

An evolutionary perspective of the sexual orientation spectrum

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Homosexuality: An evolutionary puzzle

- Homosexuality is defined as a stable exclusive or predominant sexual preference of and attraction to individuals of the same sex
- *"How can a trait like (...) homosexuality, which has a genetic component, persist over evolutionary time if the individuals that carry the genes associated with that trait are not reproducing?"*

Paul Vasey

Basics of homosexual orientation - genes

- HO was shown to have a **genetic component** that explains approximately one third of the inter-individual variation (e.g., Zietsch et al., 2012; for review, see Bailey et al., 2016)

= HO is a complex trait, composed of **genetic and environmental components**

Basics of homosexual orientation - hormones

- One of the environmental factors influencing development of sexual orientation is **sex hormones action**
- The organizational hypothesis: neural system of homosexual individuals is influenced by sex atypical hormone levels during early developmental (prenatal) phases
 - = Support: Systematic differences between homosexual and heterosexual individuals in traits that develop at least partly under the influence of sex hormones (neuroanatomy, morphology, cognition, behavior) (for review, see Bailey et al., 2016; LeVay, 2010; Wilson & Rahman, 2005)
- On average, homosexual individuals are more sex atypical than heterosexual individuals
- criticism: cause and effect



Homosexual Behaviour in Animals

An Evolutionary Perspective

Edited by **Volker Sommer** and **Paul L. Vasey**



CAMBRIDGE

Evolutionary theories of male homosexuality

1. Male homosexuality as a by-product:

- ***A fertile woman hypothesis***: Male homosexuality is a by-product of an advantage of female reproductive success
- Support: Female relatives (sisters, mothers, grand-mothers) of homosexual men have earlier puberty (longer reproduction), and higher numbers of offspring (Blanchard & Lippa 2007; Camperio Ciani et al., 2004, 2008; lemmola et al., 2009; King et al., 2005; Schwartz et al., 2009; VanderLaan & Vasey, 2009)

Evolutionary theories of male homosexuality

- ***Hypothesis of a succesful heterosexual:*** heterosexual men who carry the homosexuality-linked genetic component have higher reproductive success
- Support: heterosexual twins of homosexual individuals, who most probably share the genetic component of homosexuality but are not homosexual, report higher number of sexual partners than heterosexual twins of heterosexual individuals (Zietsch, et al., 2008)

Evolutionary theories of male homosexuality

1. Homosexuality as an adaptation:

➤ *Kin selection*

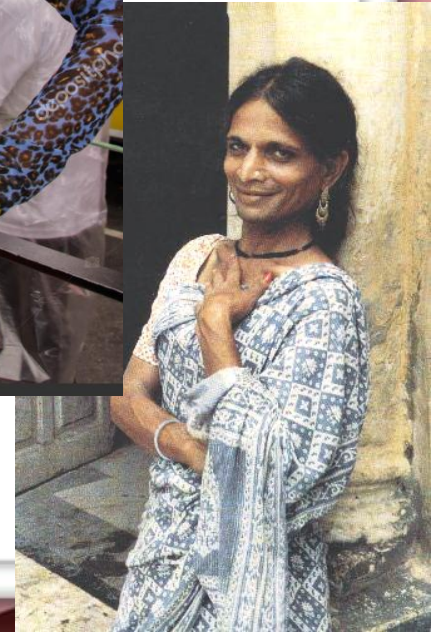
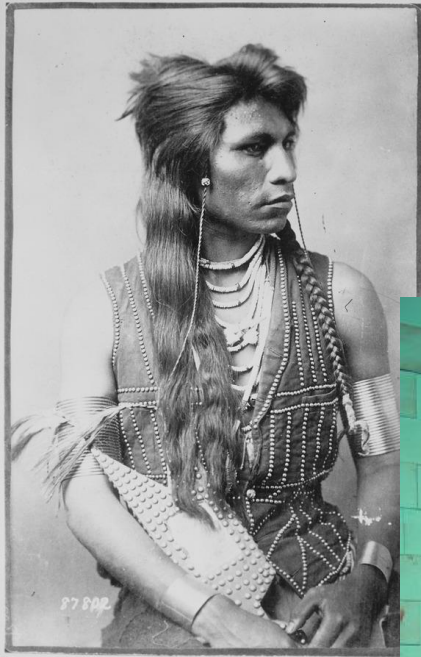
- 'Helpers' in birds and insects (but also mammals): one reproductive couple, the rest of the population is asexual, helping to build the nest, protect and feed the siblings
- homosexual individual as a "helper", helping his parents or siblings to reproduce successfully
- Genes for homosexual orientation are thus passed through their relatives, thank to the direct help of the homosexual individual
- Studies in GB, USA, Japan: No support (Bobrow & Bailey, 2001, Rahman & Hull, 2005, Vasey and Vanderlaan, 2011)

Kin selection

- Samoa: Fa'afafine report higher avuncular tendencies (Vasey and Vanderlaan, 2007, 2009, 2010)
„My sister has a daughter and a newborn son now. Soon she will go back to work and I will be the mother.“



Third gender

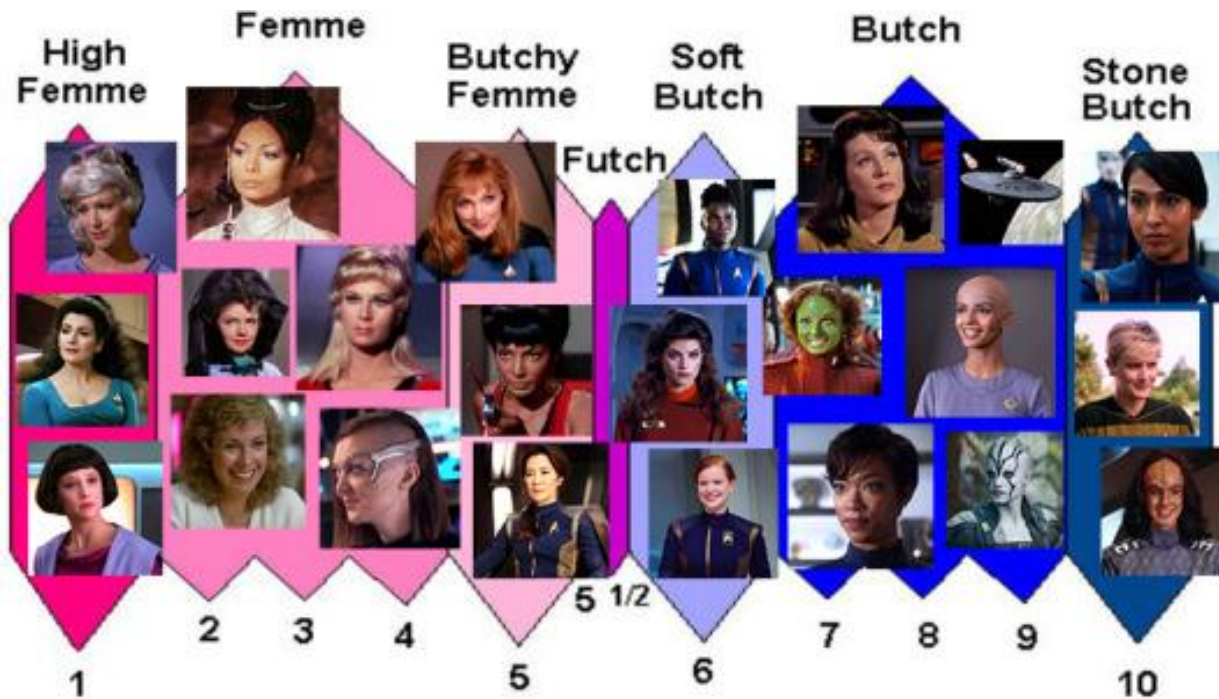
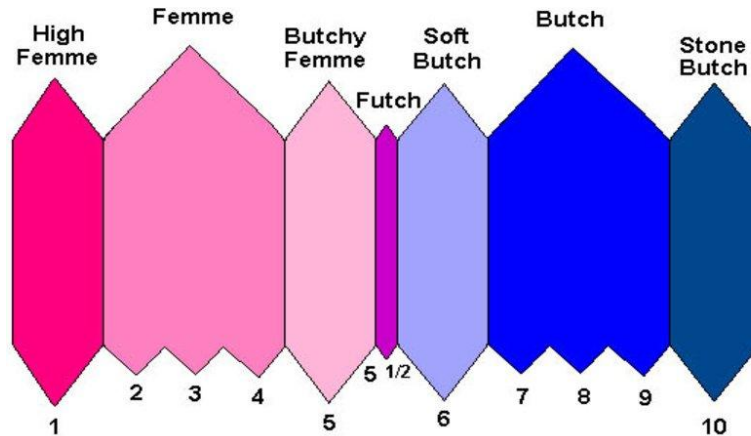


Who are Bears?





Butch & Femme

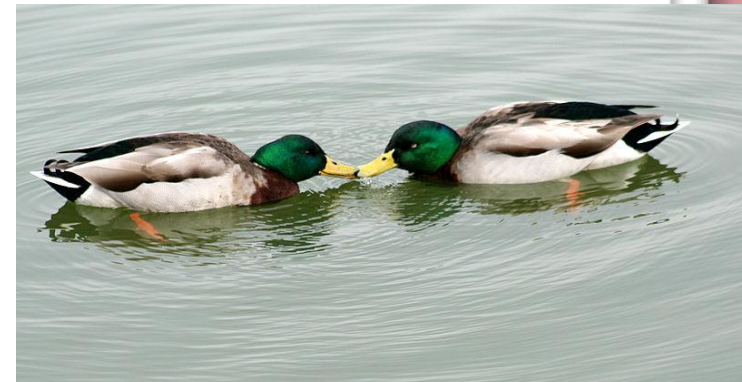


Take-home message I:

Different subtypes of homosexuality or non-heterosexuality linked to different levels of masculinity-femininity can be explained by different evolutionary theories

Exclusive homosexuality?

- We have mentioned theories explaining stable same-sex sexual preferences, life-long and exclusive homosexual orientation
- In other animals: stable same-sex preferences including sex, pair-bonding and parenting are relatively rare: black swans, penguins, ducks, gulls, zebras, elephants, spotted hyenas, sheep, macaques
- Occasional same-sex behavior: in more than 1500 species, incl. insects, amphibians, reptiles, fish, birds, and mammals
- **Sexual orientation is not only exclusive homosexuality or exclusive heterosexuality!**



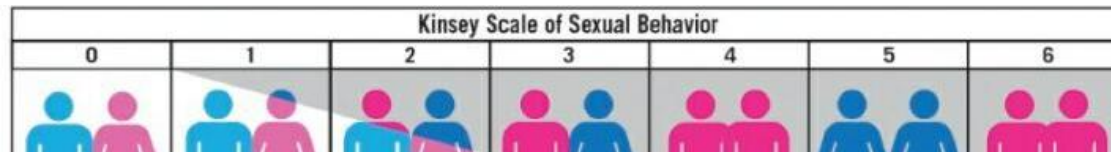
Exclusive

hetero/homosexuality?



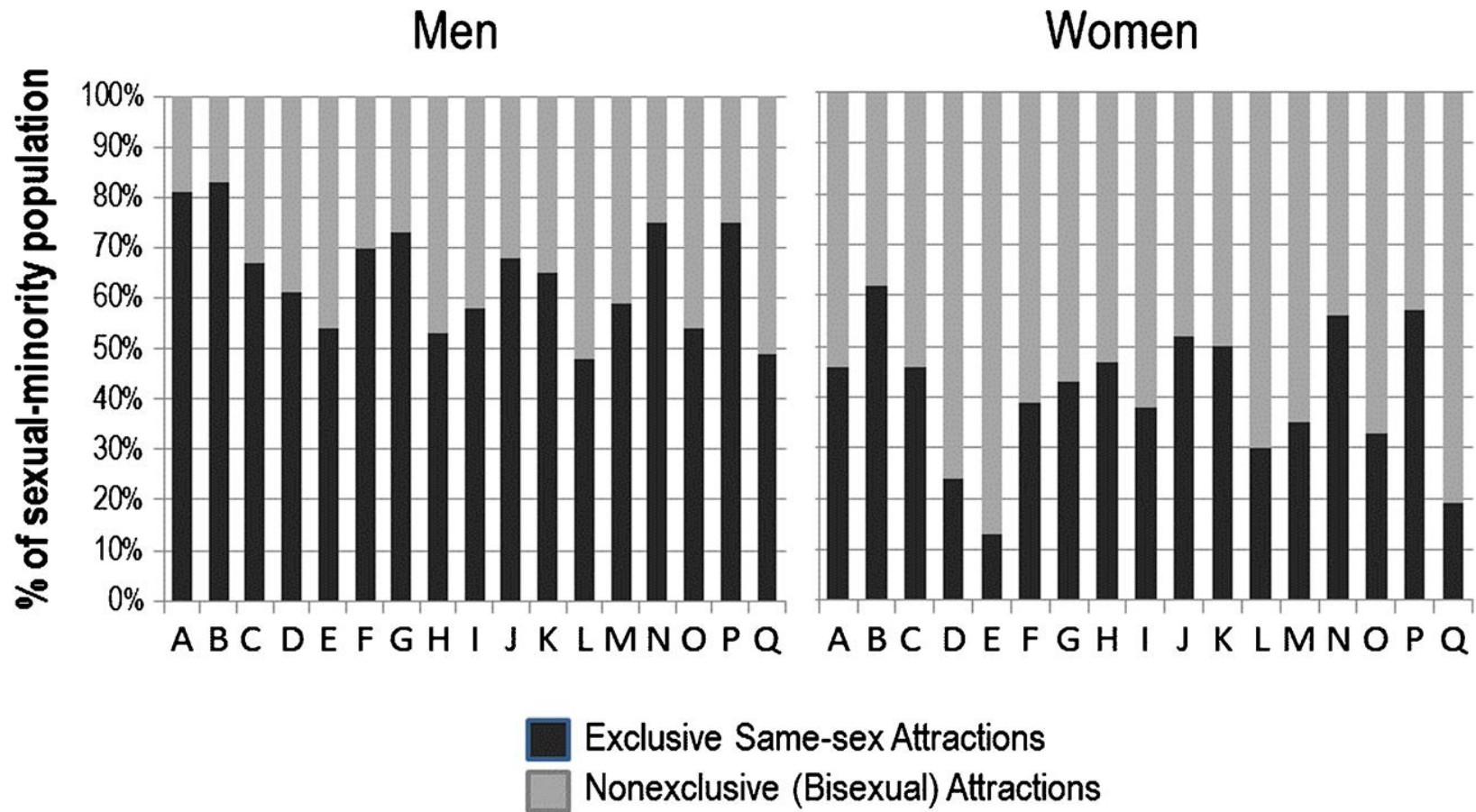
- Traditional model of two separate categories: Exclusive heterosexuals versus exclusive homosexuals

