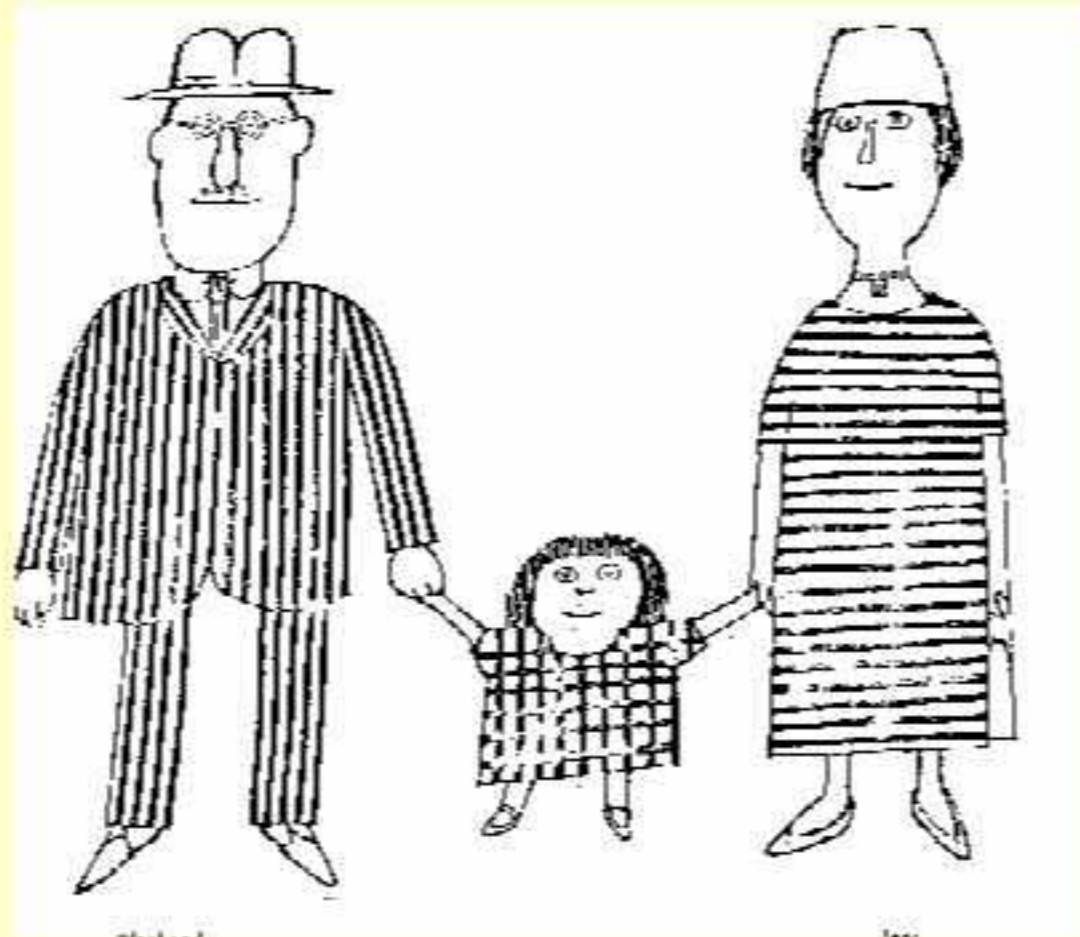


Is having a good parent more important than having good genes ?



Professor Keith Kendrick

Is having a good parent more important than having good genes ?

Sex is only the preface to a book about parenting

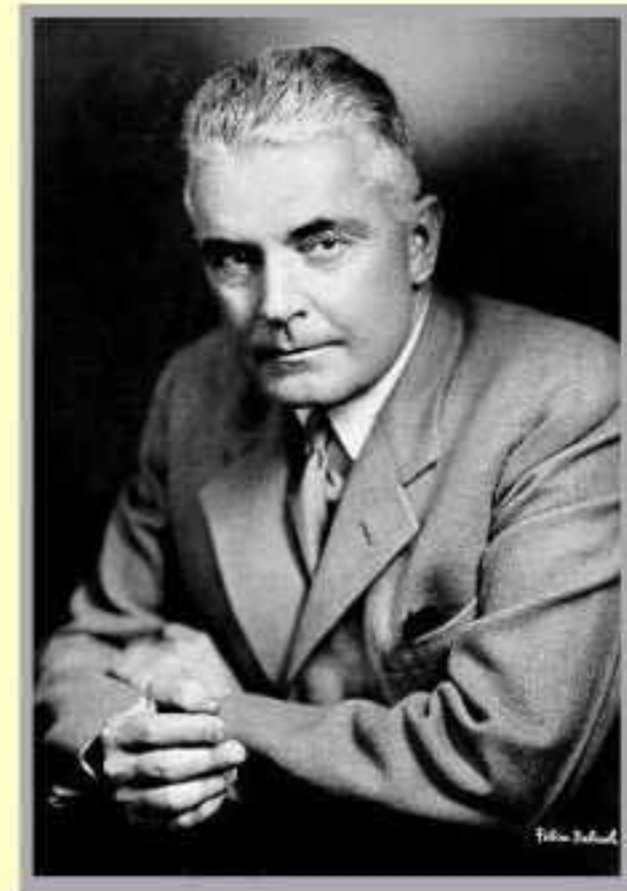
- Or as David Lodge put it:

'Literature is mostly about having sex and not much about having children; life is the other way around'

- Reproductive success is of little consequence if the children do not survive to reproduce themselves

The Nature vs. Nurture Problem

- Can sexual partners continue to promote their interests through educating their offspring ?
- 'Give me a dozen healthy infants, well formed and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist'
John B. Watson (1878-1958)



The Nature vs. Nurture Problem

- ..or is it all down to the genes they pass on and simple nutritional and protective support ?
- 'A devil, a born devil, on whose nature nurture can never stick; on whom my pains Humanely taken, all, all lost, quite lost'
Shakespeare - The Tempest (Act 4 Scene 2)
- 'putting food and money in at one end and clearing up the consequences at the other'

The 'Blank Slate' vs. genetic pre-determinism

- Any key adaptive behaviour or skill will ultimately have a strong genetic basis
- It is not simply about having specific genes but also how an individual's interaction with their environment fine-tunes their regulation
- In essence the environment can enhance, ignore or even downgrade what genetic advantages you may have but it cannot give you genes you simply don't have !

Is having a good parent more important than having good genes ?

Q Why take on parental responsibilities ?

Q What makes animals show parental behaviours ?

Q What promotes the formation of parent-offspring bonds ?

Why take on parental responsibilities?

- Two reproductive strategies:
 - Go for big numbers and leave them to it



Why take on parental responsibilities?

- Two reproductive strategies:
 - Go for big numbers and leave them to it
 - Go for small numbers and make sure they go all the way



Why take on parental responsibilities?

- Two reproductive strategies:
 - Go for big numbers and leave them to it
 - Go for small numbers and make sure they go all the way
- Sacrifices of parenthood pay off by increasing offspring survival in challenging environments

Why take on parental responsibilities?

- What is parental care ?
 - 'Any characteristics or actions of reproductive partners that increase the fitness of their offspring to the detriment of their own'
 - Indirect: length of pregnancy, preparing and maintaining nest site, protecting pregnant female or entire social group



Why take on parental responsibilities?

- What is parental care ?
 - 'Any characteristics or actions of reproductive partners that increase the fitness of their offspring to the detriment of their own'
 - Indirect: length of pregnancy, preparing and maintaining nest site, protecting pregnant female or entire social group
 - Direct: feeding offspring, keeping them warm, comforting and protecting them, carrying them around, playing with and training them



Why take on parental responsibilities?

Adaptive advantages of parental strategy

- Increased survival potential
- More rapid development
- Increased brain development and flexibility
- Social co-operation



Why take on parental responsibilities?

Who does the parenting and why ?

- In most animal species the mother does it all



Why take on parental responsibilities?

Who does the parenting and why ?

- In most animal species the mother does it all
- Mothers need to protect their high investment in egg production

- Elephants

-

-

-



Why take on parental responsibilities?

Who does the parenting and why ?

- In most animal species the mother does it all
- Mothers need to protect their high investment in egg production

- Elephants
- Chimpanzees



Why take on parental responsibilities?

Who does the parenting and why ?

- In most animal species the mother does it all
- Mothers need to protect their high investment in egg production

- Elephants
- Chimpanzees

- Fathers are better off trying to get more females pregnant



Why take on parental responsibilities?

Who does the parenting and why ?

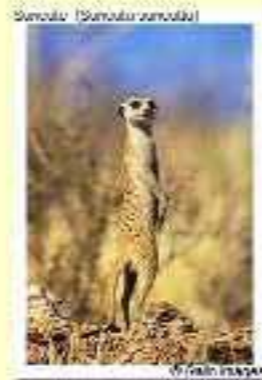
- In most animal species the mother does it all
- Mothers need to protect their high investment in egg production
 - Elephants
 - Chimpanzees
- Fathers are better off trying to get more females pregnant
- They may even see their own kids as a snack !



Why take on parental responsibilities?

In 3 - 5% of mammals fathers join forces with mothers

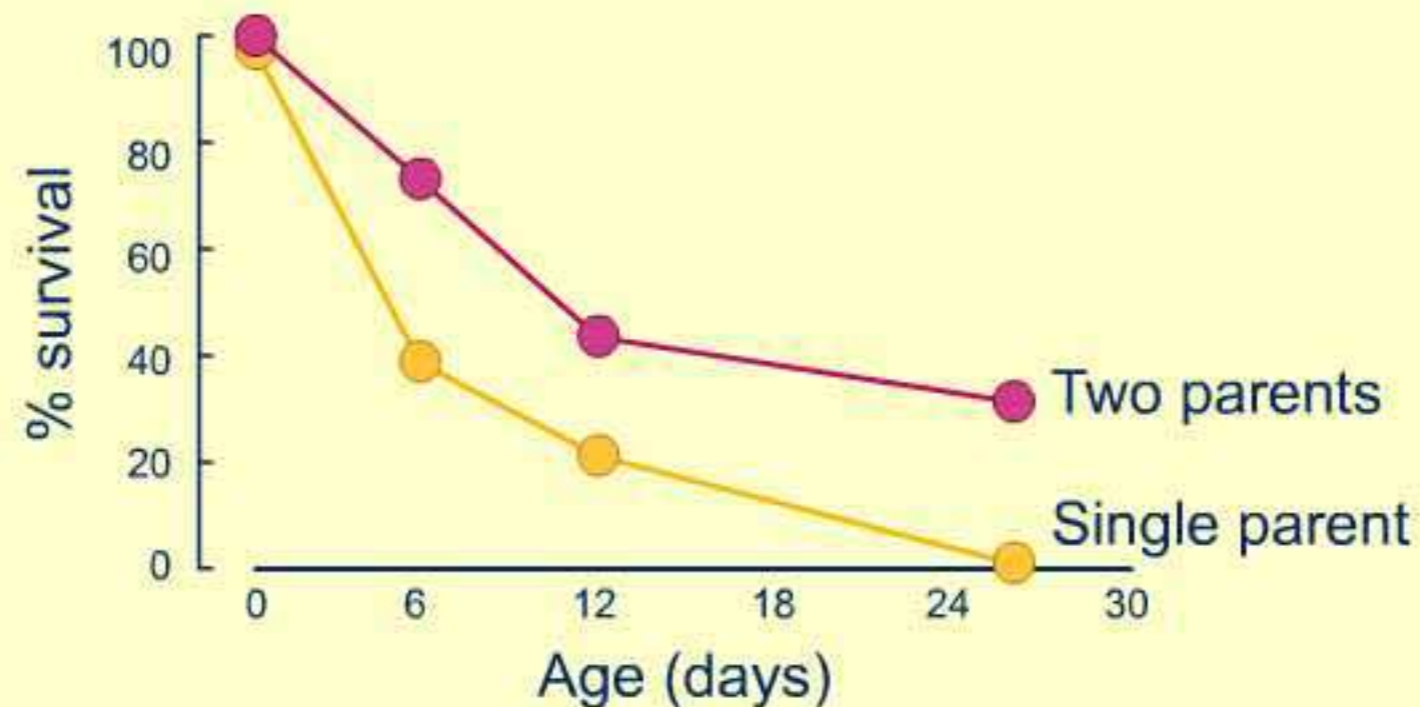
- Fruit bats, Prairie and Pine voles, California mouse, hamsters, gerbils, meerkats, foxes, wolves, hunting dogs, marmosets, tamarins, titi monkeys, humans



Why take on parental responsibilities?

In 3 - 5% of mammals fathers join forces with mothers

- Fruit bats, Prairie and Pine voles, California mouse, hamsters, gerbils, meerkats, foxes, wolves, hunting dogs, marmosets, tamarins, titi monkeys, humans
- Usually a natural extension of monogamy
- Bi-parental care improves survival of offspring



Why take on parental responsibilities?

In 3 - 5% of mammals fathers join forces with mothers

- Fruit bats, Prairie and Pine voles, California mouse, hamsters, gerbils, meerkats, foxes, wolves, hunting dogs, marmosets, tamarins, titi monkeys, humans
- Usually a natural extension of monogamy
- Bi-parental care improves survival of offspring
- Increases the likelihood of alloparenting
- Enforcement of baby-sitting



Why take on parental responsibilities?

- In rare cases fathers do it all - but not in mammals !



phalarope
sea catfish
killdeer plover

rhea
moorhen
kiwi



barking frog
pipefish

emu



- Meet the best dad in the world.....

Why take on parental responsibilities?

The Sea Horse !



What makes animals show parental behaviours ?

Why should males become house-husbands ?

- Female is worn out by her pregnancy and giving birth

-
-
-



What makes animals show parental behaviours ?

Why should males become house-husbands ?

- Female is worn out by her pregnancy and giving birth
- Female is a better resource provider

-
-



What makes animals show parental behaviours ?

Why should males become house-husbands ?

