Qu’est-ce que la psychologie évolutionniste ?

Gilles Lafargue
gilles.lafargue@univ-reims.fr

I. Qu'entend-on par *Psychologie évolutionniste* ?

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

Préambule

Réconcilier ce qui peut sembler irréconciliable

1- Dans le cerveau tout ne fait pas tout

- Distribution des fonctions cognitives dans des réseaux fonctionnels spécialisés
- Un bon nombre de ces modules fonctionnels sont des produits de l'évolution biologique (notion d'adaptation, de sélection)

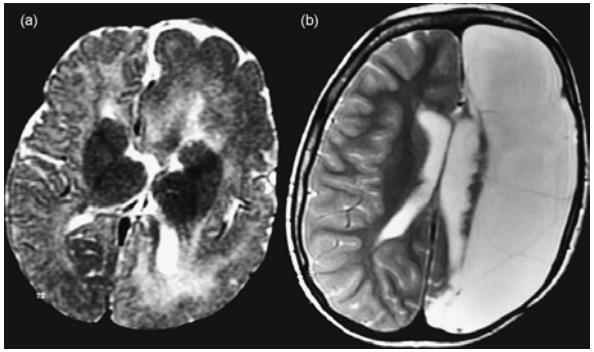
2- Les potentialités d'apprentissage et de réorganisation fonctionnelle du cerveau, tout au long de la vie, sont très importantes et, probablement, largement sous-estimées

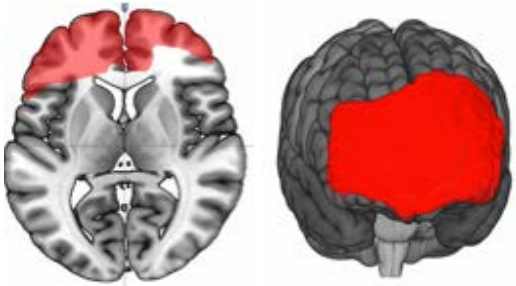
Préambule

OPINION

The musician's brain as a model of neuroplasticity

Thomas F. Münte, Eckart Altenmüller and Lutz Jäncke





Lemaitre, A.L., Herbet, G., Duffau, H., Lafargue, G. Preserved metacognitive ability despite unilateral or bilateral anterior prefrontal resection. (2017). ***Brain en Cognition***

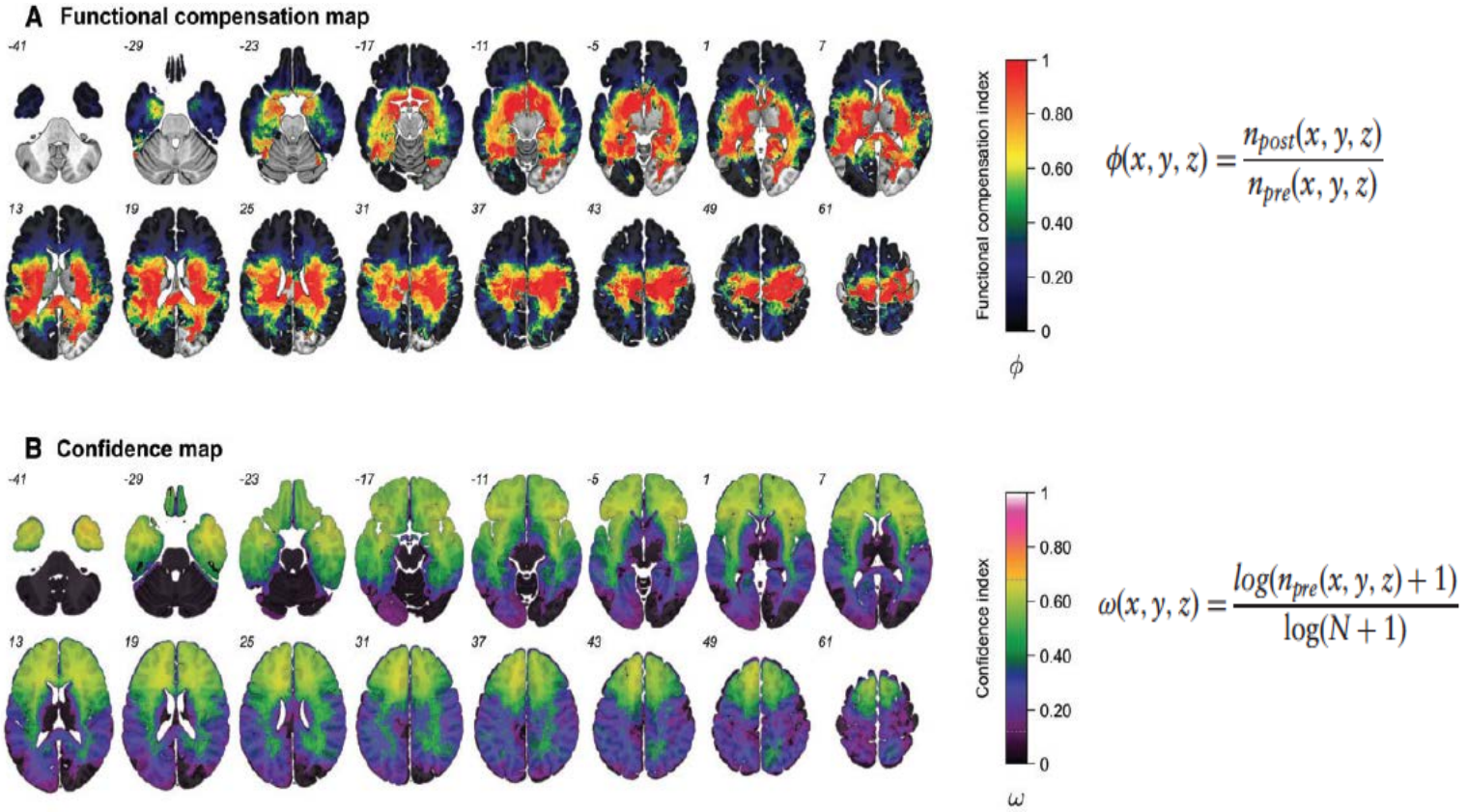
Neuroreport. 2005 November 28; 16(17): 1893–1897.

Meditation experience is associated with increased cortical thickness

Sara W. Lazar[a], Catherine E. Kerr[b], Rachel H. Wasserman[a,b], Jeremy R. Gray[c], Douglas N. Greve[d], Michael T. Treadway[a], Metta McGarvey[e], Brian T. Quinn[d], Jeffery A. Dusek[f,g], Herbert Benson[f,g], Scott L. Rauch[a], Christopher I. Moore[h,i], and Bruce Fischl[d,j]
a*Psychiatric Neuroimaging Research Program, Massachusetts General Hospital*

Préambule

231 patients

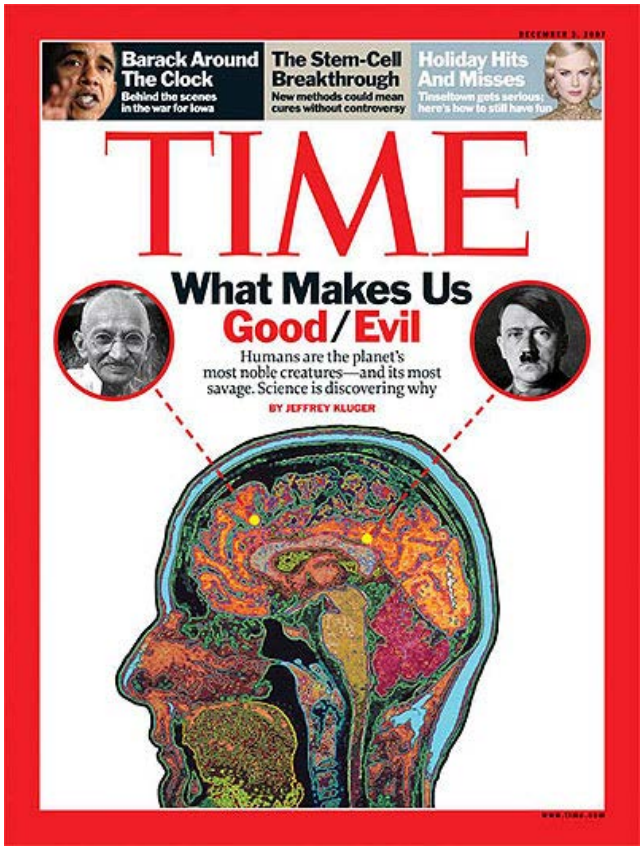


BRAIN
A JOURNAL OF NEUROLOGY

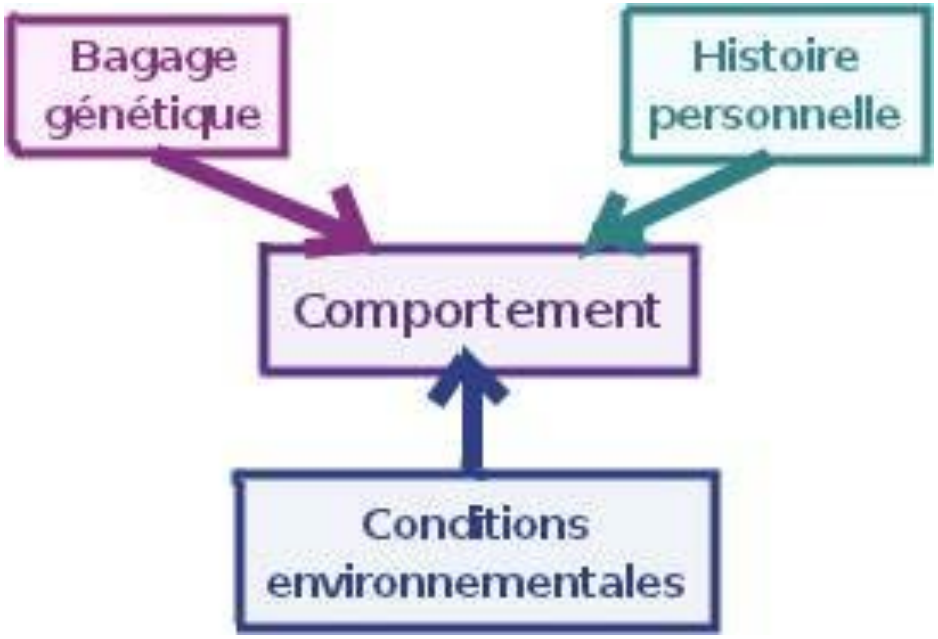
Herbet,G, Maheu *M.*, Costi E, Lafargue G., Duffau H. (2016). Mapping neuroplastic potential in brain-damaged patients. ***Brain.***

Préambule

Il n'existe pas quelque chose comme *une région cérébrale du crime* qui pourrait être isolée ou détruite !



Préambule


Bagage génétique
Histoire personnelle
Comportement
Conditions environnementales

I. Qu'entend-on par *Psychologie évolutionniste* ?

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

“On ne peut pas comprendre la cognition sociale si on ne prend pas en compte son histoire évolutive”

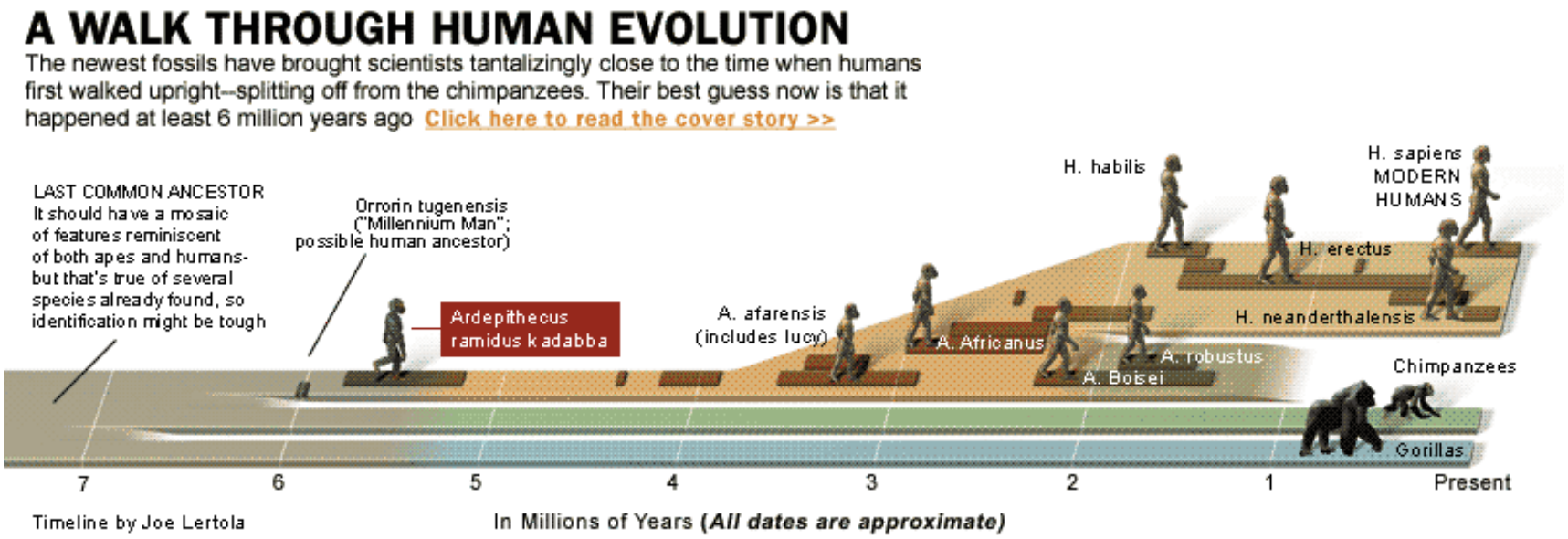
Jean Decéty

I – Qu'entend-on par *Psychologie évolutionniste* ?

- Le cerveau/esprit humain est le produit de l'évolution, au même titre que tous les organes.

- On le comprend mieux en s'intéressant aux facteurs évolutifs qui lui ont donné forme.

I – Qu'entend-on par *Psychologie évolutionniste* ?



I – Qu'entend-on par *Psychologie évolutionniste* ?

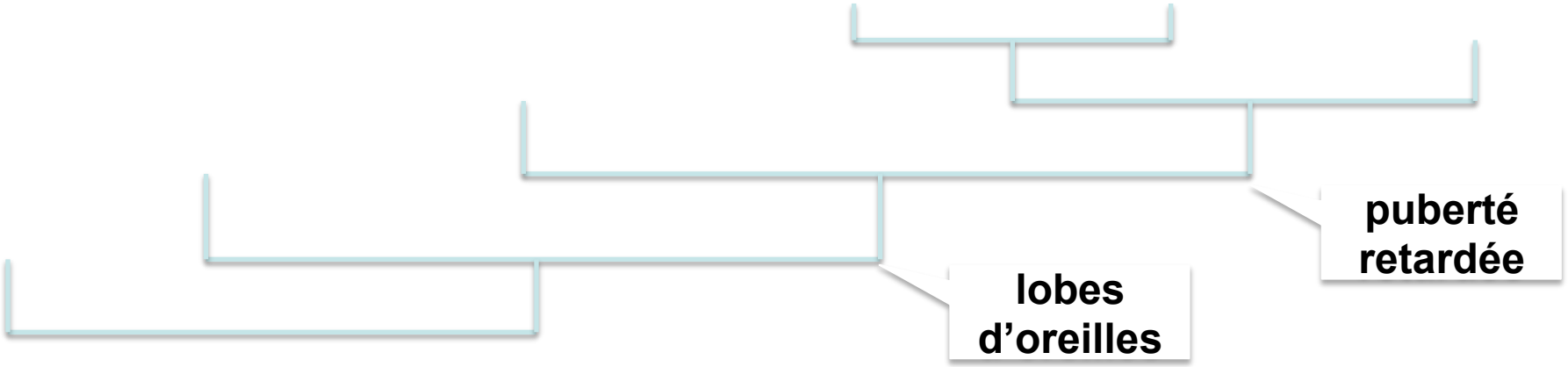
Orang-outan

Gorille

Bonobo

Chimpanzé

Humain



I – Qu'entend-on par *Psychologie évolutionniste* ?

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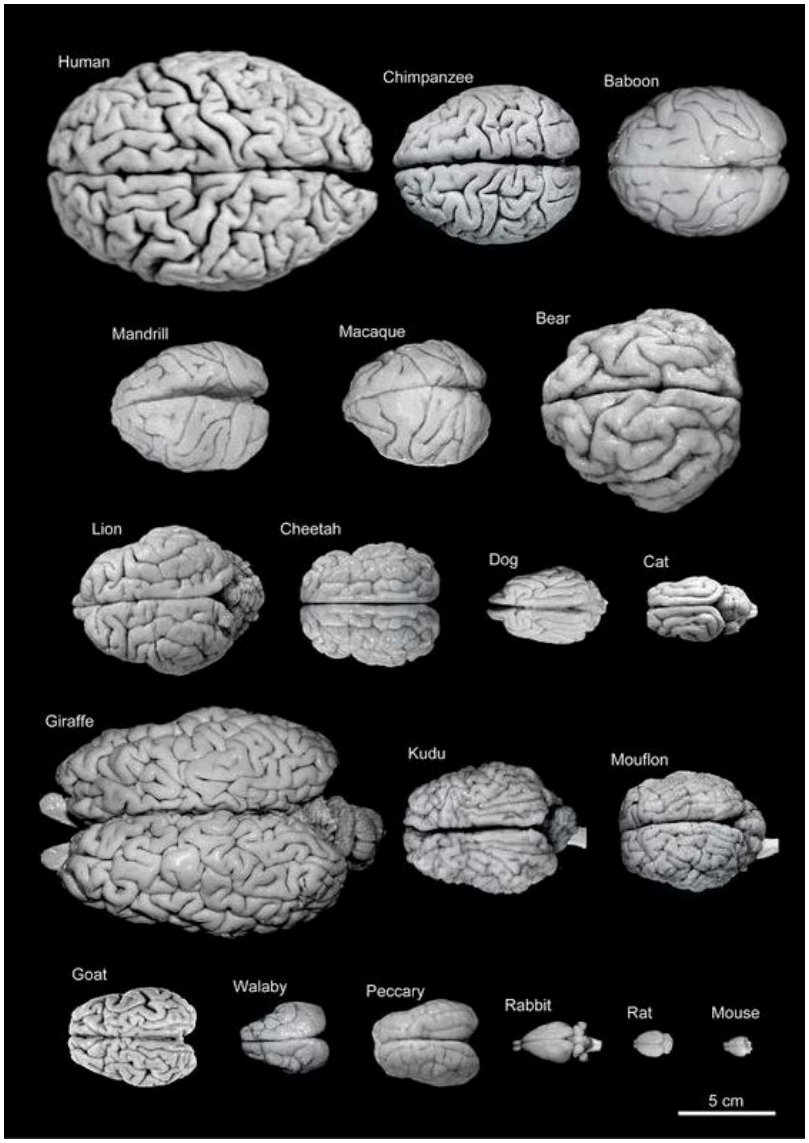


I – Qu'entend-on par *Psychologie évolutionniste* ?

