Supplementary Figure Legends

Figure S1. Drosophila escape behavior in response to looming stimuli. Eight frames taken from a video recording of an escape jump at l/|v| = 10 ms (Suppl. Movie 1, TTC: time to collision). Timing of wing raise (WR, blue frame) was defined as the first frame when the wings started elevating, and take-off (TO, red frame) was taken as the first frame when the legs lost contact with the funnel.

Figure S2. Effect of an overall luminance decrease on looming evoked escapes. Timing of wing raise relative to the expected collision time in wild-type files in response to black squares looming on a white background (white symbols) and checkerboard black and white squares looming on a gray background (checkerboard symbols) at different l/|v| values. For both stimuli, wing raise occurred earlier relative to collision for larger l/|v| values. The number of trials (n) is given immediately above each notched box and Kruskal-Wallis test p values (p_{KWT}) are shown above the square brackets indicating the compared values.

Figure S3. Timing of the escape response and the peak firing rate of the non-GF pathway in white-eyed flies. Both timing of take-off and peak firing rate of the non-GF pathway showed positive correlation with l/|v| in white-eyed flies ($\rho_{take\text{-}off}$= ρ_{peak}=0.8). The slopes and intercepts of the linear fits were as follows: For take-off: slope=2.3 (SE=0.4), intercept=-22 ms (SE=21 ms), number of trials for l/|v|=10, 40, and 70 were 5, 9, and 5 respectively; for peak: slope= 1.4 (SE=0.1), intercept=-41 (SE= 4 ms) number of trials for l/|v|=10, 40, and 70 were 35, 30, and 12 respectively.

Supplementary Results

Escape behaviors of wild type and mutant flies to BW and CB stimuli. We observed slight differences at some speeds: e.g., for BW stimuli with l/|v|=5 and 10 ms the mutant flies jumped significantly earlier (Fig. 9A). A similar result holds at l/|v|=10, 20, 40, and 60 ms in the case of the checkerboard stimuli (Fig. 9B). Furthermore, although the delay between wing raise and take-off did not significantly change across l/|v| in mutants ($p_{KWT,BW}$= 0.05, $p_{KWT,CB}$=0.46) the average delay was shorter for the BW stimuli ($D_{BW,\ D\alpha7}$ = 7 ms, SD= 2 ms; compared to D_{BW}= 11 ms, SD=11 ms in wild type; p_{KWT}=0.006), but not for the CB stimuli ($D_{CB,\ D\alpha7}$ = 6 ms, SD= 1 ms; compared to D_{CB}= 8 ms, SD=5 ms in wild type; p_{KWT}=0.2). The detailed differences we observed in the timing of behavior in mutant flies may be due to additional effects of the Dα7 mutation on pathways other than the GF system.

Supplementary Movies

Movie 1: An escape behavior triggered by a looming stimulus with l/|v| = 10 ms. Data also illustrated in Fig. 2 and S1.

Movie 2: An escape behavior triggered by looming stimulus with l/|v|=40 ms in a white-eyed fly. Data also illustrated in Fig.4A.

Movie 3: An escape behavior triggered by light-off stimulus in a white-eyed fly. Data also illustrated in Fig. 4B.

