

# Dominance, submissivity (and homosexuality) in general population. Testing of evolutionary hypothesis of sadomasochism by internet-trap-method

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## Abstract

**OBJECTIVE:** Dominance and submissiveness represent strong sexual arousal stimuli for a considerable part of population. In contrast to men's sexual dominance and women's sexual submissiveness, the opposite preferences represent an evolutionary enigma. Here, we studied prevalence and strength of particular preferences in general population by Internet-trap-method.

**DESIGN:** The subjects who clicked the banner displayed in the web interface of e-mail boxes were allowed to choose icons with homosexual or heterosexual partner of different hierarchical position.

**RESULTS:** Dominant partner was chosen by 13.8% men and 20.5% women, and submissive partner by 36.6% men and 19.8% women. Homosexual partners were chosen by 7.3% men and 12.2% women. The response times for the submissive and dominant stimuli did not differ while for the equal-status stimuli were significantly longer, suggesting that part of subjects with equal-status preferences probably intentionally mask their natural interests.

**CONCLUSIONS:** Large number of people who chose unequal sexual partner suggests that hierarchical status plays important role in human mating system.

## Abbreviations

- SM - sexual sadism and masochism  
IP address - registered Internet address  
SM gates - gates with symbols of unequal sexual partners

## Introduction

Two unexpected results were obtained in research of sexual sadism and masochism (SM) in the last decade. Firstly, in modern societies relatively a large number of people are interested or even engaged in SM activities [2, 5, 10, 12]. Secondly, the pleasure from causing pain or suffering from the pain is considered to be a motive of consensual sadomasochistic practices in small minority of SM community. The majority of people in SM community referred to be sexually aroused by both the dominance/submission role and mild or mostly symbolical pain caused by sexual practice during the SM interactions [16]. Actually, the pain, or rather a threat of pain, is usually only used for stressing power of a dominant person [17].

A psychological background of SM is unknown. Weiss (2002) claimed that this sexual variance is not related to any personal characteristic of a subject. Study on SM community members, i.e. people who did not seek a specialist's help and who had not caused any crime, did not express any psychological or psychosocial malfunction. In fact, the study shows that the participant achieved higher education [14]. However, this finding may reflect greater willingness of educated individuals to participate in the study. Majority of SM community do not meet the second APA diagnostic criterion for mental disorder sexual sadism or masochism, i.e. "The person has acted on these (SM) urges with a nonconsenting person, or the sexual urges or fantasies cause marked distress or interpersonal difficulty, or the fantasies, sexual urges, or behaviors cause clinically significant distress or impairment in social, occupational, or other important areas of functioning" [1].

Although the psychological background of SM has not been elucidated yet, responding by a sexual arousal to the disparity in hierarchical status in specific circumstance evokes a well known reproduction strategy described in many animal systems. The females of many mammal and bird species prefer higher to lower status males. The higher hierarchical status of the male probably increases breeding opportunities and survival of the offspring due to increased resources, better protection against offence and threats in society and also provides good genes [7]. In accordance with the handicap theory [19], dominance has been suggested to honestly reflect male genetic quality. Tendency to dominate is a risky strategy in competitive encounters and is also associated with higher levels of testosterone, which may reduce immunocompetence in various species; dominance could therefore reliably indicate male condition and genetic predisposition [3]. Further, during courtship females signalize their interest by acting as weak, protection-needed (and therefore

submissive) individuals [8,9]. Thus, sexual arousal by male dominant behaviour in women and sexual arousal by female submissive behaviour in men may be easily explained by evolutionary theory because such preferences would bring high quality offspring in women and increase the chance to reproduce in men. However, a reported sexual arousal of a considerable fraction of men by female dominance and unknown fraction of women by male submissiveness represents a serious challenge for most of evolutionary hypotheses of SM behavior.

