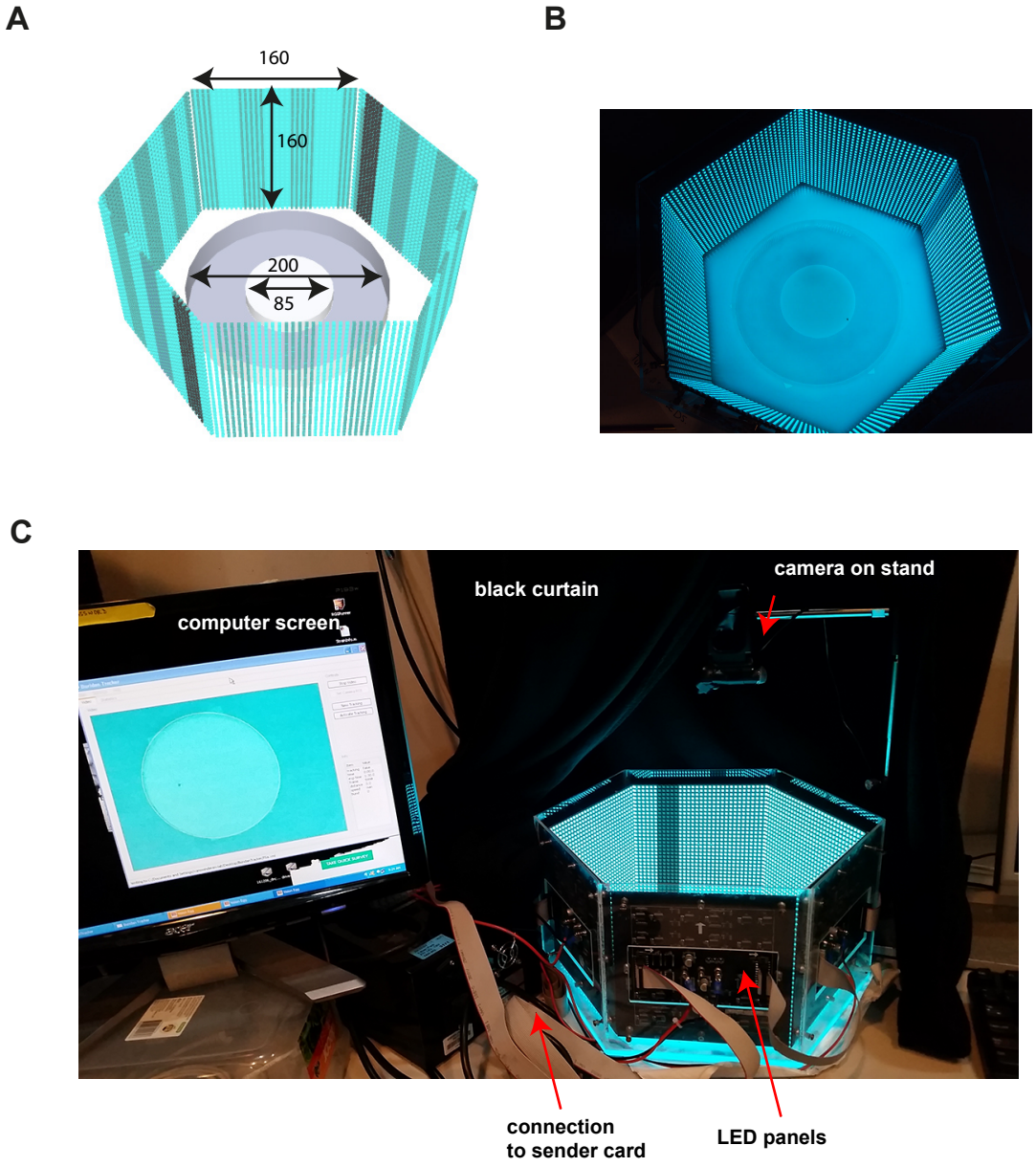

Figure S1. Specifications of the visual arena. A) Diagram of set-up (related to Figure 1A), indicating measurements in millimetres of LED panels (160 x 160mm), platform (85mm diameter) and moat (200mm). Platform and moat are 10mm in height (not shown). B) Aerial view of the arena. C) View of the entire set-up. 6 LED panels (Shenzen Sinorad, Medical Electronics, Shenzen, China) were joined to form a hexagon. These panels have been discontinued, however the arena could also be built using a new model of bendable panels (which can be bent to form a circular arena) (SF2, Vuepix, Australia, https://www.vuepix.tv/vuepix-product/sf2/). LED panels are controlled with software on the computer (LED Studio for our panels, or Nova LCT Software with Vuepix panels) via a sender card connected to the LED panels. We used Buritrack software to track the fly's movements and analyse the data (Colomb et al, 2012). Any camera with 640 x 480 resolution or better (e.g. Logitech webcam) can be used. A black curtain was draped around the arena during experiments such that flies were not distracted by the external surroundings.

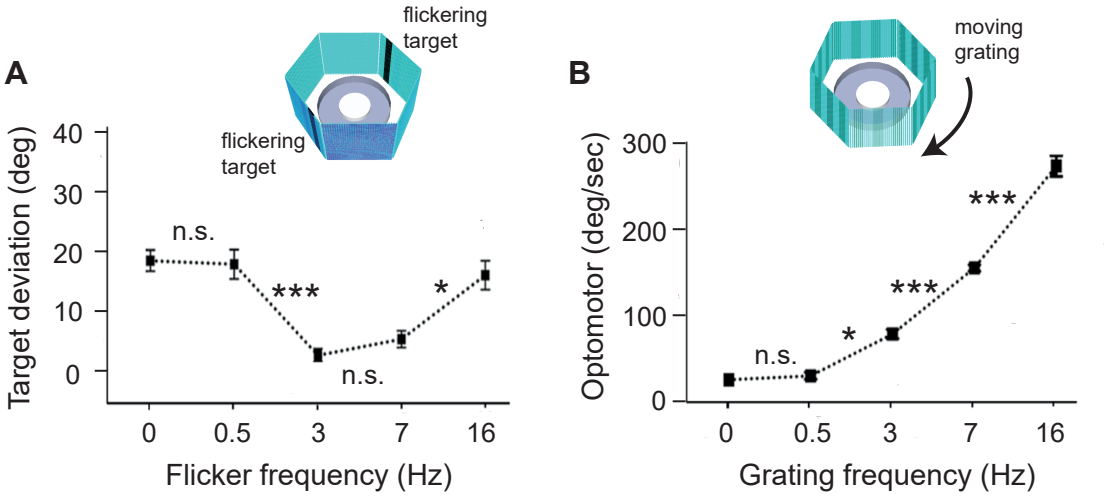

Figure S2. Visual responses are modulated by flicker and grating frequency. (A) Visual fixation in wild-type flies responding to fixation targets that were static (0 Hz) or flickering at 0.5 Hz, 3 Hz, 7 Hz, or 16 Hz. Lower target deviation indicates greater fixation. n = 14 flies for each condition. Asterisks indicate significance between adjacent data points (2-way ANOVA with Tukey's correction). (B) Optomotor response in wild-type flies responding to gratings that were stationary (0 Hz) or rotating at 0.5 Hz, 3 Hz, 7 Hz, or 16 Hz. Higher optomotor index (OI) indicates greater optomotor response. n = 10. Asterisks indicate significance between adjacent points (A), significance via 2-way ANOVA with Tukey's correction. * $p < .05$; ** $p < .01$; *** $p < .001$. Error bars show S.E.M.

