50 Samples removed from both beginning and end
3. A minimum length of 100

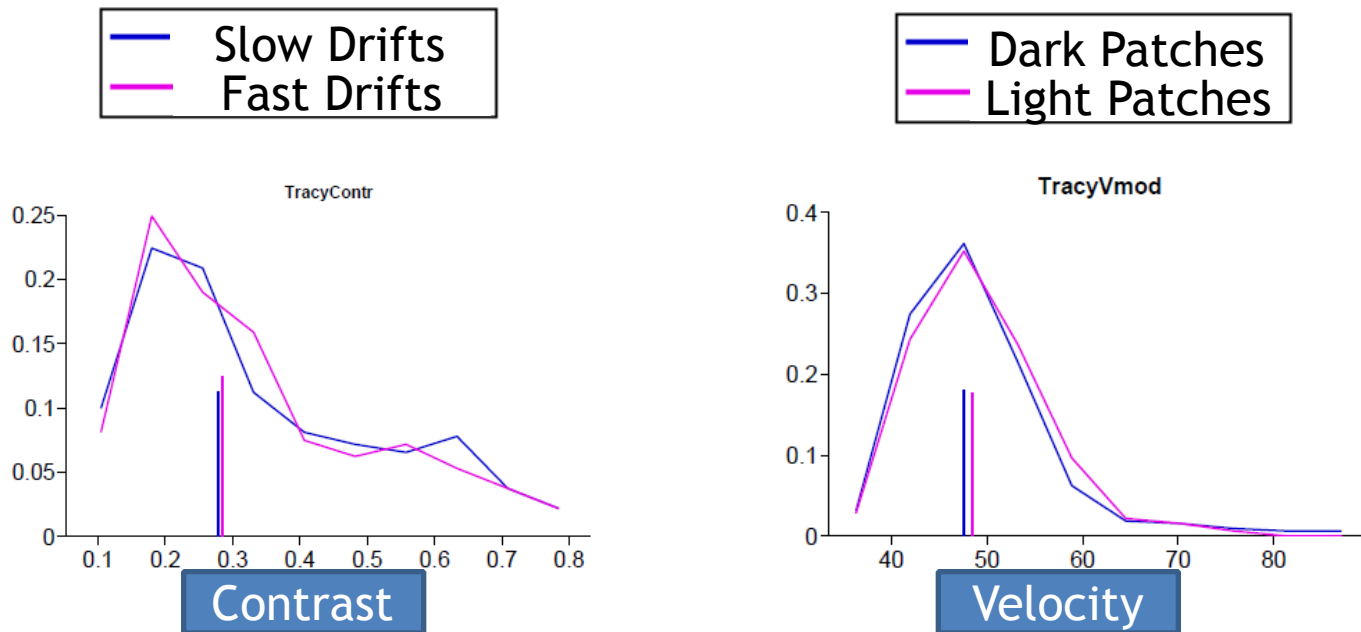
Within Task

1) Eye movement characteristics as the basis:

mean velocity, span, curvature



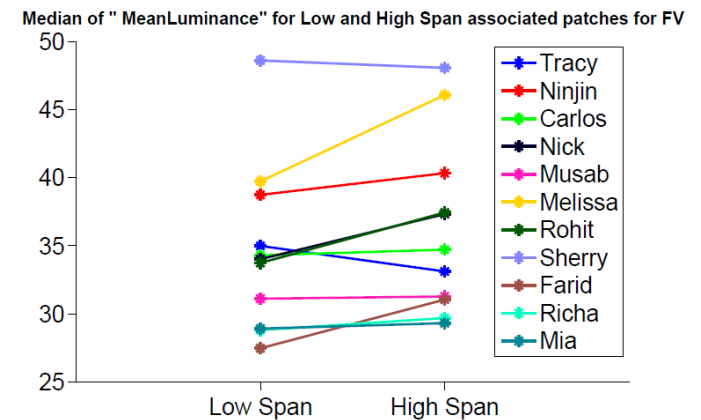
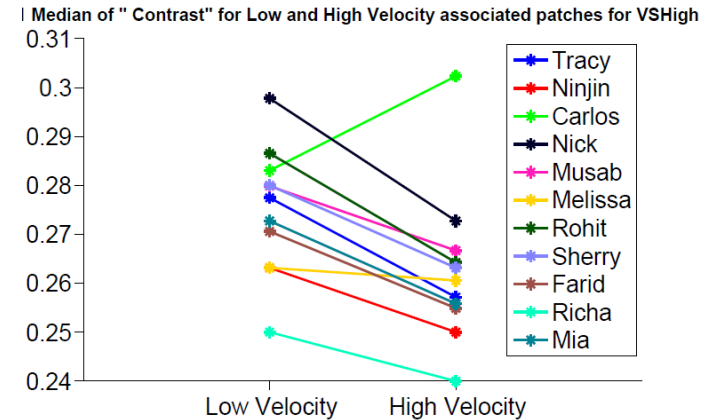
- Histograms of (span, velocity) for lower and upper 25 percentiles of (luminance, contrast) and vice versa



