ISSN 2616-7433 Vol. 7, Issue 7: 91-96, DOI: 10.25236/FSST.2025.070714

Visual Attention to Homosexual Stimuli: Effects of Presentation Type and Character's Gender

Hu Jinyan

Shanghai Starriver Bilingual School, Shanghai, China, 201108

Abstract: *Sexual minorities refer to individuals whose sexual orientation, gender identity, gender expression, or sexual behavior differ from the societal majority. Among these groups, homosexual individuals constitute the major proportion. The global population of homosexual individuals has exceeded 100 million. Despite their large number, this community continues to experience discrimination in both work and life. However, this fact is in sharp contrast to the popularity of homosexual themes in the virtual world such as comics, animation, and novels. The present study aims to investigate differences in people's attitude toward real homosexual individuals versus animated homosexual characters. Meanwhile it also explores the moderating role of the individual's gender. Images of animated characters and real-world individuals were used as visual stimuli, including homosexual couples and same-gender friends. The eye-tracking technology was introduced to record participants' gaze trajectories while viewing these images. Gaze patterns could serve as indicators of attentional bias and underlying psychological processes. The results revealed that both sexual orientation and the character's gender significantly influenced participants' visual attention. Images of lesbian couples got significantly longer first fixation duration. The potential mechanism is lesbian identity tends to be sexualized in patriarchal society. Moreover, the image type (animated vs. real-world) affected the speed of attention orientation. Participants fixated more rapidly to real-world homosexual couples, whether lesbian or gay. The corresponding fact suggests people may have implicit bias towards homosexual individuals. At the same time, real-world scenarios are considered as "high-risk" stimuli. Overall, this study sheds light on early-stage attentional responses toward homosexual individuals and offers potential methods for developing innovative anti-discrimination interventions through the use of animated representations.*

Keywords: *Animation; LGBTQ+; Homosexuality; Eye-tracking; Gender; Lesbian; Gay*

1. Introduction

The sexual minority group (LGBTQ+) includes gay, bisexual, transgender, queer, and other individuals who are not heterosexual or cisgender. Among them, homosexual individuals are the majority in the LGBTQ+ community. Data across 30 countries indicates that over 100 million adults identify themselves as lesbian or gay[1]. However, this big group continues to experience overt or covert discrimination in either work or daily life. According to the 2023 ILGA report, 64% of countries worldwide still lack legal protections against discrimination based on sexual orientation[2]. In 2021, China's National Radio and Television Administration explicitly categorized "homosexual themes" as unhealthy content and prohibited the broadcast of relevant films or TV series[3]. Such regulations not only constrain creative narratives in films and TV series, but also reinforce the implicit social norm that homosexual relationships are undesirable. This would exacerbate social exclusion and bias.

In contrast to this real-world marginalization, virtual homosexual-theme works are pretty popular. For instance, the renowned Chinese gay romance novel The Grandmaster of Demonic Cultivation has achieved over one billion total views. Its animated adaptation has exceeded two billion views. At the same time, related social media topics have accumulated over 40 billion views[4]. Beyond China, Japan and the broader global anime and manga industries have similarly witnessed an explosive rise in homosexual themes. The Japanese manga Given, which centers on gay relationships, has sold over five million copies domestically, and the digital version has attracted over 140 million global views [5]. In the United States, sales of books categorized under gay literature exceeded 2.7 million copies which makes an 18% year-over-year increase[6].

The persistent rejection of homosexuality in the real world is significantly different to the high popularity of similar content in the virtual world of anime, manga, and fiction. Previous studies have

ISSN 2616-7433 Vol. 7, Issue 7: 91-96, DOI: 10.25236/FSST.2025.070714

discussed from various angels such as narrative style, social attitudes, and censorship[7][8][9][10][11]. However, few studies have directly compared people's attitudes toward homosexual partners across different representational formats—i.e. animated versus real-world depictions. To address this gap, this study uses presentation style as the core independent variable. By leveraging eye-tracking technology, it investigates how presentation format modulates individuals' attentional patterns toward homosexual couples. Eye-tracking results could thereby reveal implicit attitude. Furthermore, the study introduces the character's gender (female vs. male) as an additional variable to explore whether gender influences people's attention bias and implicit attitude. This design provides controlled visual parameters in a cross-over framework of presentation style and the character's gender. It offers an empirical approach to understand people's implicit attitude between real-world and animated contexts via visual attention pattern. The findings could make contributions to develop more subtle and accessible anti-discrimination interventions by leveraging animated representations.