- Recently was added category of “bisexuals” but the categorization of sexual orientation remains
- Institute of Medicine report: sexual orientation is “*an enduring pattern of or disposition to experience sexual or romantic desires for, and relationships with, people of one’s same sex, the other sex, or both sexes*”
- However, sexual orientation seems to be less categorical



Categories “mostly heterosexual” and “mostly homosexual” were shown as valid and frequently used by respondents (Vrangalova & Savin-Williams, 2012)

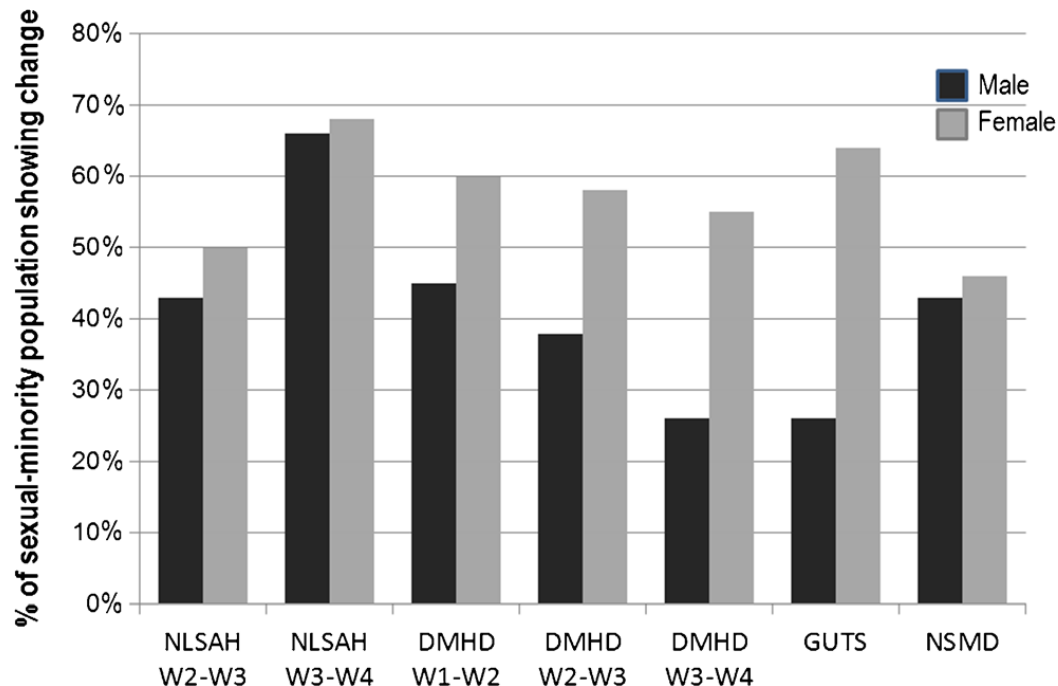
Exclusive homosexuality?



- Percentages of same-sex attracted men and women showing exclusive versus nonexclusive patterns of attraction, across 16 representative studies, with more than 3 million participants (Diamond, 2016)

Fluidity of sexual orientation

- **Fluidity** defined as a capacity for situation-dependent flexibility in sexual responsiveness, which allows individuals to experience changes in same-sex or other-sex desire across both short-term and long-term time periods



- Percentages of sexual-minority men and women reporting longitudinal changes in sexual attractions (Diamond, 2016)

Homosexuals do not reproduce?

- 20% of homosexually identified white American men reported having been married to a woman at some point in their life, and 50% of homosexual men reported having produced at least one child (Bell & Weinberg, 1978)
- recent demographic data showed that 37% of LGBT identified individuals in the US report to have had a child (Gates, 2013)
- Fa'afafine do not have children (Vasey and Vanderlaan, 2009)

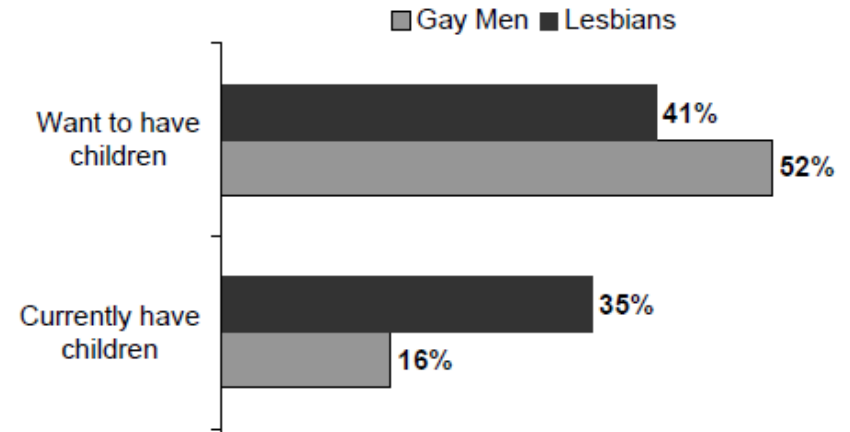


- Wells, et al. (2011). New Zealand

Sexuality groups	1 or more biological children	
	Males %	Females %
Heterosexual, no same-sex sexual experience	63.4	72.6
Heterosexual, same-sex sexual experience only	53.9	71.0
Heterosexual, same-sex sexual experience and relationship	60.0	69.0
Bisexual	28.0	64.5
Homosexual	13.5	47.6

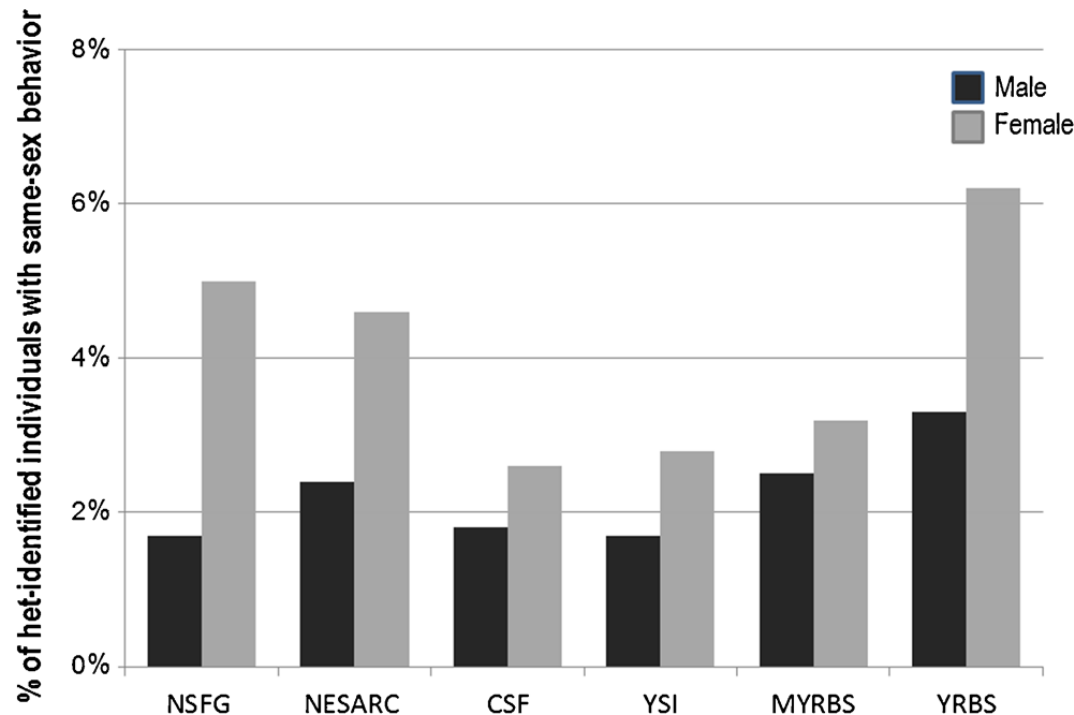
National statistics USA, 2007

- More than one in three lesbians have given birth and one in six gay men have fathered or adopted a child



- More than half of gay men and 41 percent of lesbians want to have a child
- An estimated two million GLB people are interested in adopting
- Gay and lesbian parents are raising four percent of all adopted children in the United States
- Same-sex couples raising adopted children are older, more educated, and have more economic resources than other adoptive parents (Gates, 2007)

Exclusive heterosexuality?



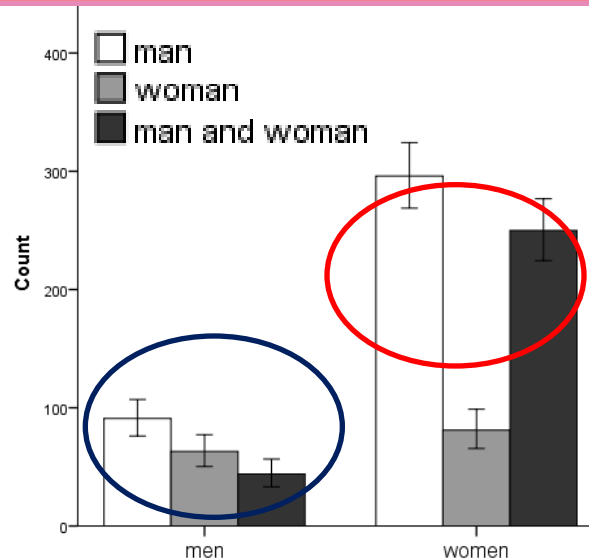
- Percentages of same-sex behavior among heterosexually identified men and women, across 16 representative studies, with more than 3 million participants (Diamond, 2016)

Exclusive heterosexuality?

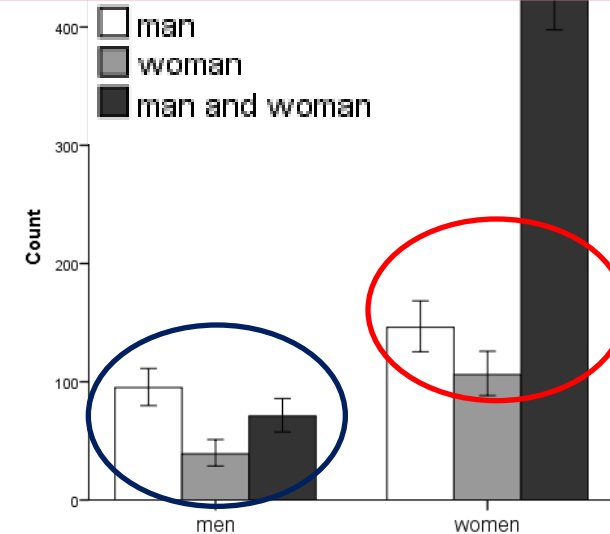
- A large-scale study demonstrated that almost 10% of heterosexually identified men reported that they have engaged in same-sex sexual activities (Pathela et al., 2006)
- A `potential for homosexual response` was reported by 32.8% of men and 65.4% of women: a huge proportion of predominantly heterosexual people has a propensity to experience same-sex sexual attraction and/or interaction (Santtila, et al., 2008)
- In some non-western populations, such as Samoa, the majority of predominantly heterosexual men engage in sex with women and the third gender (Pettersen et al., 2015)



