Data Analysis Results

Participant	Fixation count	Average fixation duration	Total dwell time	Viewing Style
P6	988	0.374	456.8	Balanced scanning
P7	830	0.416	466.9	Focused
P8	1005	0.354	436.4	Rapid scanning
P9	873	0.391	442.6	Balanced
P10	962	0.387	471.5	Active scanning
P11	1175	0.313	476.4	Exploratory
P12	1112	0.342	499.2	Exploratory
P13	573	0.637	550.0	Deep-focus
P14	751	0.469	493.2	Focused
P15	809	0.429	470.9	Sustained focus
P16	943	0.395	479.2	Balanced
P17	1001	0.367	468.8	Rapid scanning
P18	969	0.362	473.2	Active scanning
P19	885	0.626	543.7	Deep-focus
P20	907	0.582	526.0	Sustained attention

Above table shows comparison of P6-P20

Participant 1 A/B (21, Male)

Eye-tracking summary

- Fixation count: ~1409
- Average fixation duration: Not specified
- Total dwell time: Not specified

Spatial attention

- Fixations spread across the screen
- Strong cluster focused on the direct centre
- Some attention near screen edges

Viewing behaviour

Participant demonstrated a highly exploratory viewing style with many short fixations, indicating high visual interest and frequent attentional shifts driven by dense colour and detail.

Interview highlights

Participant was strongly drawn to bright, dynamic, and nostalgic visuals, associating colour with emotional engagement and sustained attention. They viewed greyscale and smart glasses positively as tools to reduce overstimulation.

Participant 2 A/B (23, Male)

Eye-tracking summary

- Fixation count: ~1352
- Average fixation duration: Not specified
- Total dwell time: Not specified

Spatial attention

- Primary focus on upper-middle centre
- Some exploration of screen edges

Viewing behaviour

Participant showed frequent fixation shifts with central anchoring, suggesting active scanning influenced by gameplay familiarity rather than colour alone.

Interview highlights

Participant reported engagement driven by familiarity and challenge rather than colour. They expressed cautious openness to screen filters, preferring dimming over full greyscale.

Participant 3 A/B (19, Female)

Eye-tracking summary

- Fixation count: ~954
- Average fixation duration: Longer than other A/B participants
- Total dwell time: Not specified

Spatial attention

- Strong focus on central region
- Minimal edge exploration

Viewing behaviour

Participant demonstrated sustained attention on fewer fixation points, indicating a more focused and deliberate viewing style.

Interview highlights

Participant preferred darker, lower-hue aesthetics and felt vivid visuals increased attentional demand. They expressed ambivalence toward greyscale, suggesting context-dependent usefulness.

Participant 4 A/B (20, Male)

Eye-tracking summary

- Fixation count: ~1225
- Average fixation duration: Short
- Total dwell time: Not specified

Spatial attention

- Central focus with some edge exploration

Viewing behaviour

Participant displayed exploratory scanning with frequent fixation shifts, indicating engagement driven by motion and activity.

Interview highlights

Participant associated bright colours with sustained interest and acknowledged mood shifts across games. They were open to adaptive display technologies.

Participant 5 A/B (25, Female)

Eye-tracking summary

- Fixation count: ~1004
- Average fixation duration: Longer than more exploratory viewers
- Total dwell time: Not specified

Spatial attention

- Strong central focus
- Limited peripheral exploration

Viewing behaviour

Participant showed deeper focus per fixation rather than broad scanning, suggesting sustained attention on fewer visual elements.

Interview highlights

Participant preferred muted or darker palettes and already used greyscale filters to manage distraction. They were positive toward automated display control technologies.

Participant 6 (21, Male)

Eye-tracking summary

- Fixation count: ~988
- Average fixation duration: ~0.374 s
- Total dwell time: ~456.8 s

Spatial attention

- Broad central focus with occasional edge exploration
- Notable left-side bias

Viewing behaviour

Participant demonstrated balanced viewing with many moderately short fixations, indicating steady engagement and continuous scanning.

