Supporting Information

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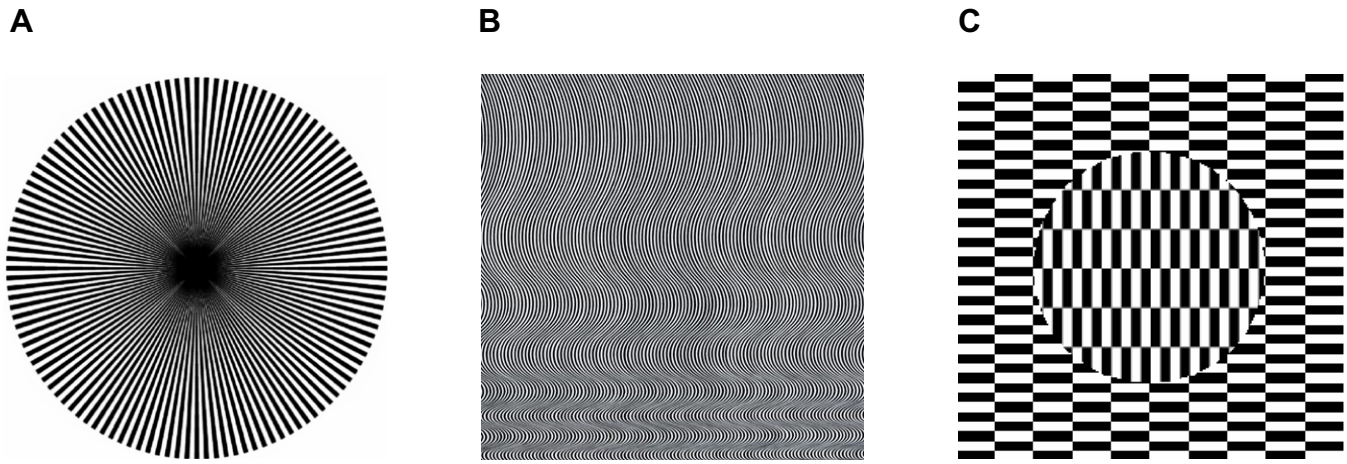

Fig. S1. Illusory motion in static patterns. (*A*) MacKay rays. (*B*) Bridget Riley's ''Fall.'' (*C*) Ouchi illusion.

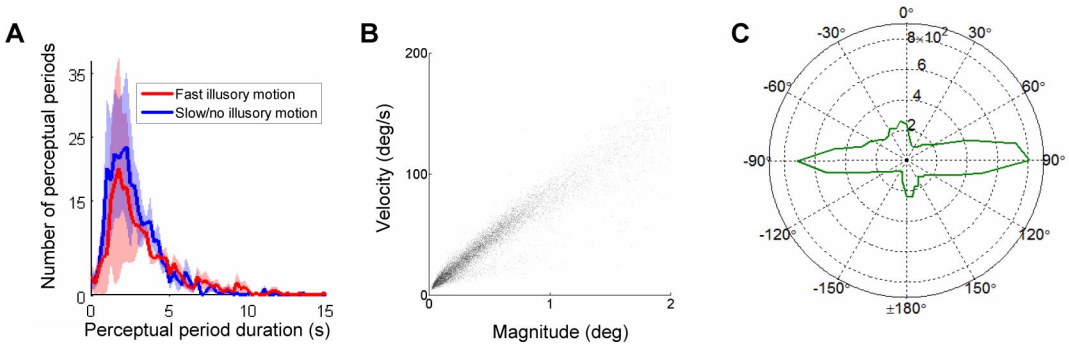

Fig. S2. Experimental design and microsaccade characterization. (*A*) Distribution of durations of faster motion (red) and slower/no motion (blue) periods during the experiment, as indicated by the subjects' report. Shaded red and blue areas indicate SEM across subjects. (*B*) Main sequence of all microsaccades ($n = 10{,}154$ microsaccades). (*C*) Distribution of microsaccade directions ($n = 10{,}154$ microsaccades).

