Just a list of our VSS presentations for 2019

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Abstract

Topics this year: Visual letter processing;

Keywords

Cognitive Neuroscience (Subfield)

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Topics this year: Visual letter processing; role of attention shifts versus buffering (mostly @cludowici, @bradpwyble); reproducibility (@sharoz); visual working memory (mostly @will_ngiam)

Symposium contribution, 12pm Friday 17 May: Reading as a visual act: Recognition of visual letter symbols in the mind and brain

Implicit reading direction and limited-capacity letter identification

ebmocloH xelA, The University of Sydney
(abstract now has better wording)
I would like to congratulate you for reading this sentence. Somehow you dealt with a severe restriction on simultaneous identification of multiple objects – according to the influential "EZ reader" model of reading, humans can identify only one word at a time. Reading text apparently involves a highly stereotyped attentional routine with rapid identification of individual stimuli, or very small groups of stimuli, from left to right. My collaborators and I have found evidence that this reading routine is elicited when just two widely-spaced letters are briefly presented and observers are asked to identify both letters. A large left-side performance advantage manifests, one that is absent or reversed when the two letters are rotated to face to the left instead of to the right. Additional findings from RSVP (rapid serial visual presentation) lead us to suggest that both letters are attentional selected simultaneously, with the bottleneck at which one letter is prioritized sited at a late stage – likely at an identification or working memory consolidation process. Thus, a rather minimal cue of letter orientation elicits a strong reading direction-based prioritization routine. Our ongoing work seeks to exploit this to gain additional insights into the nature of the bottleneck in visual identification and how reading overcomes it.

Is there a reproducibility crisis around here? Maybe not, but we still need to change.

Alex O Holcombe[1], Charles Ludowici[1], Steve Haroz[2]

Poster 2:45pm Sat 18 May

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Those of us who study large effects may believe ourselves to be unaffected by the reproducibility problems that plague other areas. However, we will argue that initiatives to address the reproducibility crisis, such as preregistration and data sharing, are worth adopting even under optimistic scenarios of high rates of replication success. We searched the text of articles

published in the Journal of Vision from January through October of 2018 for URLs (our code is here: https://osf.io/cv6ed/) and examined them for raw data, experiment code, analysis code, and preregistrations. We also reviewed the articles' supplemental material. Of the 165 articles, approximately 12% provide raw data, 4% provide experiment code, and 5% provide analysis code. Only one article contained a preregistration. When feasible, preregistration is important because p-values are not interpretable unless the number of comparisons performed is known, and selective reporting appears to be common across fields. In the absence of preregistration, then, and in the context of the low rates of successful replication found across multiple fields, many claims in vision science are shrouded by uncertain credence. Sharing de-identified data, experiment code, and data analysis code not only increases credibility and ameliorates the negative impact of errors, it also accelerates science. Open practices allow researchers to build on others' work more quickly and with more confidence. Given our results and the broader context of concern by funders, evident in the recent NSF statement that "transparency is a necessary condition when designing scientifically valid research" and "pre-registration... can help ensure the integrity and transparency of the proposed research", there is much to discuss.

Talk saturday 18 May 2.30pm

A delay in sampling information from temporally autocorrelated visual stimuli

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Understanding when the attentional system samples from continuously changing input is important for understanding how we build an internal representation of our surroundings. Previous work looking at the latency of information extraction has found conflicting results. In paradigms where features such as color change continuously and smoothly, the color selected in response to a cue can be as long as 400 ms after the cue (Sheth, Nijhawan, & Shimojo, 2000). Conversely, when discrete stimuli such as letters are presented sequentially at the same location, researchers find selection latencies under 25 ms (Goodbourn & Holcombe, 2015). The current work proposes an "attentional drag" theory to account for this discrepancy. This theory, which has been implemented as a computational model, proposes that when attention is deployed in response to a cue, smoothly changing features temporally extend attentional engagement at that location whereas a sudden change causes rapid disengagement. The prolonged duration of attentional engagement in the smooth condition yields longer latencies in selecting feature information.
In three experiments participants monitored two changing color disks (changing smoothly or pseudo-randomly). A cue (white circle) flashed around one of the disks. The disks continued to change color for another 800 ms. Participants reported the disk's perceived color at the time of the cue using a continuous scale. Experiment 1 found that when the color changed smoothly there was a larger selection latency than when the disk's color changed randomly (112 vs. 2 ms). Experiment 2 found this lag increased with an increase in smoothness (133 vs. 165 ms). Finally,

Experiment 3 found that this later selection latency is seen when the color changes smoothly after the cue but not when the smoothness occurs only before the cue, which is consistent with our theory.

Poster 2pm 20 May

Examining the effects of memory compression with the contralateral delay activity

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While visual working memory (VWM) is limited in the amount of information that it can maintain, it has been found that observers can overcome the usual limit using associative learning. For example, Brady et al. (2009) found that observers showed improved recall of colors that were consistently paired together during the experiment. One interpretation of this finding is that statistical regularities enable subjects to store a larger number of individuated colors in VWM. Alternatively, it is also possible that performance in the VWM task was improved via the recruitment of LTM representations of well-learned color pairs. In the present work, we examine the impact of statistical regularities on contralateral delay activity (CDA) that past work has shown to index the number of individuated representations in VWM. Participants were given a bilateral color recall task with a set size of either two or four. Participants also completed blocks with a set size of four where they were informed that colors would be presented in pairs and shown which pairs would appear throughout, to encourage chunking of the pairs. We find this explicit encouragement of chunking improved memory recall but that the amplitude of the CDA was similar to the unpaired condition. Xie and Zhang (2017; 2018) previously found evidence that familiarity produces a faster rate of encoding as indexed by the CDA at an early time window, but no difference at a late time window. Using the same analyses on the present data, we instead find no differences in the early CDA, but differences in the late CDA. This result raises interesting questions about the interaction between the retrieval of LTM representations and what the CDA is indexing.

Poster Tues 21 May 245pm

Selection from concurrent RSVP streams: attention shift or buffer read-out?

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Selection from a stream of visual information can be elicited via the appearance of a cue. Cues are thought to trigger a time-consuming deployment of attention that results in selection for report of an object from the stream. However, recent work using rapid serial visual presentation (RSVP) of letters finds reports of letters just before the cue at a higher rate than is explainable by guessing. This suggests the presence of a brief memory store that persists rather than being

overwritten by the next stimulus. Here, we report experiments investigating the use of this buffer and its capacity. We manipulated the number of RSVP streams from 2 to 18, cued one at a random time, and used model-based analyses to detect the presence of attention shifts or buffered responses. The rate of guessing does not seem to change with the number of streams. There are, however, changes in the timing of selection. With more streams, the stimuli reported are later and less variable in time, decreasing the proportion reported from before the cue. With two streams – the smallest number of streams tested – about a quarter of non-guess responses come from before the cue. This proportion drops to 5% in the 18 streams condition. We conclude that it is unlikely that participants are using the buffer when there are many streams, because of the low proportion of non-guesses from before the cue. Instead, participants must rely on attention shifts.