

Ovarian steroids and women's sexual desire: A
new look at old issues

Kim Wallen

Department of Psychology
Yerkes National Primate Research Center,
Emory University,
Atlanta, GA 30322 USA

Overview

- Nonhuman primates: Ovarian hormones and female sexual behavior
 - Social context and sexual behavior
 - Menstrual cycle and female sexual motivation
 - Estrogens and androgens and sexual motivation
- Women: Ovarian hormones and sexual behavior
 - Social context and sexual behavior
 - Menstrual cycle and female sexual desire
 - Estrogens and androgens and sexual desire

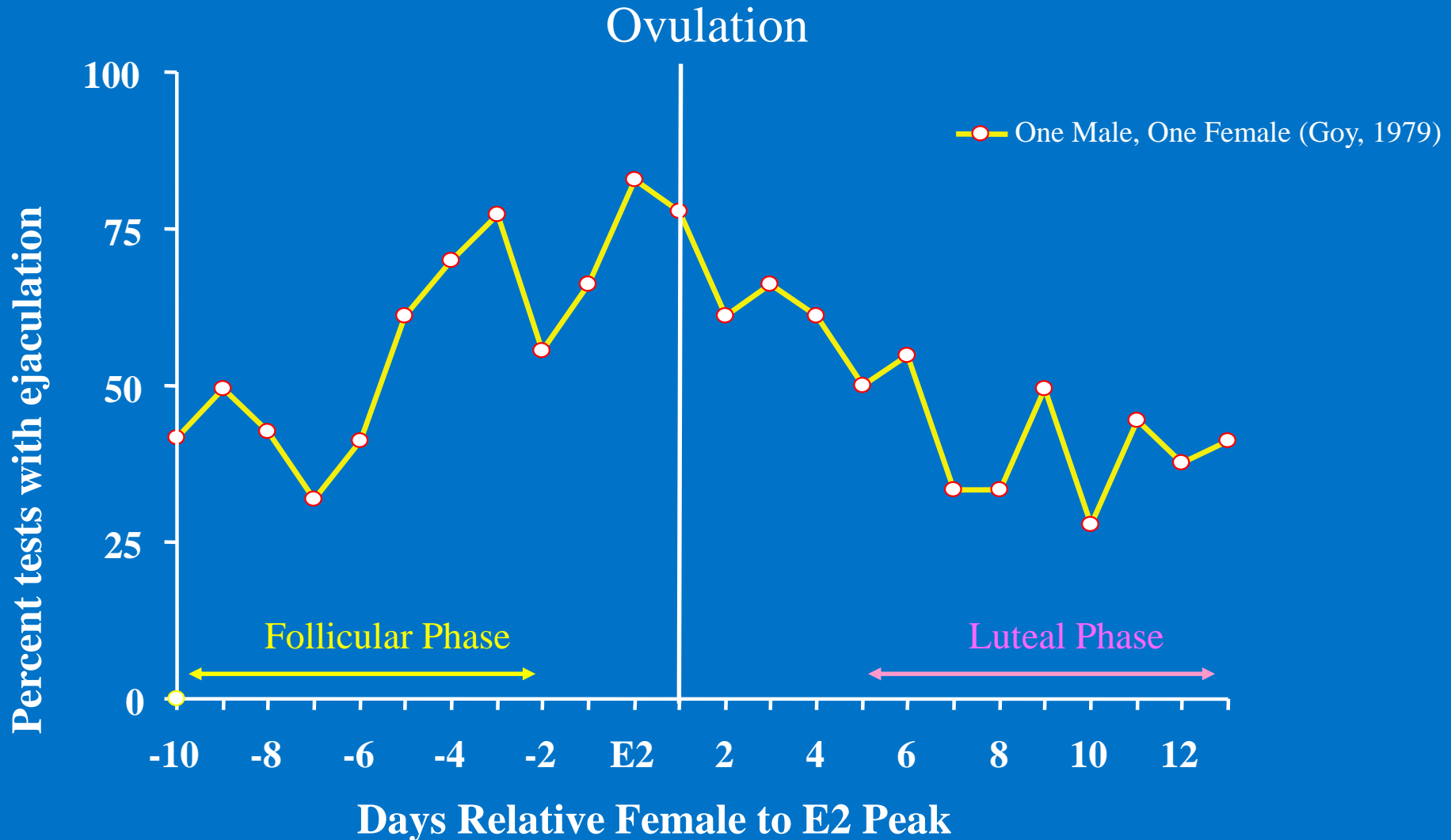
Social context and hormonal influences on mating in rhesus monkeys

Social context affects the how female hormonal
condition influences mating

Rhesus monkey pair test



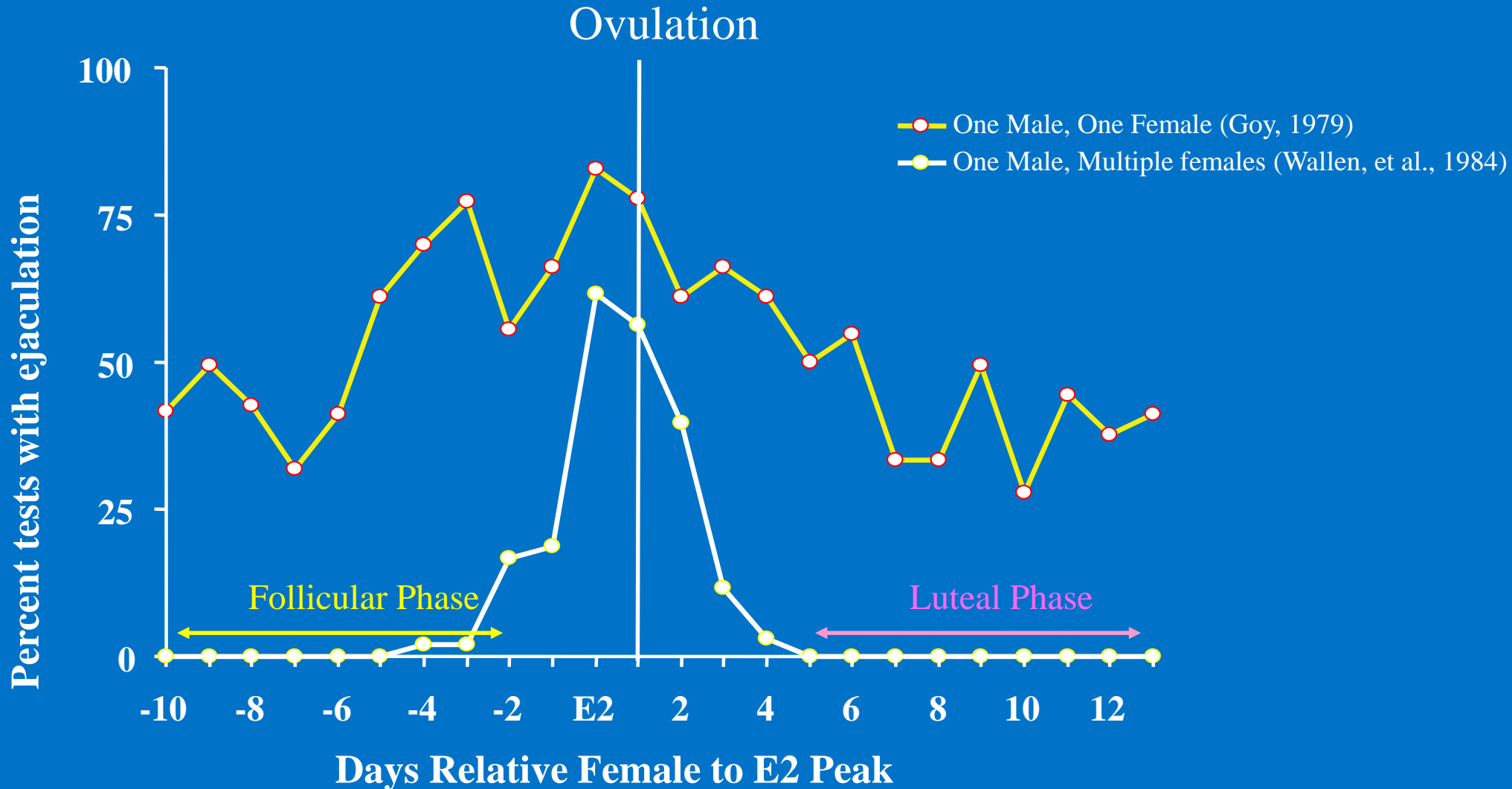
Mating in a pair-test varies little with the female's cycle



