

Did We Catch Your Eye?

Using Eye Tracking to Inform Survey Design

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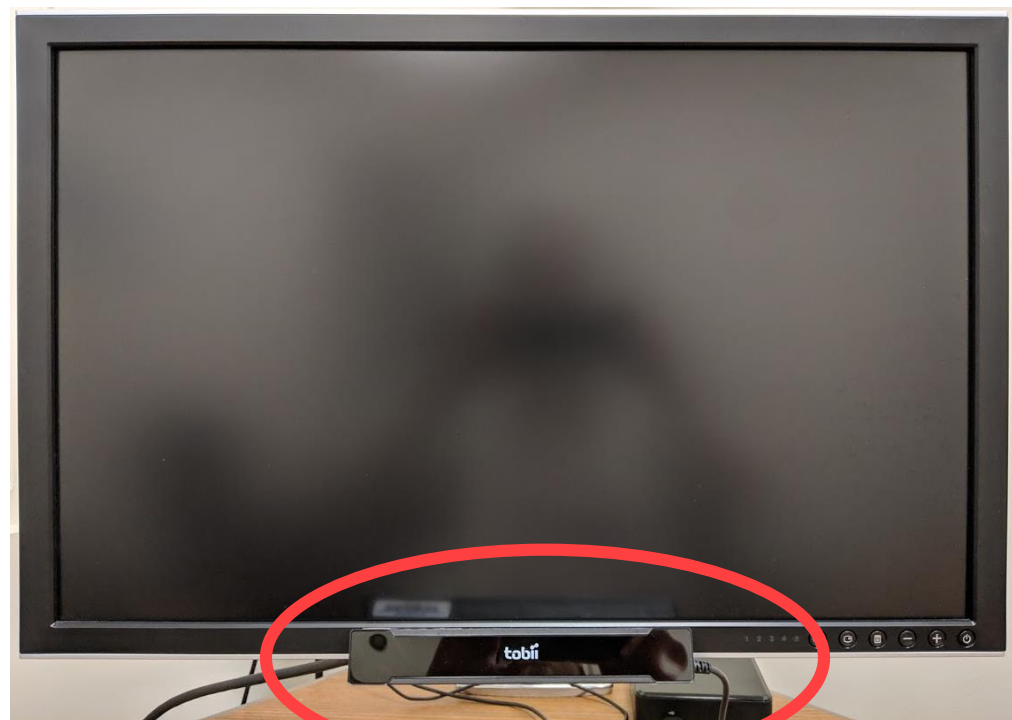
Bureau of Labor Statistics

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Eye Tracking

- Non-invasive technology to track and record eye movements
- Allows for qualitative and quantitative analysis of what users look at on a screen
- Common in human factors, usability, marketing
- Survey designers can use it to inform form and question design



Advantages of Eye Tracking

- Removes reliance on participant self-report
- Can directly observe where a participant looks and for how long
- Known patterns (e.g., reading vs. scanning) provide insight into how participants interact with the material
- Valuable in combination with other participant feedback



Eye Tracking Data

- Captures each eye movement by time and coordinate
- If two movements are in the same location for more than a set threshold, identifies a 'fixation'
- Fixations then used for analysis and visualizations

Data:

Timestamp	Number	GazepointX (L)	GazepointY (L)	CamX (L)	CamY (L)	Distance (L)	Pupil (L)	Validity (L)	
17	1	-1024	-768	0.686	0.364	-1.000	-1.000	4	
17	36	-1024	-768	-1.000	-1.000	-1.000	-1.000	4	
18	56	-1024	-768	-1.000	-1.000	-1.000	-1.000	4	
19	77	-1024	-768	0.685	0.365	-1.000	-1.000	4	
20	97	5	716	613	0.683	0.367	637.570	5.529	0
21	117	6	712	623	0.680	0.370	623.295	5.408	0
22	137	7	845	738	0.680	0.370	623.295	5.354	0
23	157	8	874	731	0.681	0.369	623.295	5.381	0
24	176	9	876	730	0.681	0.369	623.295	5.491	0
25	196	10	868	736	0.681	0.369	623.295	5.404	0
26	216	11	868	733	0.682	0.369	623.720	5.452	0
27	236	12	869	724	0.682	0.369	623.720	5.352	0
28	256	13	868	744	0.683	0.369	623.720	5.357	0
29	276	14	860	720	0.684	0.370	623.720	5.509	0
30	296	15	856	732	0.684	0.370	623.720	5.406	0
31	316	16	854	737	0.685	0.370	625.318	5.465	0
32	336	17	840	741	0.686	0.371	625.318	5.521	0
33	356	18	845	752	0.686	0.371	625.318	5.417	0
34	376	19	844	752	0.687	0.371	625.318	5.415	0
35	396	20	838	755	0.688	0.371	625.318	5.460	0
36	416	21	841	755	0.688	0.370	627.653	5.422	0
37	436	22	843	746	0.688	0.370	627.653	5.557	0
38	456	23	832	744	0.688	0.370	627.653	5.521	0
39	475	24	816	746	0.688	0.370	627.653	5.522	0
40	495	25	832	749	0.688	0.370	627.653	5.654	0
41	515	26	825	749	0.688	0.370	625.994	5.630	0
42	535	27	841	766	0.688	0.370	625.994	5.633	0