« Selon l'approche évolutionniste de l'esprit, un bon nombre des mécanismes psychologiques qui permettent à l'homme d'interagir avec son environnement physique et social sont des **adaptations**, au sens de la **théorie de la sélection naturelle et sexuelle** de Charles Darwin. Ceci signifie que ces mécanismes ont été sélectionnés au cours de l'évolution biologique pour leur capacité à répondre avec succès à des **problèmes de survie et de reproduction posés de manière récurrente** par les caractéristiques du milieu dans lequel l'espèce humaine a émergé. »

Mercier et van der Henst, 2007

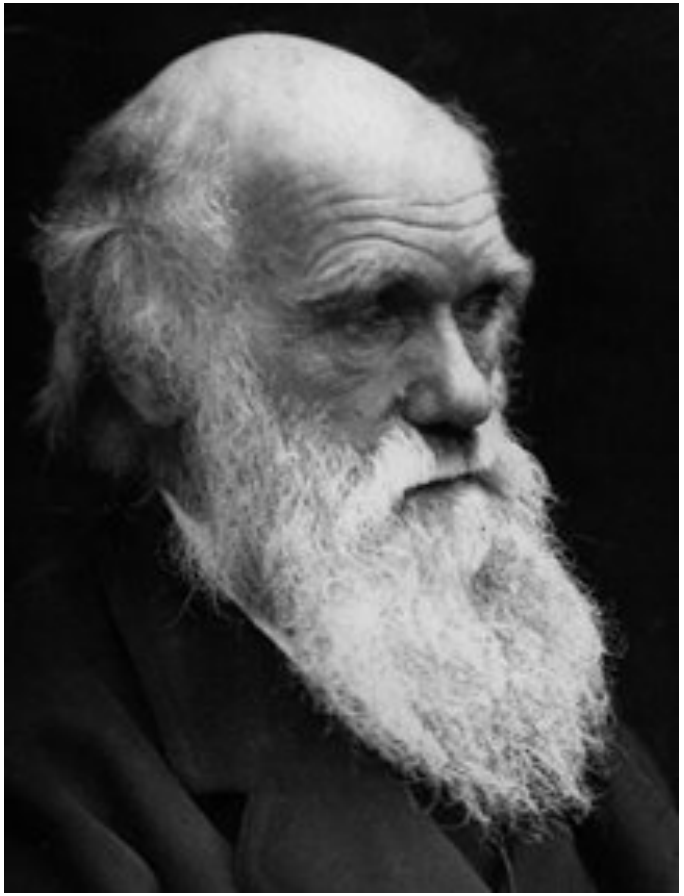
I – Qu'entend-on par *Psychologie évolutionniste* ?

- Les humains sont soumis aux mêmes processus évolutifs que les autres espèces

  – Les caractéristiques comportementales / psychologiques peuvent être héritées comme les caractéristiques physiques (étude des juméaux,..)

  – Les comportements et la psychologie humaine peuvent en partie être expliqués en terme d'évolution biologique

I – Qu'entend-on par *Psychologie évolutionniste* ?



« Dans un futur lointain, je vois une porte ouverte pour des recherches beaucoup plus importantes. La psychologie sera fondée sur un nouveau principe, celui de l'acquisition nécessairement graduelle de chaque fonction mentale ou capacité. La lumière sera faite sur l'origine de l'homme et sur son histoire. »

Charles Darwin, 1859

I – Qu'entend-on par *Psychologie évolutionniste* ?

- Il faut un certain temps pour que la sélection naturelle et sexuelle puisse promouvoir de nouvelles adaptations

- Il est en conséquence raisonnable de penser que notre esprit est construit avant tout pour résoudre les problèmes qui se posaient à nos ancêtres alors qu'ils faisaient partie de groupes de chasseurs cueilleurs nomades

  homo habilis – environ 3 Ma

  homo sapiens – environ 200 000 a

  début de l'agriculture – environ 10 000 a seulement

I – Qu'entend-on par *Psychologie évolutionniste* ?

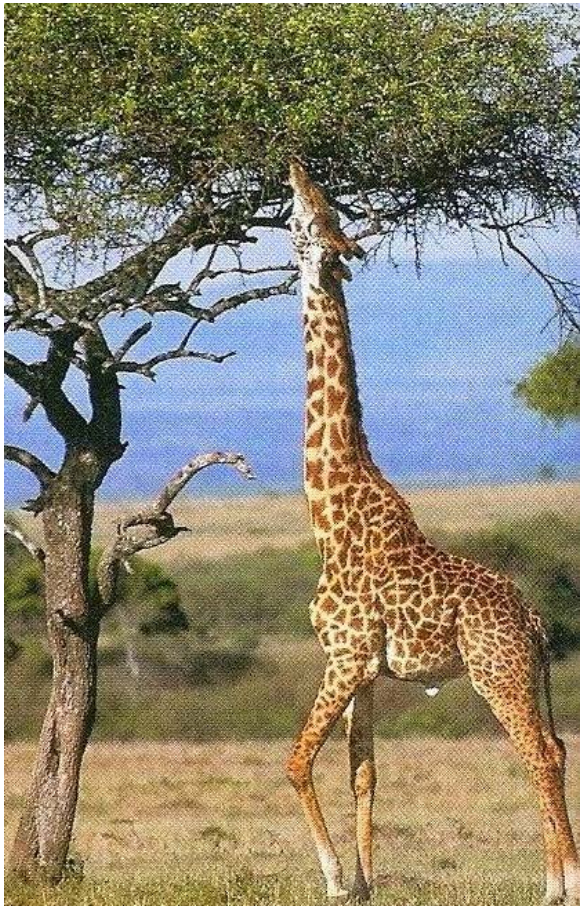
La sélection naturelle

- Les organismes adaptés ont plus de chance de survivre que ceux qui ne le sont pas
  - Ils ont plus de chance de s'accoupler et d'avoir une descendance, donc de transmettre leurs gènes à la génération suivante

- Graduellement, les gènes associés aux caractéristiques et comportements les plus adaptés sont diffusés dans la population

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection naturelle



I – Qu'entend-on par *Psychologie évolutionniste* ?

LA SÉLECTION NATURELLE

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection naturelle

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection naturelle

I – Qu'entend-on par *Psychologie évolutionniste* ?

Pourquoi la sélection naturelle n'a pas fait évoluer dans la même direction les caractères des mâles et ceux des femelles dans beaucoup d'espèces ?

- Chez les vertébrés les mâles sont souvent plus gros et plus voyants que les femelles

- Les mâles sont plus portés vers les comportements à risque

Sex differences in jealousy

- Buss argues that jealousy evolved as an **emotional alarm that signals a partner's potential infidelities** and causes behavior designed to minimize losses of reproductive investment. But infidelities pose different problems for the two sexes

  - **For men, a female's sexual infidelity entails the potential fitness costs of parental investment in another male's offspring**.

  - **For women, it is a male's emotional involvement with another woman that potentially entails fitness costs in the form of lost parental resources.**

Dilemma 1

(A) Imagining your partner forming a deep emotional attachment to that person [emotional infidelity].

(B) Imagining your partner enjoying passionate sexual intercourse with that other person [sexual infidelity].

Dilemma 2

(A) Imagining your partner trying different sexual positions with that other person [sexual infidelity].

(B) Imagining your partner falling in love with that other person [emotional infidelity].

The percentages of respondents choosing sexual infidelity as more distressing than emotional infidelity in surveys in the USA, and subsequently in other countries, are shown in Tables I and II.

Buss, D.M. et al. (1992) Sex differences in jealousy: Evolution, physiology, and psychology. ***Psychological Science*** 3, 251–255

Table I. Percentage choosing (B) sexual infidelity as more upsetting in Dilemma 1 (by survey sample)

	Survey sample											
	USA [10]	USA [12]	USA [30]	USA [31]	USA [32]	USA [33]	China [32]	Netherlands [30]	Germany [30]	Korea [12]	Japan [12]	Avg.
Male	60	76	61	55	53	73	21	51	28	59	38	51
Female	17	32	18	32	23	4	5	31	16	18	13	22

Table II. Percentage choosing (A) sexual infidelity as more upsetting in Dilemma 2 (by survey sample)

	Survey sample								
	USA [10]	USA [12]	USA [30]	USA [34]	Netherlands [30]	Germany [30]	Korea [12]	Japan [12]	Avg.
Male	44	43	44	47	23	30	53	32	38
Female	12	11	12	12	12	8	22	15	13

“The questionnaire data are questionable However, this sex difference, in itself, does not confirm Buss’s hypothesis. Buss claims that men focus on cues to sexual infidelity because of potential cuckoldry, whereas women focus on cues to emotional infidelity because of potential withdrawal of parental resources. That there should be a sex difference is a by-product of these primary entailments of Buss’s hypothesis. To confirm the hypothesis, it is necessary to confirm these primary entailments – to confirm, for example, that males care more about sexual infidelity than they do about emotional infidelity, not simply that they care more about sexual infidelity than females do. But the data don’t show this. Indeed, on average, only half (51%) of male subjects chose sexual infidelity as more distressing than emotional infidelity in response to one dilemma (Box 3, Table I), and 62% chose emotional infidelity over sexual infidelity in response to the other (Box 3, Table II).”

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection sexuelle

- Concerne les caractéristiques qui donnent aux individus un avantage dans l'accès à un partenaire sexuel

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection sexuelle

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection sexuelle

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection sexuelle

Deux formes de compétitions pour les accouplements

- **Sélection intra-sexuelle**
  - Combats entre males pour accéder aux femelles …. Développement d'instruments de combats (crocs, cornes,..)
  - Dimorphisme sexuel : par exemple males souvent plus gros que les femelles (gorilles x 2, humains x 1,2)

- **Sélection inter-sexuelle**
  - Manœuvre pour impressionner les femelles : évolution de parures sexuelles, de comportements de parade,

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection sexuelle

Sélection inter-sexuelle

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection sexuelle

Sélection intra-sexuelle

I – Qu'entend-on par *Psychologie évolutionniste* ?

LA SÉLECTION SEXUELLE

Éléphants de mer

Femelle - environ 650 kg
mâle - environ 3000 kg

Le succès d'une femelle est limité par le nombre d'ovocytes qu'elle peut produire

Le succès d'un mâle est limité par le nombre de femelles auquel il a accès

Dans le schéma classique, l'ovocyte est une ressource rare, donc convoitée

Chez la mante religieuse, le sacrifice du mâle comme investissement parentale

PROCEEDINGS B

rspb.royalsocietypublishing.org

Research

Cite this article: Brown WD, Barry KL. 2016 Sexual cannibalism increases male material investment in offspring: quantifying terminal reproductive effort in a praying mantis. *Proc. R. Soc. B* **283**: 20160656. http://dx.doi.org/10.1098/rspb.2016.0656

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Accepted: 27 May 2016

Subject Areas:
behaviour, ecology, evolution

Keywords:
cannibalism, parental investment, praying mantis, sexual conflict

Sexual cannibalism increases male material investment in offspring: quantifying terminal reproductive effort in a praying mantis

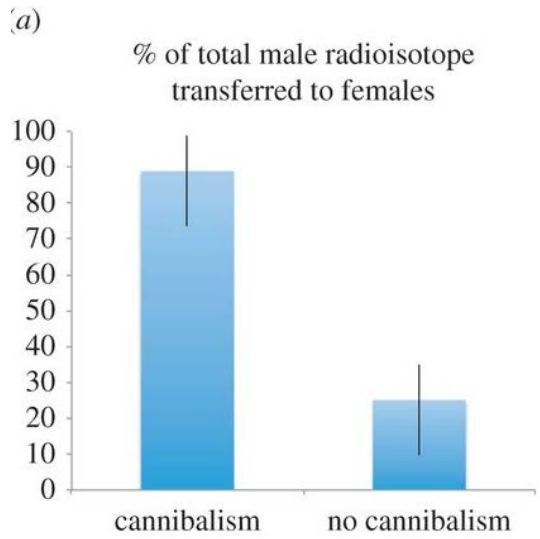
William D. Brown[1] and Katherine L. Barry[2]

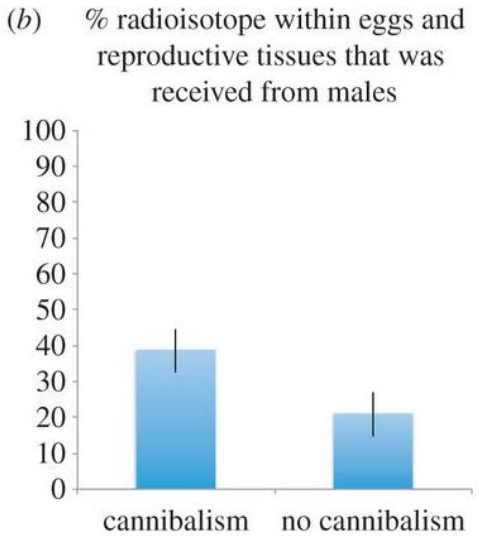
[1]Department of Biology, The State University of New York at Fredonia, Fredonia, NY, USA
[2]Department of Biological Sciences, Macquarie University, Sydney, Australia

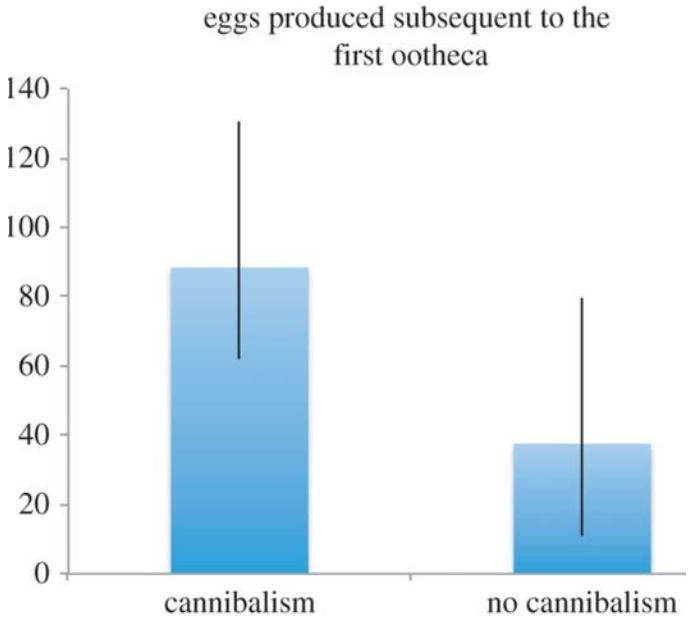
Models of the evolution of sexual cannibalism argue that males may offset the cost of cannibalism if components of the male body are directly allocated to the eggs that they fertilize. We tested this idea in the praying mantid *Tenodera sinensis*. Males and females were fed differently radiolabelled crickets and allowed to mate. Half of the pairs progressed to sexual cannibalism and we prevented cannibalism in the other half. We assess the relative allocation of both male-derived somatic materials and ejaculate materials into the eggs and soma of the female. Our results show that male somatic investment contributes to production of offspring. The eggs and reproductive tissues of cannibalistic females contained significantly more male-derived amino acids than those of non-cannibalistic females, and there was an increase in the number of eggs produced subsequent to sexual cannibalism. Sexual cannibalism thus increases male material investment in offspring. We also show that males provide substantial investment via the ejaculate, with males passing about 25% of their radiolabelled amino acids to females via the ejaculate even in the absence of cannibalism.

Chez la mante religieuse, le sacrifice du mâle comme investissement parentale

- Les rôles s'inversent dans certains cas comme la mante religieuse
  - Dans environ 20 % des cas, **la femelle avale le mâle juste après l'accouplement !**







Le cannibalisme sexuel chez la mante religieuse augmente **l'investissement matériel du mâle** dans sa descendance

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection sexuelle

Les mâles mènent des combats sanglants à l'issue desquels le vainqueur aura le monopôle d'un groupe de femelles

I – Qu'entend-on par *Psychologie évolutionniste* ?

La sélection sexuelle

Force bras : H = F + 70%
Force haut du corps : H = F + 90 %

Abe T, Kearns CF, Fukunaga T (2003) Gender differences in MRI-measured whole-body skeletal muscle mass and distribution in young Japanese adults. Br J Sports Med

I – Qu'entend-on par *Psychologie évolutionniste* ?

