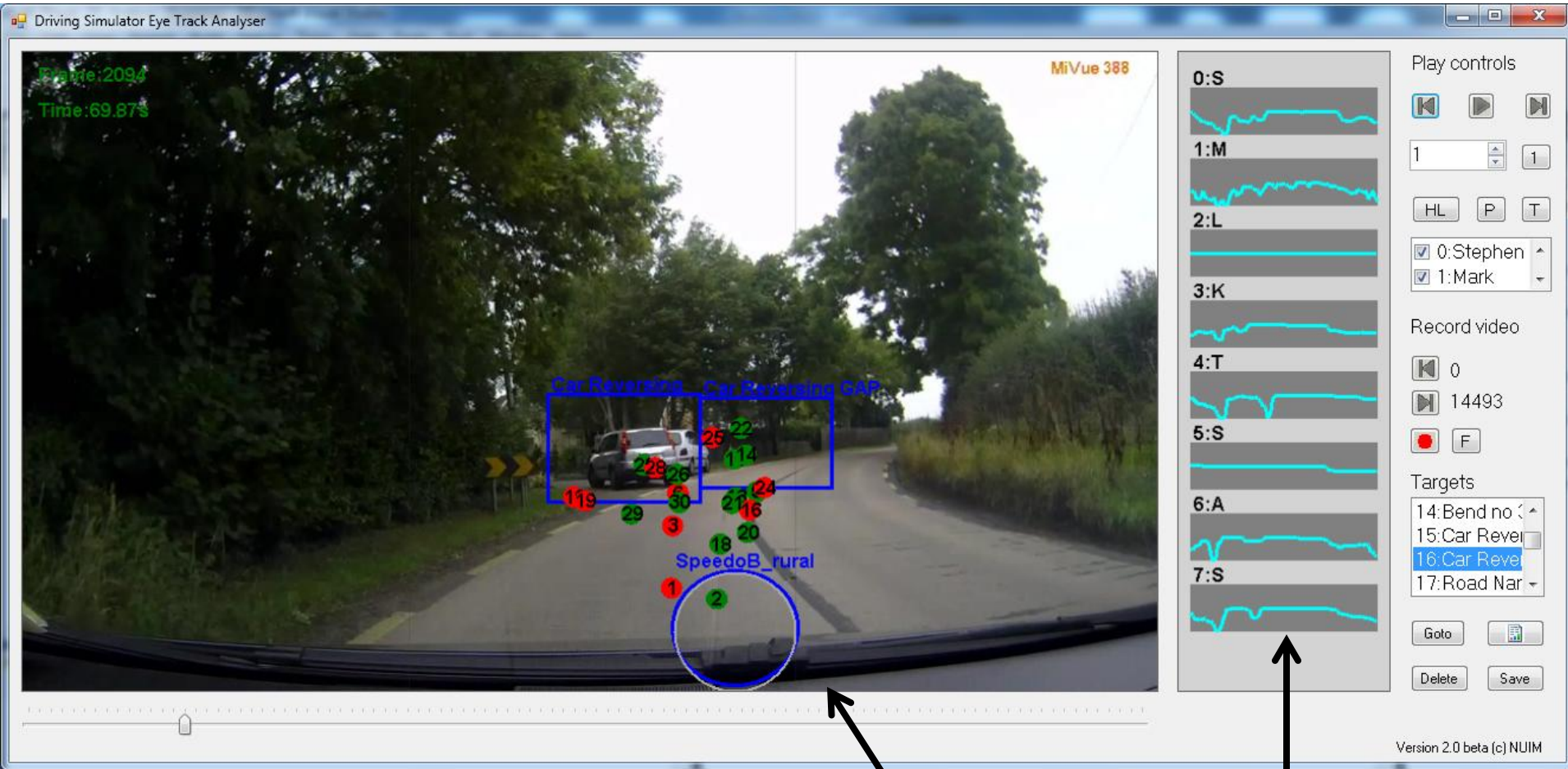


Naive approach: Did they look at a ...?" e.g. car reversing and gap



Target area



- 1 Low attention
- 2 High attention

Pedal position
Driver view and eye-gaze

31 Subjects, 11 High, 13 Low

Targets: Motorway road sign

The screenshot shows a driving simulator interface with the following elements:

- Top Left:** Frame:7365, Time:245.75s
- Top Center:** M3 Navan Exit Left Kells & Cavan Straight
- Top Right:** MIVue 388
- Center:** A road sign with two panels. The left panel shows R147, An Uaimh (Theas), NAVAN (South), 1km, and a speed limit sign of 8. The right panel shows An Cabhan CAVAN, Ceanannas KELLS, and a speed limit sign of 10. A blue box highlights the entire sign area.
- Bottom Center:** A blue circle highlights the speedometer area, labeled "Speed 1 Motorway".
- Right Panel:** Play controls (back, play, forward), a volume slider set to 1, buttons for HL, P, T, a list of targets (0:Stephen, 1:Mark), Record video controls (stop, play, 0, 14493), and a list of targets (34:M3 Staigh, 35:M3 Staigh, 36:Brown Sid, 37:M3 Navan). A red record button and a button labeled 'F' are also present.
- Bottom Right:** Version 2.0 beta (c) NUIM

Target area



- 1 Low attention
- 2 High attention

Pedal position
Driver view and eye-gaze

31 Subjects, 11 High, 13 Low

Individual response to an individual events

Target view counted in terms of frames

Index	Name	Car Rev.	Gap	M3 Navan
0	St...	0	0	51
...
6	Ai...	10	0	17
7	Sh...	1	0	56
8	Da...	5	0	49
9	Al...	16	1	0
10	Do...	20	0	33
11	Ne...	10	6	82
...
27	Pa...	2	15	4
28	Pe...	7	2	10
29	Ra...	7	0	9
30	An...	0	0	0

Accelerator pedal position (Car Reversing)

Index	Name	Before	During	After
0	St...	0.25	0.32	0.7
...
6	Ai...	0.45	0.26	0.44
7	Sh...	0.39	0.24	0.45
8	Da...	0.21	0.07	0.38
9	Al...	0.21	0.09	0.23
10	Do...	0.31	0.21	0.35
11	Ne...	0.45	0.32	0.49
...
27	Pa...	0.42	0.44	0.49
28	Pe...	0.21	0.13	0.38
29	Ra...	0.31	0.24	0.39
30	An...	0.72	0.79	0.97

Group response to an event or target

Mean view per driver (frames)

Name	Mean frame count
HorseNCart A	29.8
HorseNCart B (GAP)	9.6
Car Reversing	7.3
Car Reversing GAP	2.8
Road Narrowing Sign A	0.2
Dog Walkers	5.1
Dog Walkers- GAP	9.2
Big Bend RIGHT	4.3
Brown Sign (Services) vs M3 Straight Line Target Box 2	1.2
M3 Navan Exit Left Kells & Cavan Straight	29.6
NAVAN Exit Immediate Left	11.5
Exit 8 Left	0.0
Caution Signs M3	0.2
Speed Sign M3 120 KM	0.0
Speedo_Rural	271.8
Speedo_Motorway	375.7

Individual overall response to the route

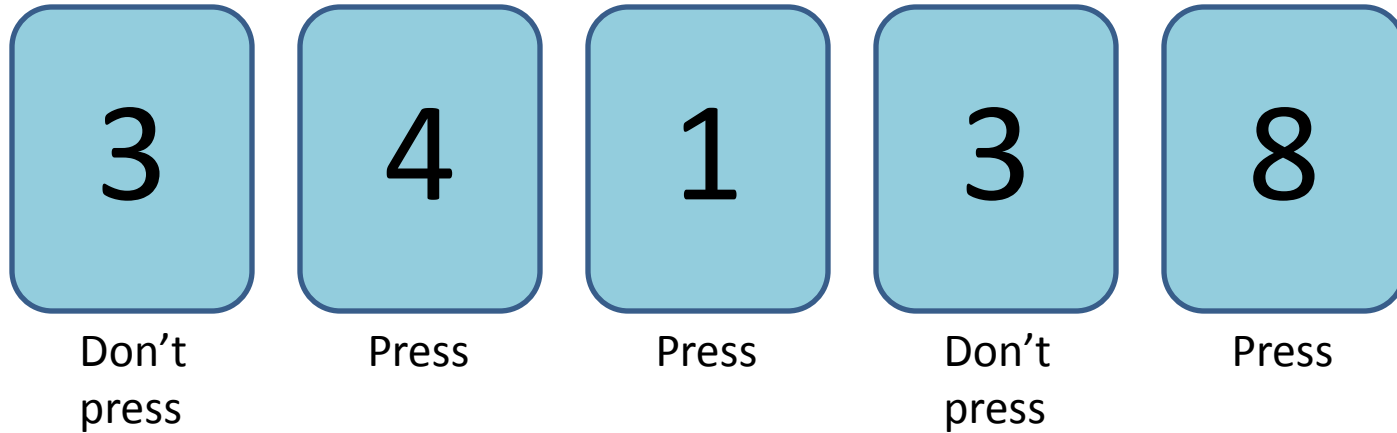
Time to drive route

Index	Name	Rural (S)	Motorway (S)
0	St..	291.4	273.9
...
6	Ai..	276.5	275.4
7	Sh..	244.7	275.2
8	Da..	387.2	174.4
9	Al..	414.9	586.4
10	Do..	305.6	495.9
11	Ne..	272.5	428.7
...
27	Pa..	329	278.5
28	Pe..	345.3	433.4
29	Ra..	365.3	555.9
30	An..	139	269