2. Method

2.1. Participants

This experiment recruited participants at a shopping mall in Shanghai. There were 23 individuals in total (*M=31.26, SD=8.10*). 14 of the participants were females and 9 were males. Before the experiment, each participant was informed of the general procedure and potential risks of the eye-tracking experiment. All participants voluntarily agreed to participate and signed the consent form.

2.2. Stimuli

The images used in the experiment consisted of 80 images. Each image depicts two individuals of the same gender. The images contained three variables: image presentation type, relationship between individuals, and gender of individuals. Images were categorized into two presentation types: the real-world individual images (3W) and the animated individual images (2W). For the relationship variable, half of the images depicted same-gender friends maintaining social distance; the other half showed homosexual couples with proper and comparatively intimate poses. On the gender dimension, images were classified as female or male. Based on these variables, the 80 images were grouped into eight categories: 2W Gay (2G), 2W Lesbian (2L), 2W Male Friends (2MF), 2W Female Friends (2FF), 3W Gay (3G), 3W Lesbian (3L), 3W Male Friends (3MF), and 3W Female Friends (3FF). Each category has 10 images. Two images will be presented side by side on the screen as a set. The two images in the same set are in the same presentation type (anime or real world) and the same character gender (female or male). One image is a homosexual partner, while the other showed same-gender friends. Their left/right positions were randomized. The 80 images generated 40 experimental material sets.

2.3. Design and procedure

Participants (N = 23) first signed the consent form. Each participant was seated in front of a monitor connected to a laptop equipped with a Tobii 4C Pro eye tracker. After completing a standard five-point calibration procedure, the formal experiment began. A fixation point—a black dot centered on the screen—was presented first to help participants align their gaze. The dot remained visible for approximately 300 milliseconds. The experimental materials were then presented. Each image pair was displayed for 5 seconds. Each combination of the fixation point and image pair constituted one trial. The eye tracker continuously recorded participants' gaze behavior throughout the entire session. The overall experiment lasted five to ten minutes. After the experiment, each participant received a small gift for appreciation.

Areas of Interest (AOIs) were defined as each individual image within the experimental stimuli, resulting in a total of 80 AOIs across the experiment. Four key eye-tracking metrics were selected for analysis: Total Fixation Duration (TFD), Fixation Count (FC), First Fixation Duration (FFD), and Time to First Fixation (TFF). This experiment used a within-subject design. After all sessions completed, eye-tracking data based on the AOI regions were exported for subsequent statistical analysis.

2.4. Data analysis

The exported raw data were categorized into eighteen datasets for subsequent analysis: Homosexual

ISSN 2616-7433 Vol. 7, Issue 7: 91-96, DOI: 10.25236/FSST.2025.070714

Couples (T) vs. Same-Gender Friends (F); 2W Homosexual Couples (2T) vs. 2W Same-Gender Friends (2F); 3W Homosexual Couples (3T) vs. 3W Same-Gender Friends (3F); Gay Couples (G) vs. Male Friends (MF); Lesbian Couples (L) vs. Female Friends (FF); 2W Gay Couples (2G) vs. 2W Male Friends (2MF); 2W Lesbian Couples (2L) vs. 2W Female Friends (2FF); 3W Gay Couples (3G) vs. 3W Male Friends (3MF); and 3W Lesbian Couples (3L) vs. 3W Female Friends (3FF).

To examine people's attention patterns toward the homosexual community, a two-sample T-test was conducted to compare Homosexual Couples (T) and Same-Gender Friends (F). To assess potential differences in people's attention across different presentation types, additional T-tests were conducted for 2T vs. 2F and 3T vs. 3F. Furthermore, to investigate the influence of gender on people's attention patterns, T-tests were performed comparing lesbian couples vs female friends and gay couples vs male friends.

