



Max Wertheimer Minerva Center for
Cognitive Processes and Human Performance

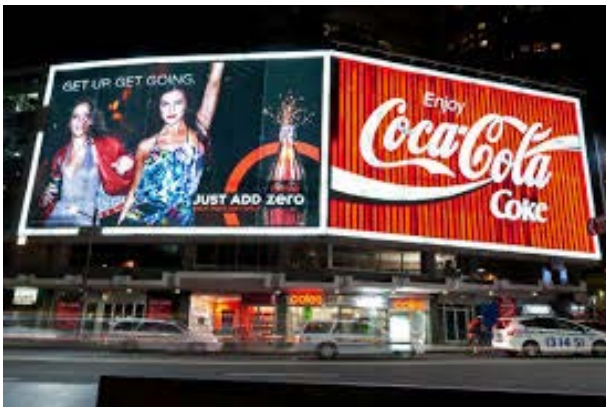
The influence of advertising billboards on the attention allocation of drivers: The effect of design parameters

Pe'erly Setter, Hadas Marciano

March, 9 20015

The influence of advertising billboards on driving

- The question about the effect of advertising billboards on driving is explored since 1950 (Rusch, 1951).
- Literature review showed that
 - Advertising billboards can cause driver's distraction.
 - Accidents rate was higher in the vicinity of billboards.



The influence of advertising billboards on driving

- **A previous study suggested that billboards design parameters might affect the level of driver's distraction.**
- **Understanding these effects is very important because it might help to set up regulation restricting advertising billboards.**

The current study

- Aim: to test the effect of design parameters of billboards on driver's attention allocation.



Phase 1 – Establishing billboard's data

- Using real billboards we established two kinds of classification of the design parameters:

1. Objective

Each billboard was classified according to:

- ❖ Graphics percentage
- ❖ Text percentage
- ❖ Text size
- ❖ Number of colors
- ❖ Background color
- ❖ Number of logos
- ❖ Number of informative elements.

ExcelObjective - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View

Clipboard Font Alignment Number Styles Cells Editing

V21 1.58620689655172

	A	B	C	D	E	P	Q	V	Z	AA	AH	AI	AJ	AK	AL
1	Billboard	Form	Width	Length	area	text area	text percentage	mean area per letter	word num	logos num	graphics area	graphic percentage	color num	background color	information
2	p001	מלבן רחב	63	46	2898	638.452	22.03076605	31.92258	6	1	940.7166	32.46089027	5	כחול	0
3	p002	עיגול	46	46	1661.06	729.661	43.92741984	10.73030588	13	2	1085	65.31973559	9	בז'	3
4	p003	מלבני אורכי	19.1	57.82	1105.518	216.235	19.55960208	2.48545977	18	1	810	73.26879408	25	אפור	0
5	p004	מלבן רחב	52	45	2340	1353	57.82051282	13.80612245	25	0	1330	56.83760684	4	אפור	2
6	p005	מלבן רחב	63	27	1701	386	22.6925338	4.106382979	21	1	273	16.04938272	8	אדום	1
7	p006	עיגול	46	46	1661.06	1155	69.53391208	14.62025316	19	1	0	0	5	צהוב	3
8	p007	מלבן אורכי	31.3	46	1441.18	695	48.2243717	7.239583333	22	0	0	0	4	שחור	1
9	p008	מלבן רחב	63	21	1323	329.511	24.90634921	19.383	4	1	104.7496	7.917581255	6	אדום	0
10	p009	מלבן אורכי	31	46	1426	42.1354	2.954796634	4.21354	2	0	897	62.90322581	4	זהב	0
11	p010	מלבן אורכי	27	46	1242	162.04	13.04669887	2.051139241	17	1	598	48.14814815	9	שחור	1
12	p011	מלבן רחב	63	22	1386	482.85	34.83766234	5.614534884	23	1	272	19.62481962	7	צהוב	0
13	p012	מלבן רחב	52	46	2392	297	12.41638796	7.815789474	9	1	1568	65.55183946	5	תכלת	0
14	p013	מלבן רחב	63	14	882	110.46	12.52380952	2.7615	11	1	238	26.98412698	7	שחור	0
15	p014	מלבן רחב	63	20	1260	585	46.42857143	10.63636364	13	2	360	28.57142857	12	תכלת	1
16	p015	מלבן רחב	53	46	2438	431	17.67842494	11.64864865	9	1	918	37.6538146	9	לבן	0
17	p016	ריבוע	46	46	2116	262.65	12.41257089	11.41956522	4	1	264	12.47637051	4	לבן	0
18	p017	מלבן אורכי	30	46	1380	202	14.63768116	3.107692308	11	1	1102	79.85507246	13	תכלת	0
19	p018	מלבן אורכי	42	46	1932	704	36.4389234	13.80392157	13	0	399	20.65217391	4	כחול	1
20	p019	מלבן אורכי	31	46	1426	696	48.80785414	5.898305085	21	2	560	39.27068724	14	תכלת	2
21	p020	מלבן אורכי	27	46	1242	230	18.51851852	1.586206897	30	5	567	45.65217391	20	לבן	1
22	p021	ריבוע	46	46	2116	1022	48.29867675	11.48314607	20	1	473	22.35349716	15	לבן	0
23	p022	מלבן רחב	63	25	1575	355.96	22.60063492	5.312835821	13	0	864	54.85714286	6	שחור	1
24	p023	מלבן אורכי	42	46	1932	216	11.18012422	24	1	1	1596	82.60869565	8	לבן	1
25	p024	מלבן אורכי	63	23	1449	171.7	11.84955141	3.434	11	1	1449	100	16	כחול	1
26	p025	מלבן אורכי	63	23	1449	604.5	41.7184265	4.227272727	31	0	638	44.03036577	6	כתום	3
27	p026	ריבוע	46	46	2116	694	32.79773157	12.85185185	10	1	2116	100	12	כתום	1

