Supplemental Material

Overview on experimental control conditions

We compared the results from our basic paradigm (Exp. 1, main text) with three critical control conditions (see Table S1). In Experiment 2, we investigated a task with 100% visibility to investigate the hypothesis that our results could be mainly a consequence of variations in contrast/luminance. In Experiment 3, we analyzed data from a task without a gap period. Finally, in Experiment 4, we presented stimuli on oriented (horizontal, vertical) 1/*f* backgrounds and on band-pass filtered backgrounds.

Table S1: Basic paradigm (Exp. 1) and three control experiments (Exp. 2-4).

Experiment	Gap period [ms]	Background condition	Visibility [%]
1	200	3 (uniform, 1/*f*, natural)	75
2	200	3 (uniform, 1/*f*, natural)	100
3	0	3 (uniform, 1/*f*, natural)	75
4	200	5 (uniform, 1/*f*, $1/f_v$, $1/f_h$, band-pass)	75

Method

Experiment 1 represents the original set-up of White et al.(2008). In the control experiments, we varied visibility (Exp. 2), gap period (Exp. 3), and background properties (Exp. 4).

In Exp. 2, the visibility of the target was set to 100% (log $T = 1$). Thirty trials were performed per background condition in randomized order. In Exp. 3, the gap period was omitted and 40 trials were run for each background condition. Seventeen students agreed to participate in Exp. 2 and 3 (aged from 19 to 31 years, $M = 23.7$ years).

In Exp. 4, forty trials were performed for 5 different backgrounds (uniform, 1/*f*, horizontally oriented $1/f_h$, vertically oriented $1/f_v$, and band-pass filtered backgrounds). Following White et al. (2008) we generated band-pass noise texture with a dominant spatial frequency of 3.5 cpd. The oriented 1/*f* noise textures showed a statistical correlation in only one dimension, which is different from the procedure in White et al. (2008), where an additional dependence of ±5° in the second direction was present. Twenty students participated in Exp. 4 (aged from 19 to 29 years, $M = 22.7$).

Results

In Exp. 2, the saccadic facilitation effect was absent as a consequence of 100% visibility, while an early microsaccadic rate effect (mainly during the gap interval, see below) was replicated, but without an effect on saccadic responses (Fig. S1a). Average saccade latencies are 161 ms (SE: ± 8 ms) for uniform background, 168 ms (SE: ± 9 ms) for 1/*f* background, and 176 ms (SE: ± 9 ms) for natural background. This finding demonstrates that it is possible to induce a microsaccadic rate effect by background manipulation independent of the saccadic facilitation effect.

In Exp. 3 without a gap period, data showed results for latencies and saccadic facilitation that were qualitatively in agreement with Exp. 1. Average latencies are 363 ms (SE: ± 26 ms) for uniform background, 258 ms (SE: ± 13 ms) for 1/*f* background, and 238 ms (SE: ± 9 ms) for natural background (Fig. S1b). From this result, we concluded that the basic effect of microsaccade rate on the latency of an upcoming saccade is independent of a gap design (see also Rolfs et al., 2006).