Interview highlights

Participant preferred darker colour schemes and expressed interest in gradual or app-specific greyscale use, valuing user control.

Participant 7 (18, Male)

Eye-tracking summary

- Fixation count: ~830
- Average fixation duration: ~0.416 s
- Total dwell time: ~466.9 s

Spatial attention

- Upper-central focus with slight left bias
- Occasional edge exploration

Viewing behaviour

Fewer but longer fixations suggest a more focused viewing style with deeper processing rather than broad exploration.

Interview highlights

Participant found split-screen contrast engaging and was open to greyscale as an attention-management tool.

Participant 8 (24, Female)

Eye-tracking summary

- Fixation count: ~1005
- Average fixation duration: ~0.354 s
- Total dwell time: ~436.4 s

Spatial attention

- Central focus with slight left bias

Viewing behaviour

Participant exhibited rapid scanning with frequent gaze shifts, indicating fast-paced engagement with visual elements.

Interview highlights

Participant found bright, nostalgic games emotionally resonant but was uncertain about adopting greyscale in daily use.

Participant 9 (21, Female)

Eye-tracking summary

- Fixation count: ~873
- Average fixation duration: ~0.391 s
- Total dwell time: ~442.6 s

Spatial attention

- Central focus with minimal edge exploration

Viewing behaviour

Participant demonstrated balanced viewing behaviour with stable fixation durations and moderate exploration.

Interview highlights

Participant valued muted palettes and viewed greyscale positively as a way to reduce screen addiction.

Participant 10 (22, Male)

Eye-tracking summary

- Fixation count: ~962
- Average fixation duration: ~0.387 s
- Total dwell time: ~471.5 s

Spatial attention

- Left-central bias with occasional upper-right glances

Viewing behaviour

Participant actively scanned the stimulus while maintaining consistent engagement.

Interview highlights

Participant's attention was driven by motion rather than colour and viewed greyscale as interesting but not motivating.

Participant 11 (22, Female)

Eye-tracking summary

- Fixation count: ~1175
- Average fixation duration: ~0.313 s
- Total dwell time: ~476.4 s

Spatial attention

- Strong focus on left-central region
- Minimal exploration of screen edges

Viewing behaviour

Participant displayed rapid, exploratory scanning with frequent gaze shifts, indicating high perceptual activity and visual engagement.

Interview highlights

Participant described black-and-white visuals as less overwhelming and reported easier detail recognition, expressing tentative interest in display-control technologies.

Participant 12 (20, Female)

Eye-tracking summary

- Fixation count: ~1112
- Average fixation duration: ~0.342 s
- Total dwell time: ~499.2 s

Spatial attention

- Lower-left-central focus with occasional broader exploration

Viewing behaviour

High fixation count with short fixations indicates active exploration and sustained engagement.

Interview highlights

Participant associated bright colours with fun and rejected greyscale for gaming contexts.

Participant 13 (24, Female)

Eye-tracking summary

- Fixation count: ~573
- Average fixation duration: ~0.637 s
- Total dwell time: ~550.0 s

Spatial attention

- Strong focus on centre-left region
- Minimal exploration

Viewing behaviour

Participant demonstrated slow, deliberate viewing with prolonged fixations on fewer elements.

Interview highlights

Participant reported focusing more on the black-and-white side despite preferring colour and rejected greyscale for everyday use.

Participant 14 (24, Female)

Eye-tracking summary

- Fixation count: ~751
- Average fixation duration: ~0.469 s
- Total dwell time: ~493.2 s

Spatial attention

- Broad exploration with left-central emphasis

Viewing behaviour

Participant exhibited fewer gaze shifts and longer fixations, indicating concentrated attention.

Interview highlights

Participant preferred muted visuals and found black-and-white reduced visual s train.