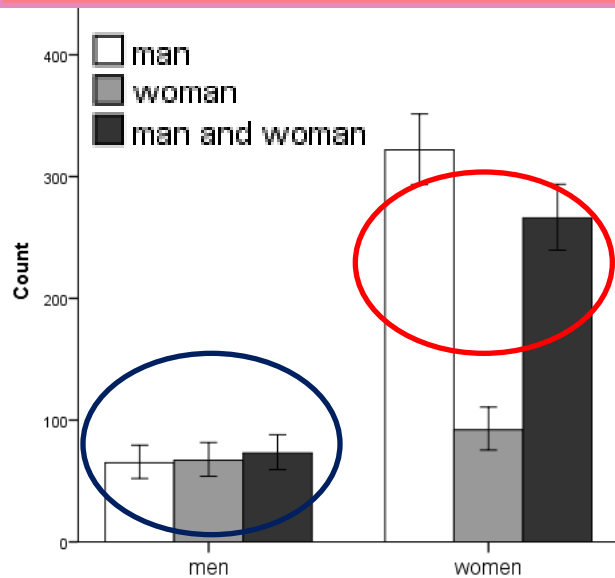
Have you ever had sex with



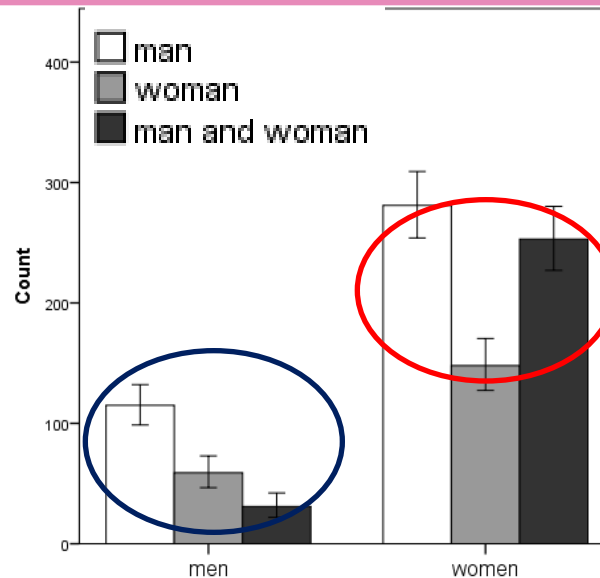
Can you imagine having sex with



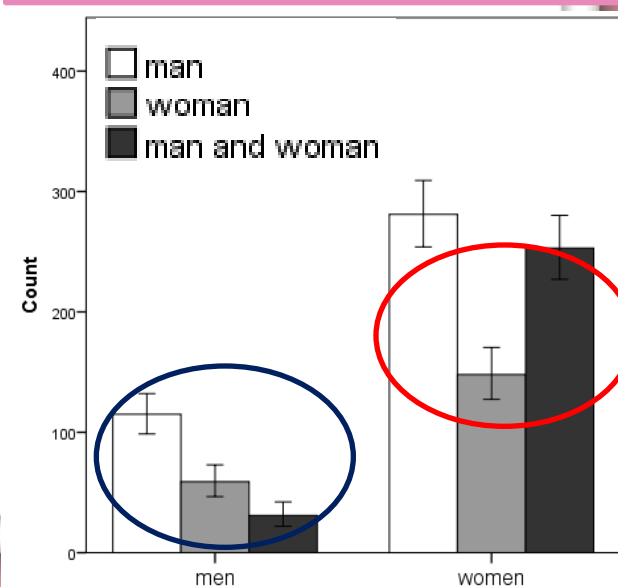
Have you ever fallen in love with



Have you ever had a long-term relationship with



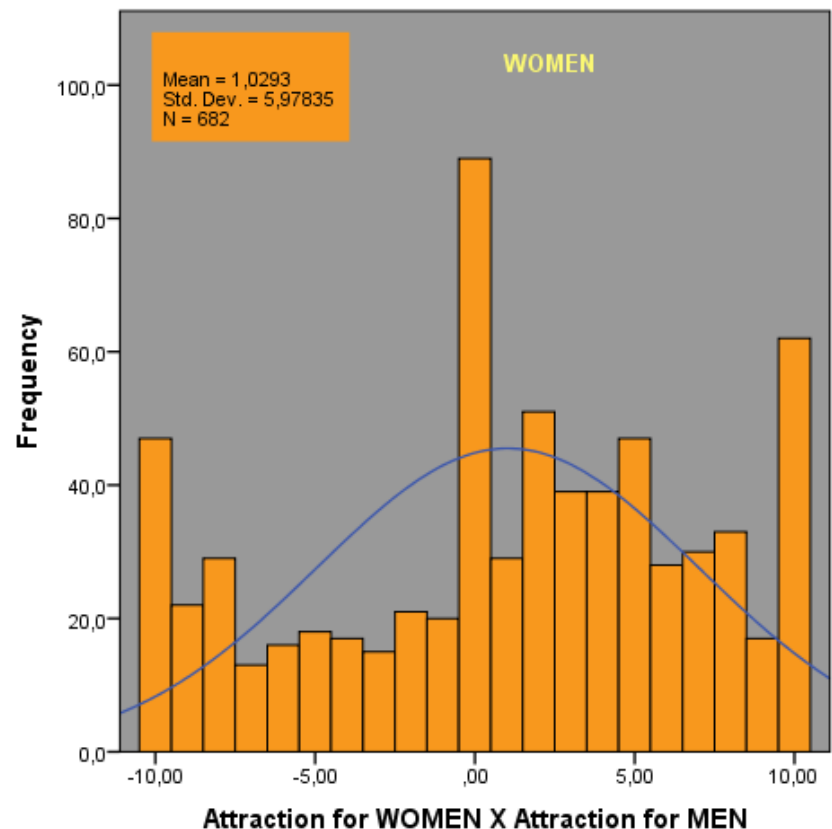
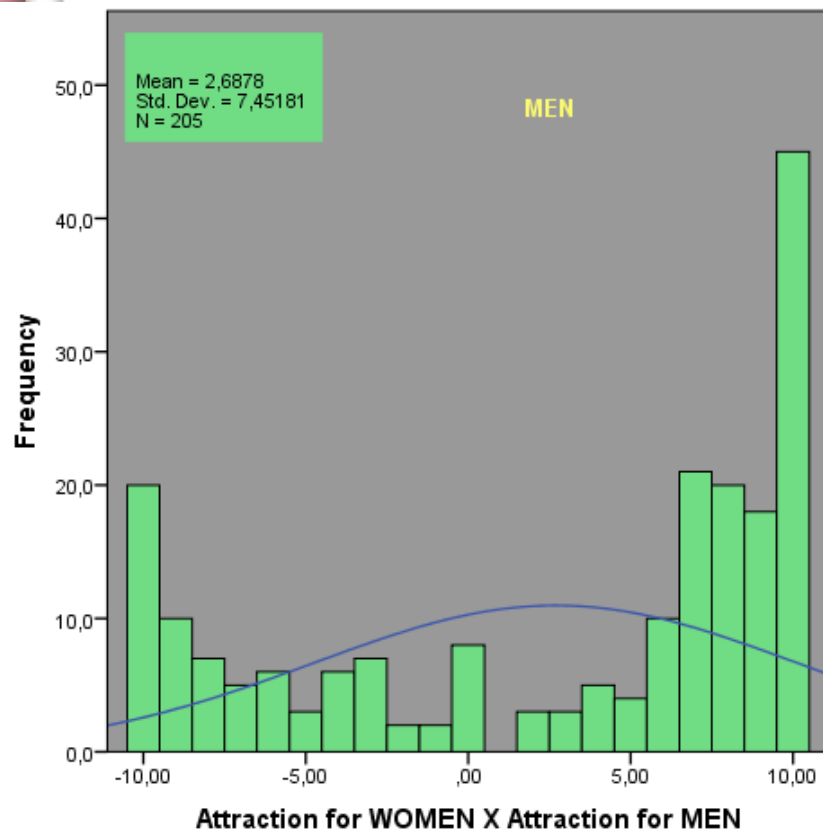
Can you imagine having a long-term relationship with



887 cis Brazilian individuals ($M_{age}=22.9$)

Attraction toward one or both sexes

- How much are you sexually attracted to men? (0-10)
- How much are you sexually attracted to women? (0-10)
- Men (N = 205): $\tau = - .616$ Women (N = 682): $\tau = - .422$
- Subtraction (Attraction toward MEN – Attraction toward WOMEN)



Female sexual attraction and arousal

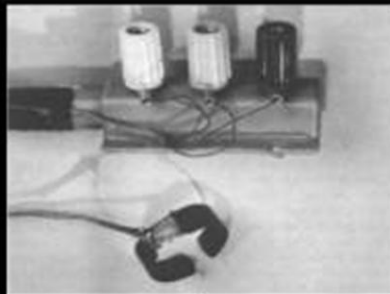


Rieger G, Savin-Williams RC (2012) *The Eyes Have It: Sex and Sexual Orientation Differences in Pupil Dilation Patterns*. PLoS ONE 7(8): e40256.

- In general, self-reported sexual orientation corresponded with pupil dilation to men and women
- Among women, **substantial dilation to both sexes was most common in heterosexually-identified women.**

A sex difference in the specificity of sexual arousal

- Chivers, M. L., Rieger, G., Latty, E., & Bailey, J. M. (2005). A sex difference in the specificity of sexual arousal. *Psychological Science*, 15, 736-744.
- Vaginal photoplethysmograph and penile plethysmograph
- ht and hm men and women, ht and hm stimuli
- Subjective arousal and measured genital arousal



Penile Plethysmographs

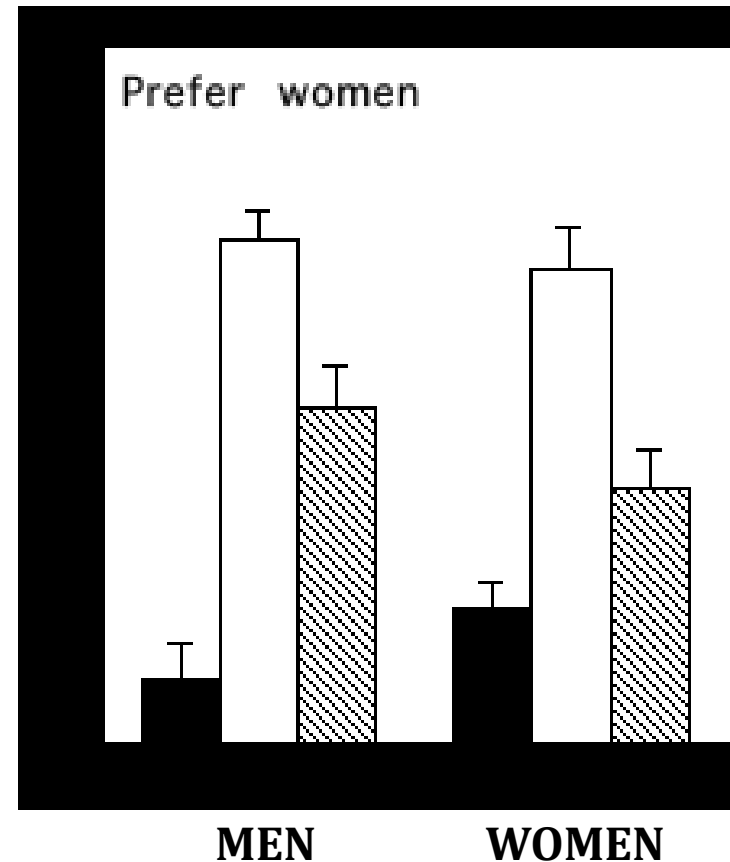
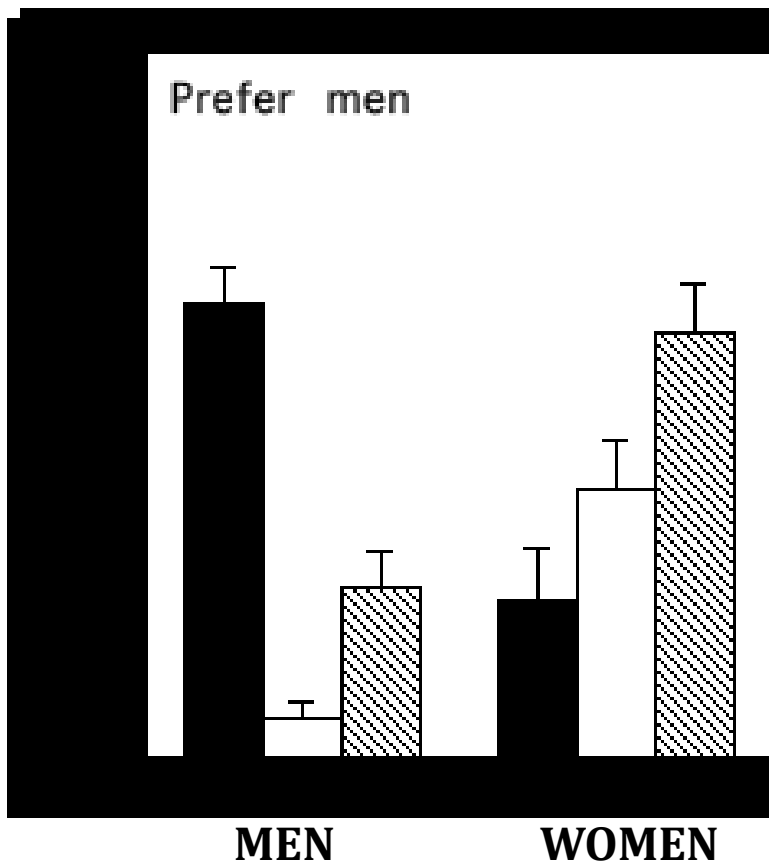


