

UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

Objectifying Gaze: an empirical study with non-sexualized images

Permalink

<https://escholarship.org/uc/item/3xw0n5jb>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 46(0)

Authors

agrawal, ayushi kumari

BHUPATHIRAJU, SRIJA KRISHNA

Vemuri, Kavita

Publication Date

2024

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at <https://creativecommons.org/licenses/by/4.0/>

Peer reviewed

Objectifying Gaze: an empirical study with non-sexualized images

Ayushi Agrawal (ayushi.a@research.iiit.ac.in)
Cognitive Science Lab, IIIT-H, Telangana, 500032, India

Srija Bhupathiraju (srija.bhupathiraju@research.iiit.ac.in)
Cognitive Science Lab, IIIT-H, Telangana, 500032, India

Kavita Vemuri (kvemuri@research.iiit.ac.in)
Cognitive Science Lab, IIIT-H, Telangana, 500032, India

Abstract

Empirical investigations demonstrate similar cognitive processing patterns for objects and sexualized women. However, sexual objectification (SO) extends beyond sexualized women. To explore SO, we apply eye-tracking technique in conjunction with local/global and body-inversion paradigms. Ninety-four college students participated in the study. The visual gaze on non-sexualized South-Asian wo(men) images and the response time in Navon task post-priming with upright and inverted images is analyzed. Results indicate that participants of both genders gaze objectify females. Interestingly, male images are also gaze objectified. A comparison of attention allocation to face versus sexual body parts in upright versus inverted female images shows a reduced face-to-body ratio for the latter orientation, indicating a gender-specific attention shift. Combining the two SO theories, the study objectively substantiates the claim that women undergo objectification in even in non-sexual attire.

Keywords: Sexual Objectification; Non-sexualized images; Local/Global processing; Body Inversion; Navon letter recognition task

Introduction

The assessment of women through a sexualised lens starts with gaze, a pervasive yet subtle act involving the visual inspection of the body (Himashree, 2014; Kaschak, 1992; Siddiqi, 2020). While some may argue that visual gaze is a benign process applied to extract information about body parts, this argument holds validity provided the person under scrutiny does not experience discomfort and invasion of privacy. A gaze directed at a person's sexual body (SB) parts is a form of sexual objectification (SO), where a woman's body or sexual functions, irrespective of her gender, are detached from her personhood, reduced to mere instruments, or seen as representatives of her (Bartky, 1990; Langton, 2009). A growing body of research suggests that sexually objectified women are not only viewed as objects at a behavioural level but also processed similar to objects at the sub-conscious level (Bernard, Gervais & Klein, 2018).

Skimpy (revealing) attire is often held accountable for sexual objectification (SO) and harassment, suggesting women are responsible for men's objectifying behavior (Bhattacharya, 2015; Roy & Bailey, 2021). However, even when dressed modestly, women face unwarranted scrutiny and touching in public and office settings. This challenges the

notion that body concealment reduces gaze, as suggested by Pazhoohi et al. (2017), though criticized for a small sample size. The belief that fully covering a woman's body in public reduces objectification can also be seen as a form of objectification, depriving her of agency and reducing her to an object for family honor or attracting mates. Our study substantiates that women endure gaze objectification even when fully clothed. Despite the belief that only women in revealing attire are sexually objectified, women experience SO regardless of attire, race, or ethnicity, with the extent influenced by sexualization (Gray et al., 2011; Gurung & Chrouser, 2007; Hollett et al., 2021; Kellie, Blake & Brooks, 2019; Tyler, Calogero & Adams, 2017). Cultural and social factors play a significant role in defining sexualized appearance. Women's societal worth is often linked to their appearance, including attire, sometimes overshadowing their abilities (Jeffreys, 2014; Wolf, 1992; Butkowski et al., 2020; Miles-McLean et al., 2015; Sherman, Allemand & Prickett, 2020). This focus on appearance can dehumanize women, viewing them in animalistic and mechanistic terms (Gervais et al., 2012; Heflick & Goldenberg, 2009; Heflick et al., 2011; Loughnan et al., 2010; Smith et al., 2018; Vaes et al., 2019). In Indian public spaces, females often face early and pervasive sexual harassment, limiting their freedom and opportunities compared to males (Bhattacharya, 2015; Roy & Bailey, 2021).

The SO theory proposed by (Fredrickson & Roberts, 1997) pertains to dehumanization (Haslam, 2006) of women in interpersonal (Henley, 1977; Holland et al., 2017; Johnson & Bennett, 2015) relations and social encounters portrayed in media. Dehumanisation is omnipresent in multimedia (Calogero, 2010; Davis, 2018; Ward, 2016; Drenten, Gurrieri & Tyler, 2020; Galdi & Guizzo, 2021; Guizzo & Cadinu, 2021; Hanna et al., 2017; Jha & Pallavi, 2014; Karsay, Knoll & Matthes, 2018; Plieger et al., 2021) wherein the camera lens focuses on body parts thereby 'forcing' sexual gaze.

To gauge objectification, methods integrate objectification theory with cognitive psychology, which posits that person perception involves holistic (global) processing (Maurer & Mondloch, 2002), while object perception involves analytical (local) processing. Studies utilizing the part-whole paradigm (Förster, Liberman & Kuschel, 2008; Gervais et al., 2012) have demonstrated biased recognition in local versus global processing indicating higher focus on SB parts. That is, suggesting object-like local processing of sexualized women

(Bernard et al., 2018; Bernard, Gervais, Klein, 2018) than non-sexualised individuals. While other factors beyond local/global processing have been inferred to contribute to this effect (Valentine, 1988; Arizpe et al., 2017; Yovel, Pelc & Lubetzky, 2010; Zogmaister et al., 2020). Another measure of objectification is the body inversion paradigm (Bernard et al., 2012) claiming that sexualized women but not men are visually processed like objects, though arguments attribute it to the stimuli type (Zogmaister et al., 2020), body asymmetry and structural complexity (Tarr, 2013; Schmidt & Kistemaker, 2015) or higher attention to a female leading to better recognition accuracies (Gauthier & Tarr, 1999) as other possible factors. Later, Cogoni et al. (2018) tested the core assumption of sexualised body-inversion hypothesis (SBIH) and investigated the role of visual properties (asymmetry) of the stimuli in inversion effect.

Research on SO primarily focuses on Western perceptions with limited exploration in other cultures (Rad, 2016; Anderson et al., 2018; Wollast et al., 2018). Addressing this gap, our study focuses on SO of women in the Indian sub-continent, highlighted by media studies in recent years (Dwivedi, 2017; Slatewala, 2019; Jain et al., 2019).