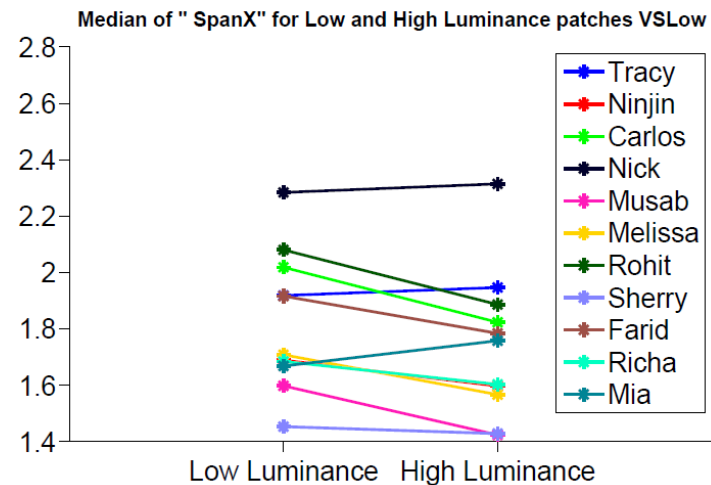
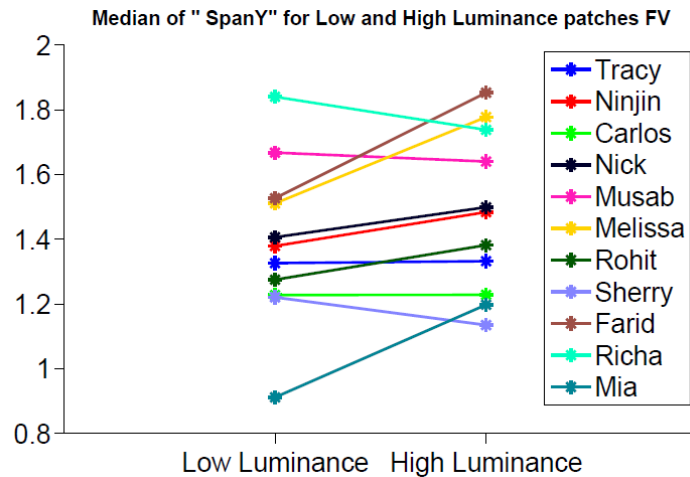
- Any consistent pattern among subjects for low vs. high?

P value of Paired t-test Between characteristic associated with 'Slow' and 'Fast' drifts	Mean Luminance	Contrast
FV	0.970	0.098
VSLow	0.525	0.579
VSHigh	0.451	0.007 *

P value of Paired t-test Between characteristic associated with 'Low Span' and 'High Span' drifts	Mean Luminance	Contrast
FV	0.045 *	0.188
VSLow	0.110	0.160
VSHigh	0.187	0.293