Figure 7. Exported gaze file from Tobii Studio.

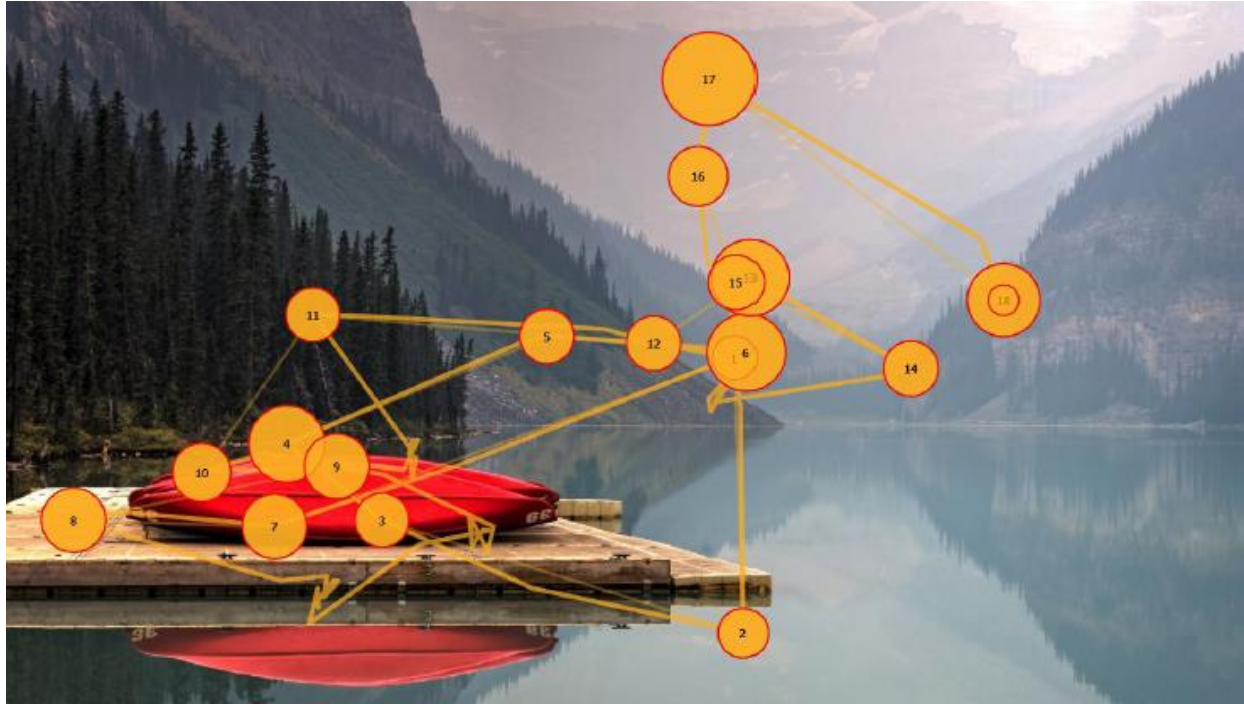
Source:

<http://www.psychology.nottingham.ac.uk/staff/vwh/eou/Eyetracker%20Output%20Utility%20Manual.pdf>