"Penile Cuffs"



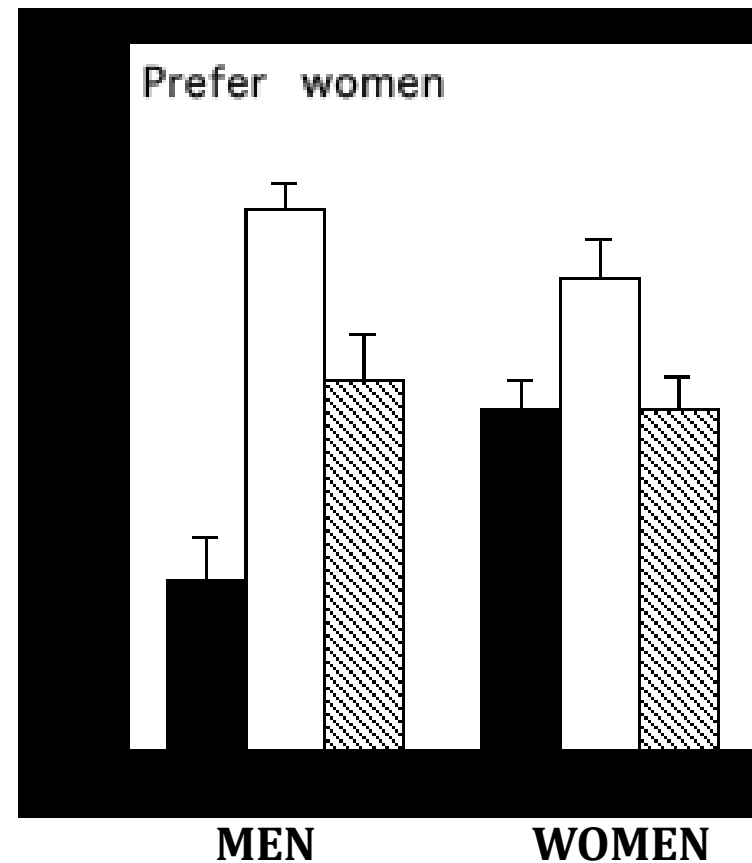
Average subjective arousal on different stimuli

■ Male-male film □ Female-female film ▨ Male-female film



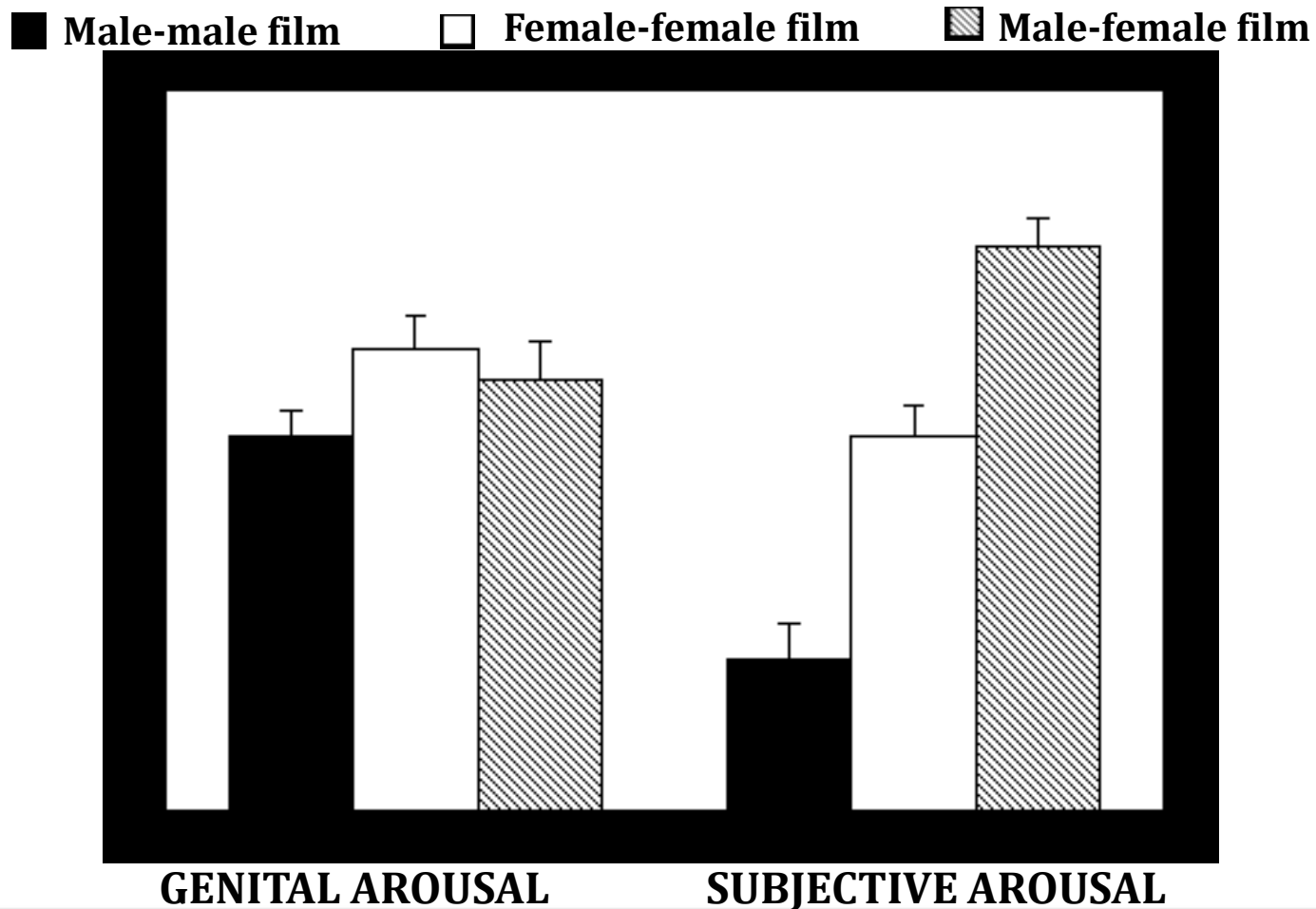
Average genital arousal on different stimuli

■ Male-male film □ Female-female film ▨ Male-female film



Chivers, M. L., Rieger, G., Latty, E., & Bailey, J. M. (2005). A sex difference in the specificity of sexual arousal. *Psychological Science*, 15, 736-744.

Average genital and subjective arousal of heterosexual women



Fluidity of female sexual orientation

Diamond (2008):

- Over 10 years, 2/3 of women changed the identity labels they had claimed at the beginning of the study, and 1/3 changed labels 2 or more times.
- more women adopted bisexual/unlabeled identities; overall, the most commonly adopted identity was “unlabeled.”
- in women, different sexual orientations are rather a matter of degree than a kind

Female sexual orientation

- female sexual orientation is substantially flexible, fluid, nonexclusive, and shaped by external and sociocultural factors

X

- male sexual orientation is rigid, stable, exclusive, and shaped by biological factors (Bailey, 2009; Baumeister, 2000; Diamond, 2008, 2009; Peplau, 2001)
- male sexual orientation is bimodally distributed (Bailey, 2009)
- “bisexual” men had either heterosexual or homosexual but not bisexual arousal pattern (Rieger, Chivers, & Bailey, 2005)

Male bisexuality

Rieger G, Chivers ML, Bailey JM (2005). "Sexual arousal patterns of bisexual men". *Psychological science*, 16 (8): 579–84.

- Result: **bisexuals had mostly reactions as homosexual men – they react more on same-sex erotic stimuli**
- Interpretation: bisexuals don't exist!

Rosenthal AM, Sylva D, Safron A, Bailey JM (2011): "Sexual arousal patterns of bisexual men revisited." 88 (1): 112–115

- Result: **Bisexual men demonstrated bisexual patterns of both subjective and genital arousal**
 - Interpretation: Bisexuals exist!
-
- Rieger et al. (2012): Among men, substantial pupil dilation to both sexes was most common in bisexually identified men

Take-home message II:

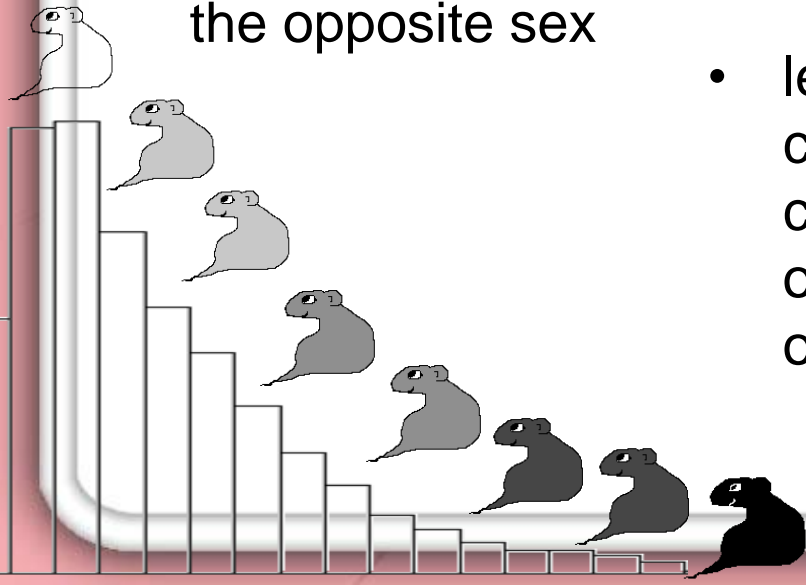
- Male and female sexual orientations differ but they both are flexible, and rather of a continuous character,
- Same-sex sexual tendencies are frequent among heterosexual individuals
- Individuals of all sexual orientations frequently reproduce

Adaptiveness of non-heterosexuality

- Same-sex sexual behavior and feelings can serve the purpose of forming and supporting same-sex alliances (*Kirkpatrick, 2000*)
- Same-sex sexuality does not primarily serve sexual (and reproductive), but rather social purposes (homo-sociality), it promotes lower aggressiveness and better cooperation among same-sex individuals
- The same function as non-procreative heterosexual sex – oral sex, anal sex, ejaculation anywhere outside the vagina and outside the fertile period – dyadic sex usually does not lead to reproduction, but to pleasure, to higher satisfaction, lower stress, improved communication, appeasement
- The most adaptive: behavioral and/or emotional bisexuality – ability to reproduce and to form same-sex bonds (*Kirkpatrick, 2000*)