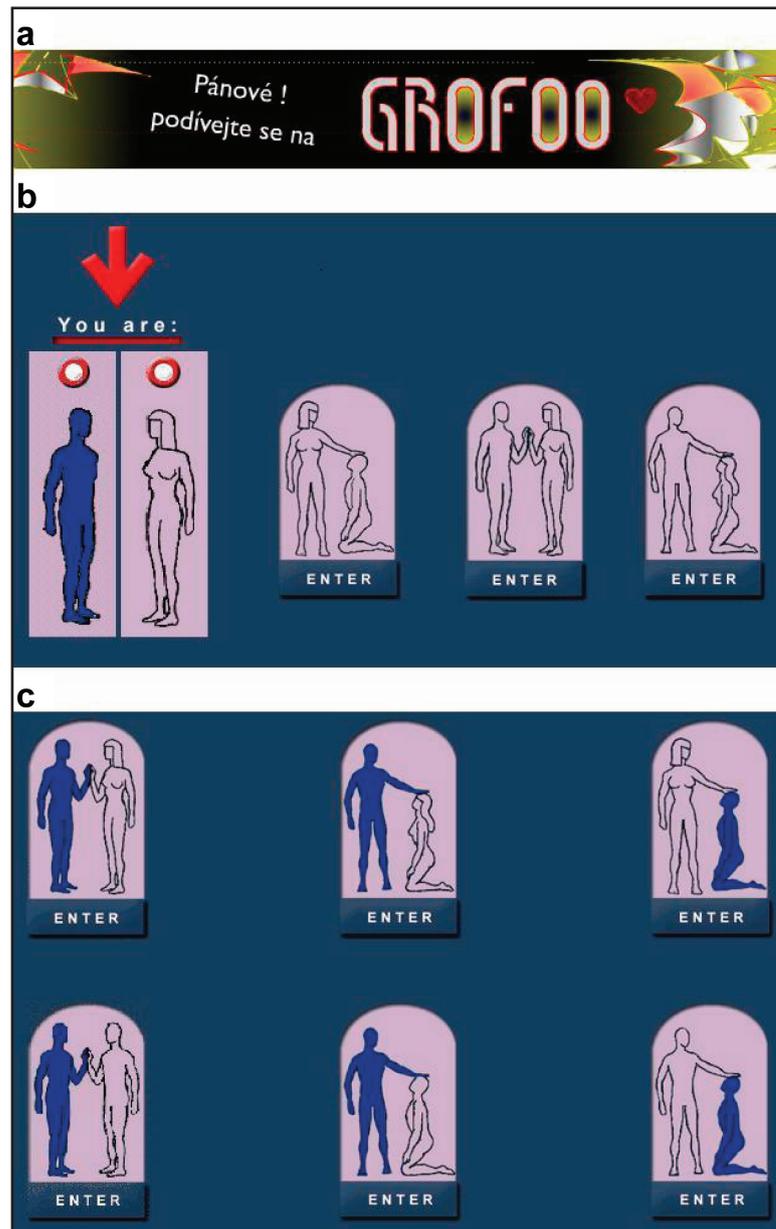
For testing evolutionary hypotheses of SM, information on frequency and strength of particular sexual preferences, including the men submissiveness and women dominance, in the general population is critically needed. However, important obstacles exist for obtaining data on the general population. Most studies mapped SM preference (usually engaging in SM sex rather than interests in SM) by direct questioning. Unfortunately, the results obtained through direct questioning or with questionnaire can be biased. For example, some persons may deny his/her interest in SM for fear of being seen as perverse. Moreover, some respondents can be unaware of their sexual preferences, for example, because of lack of sexual experience or a strong psychological block. Also, many subjects consider SM to be always associated with the pain and do not consider their preferences for dominant (submissive) sexual partners to be related with the same phenomena. All these shortages of direct methods lead us to search for an alternative indirect method for screening the general population.

Here, we have developed and used an original method to collect elementary data on the prevalence and strength of motivation of subjects with preferences of distinct hierarchical difference between partners in a general population of e-mail users. We set up a kind of internet trap that can monitor the numbers of men and women with these preferences and partly also the strength of their motivation and devotion. Neutral banners were baited in the e-mail boxes of both male and female users. By clicking the banner subjects could enter a web site and then select from several gates with simple symbols of hetero/homosexual and SM/non-SM partnerships. The web application automatically gathered the order and times of attempts to enter the gate for individual trap visitors.