Social group: one male and multiple females



Mating is more tightly coupled to the female's ovarian cycle when there are multiple females

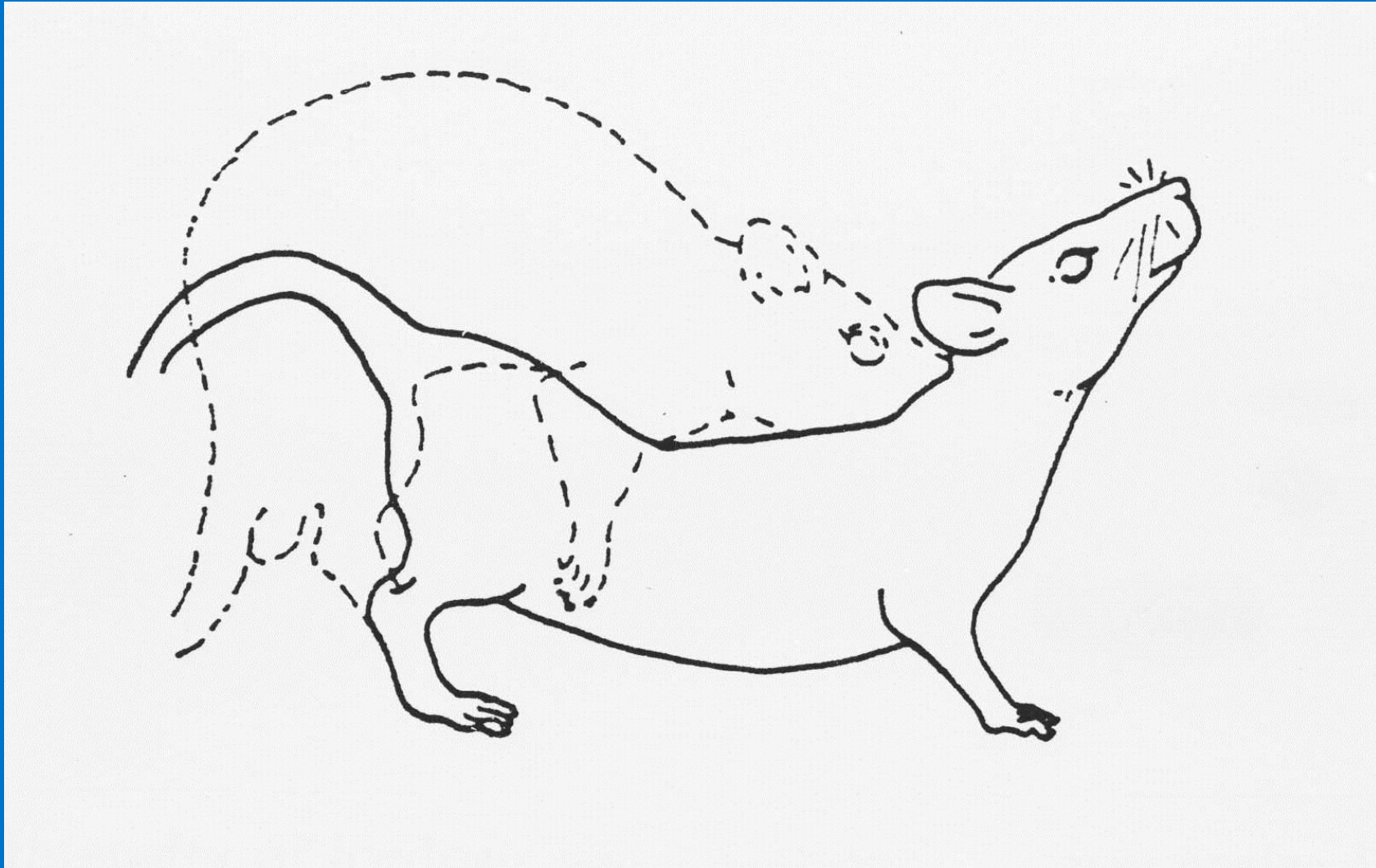


Why does mating behavior vary with social context?

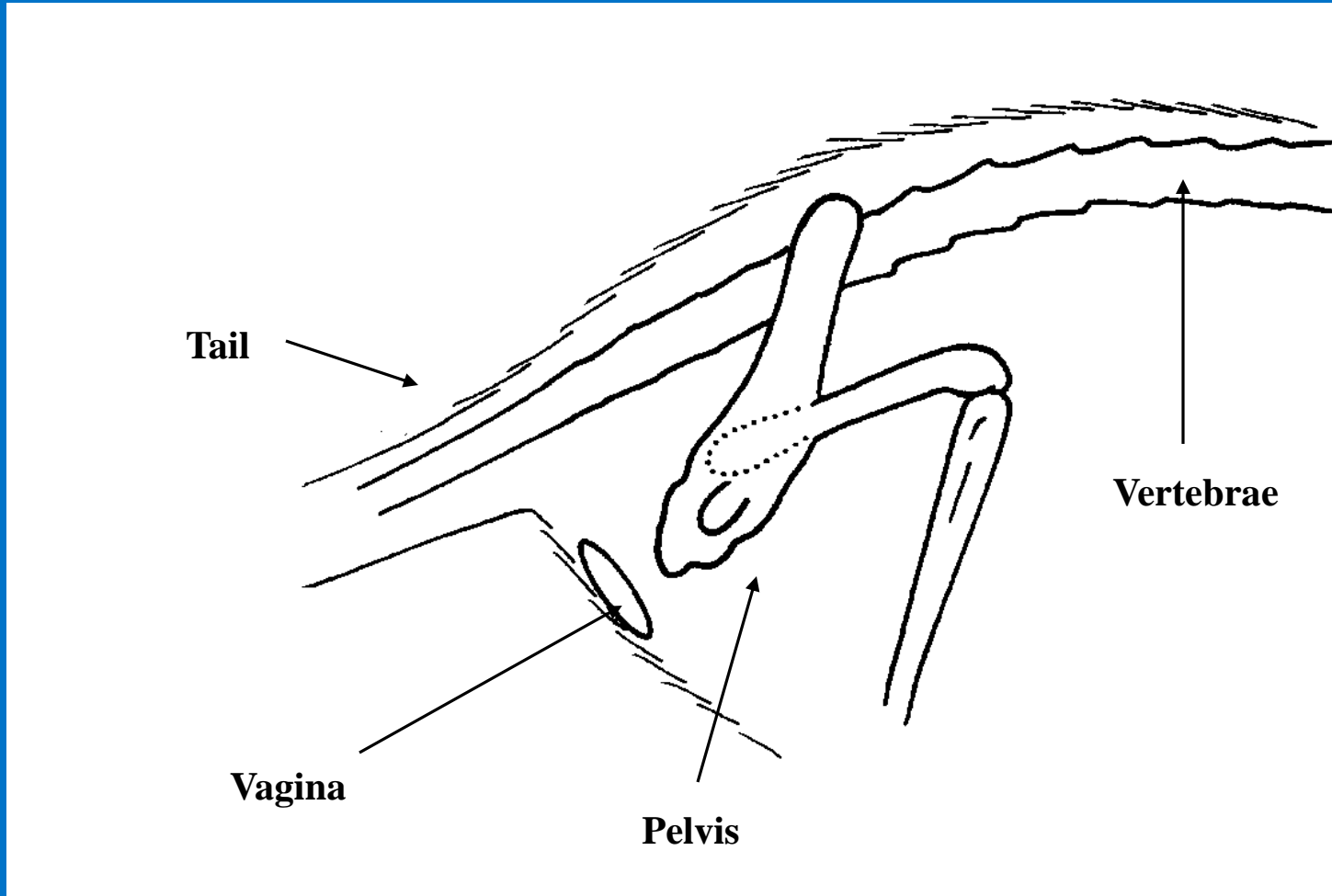
Because it can!

