

ORIGINAL RESEARCH

The Woman's Body (Not the Man's One) Is Used to Evaluate Sexual Desire: An Eye-Tracking Study of Automatic Visual Attention



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ABSTRACT

Introduction: Vision of the human body has been shown to be key in eliciting sexual desire. However, whether the visual pattern characterizing sexual desire is different in women and men is still unclear.

Aim: To investigate the effect of gender on visual patterns triggered by an identical set of stimuli depicting attractive heterosexual couples.

Methods: Heterosexual women and men (n = 106) were tested on a picture-viewing task associated with eye tracking. The context of sexual desire was activated by asking the participant whether they perceived such desire while looking at sensual pictures of heterosexual couples. Data were analyzed using mixed-subject design analyses of variance.

Main Outcome Measure: Fixation durations were used to investigate visual patterns. 2 areas of interest were created to investigate visual patterns (face vs body area).

Results: Results showed longer fixations on body rather than face areas irrespective of participant gender. Moreover, all participants looked longer at women's than men's bodies and at the faces of the opposite sex.

Clinical Implications: These findings shed light on the automatic processes underlying sexual desire, which has the potential to improve the care of patients suffering from sexual disorders by optimizing interventions.

Strengths & Limitations: The strengths of this study are the use of an eye-tracking paradigm, the dissociation between 2 fixation areas (ie, face and body), and the use of an identical set of stimuli allowing an accurate between-gender comparison of the visual pattern. The limitations are the small sample size, the use of healthy heterosexual individuals, and the absence of measures of sexual arousal and genital response.

Conclusions: These findings confirm the association between the human body and sexual desire. They also reveal the unique attentional attractiveness of woman's bodies across genders. **Bolmont M, Bianchi-Demicheli F, Boisgontier MP, et al. The Woman's Body (Not the Man's One) Is Used to Evaluate Sexual Desire: An Eye-Tracking Study of Automatic Visual Attention. J Sex Med 2019;16:195–202.**

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INTRODUCTION

Sexual desire is characterized by an increased intensity and frequency of sexual thoughts toward a target.^{1–10} These thoughts can be triggered by external (eg, visual, tactile, auditory, olfactive) and internal stimuli (eg, memories, fantasies, dreams).^{1–3,5,8–12} These stimuli trigger 2 types of processes related to sexual desire in the brain: automatic and controlled processes.^{10,13,14} Controlled processes are slow, cognitively driven, and initiated intentionally, require cognitive resources, and operate within conscious awareness. For example, when seeing a potential partner, behavior will result from a conscious reflection integrating various cognitive constructs, such as social norms (eg, “Is it moral to be attracted by this person?”), personal standards and values (eg, “Is this person pretty?”), and expectancies (eg, “Can this person be a potential long-term partner?”). Automatic

processes are fast, emotionally driven, and initiated unintentionally, tax cognitive resources to a much lesser extent than controlled processes, and occur outside conscious awareness. For example, seeing a potential partner can trigger automatic affective reactions and attract attention (eg, staring at this person). Interactions between automatic and controlled processes are thought to predict behavioral outcomes and to control for the responses' regulation.¹⁵ When both processes work together to trigger the same response (eg, an automatic attraction toward a person who is considered as a suitable potential partner), the response is facilitated. By contrast, when they activate competing responses (eg, an automatic attraction toward a person who is not considered as morally or socially suitable), the execution of behaviors can be impeded and lead to internal conflicts. It should also be noted that the processes related to sexual desire are expected to be both automatic and controlled with the dominance of 1 process over the other depending on multiple factors. In this study, we focused on spontaneous visual attention because it has been shown to be key in eliciting sexual desire.^{16,17} Moreover, viewing time of erotic materials is considered a valid and unobtrusive behavioral measure of sexual interest.^{18–24}

In most previous studies examining the locus of spontaneous visual attention, participants were asked to look at stimuli depicting the opposite gender, thereby preventing between-gender comparisons because stimuli were different across groups.^{16,17} However, such comparisons are required to investigate whether the visual pattern associated with sexual desire is similar in women and men, irrespective of the gender of the stimulus. Results from previous studies assessing sexual arousal suggest that this visual pattern could be different.^{25–27} In these studies, results consistently showed that heterosexual women were aroused by stimuli depicting both genders, whereas heterosexual men were aroused by stimuli depicting the opposite sex only. However, these previous studies focused exclusively on sexual arousal, not on sexual desire. Sexual desire and sexual arousal are intertwined, which make their distinction particularly difficult. However, both sexual desire and sexual arousal are thought to play a key role in the regulation of sexual behaviors, with some studies suggesting that sexual desire occurs before and drives sexual arousal.⁸ Therefore, a better understanding of sexual desire is important.