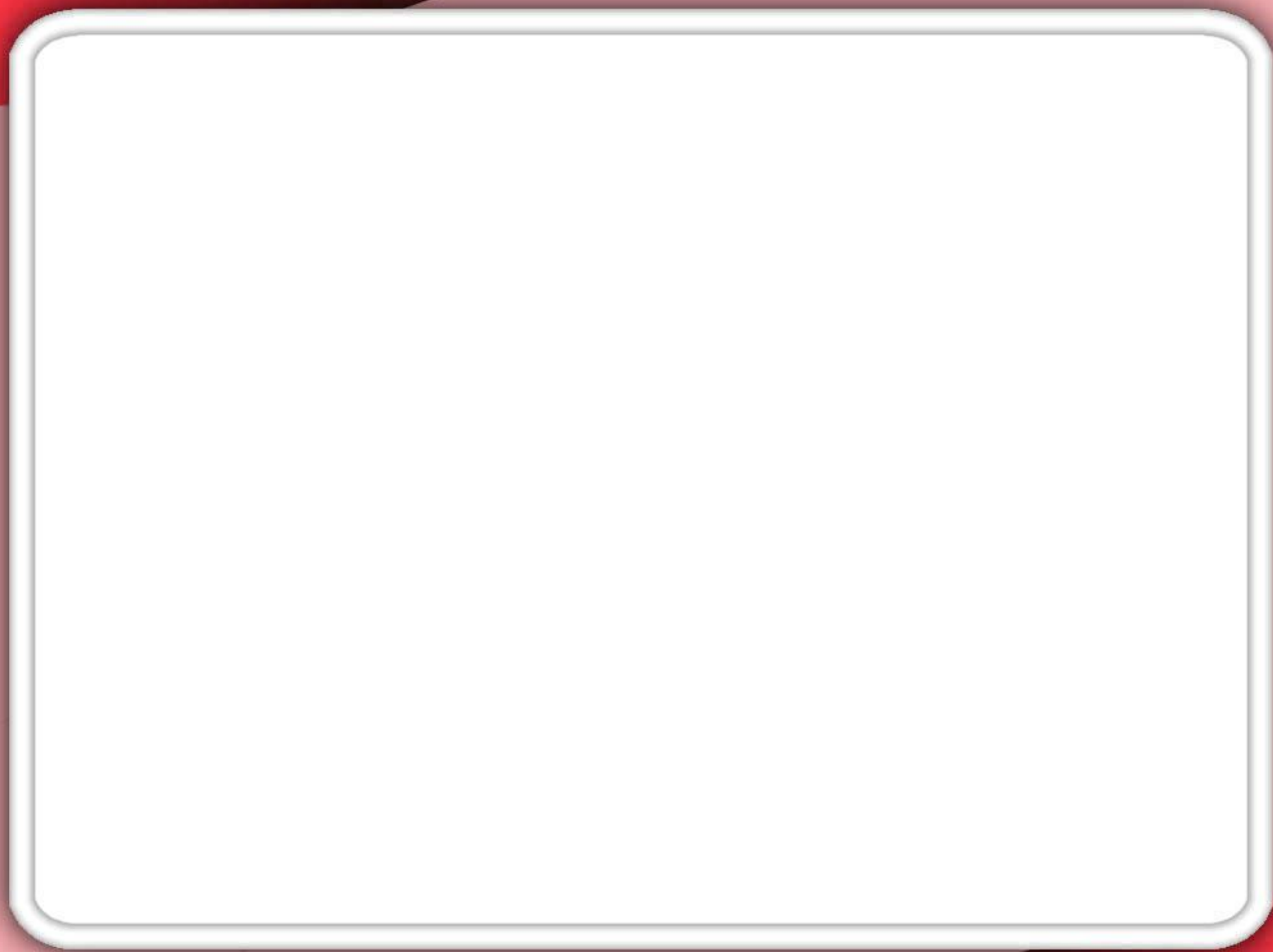
Conclusion

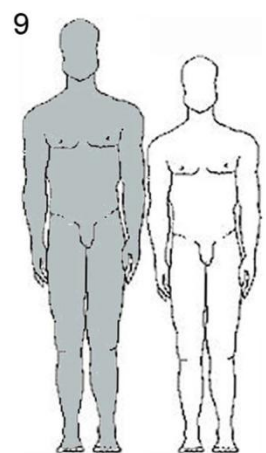
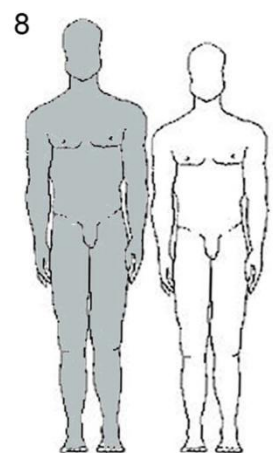
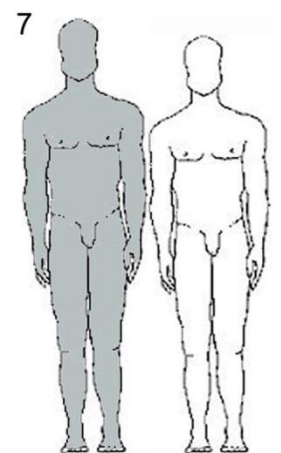
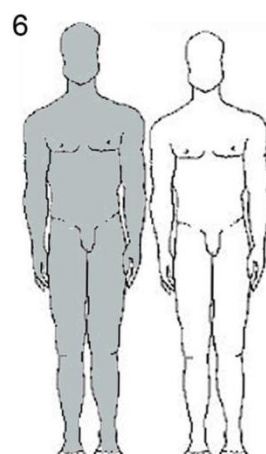
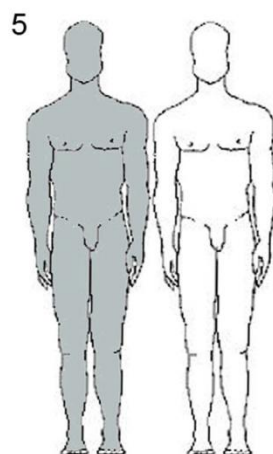
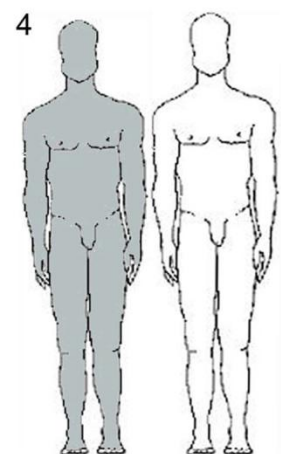
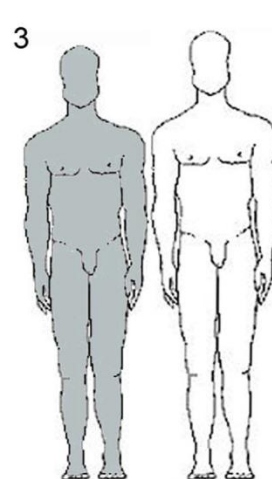
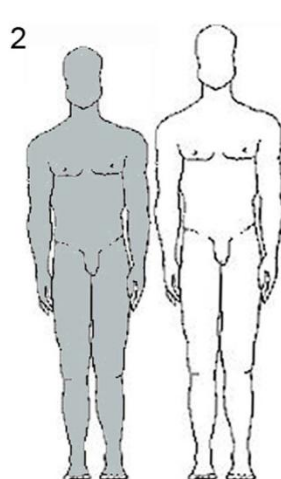
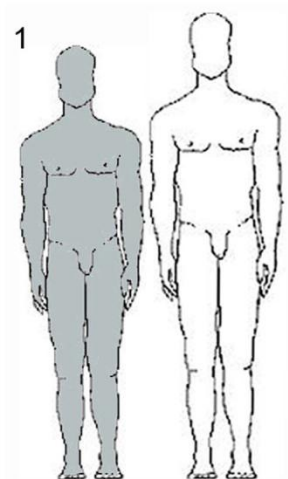
- Sexual orientation is rather a mechanism that navigates sexuality toward sex of the potential or actual partner, and generates a whole array of orientations on a continuum between the two extremes – exclusive heterosexuality and exclusive homosexuality
- The object of evolutionary analysis does not need to be the extreme pole of the continuum of sexual orientation but rather a variation of many degrees of attraction toward the same or the opposite sex
 - leaving behind essentialist categorical thinking, it might become clearer that the majority of variation on the continuum of sexual orientation can be adaptive



Take-home message

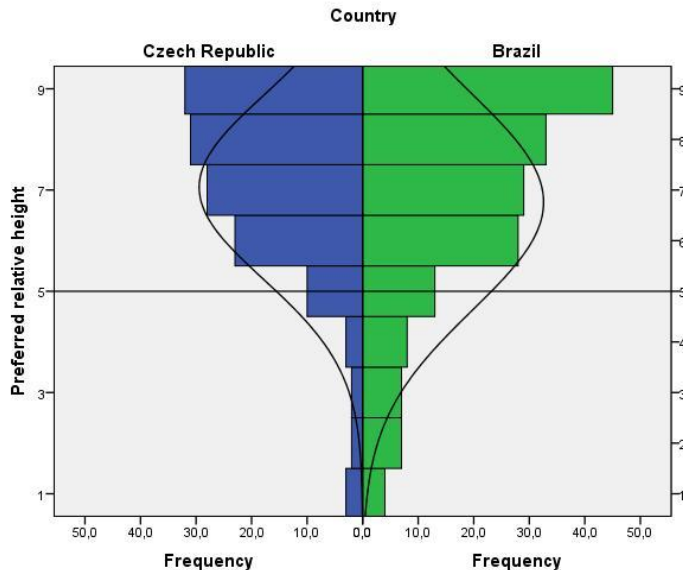
- Sexual orientation is not categoric, it is a cotinuum with many different dimensions which do not need to be in accordance
- Although female sexual orientation is more felxible, fluid and bisexual, male orientation also is not rigid
- Studies showing differences between hetero- and homosexual individuals are not invalid
- The future studies should examine specific correlates of degrees of attractions toward both sexes
- Possibly, attraction to one, other or both sexes is a part of a specific sexual or life history strategy, such as higher mating versus parenting, which in turn, can be a response to personal and environmental conditions





- 2 estudos – homens e mulheres heterossexuais e homossexuais, 3 mil participantes

Relative height preferences



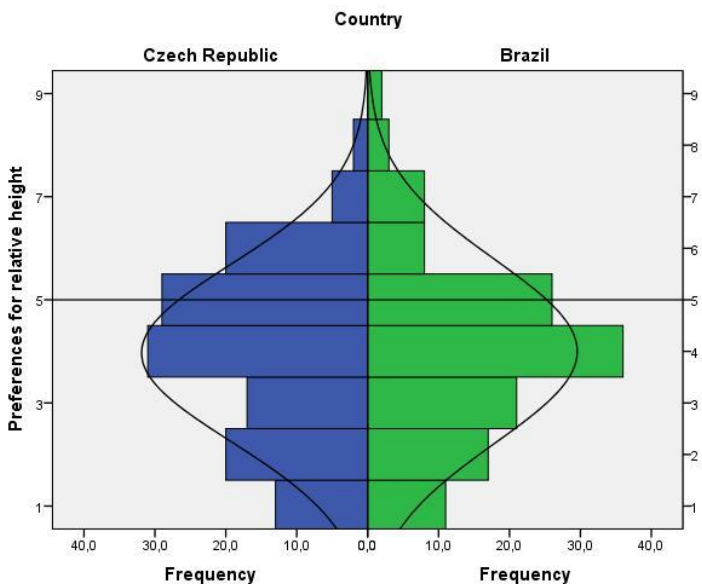
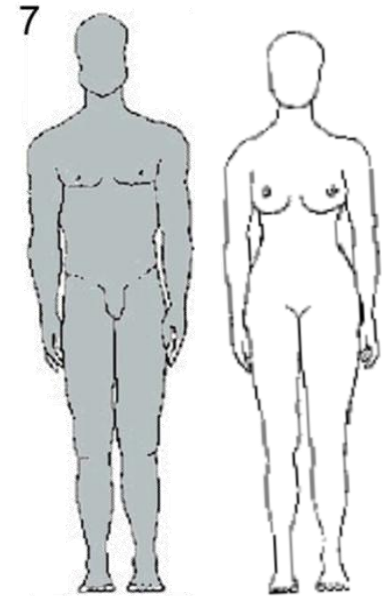
1. HETEROSEXUAL MEN

N = 308

Mean = 6.89

Median = 7.00

SD = 2.00



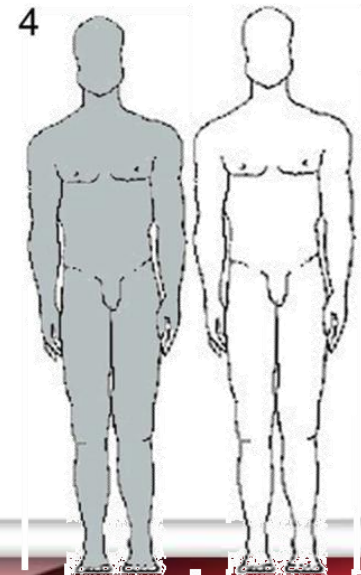
2. HOMOSEXUAL MEN

N = 285

Mean = 3.99

Median = 4.00

SD = 1.75



Relative height preferences

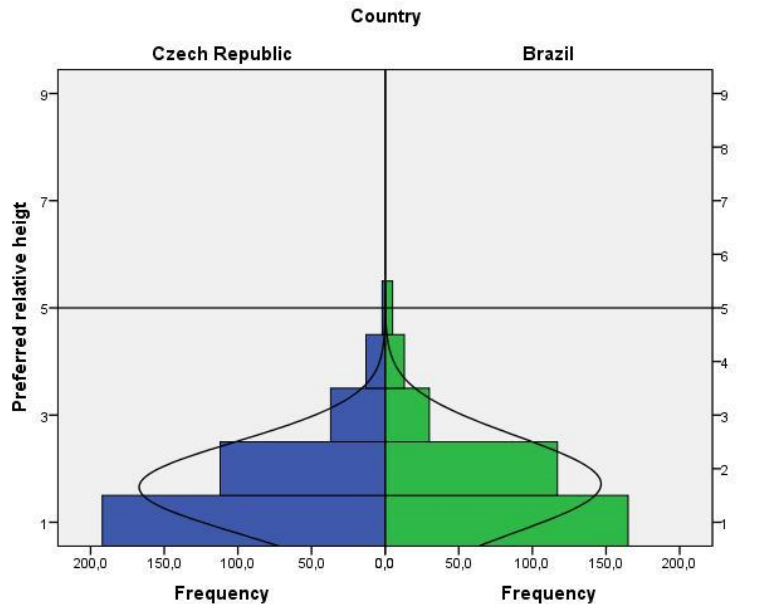
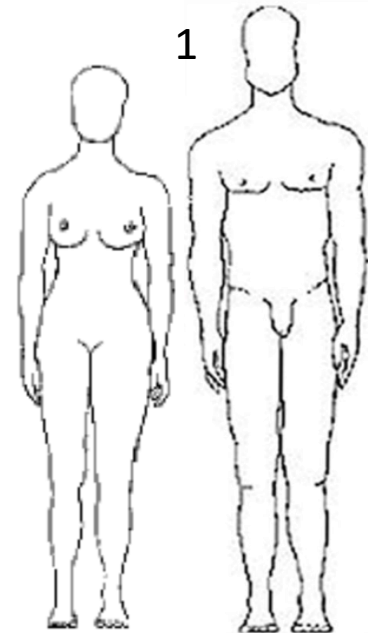
1. HETEROSEXUAL WOMEN