Scope of the Present Study

Our study investigates SO in the Asian-Indian group using socially accepted representative stimuli. As objectification extends to women in non-sexualized attire (Bhattacharyya, 2015; Gurung & Chrouser, 2007; Gervais et al., 2012; Roy & Bailey, 2021), we use images of women (and men) wearing casual office- or college-going attire. The conscious choice of pant/jeans and shirt/top as attire aligns with the typical clothing preferences of our demographic (participants).

Building on the existing research (Tarr, 2013; Bernard et al., 2012; Gervais & Eagan, 2017; Gervais, Holland & Dodd, 2013; Gervais et al., 2012; Reed et al., 2003; Tao & Sun, 2013;) we investigate the cognitive-level social bias by primarily examining differential gaze patterns and the underlying visual processing of upright and inverted non-sexualised target images. Our study compares response times when primed with male/female images, drawing from Yovel, Pelc & Lubetzky (2010) and the local/global paradigm (Bartlett & Searcy, 1993; Tanaka & Farah, 1993). Using the Navon forced letter recognition task (Figure 1b, d), we assess the impact of priming on local/global performance, where lower response times for global recognition indicate dominant global processing. Our research is the first of its kind in the Indian demographic, combining paradigms like local/global recognition and body, and considers the influence of visual attention patterns on the inversion effect (Cogoni et al., 2018).

Hypotheses Based on the literature on inversion effect, we expected *H1*: A significant inversion effect for both male and female target images, implying no object-like visual processing. We investigate the disparity in global/local processing between priming with male and female images through the priming effect. The transition from viewing the

priming stimuli to executing the Navon task involves two process shifts: 'Transfer appropriate process shift' in which residually activated procedures facilitate subsequent processing, reducing the response time, and 'Transfer inappropriate process shift' which impairs the subsequent processing as it involves switching the processes, thus increasing the response time. Accordingly, we hypothesize—*H2*: Faster global recognition in male priming condition compared to female priming condition, indicating an inappropriate transfer shift when women are objectified. *H3*: Faster local recognition in female priming condition compared to male priming condition, reflecting an appropriate transfer shift when women are objectified. Unlike previous studies (Arizpe et al., 2017; Bernard et al., 2012; Bernard et al., 2015; Tao & Sun, 2013; Zogmaister et al., 2020;) employing behavioral recall measures, we assess this effect through differential gaze behavior and by examining its impact on local/global processing in the Navon recognition task (Figure 1c). We also hypothesized that visual attention on SB parts is higher for female targets. Subsequently, we propose *H4*: Longer Fixation Duration (FD) and higher Revisit Frequency (RF) or Visit Counts on SB parts (vs face) of female targets. Based on the findings of Cogoni et al. (2018), we propose *H5*: Gaze on SB parts would be higher in inverted orientations for female target images, indicative of local processing.

Methodology

Ninety-four engineering undergraduates and graduates (24 female, 70 male, 18-27 years, mean age = 21, stdev ± 2.1) participated in the study. All participants self-identified as heterosexual, recruited through the campus social networking site, and compensated with INR 100. The experiment had undisclosed objectives, approved by the Institute Human Ethics Committee. We obtained informed written consent, emphasizing participants' freedom to exit without penalty at any time, with no additional participant profile information.

Stimuli selection and Experiment design

Priming Stimuli: We chose images of young women/men wearing jeans/pant and top/shirt, common casual or workwear in Indian cities based on the verified and validated results from a pilot study. Priming stimuli comprised ten male images (MI) and ten female images (FI) (Figure 1a). Converting color photos to grayscale controlled for achromatopsia and minimized implicit social bias, such as skin tone variations. Each set included five upright and five inverted images. To avoid center anchoring of eye gaze, we presented photos off-center on the display screen, alternating between right and left positions.

Recognition Task Stimuli: A Navon task consists of compound letter stimuli: large letters (global) formed by smaller letters (local), categorized into three sets: a) Local Navon Image b) Global Navon Image c) No global/local Navon Image (neutral). For instance, in a global Navon 'H', the target letter appears as a contour but not as a feature, while

in a local Navon image, the target letter is a feature but not a contour (Figure 1b). A neutral image indicates the absence of the target letter as a contour or a feature. We generated a total of 26 Navon images, using 2 each of global, local, and neutral images in the trial block. Eight experimental trials were conducted in each local and global category, and four in neutral.

Apparatus: We designed the experiment using the Tobii Pro Studio 3.3.2 Application. Tracking eye movement and gaze fixation on an LCD display screen was performed with the Tobii x120 eye-tracker (120Hz, desktop device). This eye tracker uses a binocular pupil-tracking technique, employing near-infrared illumination to create reflection patterns on the cornea and pupil. The image sensor captures eye images and reflection patterns to estimate gaze points accurately with respect to the LCD screen coordinates.

Experiment Procedure: Participants sat 51-71 cm away (as recommended by the device specifications) from a 22-inch LCD screen connected to a CPU. Gaze coordinates were captured and extracted using Tobii Pro software. After calibration with a 9-point target-tracking procedure and providing detailed oral explanations of the Navon test, written instructions, and the trial block, the experimenter exited the lab space to ensure participant privacy.

The study employed a within-subject design with two independent variables: gender of the actors (Female, Male) and orientation (Upright, Inverted). The dependent variable was response time, categorized into global and local response times, representing the time taken to recognize the target shape (Letter 'H' or Letter 'O') in the presented Navon image (Figure 1b). Priming condition and Navon local/global recognition were randomized to minimize confounding effects. Participants were instructed to press 'B' if they identified either target letter as a contour or a feature and 'N' if the target letters were absent (Figure 1d). The keys 'N' and 'B' were chosen for their central position on the keyboard to reduce latency. Response time was measured from the onset of Navon image presentation to key press.

The experiment began with detailed task instructions followed by a trial block. In each of the 20 sets, an actor's (male/female) image in any orientation (upright/inverted) was displayed for 7 seconds, followed by a grey-colored screen with a plus sign for 1 second, and then a Navon image (Figure 1c).