The objective of this study was to investigate the effect of gender on visual patterns triggered by an identical set of stimuli depicting attractive heterosexual couples. The context of sexual desire was activated during the presentation of each image by asking the participant whether she/he perceived this desire or not. This procedure aimed to ensure that the context of sexual desire was activated throughout the task. We hypothesized that individuals look longer at body than face areas irrespective of gender (H1). Consistent with their explicit sexual orientation, we hypothesized that heterosexual women look longer at men than women stimuli, whereas heterosexual men look longer at women than men stimuli (H2). Consistent with previous studies

examining gender difference in sexual arousal, we hypothesized that both men (H3a) and women (H3b) spend longer time gazing at the bodies of women than men. By contrast, we hypothesized that, consistent with their explicit sexual orientation, heterosexual men spend longer time staring at women's than men's faces (H4a) and heterosexual women spend longer time staring at men's than women's faces (H4b).

MATERIAL AND METHODS

Participants

A total of 106 healthy heterosexual volunteers (mean age 35.1 ± 2.95), including 73 women (mean age 33.7 ± 3.4) and 33 men (mean age 36.5 ± 2.5), participated in the study. They were recruited during the exposition "Planète Santé" in Lausanne, Switzerland, and provided written informed consent to participate in the experiment. The desired sample size was estimated using G*Power,²⁸ which indicated that 54 subjects were required to have 95% power to detect a statistically significant difference. The data collection stopping rule was to recruit at least 54 subjects and to stop by the end of the exposition "Planète Santé." Once the 54 participants were recruited, we continued collecting data until the end of the exhibition. All participants were heterosexual as ascertained by an anamnesis, reported normal or corrected-to-normal vision, no medication, no chemical dependency, and no prior or current neurologic or symptoms of psychiatric disorders. They also indicated that they had never been diagnosed for sexual disorders. This study was approved by the ethical committee of the University of Geneva, Switzerland.

Procedures

Participants were seated in front of a computer (1 m) and performed a 9-point eye-tracker calibration. Then, they were exposed to a series of 50 photographs presented in random order. Participants indicated, for each photograph, whether they felt sexual desire or not ("Yes" vs "No") by pressing a different key with their right hand. The images that were not associated with sexual desire were excluded to ensure that the images used in the main analysis actually triggered sexual desire. The concept of sexual desire was clarified as follows: "Sexual desire is the presence of feelings of sexual interest, sexual thoughts, or fantasies related to the image depicted in the photograph." Each trial started with a 1,500-ms fixation cross in the center of the screen, followed by a 1500-ms target stimulus, and a black-screen presented randomly for 1,500–2,000 ms (Figure 1).

Eye Tracking

The eye-tracking technique provides valid behavioral measures to investigate visual patterns associated with sexual desire.^{18–24} Specifically, visual patterns reflect spontaneous and automatic attentional processes associated with sexual desire that are inaccessible to introspection or that a person would prefer to conceal.

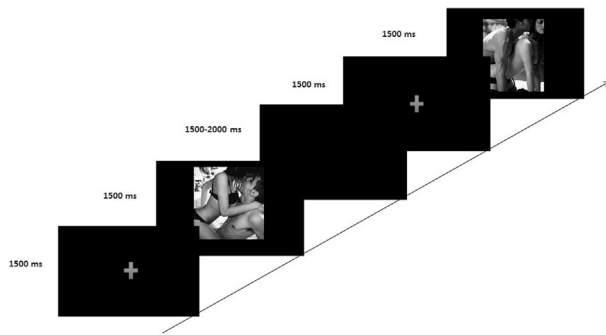


Figure 1. Design of the experiment.

Eye tracking was performed using the Tobii T60 eye tracker (Tobii Technology, Inc, Danderyd, Sweden) and Tobii Studio, version 2.3.2 (Psychology Software Tools; <http://www.pstnet.com/>).