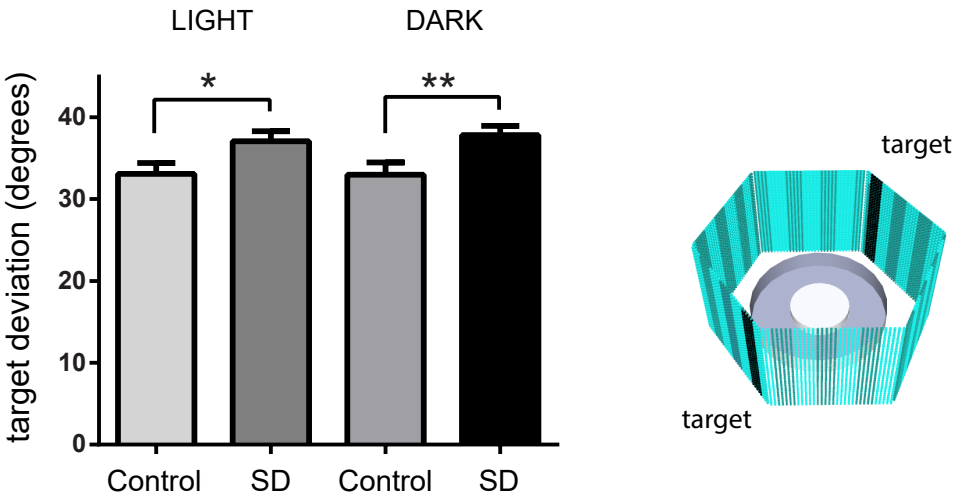

Figure S3. Sleep deprivation effects on attention are independent of visual experience. Target deviation during figure/ground discrimination in flies that were sleep deprived for 24 hrs in normal circadian conditions (light) or in 24 hrs of darkness (dark). The visual stimuli were a 7 Hz flickering object ('target') and a mid-luminance contrast grating (see methods). n>19 flies per data set. *p=0.03,**p=0.01 by t-test. Error bars indicate the s.e.m.

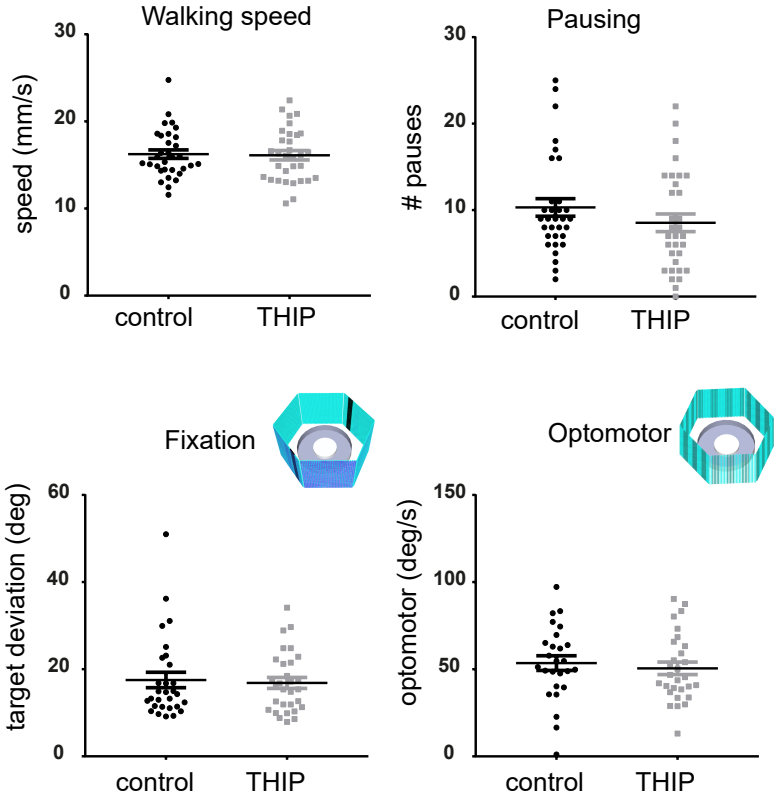

Figure S4. Pausing, walking speed, fixation and optomotor behaviour in dunce mutants following induced sleep. Sleep was induced by administering THIP for 48 hours (see Figure 6D) before testing in the visual arena, and compared to controls (dunce mutants without THIP treatment). A,B) Walking speed (A) and number of pauses (B) in dunce mutants with and without THIP treatment during the visual attention assay (same flies as Figure 6F). C, D) Fixation (C) and optomotor behaviour (D) in dunce mutants with and without THIP treatment. N>30 flies per experiment. No significant differences were observed between control and THIP treated flies (Mann-Whitney test).