

SUPPLEMENTAL DATA

TABLE S1

Regression values for saccade peak velocity vs. amplitude (main sequence) and marginal means of peak velocity used for pairwise comparisons.

	FIXED	DECEL	ACCEL	RO	RI
Slope (s ⁻¹)	58	47	63	62	55
Pearson's <i>r</i>	0.94	0.94	0.95	0.95	0.93
p value <	10 ⁻¹⁶				
Mean peak velocity (deg/s)	334	305	337	333	318

TABLE S2A

ANCOVA of effect of pulse pattern, saccade probability, and stimulation site on saccade metrics.

Factor	df	Latency		Amplitude		Peak Velocity		Duration	
		F	p <	F	p <	F	p <	F	p <
Pulse Pattern	4	19.9	10 ⁻¹⁴	14.0	10 ⁻¹⁰	10.9	10 ⁻⁷	11.9	10 ⁻⁸
Saccade Probability	1	45.6	10 ⁻¹⁰	50.8	10 ⁻¹¹	70.5	10 ⁻¹⁵	8.3	0.004
Stimulation Site	13	5.9	10 ⁻⁹	17.0	10 ⁻³⁴	19.5	10 ⁻³⁹	19.5	10 ⁻³⁹

TABLE S2B

Post-hoc comparisons of saccade metrics between pairs of pulse patterns, significant (< 0.05, Bonferroni-corrected) p-values reported. Comparisons were made using marginal means estimated from an ANCOVA model including factors of pulse pattern, saccade probability, and stimulation site (TABLE S2A), and evaluated at the grand mean of the covariate: saccade probability = 0.73.

		ACCEL	DECEL	RO	RI
FIXED	Latency	10 ⁻⁷	10⁻³	-	-
	Amplitude	10⁻⁶	-	-	-
	Peak Velocity	10⁻⁶	-	-	0.025
	Duration	10⁻³	0.006	-	-
ACCEL	Latency		10⁻¹⁴	10⁻⁴	10⁻⁴
	Amplitude		10 ⁻⁸	0.015	-
	Peak Velocity		10 ⁻⁴	0.006	-
	Duration		10 ⁻⁸	-	-
DECEL	Latency			10 ⁻⁴	10 ⁻⁴
	Amplitude			0.001	10⁻⁴
	Peak Velocity			-	0.007
	Duration			10⁻³	10⁻⁵
RO	Latency				-
	Amplitude				-
	Peak Velocity				-
	Duration				-

Bold p-values indicate that value of “row” pattern was significantly *greater* than value of “column” pattern on a particular metric; otherwise, p-values indicate row pattern was significantly *less* than column pattern. Non-significant differences marked with “-”.

TABLE S3

Regression values for saccade metrics on saccade probability.

<i>Pulse Pattern</i>	<i>Latency</i>		<i>Amplitude</i>		<i>Peak Velocity</i>		<i>Duration</i>	
	<i>r</i>	<i>p</i> <	<i>r</i>	<i>p</i> <	<i>r</i>	<i>p</i> <	<i>r</i>	<i>p</i> <
FIXED	0.27	10 ⁻³	0.30	10 ⁻⁴	0.34	10 ⁻⁵	0.14	0.05
DECEL	-	0.9	-	0.6	-	0.3	-	0.9
ACCEL	0.24	10 ⁻³	0.23	10 ⁻³	0.28	10 ⁻⁵	-	0.3
RO	0.29	10 ⁻³	0.28	10 ⁻³	0.30	10 ⁻³	0.17	0.05
RI	0.19	0.03	-	0.2	-	0.2	-	0.4

Only significant (p < 0.05) r values reported

TABLE S4

ANCOVA of effect of pulse pattern, normalized current, and stimulation site on saccade metrics.