Sheet1 Sheet2 Sheet3

Ready 120%

11:16 23/02/2015

Phase 1 - Establishing billboard's data

2. Subjective

8 participants scored each billboard on a scale between 1-5 on the following statements:

- ❖ The photo is colorful
- ❖ The contrast is high
- ❖ There is high amount of text
- ❖ The photo attracts attention
- ❖ I want to keep looking or examining the details
- ❖ The message can be understood with a glance
- ❖ It will be easy to remember the details
- ❖ The photo is full of details

Phase 1 - Establishing billboard's data



דרג את ההיגד הבא על גבי סולם בין 1-5:

כמות הטקסט גדולה

לתמונה
הבאה

לשאלה
הבאה

5

בכלל לא

4

לא במיוחד

3

באופן מתון

2

די

1

מאוד

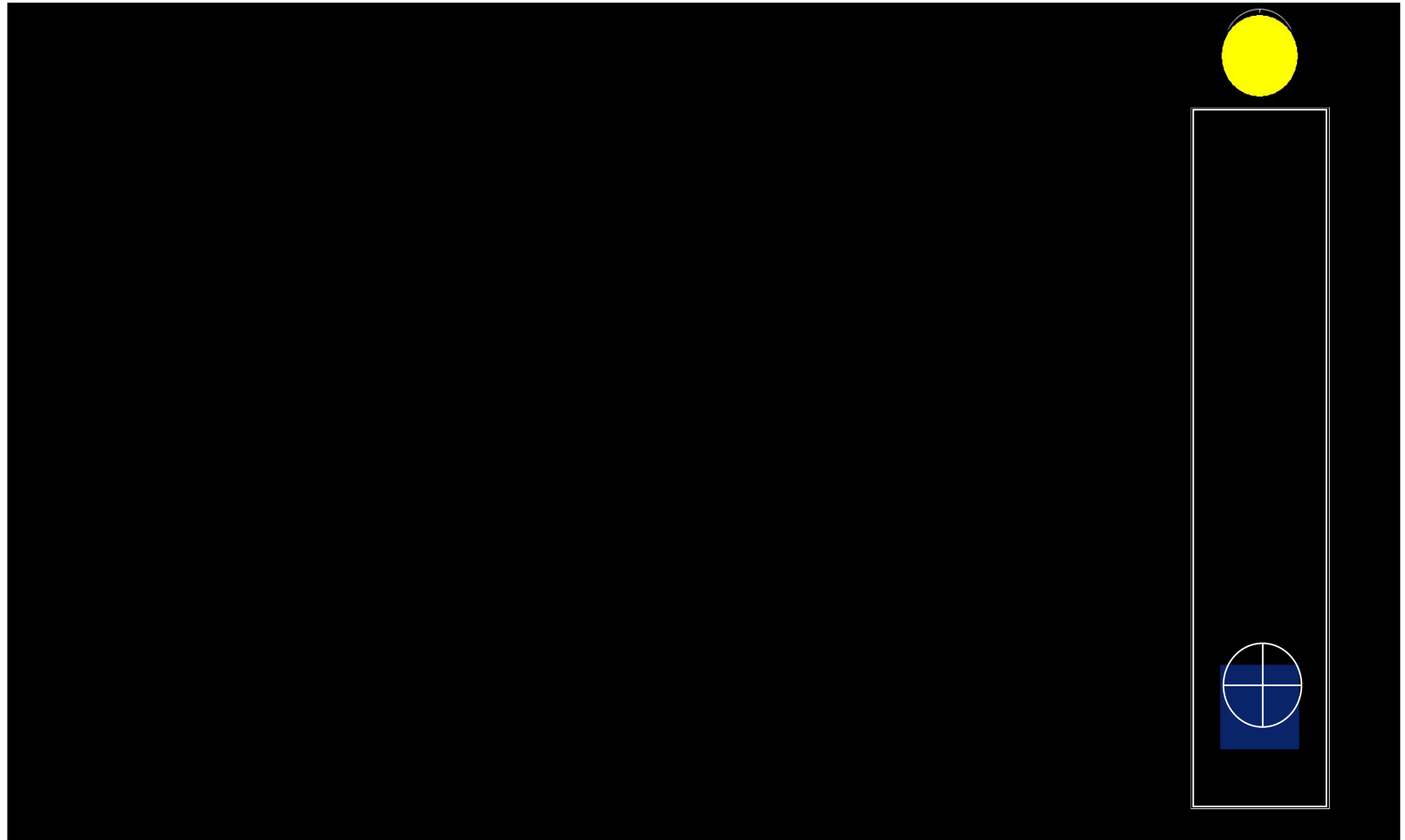
לשאלה
הקודמת

לתמונה
הקודמת

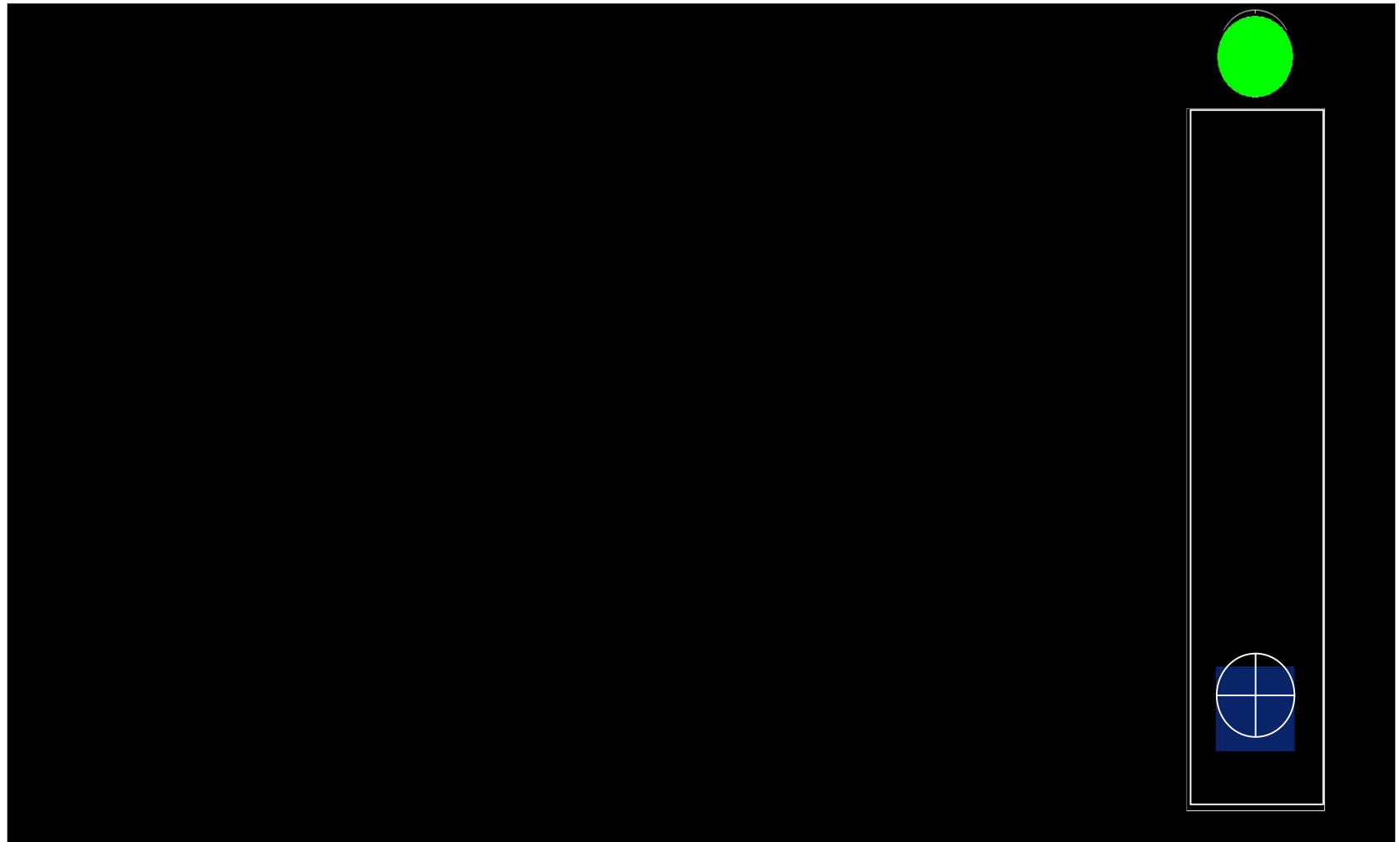
Phase 2 - Multiple-task experiment

- **Aim:** To test whether the various design parameters of billboard influence the performance of two tasks concurrently employed:
 - Tracking task (=motor part of driving)
 - Color change identification task (=traffic light detection)
- **Participants:** 20 students.