Eye Tracking Metrics: Fixations & Gaze Plots

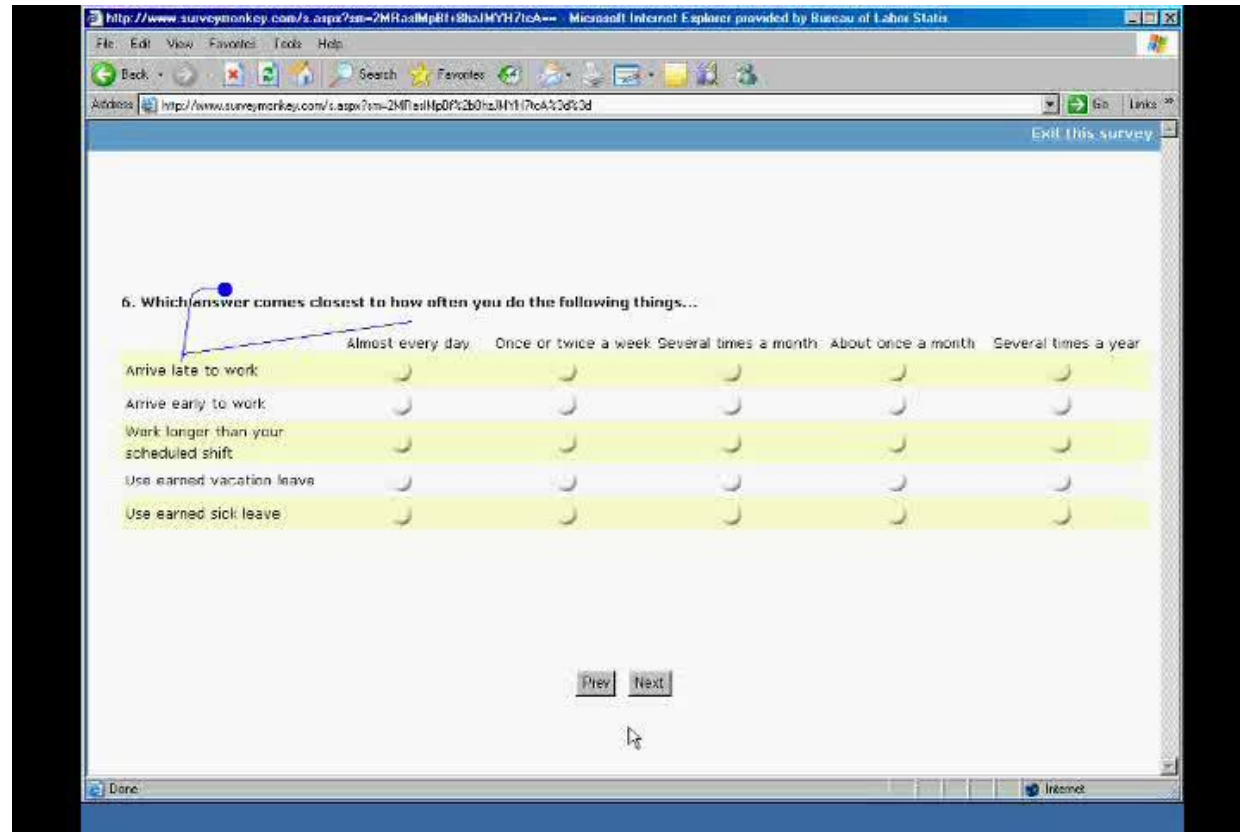
- Track fixation order and duration in gaze plots
- Longer fixations (illustrated by bigger circles) and/or more fixations show more time spent in that area