3. Results

3.1. T-test between homosexual couples (T) and same-gender friends (F)

Independent-sample T-tests for Total Fixation Duration (TFD) and Fixation Count (FC) revealed no significant differences between Homosexual Couples (T) and Same-Gender Friends (F) ($p > .05$). As shown in Table 1, the T-test for First Fixation Duration (FFD) indicated that participants' FFD for T ($M = 0.24$, $SD = 0.07$) was significantly higher ($p < .05$) than for F ($M = 0.20$, $SD = 0.04$). For Time to First Fixation (TFF), results showed that participants' TFF for T ($M = 0.64$, $SD = 0.37$) was significantly lower ($p < .05$) than for F ($M = 0.90$, $SD = 0.46$).

3.2. T-test for 2W and 3W images

Independent-sample T-*tests* for Total Fixation Duration (TFD) and Fixation Count (FC) revealed no significant differences ($p > .05$). As shown in Table 1, T-tests for First Fixation Duration (FFD) indicated that participants' FFD for 2T ($M = 0.25$, $SD = 0.10$) was significantly higher ($p < .05$) than for 2F ($M = 0.19$, $SD = 0.03$). Similarly, participants' FFD for 3T (M = 0.23, SD = 0.07) was significantly higher than for 3F (M = 0.20, SD = 0.06), $p < .05$. For Time to First Fixation (TFF), T-test results showed no significant difference between 2T and 2F ($p > .05$). However, participants' TFF for 3T ($M = 0.52$, $SD = 0.28$) was significantly lower ($p < .05$) than for 3F ($M = 0.88$, $SD = 0.42$).

3.3. T-test for female and male images

Independent-sample T-tests for Total Fixation Duration (TFD) and Fixation Count (FC) revealed no significant difference ($P>.05$).

As shown in Table 2, the T-test for First Fixation Duration (FFD) indicated that participants' FFD for Lesbian Couples (L; $M = 0.27$, $SD = 0.12$) was significantly higher ($p < .05$) than for Female Friends (FF; $M = 0.20$, $SD = 0.04$). No significant difference ($p>.05$) was found between Gay Couples (G) and Male Friends (MF). Further analyses revealed that participants' FFD for 2W Lesbian Couples (2L; $M = 0.28$, $SD = 0.15$) was significantly higher ($p < .05$) than for 2W Female Friends (2FF; $M = 0.21$, $SD = 0.05$). FFD for 3W Lesbian Couples (3L; M = 0.27, SD = 0.12) was also significantly higher ($p < .05$) than for 3W Female Friends (*3FF; M = 0.19, SD = 0.08*). However, no significant differences were observed between 2W Gay Couples (2G) and 2W Male Friends (2MF), nor between 3W Gay Couples (3G) and 3W Male Friends (3MF) ($p > .05$).

For Time to First Fixation (TFF), the T-test revealed that participants' TFF for G ($M = 0.61$, $SD = 0.39$) was significantly shorter ($p < .05$) than for MF ($M = 0.93$, $SD = 0.43$). Although TFF for L ($M = 0.67$, $SD = 0.41$) did not differ significantly from that for FF ($M = 0.87$, $SD = 0.53$), the difference approached statistical significance ($p = .08$). Further analysis indicated that participants' TFF for 3L ($M = 0.56$, $SD = 0.40$) was significantly shorter ($p < .05$) than for 3FF ($M = 0.84$, $SD = 0.54$). TFF for 3G ($M = 0.48$, $SD = 0.26$) was significantly shorter ($p < .05$) than for 3MF ($M = 0.93$, $SD = 0.47$). In contrast, no significant TFF difference was found in the 2W images between 2L and 2FF or between 2G and 2MF ($p > .05$).