- Female is worn out by her pregnancy and giving birth
- Female is a better resource provider
- Female has other males waiting for sex

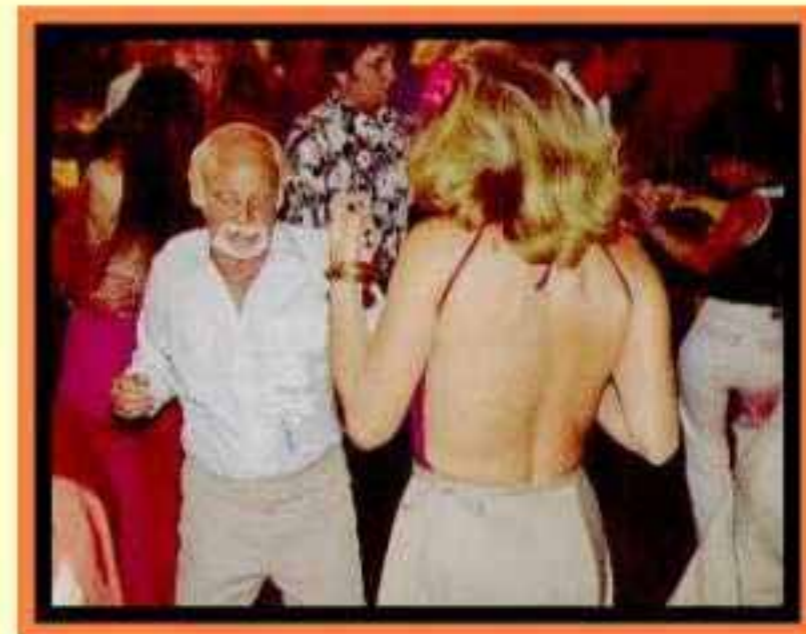


Joan Collins as Alexis in Dynasty

What makes animals show parental behaviours ?

Why should males become house-husbands ?

- Female is worn out by her pregnancy and giving birth
- Female is a better resource provider
- Female has other males waiting for sex
- Males want to live longer



What makes animals show parental behaviours ?

Two phases of parental care:

- Preparatory - nest building, detachment from social group, increased aggression towards intruders



What makes animals show parental behaviours ?

Two phases of parental care:

- Preparatory - nest building, detachment from social group, increased aggression towards intruders
- Post-birth parental responses to young



The power of a baby's voice !



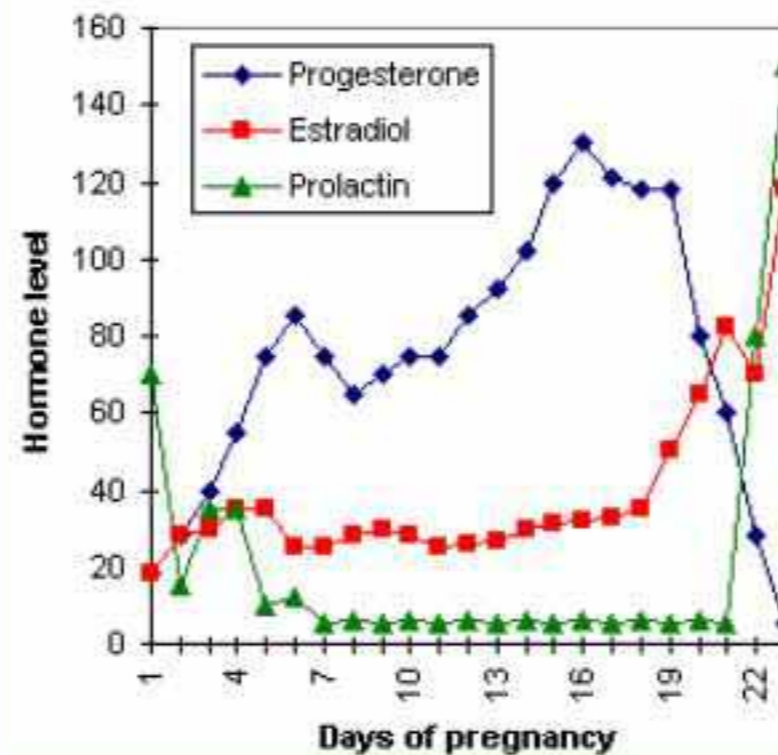
...and all together !

- All adult mammals inescapably exposed to babies will eventually either be parental towards them or kill them
- Cannibalism !

What controls a female's maternal response?

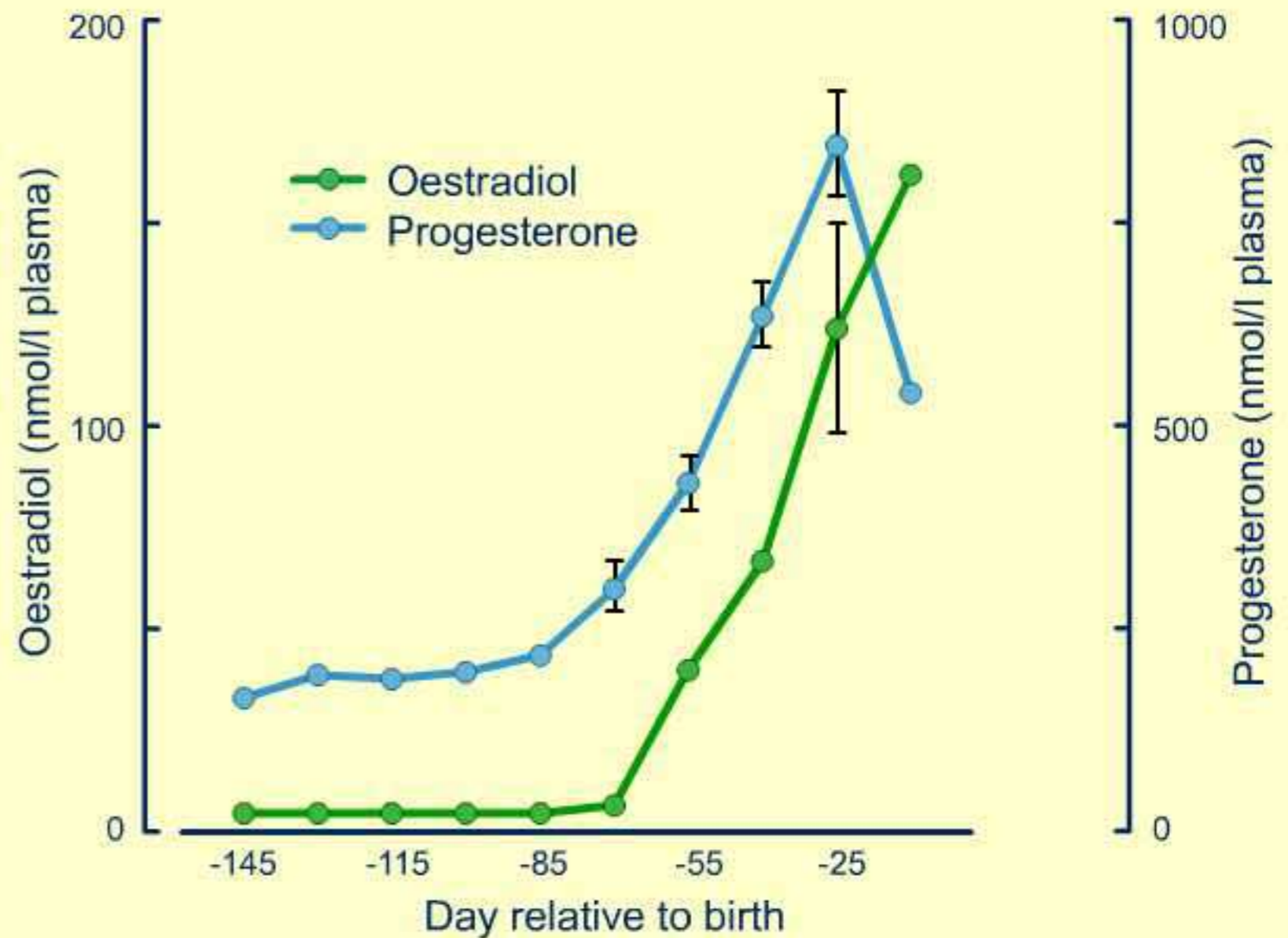
Hormonal profiles during pregnancy are very similar across mammals....

Circulating levels of progesterone, estradiol and prolactin during pregnancy in the rat



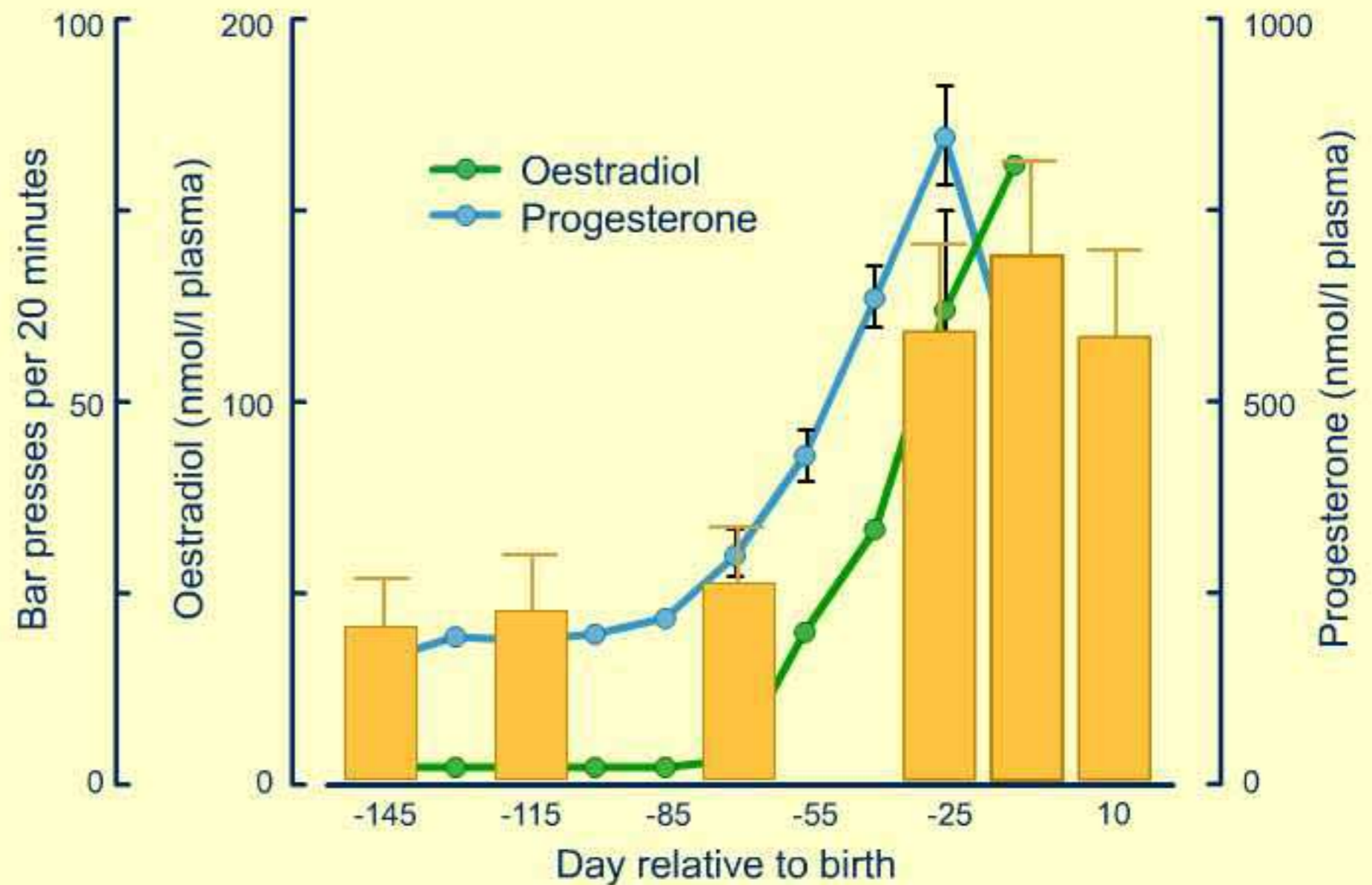
What controls a female's maternal response?

....they prepare the mother for producing and nurturing her offspring.....



What controls a female's maternal response?

.....causing a progressive interest in neonates....



What controls a female's maternal response?

....and may also stimulate preparatory nest-building



What controls a female's maternal response?

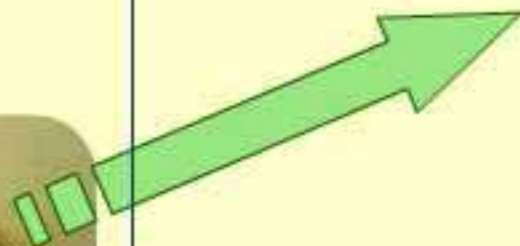
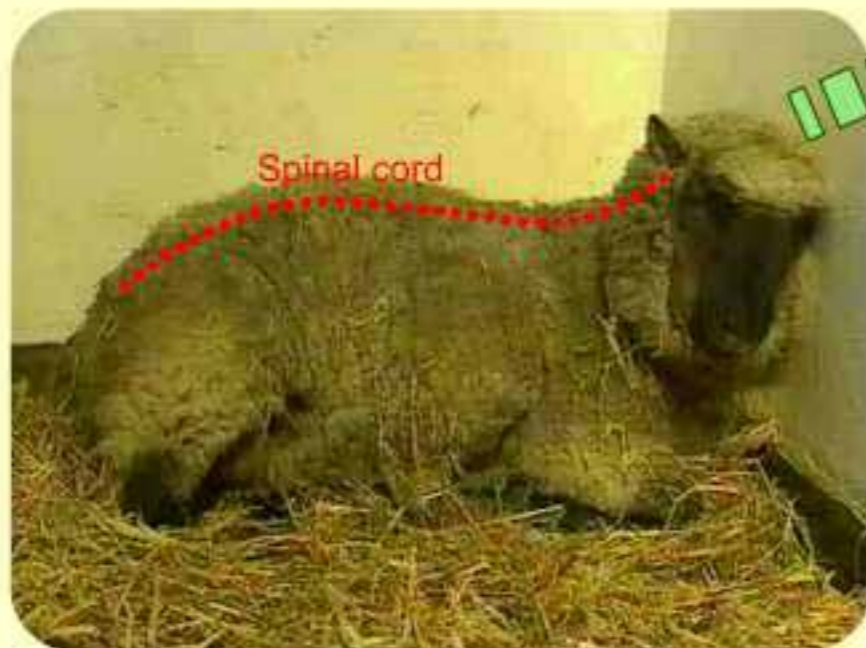
- These hormone changes are important facilitators of maternal responses to new-borns
- The process of giving birth however, is what can trigger this in a matter of seconds



Oxytocin

What controls a female's maternal response?

