Brief report on the effects of colour and target location in the Lavie and Driver object-based attention paradigm.

J. Jarmasz, Feb. 2002

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Background
- replication of the Lavie & Driver (1996) study
- goal was mainly to examine the effects of grouping by colour: is colour required for an object-based effect?
- a second part was added to determine whether results were influenced by the distribution of targets (original study had targets appearing at the edges of the display 67% of the time, possibly leading to a perceptual strategy of scanning the edges of the display 1st and thus accounting both for the object effect and the "far" effect)

Personnel
- Faculty advisor: C. Herdman
- Experiment design: C. Herdman, J. Jarmasz, K. Johannsdottir
- Experiment programmer: J. Jarmasz
- Subject scheduling, running & data collection: C. Taylor, C. Bonnin, K. Johannsdottir & J. Shaw
- Data analysis: J. Jarmasz & J. Shaw

Timeframe
- Summer & Fall 2001

Future of this project
- it's the data for J. Shaw's honours thesis in Psych (2002)
- Should eventually result in a published write-up for the lab
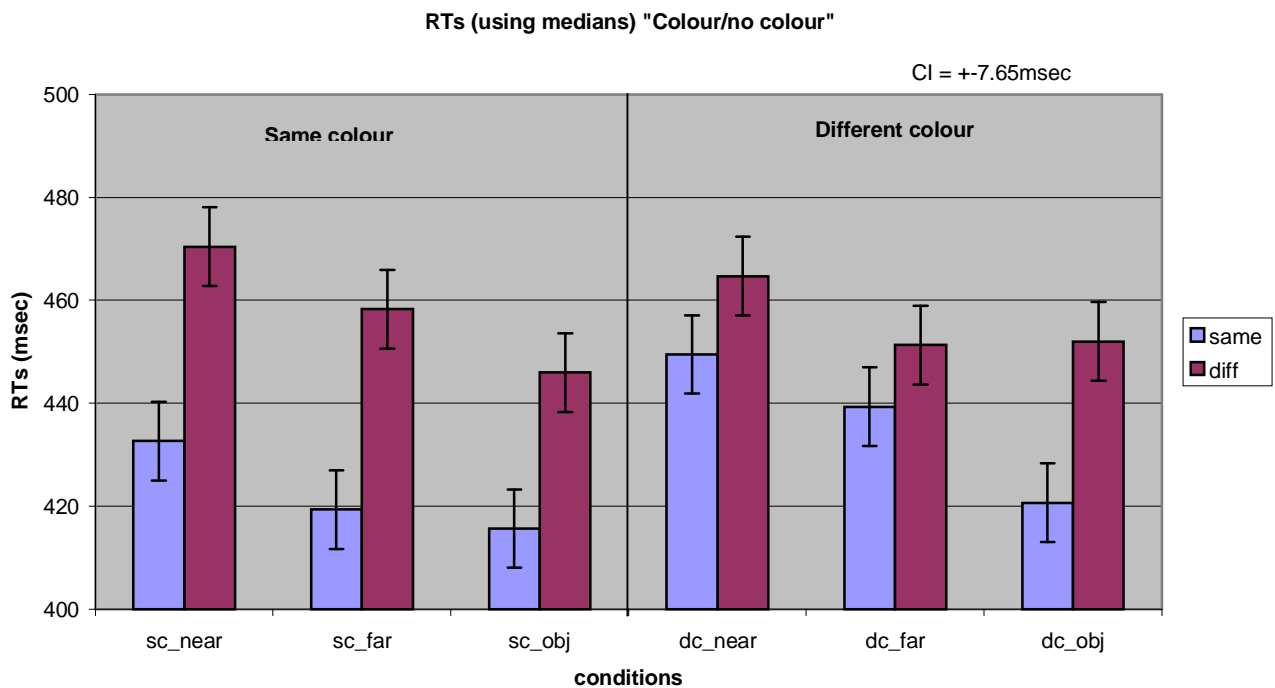
Experiment 1

Stims: the Lavie & Diver (1996) dashed screen display, with the following changes: (1) the two colours used were pink & yellow, as in L&D experiment #3; (2) on ½ the trials, both lines were the same colour (either yellow or pink)