Count of speedo. "looks"

Index	Name	Rural	Motorway
0	St..	39	44
...
6	Ai..	65	42
7	Sh..	51	21
8	Da..	31	63
9	Al..	65	27
10	Do..	94	79
11	Ne..	46	49
...
27	Pa..	11	91
28	Pe..	95	149
29	Ra..	76	39
30	An..	6	10

Psychology test: Sustained Attention to Response Task (SART)



In the standard version of the task, participants are presented with the digits 1 to 9 in random order at a rate of one every 1.15 s. Each digit is presented for 250 ms followed by a 900 ms mask and participants are required to respond to each digit as rapidly as possible by clicking the mouse, apart from when they see the number 3 when they must withhold the response. The task consists of a total of 225 trials (25 of each of the 9 digits) and lasts approximately 4.3 min.

Advanced analysis – Where did they look?

MiVue 388

6 Blink or looking away.

15 Outside three regions of interest.

Iso probability line: 90% probability that points belong inside the ellipse.

Red: Cluster nearest speedometer
Green: Cluster nearest road
Blue: Cluster "somewhere else"

Total number of drivers who viewed this cluster.

Speedometer region of interest.

68 Drivers (total)
10 Low attenders, 10 High attenders

Video frame counter

11085

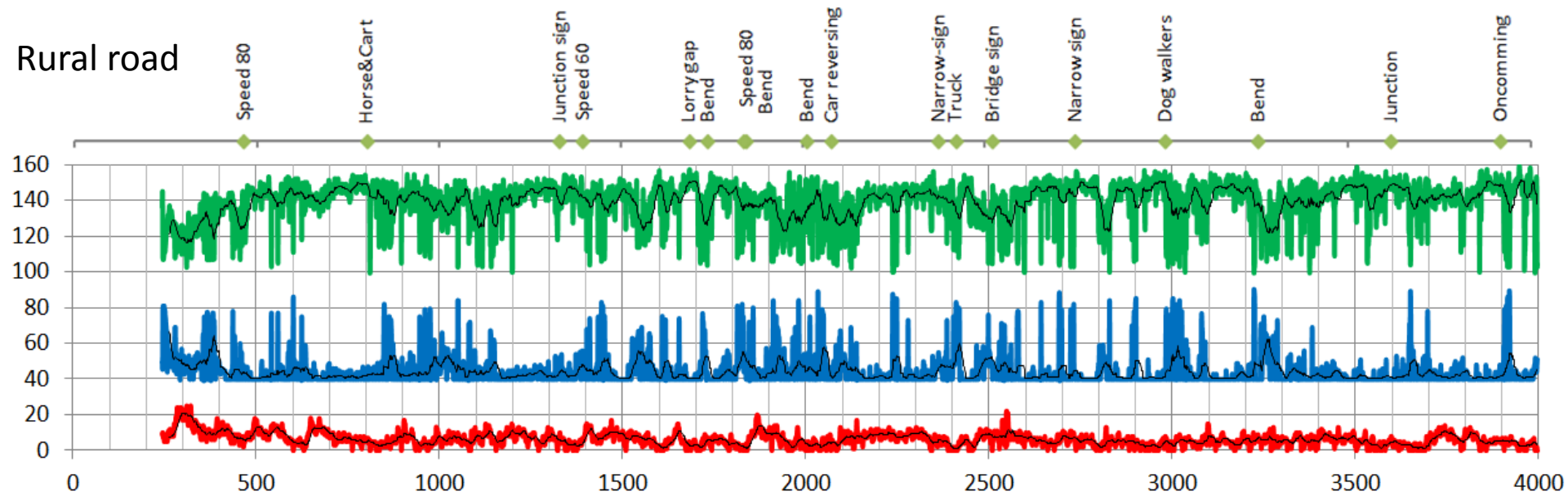
Low	1	6	0	3	0	High	0	5	2	3	0
-----	---	---	---	---	---	------	---	---	---	---	---