- In most mammalian females, gonadal hormones regulate the physical capacity to mate
- Without hormones mating is not possible in these species
- This is not the case in anthropoid primates

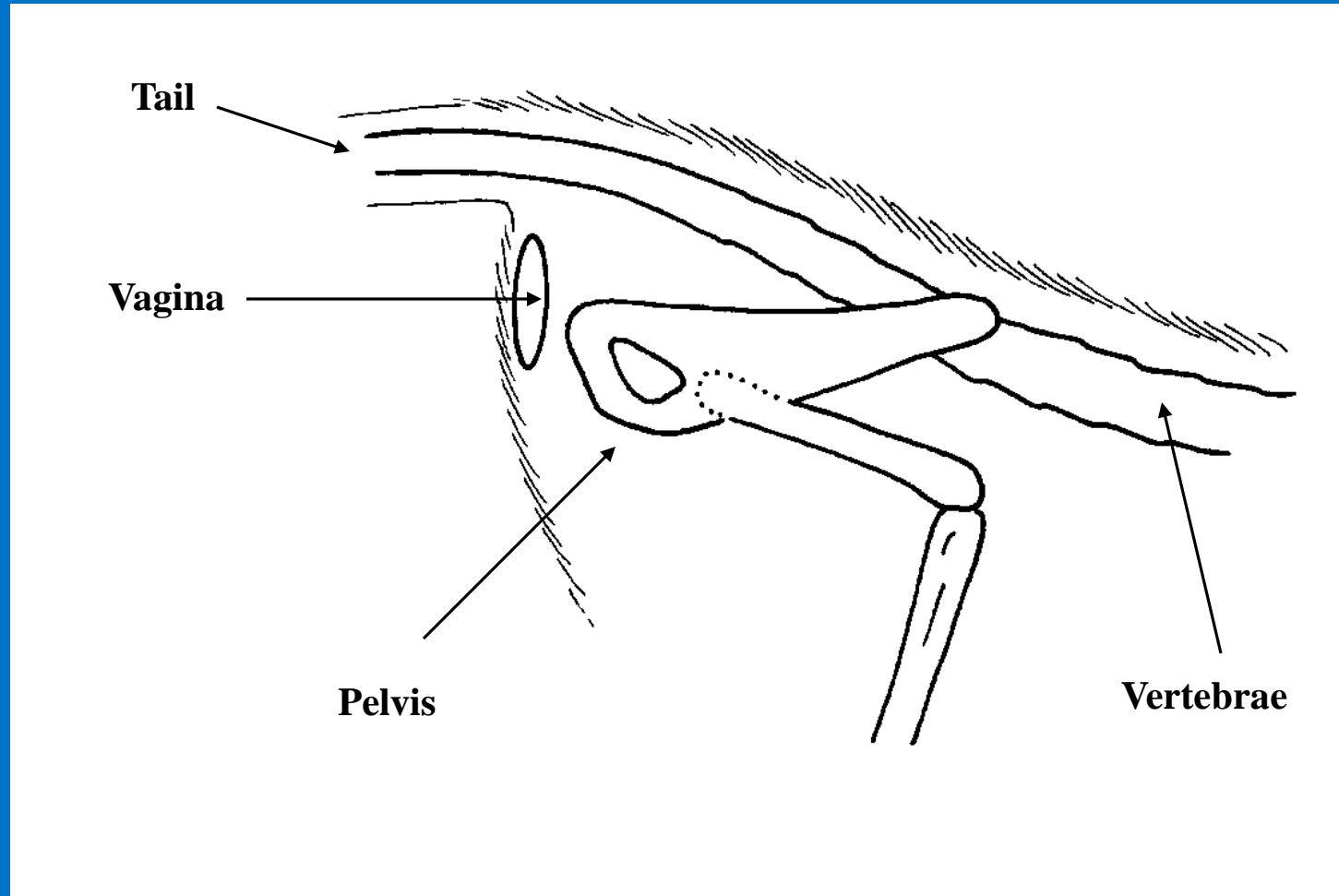
Lordosis strictly regulates the female's ability to mate.



An unreceptive female's vagina opens downward



Lordosis permits intromission by elevating the vagina



Anthropoid Primates (monkeys, apes, & humans) are different

- Hormones do not regulate the capacity to mate
- No hormonally regulated postures required for intercourse
- Females and males are physically able to mate at any time with or without hormonal stimulation

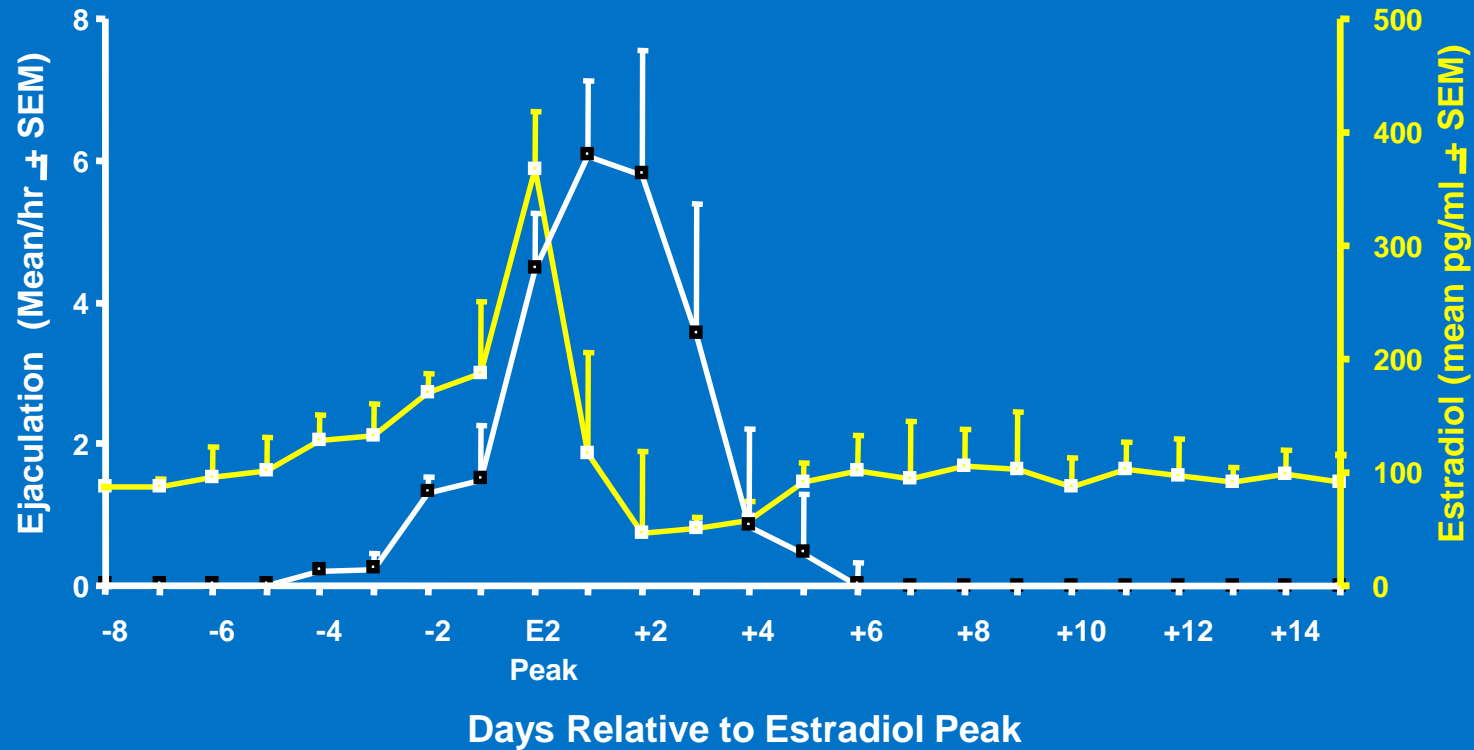
Instead of regulating the capacity to mate, in primates hormones regulate motivation to mate

- Lack of hormonally controlled capacity to mate makes primate sexual behavior sensitive to social context
- Sexual behavior can be used in nonreproductive contexts
- Gonadal steroids modulate interest in mating instead of the capacity to mate