ISSN 2616-7433 Vol. 7, Issue 7: 91-96, DOI: 10.25236/FSST.2025.070714

Table 1: FFD and TFF results

	Homosexual couples (T/G/L)		Same-gender friends (F/MF/FF)	
	FFD(s)	TFF(s)	FFD(s)	TFF(s)
Total	0.24	0.64	0.20	0.90
2W Total	0.25	0.76	0.19	0.91
3W Total	0.23	0.52	0.20	0.88
Male Total	0.21	0.61	0.19	0.93
Female Total	0.27	0.67	0.20	0.87

Table 2: FFD and TFF for Male, Female, 2W and 3W

		Homosexual couple (T/G/L)		Same-gender friend (F/MF/FF)	
		FFD(s)	TFF(s)	FFD(s)	TFF(s)
Male	2W	0.22	0.74	0.18	0.93
	3W	0.20	0.48	0.20	0.93
Female	2W	0.28	0.78	0.20	0.90
	3W	0.27	0.56	0.19	0.84

4. Discussion

This study introduced eye-tracking technology to investigate how presentation type and characters' gender influence people's visual attention patterns toward homosexual groups. Data analysis revealed that the total fixation duration (TFD) and fixation count (FC) did not show statistical difference across different groups. However, the FFD for homosexual couples was significantly influenced by the characters' gender. Compared to female friends, higher FFD was observed for lesbian couples. Furthermore, the presentation type significantly affected people's attention toward homosexual individuals. In 3W images, the participants showed significantly faster TFF toward real world homosexual couples, either lesbian or gay couples. Whereas such difference wasn't observed in animation images.

FFD (first fixation duration) reflects the individual's "motivation-emotional evaluation" stage which is jointly moderated by emotional salience and motivational relevance[[12][13]14]. This study found that lesbian images triggered higher FFD among the participants. This occurs because lesbian images carry dual attributes of "female" and "homosexual"which make them more susceptible to be sexualized, and objectified in patriarchal societies[15]. Gervais[16] found that when images depicted two women with overlapping bodies, male participants' gaze concentrated significantly more on the chest and hip region compared to images featuring man and woman, or two men. A study of media suggests that lesbians in film and TV series are often "de-authenticated". Their intimate relationships are simplified into projections of male characters' desires[17]. Thus, lesbian imagery, as sexual stimuli, carries high emotional arousal. It could activate attention in early stage which is shown as longer FFD. In contrast, gay in popular culture are often "de-sexualized" or "neutralized". In anime/manga, they are frequently depicted as "beautiful boys"[18]. In real life, they are often categorized as "more than friends"[19]. These ambiguous representations diminish their emotional arousal and sexual salience. Hence male homosexual images failed to trigger the activation during the early stages of attention.

TFF (time to first fixation) reflects the speed of attentional orientation which is primarily driven by stimulus salience. This study found that the participants exhibited significantly accelerated attentional orientation toward the real-world homosexual-couple images. This acceleration reflects the public's implicit tendency to perceive homosexual intimacy as "high-risk". Past research demonstrates that while the public's overt attitudes toward homosexuality appear relatively tolerant, their implicit attitudes could still be negative. This implicit rejection can be detected during the early stage of attention[19]. In other words, influenced by implicit discrimination, homosexual information is inherently perceived as threatening stimuli. At the same time, the realistic photographs possess greater ecological validity, more authentic emotional expression, and richer social cues. These traits could easily activate social cognition and emotional resonance mechanisms. In contrast, animated images, characterized by simplified lines and symbolic emotional cues, exhibit reduced emotional salience. It makes animated images more difficult to induce this effect[20]. Another study similarly compared realistic vs. animated videos depicting same-gender individuals kissing. It found participants' TFF was 42 ms faster under the 3W condition[21]. Studies by Hanslmayr[22] and Sun[23] also demonstrated that when both image presentation types were strictly matched for brightness, contrast, and spatial

ISSN 2616-7433 Vol. 7, Issue 7: 91-96, DOI: 10.25236/FSST.2025.070714

frequency, realistic images still held a significant advantage over the line art in TFF. The animation mitigates this threat perception, whereas real-person images amplify it through authentic expression. It ultimately leads to the corresponding visual attention behaviors.