Stimuli

Experimental stimuli consisted of 50 sensual photographs (180 × 640 pixels) of heterosexual couples depicting attractive women and men (20–40 years) in sensual situations. The use of sensual photographs of couples favored sexual connotations. No nude photographs or pictures showing genitals were presented.

Data Analyses

The total duration of all fixations was used to investigate visual patterns. 2 areas of interest were created to investigate visual patterns (face versus body area). Consistent with previous literature,¹⁶ face area included the whole face and the neck, whereas body area included the rest of the body.

Statistical Analyses

In this study, consistent with previous studies,^{16,17} we contrasted the time spent gazing at the face and body areas of women and men. Total fixation time among women and men were analyzed using mixed-subject design analyses of variance (ANOVAs). Specifically, the first ANOVA contrasted the fixation time

between face and body areas, irrespective of the gender of the stimuli. The second ANOVA contrasted the fixation time between women- and men-related stimuli, irrespective of area dimension (ie, body vs face). The third ANOVA contrasted the fixation time between the body of men and women. The fourth ANOVA contrasted the fixation time between the face of men and women. The statistical assumptions associated with ANOVA were examined. Plots of the residuals against the predicted scores of the dependent variables and against the independent variables showed no major signs of heteroscedasticity. Histograms of the residuals showed that residuals were normally distributed and centered on 0.

RESULTS

Descriptive Results

Descriptive results stratified by gender are reported in Table 1. Both men and women looked longer at body than at face areas (0.84 vs 0.56 seconds and 0.77 vs 0.63 seconds for men and women, respectively). As expected, bivariate correlations showed that explicit sexual desire (ie, the relative number of pictures associated with sexual desire) and fixation time of body areas were positively correlated in women ($r = 0.37, P = .002$) and men ($r = 0.65, P < .001$). Conversely, explicit sexual desire and fixation time of face areas were negatively correlated in women ($r = -0.26, P = .025$) and non-significantly correlated in men ($r = -0.07, P = .690$).

Fixation Time Differences Between Face and Body Areas

Fixation time was analyzed using a 2 (area: face vs body) × 2 (participant's gender: woman vs man) mixed-subject ANOVA. Results showed a main effect of area ($P < .001$). Consistent with H1, participants looked longer at body than at face areas ($P < .001$; Figure 2). Results showed that neither the main effect of participant's gender ($P = .842$) nor the 2-way interaction between area and participant's gender ($P = .139$) was significant (Table 2).

Table 1. Fixation time in seconds as a function of the type of stimulus

Type of stimulus	Gender of participants	
	Women Median (SD) [95% CI]	Men Median (SD) [95% CI]
Man	0.68 (0.15) [0.39; 0.97]	0.54 (0.16) [0.20; 0.82]
Woman	0.88 (0.16) [0.53; 1.16]	1.13 (0.30) [0.44; 1.62]
Body	0.80 (0.24) [0.30; 1.24]	0.86 (0.28) [0.29; 1.39]
Face	0.60 (0.27) [0.10; 1.16]	0.54 (0.26) [0.05; 1.07]
Man, Body	0.26 (0.11) [0.06; 0.50]	0.22 (0.08) [0.05; 0.37]
Man, Face	0.34 (0.15) [0.07; 0.65]	0.24 (0.11) [0.02; 0.46]
Woman, Body	0.51 (0.16) [0.19; 0.81]	0.61 (0.22) [0.19; 1.05]
Woman, Face	0.25 (0.14) [0.01; 0.54]	0.32 (0.19) [0.05; 0.69]

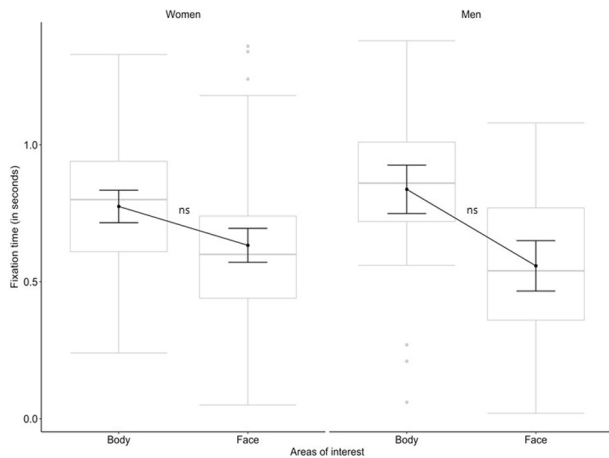


Figure 2. Mean and standard errors of fixation time as a function of area of interest and the gender of participants are in black. Boxplot of observed data are in gray. ns = non-significant effect of the simple slopes. *Significant effect of the simple slopes, $P < .0001$.