Source: <https://imotions.com/blog/7-terms-metrics-eye-tracking/>

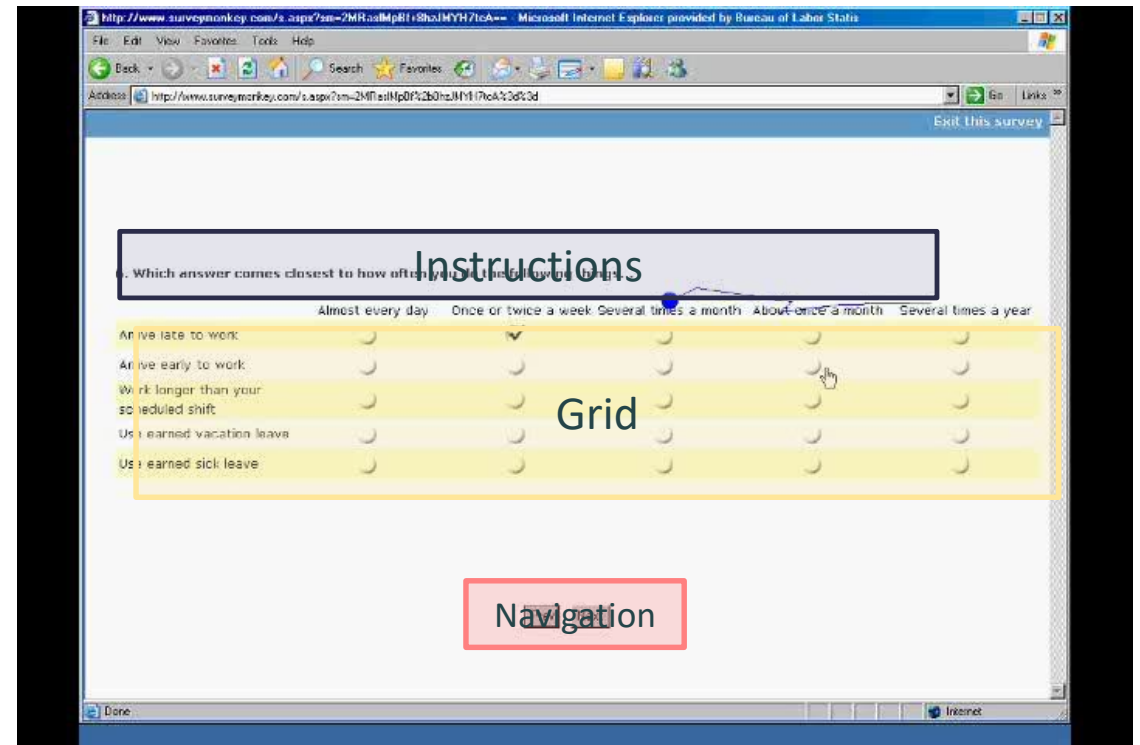
Gaze Replay

Replay session with the eye tracking results overlaid on the content



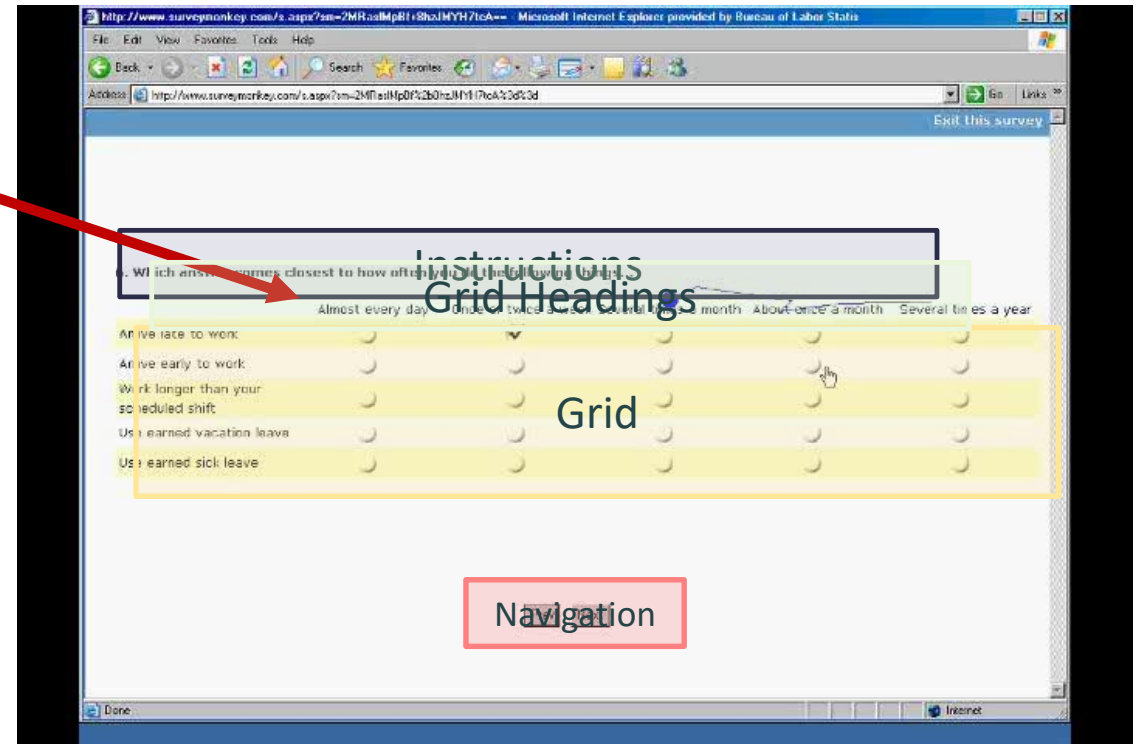
Areas of Interest (AOI)