- These hormone changes are important facilitators of maternal responses to new-borns
- The process of giving birth however, is what can trigger this in a matter of seconds



What controls a female's maternal response?

- Blocking signals from uterine contractions reaching the brain will impair or block immediate maternal responses to offspring in some animals
- What about humans ?

What controls a female's maternal response?

- Maternal experience facilitates the whole process

-

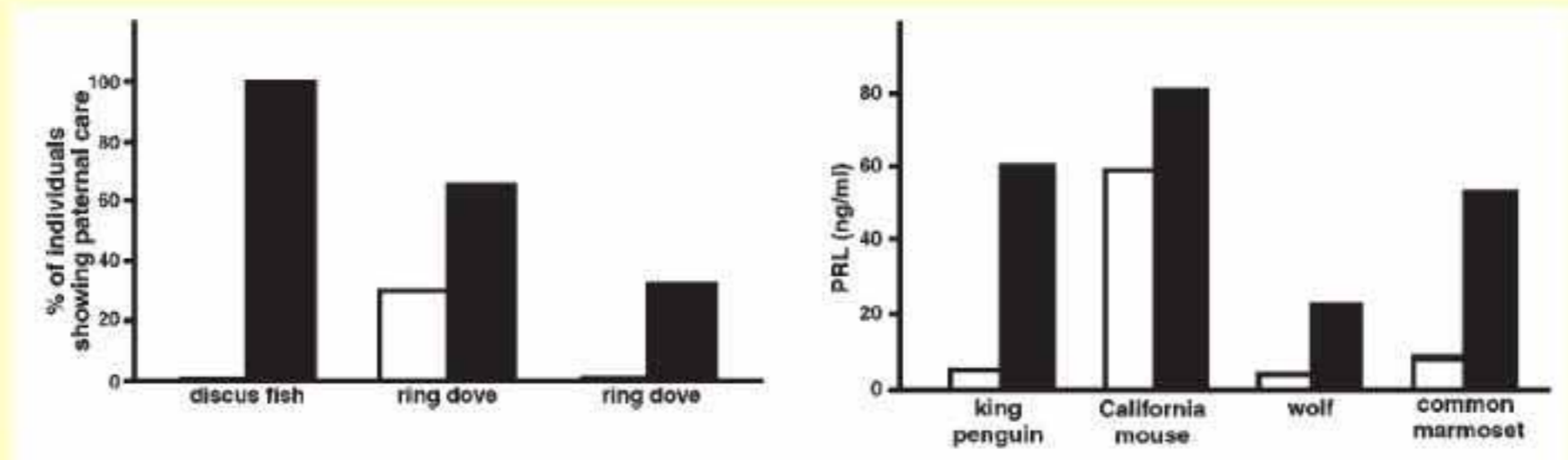


What controls a female's maternal response?

- Maternal experience facilitates the whole process
- What finally shuts off maternal responses ?
 - cessation of suckling at weaning
 - re-starts the female's reproductive cycles
 - sex and parenting are very much in opposition

What controls a male's paternal response ?

- Animal and human dads show similar hormone changes
- In general:
 - Prolactin levels increase

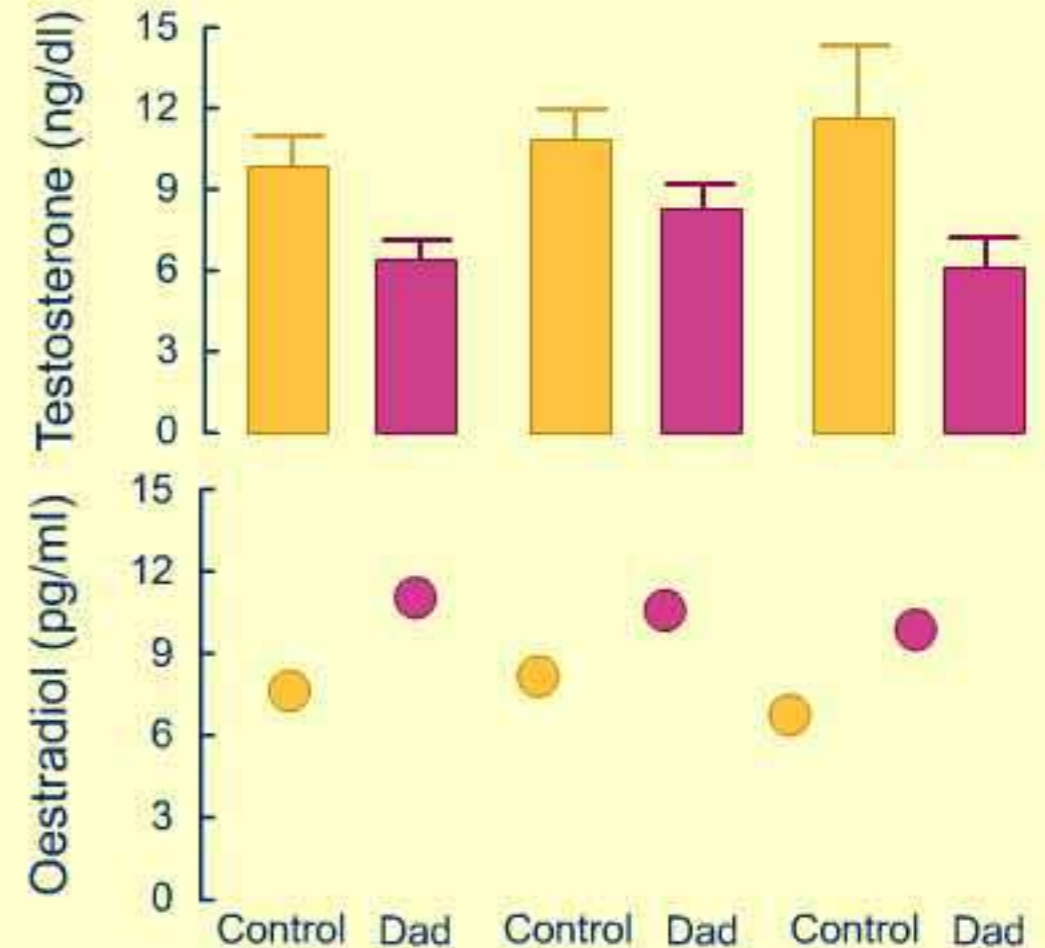


What controls a male's paternal response ?

- Animal and human dads show similar hormone changes

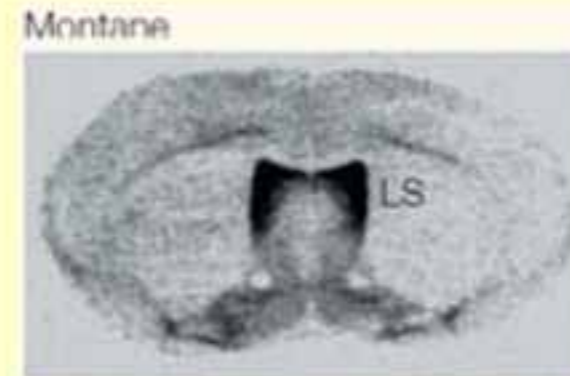
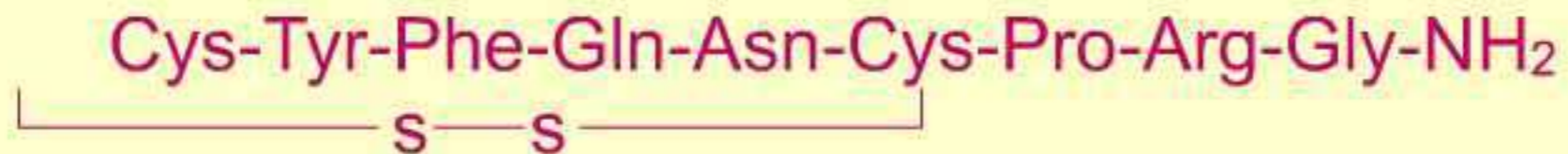
- In general:

- Prolactin levels increase
- In some cases dads may actually produce breast milk
- Testosterone levels decrease
- Oestrogen levels increase
- Testosterone is more readily converted to oestrogen in the brain



What controls a male's paternal response ?

- The peptide vasopressin may also be important



- In many ways what is happening is that dads are effectively becoming mums !
- Even males of normally non-paternal species can sometimes be induced to become dads by mimicking these hormone changes

What promotes the formation of parent-offspring bonds ?

Strong parental-bonds with babies occur in species with small litter sizes



What promotes the formation of parent-offspring bonds ?

- For mothers:
 - Oxytocin - facilitates individual recognition of offspring and its link to brain reward systems - notably through the neurotransmitter dopamine
 - Opioids - may also reinforce the emotional link by promoting pleasurable feelings during contact with young
- For fathers:
 - Vasopressin as well as oxytocin and opioids may be important

What promotes the formation of parent-offspring bonds ?

Linking individual offspring recognition with brain reward mechanisms is what makes for a lifelong bond with a parent

What happens if you don't have parental care ?

The absence of parental care can have profound effects:

- Rhesus monkeys raised in social isolation with artificial surrogate mothers who grew up to be total social misfits

-
-
-
-



What happens if you don't have parental care ?

The absence of parental care can have profound effects:

- Rhesus monkeys raised in social isolation with artificial surrogate mothers who grew up to be total social misfits
- Hand-reared animals in zoos, notably those used in the past for chimpanzee tea-parties tend to have the same problems



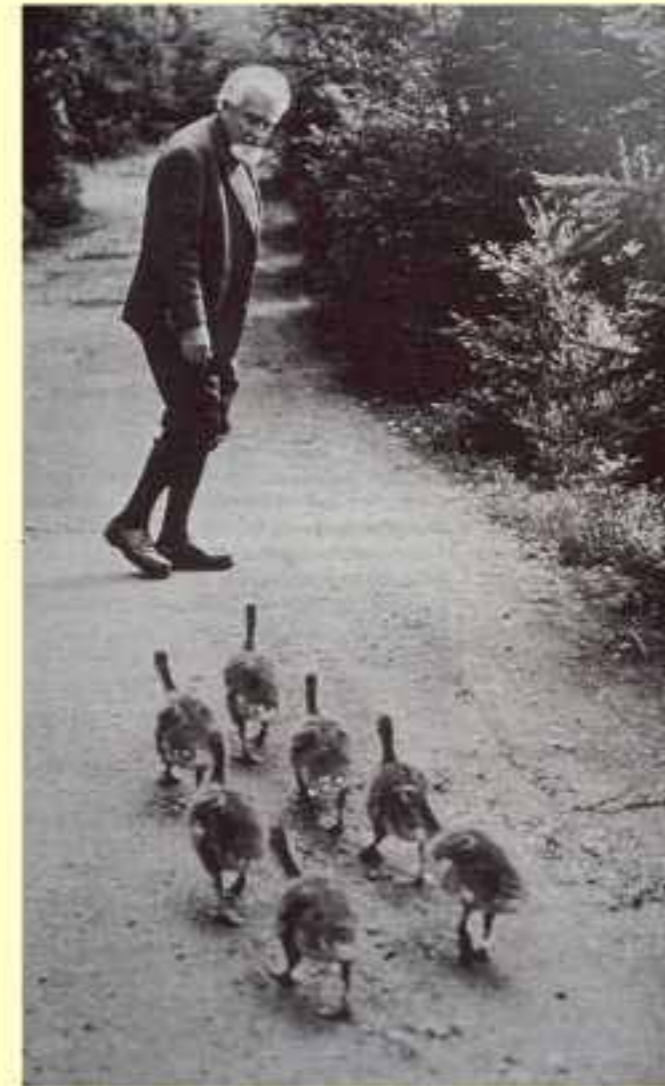
What happens if you don't have parental care ?

The absence of parental care can have profound effects:

- Rhesus monkeys raised in social isolation with artificial surrogate mothers who grew up to be total social misfits.
- Hand-reared animals in zoos, notably those used in the past for chimpanzee tea-parties tend to have the same problems
- In monkeys stress responses and alcohol abuse are significantly increased in animals raised in juvenile groups without parents
- Similar kinds of social and stress adjustment problems have been reported in orphaned or abandoned children raised in institutions - M Gunnar (in press)
- These effects may not be entirely parent-specific however

What kinds of generic influences can parents have ?

- Social and sexual imprinting
-



What kinds of generic influences can parents have ?

- Social and sexual imprinting
- What about mammals that bond with their offspring ?