Ovarian hormones and sexual behavior

How does sexual behavior vary in relation to female's ovarian hormones in a social group

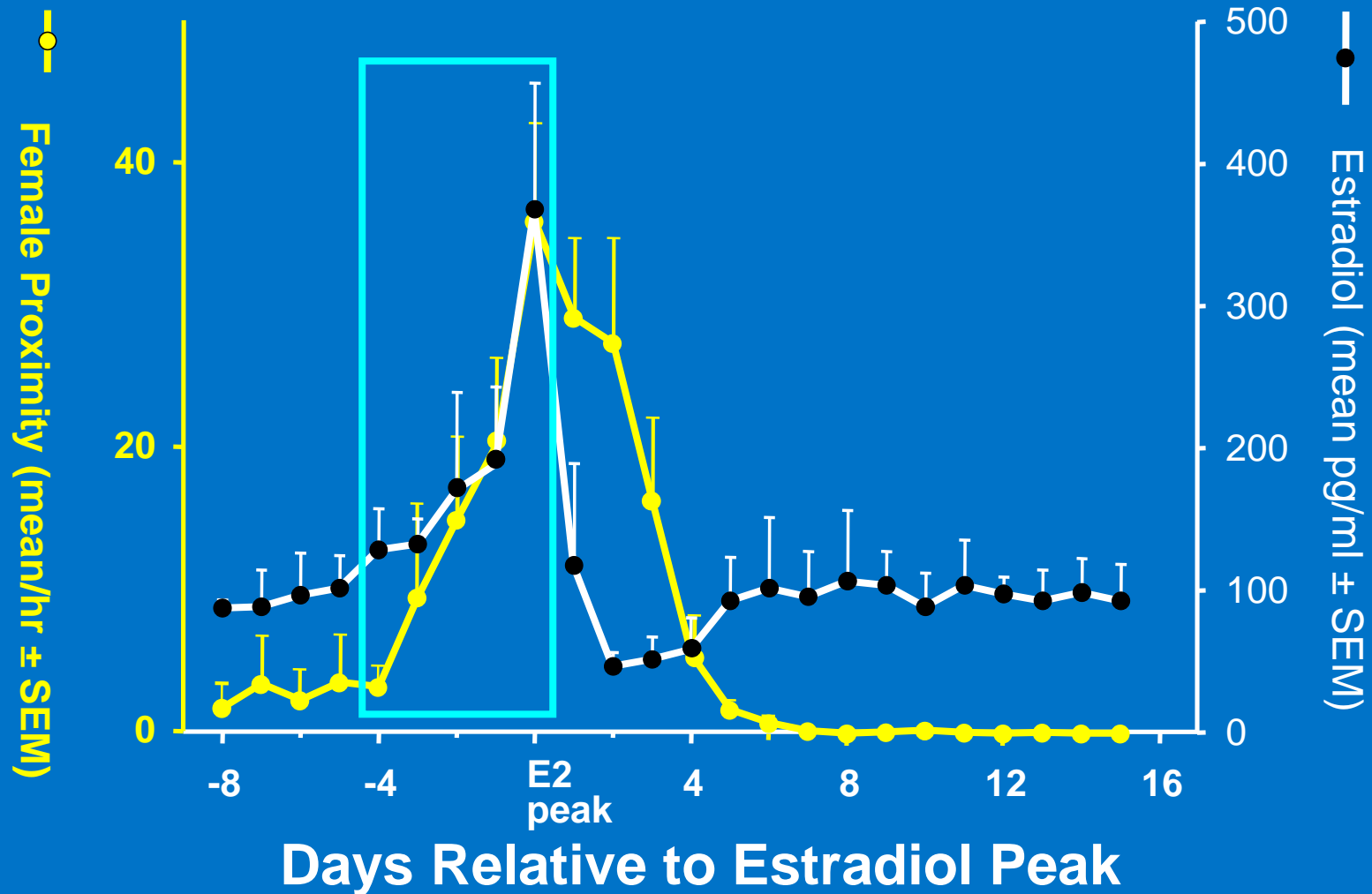
Peak ejaculation occurs following the peak in estradiol



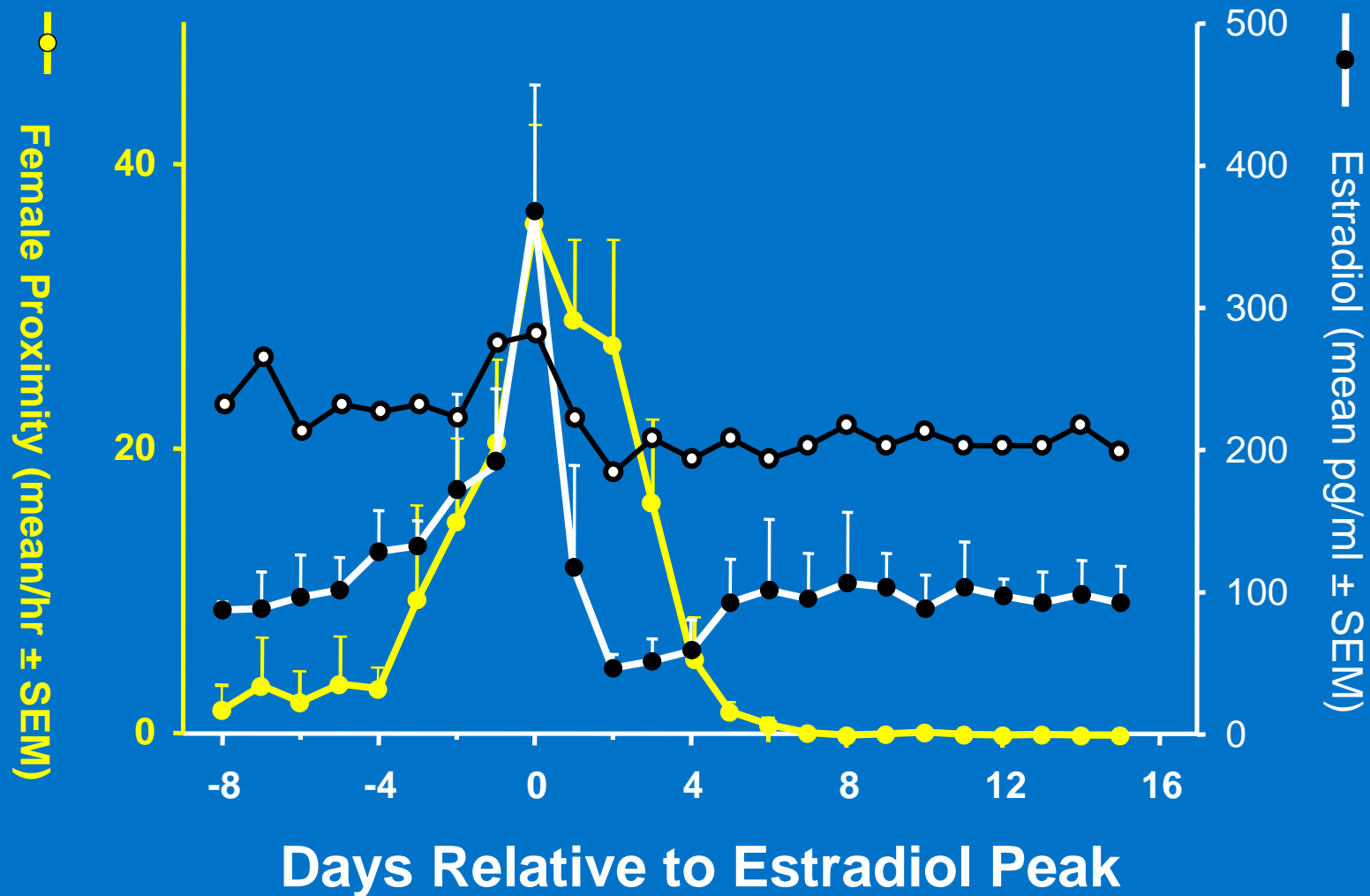
Females initiate sex with by approaching, following,
and soliciting males