- Define the target areas and the analyze software will calculate the amount of time spent (total & fixating) in that area
- Useful for analyzing how much time was spent on specific features (e.g., instructions or help screens)
- Can also show the order in which participants looked at AOIs



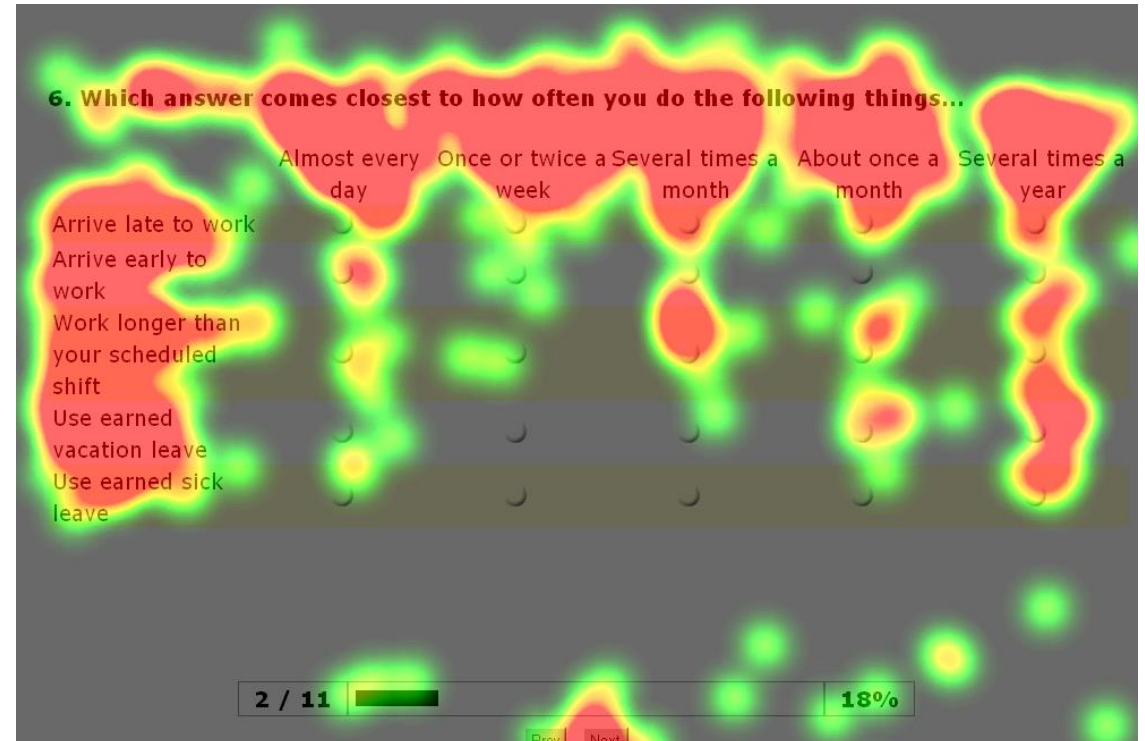
Areas of Interest (AOI): Limitation

- Have to be careful about overlapping or adjacent AOIs
- While calibration ensures the participants' eye movements are tracked in generally the right area, there is always some error (sometimes these errors are systematic)
- Designing layouts to allow for separated AOIs is ideal but not always practical



Heat Maps

- Visualization of the gaze points
- Indicates amount of time fixated in a given area
- Powerful illustration of what the participant did and did not look at



Eye Tracking Limitations

■ Looking \neq Reading \neq Understanding

■ What \neq Why

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