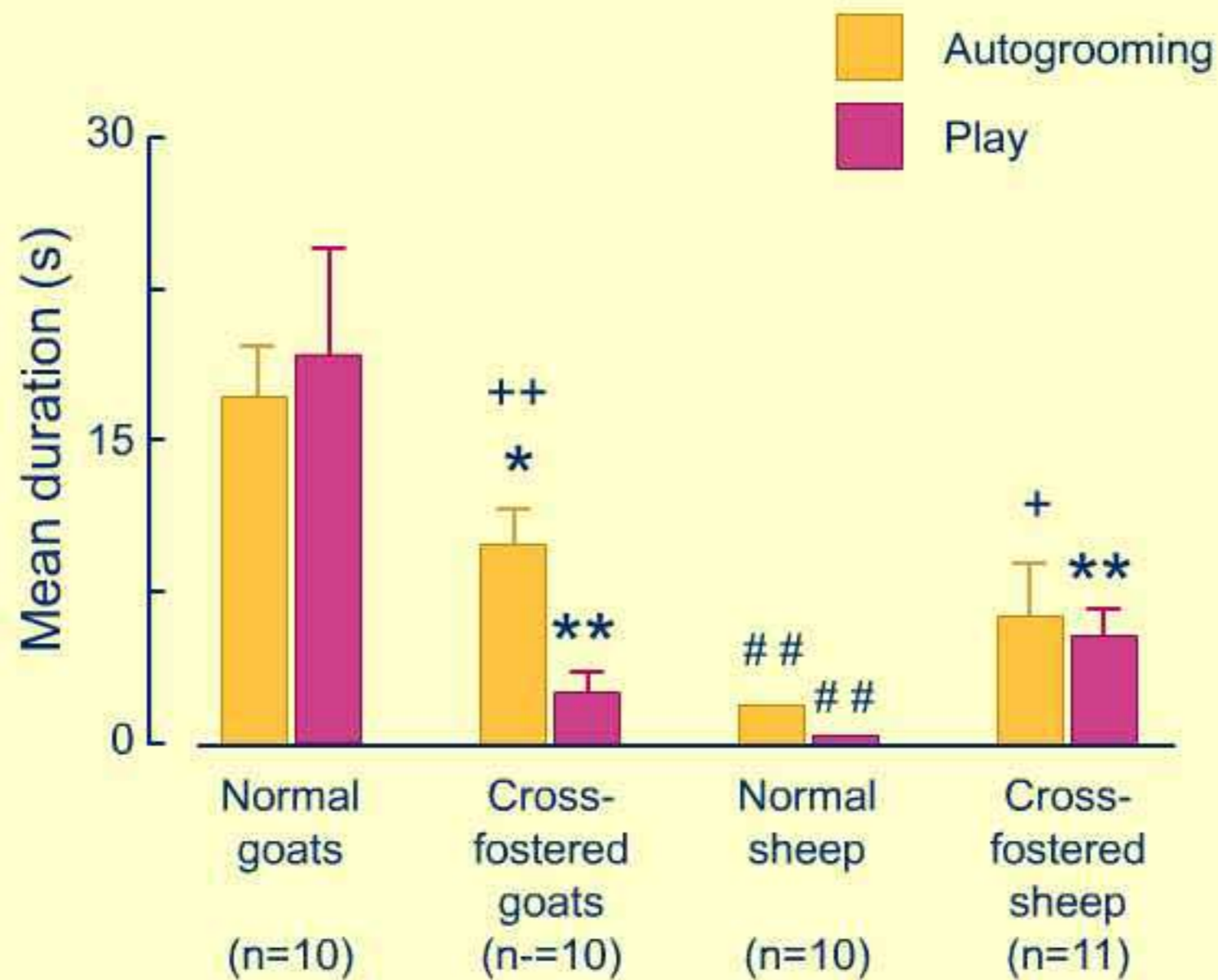
What kinds of generic influences can parents have ?

Cross-fostered sheep/goats



What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Juvenile behaviours



What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Adult social and sexual preferences



What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Year 1



What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Siblings don't make a difference



What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Year 2 (no reversal)



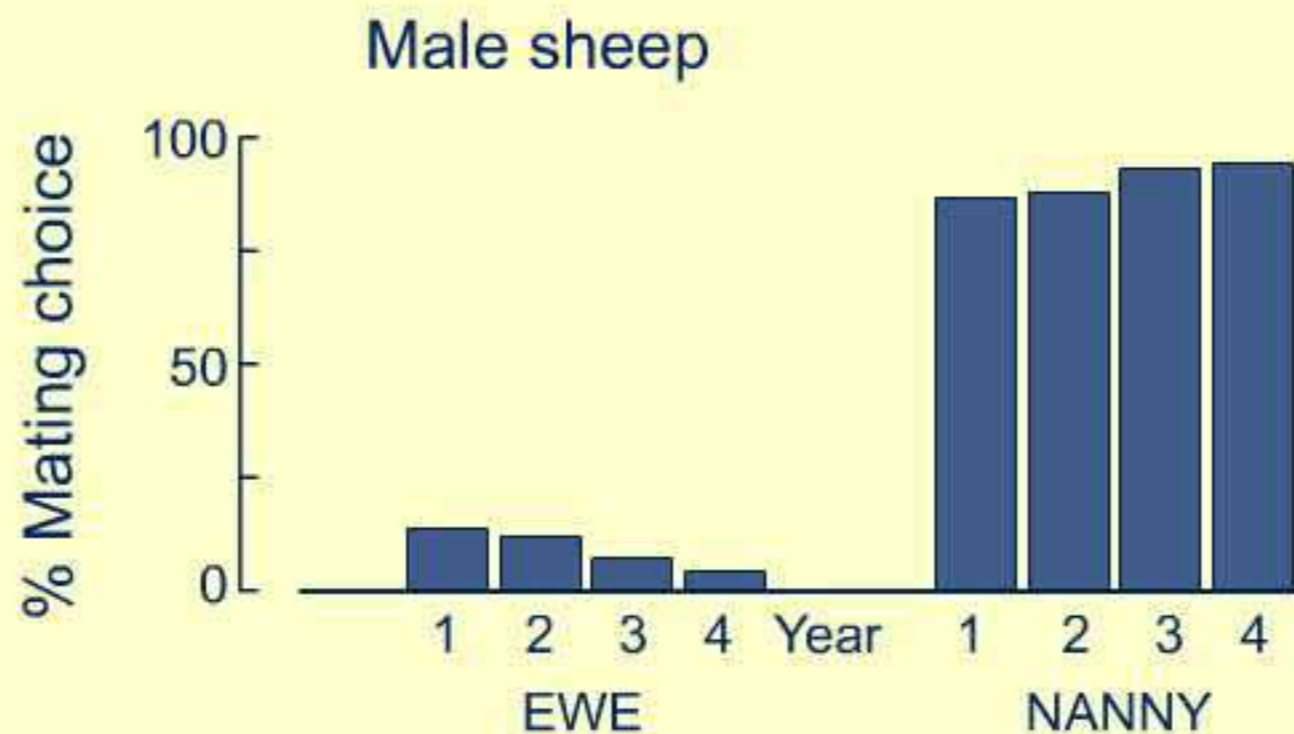
What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Year 3 (no reversal)



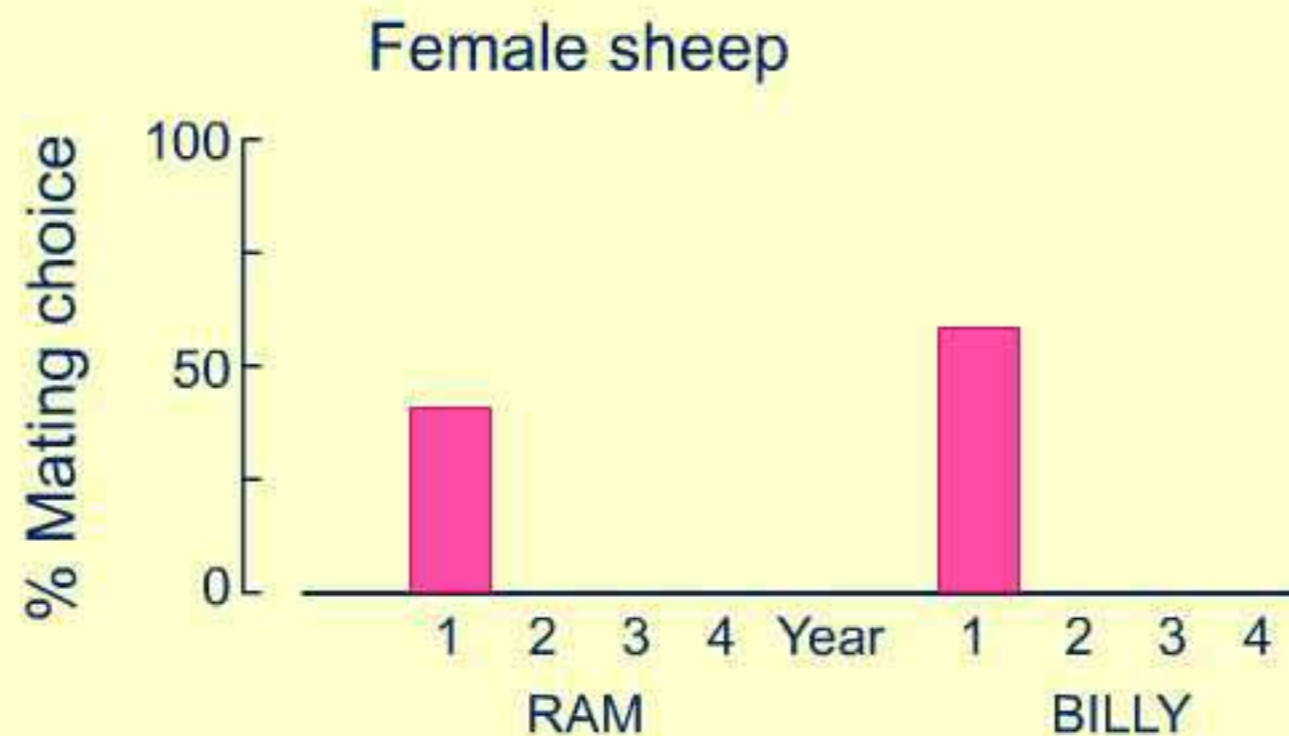
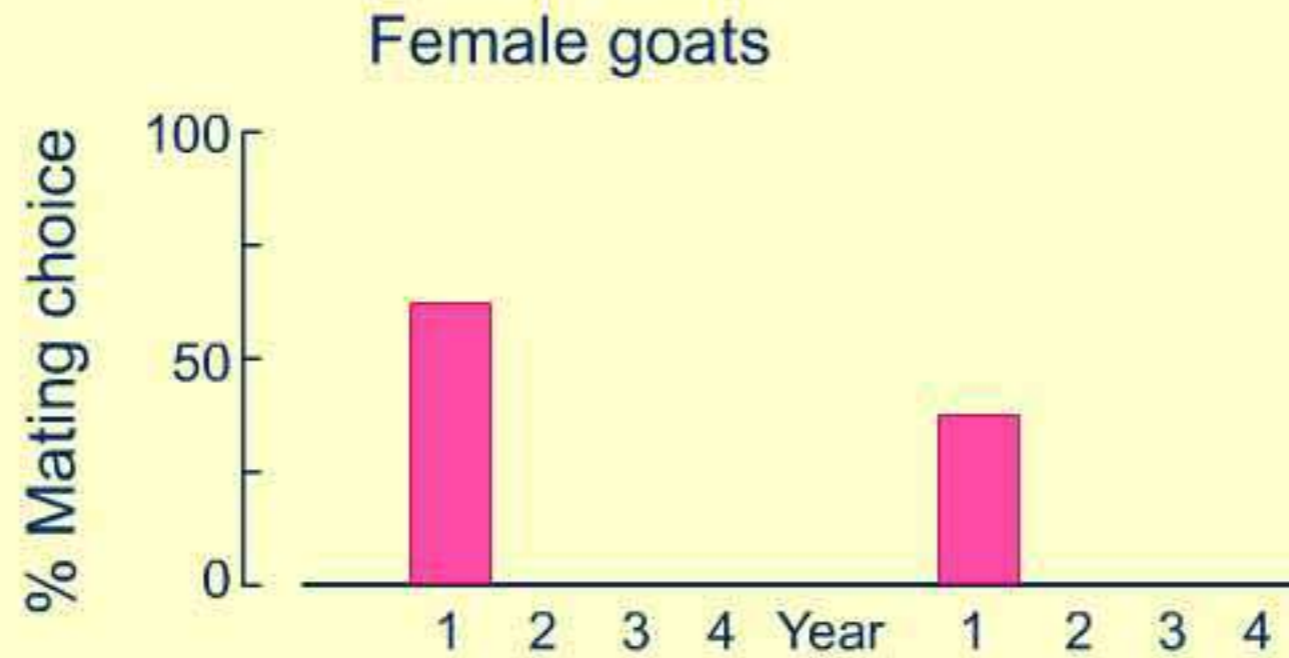
What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Year 4 (no reversal)