LA SÉLECTION SEXUELLE

Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures

David M. Buss
Department of Psychology, University of Michigan, Ann Arbor, MI 48109-1346

Abstract: Contemporary mate preferences can provide important clues to human reproductive history. Little is known about which characteristics people value in potential mates. Five predictions were made about sex differences in human mate preferences based on evolutionary conceptions of parental investment, sexual selection, human reproductive capacity, and sexual asymmetries regarding certainty of paternity versus maternity. The predictions centered on how each sex valued earning capacity, ambition–industriousness, youth, physical attractiveness, and chastity. Predictions were tested in data from 37 samples drawn from 33 countries located on six continents and five islands (total $N = 10,047$). For 27 countries, demographic data on actual age at marriage provided a validity check on questionnaire data. Females were found to value cues to *resource acquisition* in potential mates more highly than males. Characteristics signaling *reproductive capacity* were valued more by males than by females. These sex differences may reflect different evolutionary selection pressures on human males and females; they provide powerful cross-cultural evidence of current sex differences in reproductive strategies. Discussion focuses on proximate mechanisms underlying mate preferences, consequences for human intrasexual competition, and the limitations of this study.

BEHAVIORAL AND BRAIN SCIENCES (1989) 12, 1–49

I – Qu'entend-on par *Psychologie évolutionniste* ?

LA SÉLECTION SEXUELLE

Lumbar curvature: a previously undiscovered standard of attractiveness

David M.G. Lewis [a,*], Eric M. Russell [b,1], Laith Al-Shawaf [c,d,1], David M. Buss [d]

A B S T R A C T

This paper reports independent studies supporting the proposal that human standards of attractiveness reflect the output of psychological adaptations to detect fitness-relevant traits. We tested novel *a priori* hypotheses based on an adaptive problem uniquely faced by ancestral hominin females: a forward-shifted center of mass during pregnancy. The hominin female spine possesses evolved morphology to deal with this adaptive challenge: wedging in the third-to-last lumbar vertebra. Among ancestral women, vertebral wedging would have minimized the net fitness threats posed by hypolordosis and hyperlordosis, thereby creating selective pressures on men to prefer such women as mates. On this basis, we hypothesized that men possess evolved mate preferences for women with this theoretically optimal angle of lumbar curvature. In Study 1, as hypothesized, men's attraction toward women increased as women's lumbar curvature approached this angle. However, vertebral wedging and buttock mass can both influence lumbar curvature. Study 2 thus employed a forced-choice paradigm in which men selected the most attractive woman among models exhibiting the same lumbar curvature, but for different morphological reasons. Men again tended to prefer women exhibiting cues to a degree of vertebral wedging closer to optimum. This included preferring women whose lumbar curvature specifically reflected vertebral wedging rather than buttock mass. These findings reveal novel, theoretically anchored, and previously undiscovered standards of attractiveness.

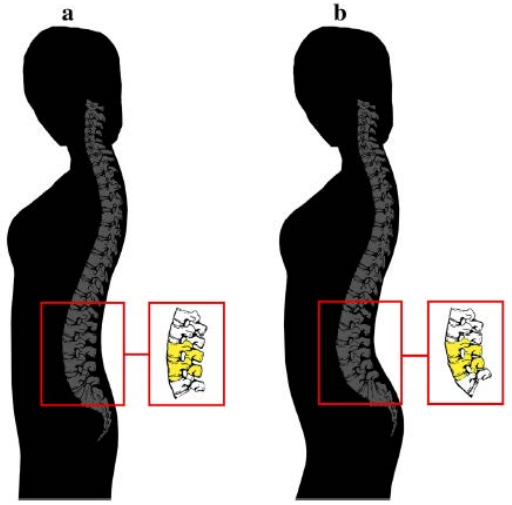
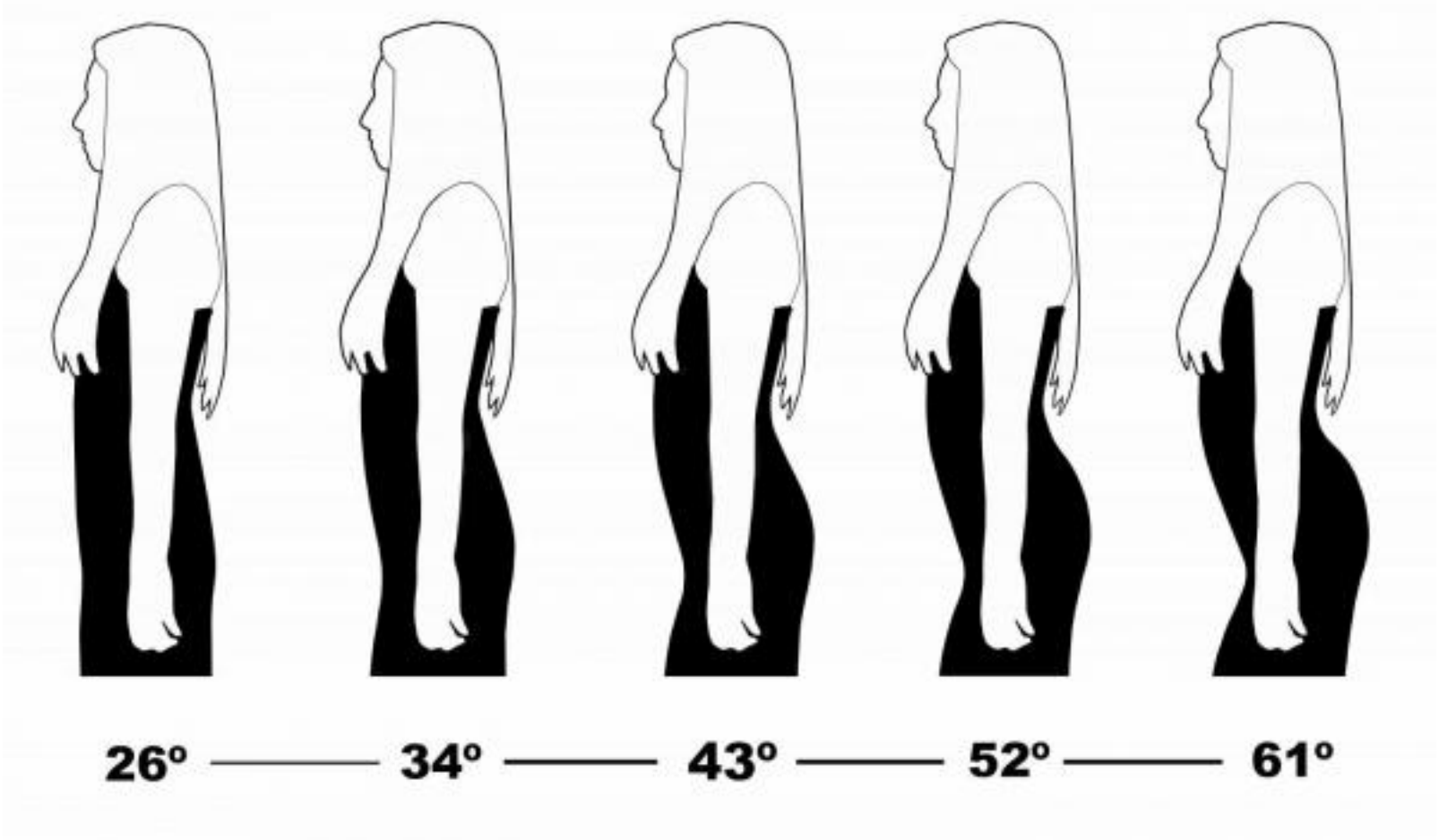


Fig. 1. A woman with (a) less vertebral wedging at the third-to-last lumbar vertebra (modal L3 depicted), and (b) greater wedging, resulting in a more acute angle of lumbar curvature.

Evolution & Human Behavior


26º
34º
43º
52º
61º

Why Women Wear High Heels: Evolution, Lumbar Curvature, and Attractiveness

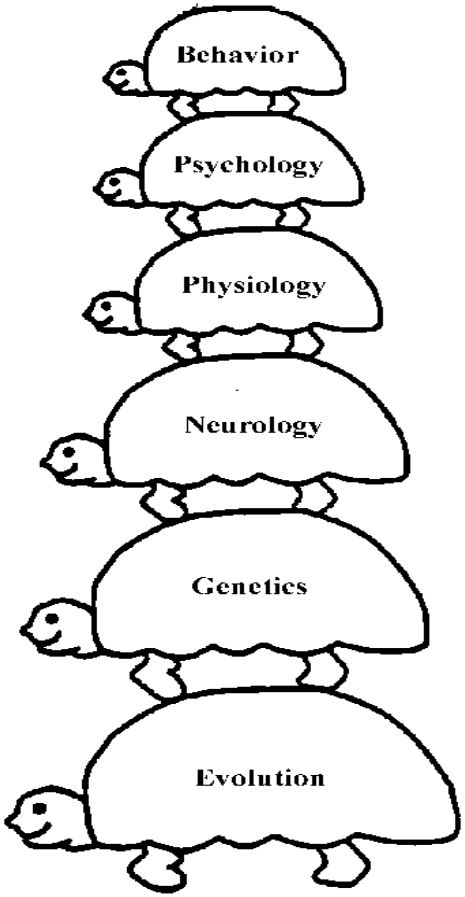
David M. Lewis[1*], Eric Russell[2], Laith Al-Shawaf[3], Vivian Ta[2], Zeynep Senveli[3], David Buss[4] and William Ickes[2]

[1]Murdoch University, Australia
[2]The University of Texas at Arlington, United States
[3]Bilkent University, Turkey
[4]The University of Texas at Austin, United States

Despite the widespread use of high-heeled footwear in both developing and modernized societies, we lack an understanding of this behavioral phenomenon at both proximate and distal levels of explanation. The current manuscript advances and tests a novel, evolutionarily anchored hypothesis for why women wear high heels, and provides convergent support for this hypothesis across multiple methods. Using a recently discovered evolved mate preference, **we hypothesized that high heels influence women's attractiveness via effects on their lumbar curvature.** Independent studies that employed distinct methods, eliminated multiple confounds, and ruled out alternative explanations showed that when women wear high heels, their lumbar curvature increased and they were perceived as more attractive. Closer analysis revealed an even more precise pattern aligning with human evolved psychology: **high-heeled footwear increased women's attractiveness only when wearing heels altered their lumbar curvature to be closer to an evolutionarily optimal angle.** These findings illustrate how human evolved psychology can contribute to and intersect with aspects of cultural evolution, highlighting that the two are not independent or autonomous processes but rather are deeply intertwined.

I – Qu'entend-on par *Psychologie évolutionniste* ?

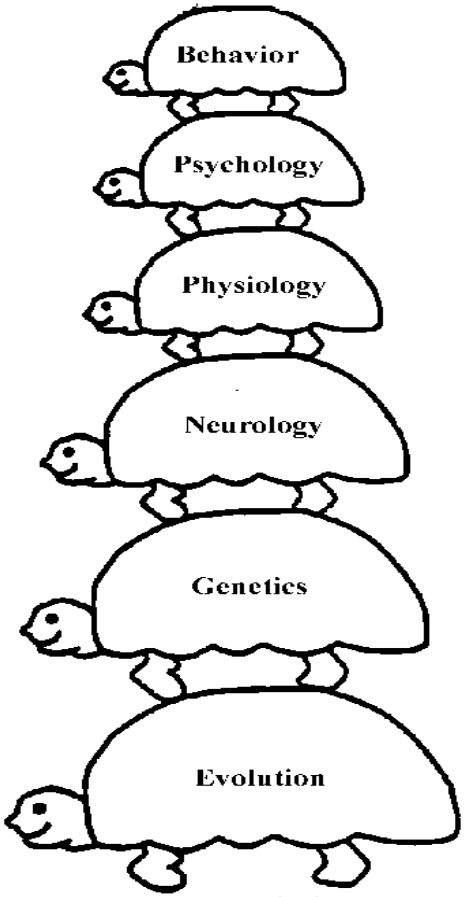
Causes prochaines / Causes ultimes



Plaisir de l'orgasme : cause proximale d'un comportement dont la cause ultime est la reproduction

I – Qu'entend-on par *Psychologie évolutionniste* ?

Causes prochaines / Causes ultimes (non conscientes)



Beaucoup de femmes enceinte durant le premier trimestre de la grossesse trouvent très déplaisantes les odeurs de certains aliments comme le poisson la viande, les œufs. Ne sont pas conscientes que ça induit un comportement qui sert à protéger le fœtus, qui est vulnérable à certains agents pathogènes

I – Qu'entend-on par *Psychologie évolutionniste* ?

Causes prochaines / Causes ultimes

Cue-based estimates of reproductive value explain women's body attractiveness

Talbot M. Andrews [a,1], Aaron W. Lukaszewski [b,*,1], Zachary L. Simmons [c], April Bleske-Rechek [d]

A B S T R A C T

Women's body attractiveness is influenced by specific anthropometric cues, including body mass index (BMI), waist-to-hip ratio (WHR), waist-to-stature ratio (WSR), and shoulder-to-waist ratio (SWR). Despite the existence of multiple functional hypotheses to explain these preferences, it remains unclear which cue-based inferences are most influential in regulating evaluations of women's body attractiveness. We argue that (i) the common link to the morphological cues that influence women's body attractiveness is that they all reliably indicate high reproductive value (as defined by youth and low parity); and (ii) ancestrally, selection pressures related to tracking between-women differences in reproductive value would have been among the strongest acting on adaptations for body evaluation. An empirical study then tested the resulting prediction that cue-based estimates of reproductive value function as powerful regulators of women's body attractiveness judgments. Subjects viewed standardized photos of women in swimsuits (with heads obscured), and were assigned to either estimate components of their reproductive value (age or number of offspring) or rate their attractiveness. Structural equation modeling revealed that a latent variable capturing estimated reproductive value was almost perfectly correlated with a latent variable capturing body attractiveness. Moreover, unique associations of women's BMI, WHR, and WSR with their body attractiveness were entirely mediated via estimated reproductive value. These findings provide strong support for the longstanding hypothesis that women's body attractiveness is primarily explained by cue-based estimates of reproductive value – expected future utility as a vehicle of offspring production.

Evolution & Human Behavior

I – Qu'entend-on par *Psychologie évolutionniste* ?

L'esprit est composé de modules fonctionnels spécialisés

- éviter les prédateurs
- manger la bonne nourriture
- former des alliances
- protéger les enfants
- « lire » dans l'esprit des autres…

I – Qu'entend-on par *Psychologie évolutionniste* ?

- Des forces inconscientes nous poussent à agir d'une certaine façon, **dans certains contextes**

    - Données archéologiques, culturelles, comparatives, anatomiques, comportementales, psychologiques

I. Qu'entend-on par *Psychologie évolutionniste* ?

- L'esprit est composé de modules fonctionnels spécialisés, produits de l'évolution biologique

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

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NeuroImage 36 (2007) 1065–1073

Sexual dimorphism of brain developmental trajectories during childhood and adolescence☆

Rhoshel K. Lenroot,[a,*] Nitin Gogtay,[a] Deanna K. Greenstein,[a] Elizabeth Molloy Wells,[a] Gregory L. Wallace,[a] Liv S. Clasen,[a] Jonathan D. Blumenthal,[a] Jason Lerch,[b] Alex P. Zijdenbos,[c] Alan C. Evans,[c] Paul M. Thompson,[d] and Jay N. Giedd[a]

Human total brain size is consistently reported to be ~8–10% larger in males, although consensus on regionally specific differences is weak. Here, in the largest longitudinal pediatric neuroimaging study reported to date (829 scans from 387 subjects, ages 3 to 27 years), we demonstrate the importance of examining size-by-age *trajectories* of brain development rather than group averages across broad age ranges when assessing sexual dimorphism. Using magnetic resonance imaging (MRI) we found robust male/female differences in the shapes of trajectories with total cerebral volume peaking at age 10.5 in females and 14.5 in males. White matter increases throughout this 24-year period with males having a steeper rate of increase during adolescence. Both cortical and subcortical gray matter trajectories follow an inverted U shaped path with peak sizes 1 to 2 years earlier in females. These sexually dimorphic trajectories confirm the importance of longitudinal data in studies of brain development and underline the need to consider sex matching in studies of brain development.

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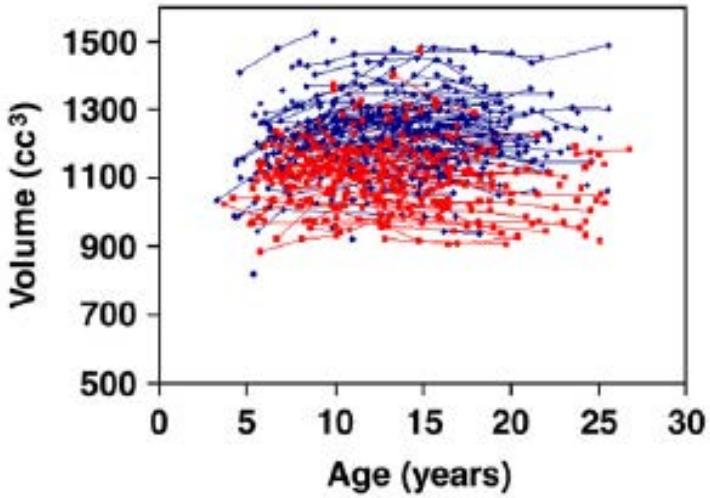

Fig. 1. Scatterplot of longitudinal measurements of total brain volume for males (N=475 scans, shown in dark blue) and females (N=354 scans, shown in red).