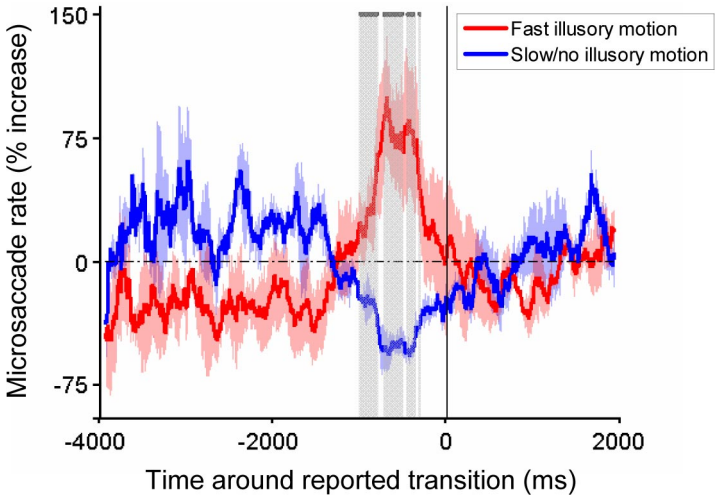

Fig. S3. Microsaccade rates before transitions to faster motion are significantly higher than microsaccade rates before transitions to slower/no motion. Same data and color code as in Fig. 2*A*. The gray bands indicate the bins where microsaccade rates before transitions to faster motion are significantly higher than microsaccades rates before transitions to slower/no motion (one-sample one-tailed paired *t* tests, bin size = 2 ms, $P < 0.05$).

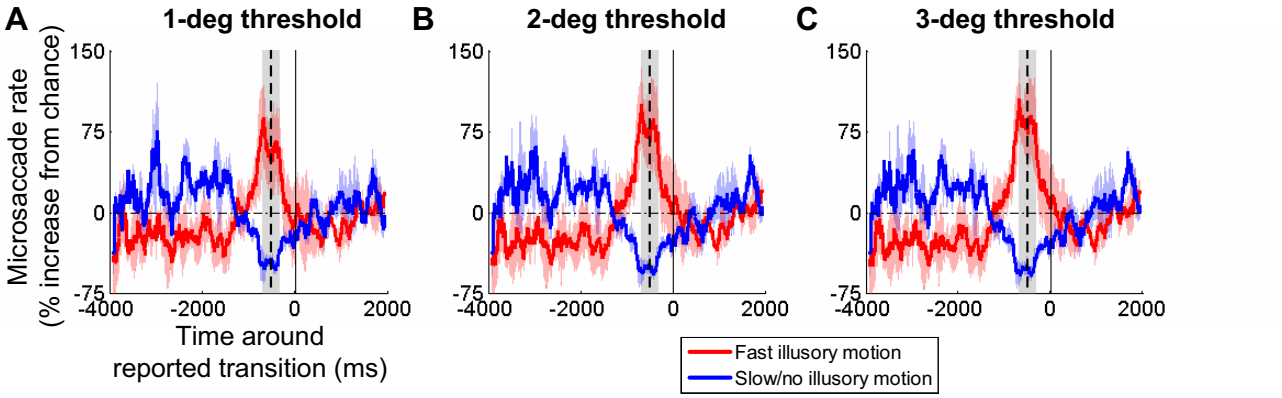

Fig. S4. The correlations between microsaccade rates and perceptual transitions are unaffected by the maximum magnitude threshold used to detect microsaccades. We obtained equivalent results for maximum microsaccade magnitude thresholds of 1-degree (*A*), 2-degrees (*B*, same data as in Fig. 2*F*), or 3-degrees (*C*). Color code as in Fig. 2.