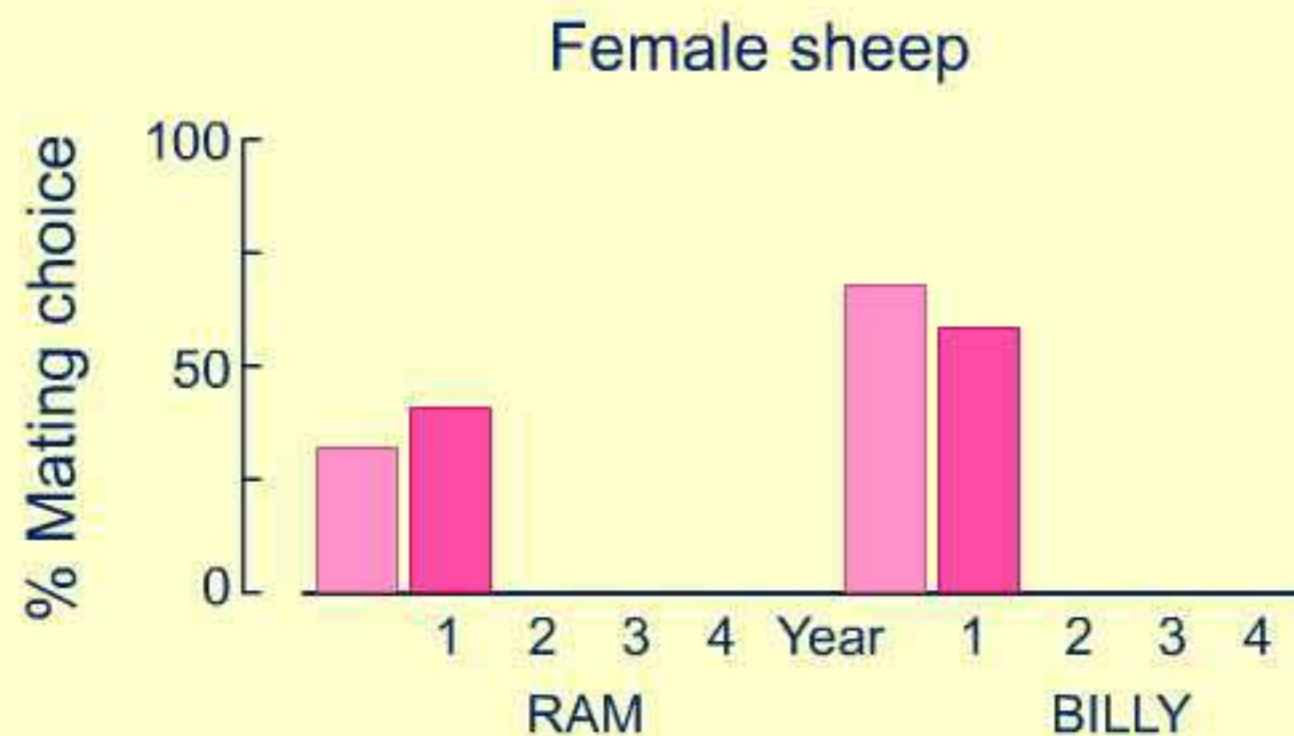
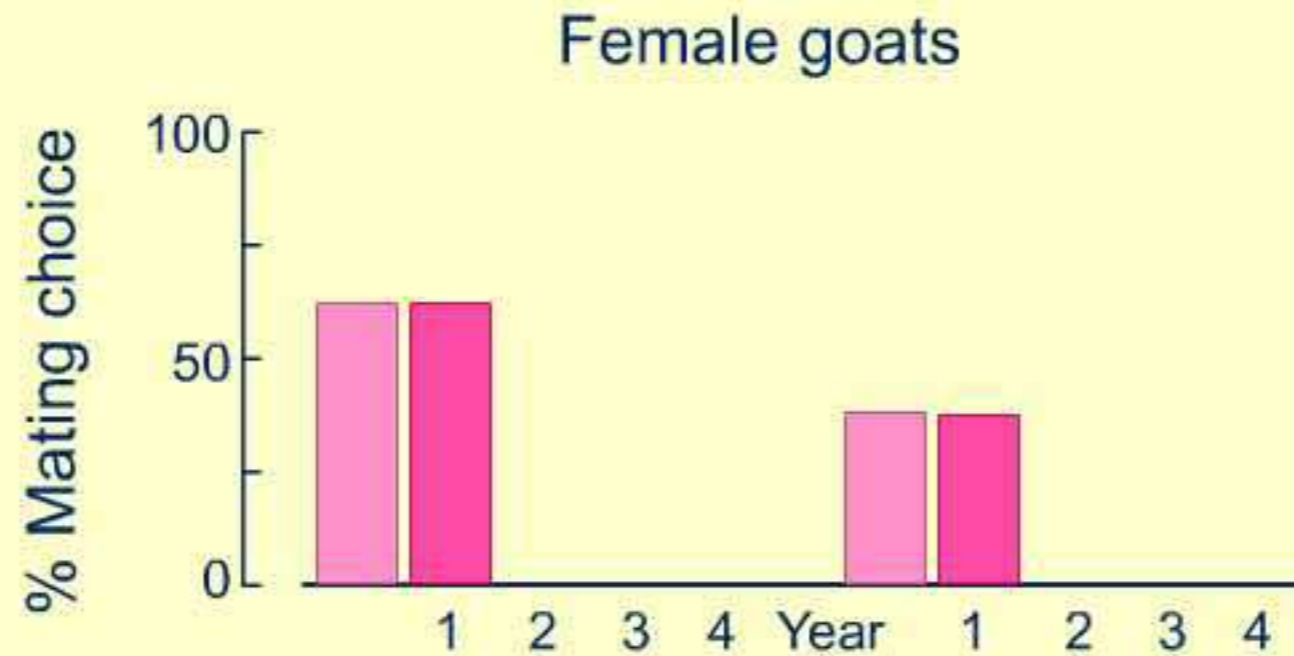
What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Year 1



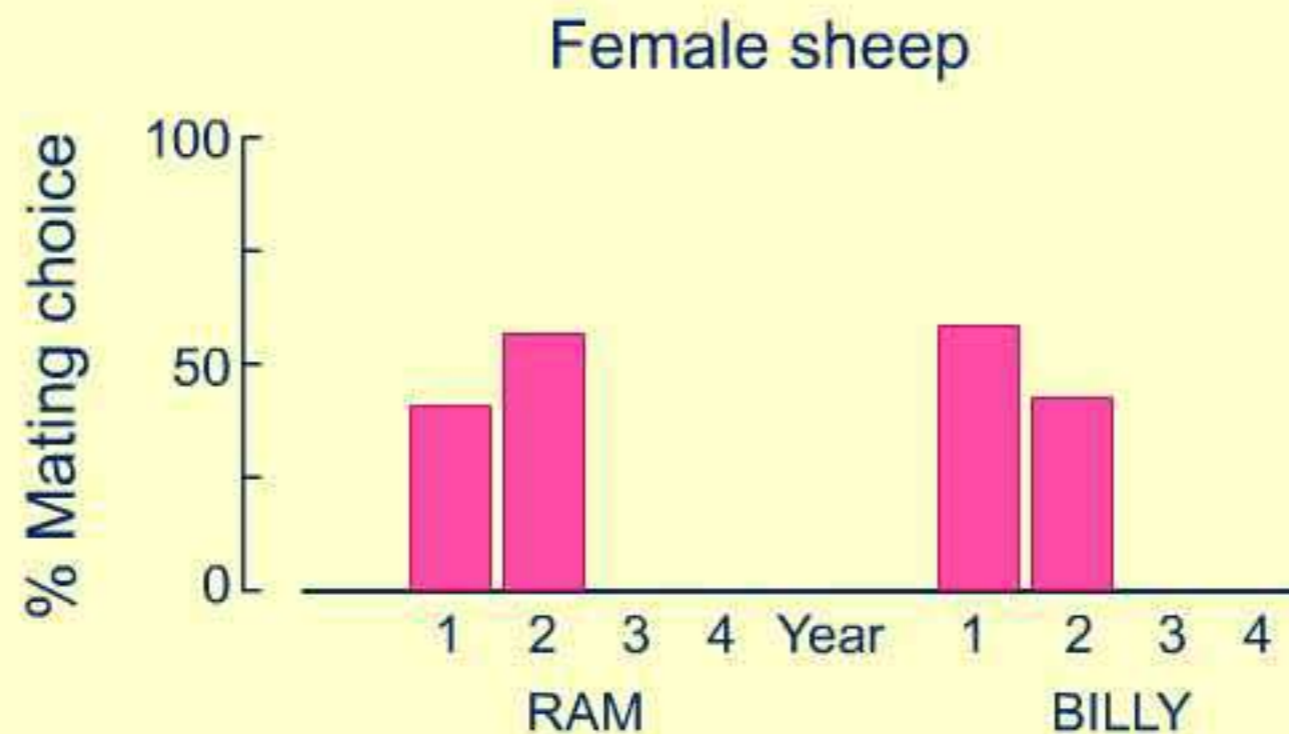
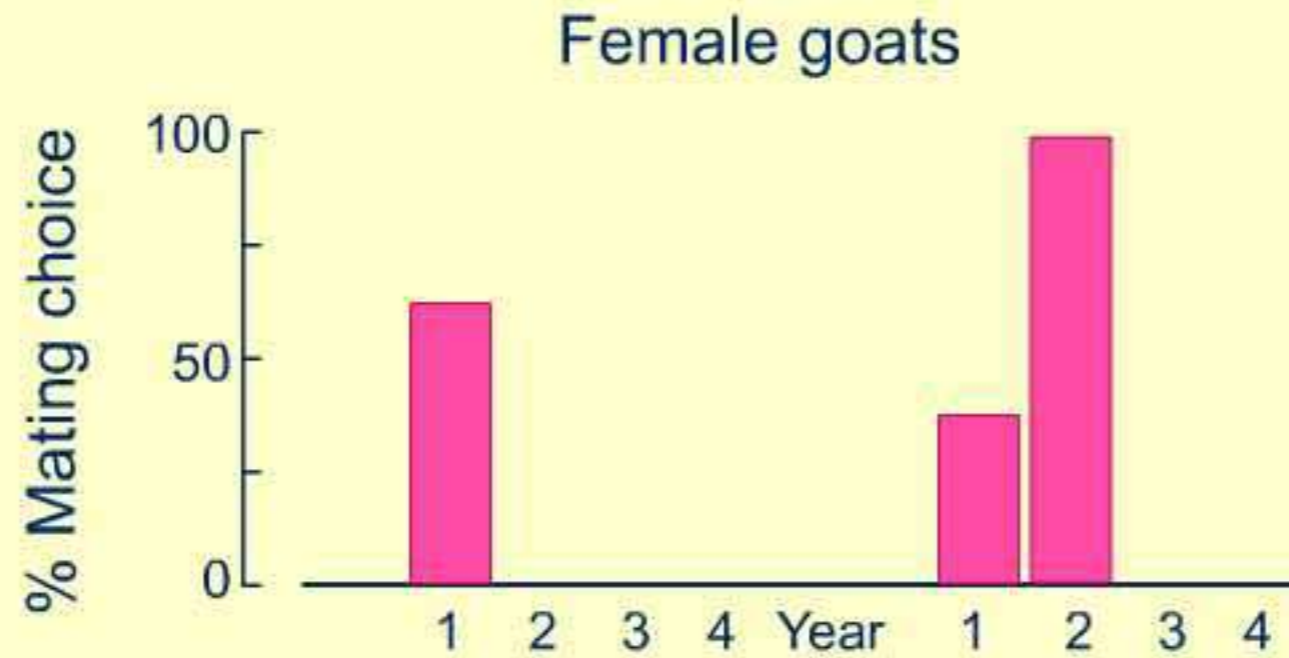
What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Siblings don't make a difference



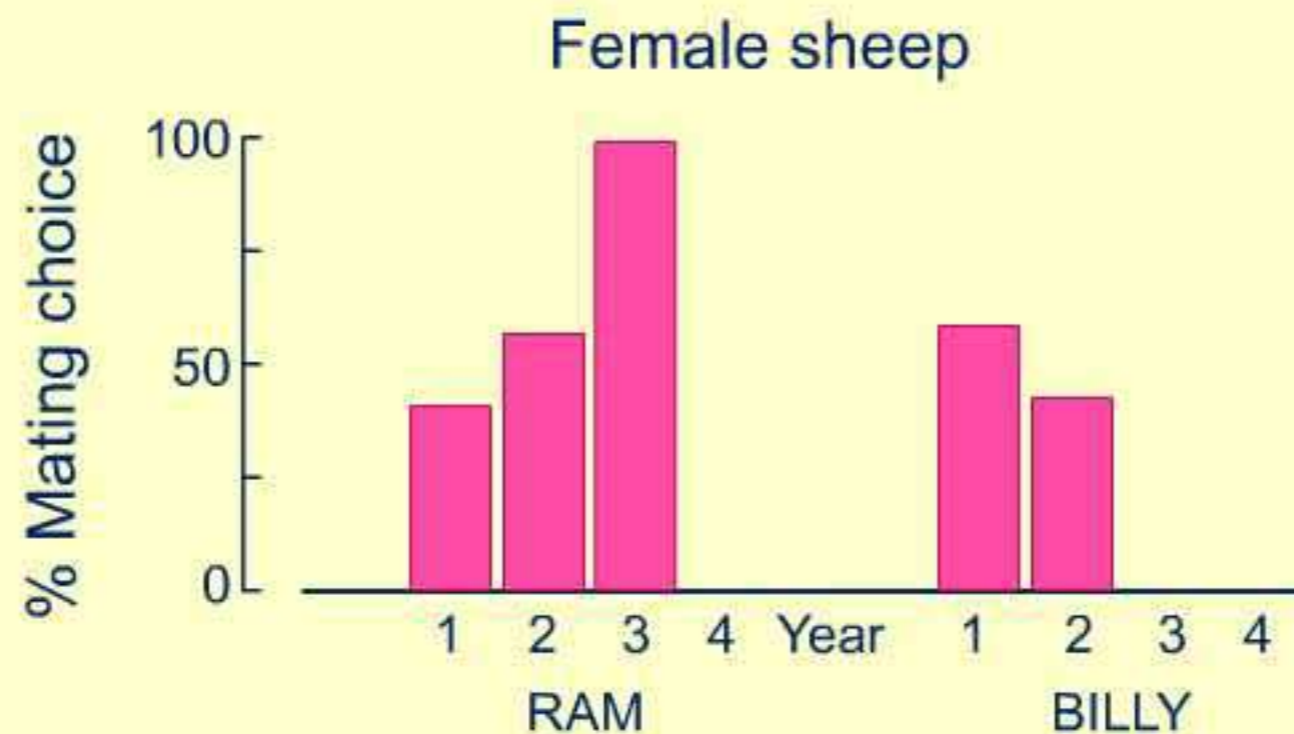
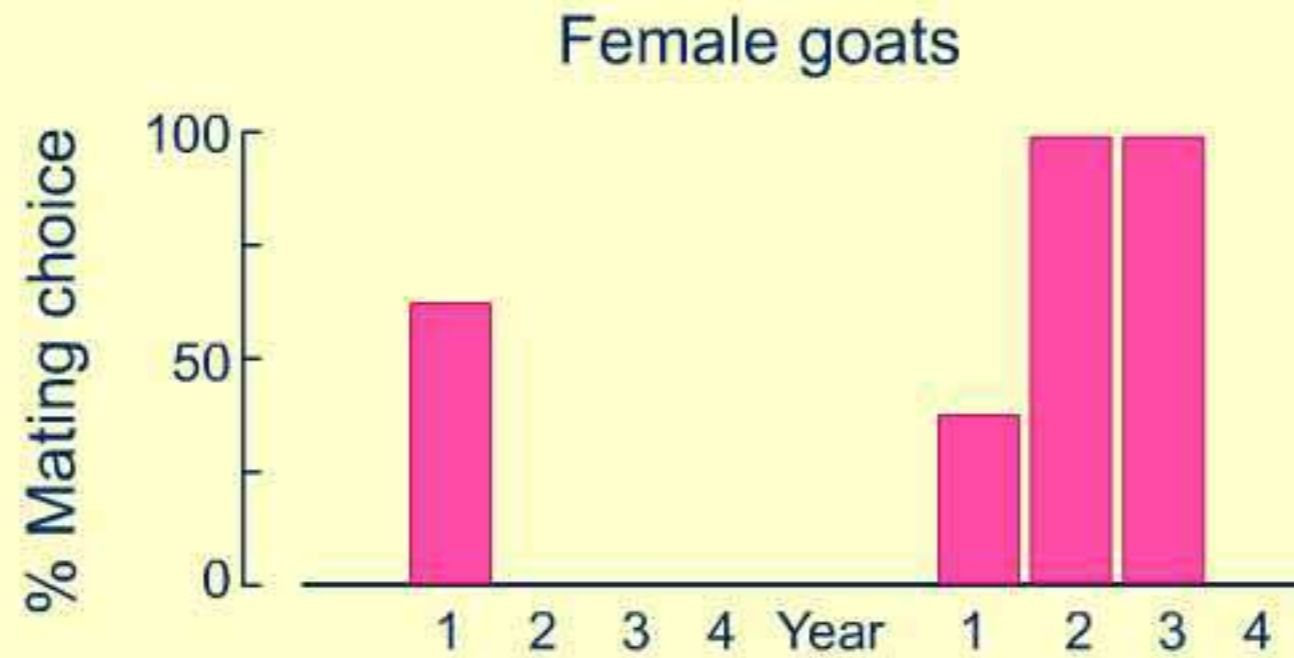
What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Year 2 (reversal evident)