Participant 15 (24, Male)

Eye-tracking summary

- Fixation count: ~809
- Average fixation duration: ~0.429 s
- Total dwell time: ~470.9 s

Spatial attention

- Upper-left-central focus with some edge exploration

Viewing behaviour

Participant showed stable viewing with moderate exploration and deeper fixation periods.

Interview highlights

Participant strongly preferred vibrant colour and was sceptical about greyscale and smart glasses.

Participant 16 (19, Female)

Eye-tracking summary

- Fixation count: ~943
- Average fixation duration: ~0.395 s
- Total dwell time: ~479.2 s

Spatial attention

- Upper-central and upper-right focus

Viewing behaviour

Participant demonstrated balanced exploration and consistent engagement.

Interview highlights

Participant enjoyed fast-paced visuals but was indifferent toward greyscale technologies.

Participant 17 (21, Female)

Eye-tracking summary

- Fixation count: ~1001
- Average fixation duration: ~0.367 s
- Total dwell time: ~468.8 s

Spatial attention

- Broad left-central focus

Viewing behaviour

Quick, active scanning combined with steady attention throughout the session.

Interview highlights

Participant preferred darker aesthetics and expressed strong interest in adaptive smart glasses systems.

Participant 18 (23, Male)

Eye-tracking summary

- Fixation count: ~969
- Average fixation duration: ~0.362 s
- Total dwell time: ~473.2 s

Spatial attention

- Left-central focus with occasional upper-right exploration

Viewing behaviour

Participant demonstrated dynamic viewing with consistent engagement.

Interview highlights

Participant found greyscale unsuitable for games but potentially useful for non-essential apps.

Participant 19 (19, Male)

Eye-tracking summary

- Fixation count: ~885
- Average fixation duration: ~0.626 s
- Total dwell time: ~543.7 s

Spatial attention

- Middle-left focus with occasional edge exploration

Viewing behaviour

Participant showed slow, deliberate viewing with strong sustained engagement.

Interview highlights

Participant viewed greyscale as situationally useful, particularly for studying.

Participant 20 (18, Female)

Eye-tracking summary

- Fixation count: ~907
- Average fixation duration: ~0.582 s
- Total dwell time: ~526.0 s

Spatial attention

- Central-left focus with scattered exploration

Viewing behaviour

Participant demonstrated normal but sustained engagement with slightly longer fixation periods.

Interview highlights

Participant valued vibrant colour and was open to greyscale during high-focus situations such as exams.

Figure 1. Exploratory viewing with strong left-central bias (Participant 11)