## Methods

### Subjects

The studied population consisted of users of e-mail boxes provided free of charge by the Czech largest Internet portal Seznam.cz. When registering for a new e-mail account, the subjects were asked to provide information about gender and age and to agree to be the target of an unspecified advertisement campaign. The provider claimed that based on a content analysis of visited web sites, about 80–90% of men and 70–90% of women provided correct information about their gender when registering.



**Figure 1.** Design of an Internet trap. **a**, Banner for men. The banner title says “Gentlemen, look at Grofoo”. The title at a similar banner for women says “Ladies, look at Grofoo”. The term “Grofoo” has no meaning in Czech language. **b**, Trap first page. **c**, Trap second page for visitors who clicked the man silhouette at the first page. The order of gates in rows was rotated for each visitor.

### Procedure

Two neutral banners, one for men and one for women (Figure 1a), were displayed in the web interface of 202 083 male and 396 994 female e-mail boxes during a one-week period for men and a two-week period for women. The banner was always displayed only once during the user’s first access to his/her e-mail box. By clicking the banner the participants entered our Internet trap (Figure 1b). There the visitor could disclose his/her gender by pressing the respective silhouette. The clicked silhouette was filled blue and then a new screen with six gates appeared (Figure 1c). The order of gates in rows was rotated for each visitor. After clicking any gate an hourglass appeared and 5 s later a message “System busy,

try again” was displayed on the gate. The web application automatically gathered the order and times of attempts to enter the gates for each visitor. The order of the first five gate accesses and access times in between were recorded. At the end of the experiment, the records of about 19% repeated accesses from the same IP addresses were filtered out (only first access from an IP address were always used in further analyses). After that the data was anonymized by deleting the information about IP addresses. The methods for recruitment of experimental subjects and data collection were approved by the IRB of the Faculty of Medicine, Charles University.

**Table 1.** Strength of motivation in male and female trap visitors.

| Presumed*                 | M      |      |        |      | F      |      |        |      |
|---------------------------|--------|------|--------|------|--------|------|--------|------|
|                           | M      |      | F      |      | F      |      | M      |      |
| Declared**                | N      | %    | N      | %    | N      | %    | N      | %    |
| <b>1 gate</b>             | 398    | 94.3 | 54     | 87.1 | 466    | 91.2 | 52     | 88.1 |
| <b>2. gates</b>           | 324    | 76.8 | 40     | 64.5 | 350    | 68.5 | 36     | 61.0 |
| <b>3 gates</b>            | 244    | 57.8 | 23     | 37.1 | 253    | 49.5 | 21     | 35.6 |
| <b>4 gates</b>            | 168    | 39.8 | 13     | 21.0 | 165    | 32.3 | 14     | 23.7 |
| <b>5 gates</b>            | 112    | 26.5 | 8      | 12.9 | 112    | 21.9 | 10     | 16.9 |
| <b>Gender choice</b>      | 14.8 s |      | 18.8 s |      | 14.2 s |      | 17.9 s |      |
| <b>First gate choice</b>  | 19.1 s |      | 18.9 s |      | 19.0 s |      | 22.0 s |      |
| <b>Time spent in trap</b> | 63.2 s |      | 54.3 s |      | 53.4 s |      | 55.3 s |      |

The data in lines 1–5 show numbers (and percentages) of participants who tried to enter one, two, three, four and five gates, respectively. Line 6 gives time lag of participant's gender choice (time between entering the trap and denoting gender by pressing the respective silhouette), line 7 shows time lag of first gate choice (time between denoting gender by pressing the respective silhouette and selecting first gate) and line 8 gives total time spent in the trap (time between entering the trap and selecting the last gate).