The Journal of Neuroscience, May 15, 1999, *19*(10):4065–4072

Sex Differences in Brain Gray and White Matter in Healthy Young Adults: Correlations with Cognitive Performance

Ruben C. Gur,[1] Bruce I. Turetsky,[1] Mie Matsui,[1] Michelle Yan,[1] Warren Bilker,[1,2] Paul Hughett,[1] and Raquel E. Gur[1]

Sex-related differences in behavior are extensive, but their neuroanatomic substrate is unclear. Indirect perfusion data have suggested a higher percentage of gray matter (GM) in left hemisphere cortex and in women, but differences in volumes of the major cranial compartments have not been examined for the entire brain in association with cognitive performance. We used volumetric segmentation of dual echo (proton density and T2-weighted) magnetic resonance imaging (MRI) scans in healthy volunteers (40 men, 40 women) age 18–45. Supertentorial volume was segmented into GM, white matter (WM), and CSF. We confirmed that women have a higher percentage of GM, whereas men have a higher percentage of WM and of CSF. These differences sustained a correction for total intracranial volume. In men the slope of the relation between cranial volume and GM paralleled that for WM, whereas in women the increase in WM as a function of cranial volume was at a lower rate. In men the percentage of GM was higher in the left hemisphere, the percentage of WM was symmetric, and the percentage of CSF was higher in the right. Women showed no asymmetries. Both GM and WM volumes correlated moderately with global, verbal, and spatial performance across groups. However, the regression of cognitive performance and WM volume was significantly steeper in women. Because GM consists of the somatodendritic tissue of neurons whereas WM comprises myelinated connecting axons, the higher percentage of GM makes more tissue available for computation relative to transfer across distant regions. This could compensate for smaller intracranial space in women. Sex difference in the percentage and asymmetry of the principal cranial tissue volumes may contribute to differences in cognitive functioning.

Key words: sex differences; neuropsychology; brain volume; magnetic resonance imaging; gray matter; white matter; cerebrospinal fluid; cognitive performance; segmentation; neuroanatomy

Sex Differences in Brain Gray and White Matter in Healthy Young Adults: Correlations with Cognitive Performance

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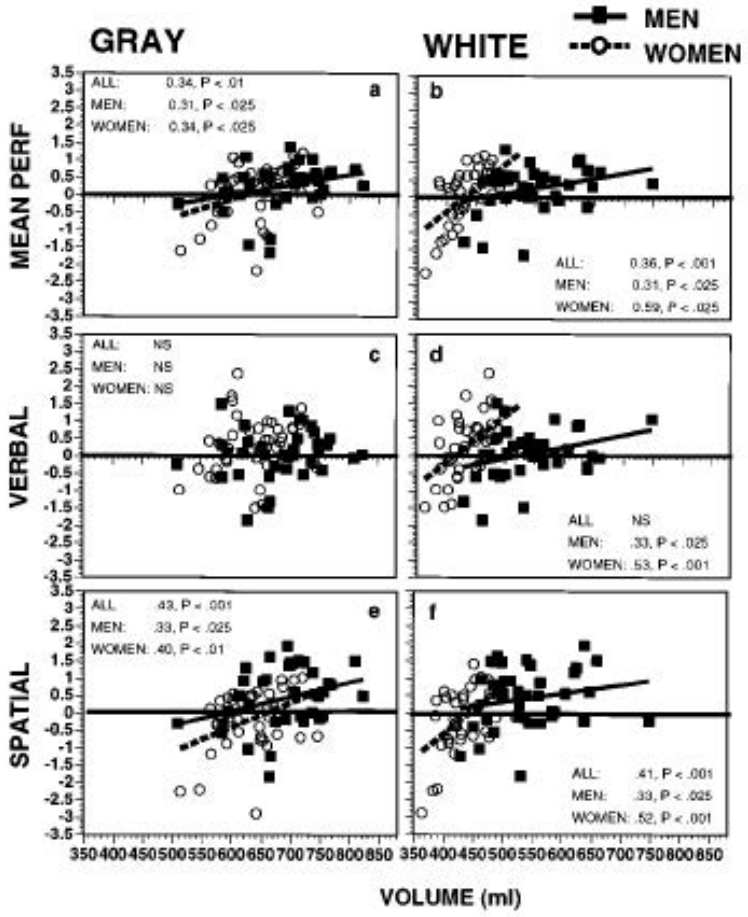

Figure 4. Scatterplots and regression lines for gray matter (*left column*) and white matter (*right column*) against average cognitive performance (*top row*) and verbal and spatial performance (*middle* and *bottom rows*, respectively) in men (*filled squares, solid regression line*) and women (*open circles, dashed regression line*).

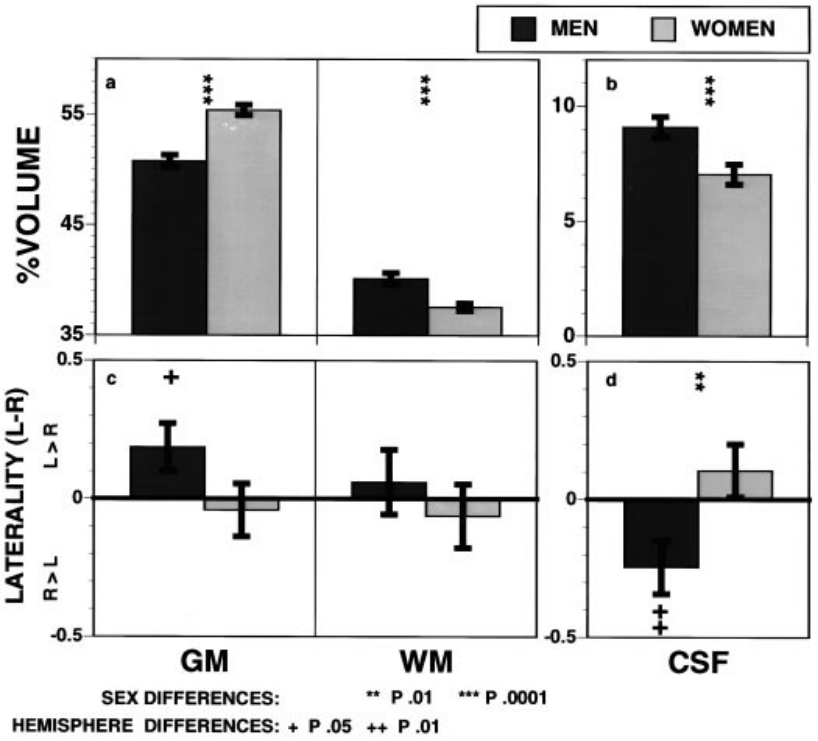

Figure 3. Means ± SEM percentage of tissue and CSF averaged bilaterally (*top*) and examined as a laterality index (left minus right, *bottom*) in men (*dark bars*) and women (*light bars*).

PNAS

Sex differences in the structural connectome of the human brain

Madhura Ingalhalikar[a,1], Alex Smith[a,1], Drew Parker[a], Theodore D. Satterthwaite[b], Mark A. Elliott[c], Kosha Ruparel[b], Hakon Hakonarson[d], Raquel E. Gur[b], Ruben C. Gur[b], and Ragini Verma[a,2]

[a]Section of Biomedical Image Analysis and [c]Center for Magnetic Resonance and Optical Imaging, Department of Radiology, and [b]Department of Neuropsychiatry, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA 19104; and [d]Center for Applied Genomics, Children's Hospital of Philadelphia, Philadelphia, PA 19104

Edited by Charles Gross, Princeton University, Princeton, NJ, and approved November 1, 2013 (received for review September 9, 2013)

Sex differences in human behavior show adaptive complementarity: Males have better motor and spatial abilities, whereas females have superior memory and social cognition skills. Studies also show sex differences in human brains but do not explain this complementarity. In this work, we modeled the structural connectome using diffusion tensor imaging in a sample of 949 youths (aged 8–22 y, 428 males and 521 females) and discovered unique sex differences in brain connectivity during the course of development. Connection-wise statistical analysis, as well as analysis of regional and global network measures, presented a comprehensive description of network characteristics. In all supratentorial regions, males had greater within-hemispheric connectivity, as well as enhanced modularity and transitivity, whereas between-hemispheric connectivity and cross-module participation predominated in females. However, this effect was reversed in the cerebellar connections. Analysis of these changes developmentally demonstrated differences in trajectory between males and females mainly in adolescence and in adulthood. Overall, the results suggest that male brains are structured to facilitate connectivity between perception and coordinated action, whereas female brains are designed to facilitate communication between analytical and intuitive processing modes.

Sex differences in the structural connectome of the human brain

Madhura Ingalhalikar[a,1], Alex Smith[a,1], Drew Parker[a], Theodore D. Satterthwaite[b], Mark A. Elliott[c], Kosha Ruparel[b], Hakon Hakonarson[d], Raquel E. Gur[b], Ruben C. Gur[b], and Ragini Verma[a,2]

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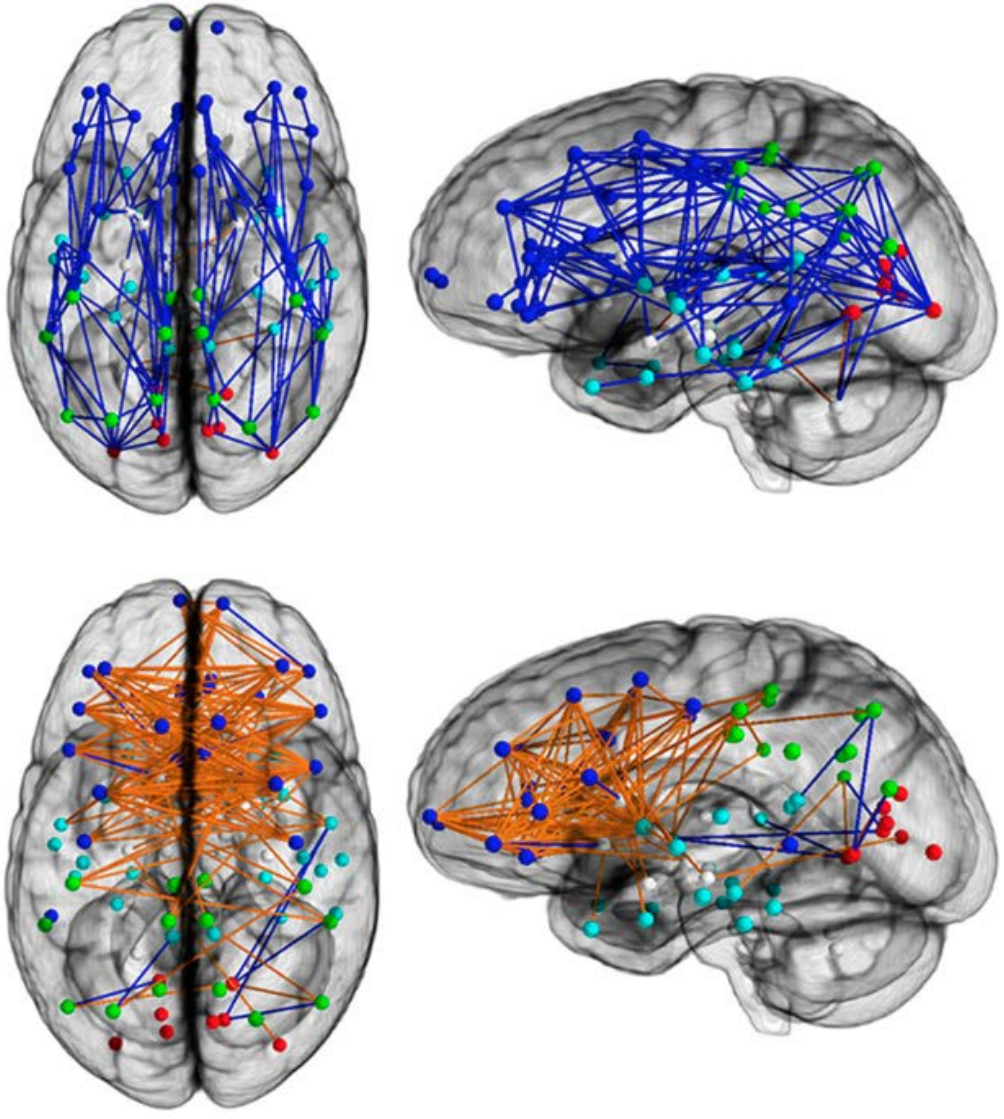

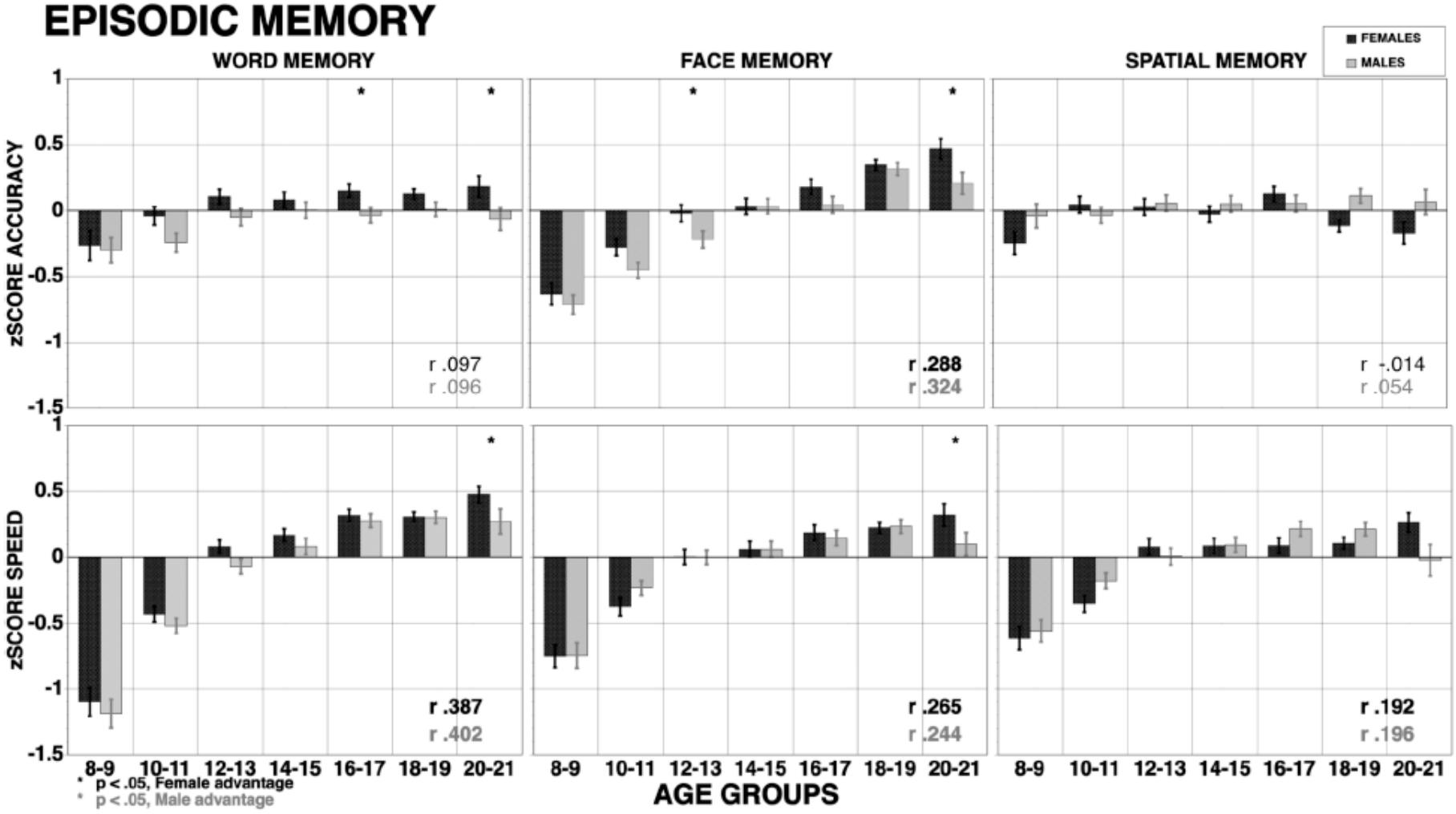
EPISODIC MEMORY
WORD MEMORY
FACE MEMORY
SPATIAL MEMORY
FEMALES
MALES
zSCORE ACCURACY
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1
0.5
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r .324
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r .265
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r .196
8-9
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14-15
16-17
18-19
20-21
AGE GROUPS
* p < .05, Female advantage
* p < .05, Male advantage

Neuroscience and Biobehavioral Reviews 39 (2014) 34–50

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A meta-analysis of sex differences in human brain structure

Amber N.V. Ruigrok[a,*], Gholamreza Salimi-Khorshidi[b], Meng-Chuan Lai[a,c], Simon Baron-Cohen[a,d], Michael V. Lombardo[a,e], Roger J. Tait[f,g], John Suckling[d,f,g]

ABSTRACT

The prevalence, age of onset, and symptomatology of many neuropsychiatric conditions differ between males and females. To understand the causes and consequences of sex differences it is important to establish where they occur in the human brain. We report the first meta-analysis of typical sex differences on global brain volume, a descriptive account of the breakdown of studies of each compartmental volume by six age categories, and whole-brain voxel-wise meta-analyses on brain volume and density. Gaussian-process regression coordinate-based meta-analysis was used to examine sex differences in voxel-based regional volume and density. On average, males have larger total brain volumes than females. Examination of the breakdown of studies providing total volumes by age categories indicated a bias towards the 18–59 year-old category. Regional sex differences in volume and tissue density include the amygdala, hippocampus and insula, areas known to be implicated in sex-biased neuropsychiatric conditions. Together, these results suggest candidate regions for investigating the asymmetric effect that sex has on the developing brain, and for understanding sex-biased neurological and psychiatric conditions.

The majority of the regions displaying sex differences in this meta-analysis also show structural differences between typically developing individuals and individuals with neuropsychiatric conditions (areas of the limbic system, e.g., amygdala, hippocampus and insula) such as autism (Beacher et al., 2012; Cauda et al., 2011; Lai et al., 2013), depression (Bora et al., 2012), schizophrenia (Shepherd et al., 2012) and attention deficit hyperactivity disorder (Etkin and Wager, 2007), providing some bases for the hypothetical view that factors driving the development of typical sex differences might also play a role in the emergence of these neuropsychiatric conditions. Most of these conditions are neurodevelopmental and their prevalence may change over developmental periods. For example, autism has a male bias from childhood onwards, higher prevalence and earlier age of onset for schizophrenia are reported for males, whereas for depression and anxiety disorder the prevalence doubles in girls during adolescence (Rutter et al., 2003). From these we could speculate that sexually differentiating mechanisms may be involved in the neurodevelopment of individuals who develop these psychiatric conditions. Therefore, research investigating differences in brain structure in psychiatric conditions that are asymmetrically affected by sex should stratify samples by sex and perform within sex case–control comparisons.