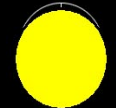
Phase 2 - Multiple-task experiment



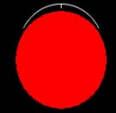
Phase 2 - Multiple-task experiment



Phase 2 - Multiple-task experiment



Phase 2 - Multiple-task experiment



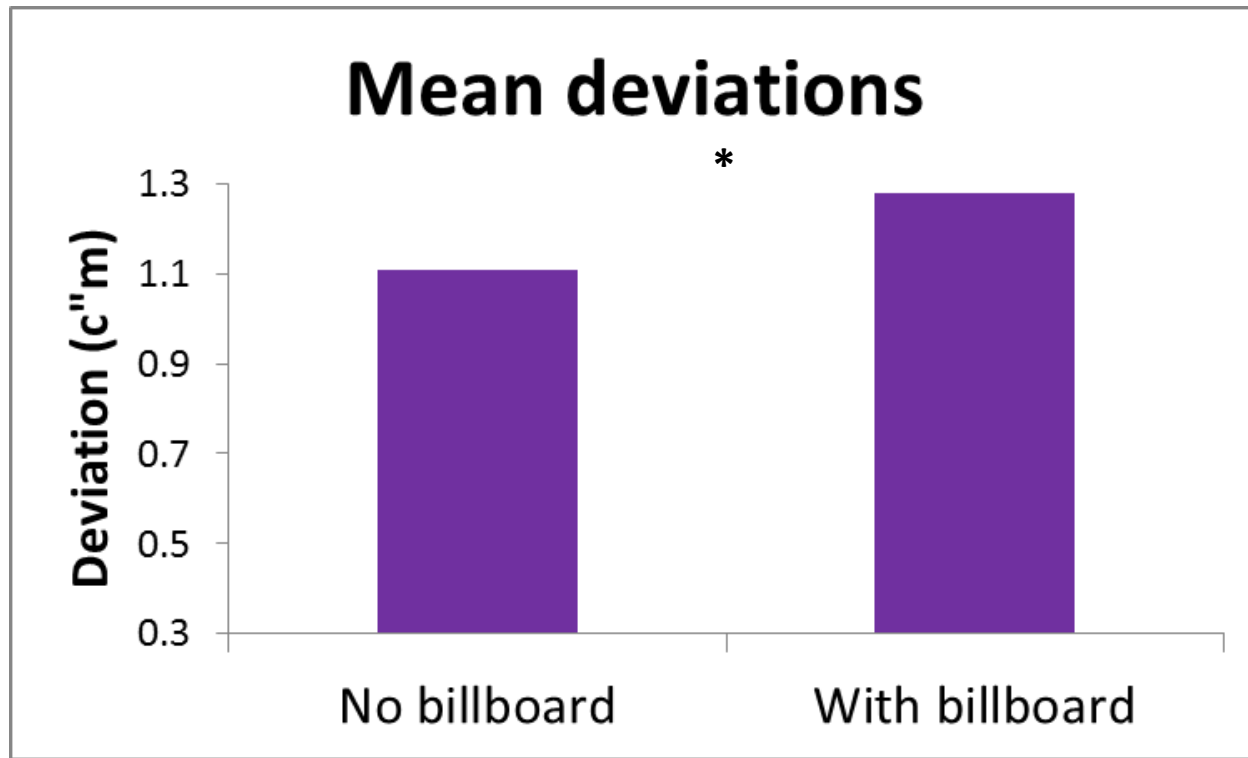
Phase 2 - Multiple-task experiment

היה צבע אדום בשלט

כן / לא

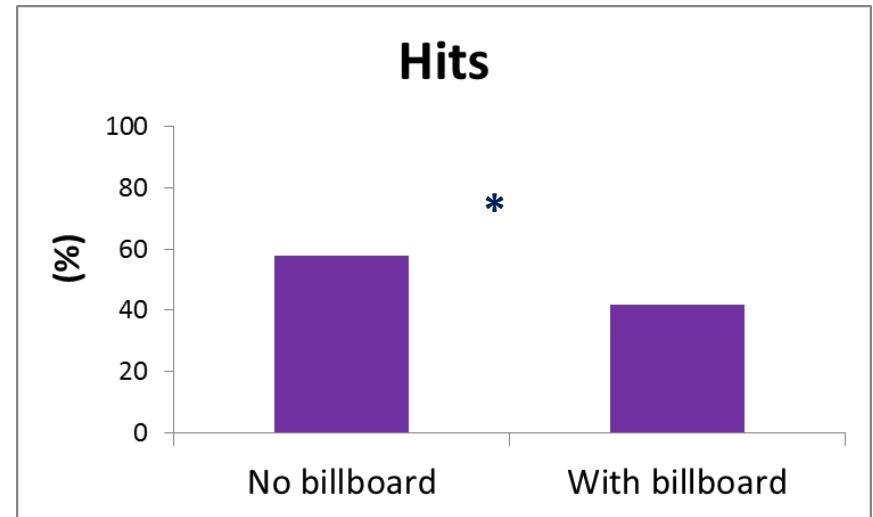
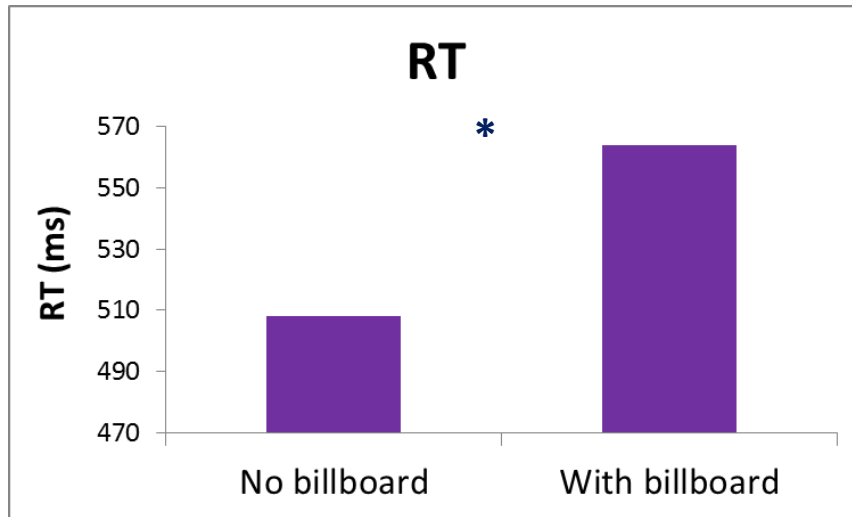
Phase 2 - Multiple-task experiment