Procedure: 2AFC, same/different target type (gap/dot), response using the numeric keypad (0=same; 2=different). Subjects were tested over 2 session, and in each session had 1 demo block (12 trials), 1 practice block (60 trials), and 10 experimental blocks (60 trials).
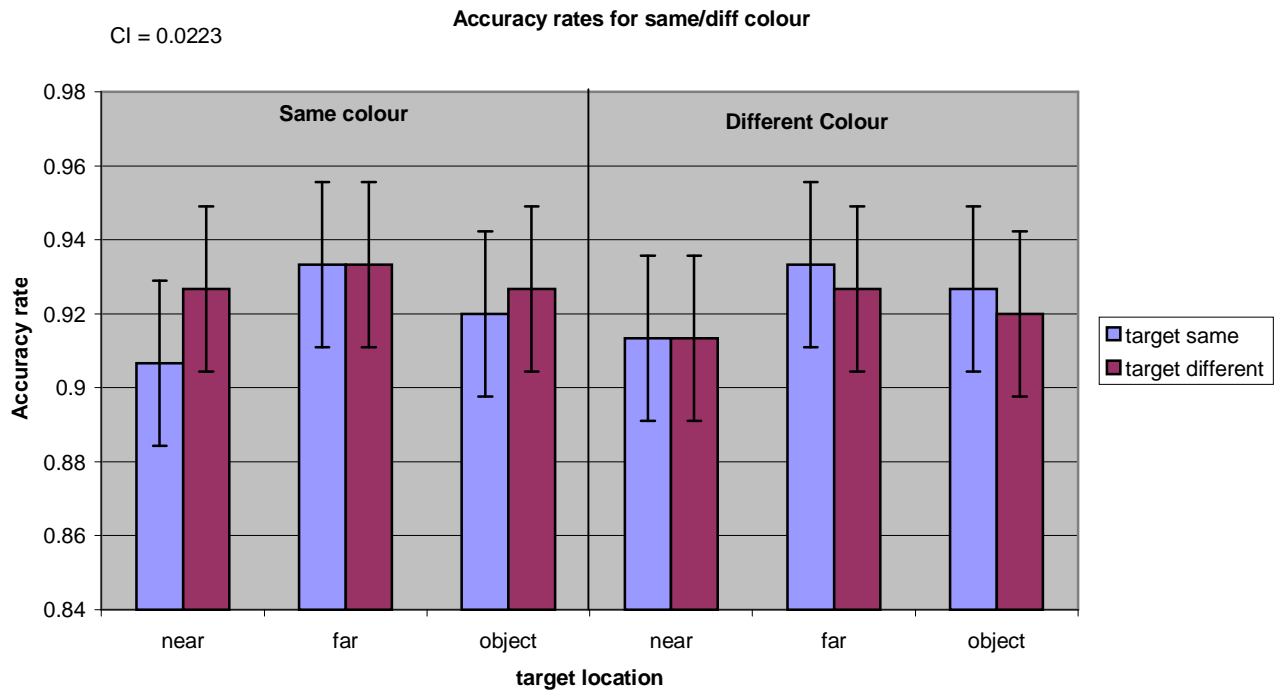
Subjects: 19 paid university-age subjects with 20/20 or corrected vision.

Data analysis: a block-by-block analysis showed a gradual decline in RTs as the experiment progressed, with no discontinuities between sessions. Session was therefore not a factor in the ANOVA. As only 15 subjects completed both sessions, data from only 15 subjects was analyzed. Data from the demo & practice blocks were excluded from the analysis. Reaction time data were analyzed for correct trials only. Both RT data and accuracy data were subjected to a repeated-measures ANOVA using subject medians for each condition. 95% within-subject confidence intervals were computed from the 3-way interaction error term. CI = +/- sqrt(MSE/N) * t(df of error term)

Results: Reaction times

RTs (using medians) "Colour/no colour"

Results: Accuracy data

CI = 0.0223

Accuracy rates for same/diff colour

Bottom line: Object effect appeared in every case. In the same-colour condition, the far targets also seem to speed up. Possibly a "big X" object-based effect. There's a main effect of target location (=object) in the accuracy data but the pattern does not seem meaningful.