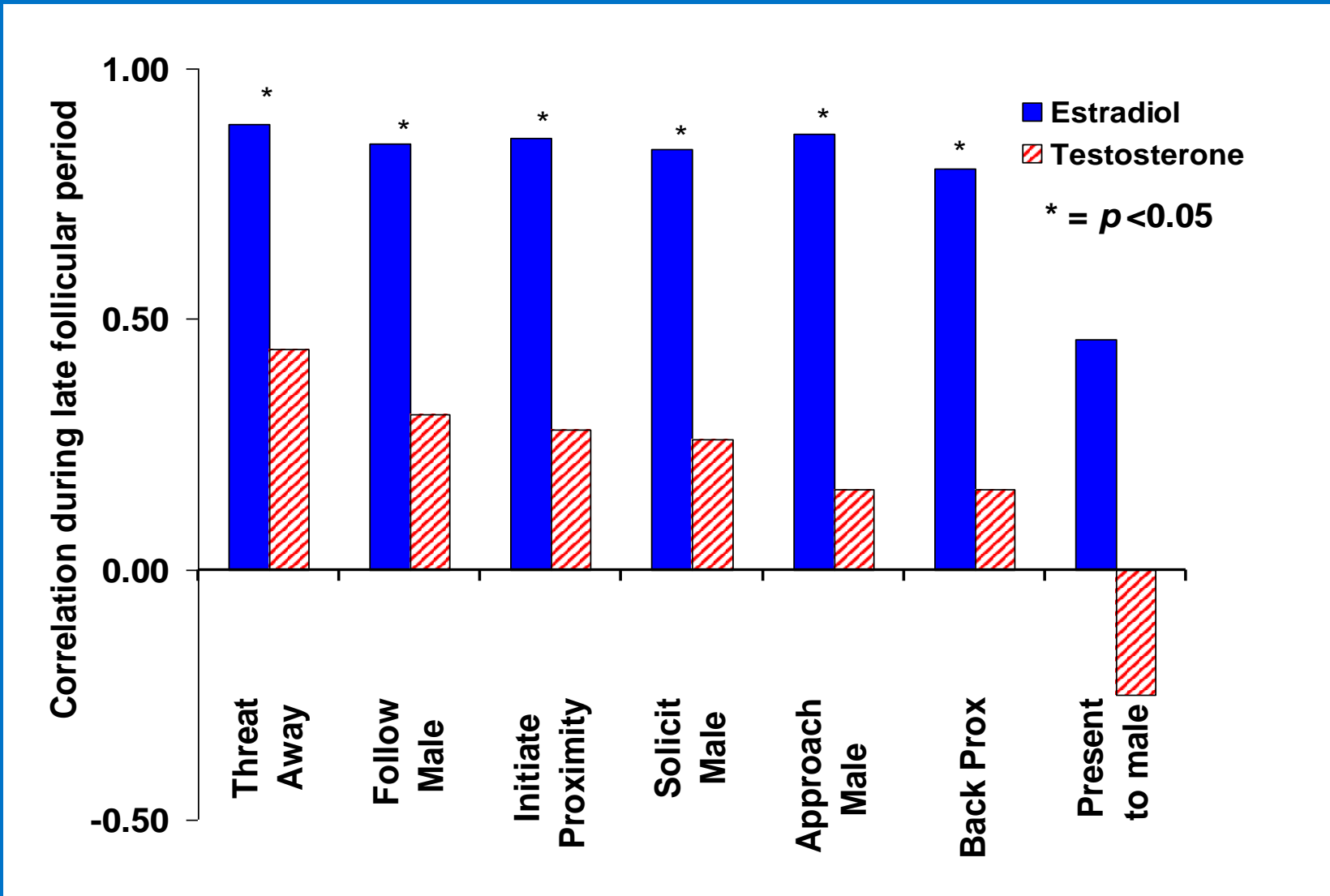
Proximity initiation is strongly correlated with estradiol and peaks on the day of the estradiol peak



The relationship between estradiol and female proximity initiation is not seen in relation to testosterone



Preovulatory estradiol levels correlated significantly with female sexual initiating behaviors.
Testosterone did not.



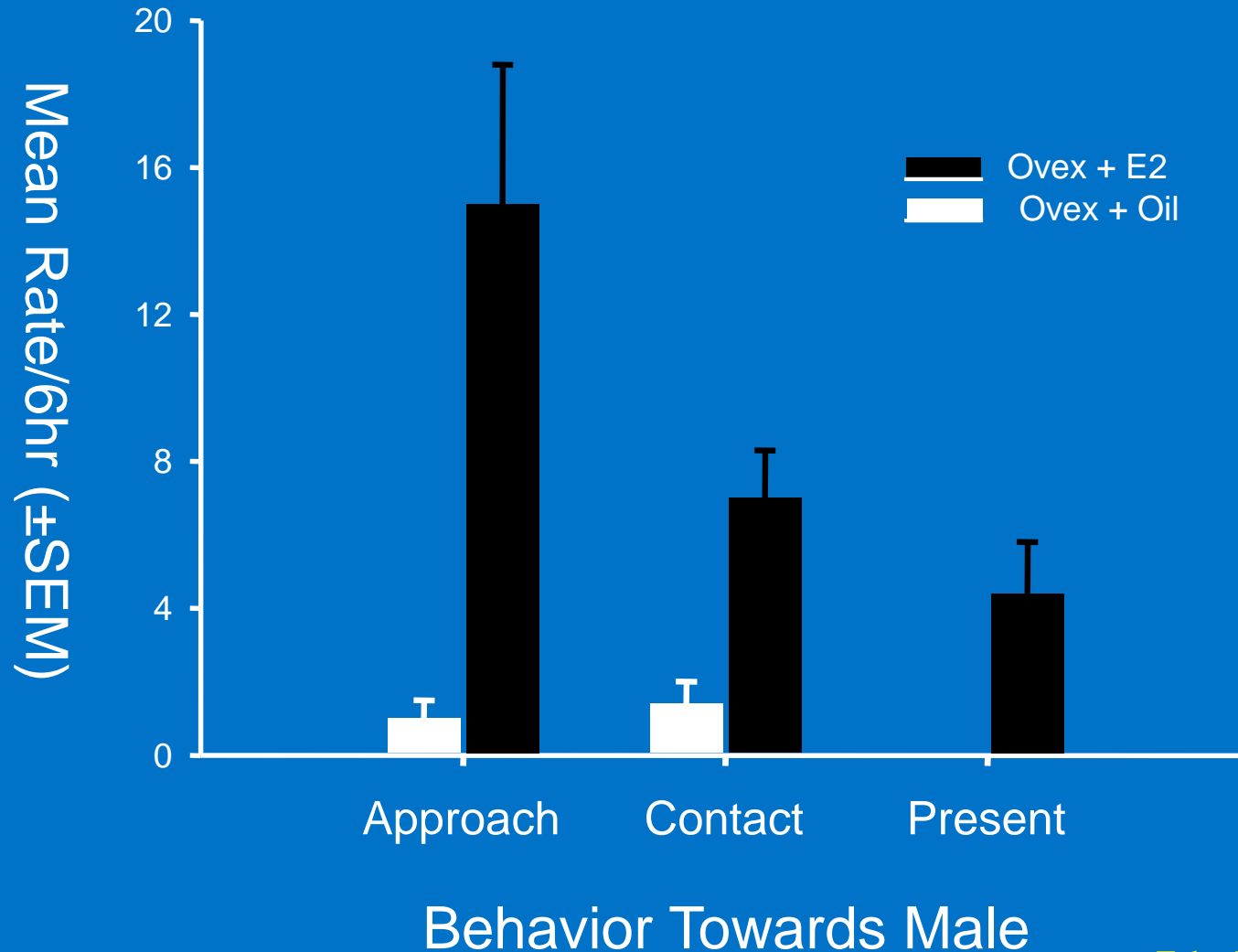
Is estradiol responsible for female sexual initiation?

Increased initiation of sexual behavior is strongly correlated with increasing estradiol, but can estradiol induce female initiation?

Estradiol stimulates sexual initiation in ovariectomized group-living rhesus monkey females

- 5 adult ovariectomized females living in a stable age-graded rhesus monkey social group of 85 males and females.
- Observed during the nonbreeding season (when males are not sexually responsive) during estradiol or no-hormone treatment.
- Received 6wks of subdermal estradiol implants producing periovulatory estradiol levels or blank capsule.
- Sexual and social behavior of ovariectomized females observed for 6hr/week.