Eye gaze count per frame
Speedometer, Road, Other, Outside cluster, Eyes shut

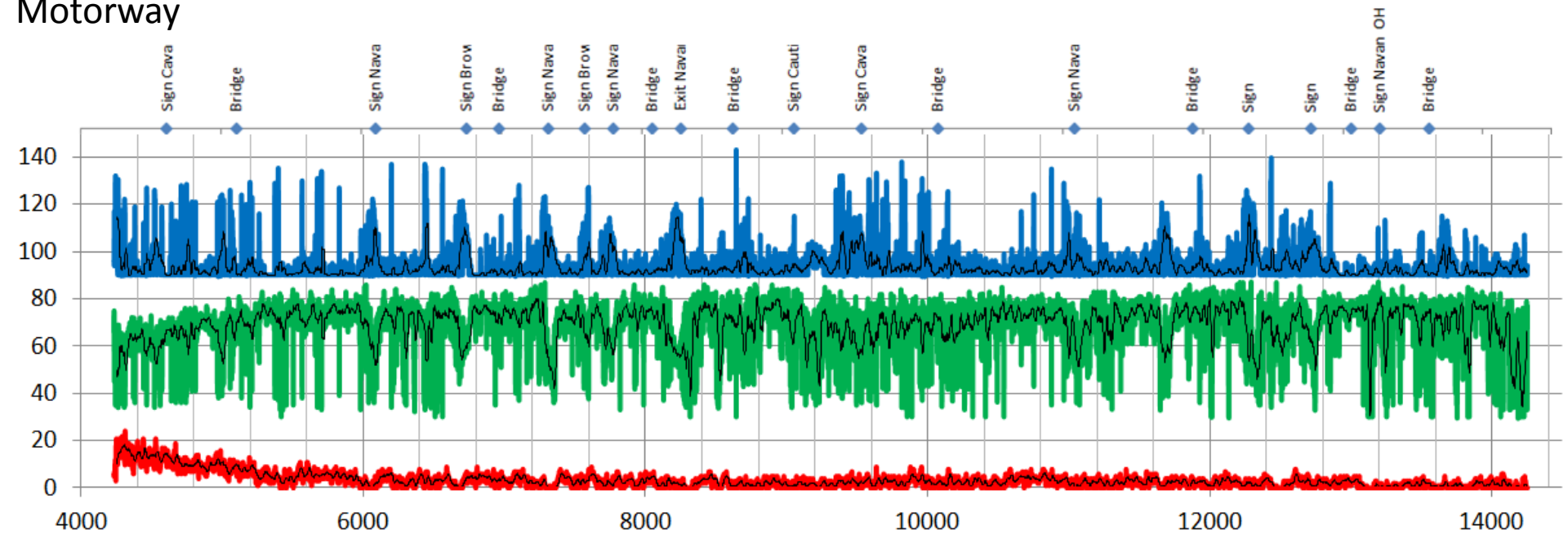


Inner: Cluster, Red, Green, Blue
Middle: Yellow outside ellipse
Outer: Black – Low, White - High

Rural road



Motorway



68 drivers, Red "speedo", Green "road", Blue "something else"