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

Hypothèse : *« la plupart des différences sexuées sont initialement faibles, de simples biais dans le caractère et le style de jeu, mais sont amplifiées à mesure que les filles et les garçons sont exposés à une culture sexuée »*

Lise Eliot, Université de Chicago

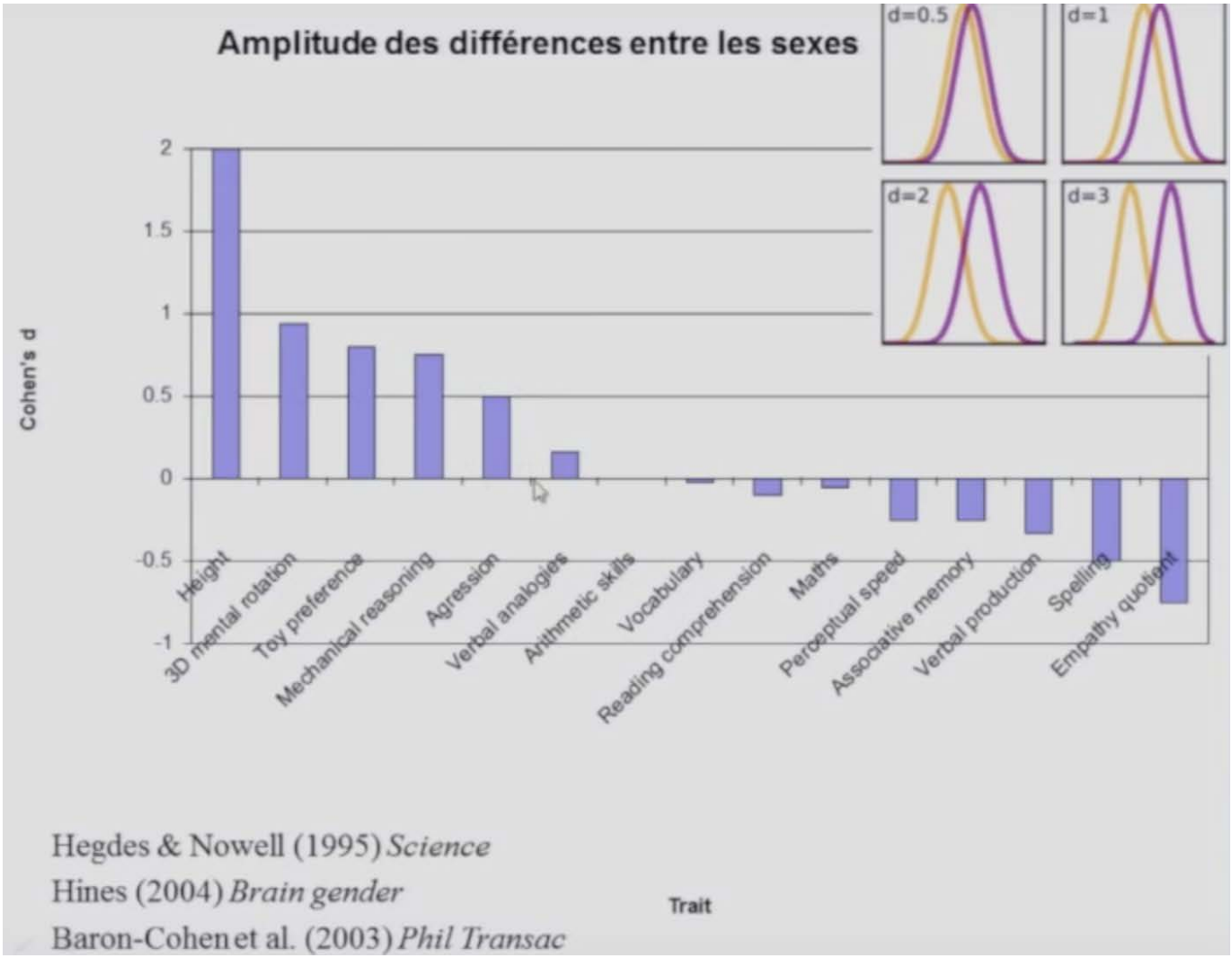
II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

- **Femmes** : « vivent les émotions de base plus intensément, ont des relations sociales plus intimes et y accordent plus d'importance, ont des capacités d'empathie supérieures aux hommes, maintiennent plus longtemps les contacts oculaires, sourient et rient plus souvent…. se souviennent mieux des repères et des positions des objets… ont de meilleures capacités verbales »

- **Hommes** : « s'orientent mieux dans l'espace, réussissent mieux les tests de rotations mentales d'objets et les problèmes de mathématiques… plus de probabilité que les filles d'être dyslexiques, d'avoir des troubles de l'attention ou de l'apprentissage, d'être émotionnellement perturbés …. sont davantage prêts à prendre les plus grands risques pour élever leur statut, attirer l'attention ou s'assurer des récompenses douteuses »

Steven Pinker

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux



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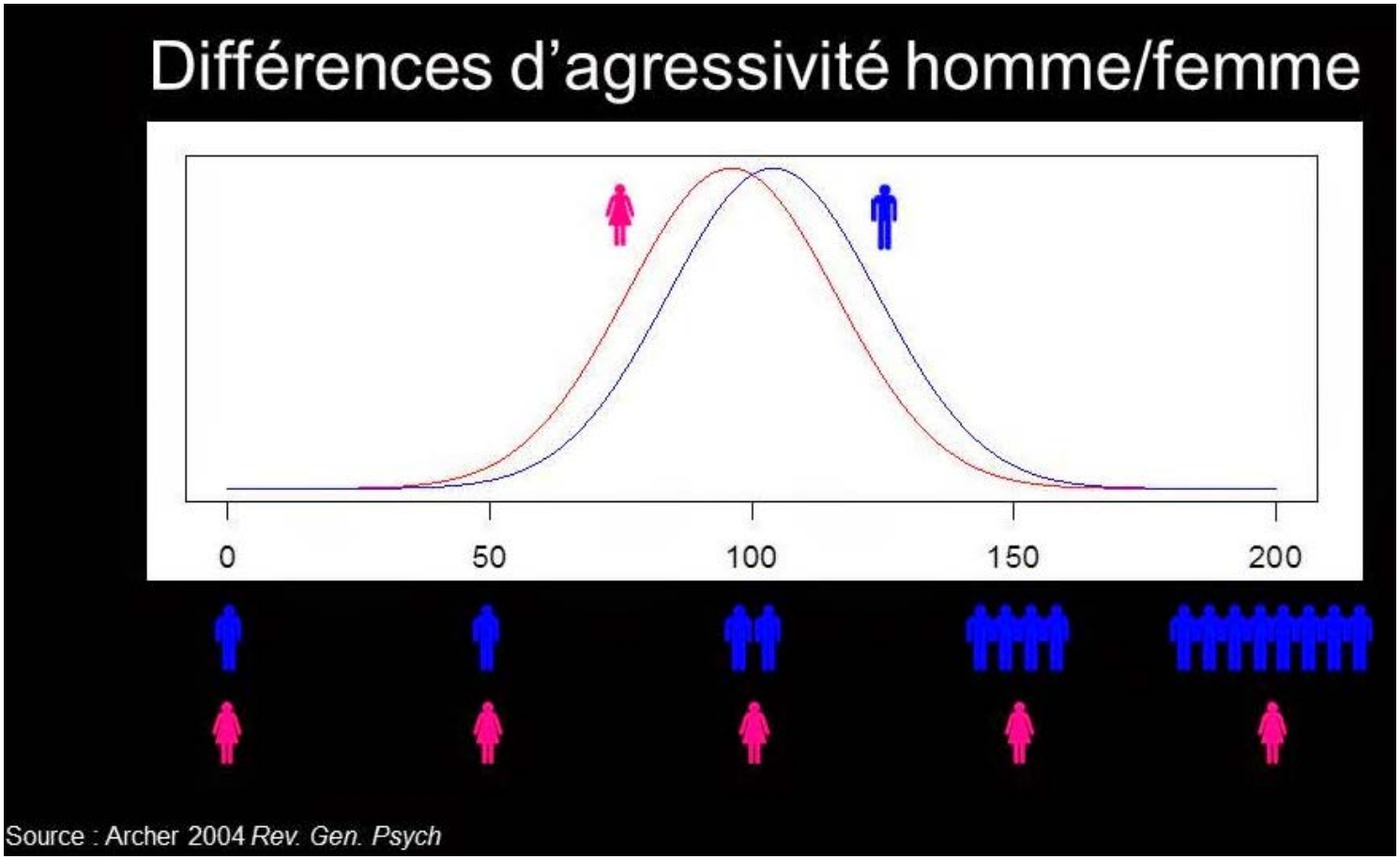

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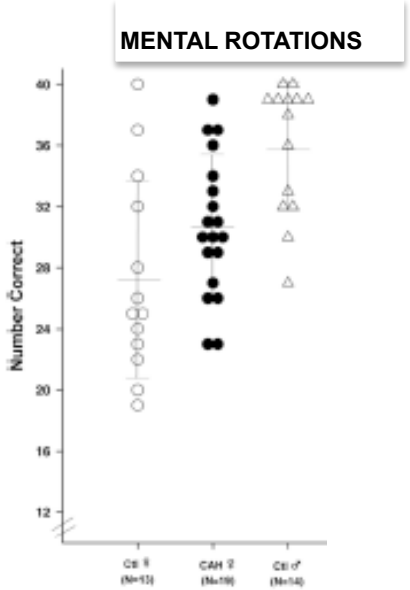
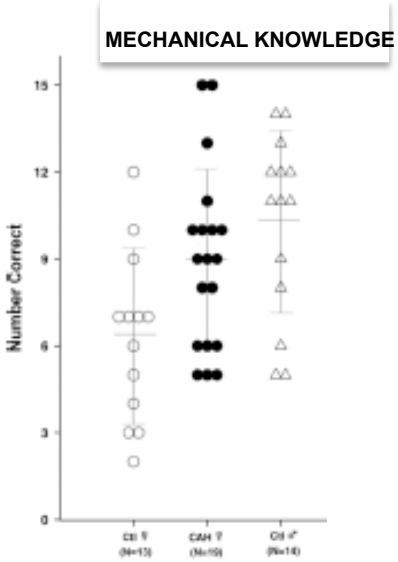
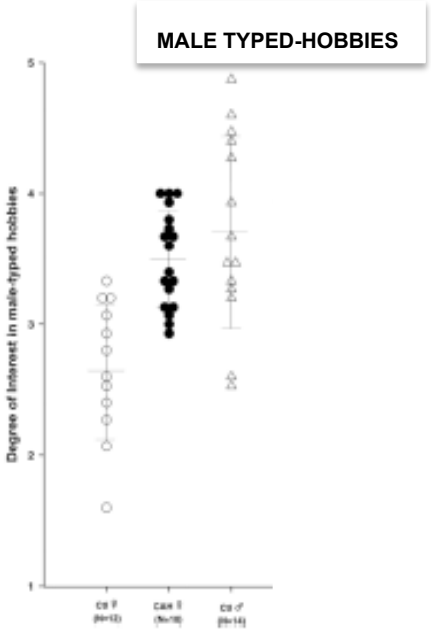






Berenbaum et al. (2012)
Behavioral Neuroscience

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

Sex differences in human neonatal social perception

Jennifer Connellan[a], Simon Baron-Cohen[a,*], Sally Wheelwright[a], Anna Batki[a], Jag Ahluwalia[b]

[a]*Departments of Experimental Psychology and Psychiatry, Autism Research Centre, Cambridge University, Downing Street, Cambridge, CB2 3EB, UK*
[b]*Neonatal Intensive Care Unit, Addenbrooke's Hospital, Hills Road, Cambridge CB2 2QQ, UK*

Received 11 July 2000; received in revised form 30 August 2000; accepted 30 August 2000

Abstract

Sexual dimorphism in sociability has been documented in humans. The present study aimed to ascertain whether the sexual dimorphism is a result of biological or socio-cultural differences between the two sexes. 102 human neonates, who by definition have not yet been influenced by social and cultural factors, were tested to see if there was a difference in looking time at a face (social object) and a mobile (physical-mechanical object). Results showed that the male infants showed a stronger interest in the physical-mechanical mobile while the female infants showed a stronger interest in the face. The results of this research clearly demonstrate that sex differences are in part biological in origin.

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

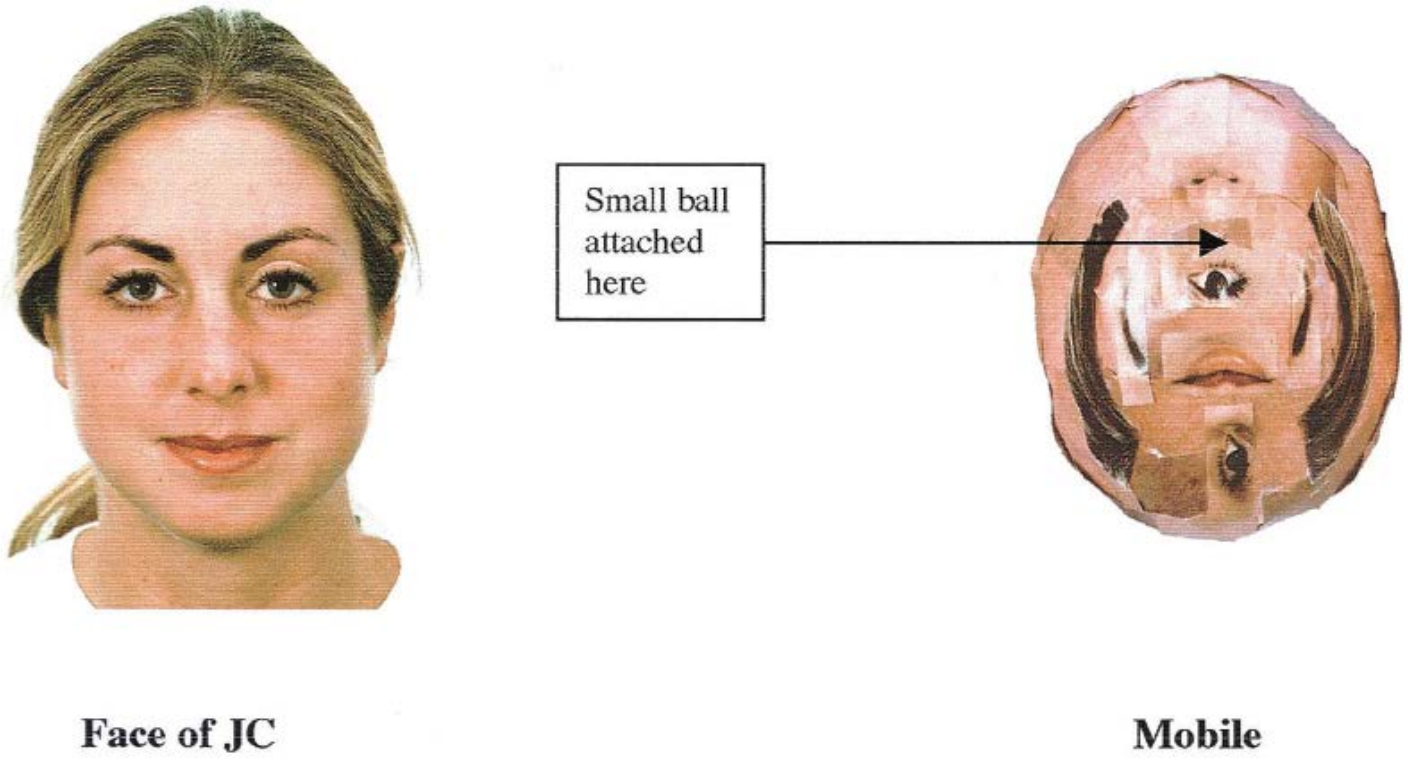
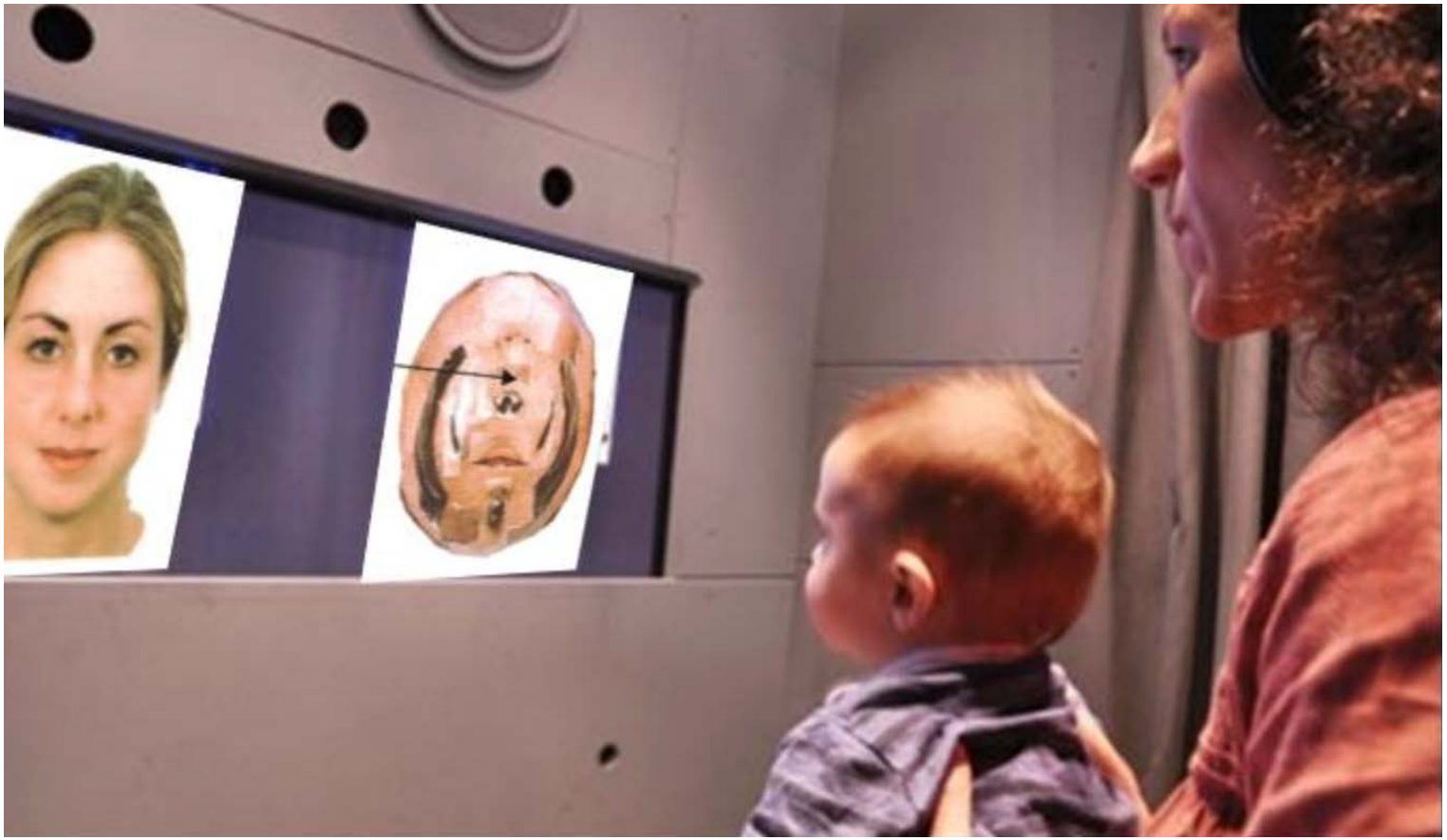


Fig. 1. Photographs of the stimuli used.