Data Analysis: We followed eye-tracking research recommendations (Amir et al., 2016; Anderson et al., 2018; Holland et al., 2017) and used Tobii Studio's default parameter settings of the Tobii IVT filter. We excluded data from five participants with a poor sampling rate (<40%) during the 9-point calibration task, and one participant due to missing data, resulting in 88 participants (24F, 64M). We set an FD threshold of 60ms (Olsen & Matos, 2012). Three non-overlapping areas of interest (AOIs) were defined for each image (Figure 1e): face (oval shape) and SB parts

(rectangular shapes covering the chest and hip). We analyzed each AOI independently and summed the hip and chest AOIs for comparison. The eye tracking metrics for the AOIs included: Total fixation duration, and Revisit frequency.

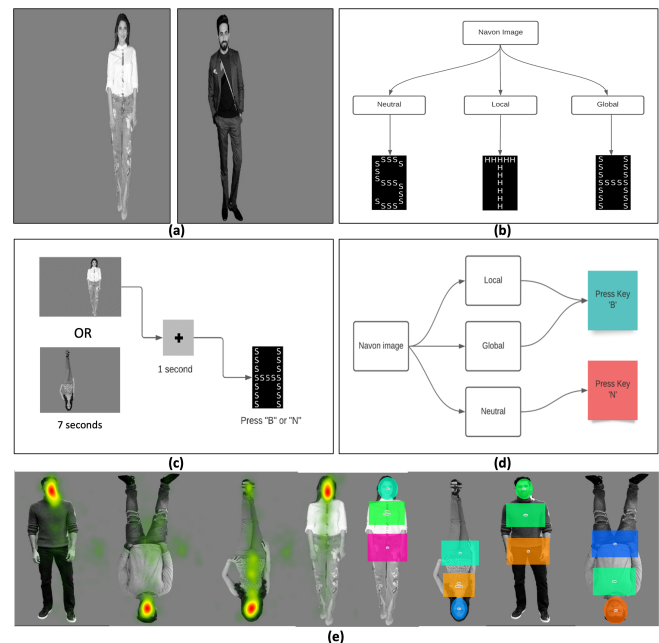


Figure 1: a) Sample priming stimuli — one photograph is displayed at a time. b) Navon letter images with target letter categories: no global/local ('H'/'O' absent – left), local ('H'/'O' as a feature – center), global ('H'/'O' as a contour – right). c) Experimental design: example for global recognition task in female priming. d) Participants press 'B' if target letters ('H'/'O') are present, else 'N'. Implicit local/global classification is maintained with the same key press 'B'. e) The left four images show participants' cumulative gaze distribution (heatmaps) on the target in upright and inverted positions, with red indicating higher density. The right four images depict the marked AOIs.

Results

Response times

We calculated response times (Figure 2a) by subtracting the timestamp of the target onset from the key press event and included only correct responses in each priming condition to compute average local/global recognition response times. This approach ensured data accuracy, although it reduced the dataset by excluding participants with any incorrect response in a stimulus set. The average response time for each priming condition was obtained by dividing the sum of correct response times by the number of correct responses. Additionally, we excluded participants with response times of zero or exceeding two seconds, resulting in a final dataset of 57 participants (12F, 45M) for analysis. We used repeated measures ANOVA to assess the impact of three independent variables—priming gender, priming image orientation, and type of recognition task (referred to as 'gender', 'orientation' and 'recognition' respectively) on the response times. The results indicate a significant main effect of gender; $F(1, 56) =$

10.007, $p = 0.003$, $\eta^2 = 0.018$; and a significant interaction effect between gender×recognition; $F(1, 56) = 51.547$, $p < 0.001$, $\eta^2 = 0.111$). Paired sample T-test was then used for the pairwise analysis of response time in various conditions. For both upright and inverted conditions, male priming interfered with the global recognition task, resulting in slower responses compared to female priming, while female priming interfered with the local recognition task, leading to slower responses in female priming compared to male priming (see Table-1).

Table-1: Post Hoc Paired Sample t-test for Recognition Task. RT — Recognition Task; Up/Inv — Upright/Inverted. Only significant values reported.

Orientation Priming RT	Orientation Priming RT	t	df	p	Cohen's d
Up_Male_Global	Up_Female_Global	4.518	56	<0.001	0.598
Inv_Male_Global	Inv_Female_Global	5.962	56	<0.001	0.79
Up_Male_Local	Up_Female_Local	-2.063	56	0.044	-0.273
Inv_Male_Local	Inv_Female_Local	-2.242	56	0.029	-0.297

Statistical Analysis of Eye-Tracking Data

For the final 88 participants, winsorization was applied to address outliers, replacing them with the nearest non-outlier value. The data's normality was assessed with the Kolmogorov test. Conducting a Repeated Measures ANOVA on FD and RF, we considered target gender (male/female), orientation (upright/inverted), and AoIs (Face, SB parts) as within-subject factors due to the parametric nature of the data. Post hoc analysis was performed using bivariate paired sample t-tests.

Fixation Duration Table-2 shows a significant main effect of AoIs and orientation, and interaction effects between gender and AoI, gender and orientation as well as AoI and orientation. Figure 2b shows the data as a function of the image type and participant gender. Post hoc analysis revealed the following observations: In both upright and inverted conditions for the *Target Gender Effect*—FD on the face of male targets is significantly longer ($p < 0.001$; $p = 0.043$) than female targets and the FD on SB parts of male targets is significantly lower ($p = 0.004$; $p < 0.001$) than female targets (Table-3). *Target Orientation/Inversion effect*— Participants fixated longer on upright faces compared to inverted ones for both male ($p < 0.001$) and female ($p < 0.001$) images. Additionally, they fixated longer on SB parts of upright female images ($p < 0.001$) and shorter on upright male SB parts ($p < 0.001$) compared to inverted orientations. *Target AoI effect*— face FD of female targets is not significantly different ($p = 0.405$) from their SB parts FD in inverted condition.

Table-2: Repeated Measures ANOVA with target gender, AoI, target orientation as within subject factors for FD. Only significant values reported.

Source	df	F	p	η^2
AoI	1	48.3	<.001	0.206
Orientation	1	10.694	0.002	0.009
Gender*AoI	1	25.509	<0.001	0.014
Gender*Orientation	1	4.85	0.03	0.001
AoI*Orientation	1	45.719	<0.001	0.071

Table-3: Post hoc t-test to measure the Gender effect, Inversion effect, and AoI effect for FD in Milli Seconds. Only significant values reported.