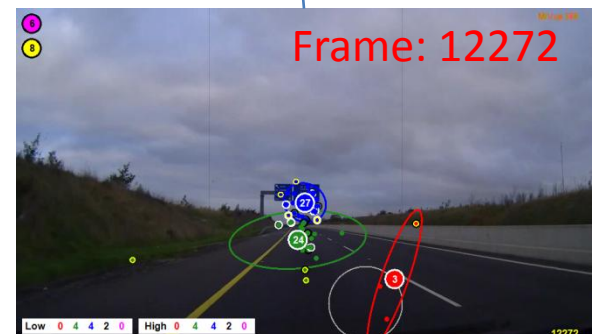
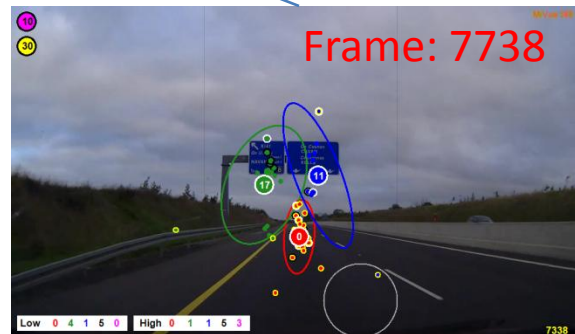
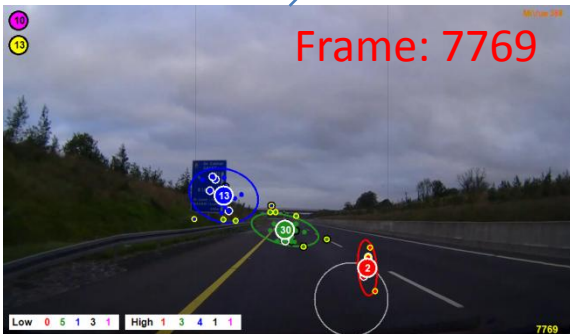
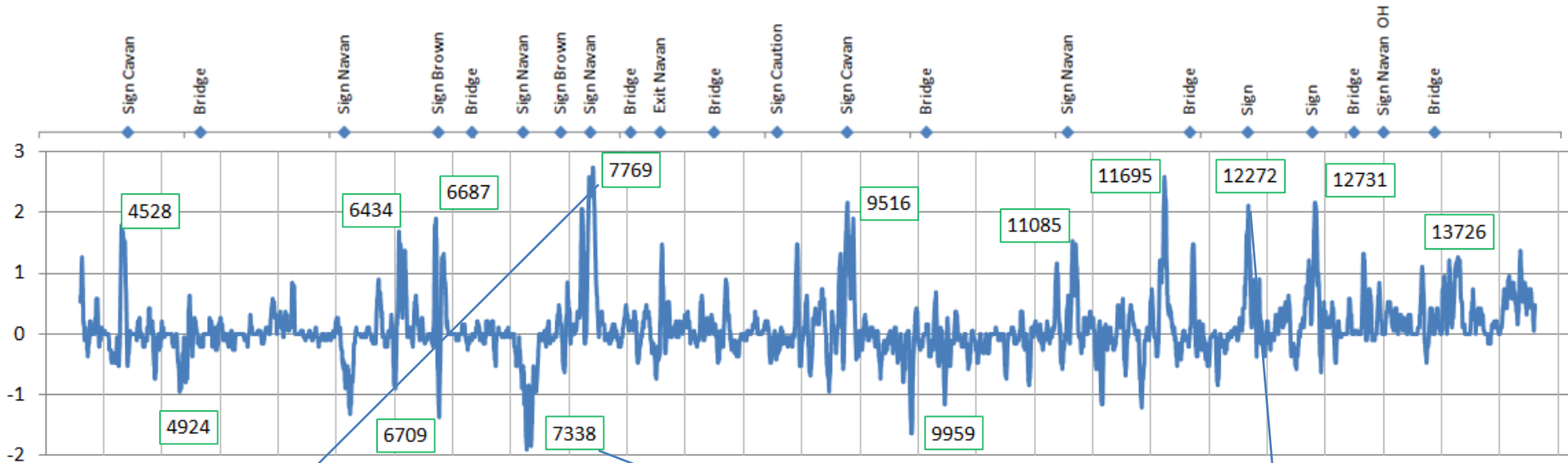
Rural road summary

High attenders check speedometer 10% more
Both look at road equally
Low attenders look around 18% more