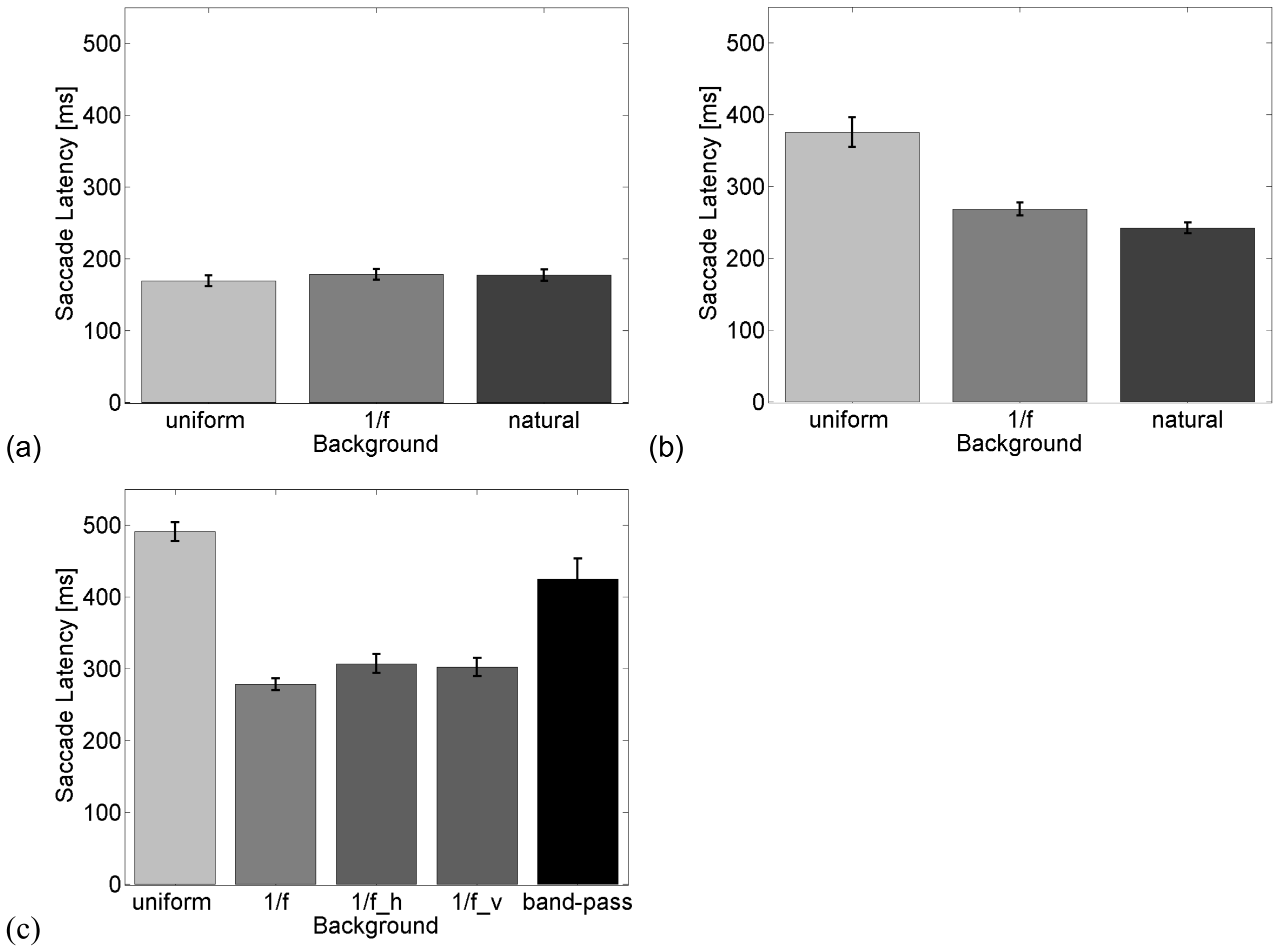

Figure S1. Average saccade latencies for different background conditions. (a) Exp. 2. (b) Exp. 3. (c) Exp. 4.

In Exp. 4, various structured backgrounds led to specific effects on saccade latencies. Average latencies was 480 ms (SE: ± 13 ms) for uniform background, 278 ms (SE: ± 8 ms) for 1/*f* background, 307 ms (SE: ± 13 ms) for horizontally directed 1/*f*, 302 ms (SE: ± 13 ms) for vertically directed 1/*f*, and 425 ms (SE: ± 29 ms) for band-pass filtered background (Fig. S1c). We did not observe a significant saccadic facilitation effect for band-pass background. Numerically, the average saccadic facilitation effect was obtained as 145 ms (SE: ± 25 ms) for 1/*f*, $1/f_v$, and $1/f_h$ backgrounds.

Next we analyzed microsaccade rates with focus on the three epochs defined in Exp. 1. In Exp. 2 (100% visibility) we observed equal latencies. Hence, the contrast/luminance manipulation of the target had no main effect on the latencies. Different from the null effect in latencies, however, we found a rapid decrease of microsaccade rate for 1/*f* and natural background after the first display change. For uniform background, the reduction in microsaccade rate after target onset was lower than in the other conditions (see Fig. S2a). In the second and early third interval the rate for uniform background was twice as high as for structured backgrounds. While there was no main effect of contrast/luminance on the baseline microsaccade rate, rate modulation depends on background properties.

In Exp. 3, the absence of the gap period led to a weaker decrease in microsaccade rate for uniform backgrounds than for structured backgrounds after target onset (see Fig. 2b). The higher microsaccade rate immediately before the saccade in the uniform condition might explain the delayed response time.