Fixation Time Differences Between Women and Men Stimuli

Fixation time was analyzed using a 2 (stimulus: woman vs man) \times 2 (participant's gender: woman vs man) mixed-subject ANOVA. Results revealed a main effect of stimulus ($P < .001$) and a 2-way interaction between stimulus and participant's gender ($P < .001$). Consistent with H2, simple test effects revealed that women looked longer at men than at women stimuli ($P < .001$). Conversely, men looked longer at women than at men stimuli ($P < .001$; Figure 3, Table 2).

Fixation Time Differences Between the Body of Men and Women

Fixation time on body areas was analyzed using a 2 (stimulus: woman vs man) \times 2 (participant's gender: woman vs man)

mixed-subject ANOVA. Results showed a main effect of stimulus ($P < .001$) and a 2-way interaction between stimulus and participant's gender ($P < .001$). Consistent with H3a, simple slope effects revealed that men looked longer at the bodies of women than of men ($P < .001$). Importantly, in line with H3b, women also looked longer at the body of women than men ($P < .001$; Figure 4, Table 2).

Fixation Time Differences Between the Face of Women and Men

Fixation time on face areas was analyzed using a 2 (stimulus: woman vs man) \times 2 (participant's gender: woman vs man) mixed-subject ANOVA. Results showed no main effect of stimulus ($P = .928$) and participant's gender ($P = .184$). However, results revealed a 2-way interaction between stimulus and participant's gender ($P < .001$). Consistent with H4a, simple slopes revealed that that men looked longer at the faces of women than of men ($P < .001$). Conversely, in line with H4b, women looked longer at the faces of men than of women ($P < .001$; Figure 5, Table 2).

DISCUSSION

Main Findings

The objective of this study was to investigate the effect of gender on visual patterns triggered by stimuli depicting attractive heterosexual couples. As expected in our first hypothesis, in a task that was explicitly related to sexual desire, participants looked longer at body than at face areas, irrespective of gender. Consistent with our second hypothesis, heterosexual women looked longer at men than at women stimuli, whereas heterosexual men looked longer at women than men stimuli. Consistent with our third hypothesis, both heterosexual men and women looked longer at women's than men's bodies. In line with our fourth hypothesis, heterosexual men spent longer time

Table 2. Results of the analyses of variance estimating fixation time differences between gender of the participants, gender of the stimulus, and areas dimension (ie, body vs face)

Gender of participant	Women	Men	Gender of participants \times area interaction	Main effect of gender	Main effect of area
Hypothesis 1: Fixation time differences between face and body areas					
Area of interest	Body	Face	Body	Face	P value
Mean (SD)	0.77 (0.24)	0.63 (0.27)	0.84 (0.28)	0.63 (0.27)	.139
Hypothesis 2: Fixation time differences between women and men stimuli					
Area of interest	Men	Women	Men	Women	P value
Mean (SD)	0.68 (0.15)	0.85 (0.16)	0.51 (0.16)	1.03 (0.30)	<.0001
Hypothesis 3: Fixation time differences between the body of men and women					
Area of interest	Body of men	Body of women	Body of men	Body of women	P value
Mean (SD)	0.28 (0.11)	0.50 (0.16)	0.21 (0.08)	0.62 (0.22)	<.0001
Hypothesis 4: Fixation time differences between the face of men and women					
Area of interest	Face of men	Face of women	Face of men	Face of women	P value
Mean (SD)	0.36 (0.15)	0.27 (0.14)	0.24 (0.11)	0.32 (0.19)	<.0001
					P value
					.184
					.928