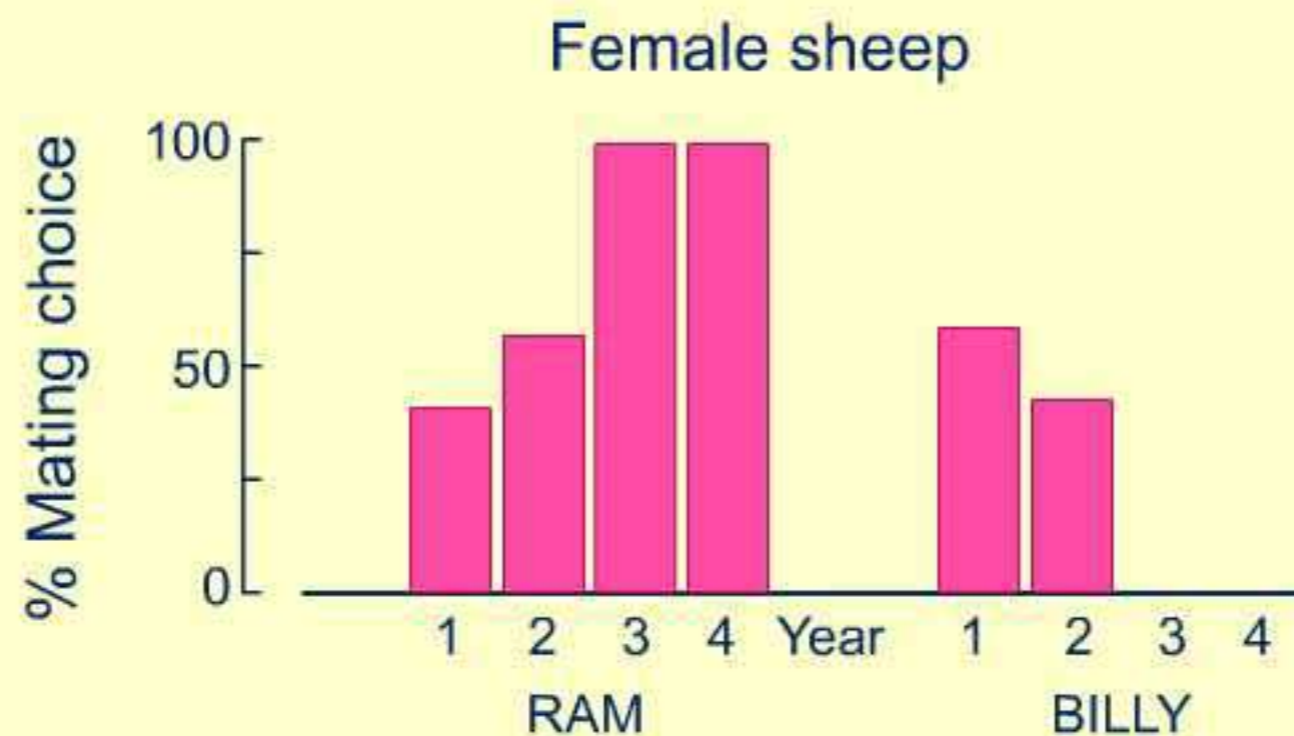
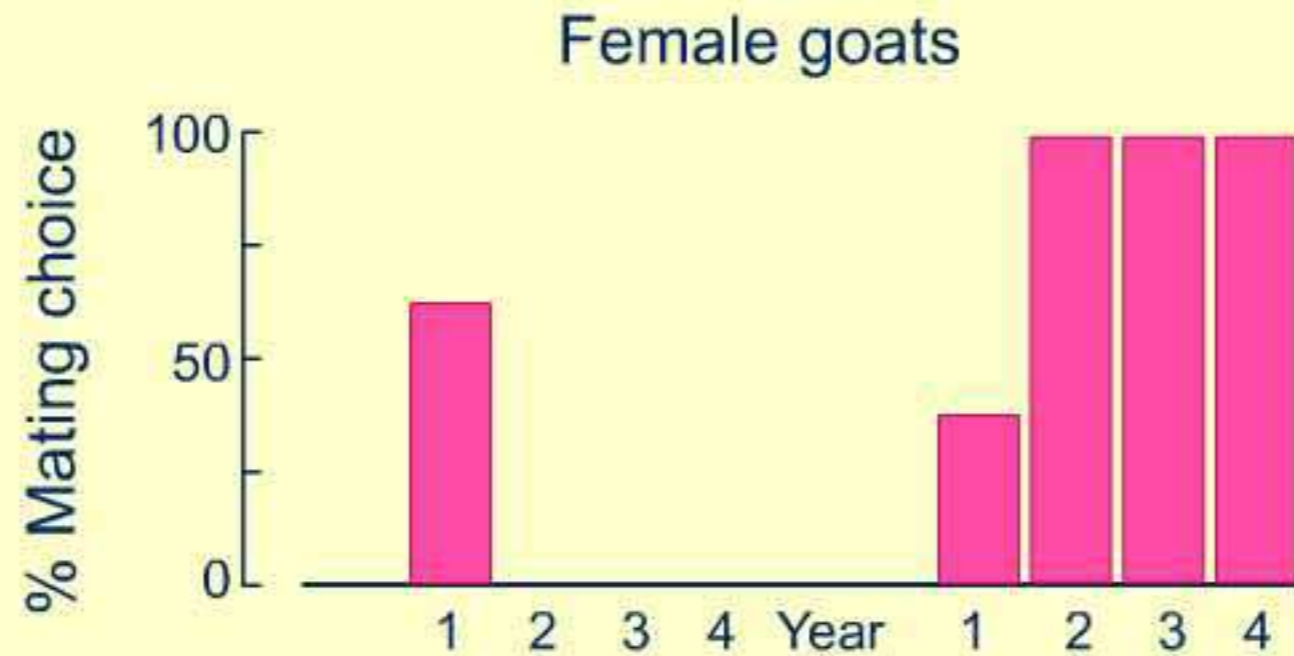
What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Year 3 (reversal complete)



What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Year 4 (reversal complete)



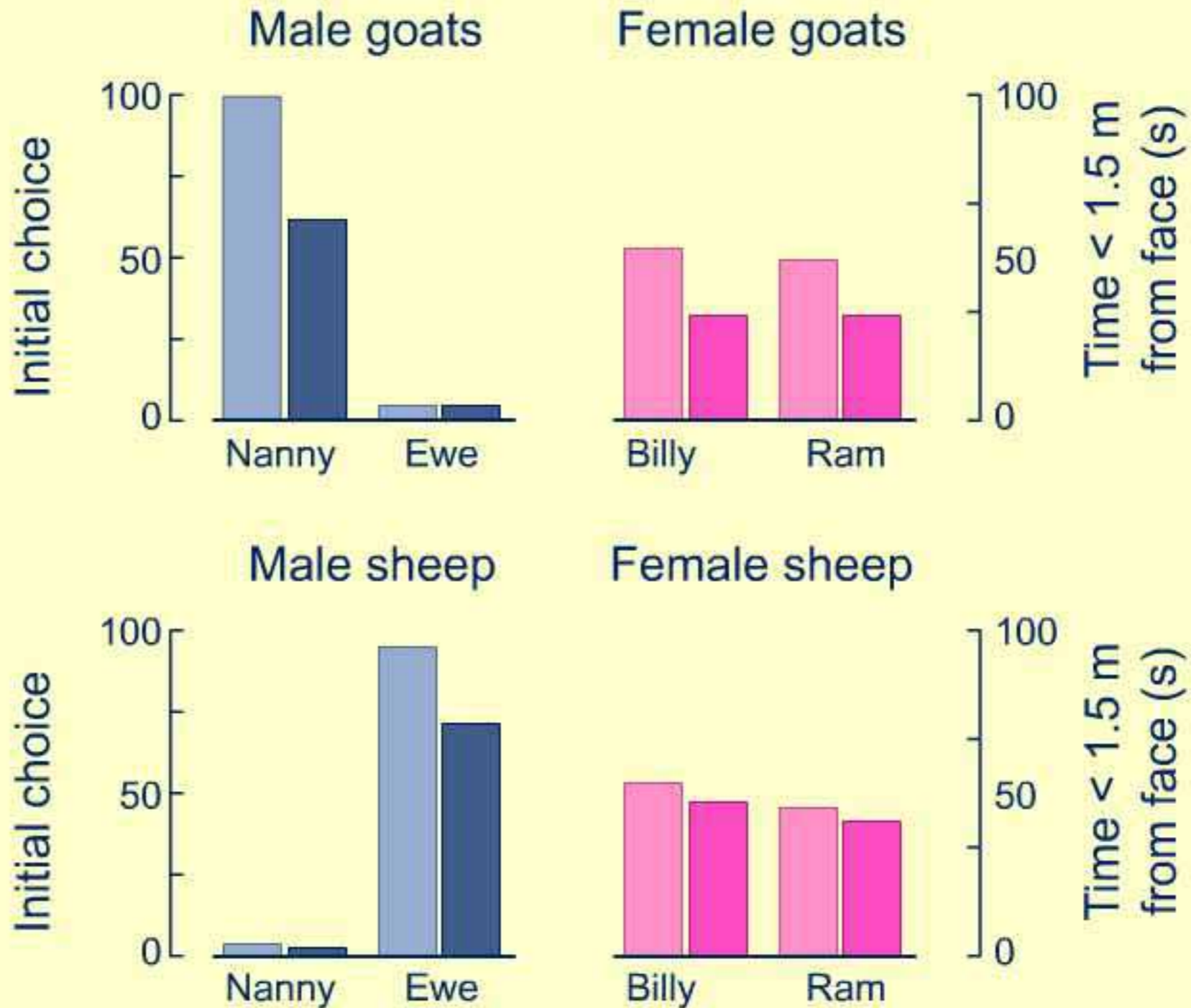
What kinds of generic influences can parents have ?