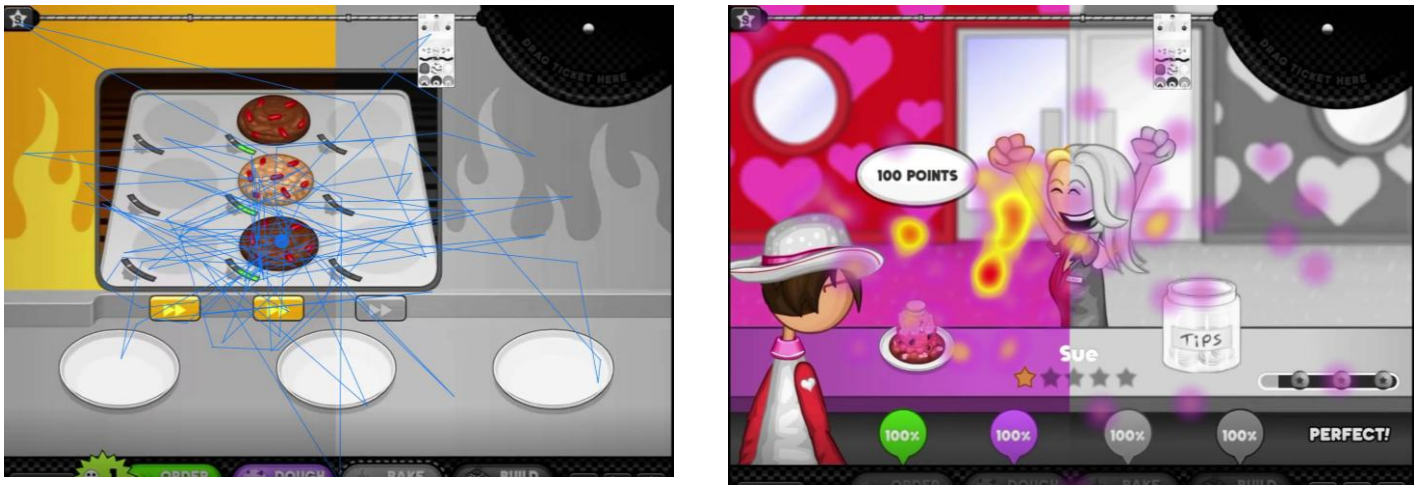


Figure 2. Deep-focus viewing with minimal exploration (Participant 13)

Figure 3. Balanced central viewing pattern (Participant 6)

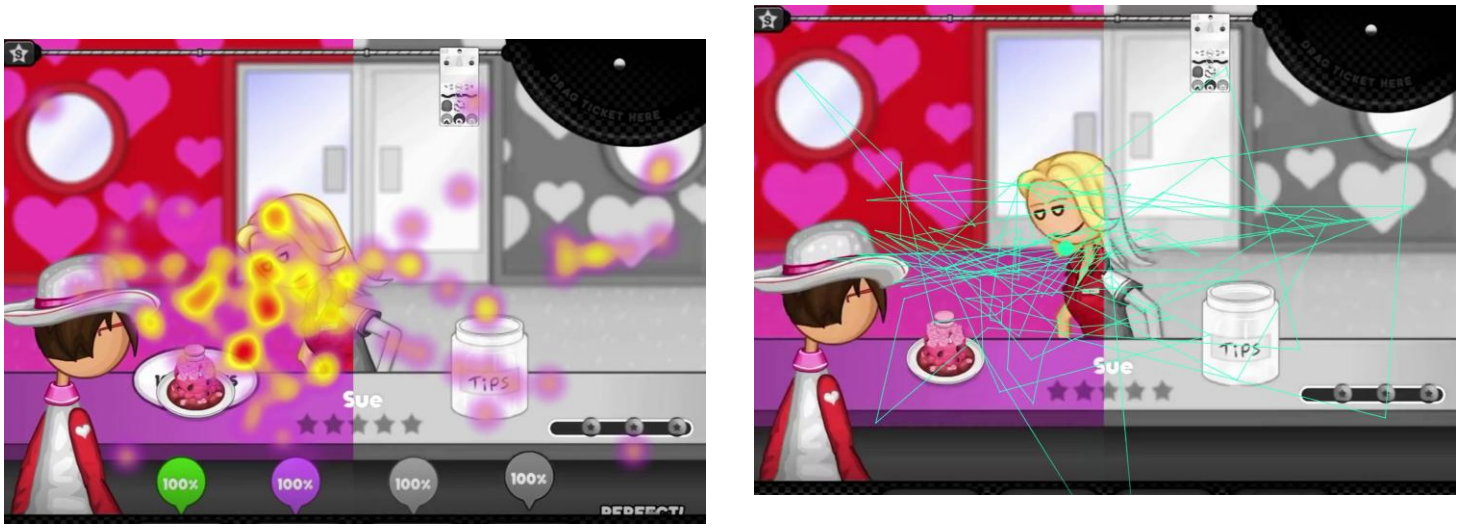


Figure 4. Broad screen exploration (Participant 14)