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux



II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

Table 1
Number (and percent) of neonates falling into each perference category

	Face Preference	Mobile Preference	No Preference
Males (n = 44)	11 (25.0%)	19 (43.2%)	14 (31.8%)
Females (n = 58)	21 (36.2%)	10 (17.2%)	27 (46.6%)

Table 2
Mean percent looking times (and standard deviation) for each stimulus

	Face	Mobile
Males (n = 44)	45.6 (23.5)	51.9 (23.3)
Females (n = 58)	49.4 (20.8)	40.6 (25.0)

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

ELSEVIER

Infant Behavior & Development 25 (2002) 327–335

Infant Behavior & Development

Short communication

Foetal testosterone and eye contact in 12-month-old human infants

Svetlana Lutchmaya [a], Simon Baron-Cohen [a,*], Peter Raggatt [b]

[a] *Autism Research Centre, Departments of Experimental Psychology and Psychiatry, University of Cambridge, Downing Site, Cambridge CB2 3EB, UK*
[b] *Department of Clinical Biochemistry, Addenbrooke's Hospital, Cambridge CB2 2QQ, UK*

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Abstract

Amniotic fluid was analysed for foetal testosterone (FT) level. Postnatally, the infants (29 girls and 41 boys) and parents were filmed at 12 months of age, and the amount of eye contact made by the infant to the parent was recorded. Girls made significantly more eye contact than boys. This replicates previous studies showing a female superiority in sociality more broadly, and eye contact in particular. The amount of eye contact varied quadratically with foetal testosterone level when data from both sexes was examined together, and when the data for the boys was examined alone. This suggests that foetal testosterone may shape the neural mechanisms underlying social development.

Keywords: Foetal testosterone; Eye contact; Infants

Hypothèse : Le degré de testostérone auquel est exposé le foetus influence les mécanismes neuraux du développement social

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

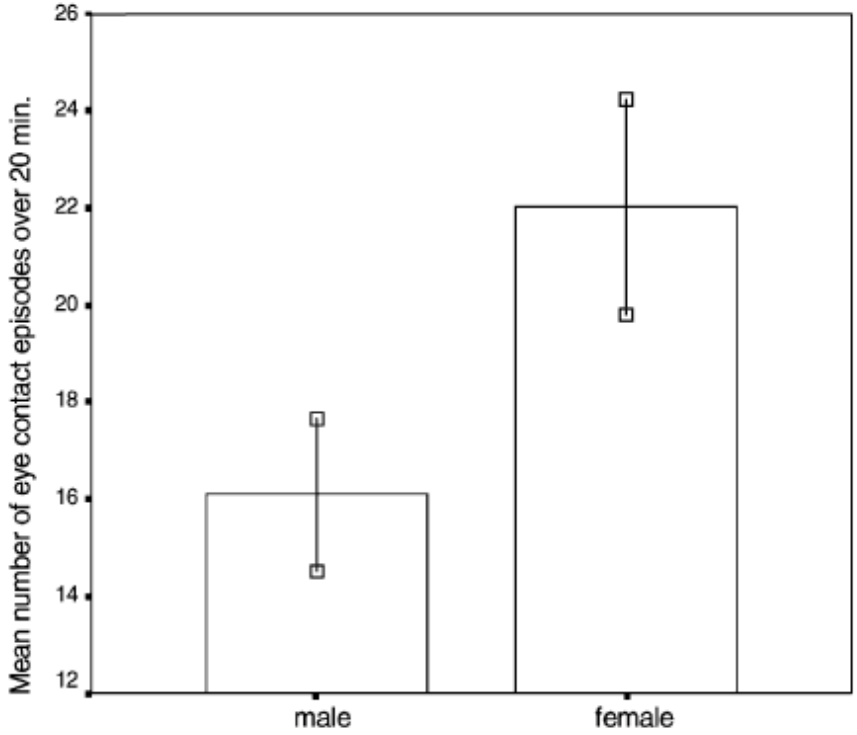


Fig. 1. Graph to show mean frequency of eye contact for each sex. Error bars represent the standard error of the mean.

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

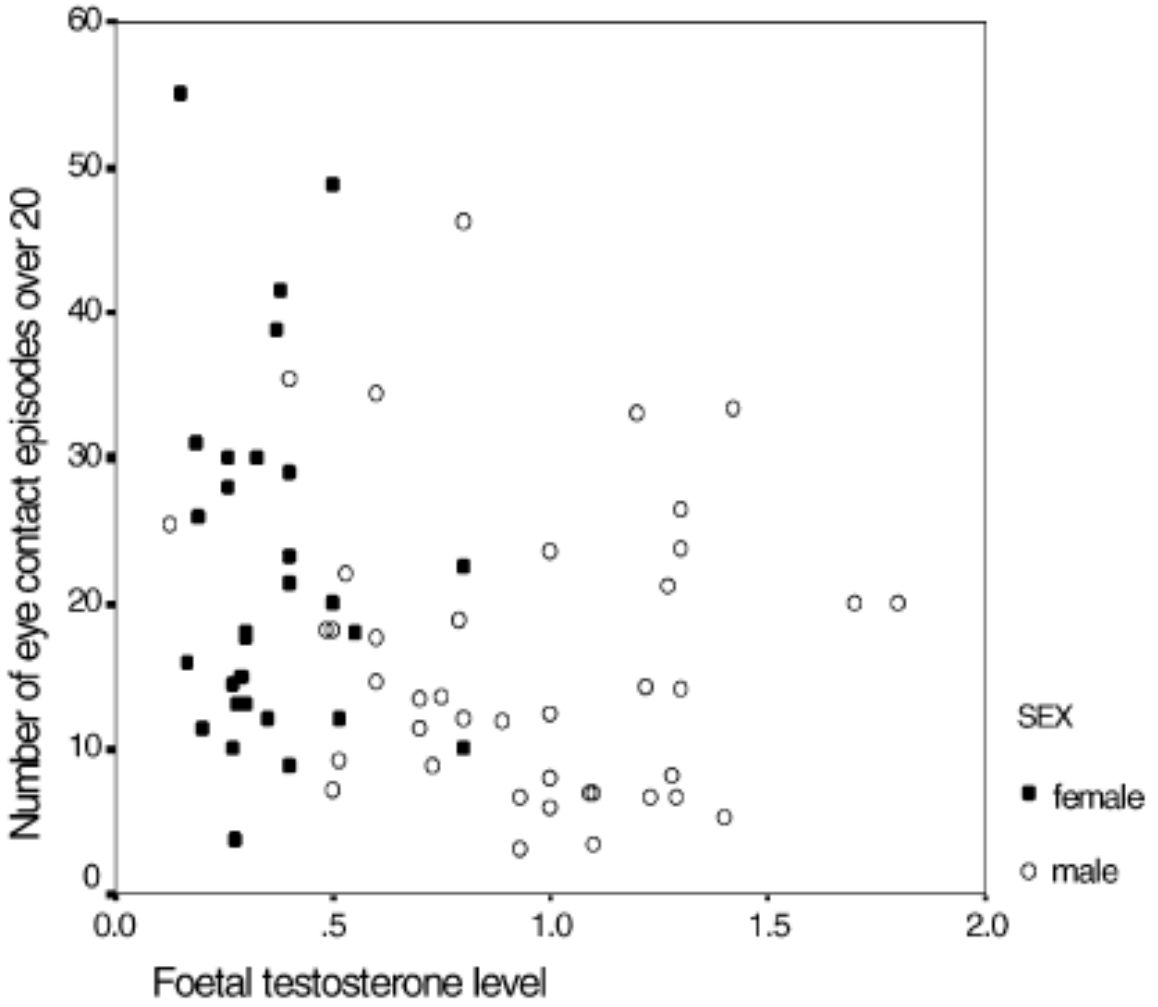


Fig. 3. Graph to show the relationship between FT level and eye contact for both sexes together.

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

Sex differences in response to children's toys in nonhuman primates (*Cercopithecus aethiops sabaeus*)

Gerianne M. Alexander[a,b,*], Melissa Hines[a,c]

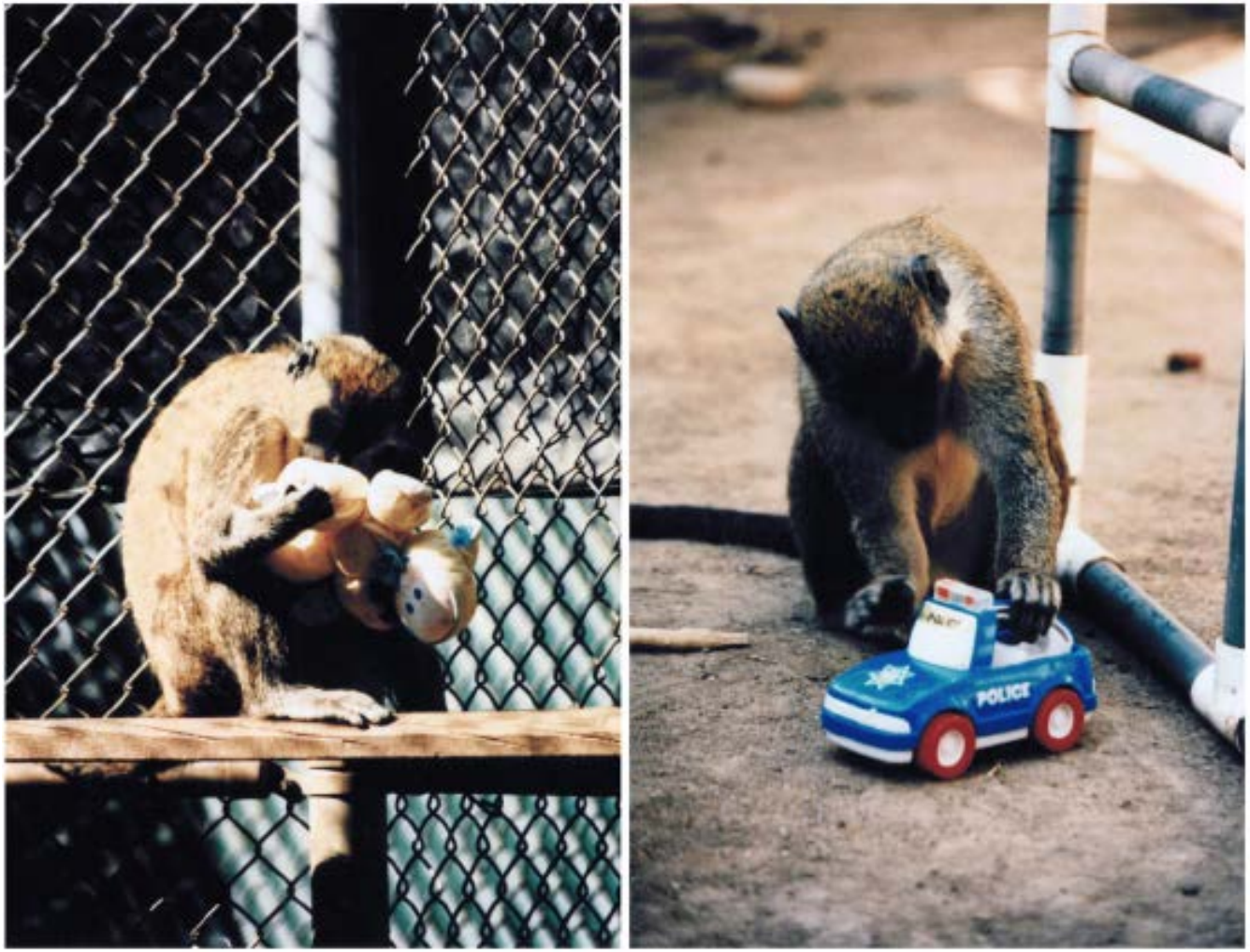
[a]*University of California, Los Angeles, USA*
[b]*Texas A & M University, College Station, USA*
[c]*City University, London, UK*

Receipt of original submission 8 January 2002; Receipt of final revision 2 June 2002

Abstract

Sex differences in children's toy preferences are thought by many to arise from gender socialization. However, evidence from patients with endocrine disorders suggests that biological factors during early development (e.g., levels of androgens) are influential. In this study, we found that vervet monkeys (*Cercopithecus aethiops sabaeus*) show sex differences in toy preferences similar to those documented previously in children. The percent of contact time with toys typically preferred by boys (a car and a ball) was greater in male vervets ($n = 33$) than in female vervets ($n = 30$) ($P < .05$), whereas the percent of contact time with toys typically preferred by girls (a doll and a pot) was greater in female vervets than in male vervets ($P < .01$). In contrast, contact time with toys preferred equally by boys and girls (a picture book and a stuffed dog) was comparable in male and female vervets. The results suggest that sexually differentiated object preferences arose early in human evolution, prior to the emergence of a distinct hominid lineage. This implies that sexually dimorphic preferences for features (e.g., color, shape, movement) may have evolved from differential selection pressures based on the different behavioral roles of males and females, and that evolved object feature preferences may contribute to present day sexually dimorphic toy preferences in children.

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux



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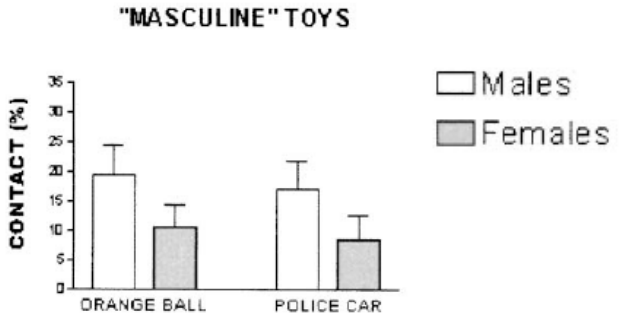

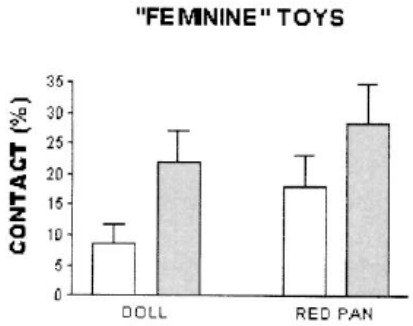

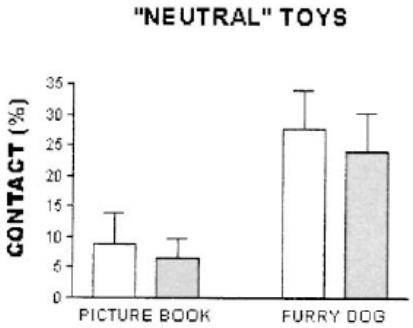

by which isolates could be scored as mutator or non-mutator with >95% confidence.

Complementation tests. Strains were transformed with plasmids carrying wild-type alleles for *mutH* (plasmid pGW1899)[23], *mutL* (pGW1842)[23], *mutS* (pgW1811)[23], *uvrD* (pGT26)[24], *mutT* (pSK25)[25], *dnaQ* (pMM5)[26] and *dnaE* (pMK9)[27], according to a standard protocol[28]. Fluctuation tests were conducted as described above, except that all strains were propagated in LB medium (containing 60 $\mu g\,ml^{-1}$ of ampicillin where the strain was plasmid bearing), and five parallel cultures were used per fluctuation test.

Analysis of fluctuation test data. A local computer program using a Luria–Delbrück distribution-generating algorithm[29] was used to calculate maximum-likelihood mutation rates from fluctuation test data. Approximate 95% confidence intervals for the mutation rates illustrated in Fig. 1 were calculated from formulae[30]. Approximate 95% confidence limits for the mutation rates illustrated in Fig. 3 are based on the theoretical variance of the maximum-likelihood estimate of ln (m), assuming normality, where m is the expected number of mutations per culture.

Received 3 March; accepted 6 May 1997.