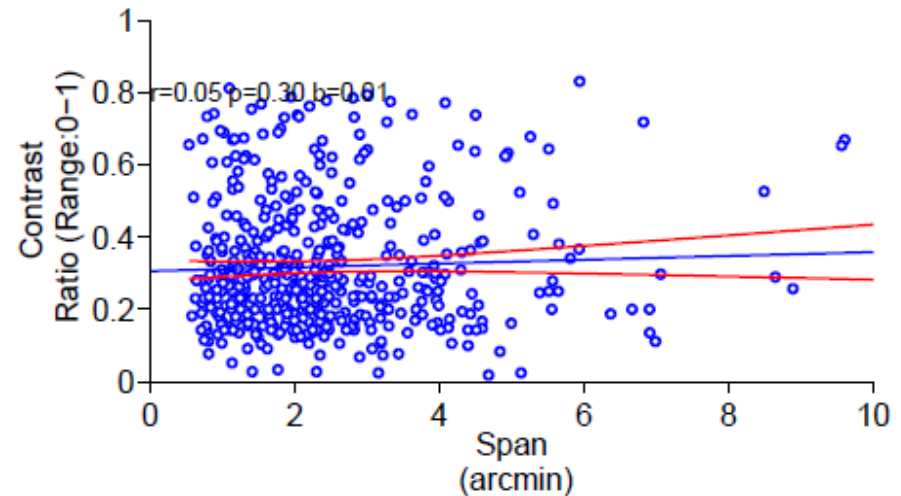
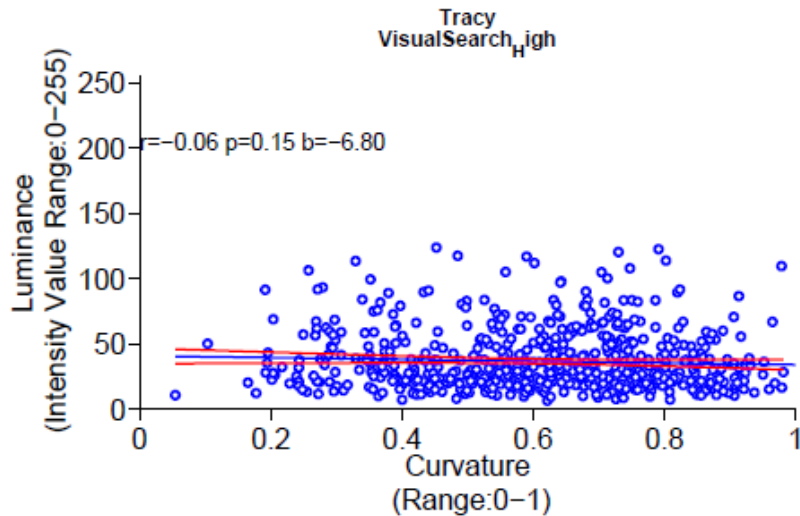


P value of Paired t-test Between characteristic associated with 'Low Luminance' and 'High Luminance' patches	Vx	Vy	Vmod	Span	SpanX	SpanY
FV	0.24	0.34	0.25	0.13	0.13	0.02 *
VS _{Low}	0.67	0.54	0.65	0.13	0.02 *	0.69
VS _{High}	0.68	0.52	0.15	0.87	0.18	0.38