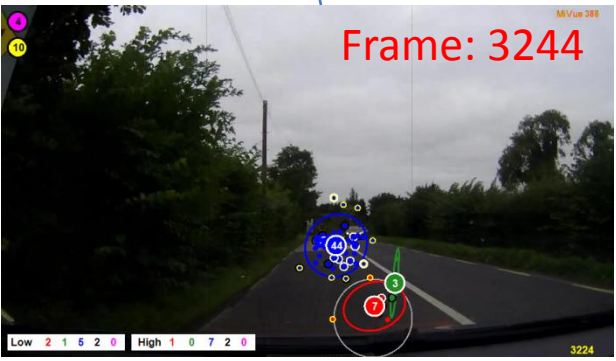
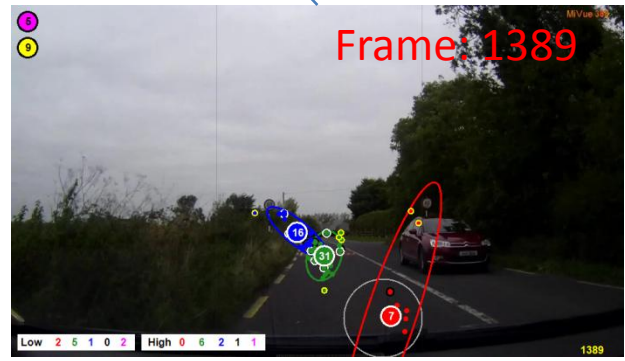
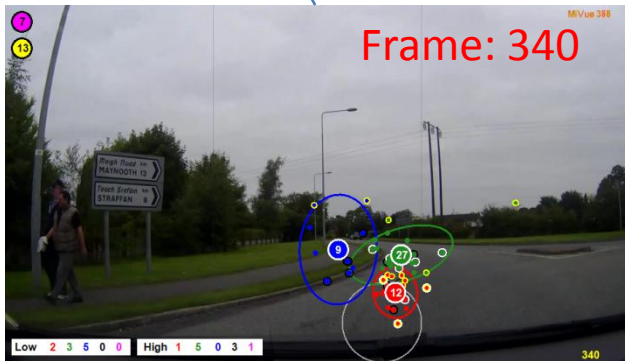
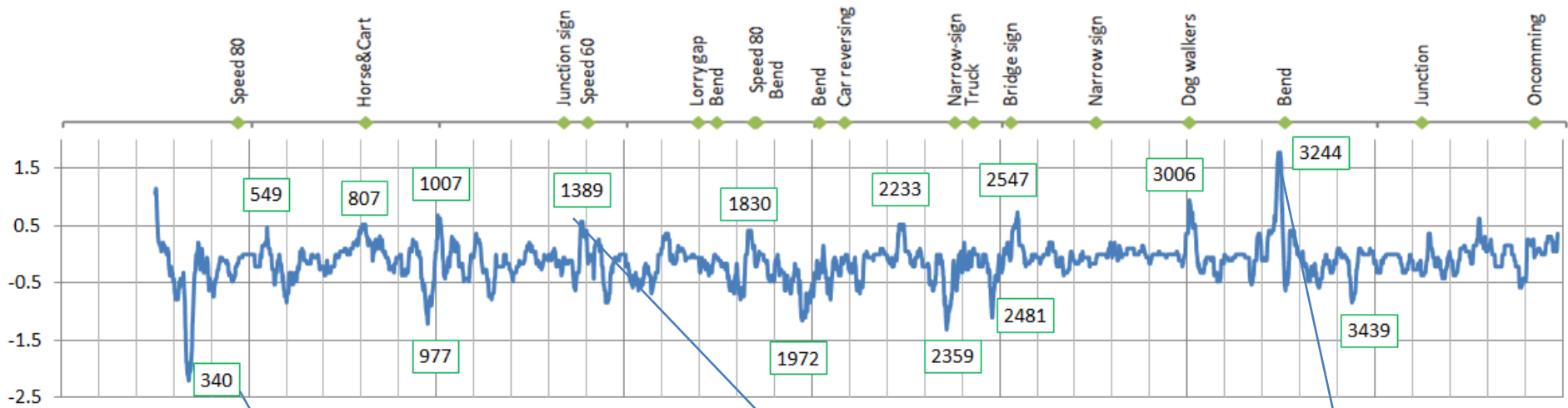
Motorway summary

High attenders check speedometer 6% more
Both look at road equally
Low attenders look around 20% more

Motorway – difference between high and low (20pt moving average)



Rural- difference between high and low (20pt moving average)



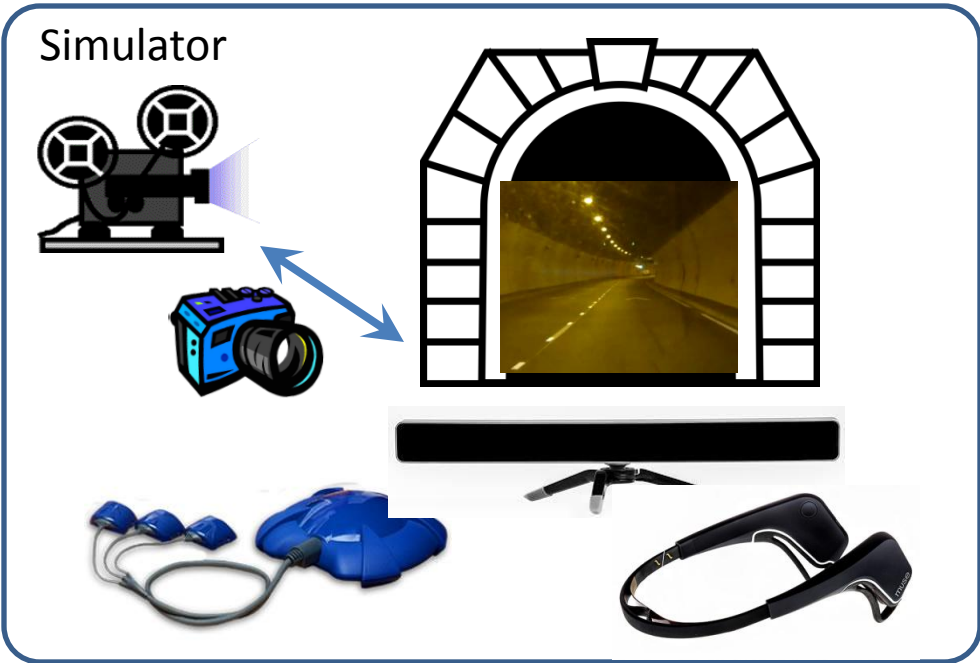
Dublin Port Tunnel – steering, new eye-tracker



