סיפור המאמר:

סקאדות קטנות - יש הבדל בין סקאדות שעוקבות אחרי קווי המתאר לכאלה שלא. (אולי צריך להראות גם בטבעי??)

בשני הגדלים ההגבלה משפיעה באותו האופן....(להסביר מעניין)

* גודל הצורה –בקטנות : **המהירות והאמפליטודה** נשמרות בשני המקרים . **התדירות** קטנה.
* חלון ההגבלה- **המהירות והאמפליטודה** נשמרות בשני הגדלים. **התדירות עולה** בשני הגדלים.

דריפט-

* גודל הצורה – בקטנות : **האמפליטודה והזמן** גדלים. **המהירות** נשמרת. בשני המקרים. (העובדה ש"יש פחות זמן" לא גוררת נסיון לשמר אמפליטודה כמו כשיש חלון הגבלה).
* חלון ההגבלה- שם **המהירות גדלה** בשני הגדלים. (אולי בגלל שהזמן מתקצר ויש נסיון לשמור על האמפליטודה).

או- **הזמן מתקצר** בשני הגדלים (ואז מגבירים את המהירות כדי לשמור על האמפליוטדה).

צורות קטנות מורידות את תדירות הסקאדות וזמן הדריפט מתארך - **שינוי בגודל הצורה** **לא** משפיע על הקינמטיקה של הסקאדות ולא על זו של הדריפט (מהירות נשמרת).

הגבלת הראייה מעלה את תדירות הסקאדות וזמן הדריפט מתקצר – **ההגבלה** **כן** משפיעה על הקינמטיקה של ה**דריפט** אבל **לא** זו של הסקאדות (אמפליטודה ומהירות נשמרים).

Figure 1.

**Creating a visual experiment with limited spatial bandwidth.**

(**A**) The vision to touch SenSub device – 3 fingertip pads with 8x4 pins each and a camera at the tip of the device. Each pin’s height is determined by the intensity of one matched pixel in the center of the camera while a participant is actively scanning the environment. (**B**) The original images from the SenSub experiment went through 3 preparation steps to match the visual limitation to that of touch via the SenSub. First, the amount of informative pixels was reduced. Second, the images were resized to their final size determined by the relevant analog. Third, the images were filtered to match the elastic modulus property of the finger (see ‘Methods’). (**C**) Only a small window around the participant gaze was revealed throughout the experiment.

Figure 2.

**Visit rates heat maps.**

(**A**) The percent of time per trial participants spent in each region of the image in the SenSub touch experiment (average of 4 participants x 20 trials). (**B**) Same as in (A) for the big shapes, fovea analog, Tunneled vision experiment (average of 4 participants x 30 trials). (**C**) Same as in (A,B) for the Big Natural vision experiment (average of 4 participants x 20 trials). (**D**) Same as (A, B, C) for the small shapes, receptors analog, Tunneled vision experiment (average of 4 participants x 50 trials). (**E**) Same as in (A,B,C,D) for the Small Natural vision experiment (average of 4 participants x 20 trials). Differences between each same shape in Tunneled vision and in SenSub touch were found to be significantly smaller than the differences between Tunneled vision and Natural vision (One-way ANOVA, p<0.001).

Figure 3.

**Detecting saccades and drifts in example trials.**

6 example trials for the different shapes – circle, parallelogram, rectangle, square, triangle and a black empty trial. The saccadic movement was detected using a velocity based algorithm, developed by Amos Arieli based on previous algorithm introduced by Engbert and Kliegl, 2003 and improved by Bonneh et al., 2010 (see ‘Methods’). Saccadic movements are shown in lighter blue and fixational pauses in darker blue.

Figure 4.

**Saccadic main sequence.**

The maximum velocity of a saccade linearly depends on its amplitude in all experiments. (**A**) All saccades from the Natural vision big shapes experiment (black), the r-square value of the linear fit is 0.66. (**B**) All saccades from the big shapes Tunneled vision experiment (blue), the r-square value of the linear fit is 0.77. (**D, E**) All saccades from the small shapes experiments ( natural in black, tunneled in red), the r-square values of the linear fits are 0.69 and 0.74. (**C, F**) The residuals from the linear fits of the experiments. The residuals from the fit of both Tunneled experiments are larger in the range of ~5-12 deg saccades amplitude.

Figure 5.

**Saccades rates, amplitudes and types.**

(**A**) Populations of saccades Rates in Natural, big Tunneled and small Tunneled vision (black, Blue and red respectively) for each participant separately and all together. Values were normalized per each participant Natural vision population’s mean. In both Tunneled vision experiments the rates of saccades decreased significantly (t-test, p<0.01, ES=0.7). This phenomenon also occurred to each participant separately, except one (MS). (**B**) Populations of saccades amplitudes in Natural, big Tunneled and small Tunneled vision (black, Blue and red respectively), normalized as in (A). In both Tunneled vision experiments the population of saccades amplitudes split to two different populations – one smaller and one larger than in the Natural vision experiment. This phenomenon also occurred to each participant separately, except one (MS). (**C**) Saccadic categorization to two classes – border following saccades (light blue) and others (pink).

Figure 6.

**Drift velocity, amplitude and type.**

(**A**) Populations of drift velocities in Natural, big Tunneled and small Tunneled vision (black, Blue and red respectively) for each participant separately and all together. Values were normalized as in Figure 5. In both Tunneled vision experiments the velocities of drift increased significantly (t-test, p<0.01, ES=0.5). This phenomenon also occurred to each participant separately. (**B**) Populations of drift amplitudes in Natural, big Tunneled and small Tunneled vision (black, Blue and red respectively), normalized as in (A). In both Tunneled vision experiments the amplitudes of drift increased significantly (t-test, p<0.01, ES=0.8). This phenomenon also occurred to each participant separately. (**C**) Drift categorization to two classes – strait (light blue) and circular (pink).