Estradiol treatment significantly increased initiating behaviors



Why is rhesus monkey sexual behavior sensitive to social context, yet hormonally modulated

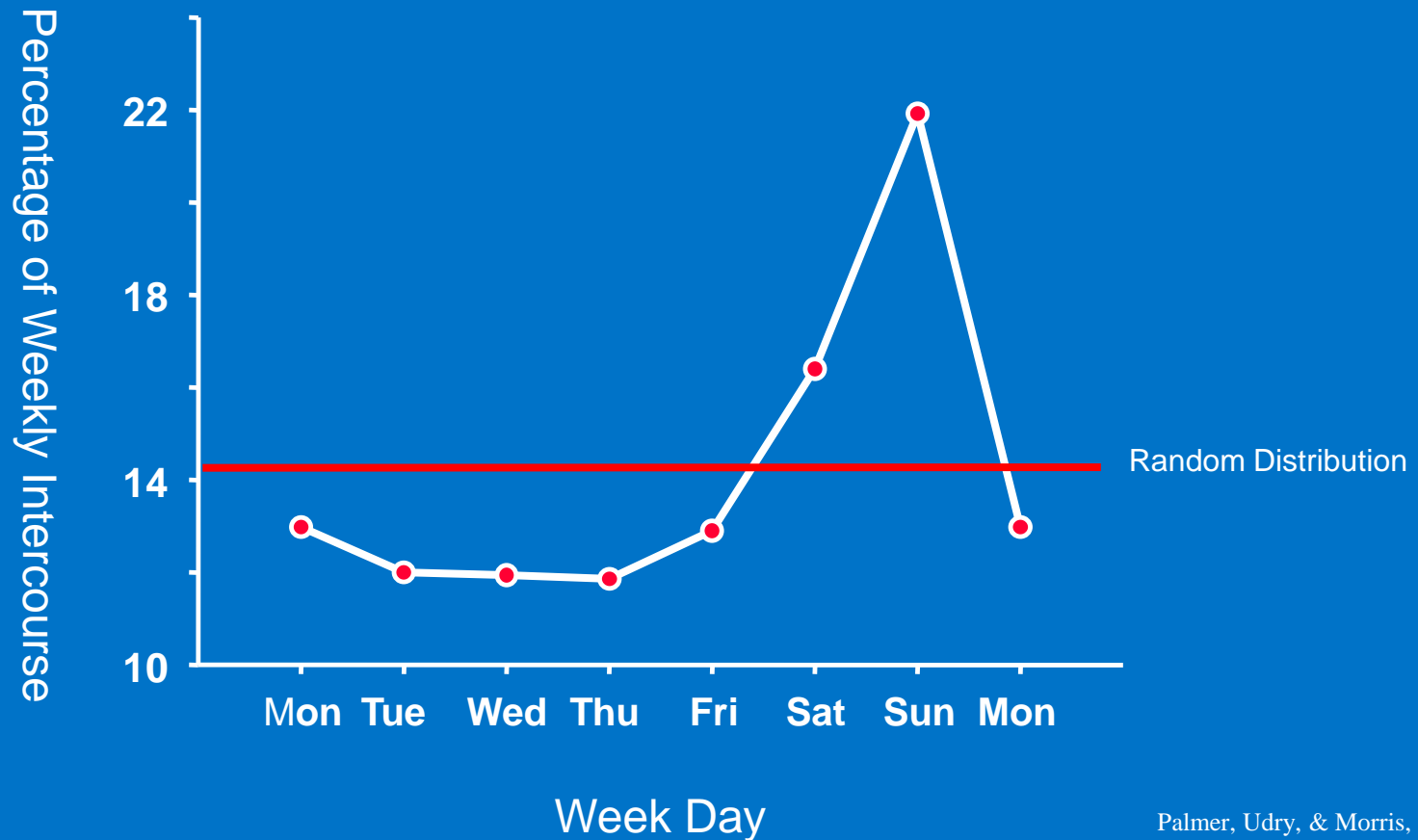
Social risk is a feature of mating in a social context.

- Mating in a socially complex group is socially destabilizing
- Hormonal systems have evolved to solve the problem of mating in a social group
- The disappearance of hormonal control of the capacity to mate allows sexual behavior to respond to social conditions
- Hormonally modulated motivational systems coordinated with fertility increase the probability that mating occurs when the partners are fertile
- In simian primates, motivational systems have replaced other regulatory mechanisms as the primary modulators and coordinators of mating behavior

Is human sexual behavior like that of other primates?

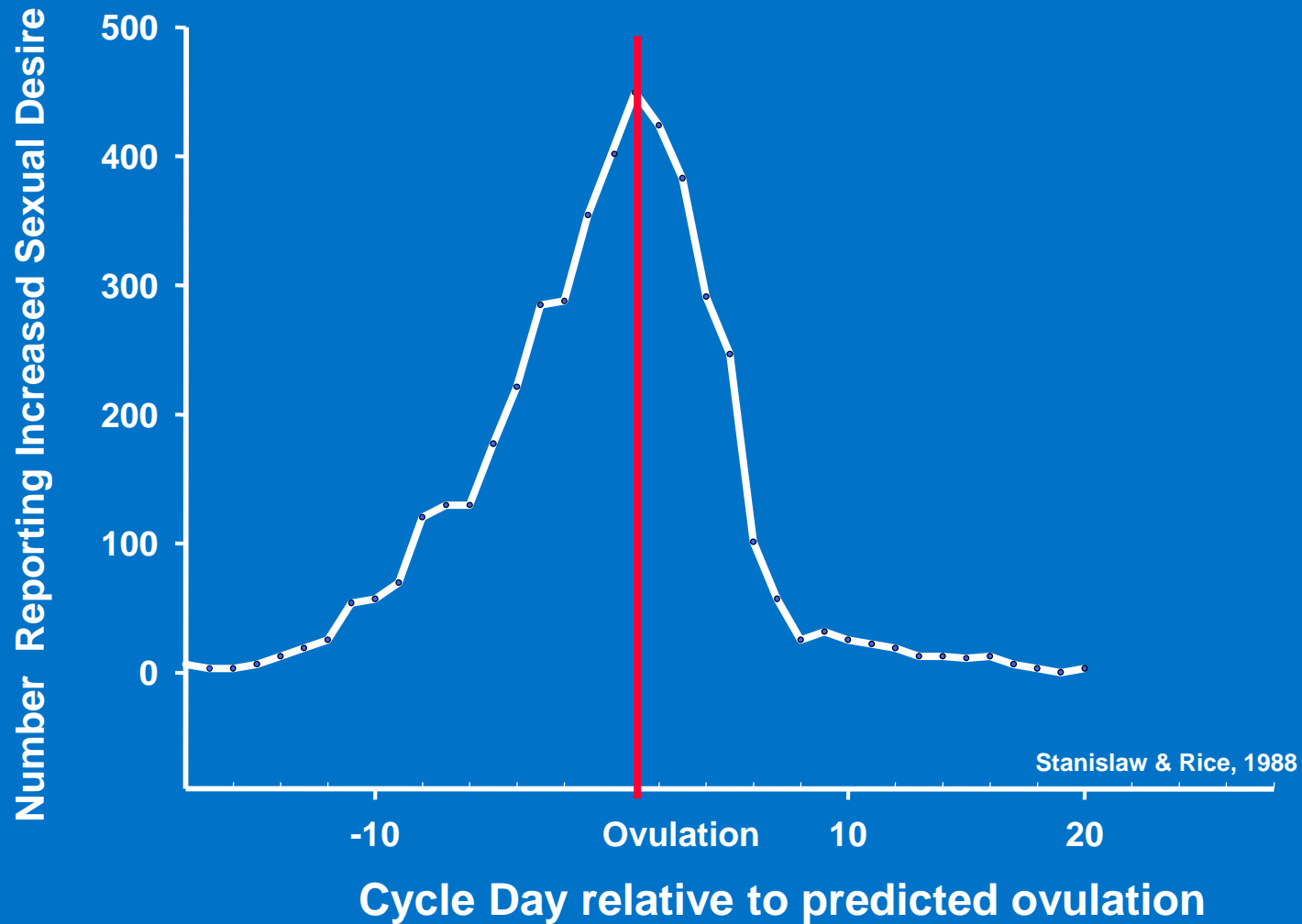
Human sex is sensitive to social context