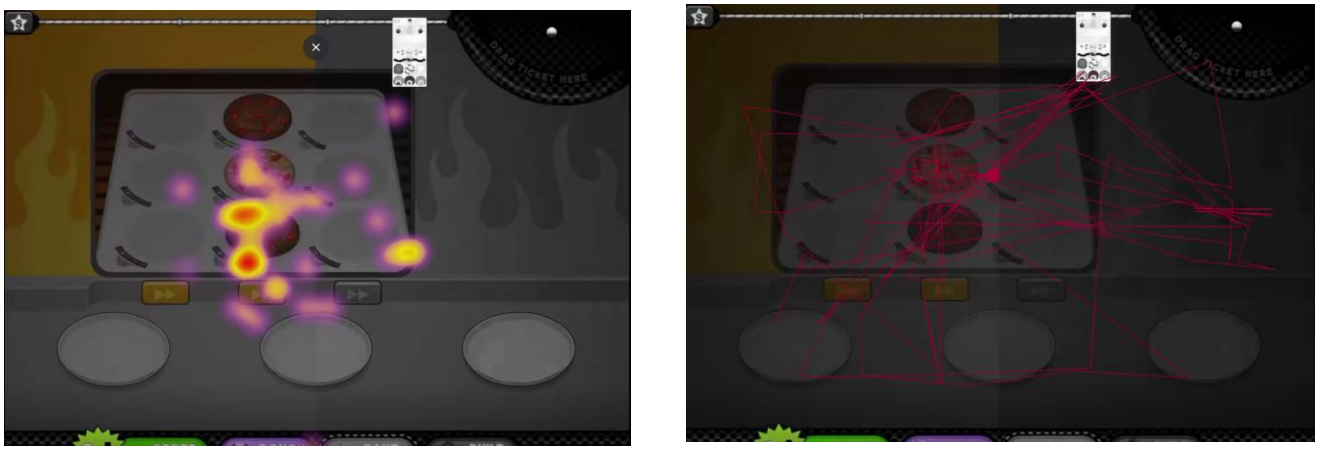
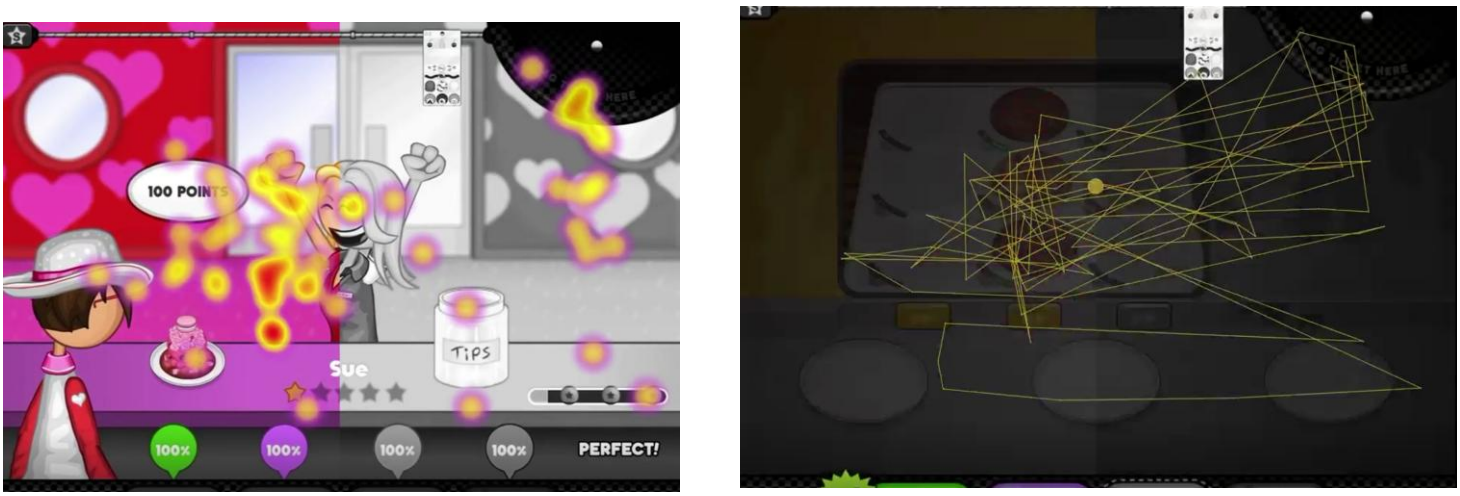


Figure 5. Sustained attention with longer fixation durations (Participant 20)



Cross-Participant Summary

Across both A/B participants and Participants 6-20, eye-tracking data revealed consistent attentional patterns alongside substantial individual variation in viewing strategy.

