RESULTS FOR EXPERIMENT : THE ROLE OF CATEGORIZATION IN VISUAL SEARCH FOR ORIENTATION : The Basic Phenomena

Dhriti Garg
IIT Kanpur

In this experiment, we have replicated the findings of parallel search for one orientation among homogeneous distractors and serial search for an orientation among heterogeneous distractors.

Visual search for 1 target orientation is fast and virtually independent of set size if all of the distractors are of a single, different orientation. However, in the presence of distractors of several orientations, search can become inefficient and strongly dependent on set size. Search can be inefficient even if only 2 distractor orientations are used and even if those orientations are quite remote from the target orientation (e.g. 20° or even 40° away). Search for 1 orientation among heterogeneous distractor orientations becomes more efficient if the target orientation is the only item possessing a categorical attribute such as steep, shallow, tilted left or tilted right, or simply tilted. Orientation categories appear to be 1 of several strategies used in visual search for orientation. These serve as a compromise between the limits on parallel visual processing and the demands of a complex visual world.

Total number of subjects: 9

Number of Right Decisions				
Task ↦ Subject↴	1(192 trials)	2(192 trials)	3(192 trials)	4(192 trials)
1	192	192	191	189
2	190	191	191	191
3	191	192	189	179
4	192	192	191	190
5	191	191	190	186
6	191	192	187	186
7	191	192	189	189
8	192	192	192	180
9	192	191	190	180

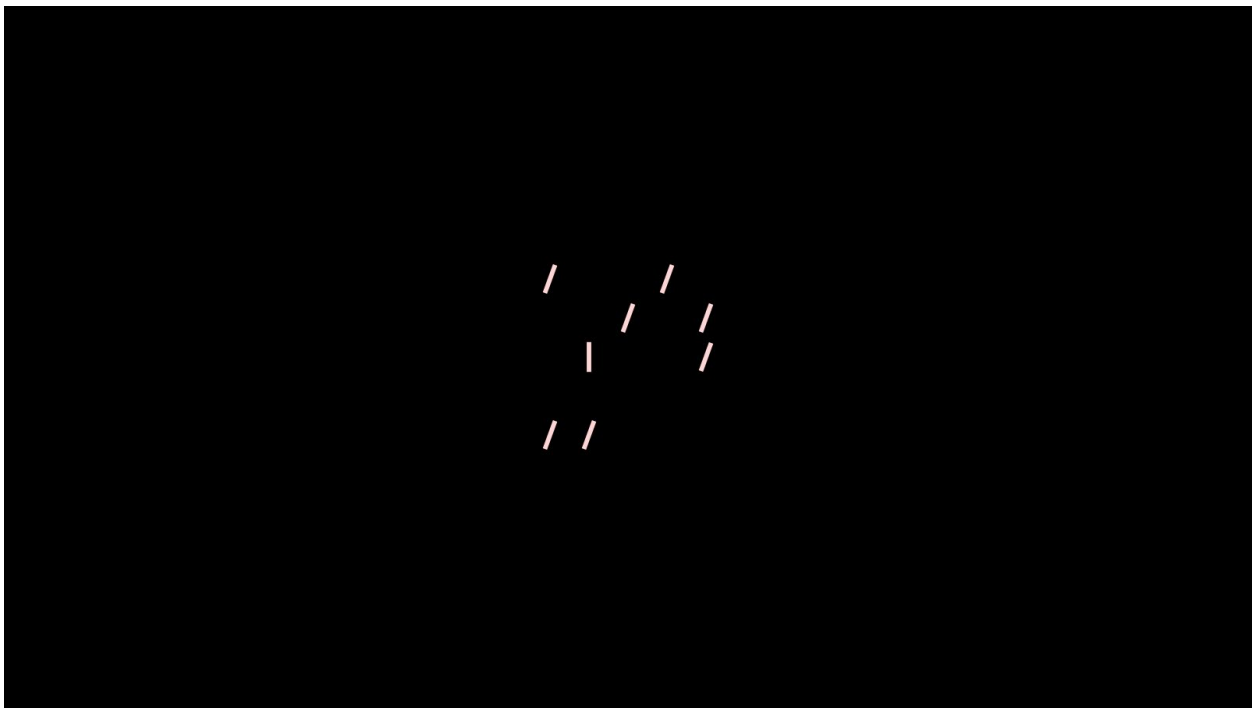
STIMULI

For task 1:

Target: 

Distractors: 

Sample Image from trial:

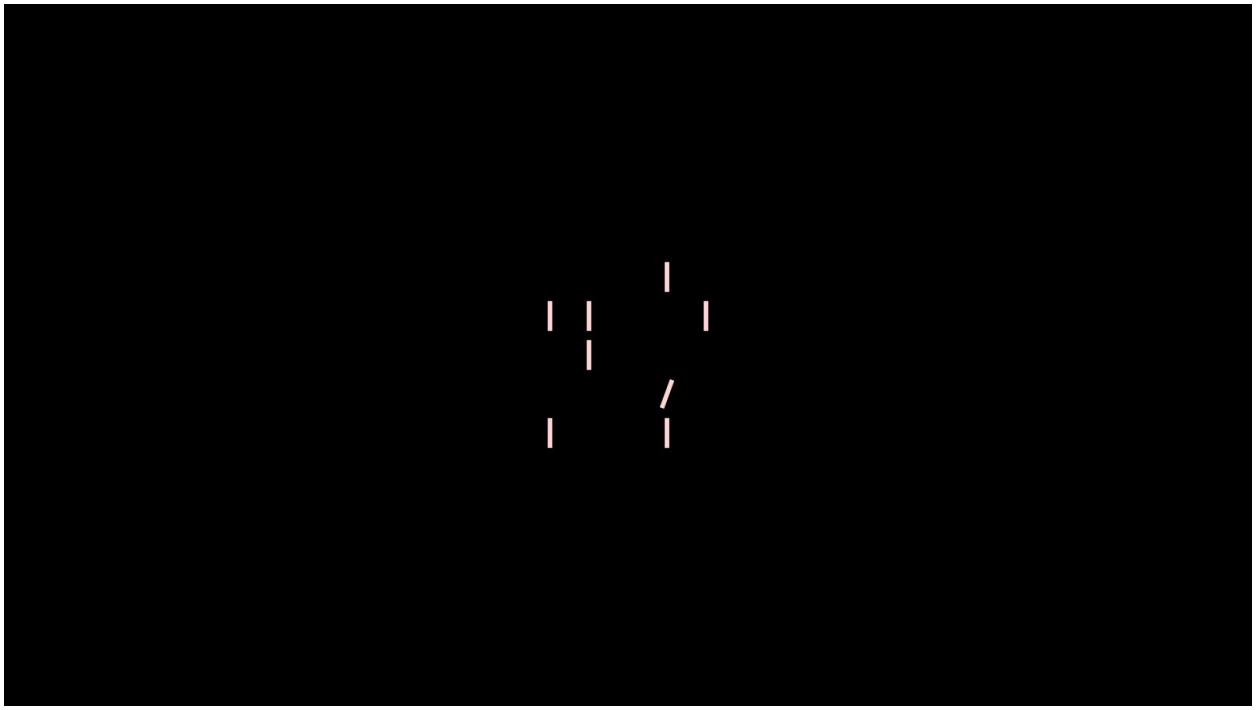


For task 2:

Target : 

Distractors: 

Sample Image from trial:

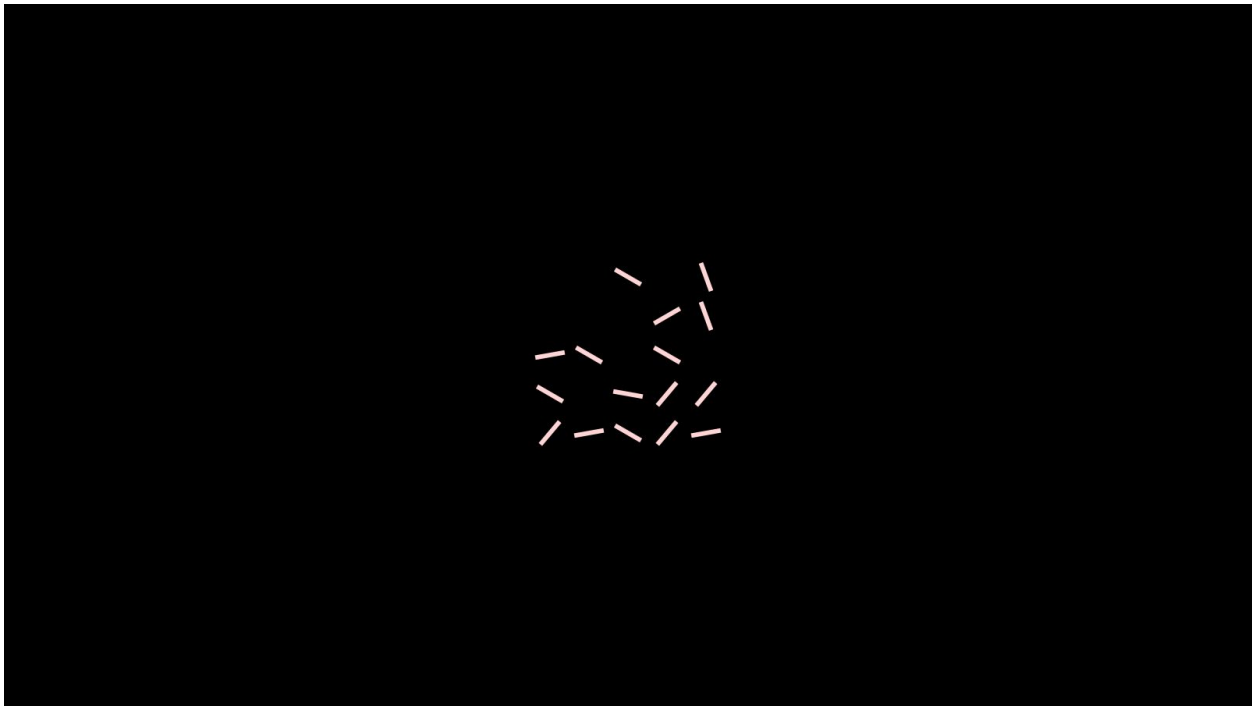


For task 3:

Target: 

Distractors: 

Sample Image from trial:

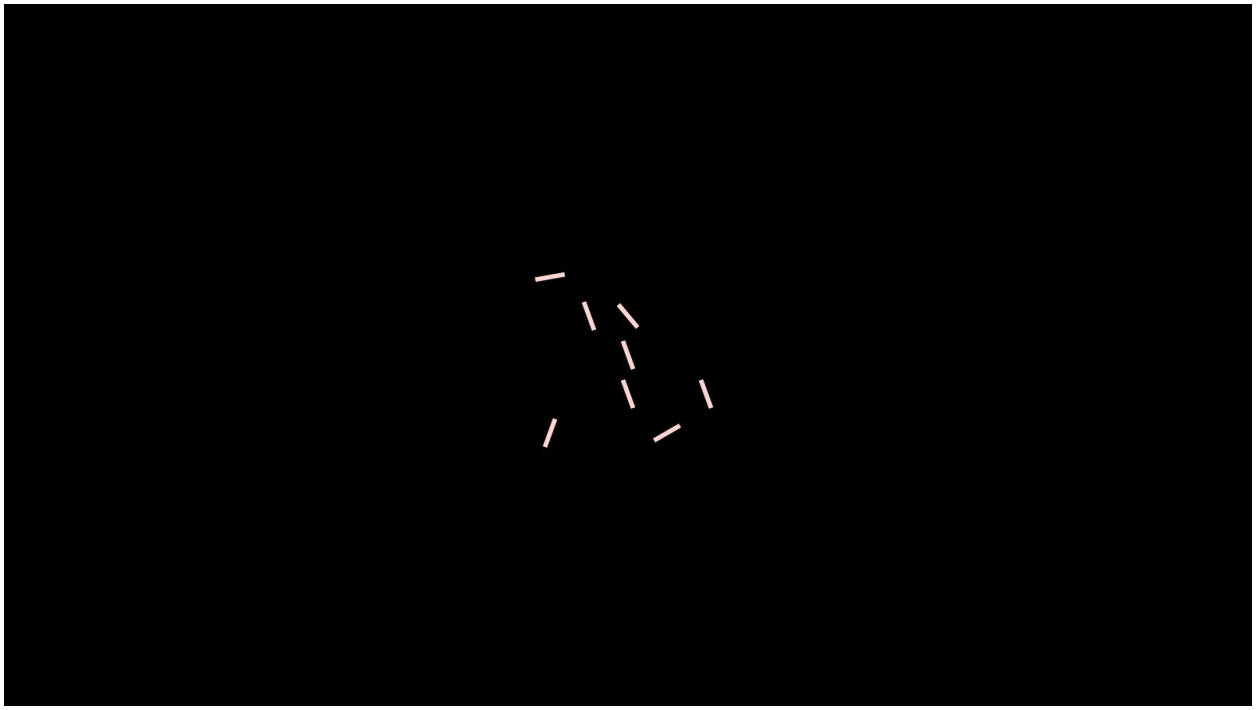


For task 4:

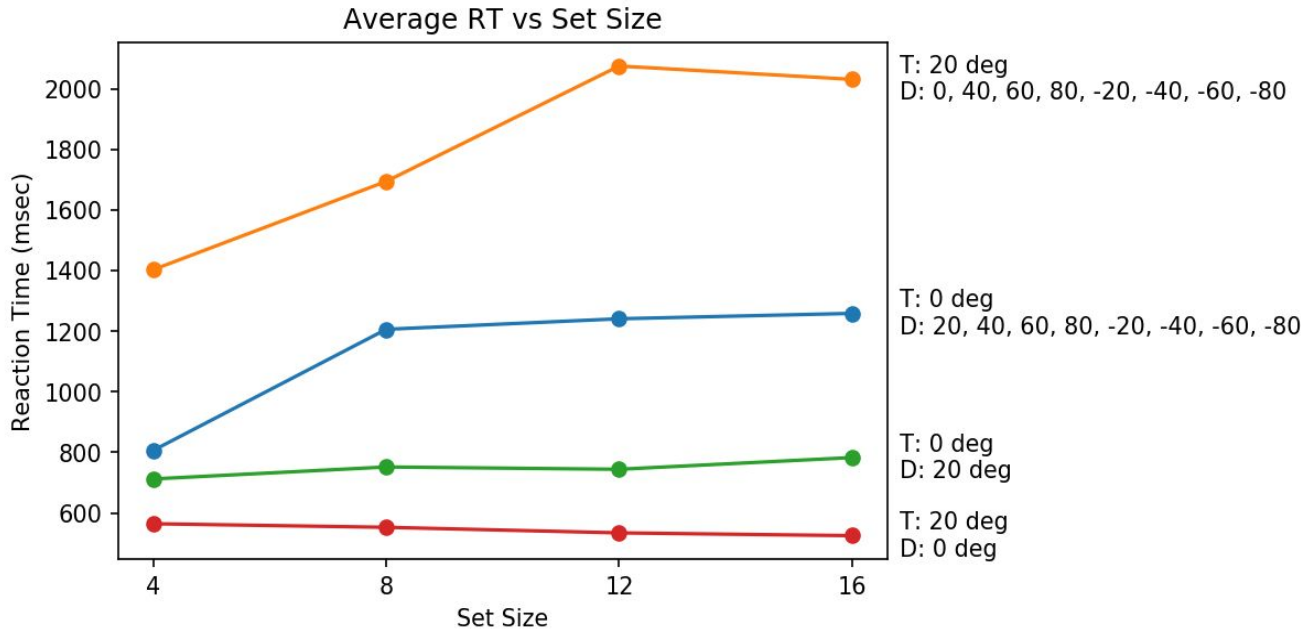
Target: 