Orientation Gender AoI	Orientation Gender AoI	t	df	p	Cohen's d
Gender Effect					
Up_Male_Face	Up_Female_Face	3.637	87	<0.001	0.388
Inv_Male_Face	Inv_Female_Face	2.05	87	0.043	0.218
Up_Male_O	Up_Female_O	-2.94	87	0.004	-0.313
Inv_Male_O	Inv_Female_O	-3.91	87	<0.001	-0.417
Inversion Effect					
Up_Male_Face	Inv_Male_Face	5.962	87	<0.001	0.636
Up_Male_O	Inv_Male_O	-4.21	87	<0.001	-0.449
Up_Female_Face	Inv_Female_Face	4.594	87	<0.001	0.49
Up_Female_O	Inv_Female_O	5.638	87	<0.001	-0.601
AoI effect					
Up_Male_Face	Up_Male_O	10.04	87	<0.001	1.07
Inv_Male_Face	Inv_Male_O	3.707	87	<0.001	0.395
Up_Female_Face	Up_Female_O	7.565	87	<0.001	0.806

Revisit Frequency Table-4 shows a significant main effect of gender, AoI, and orientation, and interaction effects between gender and AoI as well as AoI and orientation (refer to Figure 2c for the distribution across image presentation category). Post hoc analysis revealed the following observations: *Target Gender Effect*: Table-5 shows no significant gender difference in face revisits between male and female targets in both upright and inverted orientations. However, in the upright orientation, revisits to female SB parts significantly surpass those to male parts ($p < 0.001$), whereas revisits to male SB parts are higher in the inverted

orientation ($p<0.001$). *Target Orientation or Inversion Effect*: face revisits are significantly greater in upright than inverted positions for both male and female targets. No significant difference in SB parts revisits is observed between upright and inverted orientations for either gender (Table-5). *Target AoI effect*— Female targets' SB parts are revisited significantly more ($p<0.001$) than their faces in inverted orientation, but significantly less ($p<0.001$) in upright condition. In contrast, male targets' SB parts are revisited significantly less than their faces in both conditions.

Table-4: Repeated Measures ANOVA with target gender, AoI, target orientation as within subject factors for RF. Only significant values reported.

Source	df	F	p	η^2
Gender	1	16.926	<0.001	0.022
AoI	1	94.722	<0.001	0.219
Orientation	1	7.773	0.007	0.015
Gender* AoI	1	47.57	<0.001	0.025
AoI*Orientation	1	33.917	<0.001	0.024

Table-5: Post hoc t-test to measure the Gender effect, Inversion effect, and AoI effect for RF in Milli Seconds. Only significant values reported.

Orientation_Gender_AoI	Orientation_Gender_AoI	t	df	p	Cohen's d
Gender Effect					
Up_Male_O	Up_Female_O	-3.753	87	<0.001	-0.4
Inv_Male_O	Inv_Female_O	5.269	87	<0.001	-0.562
Inversion Effect					
Up_Male_Face	Inv_Male_Face	5.881	87	<0.001	0.627
Up_Female_Face	Inv_Female_Face	4.542	87	<0.001	0.484
AoI effect					
Up_Male_Face	Up_Male_O	-3.232	87	0.002	-0.344
Inv_Male_Face	Inv_Male_O	-7.346	87	<0.001	-0.783
Up_Female_Face	Up_Female_O	7.565	87	<0.001	-0.778
Inv_Female_Face	Inv_Female_O	-11.404	87	<0.001	-1.216

Participant Gender Effect

To balance the participant gender ratio, male sample (N=45) was divided into four sets (12, 12, 12, 9) to match the female set of 12. Additional random data points (N=3) were added to the fourth male set to ensure parity. Mann-Whitney tests compared each male sub-sample with the female sample for

response time data. Same process was repeated for FD and RF, with the male sample divided into sets of sizes 24, 24, and 16. Additional random data points (N=4) were added to the third male set. No significant participant gender effects were observed for any parameters.

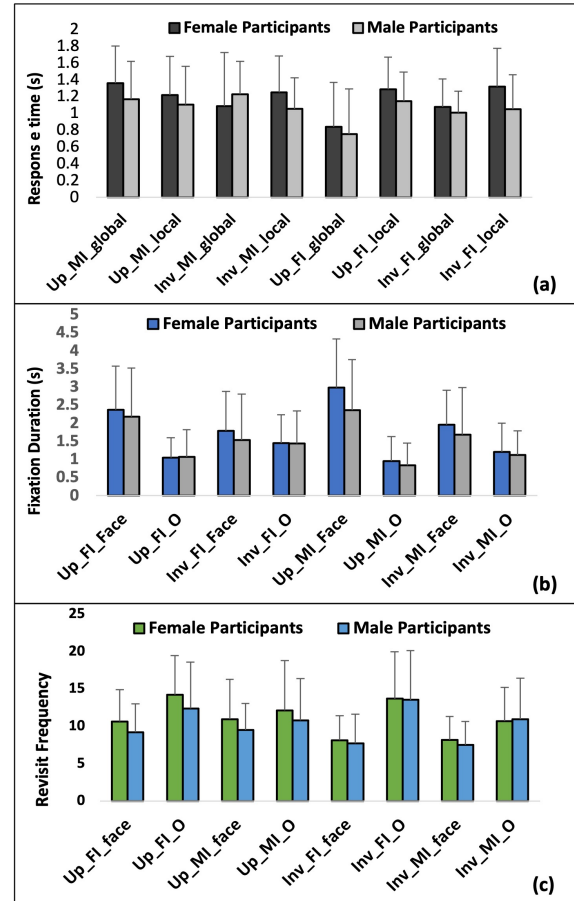


Figure 2: Comparative analysis of males and females in all conditions — a) Response Times in the range 0-2 seconds. b) Fixation Duration metrics. c) Revisit Frequency metrics. Up/Inv — Upright/Inverted o; MI/FI — Male Image/Female image; Face/O — Face/Objectified (SB parts).

Discussion

This study explored two primary theories: 1) the sexualized body inversion theory (Bernard et al., 2012; Bernard et al., 2015) cognizant of the counterargument by Schmidt & Kistemaker (2015) and 2) local/global processing in SO (Gervais et al., 2012). Participants demonstrated a significant priming effect on global recognition, responding faster in the female (vs. male) priming condition (Figure 2a), contradicting hypothesis H2. For the local recognition task, participants responded faster in the male (vs. female) priming condition, invalidating H3. Contrary observations for both H2 and H3, coupled with the absence of an orientation effect in response times for either priming condition, suggest analytical (local) processing for male images and configural (global) processing for female images. This implies that non-

sexualized male images are processed more like objects than non-sexualized female images, indicating a greater transfer-appropriate shift in female (vs. male) priming conditions. Our findings contrast with studies on SB part recognition bias (Bernard, Gervais & Klein, 2018; Bernard et al., 2018; Gervais et al., 2012) but align with a study on the Chinese population (Xiao et al., 2019). But, unlike studies on Western population wherein the sexualized stimuli (more skin exposure to emphasize SB parts), our results are based on non-sexualized stimuli, which can explain the contrasting findings.