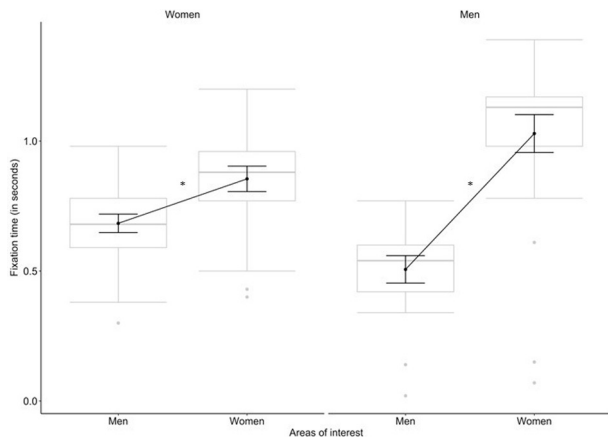


Figure 3. Mean and standard errors of fixation time in seconds as a function of the gender of stimuli and the gender of participants are in black. Boxplot of observed data are in gray. ns = non-significant effect of the simple slopes. *Significant effect of the simple slopes, $P < .0001$.

staring at women's faces than at men's, and heterosexual women spent longer time staring at men's than at women's faces. Overall, these findings are consistent with the suggestion that the human body, especially women's bodies, is associated with sexual desire irrespective of gender.

Comparison With Previous Studies

Results showed that participants, irrespective of their gender, looked longer at the body (vs face) of stimuli. This finding is consistent with our first hypothesis and with previous literature suggesting that, in tasks related to sexual desire, the locus of spontaneous visual attention is preferentially directed toward the body, whereas visual attention is directed toward the face in tasks related to love.^{16,17} A potential explanation for this result is that

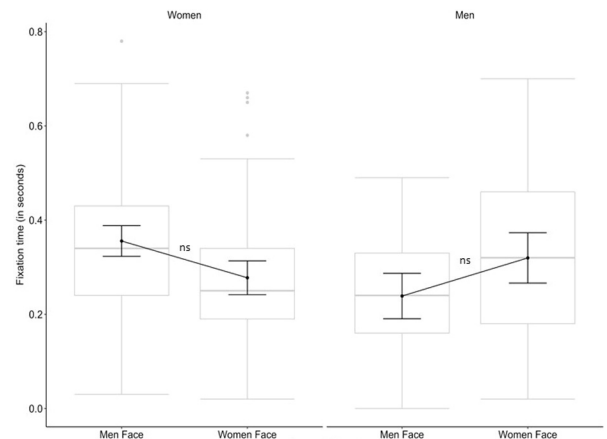


Figure 5. Mean and standard errors of fixation time at the face in seconds as a function of the gender of the stimuli and the gender of participants are in black. Boxplot of observed data are in gray. ns = non-significant effect of the simple slopes. *Significant effect of the simple slopes, $P < .0001$.

love relies on the integration of abstract and intellectual representations (eg, feeling incorporating mechanisms of reward expectancy and habit learning) that can preferentially be extracted from the human face. Conversely, sexual desire more strongly relies on the integration of past bodily and affective experiences (eg, affective visceral and bodily sensations) that can be extracted from body movements and posture.¹⁶ Therefore, our results support the importance and saliency of the human body in triggering sexual desire. Another potential explanation is the area difference between the head and the body. It is also important to acknowledge that these links between body fixation and sexual desire vs face fixation and love have been demonstrated only recently and, as such, require further replication and validation studies.

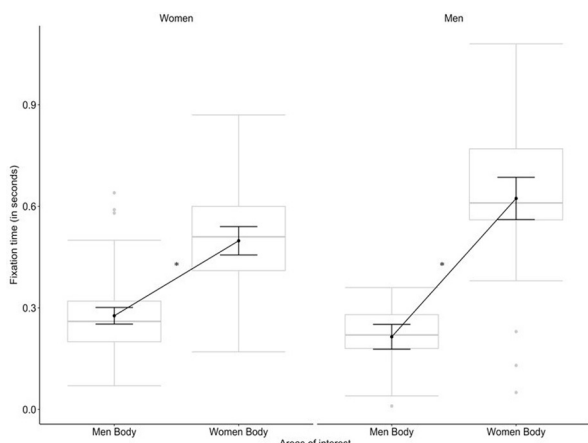


Figure 4. Mean and standard errors of fixation time at the body in seconds as a function of the gender of the stimuli and the gender of participants are in black. Boxplot of observed data are in gray. ns = non-significant effect of the simple slopes. *Significant effect of the simple slopes, $P < .0001$.