Cross-fostered sheep/goats - Face preference



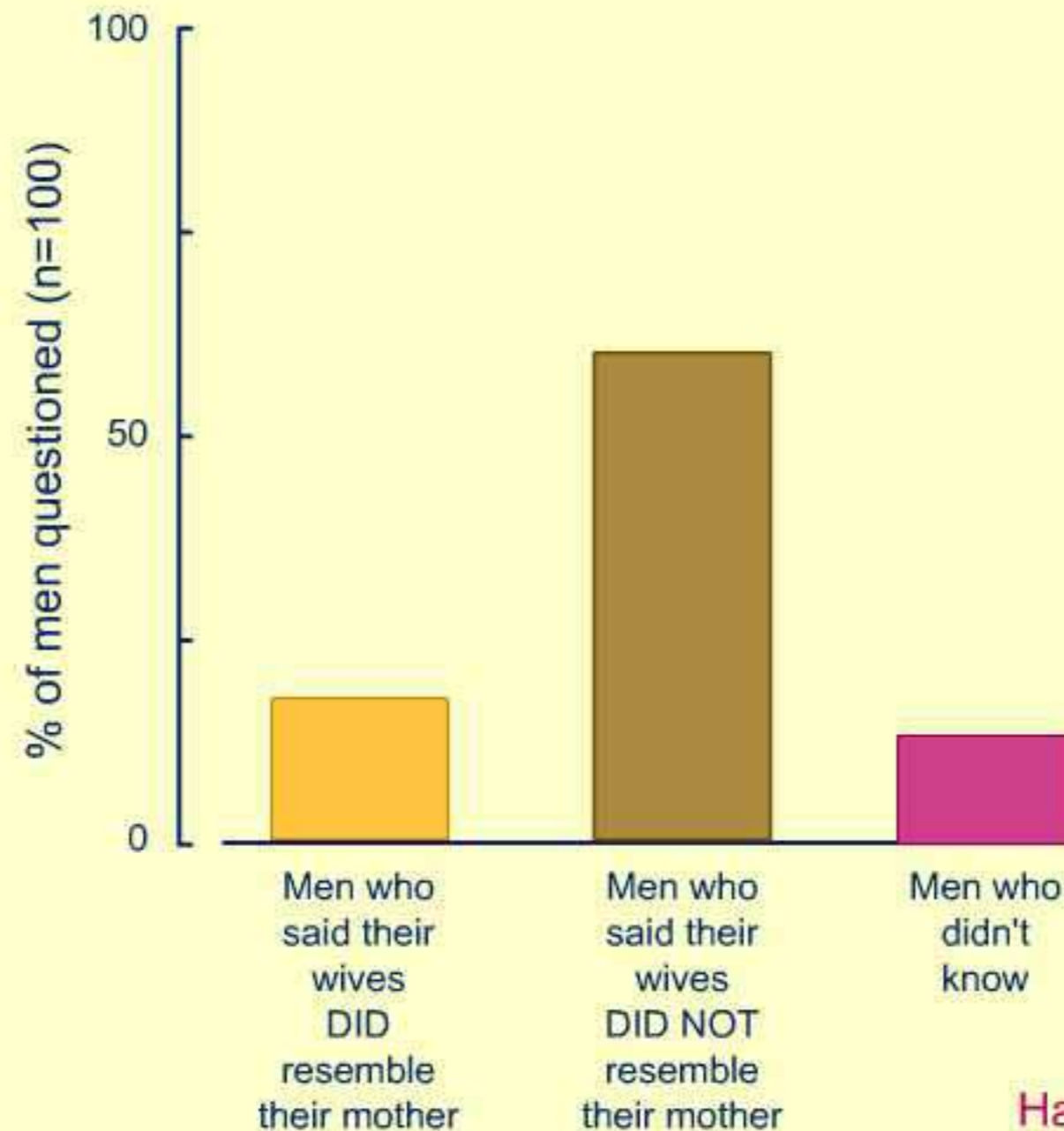
Initial choice

Time < 1.5m from face (s)



What kinds of generic influences can parents have ?

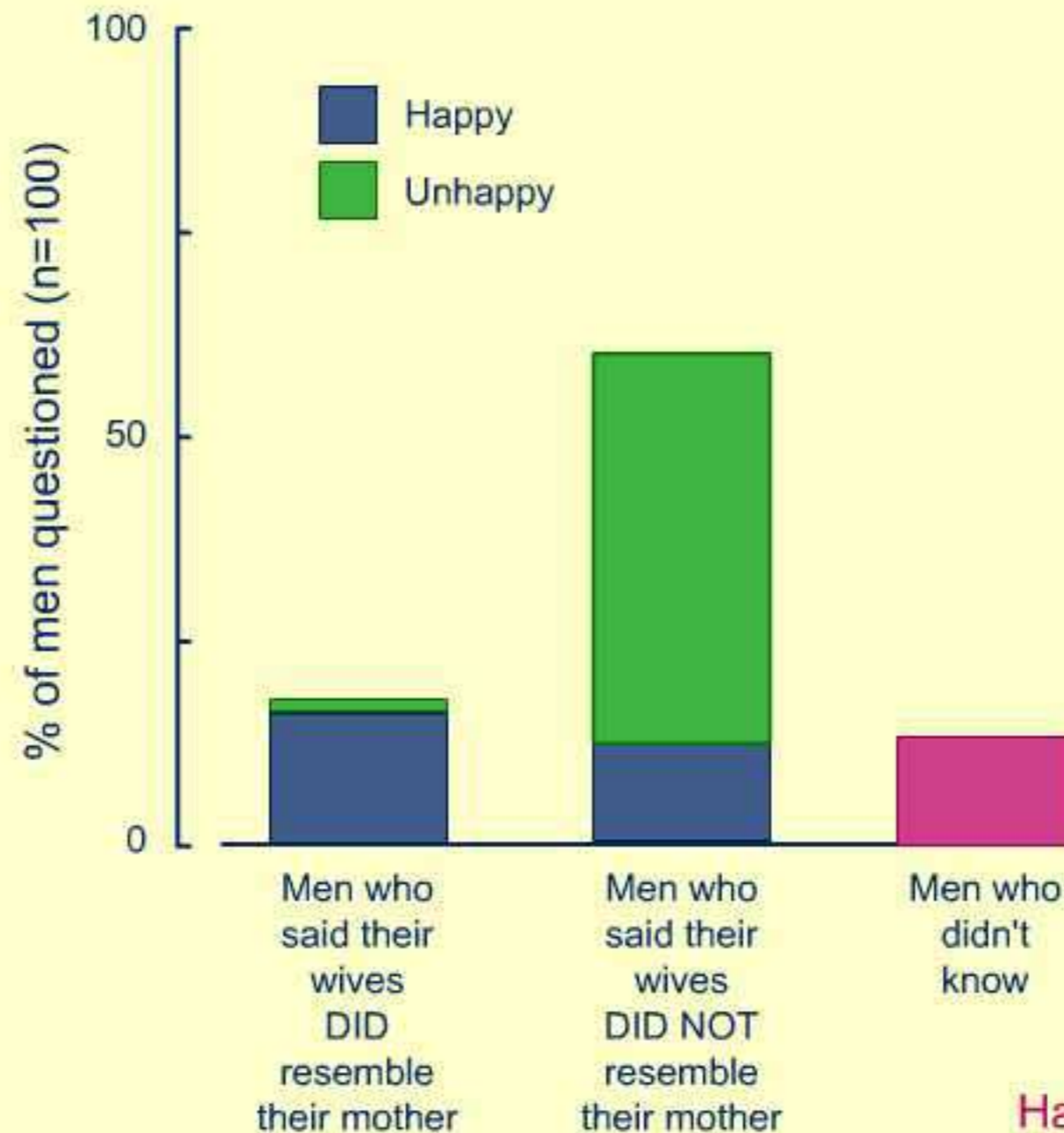
- Similar effects are seen in cross-fostered monkeys
- 'I want a girl, just like the girl that married dear old dad'



Hamilton & MacGowan. (1929)

What kinds of generic influences can parents have ?

- Similar effects are seen in cross-fostered monkeys
- 'I want a girl, just like the girl that married dear old dad'



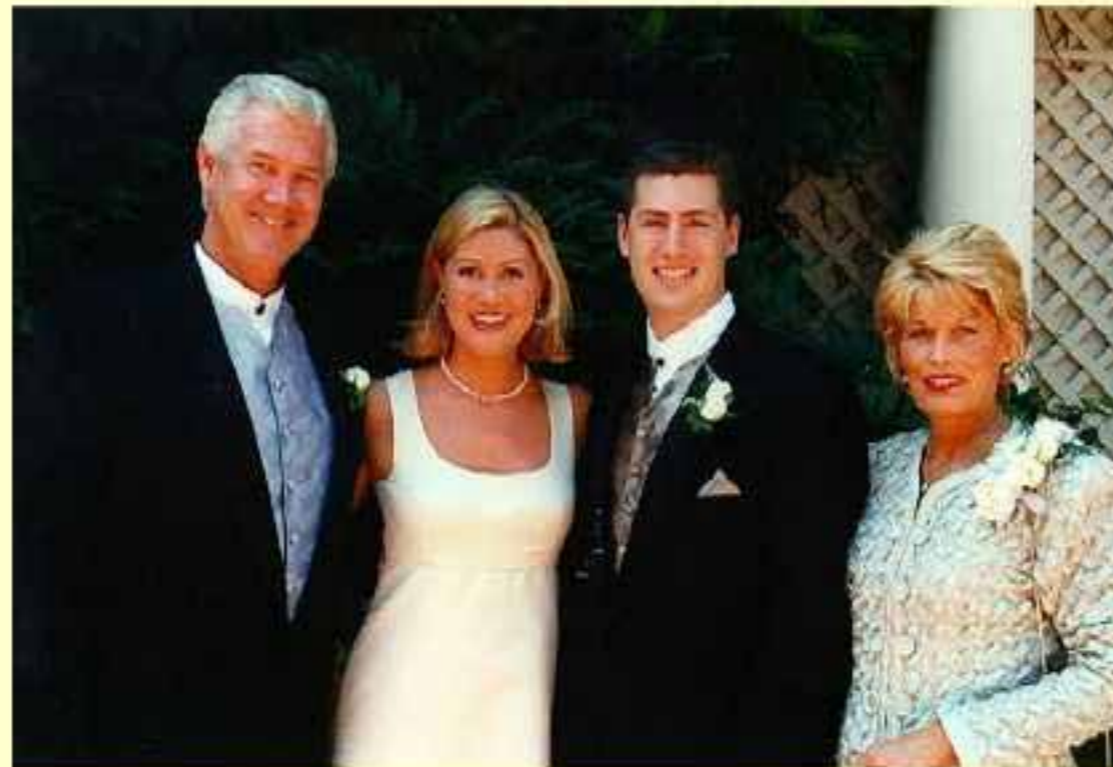
What kinds of generic influences can parents have ?

- If your mum or dad were older, you are more likely to be attracted to an older partner



What kinds of generic influences can parents have ?

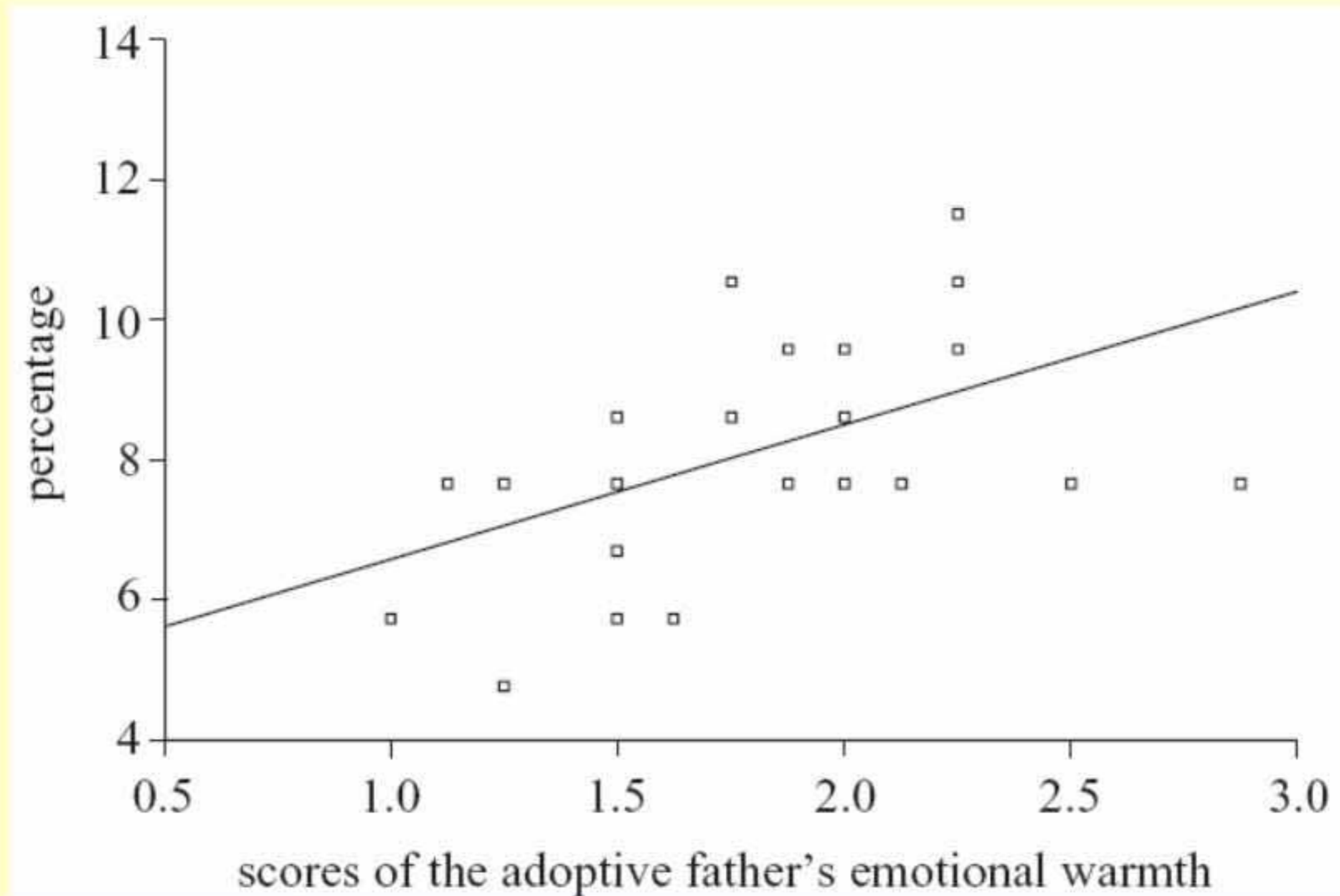
- If your mum or dad were older, you are more likely to be attracted to an older partner
- You are also more likely to be attracted to partners with their same eye or hair colour as your parents



What kinds of generic influences can parents have ?