Question for next study: is the effect seen here due to the fact that most trials (67%) have targets at either edge of the display?
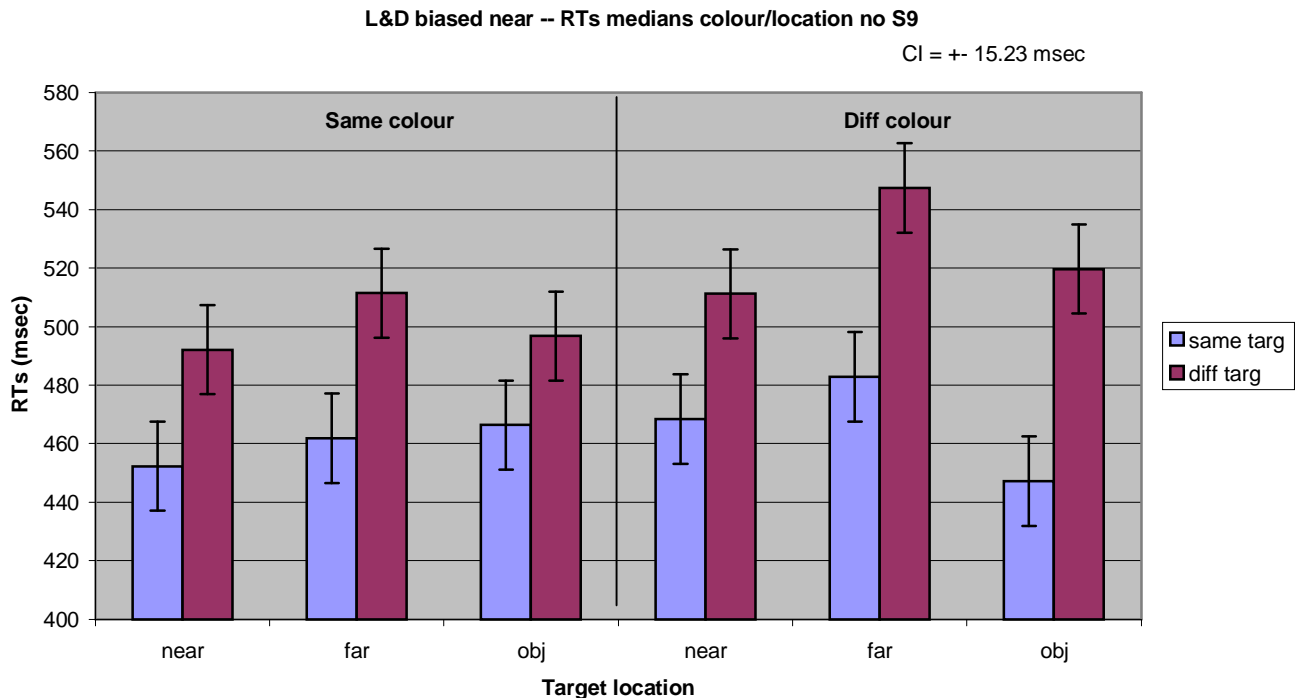
Experiment 2

Stims: same as above, except that the ratio of near targets to far & object targets was 5:1:1.

Procedure: identical to Experiment 1

Subjects: 16 subjects, both paid volunteers and for-credit undergrads; only 15 completed both sessions.

Data analysis: as for Experiment 1.

Results:

L&D biased near -- RTs medians colour/location no S9

CI = +- 15.23 msec

Results: Accuracy (no graph was made)

	Same colour			Different Colour		
	near	far	object	near	far	object
target same	.9267	.9400	.9467	.9333	.9333	.9533
target different	.9400	.9200	.9133	.9267	.9267	.9267

Bottom line: hard to interpret this one. Clearly the biasing had an effect. In all cases there is a "near effect." However, the object effect survives in the different colour condition, and is severely weakened in the same colour condition. The far condition still speeds up in the same colour condition. It's as if spatial factors (near) & 2 levels of object-based factors modulated by colour (object effect both cases, and "big X" effect only when same colour) were operating at the same time. Another thing is that the progression from trial to trial (insert later) shows what looks like a progressive "learning" of the object effect across trials, especially in the same colour condition. What does this mean?

NB: no significant effects in the accuracy data at all.

References

Lavie, N. & Driver, J. (1996). "On the spatial extent of attention in object-based visual selection." *Perception & Psychophysics 58:* 1238-1251.