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Evidence from Turner's syndrome of an imprinted X-linked locus affecting cognitive function

D. H. Skuse*, R. S. James†, D. V. M. Bishop‡, B. Coppin§, P. Dalton†, G. Aamodt-Leeper*, M. Bacarese-Hamilton*, C. Creswell*, R. McGurk* & P. A. Jacobs†

* *Behavioural Sciences Unit, Institute of Child Health, 30 Guilford Street, London WC1N 1EH, UK*

† *Wessex Regional Genetics Laboratory, Salisbury District Hospital, Salisbury, Wiltshire SP2 8BJ, UK*

‡ *MRC Applied Psychology Unit, 15 Chaucer Road, Cambridge CB2 2EF, UK*

§ *Wessex Regional Genetics Service, Princess Anne Hospital, Coxford Road, Southampton SO16 5YA, UK*

Turner's syndrome is a sporadic disorder of human females in which all or part of one X chromosome is deleted[1]. Intelligence is usually normal[2] but social adjustment problems are common[3]. Here we report a study of 80 females with Turner's syndrome and a single X chromosome, in 55 of which the X was maternally derived ($45,X^m$) and in 25 it was of paternal origin ($45,X^p$). Members of the $45,X^p$ group were significantly better adjusted, with superior verbal and higher-order executive function skills, which mediate social interactions[4]. Our observations suggest that there is a genetic locus for social cognition, which is imprinted[5] and is not expressed from the maternally derived X chromosome. Neuropsychological and molecular investigations of eight females with partial deletions of the short arm of the X chromosome[6] indicate that the putative imprinted locus escapes X-inactivation[7], and probably lies on Xq or close to the centromere on Xp. If expressed only from the X chromosome of paternal origin, the existence of this locus could explain why 46,XY males (whose single X chromosome is maternal) are more vulnerable to developmental disorders of language and social cognition, such as autism, than are 46,XX females[8].

- Il existe un locus pour la cognition sociale non exprimé par le X maternel….. qui n'est pleinement actif que chez le garçon (qui n'a pas de contrepartie au gène de X)

- L'existence de ce locus pourrait expliquer pourquoi les 46 XY (dont l'unique X est d'origine maternelle) sont plus vulnérables que les 46 XX aux désordres développementaux du langage et de la cognition sociale) comme l'autisme

Table 1 Neuropsychological test results

	Turner's syndrome		Normal	
	45,X^m	45,X^p	46,XX	46,XY
	(mean ± s.d.)	(mean ± s.d.)	(mean ± s.d.)	(mean ± s.d.)
IQ				
Verbal	96.2 ± 15.9	106.4 ± 14.4	100.1 ± 16.7	98.6 ± 17.1
Non-verbal	79.5 ± 18.8	82.1 ± 15.9	–	–
Executive function tasks				
Behavioural inhibition	8.7 ± 7.1	5.7 ± 4.8	5.3 ± 4.1	6.8 ± 3.4
Planning ability	6.1 ± 1.7	7.4 ± 1.7	6.6 ± 1.6	7.2 ± 1.4

The 45,X^p females have significantly higher verbal IQ than 45,X^m subjects ($P < 0.02$), but neither Turner group differs significantly from the normal female comparisons. Non-verbal IQ was measured only in Turner-syndrome subjects and does not significantly distinguish the subgroups; it incorporates tests of visuospatial abilities, which are known to be specifically impaired in this condition[2,29]. In all analyses using the executive function measures, age has been covaried because, unlike conventional IQ measures, these tests are not yet standardized for age. Behavioural inhibition scores (Same–Opposite World) are measured in seconds, higher scores indicating more difficulty completing the task accurately. The 45,X^m females are less competent than either 45,X^p subjects ($P < 0.02$) or normal females ($P < 0.03$). Males are less competent than normal females ($P < 0.03$). On the planning task (Tower of Hanoi), neither the two Turner subgroups nor normal males and females are significantly distinguished from one another by the mean highest level achieved.

Box 1 Scale measuring social cognition

Complete the following section by circling 0 if the statement is not at all true of your child, 1 if it is quite or sometimes true of your child, and 2 if it is very or often true of your child:

* lacking an awareness of other people's feelings
* does not realise when others are upset or angry
* is oblivious to the effect of his/her behaviour on other members of the family
* behaviour often disrupts normal family life
* very demanding of people's time
* difficult to reason with when upset
* does not seem to understand social skills: e.g., interrupts conversation
* does not pick up on body language
* unaware of acceptable social behaviour
* unknowingly offends people with behaviour
* does not respond to commands
* has difficulty following commands unless they are carefully worded

Internal consistency for set of 12 questions: Standardised item alpha 0.94.

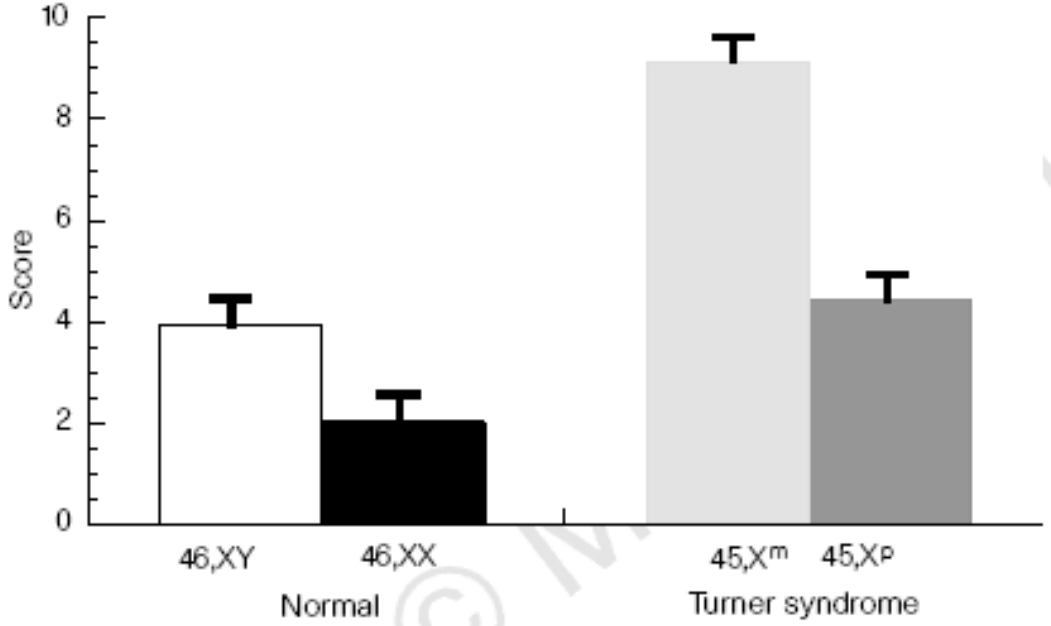


Figure 1 Subscale scores (mean + s.e.) of questionnaire on social-cognitive impairment (Box 1). Higher scores indicate poorer social cognitive skills. The 45,X^m Turner-syndrome females score higher than 45,X^p females and both normal groups ($P < 0.0001$). Normal males score higher than normal females ($P < 0.001$); the effect size of this difference is 0.58, implying that the upper 50% of females score higher than approximately 72% of males. The ratios of mean social-dysfunction scores male : female and 45,X^m : 45,X^p are very similar 2.2 : 1 and 2.1 : 1, respectively). The overall higher scores for the Turner-syndrome subjects, compared with normal females, may reflect the contribution made by visuospatial abilities to social cognition[11]. These abilities are impaired equally in both monosomic groups. No information regarding parental origin of the normal X chromosome was made available to parents, their consultants, or members of the research team gathering these or other data.

The extreme male brain theory of autism

Simon Baron-Cohen

The key mental domains in which sex differences have traditionally been studied are verbal and spatial abilities. In this article I suggest that two neglected dimensions for understanding human sex differences are 'empathising' and 'systemising'. The male brain is a defined psychometrically as those individuals in whom systemising is significantly better than empathising, and the female brain is defined as the opposite cognitive profile. Using these definitions, autism can be considered as an extreme of the normal male profile. There is increasing psychological evidence for the extreme male brain theory of autism.

Syndrome d'Asperger : 9 hommes / 1 femme

I. Qu'entend-on par *Psychologie évolutionniste* ?

- L'esprit est composé de modules fonctionnels spécialisés, produits de l'évolution biologique
- La notion de mismatch

II. Les différences cognitives et psychologiques entre les femmes et les hommes ne sont pas induites exclusivement par l'éducation et des facteurs sociaux

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

« Tout au long de la préhistoire et de l'histoire, et quelque soit la culture, **ce sont avant tout les hommes qui commettent et sont victimes d'homicide** (la forme la plus extrême d'agression) »

Steven Pinker

The phylogenetic roots of human lethal violence

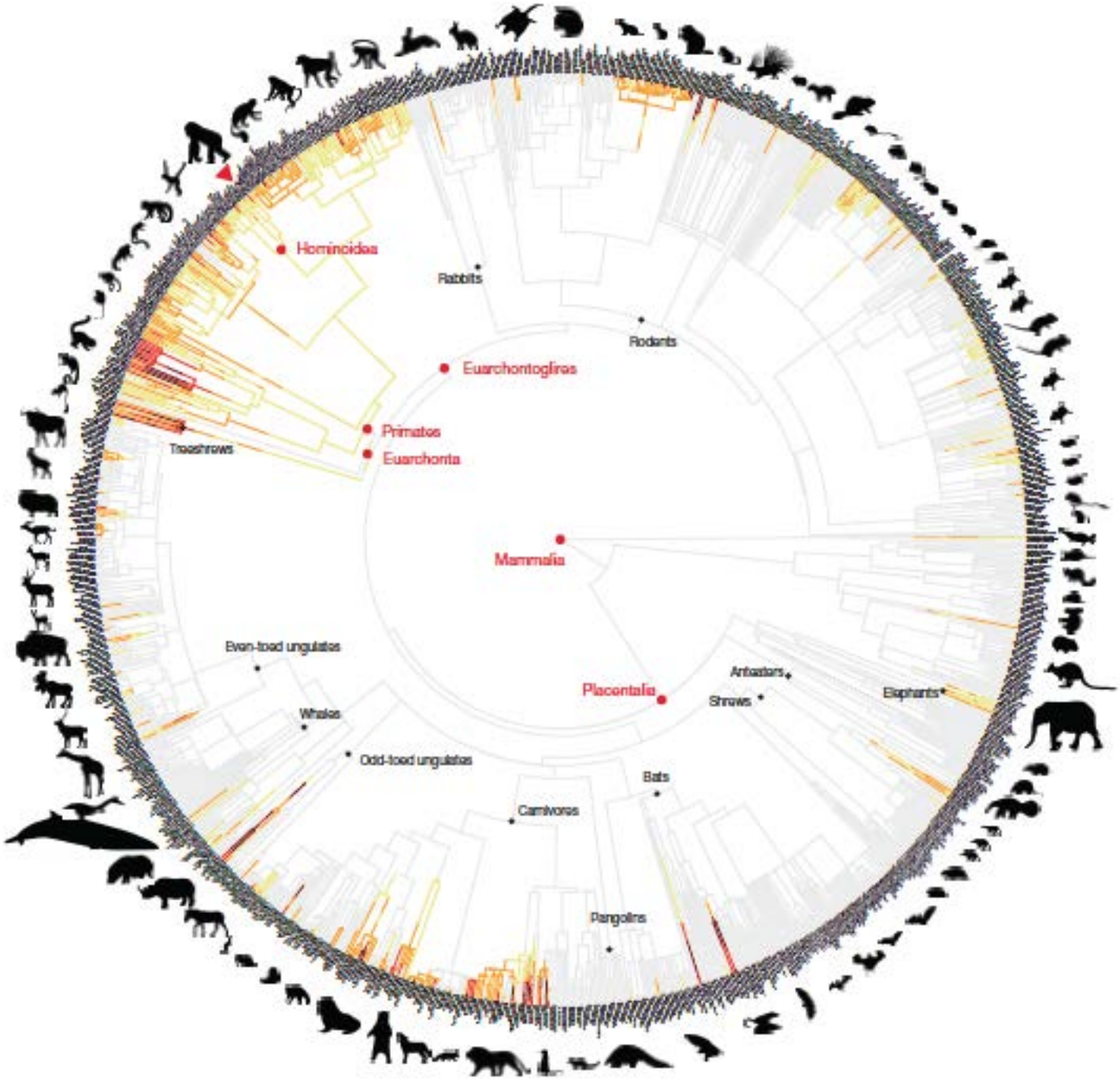
José María Gómez[1,2], Miguel Verdú[3], Adela González-Megías[4] & Marcos Méndez[5]

The psychological, sociological and evolutionary roots of conspecific violence in humans are still debated, despite attracting the attention of intellectuals for over two millennia[1–11]. Here we propose a conceptual approach towards understanding these roots based on the assumption that aggression in mammals, including humans, has a significant phylogenetic component. By compiling sources of mortality from a comprehensive sample of mammals, we assessed the percentage of deaths due to conspecifics and, using phylogenetic comparative tools, predicted this value for humans. The proportion of human deaths phylogenetically predicted to be caused by interpersonal violence stood at 2%. This value was similar to the one phylogenetically inferred for the evolutionary ancestor of primates and apes, indicating that a certain level of lethal violence arises owing to our position within the phylogeny of mammals. It was also similar to the percentage seen in prehistoric bands and tribes, indicating that we were as lethally violent then as common mammalian evolutionary history would predict. However, the level of lethal violence has changed through human history and can be associated with changes in the socio-political organization of human populations. Our study provides a detailed phylogenetic and historical context against which to compare levels of lethal violence observed throughout our history.

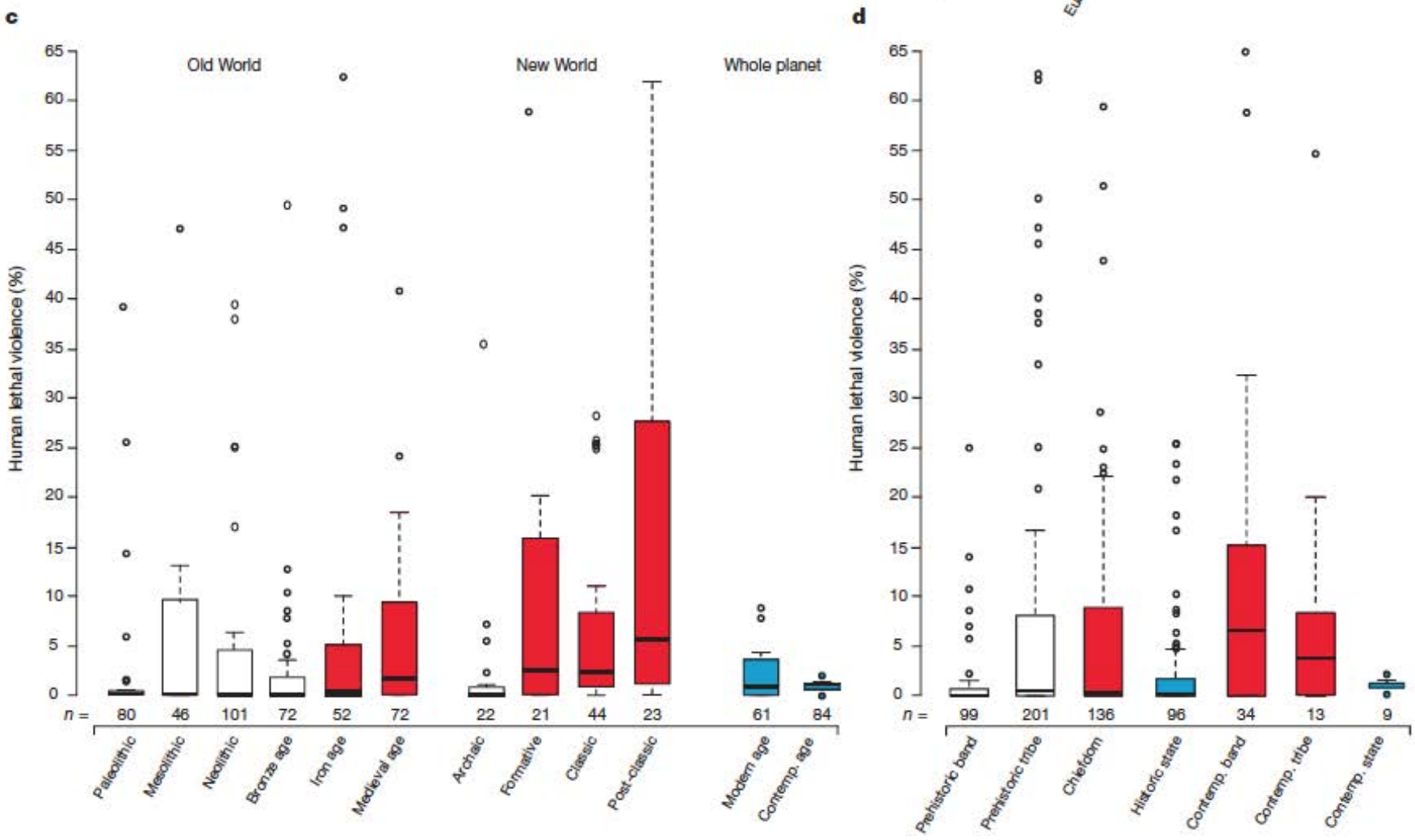
The phylogenetic roots of human lethal violence

José María Gómez[1,2], Miguel Verdú[3], Adela González-Megías[4] & Marcos Méndez[5]