N = 686

Mean = 1.68

Median = 1.00

SD = .87



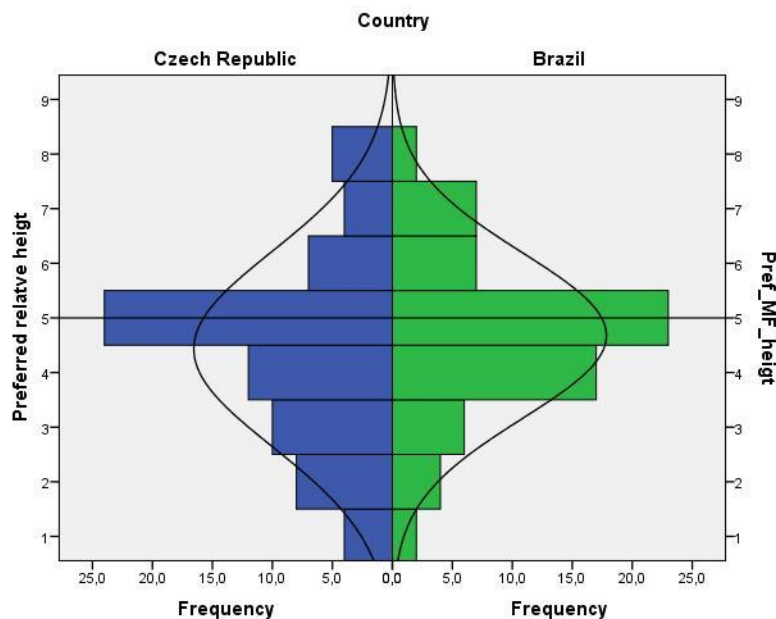
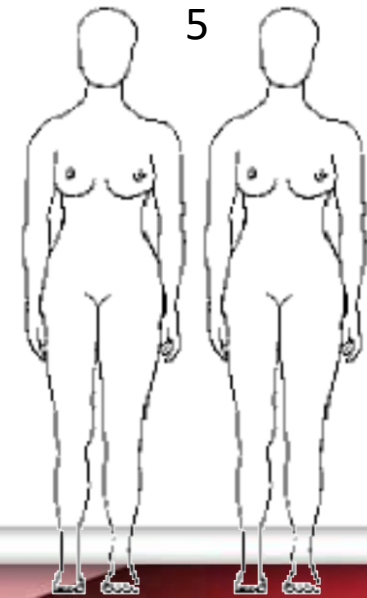
2. HOMOSEXUAL WOMEN

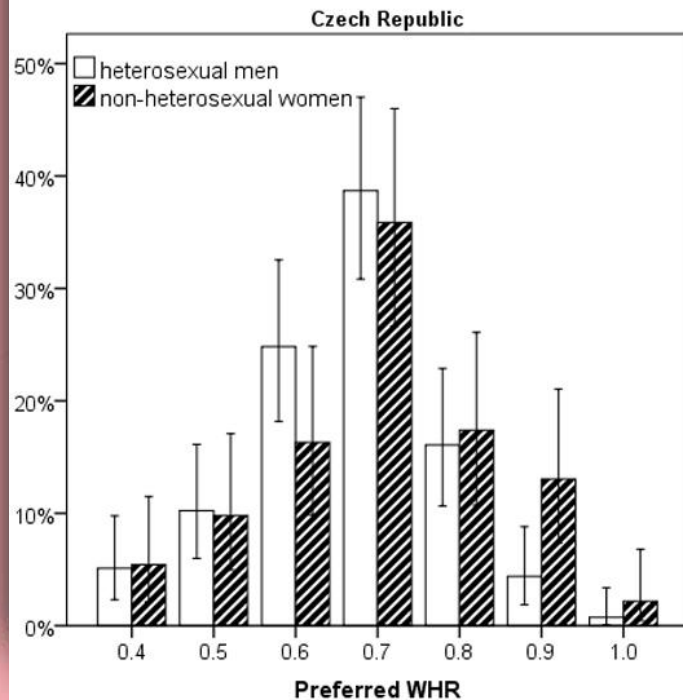
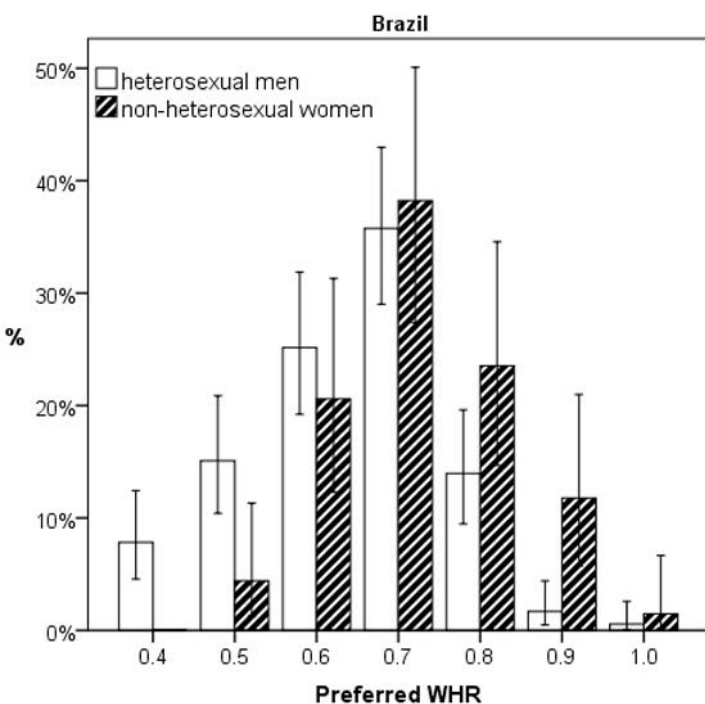
N = 142

Mean = 4.55

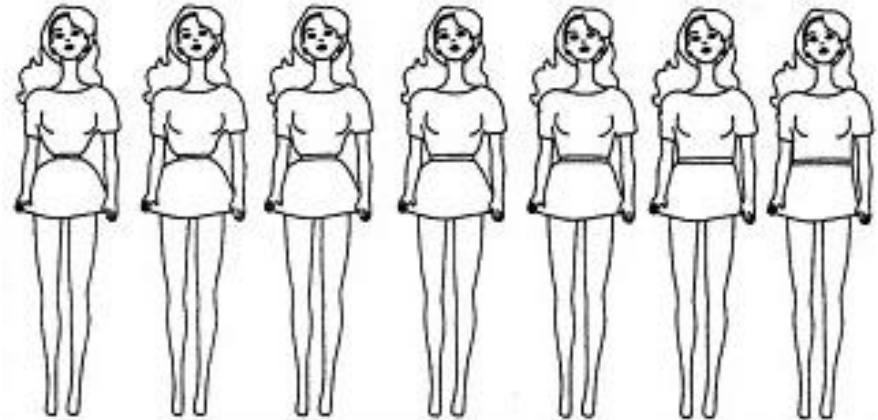
Median = 5.00

SD = 1.66

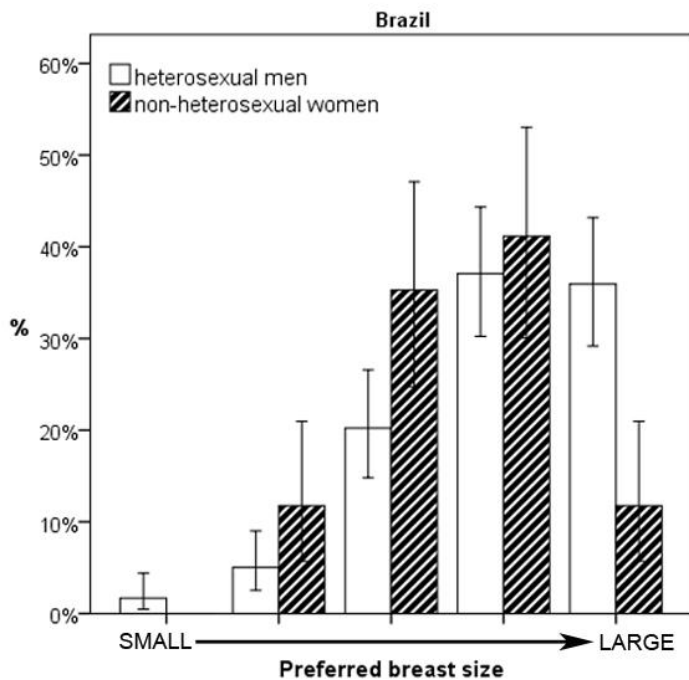




- Homens heterossexuais, N = 276
- Mulheres homossexuais, N = 192

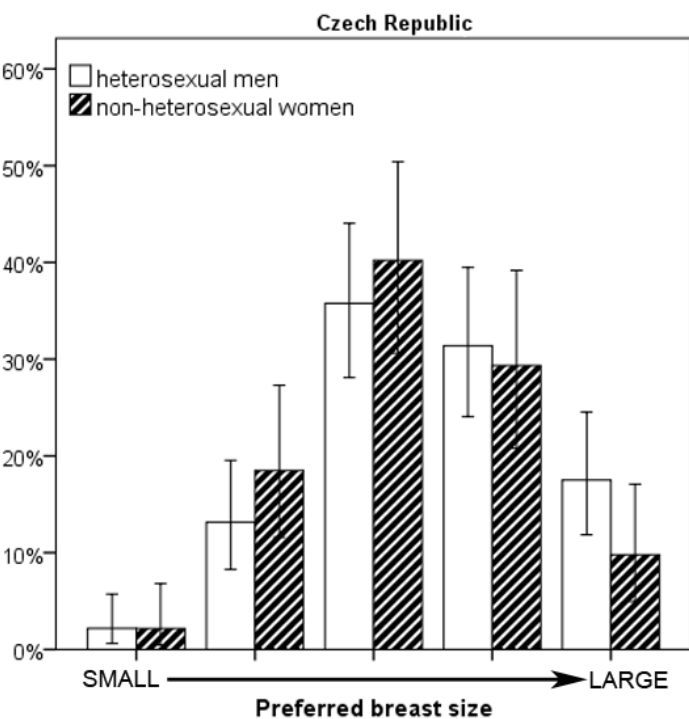


- Nenhuma diferença entre os países
- Homens preferem WHR menor do que mulheres



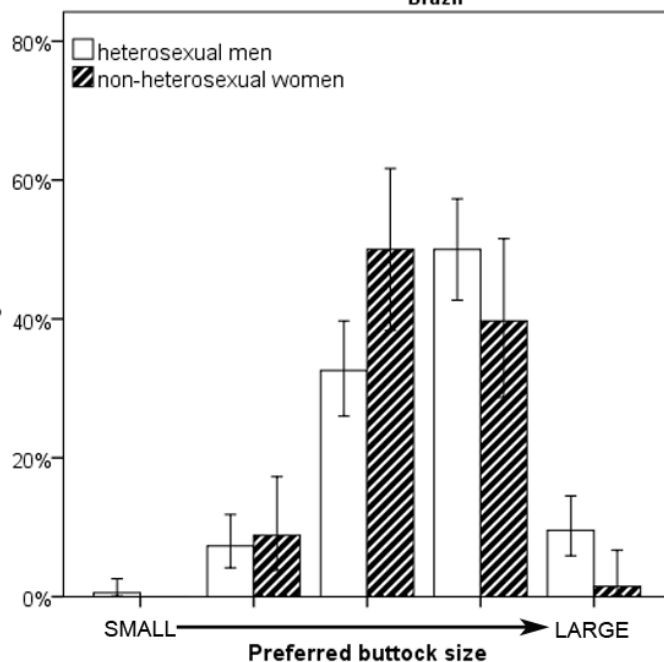
Preferências por tamanho de seios

- Heterosexual men:
Brazil - N = 218
Rep Tcheca – N= 164
- Non-heterosexual women
Brazil - N = 93
Rep Tcheca – N= 132

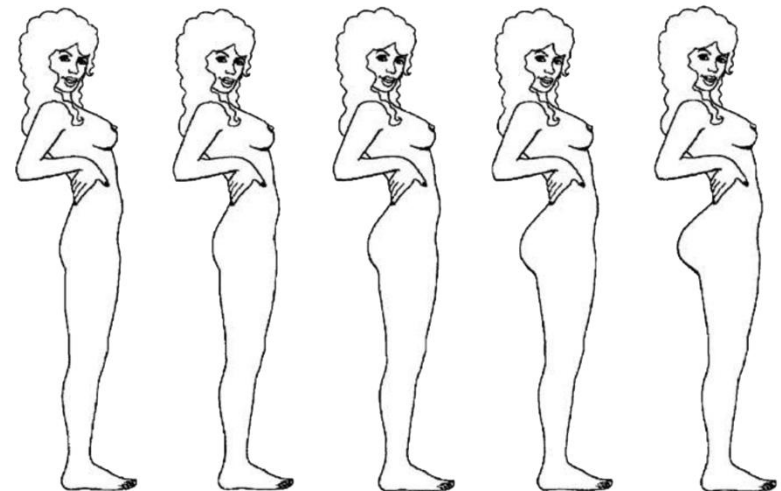


- Diferença significativa entre os países e entre homens e mulheres
- Brasileiros preferem seios maiores do que Tchecos
- Homens preferem seios maiores do que mulheres