Drive route once



Re drive route many times



Eye gaze (x,y)



Speed



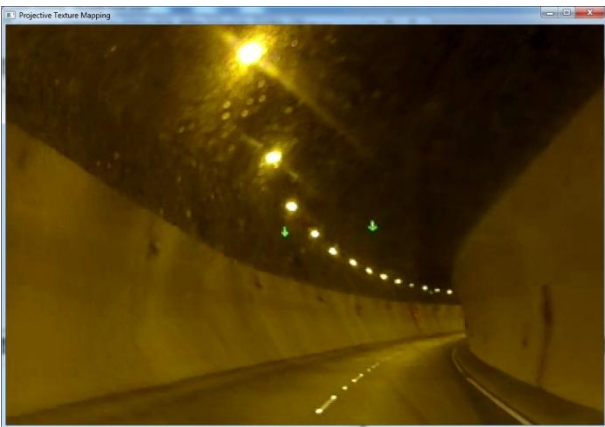
Steering



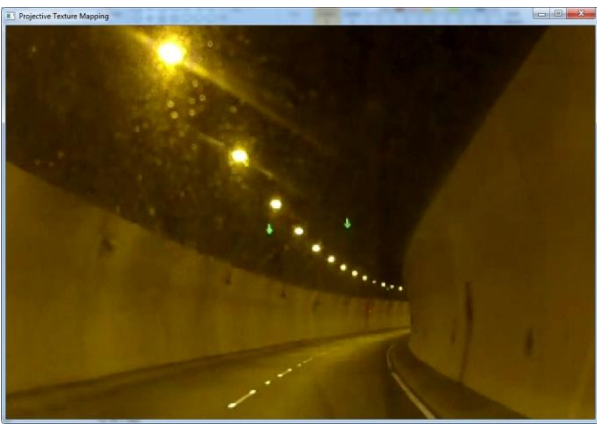
EEG\GSR\HR



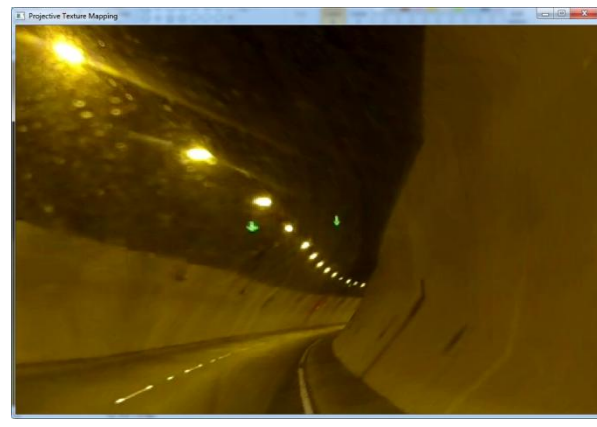
Video frames projected onto a white model estimate of the tunnel. Driver point of view adjustable using steering wheel on playback. Frame rate set by accelerator pedal position.



Left



Straight



Right

Dublin Port Tunnel – steering, new eye-tracker

Dublin Port Tunnel (Eye gaze experiment)

Frame: 1208

Id:
% Eye gaze active
Speed

Eye-gaze:
red active,
black untracked,
yellow average.