Total Fixation Duration (TFD) and Fixation Count (FC) showed no significant difference across all dimensions. The potential reason is that TFD and FC reflect the late maintenance phase of attention rather than the early orienting stage. In the present study, participants engaged in free viewing without specific task instructions. Under these conditions, images of homosexual couples and same-gender friends were equally "subsequently available" and participants did not allocate additional attentional resources to either category[24]. In contrast, the early attentional differences observed in TFF and FFD were driven primarily by emotional and stimulus salience. TFD and FC represent late-stage attentional maintenance. They are more influenced by higher-order task goals and cognitive value[23]. This explains the lack of significant differences. This pattern aligns with prior research. Liu (2021) found no significant differences in TFD or FC across three image categories—heterosexual couples, gay couples, and male friends—under free-viewing conditions. Differences in TFD and FC only appear when task goals were introduced. For example, labelling images of same-gender individuals as "your future partner" or "your friends" would result in a 20–40% increase in TFD and a 15–25% increase in FC[25] .

This study successfully distinguished early attention (TFF/FFD) from late attention (TFD/FC) processing stages under a free-viewing paradigm. The results reveal how image presentation type and characters' gender influence people's attention toward homosexual individuals. Several limitations remain to be improved. First, the participants' sexual orientation was not reported. Therefore, the contributions of "sexual interest" and "group relevance" to eye-tracking outcomes could not be separated. Future research could further evaluate the impact of sexual orientation to provide a more comprehensive understanding. Second, the study materials were static images and did not incorporate dynamic interactions. Vocal intonations, or other authentic social cues may also influence people's gaze. Future studies could further explore how media ecological factors moderate attentional responses. Finally, this study compared homosexual couples with same-gender friends. More investigations could be conducted to compare between homosexual and heterosexual couples. Such contrasts may yield additional insights.

5. Conclusion

This study leveraged eye-tracking technology under free-viewing conditions to investigate how image presentation types and the characters' gender influence people's attention bias toward the homosexual individuals. Data analysis revealed that presentation format and the characters' gender did not affect the late attention stage. Since there was no difference in TFD and FC. However, both factors influenced the early attention. Lesbian images got higher FFD. Meanwhile, shorter TFF suggests that the real-world lesbian and gay images triggered stronger attention-directing acceleration. This study successfully clarifies the millisecond-level temporal threshold for people's attention bias toward homosexual stimuli which confirms the independent modulation of attention by presentation types and the characters' gender. The findings demonstrate that animated symbolic images do not induce early emotional arousal. It could be a potential method for anti-discrimination education which has low threats and is easy to be accepted.

References

[1] Ipsos. (2021). LGBT+ Pride 2021 Global Survey. Ipsos Global Advisor. https://www.ipsos.com/sites/default/files/ct/news/documents/2021-06/LGBT%20Pride%202021%20Global%20Survey%20Report_3.pdf

[2] ILGA. (2023). State-sponsored homophobia report.

[3] NRTA. (2021, December 15). Detailed standards for online short video content review. National Radio and Television Administration.https://www.nrta.gov.cn/art/2021/12/15/art_113_58926.html

[4] Wen, J., Jin, H., & Rong, J. (2020). 2019 Film & TV IP Drama Fan Economy Research Report: Exploring the Factors Influencing IP Drama Impact and Monetization (Research Report No. 15, Issue 96). Tsinghua University PBC School of Finance.

[5] Given (manga). (2023). Sales & reception data. Fandom. https://given.fandom.com/wiki/Given_(manga)

[6] Resetera. (2023). US Manga Sales 2022 (BookScan report). https://www.resetera.com/threads/us-manga-sales-2022-bookscan-report-top-54-best-selling-mangaka