<i>Factor</i>	<i>df</i>	<i>Latency</i>		<i>Amplitude</i>		<i>Peak Velocity</i>		<i>Duration</i>	
		<i>F</i>	<i>p <</i>	<i>F</i>	<i>p <</i>	<i>F</i>	<i>p <</i>	<i>F</i>	<i>p <</i>
Pulse Pattern	4	9.7	10^{-6}	8.6	10^{-6}	9.5	10^{-6}	9.3	10^{-6}
Normalized Current	1	59.1	10^{-13}	54.3	10^{-12}	91.5	10^{-19}	5.8	0.02
Stimulation Site	13	6.1	10^{-10}	18.4	10^{-37}	21.9	10^{-43}	20.0	10^{-40}

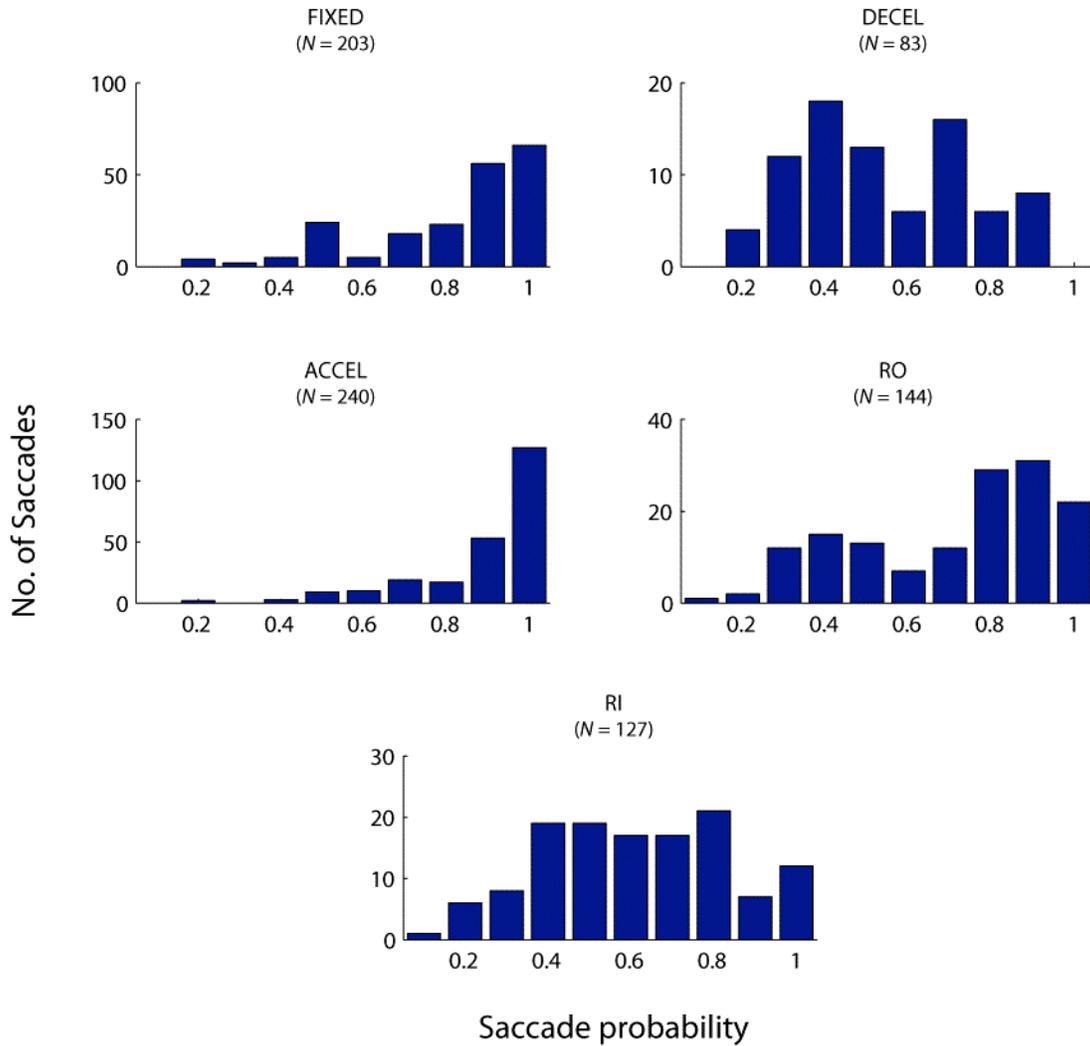
Normalized current is calculated as the stimulation current divided by the site threshold (see Materials and Methods). The yellow shading highlights that the effect of pulse pattern is independent of stimulation current and FEF stimulation site. Thus, the effect of pulse pattern on saccade metrics regressed on saccade probability (FIGURE 3) cannot be explained by a simple common dependence of saccade metrics and saccade probability on stimulation current (shown graphically in Supplemental FIGURE S2).