Why humans invented the weekend

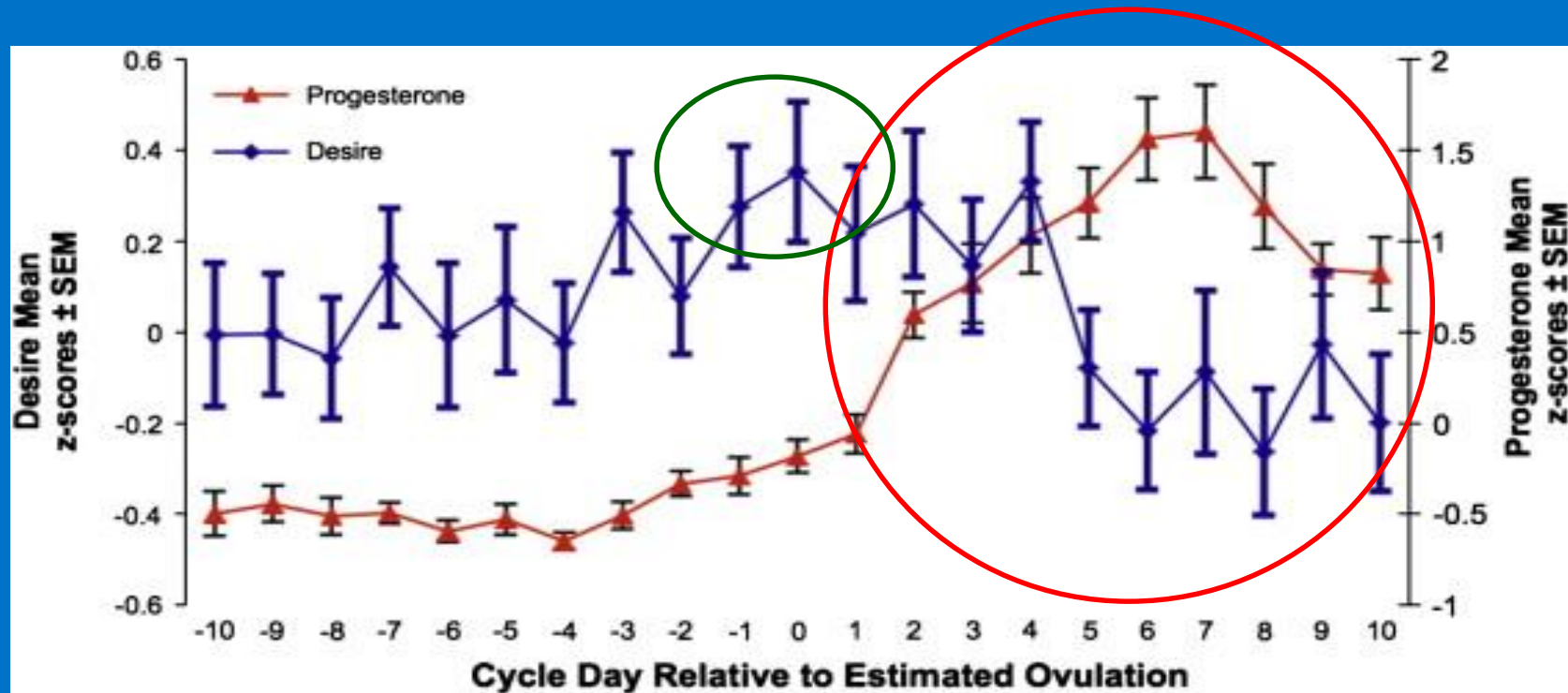


Sexual behavior is affected by social context. Does sexual desire vary with the female's ovarian cycle?

In women, increased sexual desire peaked at midcycle



Womens' sexual desire varied with their ovarian hormones



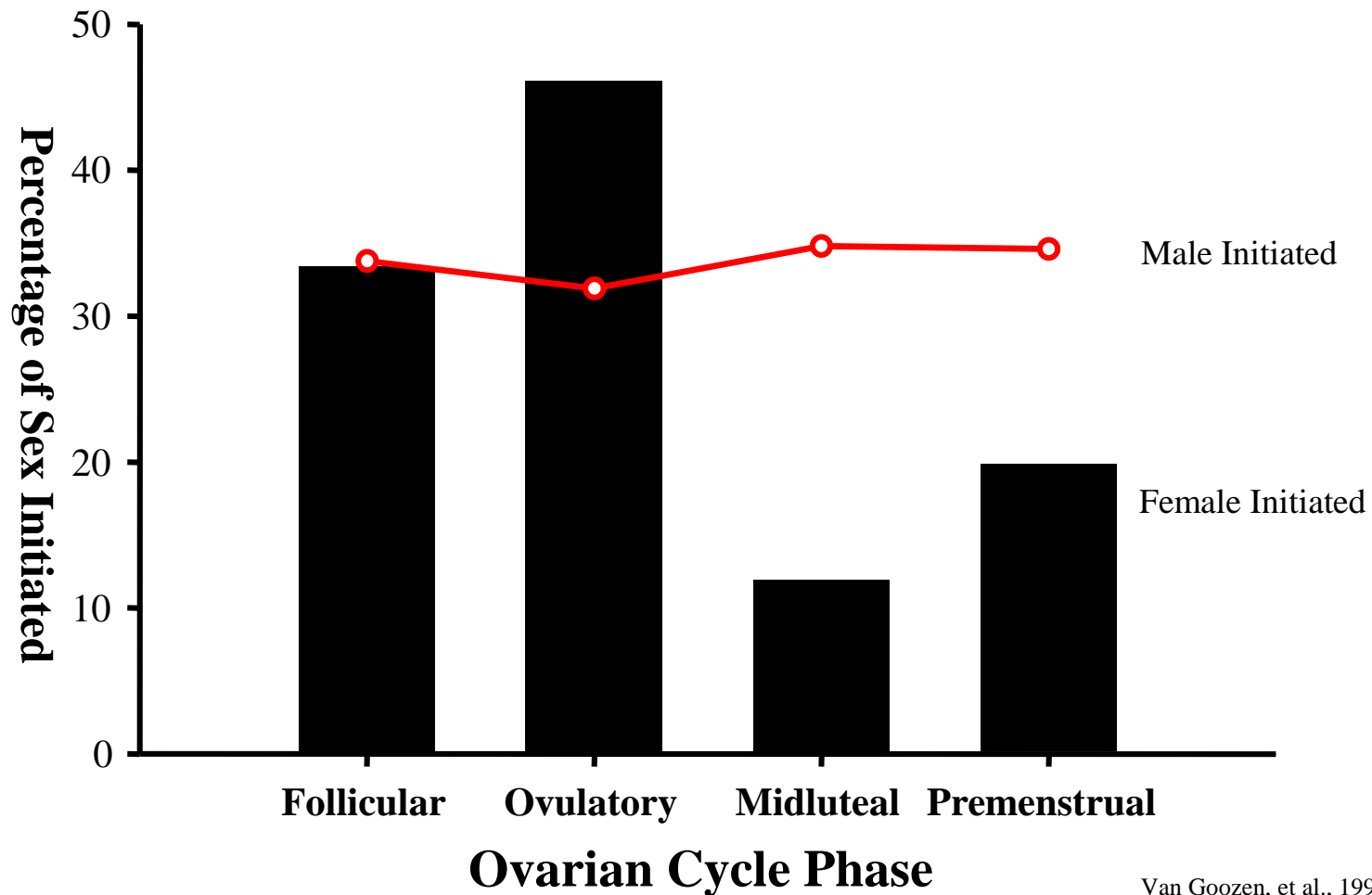
Peak sexual desire was predicted by **estradiol** level two days before (2-day lag)