\*presumed gender (M – male, F – female) of the participant (user of a particular e-mail account); \*\*gender denoted by the trap visitor

On the basis of raw data, the minimum length of stay in the trap (time between entering the trap and clicking the last door), time lag in denoting gender (time between entering the trap and clicking either the male or female silhouette), time lag of first choice (time between clicking either the male or female silhouette and clicking the first gate), waiting times for the first five gates (time between clicking the particular gate and the next one) and index of adherence to the first gate choice (total of times the same gate was chosen/total of attempts to enter any gate) were calculated for each subject. All time lags longer than 100 s and lengths of stay in the trap longer than 225 s were considered outliers and were removed from the data set. Categorical data (frequencies of particular gate choices) were analyzed with Chi Square, continuous variables (times and index of adherence) with nonparametric Kruskal-Wallis ANOVA. The program package Statistica 6.0 was used for all statistical testing.

## Results

During a one-week period the man-type banner was displayed 202 083 times on e-mail pages owned by male users. Eight hundred and twenty one presumed men (0.41%) clicked the banner and visited the trap. The woman-type banner was displayed 396 994 times on e-mail sites owned by female users during a two-week period to obtain similar numbers of hits for both genders. One thousand and fifty nine presumed women (0.27%) clicked the banner and visited the trap. Four hundred and eighty four presumed men disclosed their gender, 422 (87.2%) as male and 62 (12.8%) as female and after that 452 presumed men tried to enter at least one gate (Table 1.). Among presumed women, 570 indicated their gender, 59 (10.4%) as male and 511 (89.6%) as female, and then 518 of presumed women tried to enter

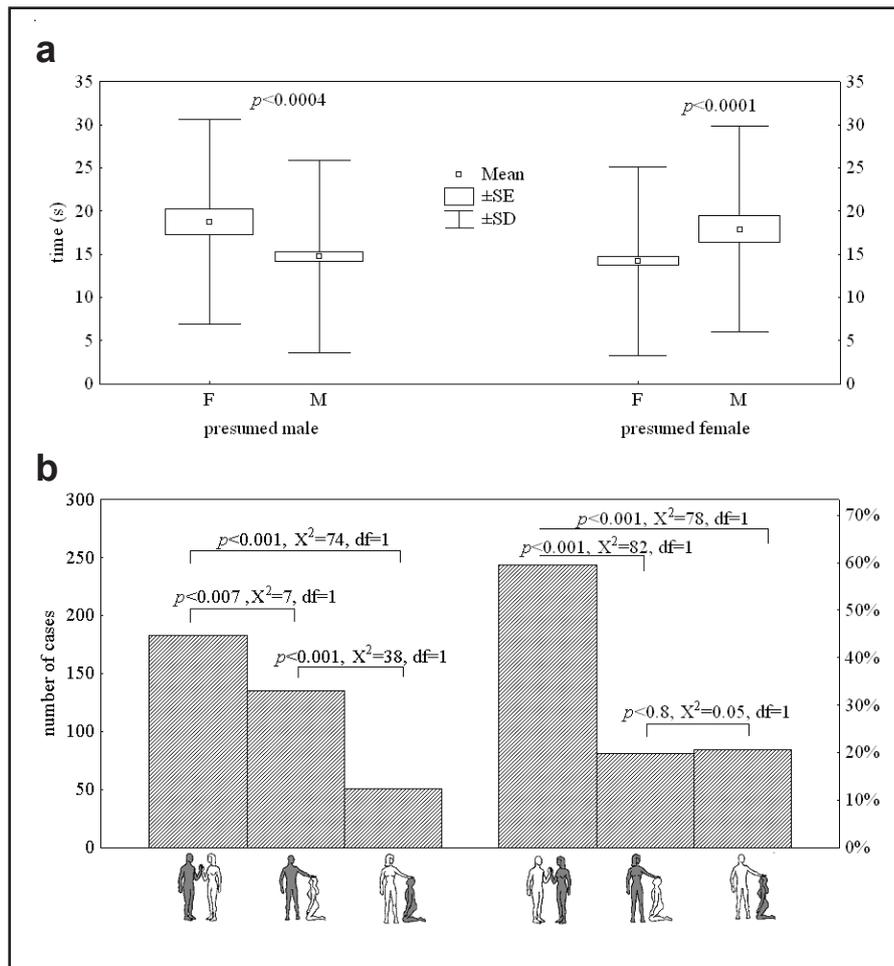
at least one gate (Table 1.). The subjects whose declared and presumed genders differed hesitated significantly longer before denoting gender by pressing the respective silhouette (Figure 2a). Next, we performed separately all analyses both for the subjects whose declared and presumed gender was identical and for all subjects divided into men and women on the basis of the declared gender, i.e. regardless of presumed gender. As the results of both types of analyses were nearly the same, only data on the former population will be presented. Frequencies of choices of particular gates are shown in Table 2. About 7.3% of men and 12.2% of women chose homosexual gates in their first gate choice. Frequencies of choices of particular heterosexual gates (in the first gate choice) and the results of particular statistical tests are shown in Figure 2b.