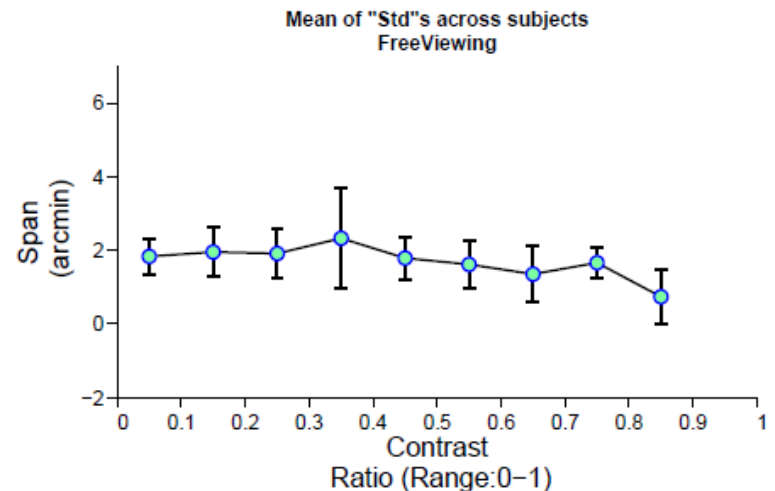
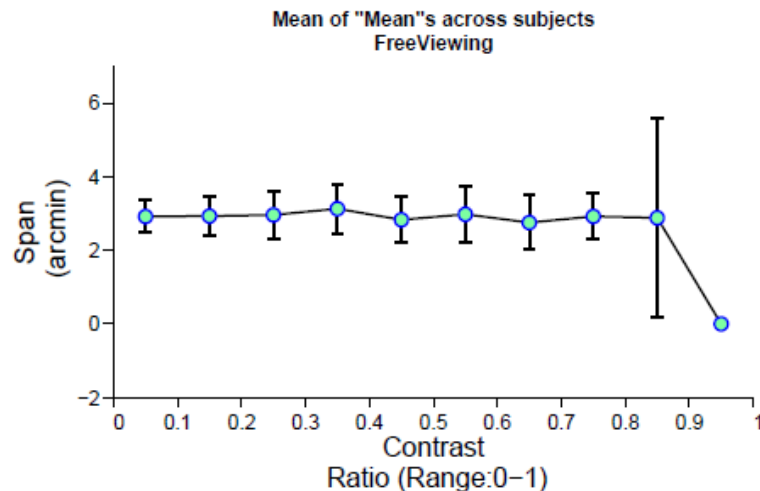
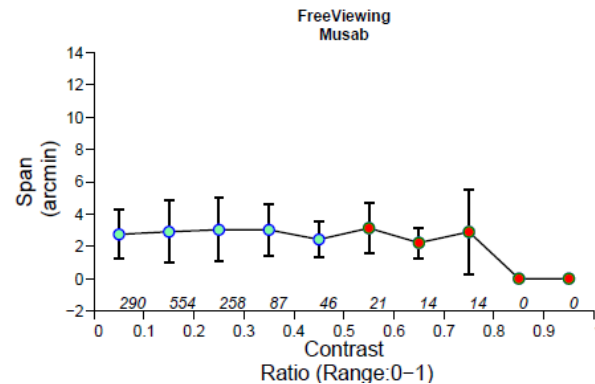
P value of Paired t-test Between characteristic associated with 'Low Contrast' and 'High Contrast' patches	Vx	Vy	Vmod	Span	SpanX	SpanY
FV	0.24	0.34	0.25	0.13	0.13	0.08
VS _{Low}	0.67	0.54	0.65	0.13	0.07	0.31
VS _{High}	0.68	0.52	0.15	0.87	0.59	0.69

- Regressing Characteristics of Drifts on Characteristics of Image:
 - (Duration, curvature, span, velocity)
on
(Luminance , Contrast)

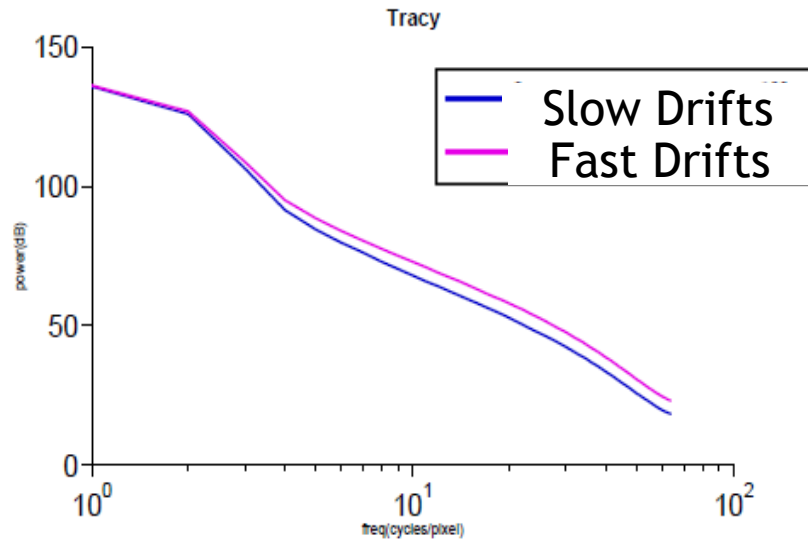


➤ Maybe the relation is not linear (std is changing)

- Binning the contrast/luminance, looking at the mean and std of span, velocity,...in each bin