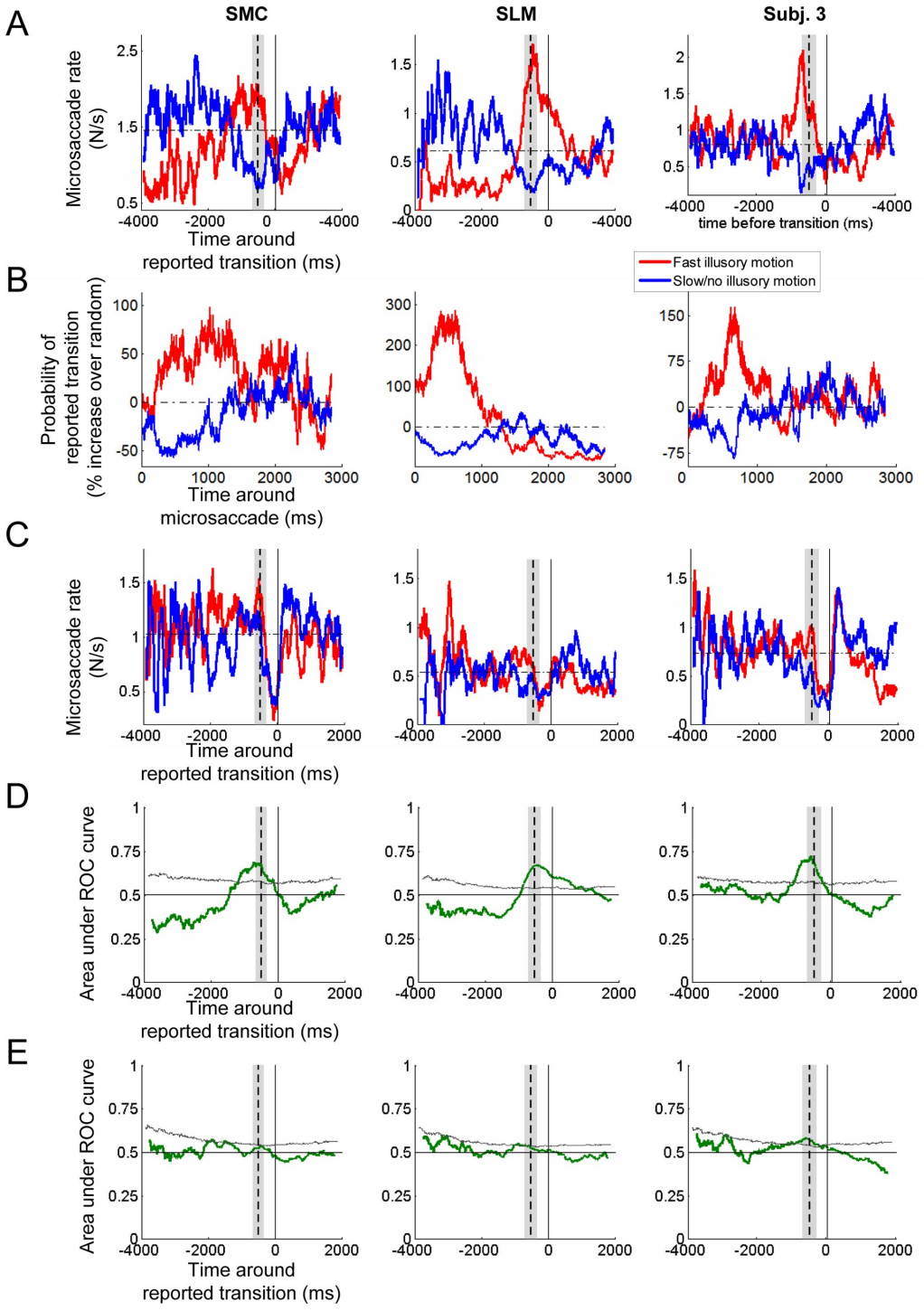

Fig. S5. Microsaccades can drive the perception of illusory motion in *Enigma*–Individual subjects' data. (*A*) Average microsaccade rates around reported transitions toward faster (red) vs. slower/no (blue) illusory motion for each individual subject (the average of all subjects is shown in Fig. 2*F*). Note that microsaccade rate starts changing (increasing or decreasing) before the estimated moment of the perceived (illusory) transitions (gray band) for each individual subject. (*B*) Average probability of transitions after microsaccade onset. The results are expressed as the percentage increase over a correlation where microsaccades happened at random times (the average of all subjects is shown in Fig. 2*B*). Color code as in *A*. (*C*) Average microsaccade rates around reported transitions in nonillusory motion speed (control experiment) (average of all subjects shown in Fig. 2*E*). (*D*) ROC analysis: the ideal observer can predict the type of illusory transition in *Enigma* (faster vs. slower/no motion) based on microsaccade rate for each individual subject (all other details as in Fig. 2*G*). (*E*) In the control experiment the ideal observer cannot predict the type of transition in motion speed (faster vs. slower/no motion) based on microsaccade rate for any of the individual subjects (all other details as in Fig. 2*H*). For all of the panels the vertical gray band indicates the estimated moment of the perceived (illusory) transitions (mean latency and SD for each subject from Fig. 2*C Inset*).

Table S1. Average microsaccade parameters and perceptual reports for all subjects

Parameter	SMC	SLM	Subj3	Average
Microsaccade rate, N/s	1.46	0.61	0.80	1.0 ± 0.2 SE
Microsaccade magnitude, deg	0.48 ± 0.40 SD	0.53 ± 0.44 SD	0.21 ± 0.16 SD	0.4 ± 0.1 SE
Microsaccade duration, ms	18 ± 11 SD	18 ± 11 SD	11 ± 6 SD	16 ± 2 SE
Microsaccade peak velocity, deg/s	42 ± 31 SD	45 ± 32 SD	23 ± 12 SD	38 ± 7 SE
″Slower/no motion″ period duration, s	2.7 ± 1.6 SD	2.4 ± 1.2 SD	4.3 ± 2.6 SD	3.1 ± 0.6 SE
″Faster motion″ period duration, s	5.7 ± 3.1 SD	2.2 ± 1.0 SD	4.3 ± 2.0 SD	4 ± 1 SE
Time spent in ″slower/no motion″ periods, %	36	55	56	49 ± 6 SE
Time spent in ″faster motion″ periods, %	64	45	44	51 ± 6 SE