The gates with symbols of an unequal sexual partnership (“SM” gates) were chosen by 51.0% men and 41.6% women. Men entered the submissive-woman gate approximately 2.6 times more frequently than the dominant-woman gate. At the same time, women entered the either submissive- or dominant-man gates with equal frequency.

To disclose possible differences in motivation of subjects with particular preferences we compared several parameters for particular gates and particular subjects separated into groups according to their first choice gate. We found no difference in waiting times for particular types of gates for both men and women. For men, the Kruskal-Wallis ANOVA showed differences in average time spent in the trap ( $p=0.018$ ) Figure 3. No difference in time spent in the trap was found for women. No significant differences were observed either in index of adherence to first gate choice for both men and women. For example, the men who clicked the heterosexual gate with kneeling man in their first attempt and those who

**Table 2.** First gate and all gate choices of male (M) and female (F) participants. The dark silhouette represents the responder and the white one stands for his/her partner.

|  | Declared M |      |           |      |            |      |           |      |  | Declared F |      |           |      |            |      |           |      |
|---|------------|------|-----------|------|------------|------|-----------|------|---|------------|------|-----------|------|------------|------|-----------|------|
|   | Presumed M |      |           |      | Presumed F |      |           |      |   | Presumed F |      |           |      | Presumed M |      |           |      |
|   | Gate 1     |      | All gates |      | Gate 1     |      | All gates |      |   | Gate 1     |      | All gates |      | Gate 1     |      | All gates |      |
|   | N          | %    | N         | %    | N          | %    | N         | %    |   | N          | %    | N         | %    | N          | %    | N         | %    |
|  | 183        | 46   | 476       | 38.2 | 19         | 36.5 | 48        | 36.0 |  | 244        | 52.4 | 611       | 45.4 | 11         | 20.4 | 25        | 18.1 |
|  | 135        | 33.9 | 361       | 29.0 | 13         | 25.0 | 34        | 25.6 |  | 81         | 17.4 | 246       | 18.3 | 9          | 16.7 | 22        | 16.0 |
|  | 51         | 12.8 | 226       | 18.1 | 14         | 26.9 | 33        | 24.8 |  | 84         | 18.0 | 254       | 18.9 | 10         | 18.5 | 35        | 25.4 |
|  | 12         | 3.0  | 64        | 5.1  | 4          | 7.7  | 8         | 6.0  |  | 28         | 6.0  | 101       | 7.5  | 9          | 16.7 | 25        | 18.1 |
|  | 10         | 1.7  | 63        | 5.1  | 1          | 1.9  | 4         | 3.0  |  | 14         | 3.0  | 63        | 4.7  | 11         | 20.4 | 16        | 11.6 |
|  | 7          | 2.5  | 55        | 4.4  | 1          | 1.9  | 6         | 4.5  |  | 15         | 3.2  | 70        | 5.2  | 4          | 7.4  | 15        | 10.9 |



**Figure 2.** Behavior of the trap visitors. **a**, Time needed by presumed males and presumed female for declaring either male (M) or female (F) gender (by pressing the respective silhouette). The p values were derived from the nonparametric Kruskal-Wallis ANOVA. **b**, First gate choices in heterosexual men and women. The p values were derived from the Chi Square test.