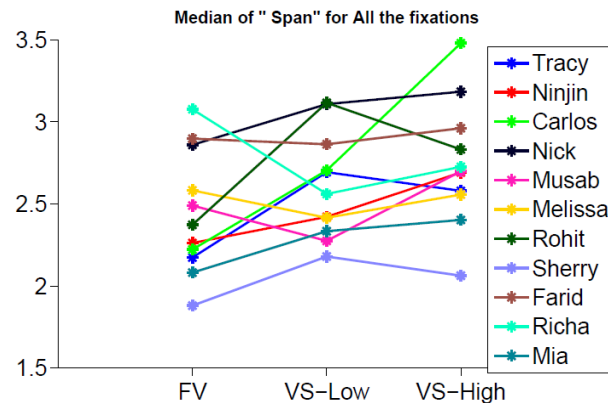
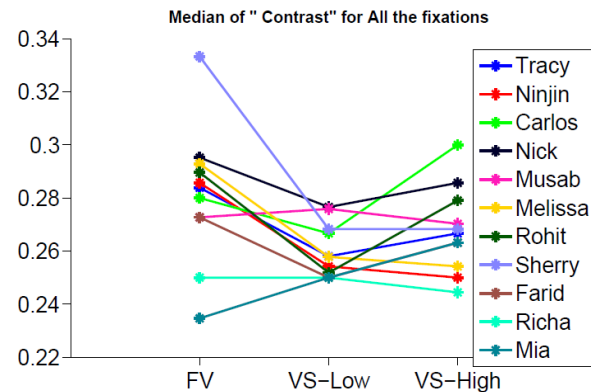
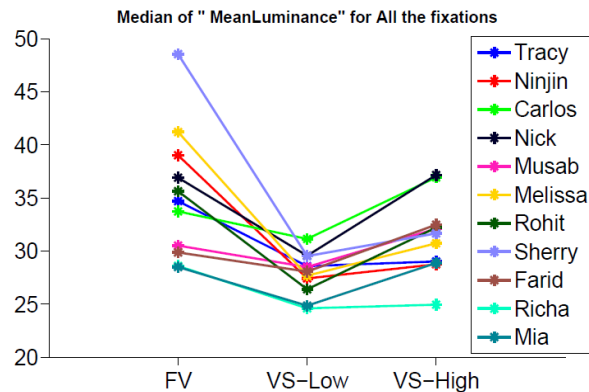
- Does the spectral characteristics of the patch make a difference?



Between Task

- Consistent pattern among subjects: Paired t-test

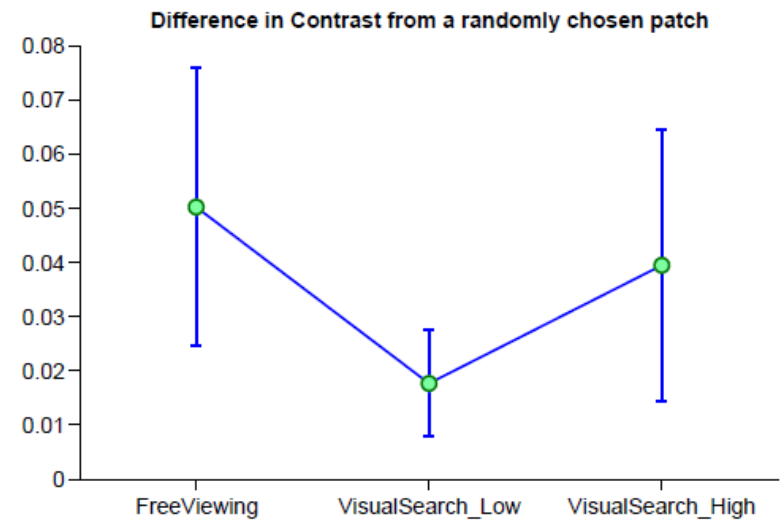
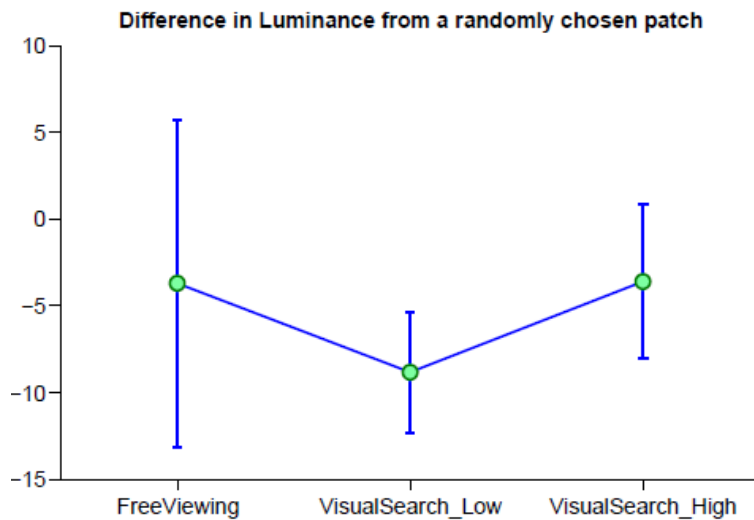
P value of Paired t-test	Mean nance	Lumi-	Contrast	Velocity	Span	Duration
FV- VSLow	0.0013*		0.0107*	0.1551	0.1765	0.089
FV-VSHigh	0.0753		0.1254	0.4662	0.0322*	0.109
VSLow-VSHigh	0.0005*		0.0819	0.5375	0.1452	0.568