TABLE S5

Parameter values, 95% confidence intervals (CI), and r^2 values obtained for least-square fits of amplitude vs. latency regressions using the following function (see Materials and Methods for nomenclature):

$$A = \frac{p_1(-L) + p_2}{q_1 - L}$$

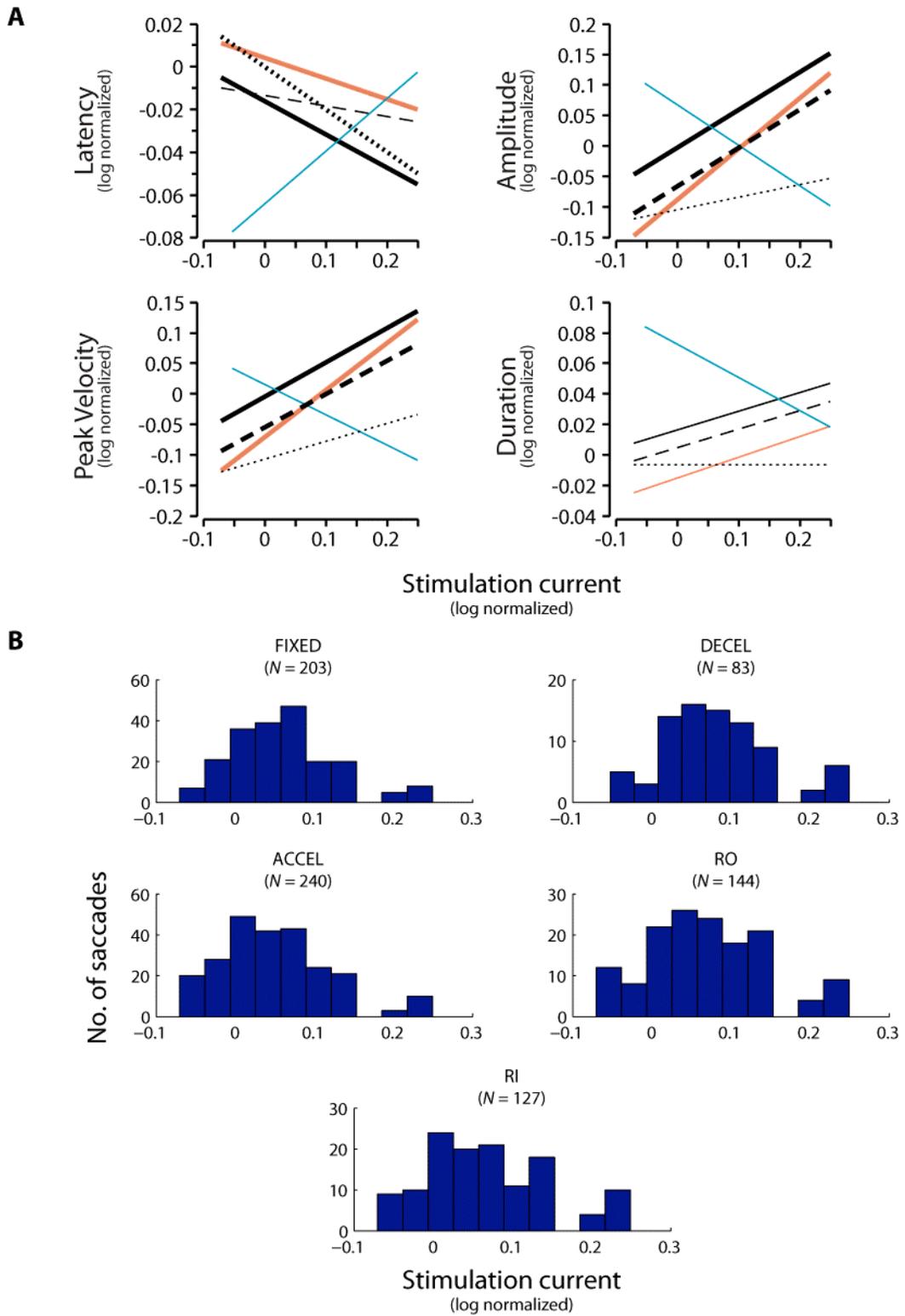
	FIXED	DECEL	ACCEL	RO	RI
p_1 (CI)	1.617 (0.838, 2.395)	0.906 (0.574, 1.237)	1.232 (0.452, 2.013)	1.066 (0.586, 1.547)	1.179 (-0.750, 3.107)
p_2 (CI)	-0.0155 (-0.0286, -0.0025)	-0.0188 (-0.0330, -0.0045)	-0.0061 (-0.0129, 0.0008)	-0.0146 (-0.0258, -0.0034)	-0.0546 (-0.1506, 0.0415)
q_1 (CI)	0.358 (0.183, 0.533)	0.273 (0.181, 0.366)	0.208 (0.088, 0.328)	0.253 (0.149, 0.357)	0.484 (-0.281, 1.248)
r^2	0.71	0.72	0.61	0.71	0.29