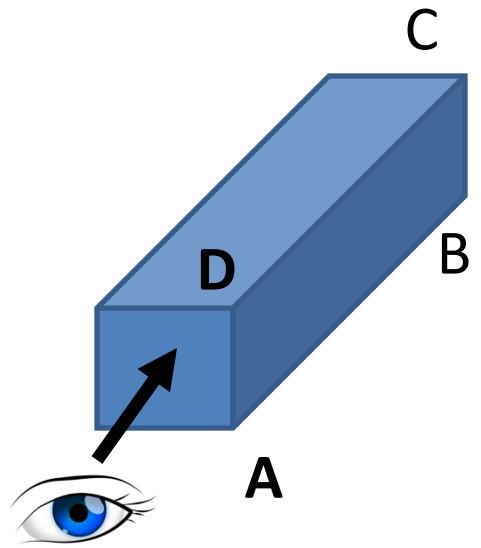
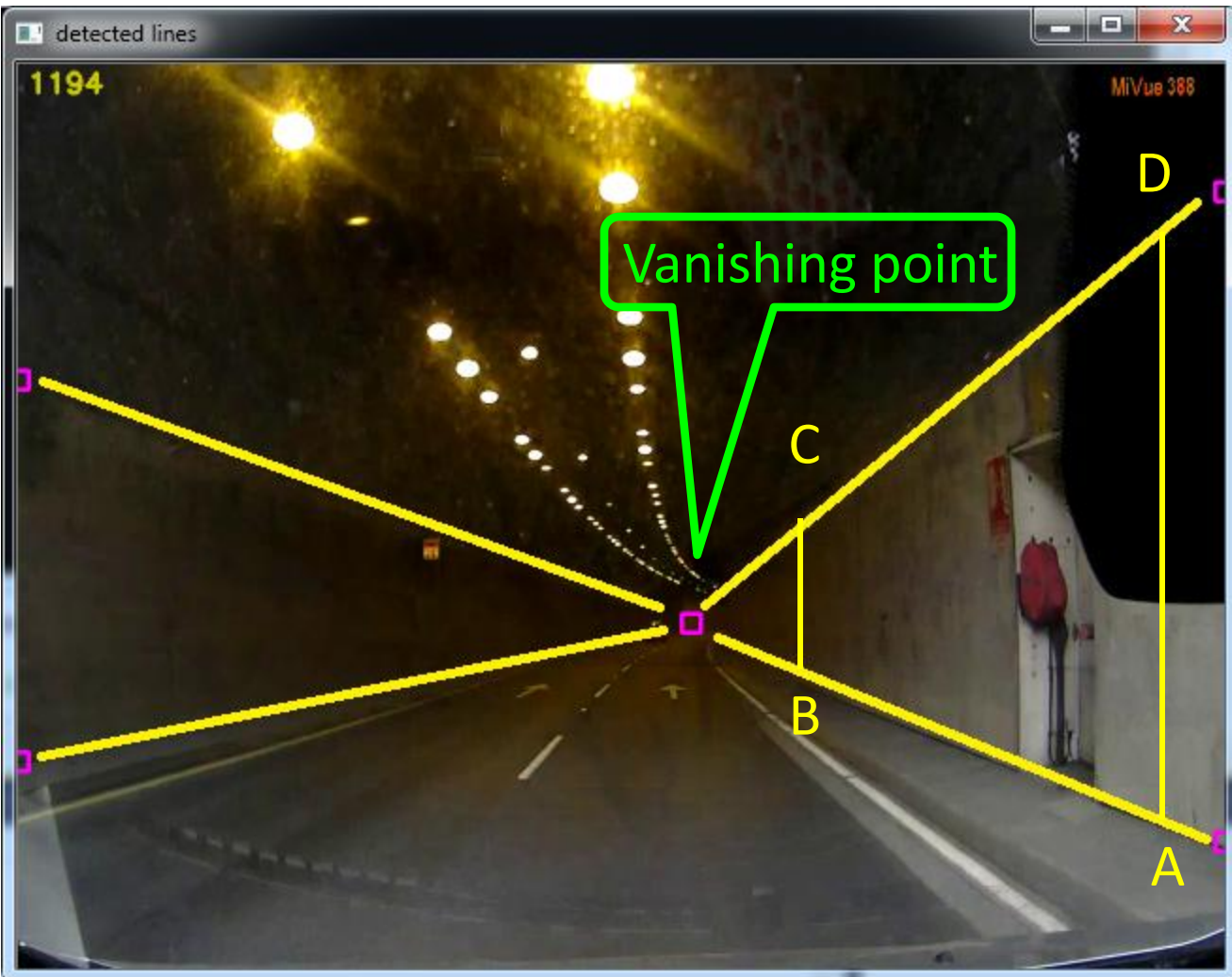
0:49%	:119.9km/hr
1:33%	:75.9km/hr
2:52.9%	:108.6km/hr
3:61.1%	:113.8km/hr
4:52.1%	:119.9km/hr
5:15.2%	:119.9km/hr
6:62.3%	:119.9km/hr
7:61.2%	:101.7km/hr

Moving map, OSM
Vehicle position

Reveal

Quit

Dublin Port Tunnel – reconstruction of tunnel geometry (update)



To reduce distortion when steering, machine vision methods are being developed to accurately position the viewing camera (driver), tunnel model and point (and method) of texture projection.