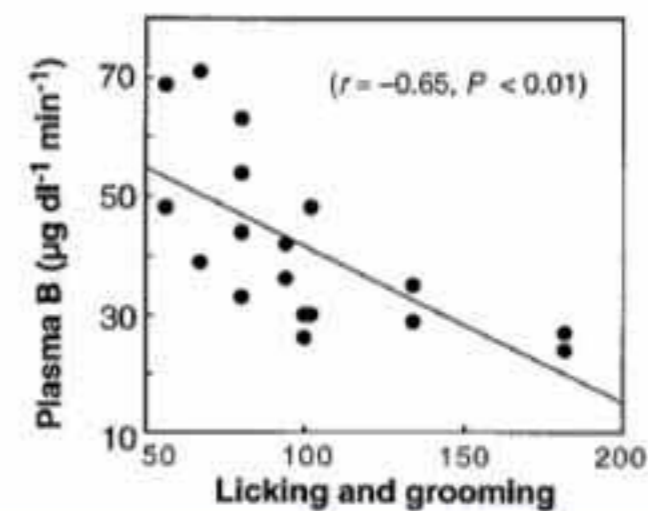
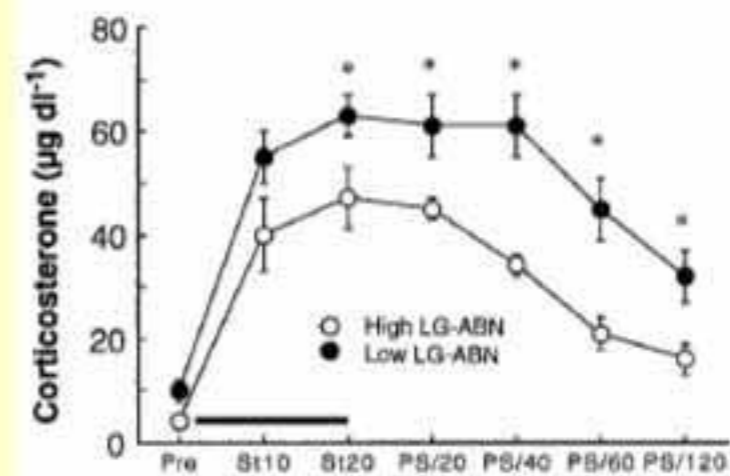
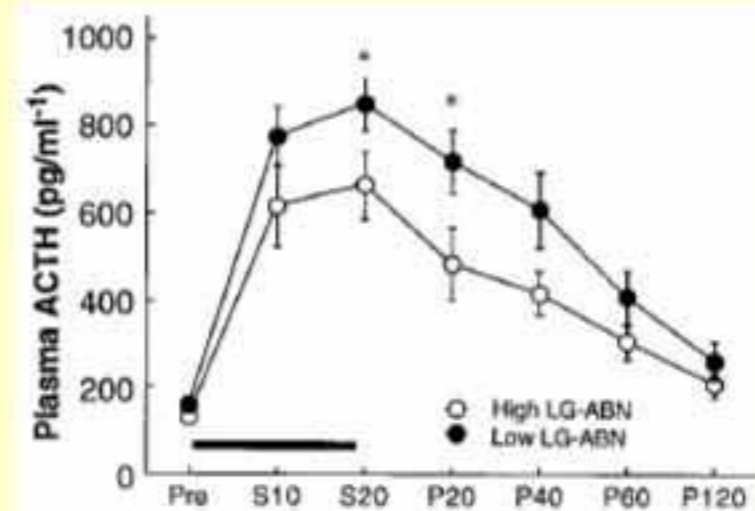
- If your mum or dad were older, you are more likely to be attracted to an older partner
- You are also more likely to be attracted to partners with their same eye or hair colour as your parents
- Current tests for effects of adoption vs. biological parents
- www.perceptionlab.com

What kinds of generic influences can parents have ?



What impact can different parenting styles have ?

- Stress and parenting responses



Dong Liu *et al* 1997

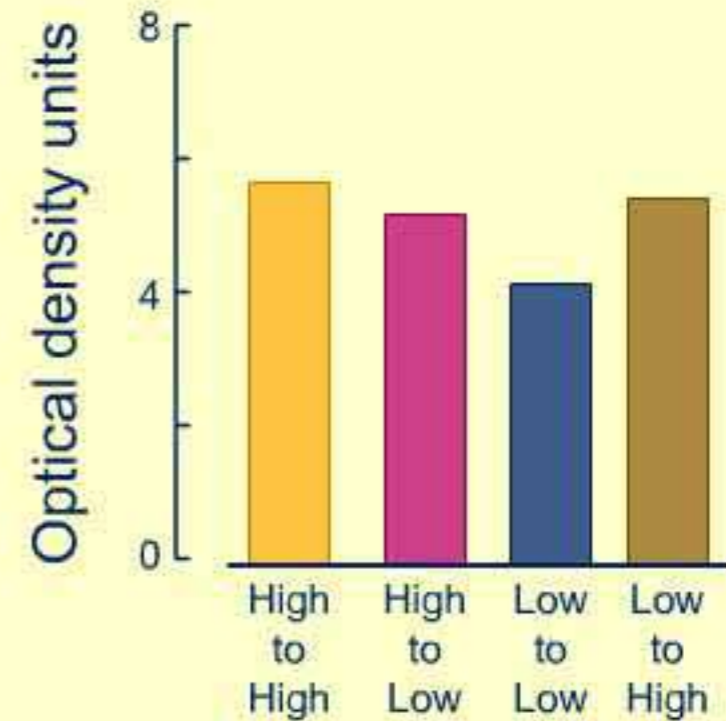
What impact can different parenting styles have ?

- Stress and parenting responses
- Intelligence

Spatial memory task



Synaptophysin in hippocampus



What impact can different parenting styles have ?

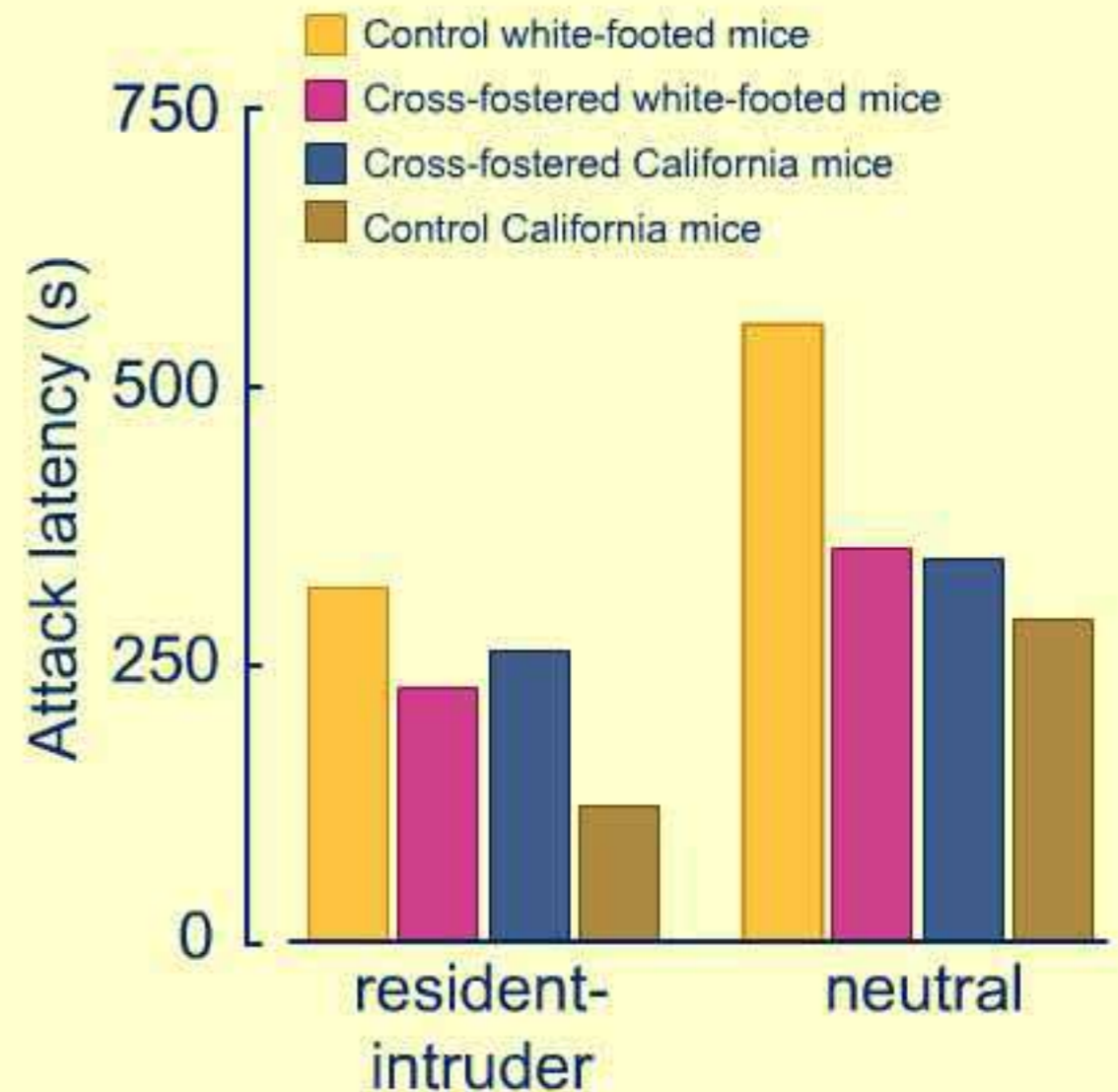
- Stress and parenting responses
- Intelligence
- In humans, parental attentiveness and A-level grades



Time worked by mothers during pre-school years

What impact can different parenting styles have ?

- Stress and parenting responses
- Intelligence
- In humans, parental attentiveness and A-level grades
- Aggressive personality cross-fostered Californian mice and white footed mice



What impact can different parenting styles have ?

- Stress and parenting responses
- Intelligence
- In humans, parental attentiveness and A-level grades
- Aggressive personality
cross-fostered Californian mice
and white footed mice
- Social dominance



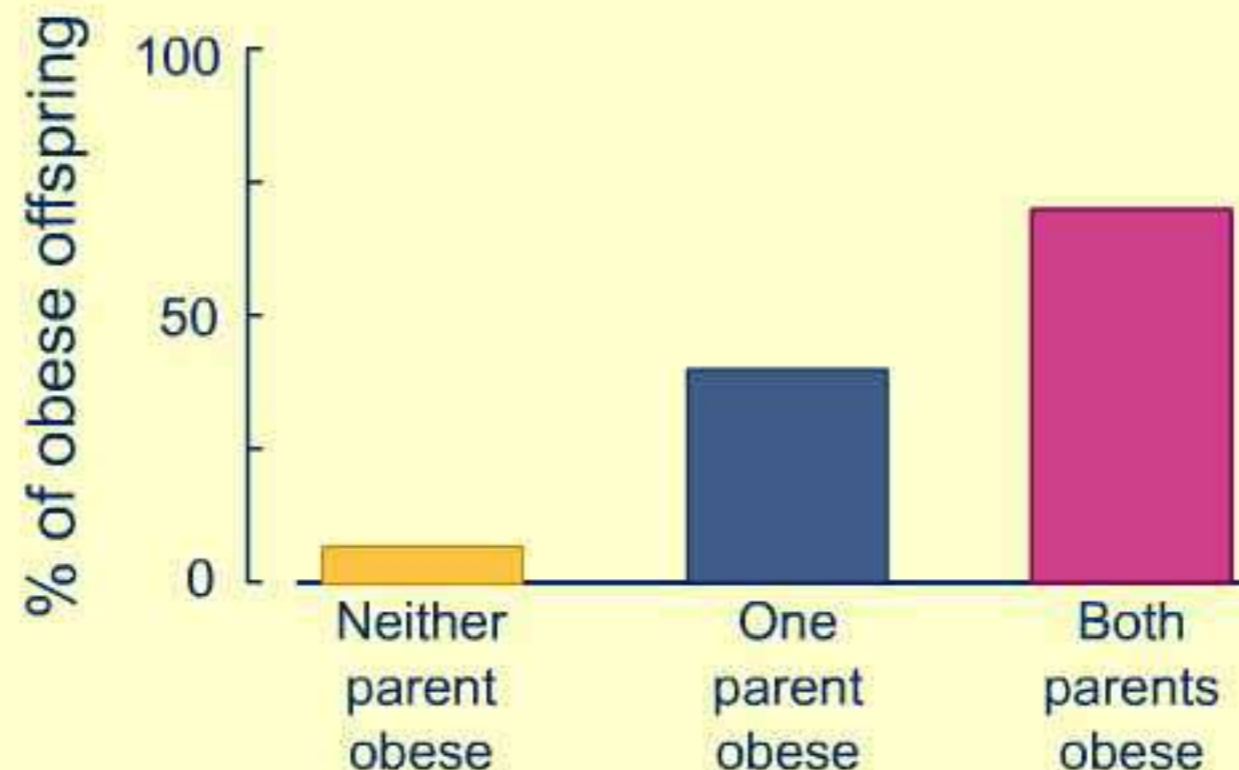
What impact can different parenting styles have ?

- Dietary preferences - social transmission very important
- What animals learn from parents is more influential than from others
- This is also reported in humans (Escobar 1999)
-
-

Young children are capable of learning to like and accept a wide variety of foods, and this learning occurs rapidly during the first few years of life.

What impact can different parenting styles have ?

- Dietary preferences - social transmission very important
- What animals learn from parents is more influential than from others
- This is also reported in humans (Escobar 1999)
- Parental influence on obesity



-

What impact can different parenting styles have ?

- Dietary preferences - social transmission very important
- What animals learn from parents is more influential than from others
- This is also reported in humans (Escobar 1999)
- Parental influence on obesity
- Learning how to get food



Some general final conclusions

- Parental care allows species to deal with even the most difficult environments
- It provides the basis for species to develop social, emotional and co-operative ties
- It allows greater social transmission of survival skills and even social and sexual attraction to the opposite sex
- What foods to eat and how to get them are also passed on

Some general final conclusions

- Having good attentive parents will enhance social competence and dealing with stress
- They may even help you make the most of your intellectual skills
- However, levels of aggression and social dominance may also be passed on
- Parental influences are mainly only during early development

So, 'Is having a good parent more important than having good genes ?'

- Parents help to create a strong social and emotional base
- There is not much point in having good genes if you can't cope with the life and society in which they need to be exploited
- Parents can help to promote genetic advantages, but may also enhance the expression of more negative behaviours