In accordance with objectification theory, females attracted shorter face fixations and longer fixations on SB parts compared to males. Our data confirmed greater fixation on female SB parts than on male counterparts in both orientations (Figure 2b). A significant inversion effect was observed for both face and SB parts FD for both males and females (Table-3) indicating that the orientation of the stimuli influences how long people focus on them, partially validating our H1. Moreover, males received significantly higher face fixations than SB part fixations in the inverted condition while there was a reversal for female images. This suggests a gender-specific attention shift from the female face to SB parts when inverted, with no such shift observed for males in the same condition.

The observed patterns for RF support objectification theory and the SBIH, as evident from the absence of an orientation effect for SB parts in both male and female targets. In the upright orientation, female SB parts receive more attention than males, supporting objectification theory. Conversely, in the inverted condition, attention shifts towards male SB parts. The significantly higher revisits to SB parts compared to faces for both genders further support objectification in the inverted orientation, particularly pronounced in females. These findings partially validate hypothesis H4. Our results show that, in terms of both FD and RF, the female face attracts more attention than female SB parts in the upright condition but less attention than the male face (Bareket et al., 2019; Gervais, Holland & Dodd, 2013; Karsay, Knoll & Matthes, 2018), consistent with previous results reported for non-sexualized images (Cogoni et al., 2018; Nummenmaa et al., 2012). The notable focus on faces in a diverse country like India may indicate categorical social cognition (Freeman & Johnson, 2016) linked to different cultural notions of attractiveness/beauty and social status (Lakshmi et al., 2021) in contrast to SO studies in Western societies reporting longer gazes on sexualized body parts (appearance) than face.

Inverted female images received fewer face fixations and more SB part fixations than upright images, in line with Cogoni et al. (2018). Additionally, participants fixated longer on female SB parts than male counterparts and revisited them more than female faces in the inverted condition. Validating our hypothesis H5, the higher or comparable gaze on SB parts and reduced face fixation in inverted female images suggests analytical processing or objectification.

We extended the findings of studies (Bernard et al., 2018; Cogoni et al., 2018; Gervais, Holland & Dodd, 2013; Gervais,

Vescio & Allen, 2011; Gervais et al., 2012; Schmidt & Kistemaker, 2015; Tarr, 2013) which have compared responses to full attire and short dress (Cogoni et al., 2018), partially clad men/women (Hollett et al., 2021). Overall, the analysis of the two eye-tracking metrics supports the theory of visual gaze behaviour as a possible indicator of the underlying objectification process (Andrighetto et al., 2019; Bernard et al., 2012; Bernard, Gervais, Klein, 2018; Gervais et al., 2012) and the association between gaze behaviour and objectifying attitudes (Bareket et al., 2019). Importantly the gaze data reinforce the findings that men & women objectify women (Cikara, Eberhardt & Fiske, 2011; Gurung & Chrouser, 2007; Rupp & Wallen, 2007; Strelan & Hargreaves, 2005). Contrary to the prevailing perception, our study reveals that non-sexualised men are also subject to objectification. This phenomenon may be explained by self-objectification, where individuals adopt an objectifying perspective of themselves (Schwartz et al., 2010). However, the objectification of men differs in nature from that of women which often involves intrusive behaviors like staring, restricting their freedom and access to public spaces, as well as subjects them to moral judgments (e.g., rape victim-blaming; Gervais, DiLillo & McChargue, 2014; Loughnan et al., 2013; Rudman & Mescher, 2012).

Our study concludes that intrusive visual gaze, a form of objectification, occurs even for individuals wearing non-sexualized clothing that conceals skin or body shape. This finding is pertinent to the claims made of women's attire attracting the sexualized gaze and blaming attire for rape or sexual harassment. We substantiate this societal observation with empirical evidence. Additionally, we observed a reduced face-to-body ratio in inverted female images indicating a gender-specific attention shift.

Limitations and Future Research

The present study has a few limitations that future research can address. Specifically, within-gender gaze objectification should be correlated with objectifying attitudes, system justification theory (Calogero, 2013), empathy (Cogoni et al., 2018), rape victim empathy (Bevens, Brown & Loughnan, 2018), and self-objectification due to intimate partner violence (Gervais & Davidson, 2013). While male self-objectification (Johnson McCreary & Mills, 2007) has been linked to an excessive emphasis on masculinity (Daniel, Bridges & Martens, 2014), no direct link has been established to violence, attitudes, intentions, and personal traits of empathy. Therefore, investigating rape myth acceptance and gaze objectification in the South-Asian context could be insightful. Additionally, caution should be exercised in generalizing from student to general populations, as social attitudes are influenced by prospects, education levels, and sense of autonomy (Hanel & Vione, 2016; Peterson, 2001).

Acknowledgments

This research is funded by the Department of Science and Technology's Cognitive Science Research Initiative (DST/CSRI/2017/374, 25-07-2019).