Figure S1

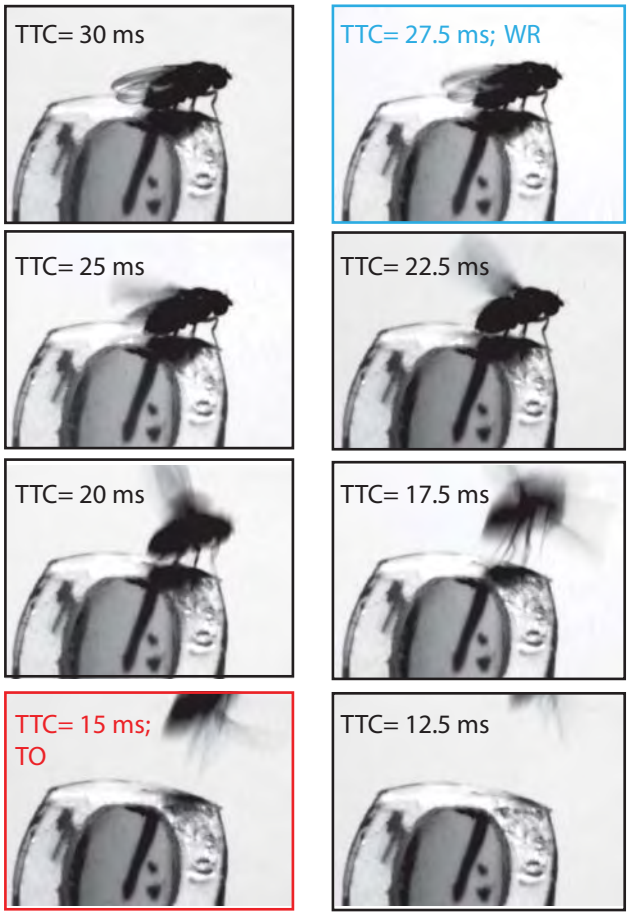

TTC= 30 ms
TTC= 27.5 ms; WR
TTC= 25 ms
TTC= 22.5 ms
TTC= 20 ms
TTC= 17.5 ms
TTC= 15 ms;
TO
TTC= 12.5 ms

Figure S2

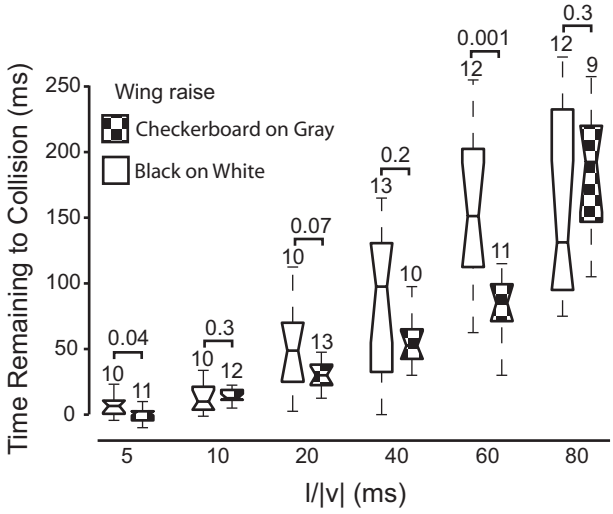
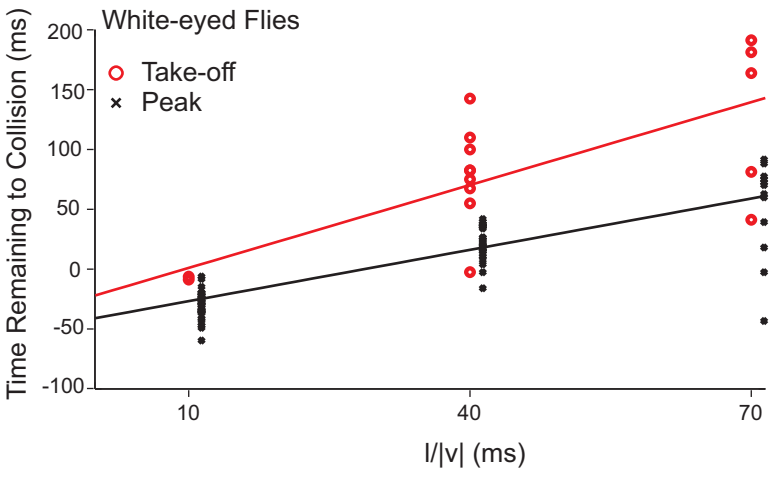

Time Remaining to Collision (ms)
250
200
150
100
50
0
Wing raise
Checkerboard on Gray
Black on White
0.04
0.3
0.07
0.2
0.001
0.3
10
11
10
12
10
13
13
10
12
11
12
9
5
10
20
40
60
80
l/|v| (ms)

Figure S3


White-eyed Flies
Take-off
Peak
Time Remaining to Collision (ms)
200
150
100
50
0
-50
-100
10
40
70
l/|v| (ms)