A/B participants

Within the A/B group, all participants demonstrated a strong central focus. Male participants showed higher fixation counts and broader spatial exploration, frequently reaching the edges of the screen, whereas female participants produced fewer fixation points and concentrated more heavily on central regions. Female fixation counts ranged approximately between 950-1005, while male fixation counts ranged between 1225-1410.

Viewing styles (Participants 6-20)

Fixation counts varied widely across Participants 6-20, ranging from very low (approximately 573 fixations) to very high (approximately 1175 fixations). This variation reflected two dominant viewing styles:

- **Exploratory viewing**, characterised by high fixation counts and shorter fixation durations, indicating rapid scanning and frequent gaze shifts.
- **Deep-focus viewing**, characterised by fewer fixations combined with longer fixation durations, indicating sustained attention on fewer visual elements.

Participants with higher fixation counts (e.g. P11, P12, P17, P6, P10, P18) demonstrated active scanning behaviour and fast perceptual processing. In contrast, participants with lower fixation counts (e.g. P13, P14, P15, P19) showed longer fixation durations, suggesting more deliberate and concentrated viewing.

Fixation duration patterns further reinforced this split, with some participants showing very short fixation durations associated with rapid perceptual turnover, and others exhibiting notably long fixation durations indicative of slower, sustained attention. Despite these differences, total dwell time remained consistently high across almost all participants (typically between 440 and 520 seconds), indicating strong and continuous engagement with the video stimuli.

Spatial attention patterns

Bee Swarm and Heat Map visualisations revealed a pronounced spatial bias across the dataset. Most participants focused heavily on central or central-left regions of the screen, with limited exploration of extreme edges, particularly the bottom and far-right areas. Many participants repeatedly returned to left-central regions, indicating a consistent left-side attentional bias.

A smaller number of participants maintained a more symmetrical central focus, while a few demonstrated broader exploration; however, even these patterns remained anchored around central or upper-central regions. Heat Maps reinforced these findings, with strong, recurring hotspots in central-left areas and minimal fixation density at the periphery. Overall, viewing behaviour remained stable and within expected norms for dynamic visual content, with no evidence of erratic gaze paths or disengagement.

Gender patterns and statistical analysis

Although descriptive trends suggested that male participants tended to show higher fixation counts and broader exploration, while female participants often exhibited longer fixation durations and more sustained attention on fewer points, statistical testing revealed no significant gender differences in fixation count, fixation duration, or total dwell time. Observed gender-related patterns therefore appear attributable to individual variation rather than systematic effects.

To contextualise fixation behaviour, participants' average fixation duration was compared against an established benchmark for naturalistic video viewing (330 ms). The mean fixation duration across Participants 6-20 was significantly higher than this benchmark, indicating generally prolonged fixation durations and suggesting heightened or sustained visual attention elicited by the stimuli.

Interview alignment

Interview responses reflected substantial individual differences in attentional preferences. Participants' experiences broadly clustered around stimulation-oriented strategies (e.g. preference for bright colour, motion, and nostalgia) and regulation-oriented strategies (e.g. preference for muted palettes, black-and-white visuals, and reduced visual load). These qualitative patterns closely aligned with eye-tracking results, illustrating how subjective strategies of engagement and attention regulation were reflected in observable viewing behaviour. The majority of participants expressed openness to experimenting with greyscale or adaptive display technologies, particularly in contexts requiring focus or reduced overstimulation.