References

- Amir, I., Zvielli, A., & Bernstein, A. (2016). (De) coupling of our eyes and our mind's eye: A dynamic process perspective on attentional bias. *Emotion*, 16(7), 978.
- Anderson, J. R., Holland, E., Heldreth, C., & Johnson, S. P. (2018). Revisiting the Jezebel Stereotype: The Impact of Target Race on Sexual Objectification. *Psychology of Women Quarterly*, 42(4), 461–476. <https://doi.org/10.1177/036168431879>
- Andrighetto, L., Bracco, F., Chiorri, C., Masini, M., Passarelli, M., & Piccinno, T. F. (2019). Now you see me, now you don't: Detecting sexual objectification through a change blindness paradigm. *Cognitive Processing*, 20(4), 419–429.
- Arizpe, J. M., McKean, D. L., Tsao, J. W., & Chan, A. W.-Y. (2017). Where You Look Matters for Body Perception: Preferred Gaze Location Contributes to the Body Inversion Effect. *PLOS ONE*, 12(1). <https://doi.org/10.1371/journal.pone.0169148>
- Bareket, O., Shnabel, N., Abeles, D., Gervais, S., & Yuval-Greenberg, S. (2019). Evidence for an Association between Men's Spontaneous Objectifying Gazing Behavior and their Endorsement of Objectifying Attitudes toward Women. *Sex Roles*, 81(3–4), 245–256. <https://doi.org/10.1007/s1199-018-0983-8>
- Bartky, S. L. (1990). *Femininity and Domination: Studies in the Phenomenology of Oppression*. Psychology Press.
- Bartlett, J. C., & Searcy, J. (1993). Inversion and configuration of faces. *Cognitive Psychology*, 25(3), 281–316.
- Bernard, P., Gervais, S. J., & Klein, O. (2018). Objectifying objectification: When and why people are cognitively reduced to their parts akin to objects. *European Review of Social Psychology*, 29(1), 82–121. <https://doi.org/10.1080/10463283.2018.1471949>
- Bernard, P., Gervais, S. J., Allen, J., Campomizzi, S., & Klein, O. (2012). Integrating Sexual Objectification With Object Versus Person Recognition: The Sexualized-Body-Inversion Hypothesis. *Psychological Science*, 23(5), 469–471. <https://doi.org/10.1177/0956797611434748>
- Bernard, P., Gervais, S. J., Allen, J., Delmoe, A., & Klein, O. (2015). From sex objects to human beings: Masking sexual body parts and humanization as moderators to women's objectification. *Psychology of women quarterly*, 39(4), 432–446.
- Bernard, P., Rizzo, T., Hoonhorst, I., Deliens, G., Gervais, S., B, Bayard, C., Deltenre, P., Colin, C., & Klein, O. (2018). The Neural Correlates of Cognitive Objectification. *Social Psychological and Personality Science*, 9, 550–559.
- Bevens, C. L., Brown, A. L., & Loughnan, S. (2018). The role of self-objectification and women's blame, sympathy, and support for a rape victim. *Plos one*, 13(6), e0199808.
- Bhattacharyya, R. (2015). Understanding the spatialities of sexual assault against Indian women in India. *Gender, Place & Culture*, 22(9), 1340–1356.
- Butkowski, C. P., Dixon, T. L., Weeks, K. R., & Smith, M. A. (2020). Quantifying the feminine self(ie): Gender display and social media feedback in young women's Instagram selfies. *New Media & Society*, 22(5). <https://doi.org/10.1177/1461444819871669>
- Calogero, R. M. (2013). Objects don't object: Evidence that self-objectification disrupts women's social activism. *Psychological science*, 24(3), 312–318.
- Calogero. (2010). Self-objectification in women: Causes, consequences, and counteractions. In R. M. Calogero, S. Tantleff-Dunn, & J. K. Thompson (Eds.), *Self-objectification in women: Causes, consequences, and counteractions*. American Psychological Association. <https://doi.org/10.1037/12304-000>
- Cikara, M., Eberhardt, J. L., & Fiske, S. T. (2011). From Agents to Objects: Sexist Attitudes and Neural Responses to Sexualized Targets. *Journal of Cognitive Neuroscience*, 23(3). <https://doi.org/10.1162/jocn.2010.21497>
- Cogoni, C., Carnaghi, A., Mitrovic, A., Leder, H., Fantoni, C., & Silani, G. (2018). Understanding the mechanisms behind the sexualized-body inversion hypothesis: The role of asymmetry and attention biases. *PLOS ONE*, 13(4). <https://doi.org/10.1371/journal.pone.0193944>
- Daniel, S., Bridges, S. K., & Martens, M. P. (2014). The development and validation of the Male Assessment of Self-Objectification (MASO). *Psychology of Men & Masculinity*, 15(1), 78–89. <https://doi.org/10.1037/a0031518>
- Davis, S. E. (2018). Objectification, Sexualization, and Misrepresentation: Social Media and the College Experience. *Social Media + Society*, 4(3). <https://doi.org/10.1177/2056305118786727>
- Drenten, J., Gurrieri, L., & Tyler, M. (2020). Sexualized labour in digital culture: Instagram influencers, porn chic and the monetization of attention. *Gender, Work & Organization*, 27(1). <https://doi.org/10.1111/gwao.12354>
- Dwivedi, S. (2017). Sexual objectification of females in bollywood rap and item songs. *International Journal of Humanities & Social Science Studies (IJHSSS)*, 3:399–400
- Förster, J., Liberman, N., & Kuschel, S. (2008). The effect of global versus local processing styles on assimilation versus contrast in social judgment. *Journal of Personality and Social Psychology*, 94(4), 579.
- Fredrickson, B. L., & Roberts, T. A. (1997). Toward understanding women's lived experiences and mental health risks. *Psychology of Women Quarterly*, 21(2), 173–206.
- Freeman, J. B., & Johnson, K. L. (2016). More Than Meets the Eye: Split-Second Social Perception. *Trends in Cognitive Sciences*, 20(5), 362–374. <https://doi.org/10.1016/j.tics.2016.03.003>
- Galdi, S., & Guizzo, F. (2021). Media-induced sexual harassment: The routes from sexually objectifying media to sexual harassment. *Sex Roles*, 84(11), 645–669. <https://doi.org/10.1007/s1199-020-01196-0>
- Gauthier, I., Behrmann, M., & Tarr, M. J. (1999). Can face recognition really be dissociated from object recognition?. *Journal of cognitive neuroscience*, 11(4), 349–370.