**Figure 3.** Behavior of the trap visitors. a, Time spent by men in the trap. b, Time lag of first gate choice of heterosexual gates for men and c for women. The p values were derived from the Mann-Whitney test.

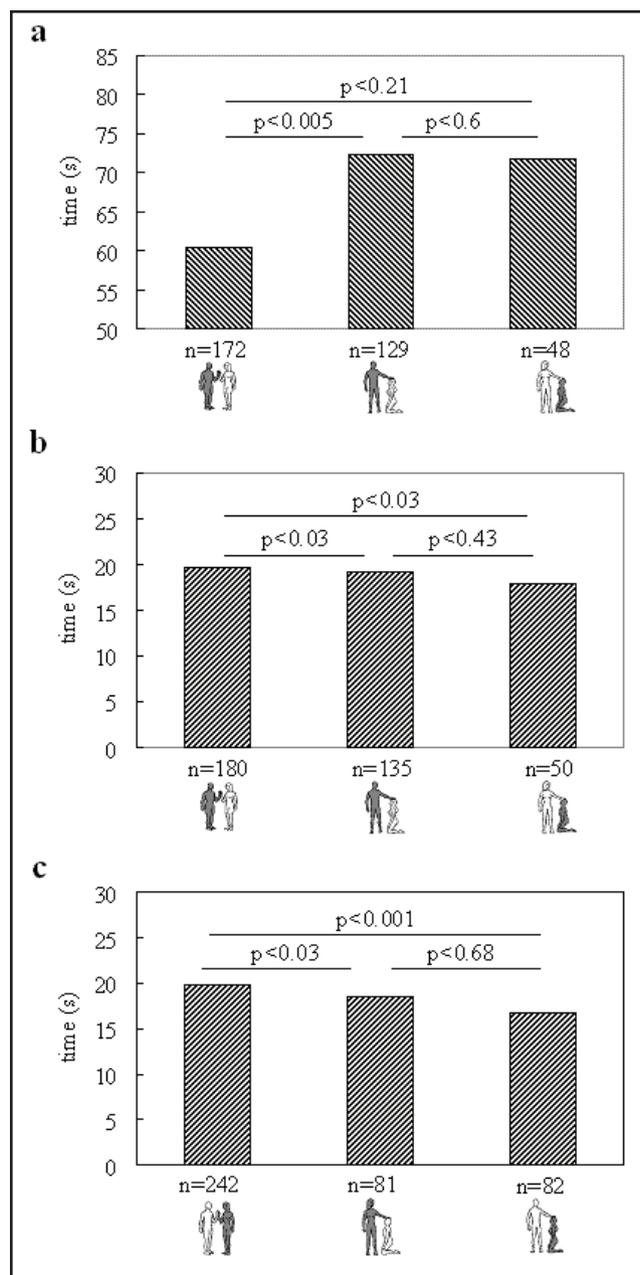
clicked the heterosexual gate with kneeling woman in their first attempt repeated their choice with similar frequencies. Both men ( $p < 0.03$ ) and women ( $p = 0.0001$ ) differed in time lag of particular first gate choice: the gates with standing (equal) man and woman were always chosen most slowly, Figure 3.

## Discussion

Among 864 visitors of our Internet trap (398 men and 466 women whose disclosed gender agreed with their presumed gender and who entered at least one gate) 7.3% men and 12.2% women chose gates with homosexual content (homosexual gates) in their first choice. Similarly, 51.0% men and 41.6% women chose the gates with symbols of unequal sexual partners (SM gates). The men entered the SM gate with submissive women approximately 2.6 more times than the gate with dominant women. In the same time, the women entered the SM gates with submissive and dominant men with equal frequencies. We found no indications for the proposition that submissive and the dominant men (women) differ in strength of their motivation to enter particular gates (no differences in waiting time for particular gates and in index of adherence to first gate choice) or consciously try to hide their natural tendencies by pressing the “wrong” gate (no differences in time lag of first gate choice).