In Exp. 4, we found that the saccade latencies do critically depend on the 1/*f* feature (for both oriented and general 1/*f* structure), while the microsaccade rate is influenced by background structures, but not statistical correlation type (Fig. S2c). For masked targets the 1/*f* background caused short latencies, while the microsaccade rate is increased only in the uniform background condition. The uniform background as well as the band-pass filtered background produced prolonged latencies

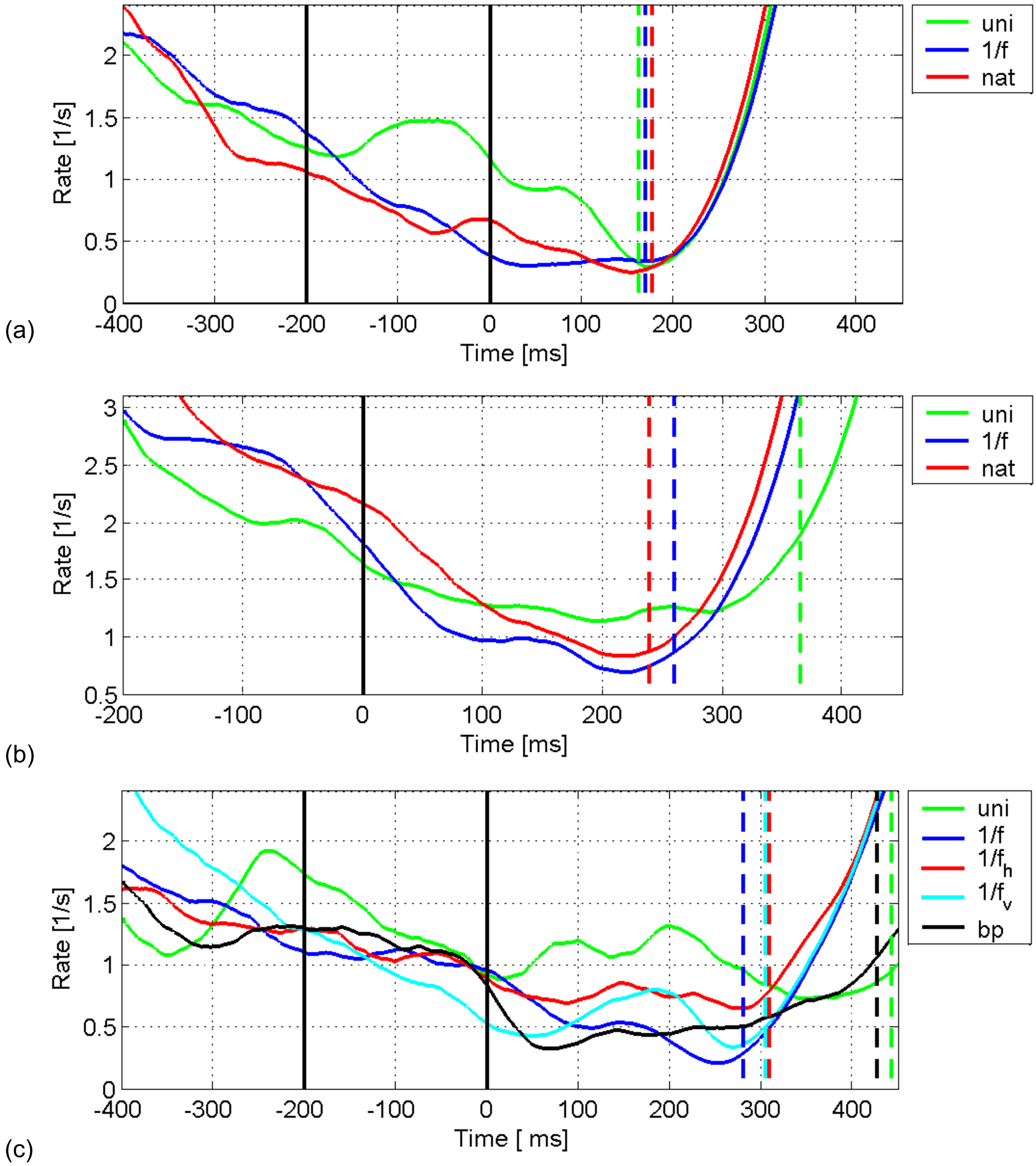

Figure S2. Microsaccade rates as function of time for different background conditions. (a) Exp. 2. (b) Exp. 3. (c) Exp. 4. Black vertical lines (bold) indicated display changes. Colored vertical lines (dashed) give average saccadic response latencies.