- Results: Tracking measurement (deviation)



Phase 2 - Multiple-task experiment

- Results: Color change detection measurement



Phase 2 - Multiple-task experiment

- **Results: Clustering analysis**

Clustering analysis was performed on all billboards, yielding 5 different clusters, according to the following design parameters:

- **Text percentage**
- **Graphics percentage**
- **Number of letters (large, medium, small)**
- **Number of logos**
- **Number of colors**
- **Number of informative elements**

Phase 2 - Multiple-task experiment

- **Results: Clustering analysis - ANOVAs**
One-way ANOVAs with these 5 clusters as a factor were performed.
 - **Cluster 5** was found to deteriorate the performance in the tracking task, but did not affect the color change detection task.
 - **Cluster 4** was found to deteriorate the performance in the color change detection task, but did not affect the tracking task .
 - **Cluster 3** was found to be the least interfering cluster in both tasks.

Phase 2 - Multiple-task experiment

- Cluster 5:

- * Many letters (especially large and small),
- * Many logos,
- * Many colors (though not a lot of graphics elements),
- * Many informative elements

הצטרפו אלינו
מעלות תרשיחא

המשרד
לפיתוח
המגזר
המזרחי

המשרד
לפיתוח
המגזר
המזרחי

אגם
מונפורט

המשרד
לפיתוח
המגזר
המזרחי

המשרד
לפיתוח
המגזר
המזרחי

המשרד
לפיתוח
המגזר
המזרחי

המשרד
לפיתוח
המגזר
המזרחי

המשרד
לפיתוח
המגזר
המזרחי

פסטיבל פיסול בינלאומי
"אבן בגליל" ה-22
חוג'מ פסח 8-11.4.12
באגם מונפורט-מעלות תרשיחא

מוקד מידע:
04-9578871/68
www.maltar.org.il

בברכת חג שמח,
שלמה בוחבט
ראש העיר מעלות-תרשיחא
ויור מרכז השלטון המקומי

אמנים מפסלים
תיאטרון קליפה
אטרקציות באגם
וליום שטאר
סדנאות והפעלות לילדים
איזי
אמיר דדון
אהוד בנאי

Phase 2 - Multiple-task experiment

➤ Cluster 4:

- * Low text percentage, * High graphics percentage, * Many colors,
- * Not many informative elements



Phase 2 - Multiple-task experiment

- Cluster 3:
 - * Medium text percentage, * If text – mostly large letters,
 - * Low graphics percentage, * Not many colors,
 - * Not many informative elements



Phase 2 - Multiple-task experiment

- **Discussion:**

- The presence of billboards deteriorated the performance of the participants in both concurrent tasks.
- Billboards of cluster 5 interfered with the tracking task but not with the color change detection task.
- Billboards of cluster 4 interfered with the color change detection task but not with the tracking task.
- Billboards of cluster 3 did not interfere with both color change detection and tracking tasks.

Phase 2 - Multiple-task experiment

- **Conclusions:**
 - Billboards that contain a large amount of text, many details and many colors might interfere with the motor part of driving.
 - Billboards that contain a large amount of graphics and many colors might interfere with the cognitive part of driving (e.g., traffic light detection).
 - Billboards that contain small amount of text, colors and graphics might be the least interfering, hence quite safe.

Phase 3 – Simulator experiment

- **The various clusters we identified will be tested in more realistic driving setting – in our driving simulator.**



Max Wertheimer Minerva Center for
Cognitive Processes and Human Performance

Thank you for your attention