- Gervais, S. J., & Davidson, M. M. (2013). Objectification among college women in the context of intimate partner violence. *Violence and Victims*, 28(1), 36–49.
- Gervais, S. J., & Eagan, S. (2017). Sexual objectification: The common thread connecting myriad forms of sexual violence against women. *American Journal of Orthopsychiatry*, 87(3), 226.
- Gervais, S. J., DiLillo, D., & McChargue, D. (2014). Understanding the link between men's alcohol use and sexual violence perpetration: The mediating role of sexual objectification. *Psychology of Violence*, 4(2). <https://doi.org/10.1037/a0033840>
- Gervais, S. J., Holland, A. M., & Dodd, M. D. (2013). My eyes are up here: The nature of the objectifying gaze toward women. *Sex Roles*, 69(11), 557–570.
- Gervais, S. J., Vescio, T. K., & Allen, J. (2011). When What You See Is What You Get. *Psychology of Women Quarterly*, 35(1), 5–17. <https://doi.org/10.1177/0361684310386121>
- Gervais, S. J., Vescio, T. K., Förster, J., Maass, A., & Suitner, C. (2012). Seeing women as objects: The sexual body part recognition bias. *European Journal of Social Psychology*, 42(6), 743–753.
- Gray, K., Knobe, J., Sheskin, M., Bloom, P., & Barrett, L. F. (2011). More than a body: mind perception and the nature of objectification. *Journal of Personality and Social Psychology*, 101(6), 1207.
- Guizzo, F., & Cadinu, M. (2021). Women, not objects: testing a sensitizing web campaign against female sexual objectification to temper sexual harassment and hostile sexism. *Media Psychology*, 24(4), 509–537. <https://doi.org/10.1080/15213269.2020.1756338>
- Gurung, R. A. R., & Chrouser, C. J. (2007). Predicting objectification: Do provocative clothing and observer characteristics matter? *Sex Roles*, 57(1), 91–99.
- Hanel, P. H. P., & Vione, K. C. (2016). Do student samples provide an accurate estimate of the general public? *PloS One*, 11(12), e0168354.
- Hanna, E., Ward, L. M., Seabrook, R. C., Jerald, M., Reed, L., Giaccardi, S., & Lippman, J. R. (2017). Contributions of Social Comparison and Self-Objectification in Mediating Associations Between Facebook Use and Emergent Adults' Psychological Well-Being. *Cyberpsychology, Behavior, and Social Networking*, 20(3). <https://doi.org/10.1089/cyber.2016.0247>
- Haslam, N. (2006). Dehumanization: An Integrative Review. *Personality and Social Psychology Review: An Official Journal of the Society for Personality and Social Psychology*, 10, 252–264. https://doi.org/10.1207/s15327957pspr1003_4
- Heflick, N. A., & Goldenberg, J. L. (2009). Objectifying Sarah Palin: Evidence that objectification causes women to be perceived as less competent and less fully human. *Journal of Experimental Social Psychology*, 45(3). <https://doi.org/10.1016/j.jesp.2009.02.008>
- Heflick, N. A., Goldenberg, J. L., Cooper, D. P., & Puvia, E. (2011). From women to objects: Appearance focus, target gender, and perceptions of warmth, morality and competence. *Journal of Experimental Social Psychology*, 47(3), 572–581. <https://doi.org/10.1016/j.jesp.2010.12.020>
- Henley, Nancy. (1977). *Body politics: power, sex, and nonverbal communication*. Prentice-Hall.
- Himashree, P. (2014). Portrayal of Women in Indian Mass Media: An Investigation. *Journal of Education & Social Policy*, 1(1), 84–92.
- Holland, E., Koval, P., Stratemeyer, M., Thomson, F., & Haslam, N. (2017). Sexual objectification in women's daily lives: A smartphone ecological momentary assessment study. *British Journal of Social Psychology*, 56(2), 314–333. <https://doi.org/10.1111/bjso.12152>
- Holland, E., Wolf, E. B., Looser, C., & Cuddy, A. (2017). Visual attention to powerful postures: People avert their gaze from nonverbal dominance displays. *Journal of Experimental Social Psychology*, 68, 60–67.
- Hollett, R., Rogers, S., Florido, P. M., & Mosdell, B. A. (2021). Body gaze as a marker of sexual objectification: A new scale for pervasive gaze and gaze provocation behaviours in heterosexual women and men.
- Jain, P., Roy, E., Garud, N., & Mazid, I. (2019). Sexuality and substance abuse portrayals in item songs in Bollywood movies. *South Asian Popular Culture*, 17(1), 15–29. <https://doi.org/10.1080/14746689.2019.1585605>
- Jeffreys, S. (2014). *Beauty and misogyny: Harmful cultural practices in the West*. Routledge.
- Jha, & Pallavi. (2014). Songs, Representation of Women in Indian Cinema: Analysis of Item.. *Humanities and Social Sciences Review*.
- Johnson, M., & Bennett, E. (2015). *Everyday Sexism: Australian women's experiences of street harassment*. The Australia Institute, March. <http://www.tai.org.au/downloadpopup/nojs/11578>
- Johnson, P. J., McCreary, D. R., & Mills, J. S. (2007). Effects of exposure to objectified male and female media images on men's psychological well-being. *Psychology of Men & Masculinity*, 8(2), 95–102. <https://doi.org/10.1037/1524-9220.8.2.95>
- Karsay, K., Knoll, J., & Matthes, J. (2018). Sexualizing Media Use and Self-Objectification: A Meta-Analysis. *Psychology of Women Quarterly*, 42(1), 9–28. <https://doi.org/10.1177/0361684317743019>
- Kaschak, E. (1992). *Engendered lives*. New York: Basic Books.
- Kellie, D. J., Blake, K. R., & Brooks, R. C. (2019). What drives female objectification? An investigation of appearance-based interpersonal perceptions and the objectification of women. *PloS One*, 14(8), e0221388.
- Langton, R. (2009). *Sexual Solipsism: Philosophical essays on pornography and objectification*. Oxford: Oxford University Press.
- Lakshmi, A., Wittenbrink, B., Correll, J., & Ma, D. S. (2021). The India Face Set: International and Cultural Boundaries Impact Face Impressions and Perceptions of Category Membership. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.627678>