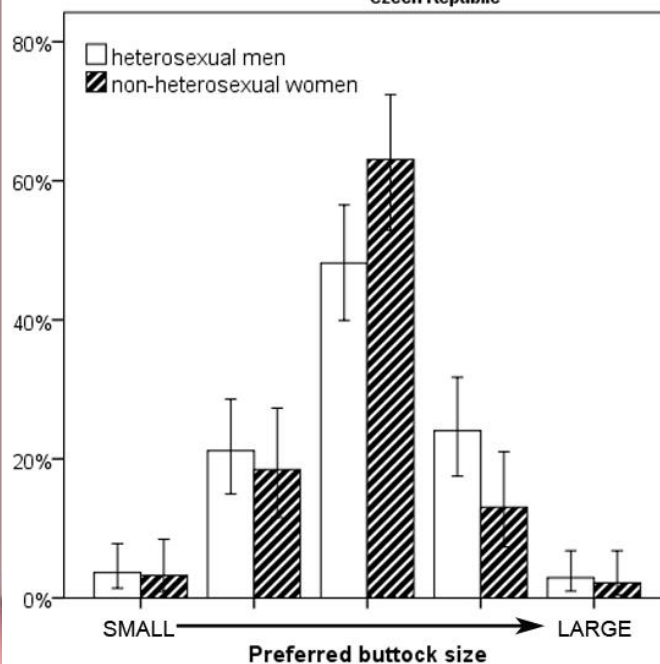
Brazil



- Homens heterossexuais, N = 276
- Mulheres homossexuais, N = 192



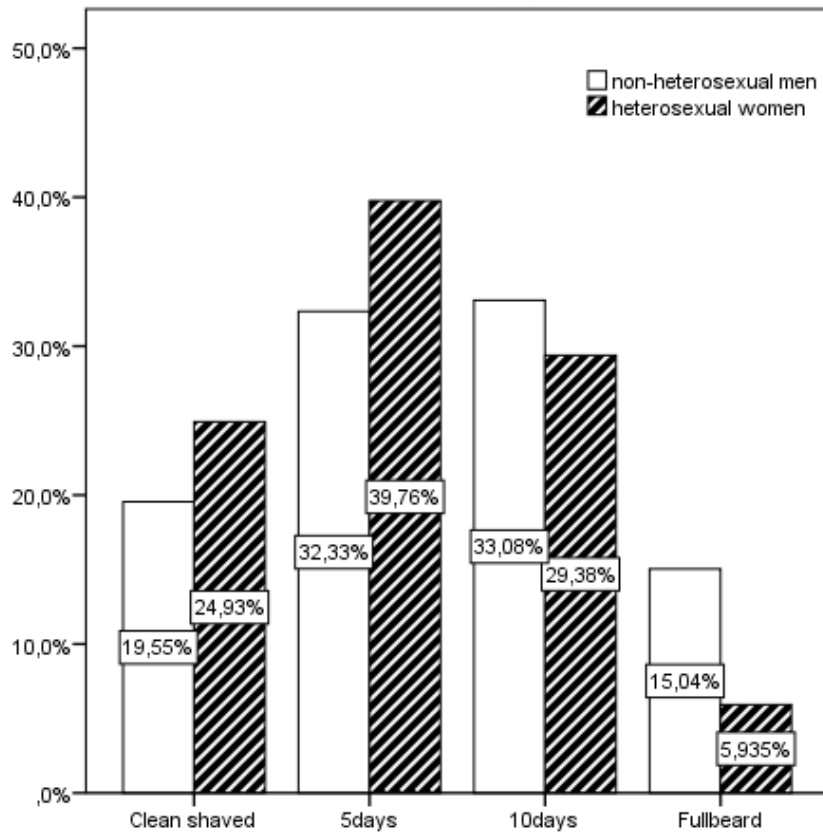
Czech Republic



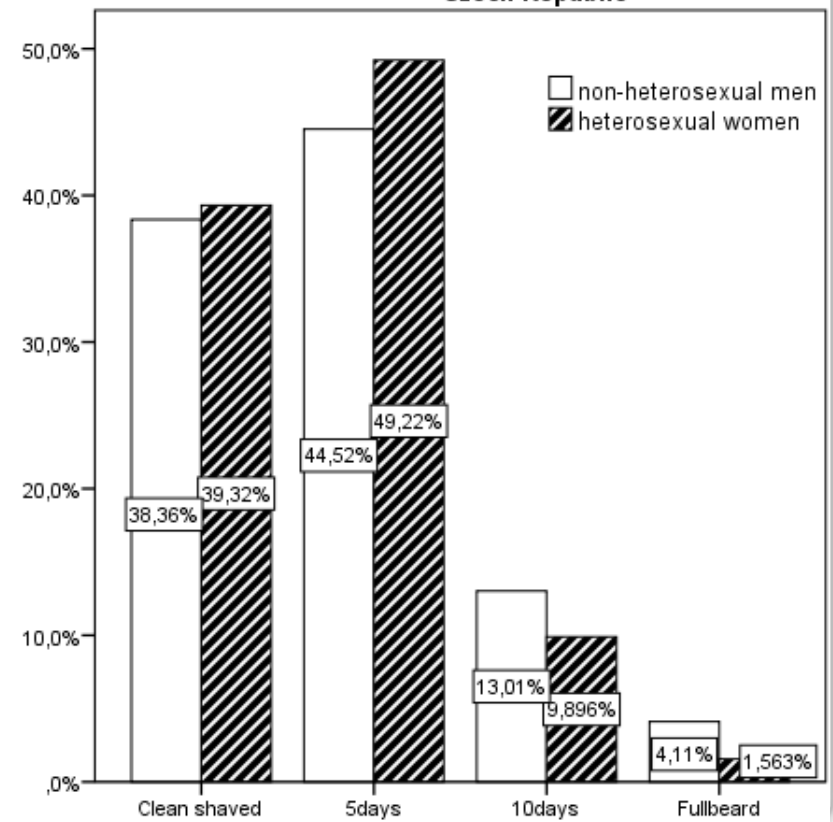
- Diferença significativa entre os países e entre homens e mulheres
- Brasileiros preferem nádegas maiores do que Tchecos
- Homens preferem nádegas maiores do que mulheres



Brazil

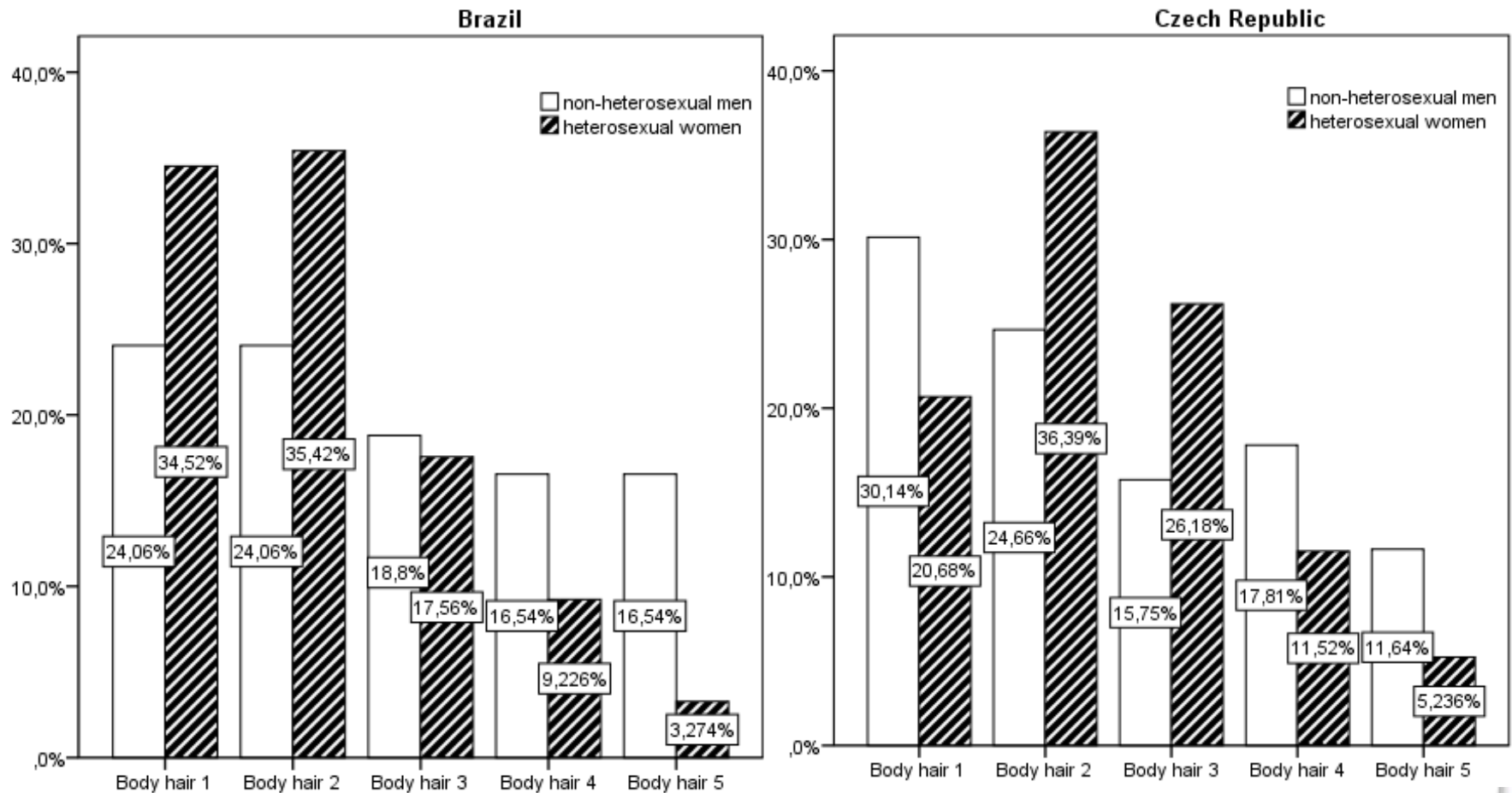


Czech Republic



Pelo corporal - homens

- Redução da massa (não densidade) de pelo corporal em humanos
- distribuição específica, começo durante a puberdade, dimorfismo sexual =



Atratividade da voz



- Em média, os homens têm de vozes mais baixos do que as mulheres
- vozes masculinas mais baixas são avaliadas como mais atraentes, masculinas, e seus proprietários são julgados como mais maduros, mais velhos, mais pesados, mais fortes, mais altos, mais peludos
- Os homens homossexuais preferem vozes masculinas mais baixas (Valentova et al., 2013)



Importante

complexo de vários traços
os juntos

uma dimensão importante
mais do que a atratividade

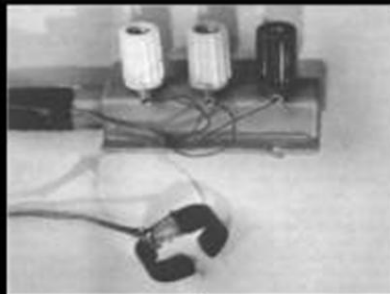
estática

- e.g. atratividade de jeito de andar – o movimento balançando dos quadris é julgado atraente nas mulheres, e movimentos de ombros são julgados como atraentes em homens (*Tassinari and Johnson, 2007*)
- E.g. atratividade de dança – parte int da flerte, no qual indivíduos mostram capacidade de respiração, equilíbrio, fo
- Atratividade de dança nos homens é c com saúde e força nos homens (*Fink et.*



A sex difference in the specificity of sexual arousal

- Chivers, M. L., Rieger, G., Latty, E., & Bailey, J. M. (2005). A sex difference in the specificity of sexual arousal. *Psychological Science*, 15, 736-744.
- Vaginal photoplethysmograph and penile plethysmograph
- ht and hm men and women, ht and hm stim



Penile Plethysmographs



"Penile Cuffs"



Copen, C. E., Chandra, A., & Febo-Vazquez, I. (2016). Sexual behavior, sexual attraction, and sexual orientation among adults aged 18-44 in the United States: data from the 2011-2003, National Survey of Family Growth.

