TVA

**1: Introduction:** TVA is a mathematical model that views visual attention as a **race** between input/stimuli which can be influenced by executive functions by **favouring** targets and **increasing** the **likelihood** that they make it first to the finish line.

* *K*: Capacity of VSTM
* *C*: Processing speed
* : Selectivity – ratio of distractors to targets (0-1, 0 = perfect selection)
* *T0:* Threshold at which stimuli are noticed (ms)
* *Windex: Attentional weight to each side of display (Right 0-1 Left, 0.5 = balanced)*

**2: Hypothesis**

* Accuracy increases with display time
* Correlation between C and K parameters
* TVA-parameters are correlated with age but not sex
* Imperfect selectivity: distractors decrease correctly reported letters
* Windex = 0,5, no spatial bias in target recall

**3: Method:** Computer-based paradigm with both whole- and partial reports. 9 Blocks of 27 trials. Between subjects counterbalanced target/distractor colours. Fixation 1000 ms -> up to 6 letters 10-200 ms -> letters masked 500 ms -> report targets

**4: Results** Figure 2: Correctly reported letters at various display times. 🡪 Longer display time = more correct letters reported (main effect). 🡪 # of correct letters seem to flatten out ~200ms = The point where C is exchanged for K as limiting factor. **2T4D, 150ms**: More than ½ reported 🡪 good but imperfect α. Fewer reported letters vs full-report (150ms) 🡪 **distractor influence**.

Figure 3: Correlation of C and K. Positive correlation between C and K (higher speed = higher capacity). Positive correlation between age and α (older = poor selection).

**5: Results** Table 1: M (37) vs F (169): Only difference: Windex is higher for F (leaning left) than M (neutral selection). 🡪 Overall sample attention is leaning left.

Imperfect selectivity: One-sample t-test of difference between mean number of correctly reported letters for 2T4D displays and 2 (maximum possible) 🡪 significant difference🡪 imperfect selection 🡪 Bottom-up processes interject distractors into consciousness

**6: Conclusions**: More letters reported with longer display times

Distractors reduce accuracy in partial report trials: α>0 and fewer correct letters in 2T4D than full report 150 ms display

C and K are correlated (possible neural overlap)

Attention is not divided equally, rather shifted slightly left: Windex > 0.5

**7: Discussion**

**Left-weighted attention**: Reading direction, **Adelman et al**: all letters in word processed in parallel 🡪 but we are still used to orienting to top left before anything else

- Bottom-up/stimulus-driven attention vs top-down/controlled attention

- **Overt vs covert attention** 🡪 3 mental operations that occur during covert orienting: **disengagement** of current focus, **movement** to selected target, and **engagement** of selected target.

**Feature search**: looking for target colours 🡪 pop out effect

**Patients:** ADHD high α due to limited attention inhibition (preventing irrelevant info from interfering), Hemispatial neglect Windex to either side.

**8: Grand perspective**: ***Note***: According to **TVA, parameters are independent** and should not correlate. Our correlations of C and K may be explained by alleging **overlapping neural** **bases** for the two factors/functions 🡪 Coincidentally, this is somewhat similar to the findings of **Todd and Marois (2004)** in which IPS/IOS was involved in both encoding and maintenance of VSTM and peaked in activity according to the VSTM capacity limit

- **Neural basis of attention** (Gondan slides): bilateral network of Frontal Eye Fields (FEF), intraparietal sulcus **(IPS)** and superior parietal lobule (LPL)

- Dorsal (where, up) and ventral (what, left) streams of visual processing

- **Baddeleys** multi component model: Visual sketchpad: Maintains visual information about form or colour

- **Funahashi**: Response of a single neuron in right DLPFC 🡪 firing is strongest during the delay period, but only when the cue was located at the upper left corner 🡪 This neuron is specialized in visual input from this area of our field of vision