The design of our study does not allow to tell whether the choice of a particular gate reflects a subject’s sexual preferences rather than just his/her general curiosity. However, we incline to believe that the interest of most of the trap visitors in particular gates was primarily driven or at least influenced by their sexual preferences. This presumption is supported by four independent (and rather indirect) lines of evidence:

1) The frequency of subjects entering the homosexual gates (7.3% of men and 12.2% of women) approximately corresponded to the expected proportion of the population with homosexual preferences (see below).



2) Pronounced gender specific differences were observed in the submissive to dominant gate entrance ratios (0.4 to one for men, 1.0 to one for women).

3) The subjects showed clear indices of strong motivation for their behavior. They usually stayed in the trap very long (men for 63.2s on average, women for 53.4s on average) and usually tried (unsuccessfully) several gates (for example 112 men and the same number of women tried five gates) before finally leaving our web site. Many of them (17.8% of men and 20.2% of women) saved the link to the page and voluntarily returned to the trap later on, some of them even several days after their first visit. They also exhibited a strong adherence to their first gate choice.

4) The men in our sample of e-mail users expressed stronger curiosity by clicking the banner advertising mys-

terious grofoo approximately 52% more often than women. However, after entering the trap, women and men showed similar curiosity: they stayed in the trap similarly as long and tried to enter similar numbers of gates.

The proportion of men with homosexual interest in our sample was in good agreement with results of other studies. For example Laumann, Gagnon, Michael, and Michaels (1994) reported 7.7% of male and 7.5% of female subjects who claimed homosexual desires among the US population [11]. Kinsey reported 10% prevalence of homosexuality in U.S. men and 2–6% prevalence of homosexuality in US women, however, he also estimated that nearly 46% of men had engaged in both heterosexual and homosexual activities, or “reacted to” persons of both sexes, in the course of their adult lives and between 6 and 14% of women (ages 20–35) had more than incidental homosexual experience in their histories [5]. Similarly, as many as 22% of men and 17% of women in the USA had at least some homosexual experience [10]. The Australian study showed that about 1.6% men and 0.8% women identified as homosexual while 0.9% men and 1.4% women identified as bisexual [15], however, 8.6% of men and 15.1% of women report either feeling attraction to the same sex or some sexual experience with the same sex [6]. In the Czech Republic, sexual intercourse with the same sex was reported by 5% of men and 6% of women [18].

The incidence of women preferring homosexual gates in our sample (12.2%) was higher than expected on the basis of previous studies. We believe that our data reflect more correctly the real frequency of women with homosexual preferences among a modern western population. Lower values obtained in interviews or questionnaire-based studies can be explained by the women’s strong tendency to underreport sexual activities in terms of both their frequency and scope. In our study the subjects had much weaker motivation to hide their natural tendencies and preferences. Most subjects voluntarily entering the trap from their private e-mail box did not suspect they were the subject of scientific study. Moreover, they probably clicked the banner (and entered the trap, and then stayed in the trap) only when they felt secure and in privacy. Under such conditions they had only few reasons for hiding or distorting their natural preferences.

The prevalence of subjects with SM preferences in the general population is not known. Kinsey’s data showed that about 12% of women and 22% of men reported having an erotic response to a sadomasochistic story, and 55% of women and 50% of men reported having responded erotically to being bitten. Janus and Janus [10] showed that about 14% of male and 11% of female responders in USA had personal experience with SM sexual practices and about 8–10% of responders had some SM “toys” at their homes. In Australia, 12% of men who had been homosexually active in the six months before the interview

reported being engaged in SM activities [2]. Another Australian study showed that 2% men and 1.4% women that had during last six months partner participated in SM [12]. Again, we believe that most of the previous studies strongly underestimated the actual proportion of the general population with sexual SM preferences. Some subjects probably do not admit their “perverse” sexual preferences in questionnaire-based studies. Also, some subjects probably never followed their natural sexual (SM) preferences and therefore have neither personal experience with SM sexual practices nor have any SM equipment at their homes. Most importantly, many subjects are probably sexually aroused just by the difference in hierarchical positions between sexual partners and have no need to involve in any formal SM practices. All these subjects probably chose the SM gates in our trap while they would have scored SM-negative in all previous studies. Therefore, we believe that the results of our study, i.e. 50.4% of SM positive men and 40.3% of SM positive women, better reflect the real frequency of subjects with SM interest (of course not SM behavior) among our study population.