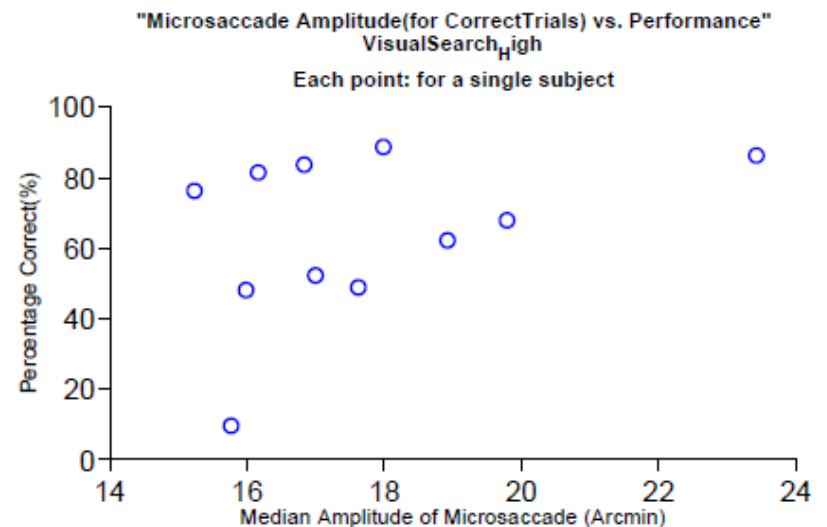
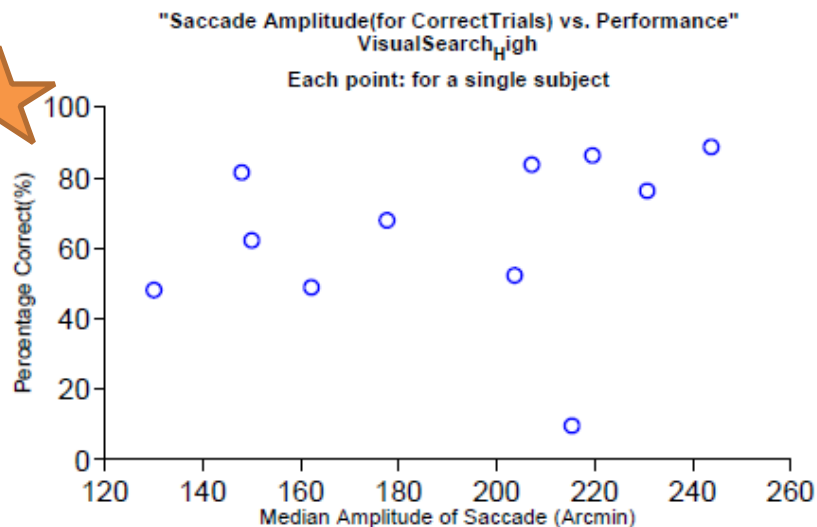
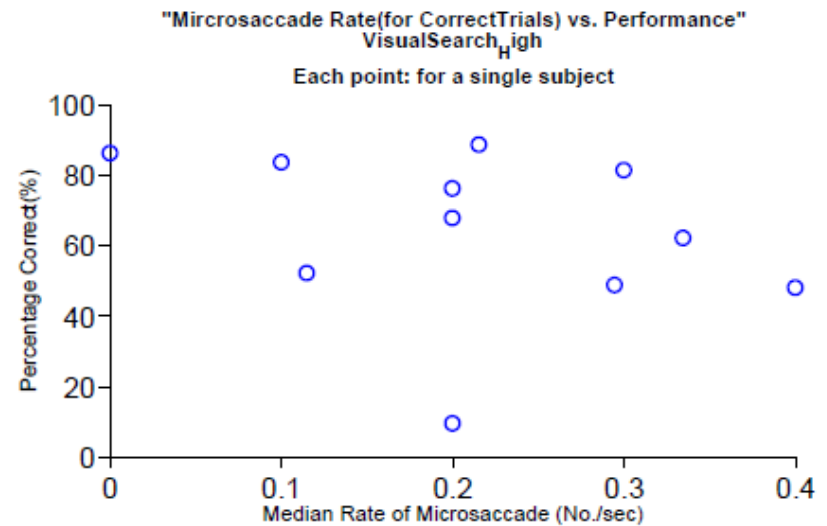
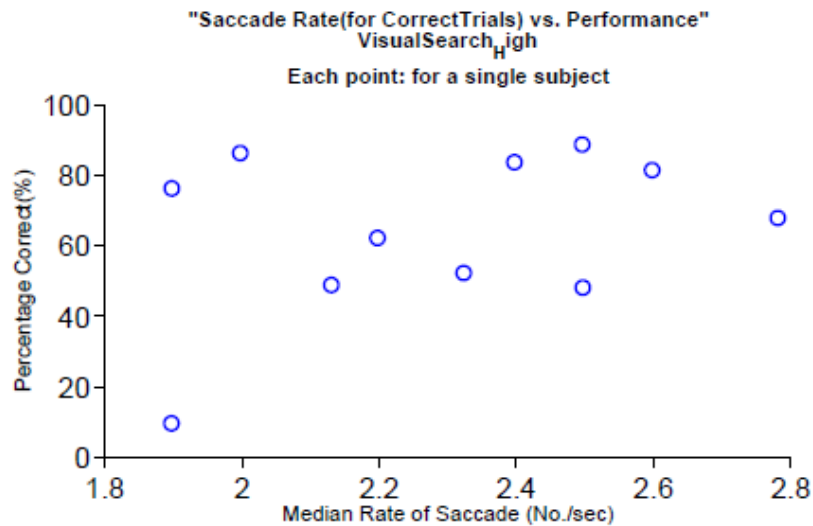
- Consistent pattern among subjects: Paired t-test
 - Diffusion Coefficient