Women looked longer at the women than the men stimuli, whereas men looked longer at the men than the women stimuli. This result was expected (H2) because this study only included heterosexual participants, and previous studies showed that viewing time is consistent with sexual orientation.^{18,19,29,30} In these studies, participants looked longer at stimuli associated with the opposite sex. However, results also showed, for the first time, that this general trend was area dependent. Specifically, both men and women looked longer at face areas of the opposite sex. This finding is consistent with previous studies suggesting the importance of the human face to evaluate whether the person depicted in a picture may represent a potential long-term partner.¹⁶ In a context related to "love," heterosexual men and women are expected to look preferentially at the face of the opposite gender. To confirm this proposition, future studies should test whether homosexual individuals looked longer at faces of the same gender.

When considering body areas, results revealed that both men and women looked longer at women's bodies. This finding

supports previous studies showing that both men and women looked longer at women than at men stimuli.^{25,31–36} However, unlike previous studies, by disaggregating body and face areas, our results showed that this effect was area dependent. A potential explanation for this result can be found in the study by Rieger et al,²⁵ where they claimed that all women (even heterosexual ones) are sexually aroused by women stimuli. Another potential explanation is the hypothesis of women's sexual fluidity,^{26,37} suggesting that sexual responses of heterosexual women is unrelated to the gender of the stimulus. This may explain why, in contrast to men, women do not demonstrate a tendency to be attracted by men-related stimuli. A third explanation could be the effect of social norms on sexual desire. In our society, women are generally more sexually objectified than men, which may play a role in conditioning women to focus on women's bodies to evaluate sexual desirability. A fourth potential explanation is gender-related differences in increasing psychogenic components when exposed to sexual-related material, such as stress, anxiety, or guilt.^{38,39} To buffer this stress, women may direct their attention away from the anxiogenic parts of the image. It should be noted that these 4 potential explanations are not mutually exclusive and may all contribute to a better understanding of the attentional bias toward the woman's body.

Strengths and Limitations of the Study

The strengths of this study include the use of an eye-tracking paradigm to assess automatic attention processes, the dissociation between 2 areas of fixation (ie, face and body), and the use of an identical set of stimuli to allow an accurate between-gender comparison of the visual pattern. However, several limitations should also be noted. First, the sample size of the study was small, especially for the group of men. Second, our study only involved heterosexual participants. Future studies should examine whether our results generalize to a larger and more heterogeneous group of individuals. Third, although not formally tested, our study did not involve individuals suffering from sexual disorders. It may be important in future studies to examine visual pattern differences between normal vs pathologic sample. Fourth, the level of sexual arousal is expected to influence the visual pattern. However, this study did not measure such arousal response. Future research should control for the influence of sexual arousal on the visual pattern. In the same vein, assessing the level of sexual desire throughout the experiment would have been useful to control for the potential increase in sexual desire across the experiment. Fifth, although the main outcome (viewing time) is a widely used and validated marker of sexual interest,^{18–24} this marker may also reflect a general interest rather than a specific sexual interest. In addition, viewing time is not equivalent to other measures of sexual responses such as genital response. Future studies could combine multiple measures to understand better the complexity of the sexual response. Sixth, the time intervals between the presentation of 2

subsequent images were relatively short (3,000–4,000 ms). Although this experimental procedure is consistent with previous research, it is not possible to exclude that this time is not sufficient to allow the sexual desire of the participant to return to normal, leading to a contagion bias. However, because the images were presented in a random order, this potential bias is unlikely to explain the results.

CONCLUSION

Results suggest that automatic visual attention associated with sexual desire is prominently oriented toward women's bodies, irrespective of gender. This finding confirms the importance of the human body in sexual desire and underlines the unique attentional attractiveness of women's bodies across genders. These findings have implications for the clinical practice as improving our understanding of the automatic processes underlying sexual desire can improve the care of patients suffering from sexual disorders and optimize interventions. For example, helping patients with hypoactive sexual desire disorders to focus on (rather than avoid) stimuli triggering sexual desire, or helping patients with hyperactive sexual desire disorders to direct their attention toward faces (instead of bodies) could help developing a normal level of sexual desire.

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