The frequency of subjects with SM interests was slightly higher in homosexual (58.6% men and 50.9% women) than heterosexual (50.4% men and 40.3% women) subjects, which agree with results of Australian studies [2,12]. Possibly, the subjects willing to admit their homosexual orientation are also more willing to admit their SM interest. However, the number of homosexual subjects in particular SM categories is very low. Therefore, more data will be probably needed for confirmation of this observation.

In accord with the evolutionary psychological theory of SM discussed in the introduction, the SM-positive men strongly prefer to be in the dominant role. Surprisingly, equal fractions of SM-positive women prefer the submissive and dominant roles. The evolutionary theory predicts that most women would prefer the submissive role in sex (to get the good genes from the best, i.e. most dominant, men in the population). We found no evidence to support what we believe is the most probable explanation: a part of women are unable or unwilling to accept their natural tendencies and chose the dominant instead of the submissive gate. The same could be also true of 13.8% of men who chose the gate with dominant woman and whose sexual interest was therefore incompatible with evolutionary psychology-based expectations of woman’s (submissive) sexual preferences. The only clues to lower motivation to enter particular gates and therefore to possible conscious distortion of the subject’s natural tendencies (shorter time spent in the trap and slower choice of the first gate) were observed in the subjects preferring the gate with equal man and woman in their first choice. The existence of dominant women and submissive men can be explained in four principally different (nonexclusive) ways, at least.

- 1) Unconscious suppression and transformation of the subject's natural tendencies. Our Internet test probably discriminates between the subjects who make their choices spontaneously and those who hesitate before pressing the gate because of a conscious conflict between their rationally reflected natural tendencies and their rationally reflected personality (scale of values). However, the resolution of our method does not allow differentiation between the subjects whose rationally self-reflected natural tendencies correspond to their real natural tendencies and those whose rationally self-reflected natural tendencies have already been unconsciously suppressed and substituted with the opposite tendencies. The results of Sanchez et al. [13] suggest that women may suppress their natural preference to obey common gender stereotypes and similar effect can be expected in men too. The high frequency of subjects who sometimes (or even often) switch between dominant and submissive sexual preferences (so called "switches") in SM communities suggests that the internal battle between the rationally self-reflected and unaware tendencies can play an important role in SM phenomena.
- 2) The evolutionary constraints. For example, the SM preferences can be adaptive for members of one sex only. The members of the other sex, e.g. men, can express these preferences just because of the presence of the same genes in their genomes.
- 3) A more complex evolutionary psychological explanation for the existence of the SM phenomenon. For example, the dominant sexual preference can be useful for high quality men (it can help them to achieve reproduction with high quality women) and low quality women (it can help them gain resources – in an exchange for reproduction – from low quality men) and at the same time the submissive sexual preference can be useful to low quality men (it can help them to achieve the reproduction with at least some (low quality) women – in an exchange for resources) and to high quality women (it can help them to achieve reproduction with high quality men). Again, existence of such conditional strategies could explain the high frequency of switches in SM communities. Study of correlation of hierarchical status of subjects with his/her sexual preferences should be used in future for testing this conditional strategy theory.
- 4) Evolutionary explanation of SM is wrong and some other explanations, for example the psychoanalytic model of SM [4], hold.

The most interesting result of our study was detection of a rather high frequency of subjects expressing interest for difference in hierarchical positions between sexual partners in a population of e-mail users. The number of men with such interests was in fact higher than that of men without such interest and the numbers of women with and without such interests were nearly equal. The current surveys show that only about 33% of people

regularly use e-mail in the Czech Republic. Therefore, it is not clear whether the results obtained for our sample of e-mail users can be generalized to the whole population. If yes, then the preferences for disparity in hierarchical status of sexual partners, the probable background of the sadomasochism phenomena, could be in fact an important part of regular human reproduction strategy.

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