Peak sexual desire was not predicted by **testosterone** levels at any time lag

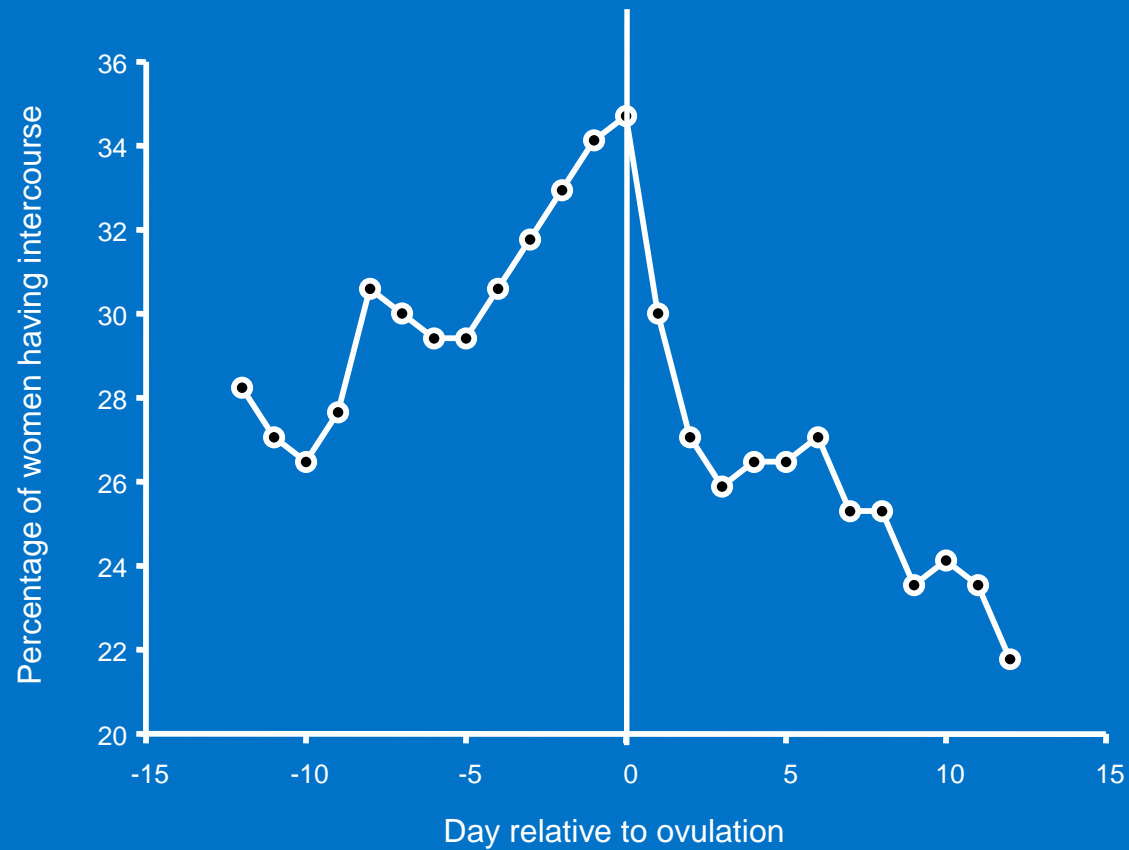
Sexual desire declined markedly post-ovulation

Progesterone levels predicted the post-ovulatory decline in sexual desire

Female sexual initiation is more sensitive to the ovarian cycle than is male sexual initiation



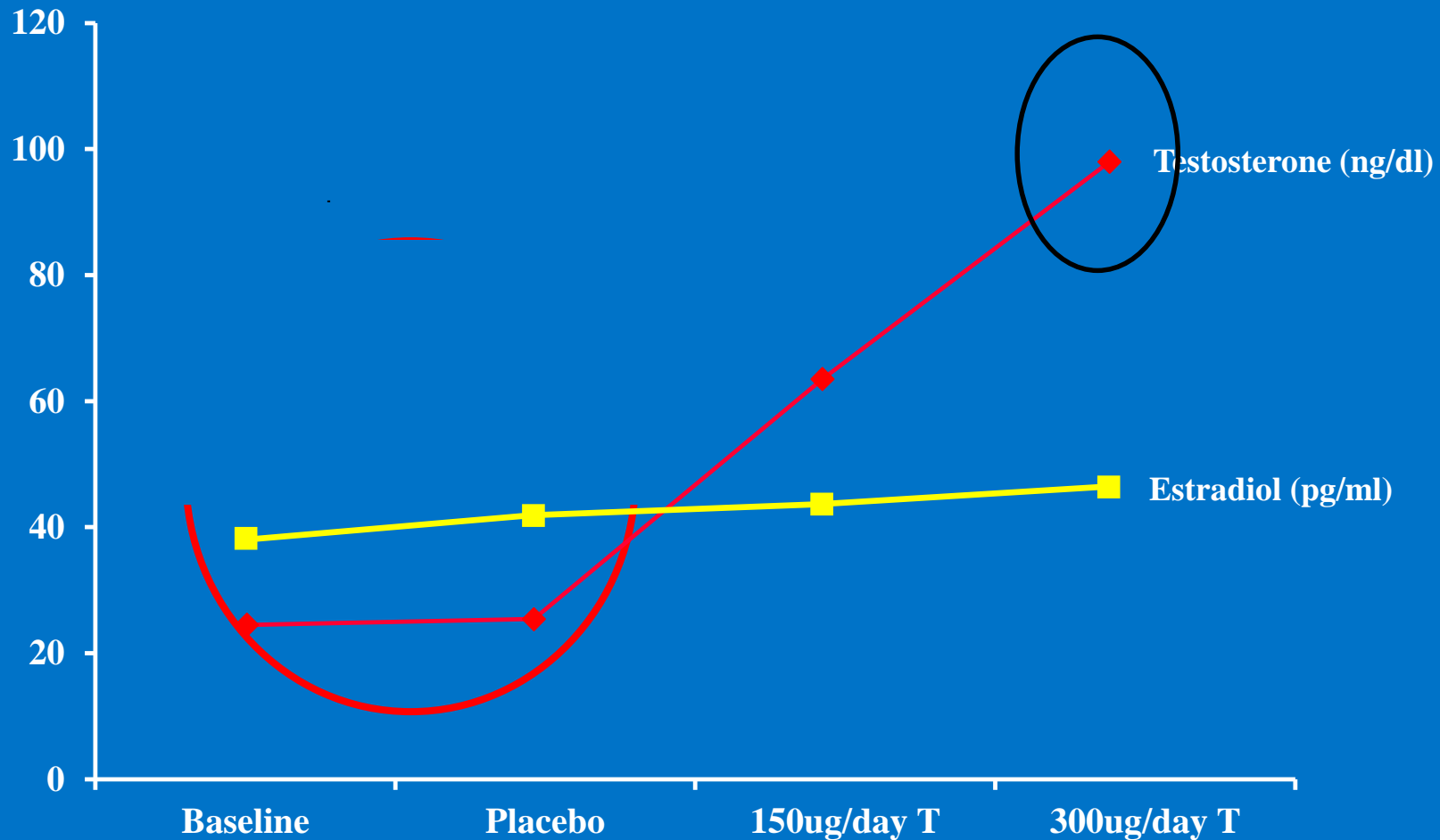
In women using permanent contraception intercourse frequency varied with their ovarian cycle



What about hormonal replacement therapies with
estradiol and testosterone?

An example of the findings

T treatment did not increase sexual desire scores above placebo



Summary of placebo controlled random trials of E and E plus T treatments

- T increased sexual desire only in combination with E and when T levels were supraphysiological
- Women in most studies were hypoestrogenic ($E_2 < 45\text{pg/ml}$)
- E alone increased sexual desire in 2 of 3 studies when E_2 levels were over 150pg/ml .
- Combined E and T treatment is more consistently effective than E alone or T alone

Like in other mammalian females estradiol and progesterone are the primary hormonal modulator of female sexual desire

Testosterone may have a role, but its influence is either through aromatization to estradiol or through its interaction with SHBG to modulate free estradiol which is the neurally active steroid.

Thank you for your attention



Hormonally modulated sexual desire an evolved neuroendocrine mechanism assuring that sexual reproduction occurs in primates even if there are social risks and consequences to sex