ISSN 2616-7433 Vol. 7, Issue 7: 91-96, DOI: 10.25236/FSST.2025.070714

s-top-458-best-selling-manga-volumes-and-more.705569/
[7] Bärthlein, L. (2022). The Presentation of Bisexual Characters in TV Shows and How It Affects the Viewer's Attitude Change Toward Bisexuals. University of Twente. https://essay.utwente.nl/81823/1/Bärthlein_BA_BMS.pdf
[8] Global Media Journal. (2023). Evolving Media Coverage on Transgender Individuals: A Step towards Inclusivity. https://www.globalmediajournal.com/open-access/evolving-media-coverage-on-transgender-individuals-a-step-towards-inclusivity.pdf
[9] AWARE. (2021). An Omnibus on Gender Equality. https://www.aware.org.sg/wp-content/uploads/AWARE-Report-July-2021-An-Omnibus-on-Gender-Equality.pdf
[10] Fan Ruiyi. (2014). News Presentation of the LGBTQ+ Community on Weibo in the New Media Era—— A Case Study of Sina Weibo. (Doctoral Dissertation, Southwest University of Political Science and Law).
[11] Trivette, N. (2023). Won't Somebody Think of the (Queer) Children?! Changing Representations of and Media Reactions to Same-Sex Attraction and Queer Relationships in British Teen Television, 1994 and 2019. University of Birmingham. https://www.diva-portal.org/smash/get/diva2:1847156/FULLTEXT01.pdf
[12] Hickey, C., & Peelen, M. V. (2015). Neural mechanisms of incentive salience in naturalistic human vision. Neuron, 85(3), 512–523. https://doi.org/10.1016/j.neuron.2014.12.049
[13] Schütz, A. C., Braun, D. I., & Gegenfurtner, K. R. (2019). Eye movements and perception: A selective review. Journal of Vision, 19(5), 1–23. https://doi.org/10.1167/19.5.15
[14] Kissler, J., Keil, A., & Moratti, S. (2020). Rapid visual processing of affective stimuli: The impact of TMS on early eye fixations. Psychophysiology, 57(4), e13542. https://doi.org/10.1111/psyp.13542
[15] Ward, J. (2016). The cultural politics of female sexuality in South Africa. Routledge.
[16] Gervais, S. J., Holland, A. M., & Dodd, M. D. (2018). My eyes are up here: The effects of sexualized imagery on visual attention in women and men. Sex Roles, 79(5-6), 316–328. https://doi.org/10.1007/s11199-017-0850-0
[17] Walters, S. D. (2014). The tolerance trap: How God, genes, and good intentions are sabotaging gay equality. NYU Press.
[18] Zang, Y. (2022). Beautiful boys without sex: Aesthetic desexualization in Japanese commercial BL anime. Journal of Gender Studies, 31(2), 147–159. https://doi.org/10.1080/09589236.2021.1959592
[19] Liu, T., & Zhang, Q. (2021). Bromance or romance? Desexualized gay representation in Chinese youth films. Sexuality & Culture, 25(4), 1423–1442. https://doi.org/10.1007/s12119-021-09834-9
[20] Vuilleumier, P. (2005). How brains beware: Neural mechanisms of emotional attention. Trends in Cognitive Sciences, 9(12), 585–594.
[21] Mühlenbeck, C., & Jaeger, B. (2020). Realistic vs. stylized affective images: Early EEG and eye-movement evidence. Biological Psychology, 156, 107960. https://doi.org/10.1016/j.biopsycho.2020.107960
[22] Hanslmayr, S., & Mühlenbeck, C. (2021). Matching affective images: SHINE-based control of low-level features and its impact on early eye movements. Behavior Research Methods, 53(2), 671–686. https://doi.org/10.3758/s13428-020-01452-9
[23] Sun, Y., Wang, Y., & Zhang, Q. (2022). Stylization reduces affective salience: Evidence from ERP and eye-tracking. Journal of Vision, 22(3), 1–14. https://doi.org/10.1167/jov.22.3.14
[24] Henderson, J. M. (2008). Eye movements during scene viewing: Evidence for mixed control of fixation durations. Psychonomic Bulletin & Review, 15(3), 566–573. https://doi.org/10.3758/PBR.15.3.566
[25] Keefe, B. D., Dzhelyova, M., Perrett, D. I., & Barraclough, N. E. (2021). Adaptive face coding is enhanced by increasing the motivational relevance of faces. Vision, 5(2), 24. https://doi.org/10.3390/vision5020024