- Loughnan, S., Haslam, N., Murnane, T., Vaes, J., Reynolds, C., & Suitner, C. (2010). Objectification leads to depersonalization: The denial of mind and moral concern to objectified others. *European Journal of Social Psychology*. <https://doi.org/10.1002/ejsp.755>
- Loughnan, S., Pina, A., Vasquez, E. A., & Puvia, E. (2013). Sexual objectification increases rape victim blame and decreases perceived suffering. *Psychology of Women Quarterly*, 37(4), 455–461.
- Maurer, D., Grand, R. le, & Mondloch, C. J. (2002). The many faces of configural processing. *Trends in Cognitive Sciences*, 6(6). [https://doi.org/10.1016/S1364-6613\(02\)01903-4](https://doi.org/10.1016/S1364-6613(02)01903-4)
- Miles-McLean, H., Liss, M., Erchull, M. J., Robertson, C. M., Hagerman, C., Gnoleba, M. A., & Papp, L. J. (2015). “Stop Looking at Me!”: Interpersonal Sexual Objectification as a Source of Insidious Trauma. *Psychology of Women Quarterly*, 39(3), 363–374. <https://doi.org/10.1177/0361684314561018>
- Nummenmaa, L., Hietanen, J. K., Santtila, P., & Hyönä, J. (2012). Gender and visibility of sexual cues influence eye movements while viewing faces and bodies. *Archives of sexual behavior*, 41(6), 1439–1451.
- Olsen, A., & Matos, R. (2012, March). Identifying parameter values for an I-VT fixation filter suitable for handling data sampled with various sampling frequencies. In *proceedings of the symposium on Eye tracking research and applications* (pp. 317–320).
- Pazhoohi, F., Macedo, A. F., & Arantes, J. (2017). The effect of religious clothing on gaze behavior: An eye-tracking experiment. *Basic and Applied Social Psychology*, 39(3), 176–182.
- Peterson, R. A. (2001). On the use of college students in social science research: Insights from a second-order meta-analysis. *Journal of Consumer Research*, 28(3), 450–461.
- Plieger, T., Groote, O., Hensky, R., Hurtenbach, L., Sahler, S., Thönes, L., & Reuter, M. (2021). The Association Between Sexism, Self-Sexualization, and the Evaluation of Sexy Photos on Instagram. *Frontiers in Psychology*, 3234.
- Rad, M. T. (2016). Women and Their Portrayal in Indian Cinema. *International Journal of Humanities and Social Sciences*, 2, 1318–1334.
- Reed, C. L., Stone, V. E., Bozova, S., & Tanaka, J. (2003). The body-inversion effect. *Psychological science*, 14(4), 302–308.
- Roy, S., & Bailey, A. (2021). Safe in the City? Negotiating safety, public space and the male gaze in Kolkata, India. *Cities*, 117, 103321.
- Rudman, L. A., & Mescher, K. (2012). Of animals and objects: Men’s implicit dehumanization of women and likelihood of sexual aggression. *Personality and Social Psychology Bulletin*, 38(6), 734–746.
- Rupp, H. A., & Wallen, K. (2007). Sex differences in viewing sexual stimuli: An eye-tracking study in men and women. *Hormones and behavior*, 51(4), 524–533.
- Schmidt, A. F., & Kistemaker, L. M. (2015). The sexualized-body-inversion hypothesis revisited: Valid indicator of sexual objectification or methodological artifact? *Cognition*, 134(October), 77–84. <https://doi.org/10.1016/j.cognition.2014.09.003>
- Schwartz, J. P., Grammas, D. L., Sutherland, R. J., Siffert, K. J., & Bush-King, I. (2010). Masculine gender roles and differentiation: Predictors of body image and self-objectification in men. *Psychology of Men & Masculinity*, 11(3), 208.
- Sherman, A. M., Allemand, H., & Prickett, S. (2020). Hypersexualization and Sexualization in Advertisements for Halloween Costumes. *Sex Roles*, 83(3–4). <https://doi.org/10.1007/s11199-019-01105-0>
- Siddiqi, N. (2020). A thematic analysis of sexist Bollywood songs. *Multidisciplinary Journal of Gender Studies*, 9(2). <https://doi.org/10.17583/generos.2020.4628>
- Slawala, Z. Z. (2019). Objectification of Women in Bollywood Item Numbers. University of South Florida.
- Smith, J. K., Liss, M., Erchull, M. J., Kelly, C. M., Adragna, K., & Baines, K. (2018). The Relationship Between Sexualized Appearance and Perceptions of Women’s Competence and Electability. *Sex Roles*, 79(11–12), 671–682. <https://doi.org/10.1007/s11199-018-0898-4>
- Strelan, P., & Hargreaves, D. (2005). Women who objectify other women: The vicious circle of objectification? *Sex Roles*, 52(9–10), 707–712. <https://doi.org/10.1007/s11199-005-3737-3>
- Tanaka, J. W., & Farah, M. J. (1993). Parts and Wholes in Face Recognition. *The Quarterly Journal of Experimental Psychology Section A*, 46(2), 225–245. <https://doi.org/10.1080/14640749308401045>
- Tao, W., & Sun, H. (2013). Configural processing in body posture recognition: an eye-tracking study. *Neuroreport*, 24(16), 903–910.
- Tarr, M. J. (2013). Perception Isn’t So Simple. *Psychological Science*, 24(6). <https://doi.org/10.1177/0956797612474669>
- Tyler, J. M., Calogero, R. M., & Adams, K. E. (2017). Perpetuation of sexual objectification: The role of resource depletion. *British Journal of Social Psychology*, 56(2), 334–353.
- Vaes, J., Cristoforetti, G., Ruzzante, D., & Cogoni, C. (2019). Assessing neural responses towards objectified human targets and objects to identify processes of sexual objectification that go beyond the metaphor. *Scientific Reports*, 9(1), 1–10. <https://doi.org/10.1038/s41598-019-42928-x>
- Valentine, T. (1988). Upside-down faces: A review of the effect of inversion upon face recognition. *British Journal of Psychology*, 79(4). <https://doi.org/10.1111/j.2044-8295.1988.tb02747.x>
- Ward, L. M. (2016). Media and Sexualization: State of Empirical Research, 1995–2015. In *Journal of Sex Research* (Vol. 53, Issues 4–5, pp. 560–577). <https://doi.org/10.1080/00224499.2016.1142496>
- Wolf, N. (1992). The beauty myth: how images of beauty are used against women. *Choice Reviews Online*, 29(05), 29-3031–29–3031. <https://doi.org/10.5860/CHOICE.29-3031>

- Wollast, R., Puvia, E., Bernard, P., Tevichapong, P., & Klein, O. (2018). How sexual objectification generates dehumanization in western and eastern cultures: A comparison between Belgium and Thailand. *Swiss Journal of Psychology*, 77(2), 69–82. <https://doi.org/10.1024/1421-0185/a000209>
- Xiao, L., Li, B., Zheng, L., & Wang, F. (2019). The Relationship Between Social Power and Sexual Objectification: Behavioral and ERP Data. *Frontiers in Psychology*, 10, 57. <https://doi.org/10.3389/fpsyg.2019.00057>
- Yovel, G., Pelc, T., & Lubetzky, I. (2010). It's all in your head: Why is the body inversion effect abolished for headless bodies? *Journal of Experimental Psychology: Human Perception and Performance*, 36(3), 759–767. <https://doi.org/10.1037/a0017451>
- Zogmaister, C., Durante, F., Mari, S., Crippa, F., & Volpato, C. (2020). Measuring objectification through the Body Inversion Paradigm: Methodological issues. *PLOS ONE*, 15(2). <https://doi.org/10.1371/journal.pone.0229161>