Sexual attraction

%	Only opposite sex	Mostly opposite sex	Equally to both	Mostly same sex	Only same sex	Not sure
Women (N = 55,271)	81.0	12.9	3.2	0.8	0.8	1.2
Men (N = 54,685)	92.1	4.1	0.9	0.8	1.5	0.7

Percent reporting

Most same-sex sexual relations are made by heterosexual individuals

sexual contact

Women

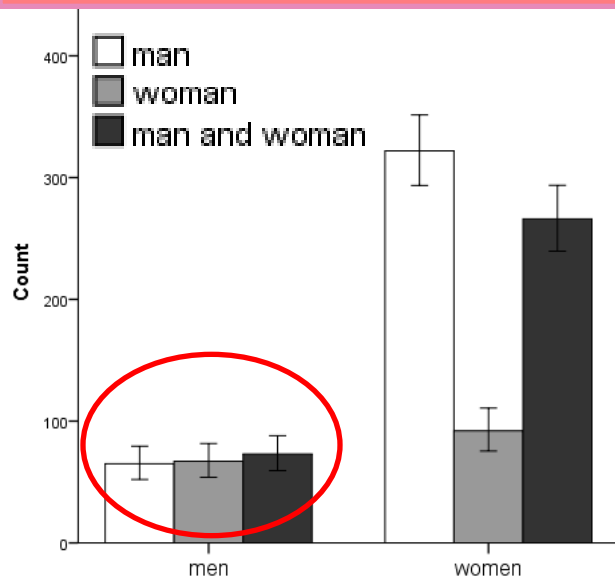
17.4

Men

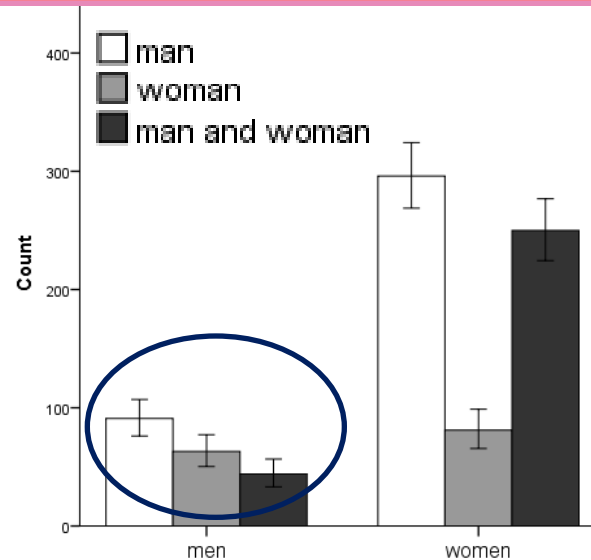
6.2

Discrepancies in men

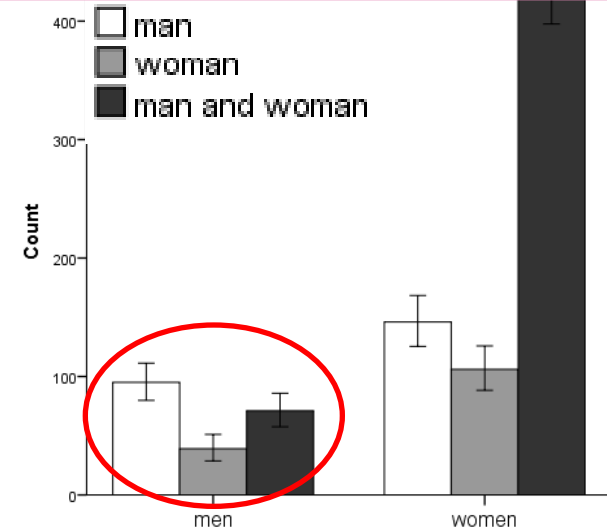
Have you ever fallen in love with



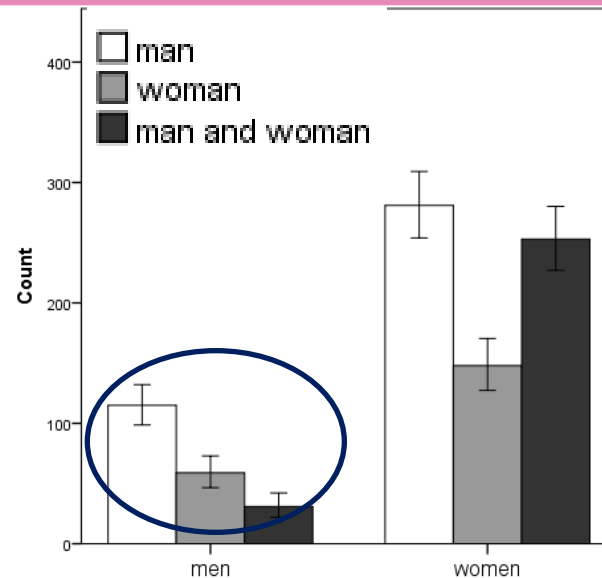
Have you ever had sex with



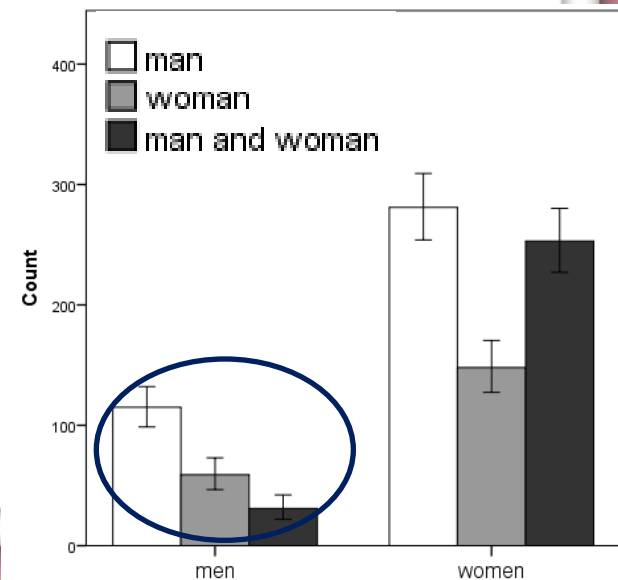
Can you imagine having sex with



Have you ever had a long-term relationship with

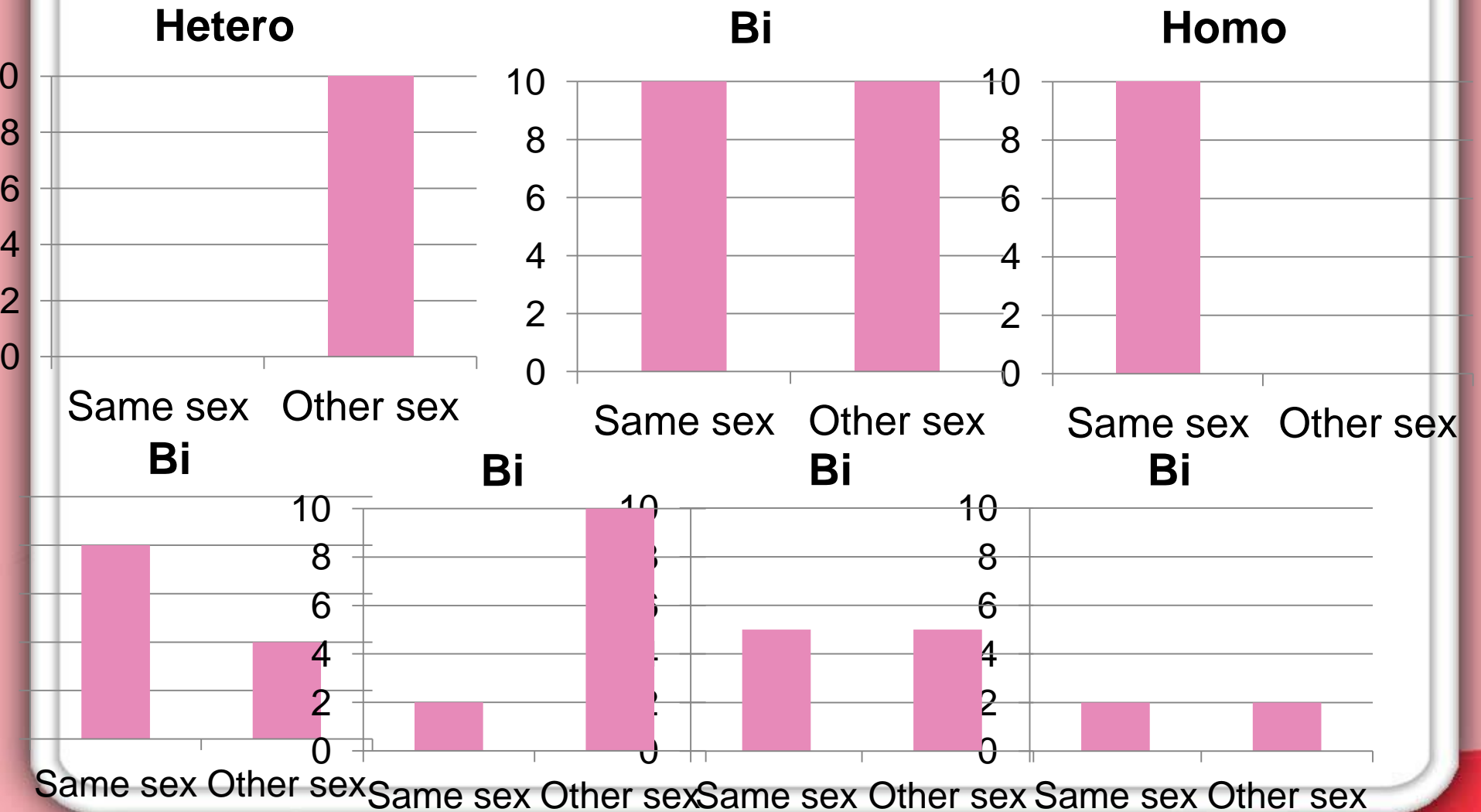


Can you imagine having a long-term relationship with



Classifying sexual orientations

- How much are you sexually attracted to men? (0-10)
- How much are you sexually attracted to women? (0-10)

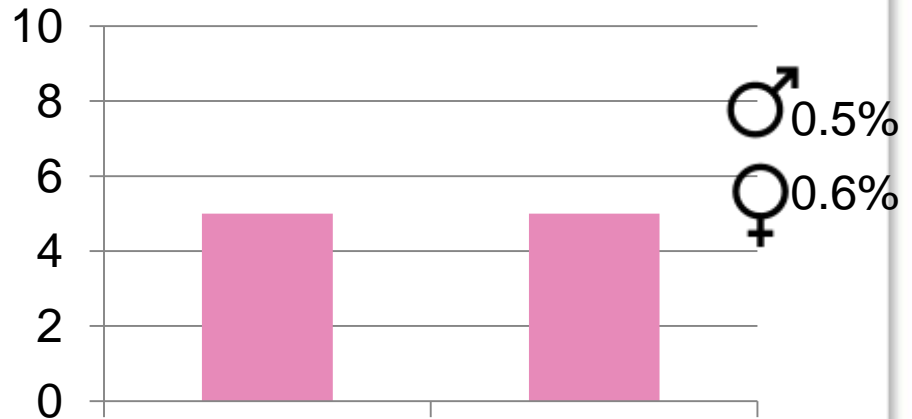
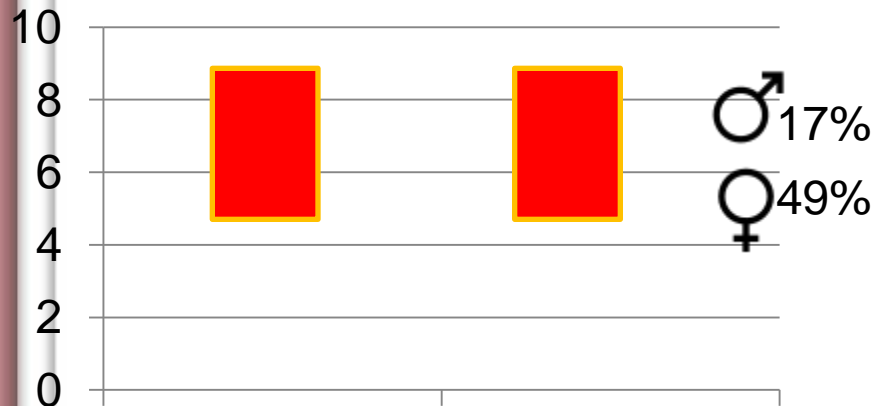


Classifying sexual orientations

- Recruitment focused on bisexuals

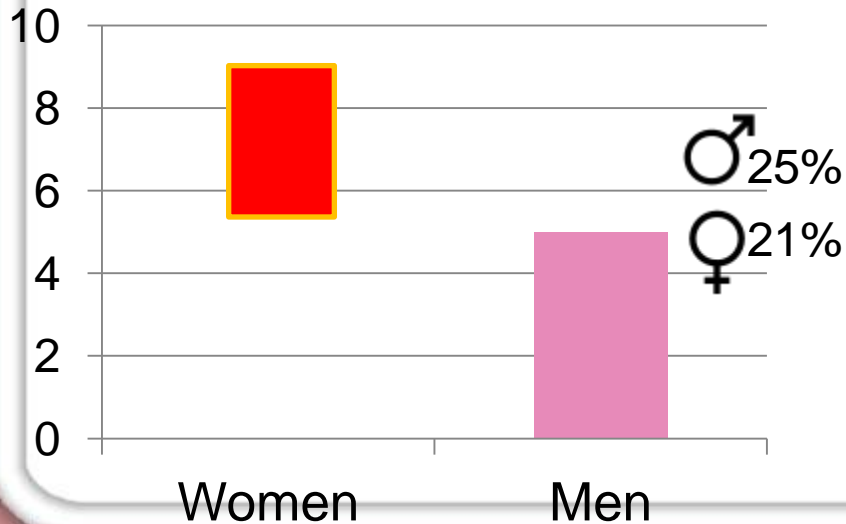
High attraction to both sexes

Low attraction to both sexes



Attracted predominantly to women

Attracted predominantly to men



A puzzle to evolutionary thinking?

- Individuals who do have same-sex attractions, even predominantly homosexual individuals, can and do reproduce – they are not a puzzle to evolutionary thinking
- A substantial proportion of men and especially women do not have an exclusive categorical sexual orientation
- Life-long exclusive same-sex preferences can be a by-product, or an extreme form of adaptive bisexuality (*Kirkpatrick, 2000*) or numerous degrees of same-sex and other-sex tendencies