FIGURE S1

Histograms of saccade probability. For each pulse pattern, the number of saccades evoked with a given saccade probability across the three middling currents is represented by the height of each bar. Saccade probability was calculated for a block of trials at a given FEF site, microstimulation current, and pulse pattern, and the resulting value was assigned to the individual saccades evoked within that block. Each bar contains values of saccade probability less than or equal to the label given beneath it and greater than the label of the previous bar. For instance, the bar labeled “0.4” contains saccade

probabilities > 0.3 and ≤ 0.4 . The total number of saccades evoked for a given pulse pattern is given in parentheses. These distributions underlie the regressions shown in FIGURE 3.

FIGURE S2



Regressions of saccade metrics on normalized current and histograms of normalized

current. (A) As in Figure 3, four metrics are analyzed for saccades evoked at the three middling currents across all FEF sites: (*clockwise from top-left*) latency, amplitude, duration, and peak velocity. Plotted separately for each pulse pattern are linear regressions of log normalized values for single saccades on the normalized current used to evoke the saccade. *Normalized current* is calculated as the stimulation current divided by the site threshold (see Materials and Methods) and is distinct from normalized *ordinal* current discussed in the main text (e.g., FIGURE 2). Line colors and styles are as in main text (e.g., FIGURE 1). Significant ($p < 0.05$) regressions drawn with *thick lines*. The fact that the regressions for each pulse pattern are significantly different (see Supplemental TABLE S4) indicates that the effect of pulse pattern on saccade metrics regressed on saccade probability (FIGURE 3) cannot be explained by a simple common dependence of saccade metrics and saccade probability on stimulation current. (B) Histograms of normalized current for each pulse pattern are shown with the total number of saccades in parentheses. These distributions underlie the regressions plotted in panel A. Note that unlike saccade probability, values of normalized current were chosen by the experimenters, not obtained from the data.