Paired ttest p-value	FV-VSLow	FV-VSHigh	VSLow-VSHigh
Diffusion Coefficient	0.89	0.50	0.39
Rate of increase in the Area Under 2D Histogram-EigenValue Method	0.52	0.16	0.33

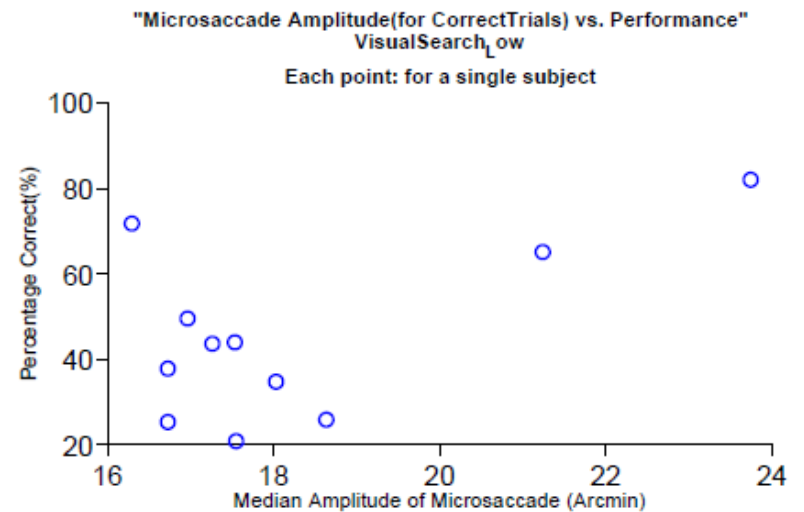
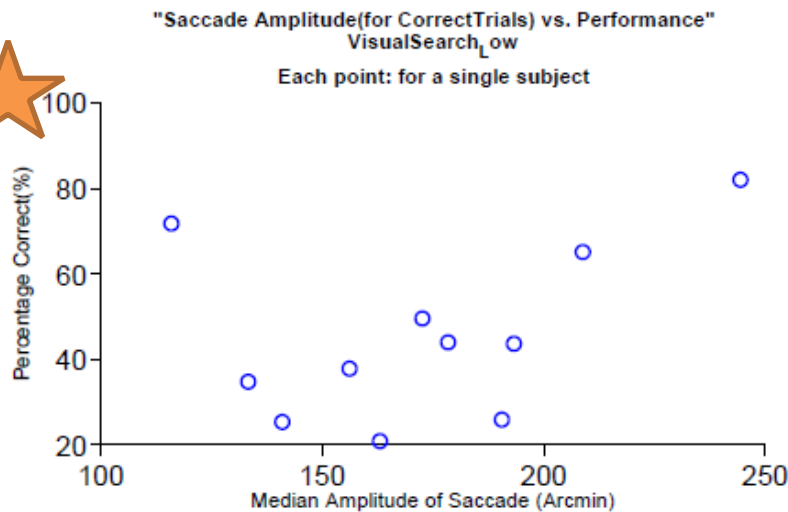
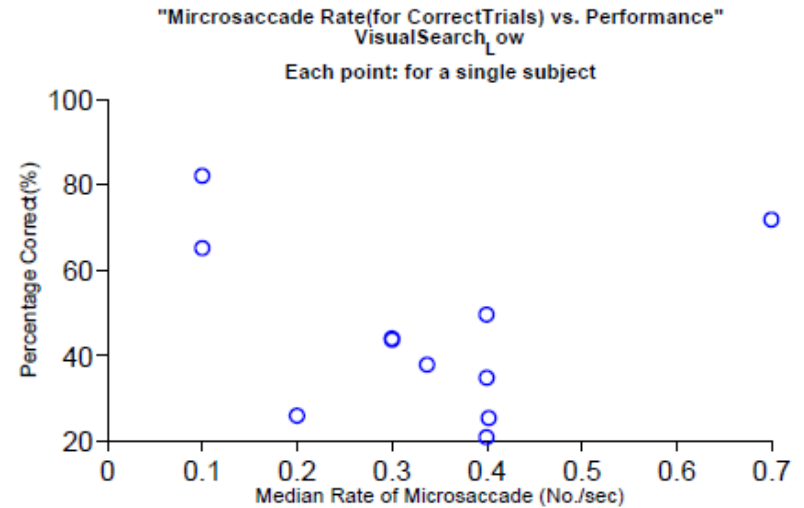
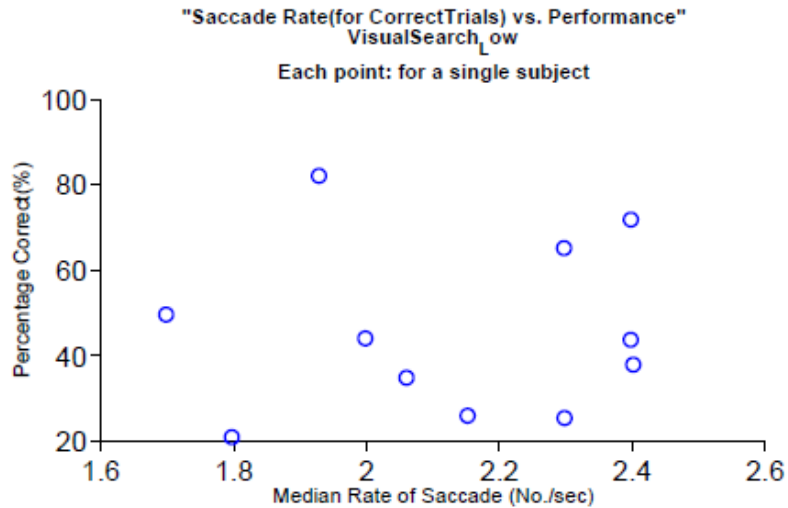
- How different is the selected patch from a random patch?



- Performance and saccade ? Any relation?
– VS-High



– VS-Low



Summary

- Within task→ not a solid conclusion
 - Try diffusion coefficient for lower vs. upper percentile
 - Try frequency content
- Between task→
 - Seemingly the patches are not chosen randomly.
 - Higher luminance and contrast in FV compared with VS-Low
 - Higher contrast in VS-High compared with VS-Low
 - Higher saccade amplitude, higher performance

The End