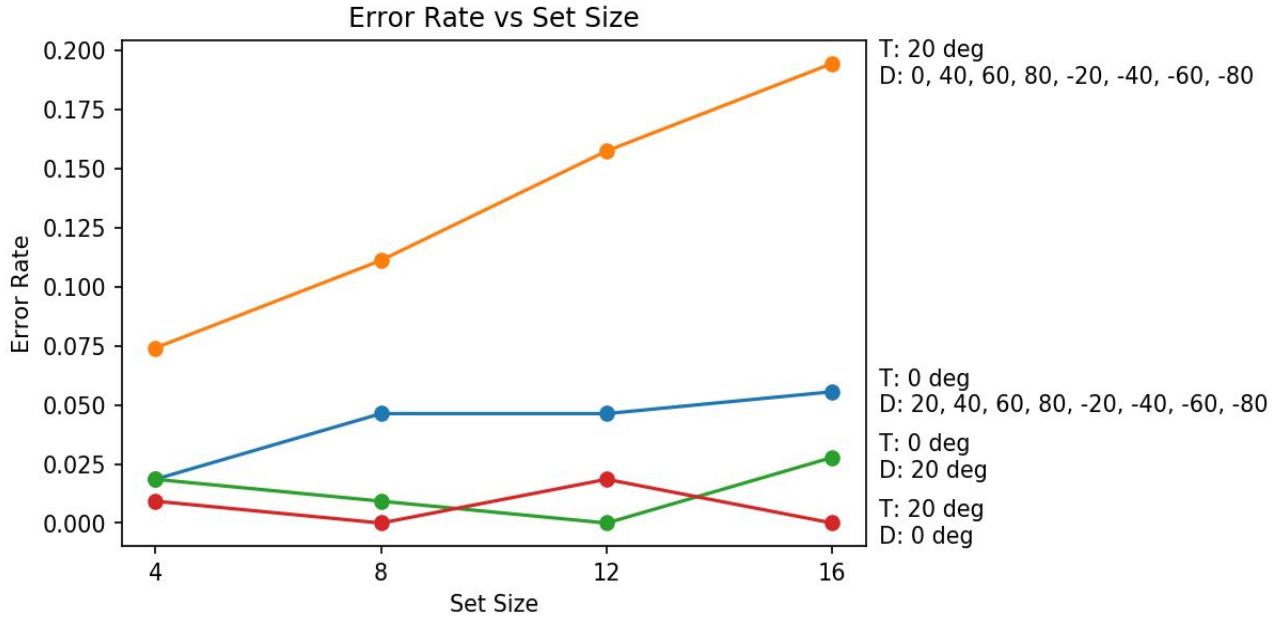
Distractors: 

Sample Image from trial:



RESULTS


Average RT vs Set Size
Reaction Time (msec)
2000
1800
1600
1400
1200
1000
800
600
4
8
12
16
Set Size
T: 20 deg
D: 0, 40, 60, 80, -20, -40, -60, -80
T: 0 deg
D: 20, 40, 60, 80, -20, -40, -60, -80
T: 0 deg
D: 20 deg
T: 20 deg
D: 0 deg


Error Rate vs Set Size
Error Rate
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
4
8
12
16
Set Size
T: 20 deg
D: 0, 40, 60, 80, -20, -40, -60, -80
T: 0 deg
D: 20, 40, 60, 80, -20, -40, -60, -80
T: 0 deg
D: 20 deg
T: 20 deg
D: 0 deg

Task 1: T: 0 deg D: 20 deg				
Set Size ↦ Measure(ms)↴	4	8	12	16
Mean	712.083333	751.527778	743.986111	782.625000
Median	578.5	651.0	652.5	652.5
Mode	397.42424242	412.54545455	606.09090909	413.18181818
Variance	141434.274648	162624.421753	103100.464593	298384.294014

Task 2: T: 20 deg D: 0 deg				
Set Size ↦ Measure(ms)↴	4	8	12	16
Mean	564.222222	552.458333	534.069444	524.861111
Median	489.5	482.5	449.5	468.0
Mode	327.17171717	396.06060606	439.06060606	370.53535354
Variance	114874.823161	60460.674296	46650.178208	39218.515649

Task 3: **T: 0 deg** **D: 20, 40, 60, 80, -20, -40, -60, -80**				
Set Size ↦ Measure(ms)↴	4	8	12	16
Mean	806.375000	1205.902778	1240.666667	1258.472222
Median	607.5	831.0	811.0	902.5
Mode	411.91959799	449.34673367	709.28643216	458.22110553
Variance	3.873274e+05	8.032648e+05	1.074502e+06	8.675668e+05

Task 4: **T: 20 deg** **D: 0, 40, 60, 80, -20, -40, -60, -80**				
Set Size ↦ Measure(ms)↴	4	8	12	16
Mean	1402.76389	1694.166667	2074.861111	2030.902778
Median	1061.5	1388.0	1981.5	1786.5
Mode	804.58291457	1082.90452261	2167.2361809	3216.15075377
Variance	1.001864e+06	8.088703e+05	1.049735e+06	9.593890e+05

References:

The Role of Categorization in Visual Search for Orientation
Journal of Experimental Psychology
Human Perception and Performance
1992. Vol. I X . No. !. .14-49

0096-1523/92/S3.00

For online data collection, the software PsyToolkit was used (Stoet, 2010, 2017).

References

Stoet, G. (2010). PsyToolkit - A software package for programming psychological experiments using Linux. *Behavior Research Methods, 42(4)*, 1096-1104.

Stoet, G. (2017). PsyToolkit: A novel web-based method for running online questionnaires and reaction-time experiments. *Teaching of Psychology, 44(1)*, 24-31.