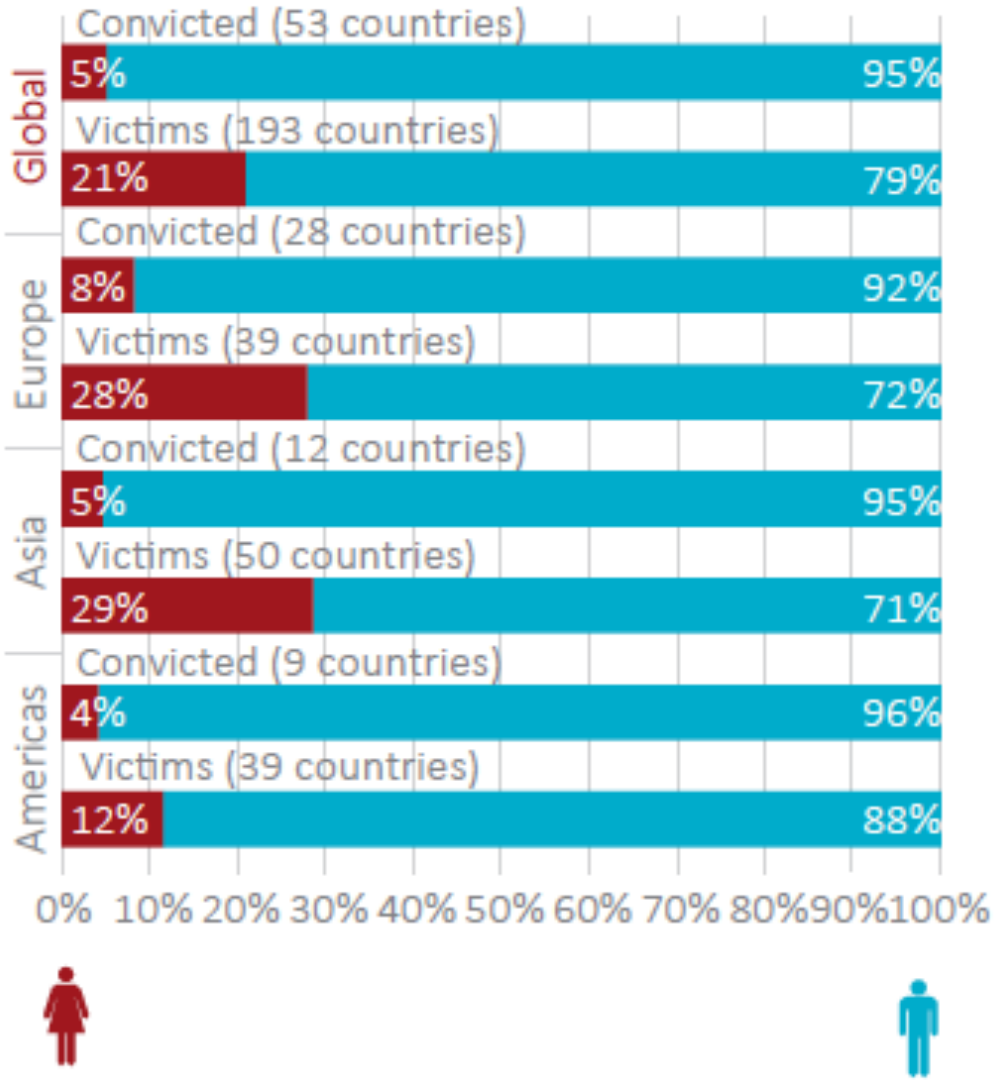
- Des espèces proches tendent à avoir des niveaux similaires de violence létale ; ce qui suggère que c'est un caractère héritable
- 40 % des mammifères et la plupart des primates s'entre-tuent
- Chez les primates (humains à l'origine de notre espèce compris) le poids de la violence létale est estimé à 2%
- plus une espèce est sociale et territorialisée, plus la violence létale s'y exprime.


Hominoidea
Rabbits
Rodents
Euarchontoglires
Primates
Euarchonta
Treeshrews
Mammalia
Even-toed ungulates
Placentalia
Anteaters
Elephants
Shrews
Whales
Odd-toed ungulates
Bats
Carnivores
Pangolins

b
Mammal lethal aggression (%)
4
3
2
1
0
n = 800 800 800 800 800 800
Hominoidea
Primates
Euarchonta
Euarchontoglires
Placentalia
Mammalia
d

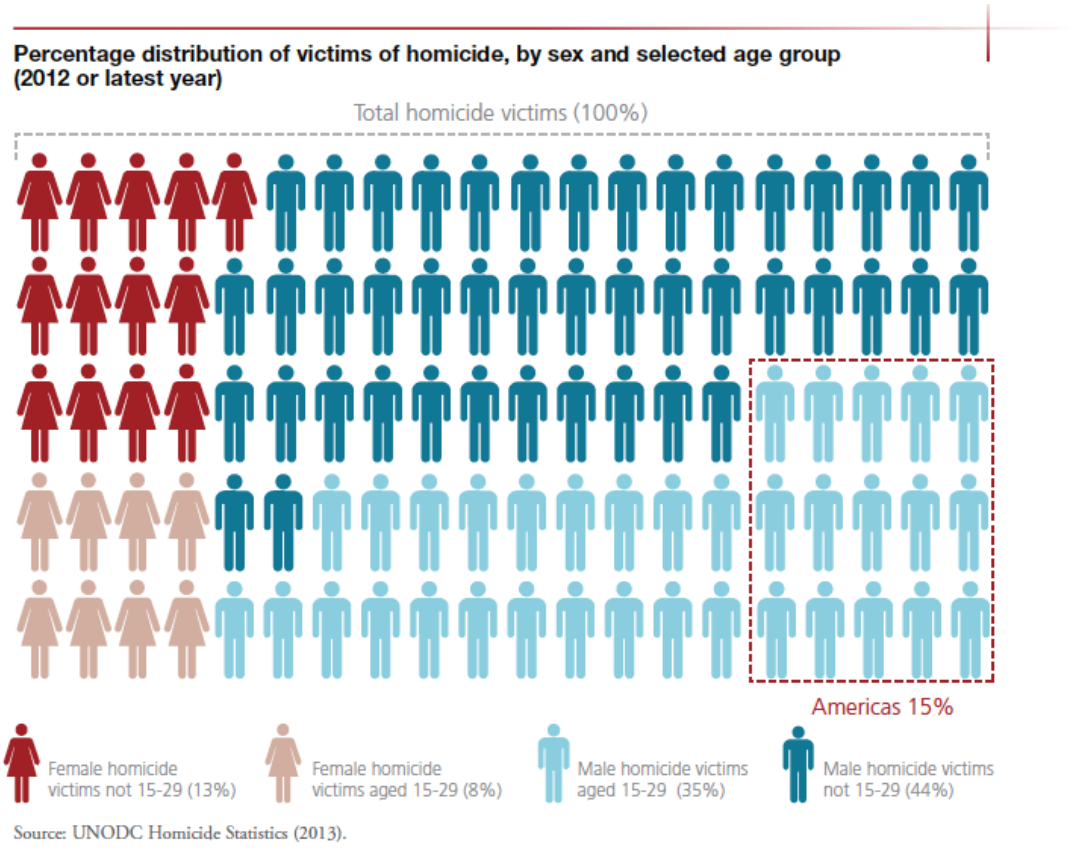

c
Old World
New World
Whole planet
Human lethal violence (%)
n =
80
46
101
72
52
72
22
21
44
23
61
84
Paleolithic
Mesolithic
Neolithic
Bronze age
Iron age
Medieval age
Archaic
Formative
Classic
Post-classic
Modern age
Contemp. age
d
Human lethal violence (%)
n =
99
201
136
96
34
13
9
Prehistoric band
Prehistoric tribe
Chiefdom
Historic state
Contemp. band
Contemp. tribe
Contemp. state

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs



UNODC
United Nations Office on Drugs and Crime

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

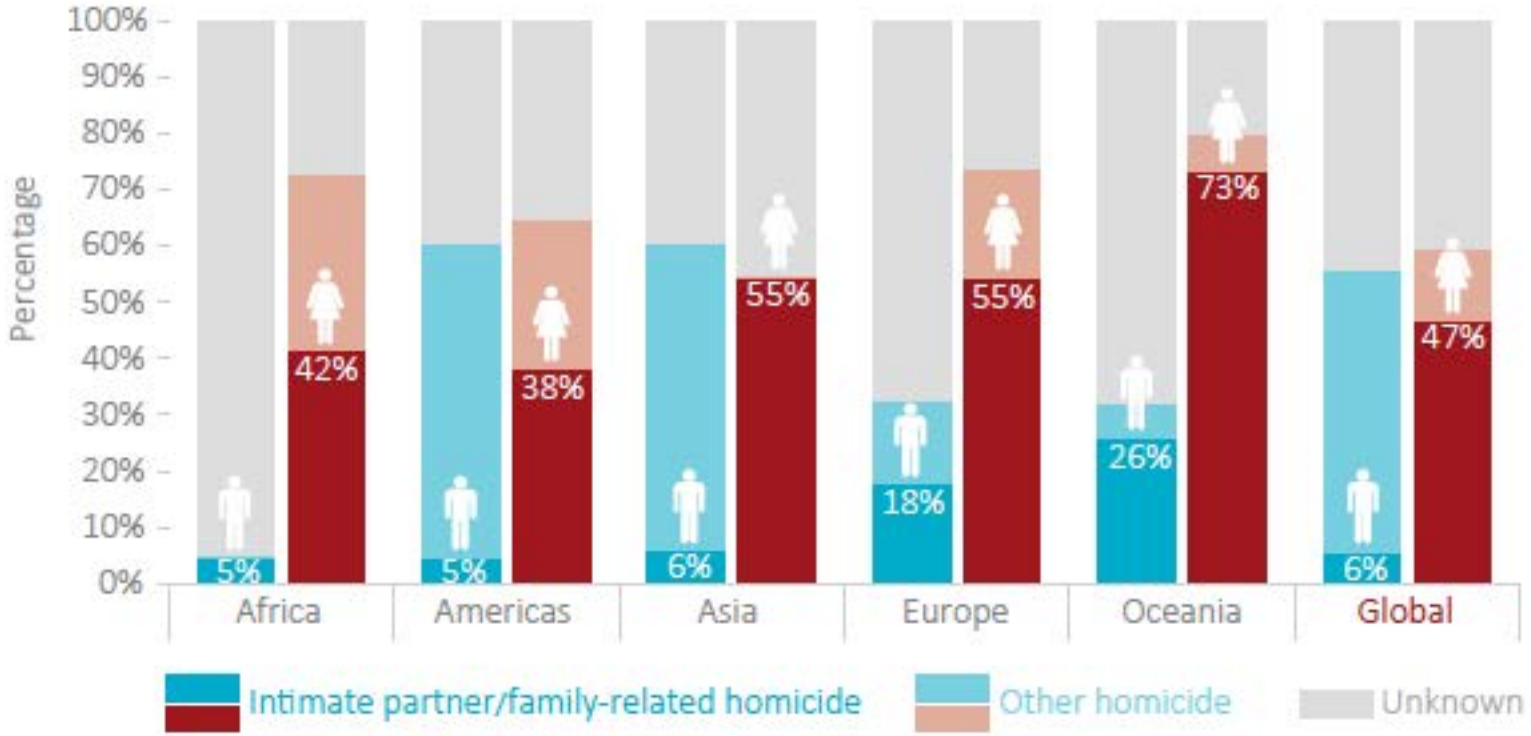


Les comportements criminels (dont les homicides) sont beaucoup plus souvent perpétrés par des hommes que par des femmes. Ils sont particulièrement importants lorsque les hommes entrent dans la période de compétition reproductive et ils déclinent avec l'âge.

UNODC
United Nations Office on Drugs and Crime

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

Fig. 2.2.6: Male and female victims of intimate partner/family-related homicide as a percentage of total male and total female homicide victims, by region (latest year)



Note: Estimates based on data for 4 countries in Africa, 15 countries in the Americas; 9 countries in Asia; 21 countries in Europe; and 3 countries in Oceania.

Source: Elaboration based on UNODC Homicide Statistics (2013).

UNODC
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III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

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Quelques hypothèses évolutionnistes

- Subtiliser les ressources d'autrui
- Se défendre contre des attaques (cultiver une réputation qui dissuade autrui d'user de la force)
- Élever son statut ou son pouvoir dans la hiérarchie sociale
- Rendre moins désirables les rivaux du même sexe
- Éliminer des rivaux
- S'accoupler avec des femmes fertiles

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

LETTER

doi:10.1038/nature13727

Lethal aggression in *Pan* is better explained by adaptive strategies than human impacts

Michael L. Wilson[1,2], Christophe Boesch[3], Barbara Fruth[4,5], Takeshi Furuichi[6], Ian C. Gilby[7,8], Chie Hashimoto[6], Catherine L. Hobaiter[9], Gottfried Hohmann[3], Noriko Itoh[10], Kathelijne Koops[11], Julia N. Lloyd[12], Tetsuro Matsuzawa[6,13], John C. Mitani[14], Deus C. Mjungu[15], David Morgan[16], Martin N. Muller[17], Roger Mundry[18], Michio Nakamura[10], Jill Pruetz[19], Anne E. Pusey[7], Julia Riedel[3], Crickette Sanz[20], Anne M. Schel[21], Nicole Simmons[12], Michel Waller[22], David P. Watts[23], Frances White[22], Roman M. Wittig[3], Klaus Zuberbühler[9,24] & Richard W. Wrangham[25]

Observations of chimpanzees (*Pan troglodytes*) and bonobos (*Pan paniscus*) provide valuable comparative data for understanding the significance of conspecific killing. Two kinds of hypothesis have been proposed. Lethal violence is sometimes concluded to be the result of adaptive strategies, such that killers ultimately gain fitness benefits by increasing their access to resources such as food or mates[1–5]. Alternatively, it could be a non-adaptive result of human impacts, such as habitat change or food provisioning[6–9]. To discriminate between these hypotheses we compiled information from 18 chimpanzee communities and 4 bonobo communities studied over five decades. Our data include 152 killings ($n = 58$ observed, 41 inferred, and 53 suspected killings) by chimpanzees in 15 communities and one suspected killing by bonobos. We found that males were the most frequent attackers (92% of participants) and victims (73%); most killings (66%) involved intercommunity attacks; and attackers greatly outnumbered their victims (median 8:1 ratio). Variation in killing rates was unrelated to measures of human impacts. Our results are compatible with previously proposed adaptive explanations for killing by chimpanzees, whereas the human impact hypothesis is not supported.

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

- Différents types de comportements agressifs qu'on peut observer aujourd'hui ont pu avoir dans le passé une valeur adaptative
    - c'est le cas par exemple des agressions liées à une rivalité amoureuse ou au contrôle d'un territoire (qui permet l'accès à des ressources)

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

Le Parisien

FAITS DIVERS | Nord : une rivalité amoureuse au coeur d'un guet-apens mortel

5 RÉACTIONS 4.8K PARTAGE PARTAGER TWEETER

Nord : une rivalité amoureuse au coeur d'un guet-apens mortel

Créteil

Agression au lycée sur fond de rivalité entre quartiers

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

20 ans de prison pour un meurtre par jalousie

Par LeFigaro.fr avec AFP | Mis à jour le 26/03/2015 à 20:28 / Publié le 26/03/2015 à 20:23

Une peine de 20 ans de réclusion a été prononcée aujourd'hui par la cour d'assises de Côte-d'Or à l'encontre d'un employé municipal, pour l'assassinat de son collègue, qu'il croyait à tort être son rival.

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

REUTERS

SPORTS NEWS | Tue Jul 17, 2007 | 5:39pm EDT

Steroid found in body of dead wrestler Benoit

“Professional wrestler Chris Benoit, who killed his wife and son before hanging himself, injected steroids not long before he died..”

“The testosterone in Benoit's urine, about 10 times the normal level, indicated that he had injected the steroid within a "reasonably short period of time" before he died, but Sperry said he could not draw any conclusions from that evidence.”

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

Review of General Psychology
2008, Vol. 12, No. 1, 86–97

1089-2680/08/$12.00 DOI: 10.1037/1089-2680.12.1.86

Why Do Men Rape? An Evolutionary Psychological Perspective

William F. McKibbin, Todd K. Shackelford, Aaron T. Goetz, and Valerie G. Starratt
Florida Atlantic University

"We, like others (e.g. Thornhill & Palmer, 2000), propose that rape is a conditional strategy that may **potentially** be deployed by any man."

"At least one-third of men admit they would rape under specific conditions, and many men report coercive sexual fantasies (see Malamuth, Huppin, & Paul, 2005, for a review). Such evidence suggests that rape adaptations might be universal features of male psychology."

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

Accueil › Articles

Articles

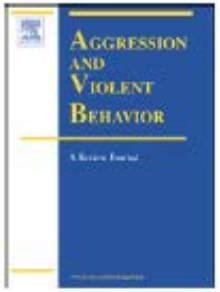
Viol conjugal : 30% des viols commis en France.

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

Aggression and Violent Behavior 13 (2008) 119–123

Contents lists available at ScienceDirect

Aggression and Violent Behavior



Proximate and ultimate explanations are required for a comprehensive understanding of partner rape

Aaron T. Goetz [a,*], Todd K. Shackelford [b], Joseph A. Camilleri [c]

[a] California State University, Fullerton, United States
[b] Florida Atlantic University, United States
[c] Queen's University, Canada

Plusieurs études montrent que dans le cadre du couple, un bon prédicteur de comportements de coercition sexuelle commis par l'homme est la croyance que la partenaire est infidèle

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

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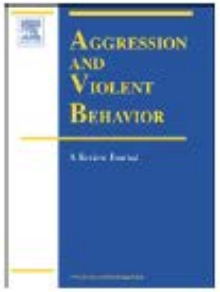

Proximate and ultimate explanations are required for a comprehensive understanding of partner rape

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Hypothèse : *la coercition sexuelle est une tactique (non consciente) utilisée par certains hommes pour réduire l'incertitude de paternité, en s'engageant dans une compétition spermatique (compétition pour la fécondation entre les gamètes des différents géniteurs mâles potentiels)*

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

Sexual Coercion and Forced In-Pair Copulation as Sperm Competition Tactics in Humans

Aaron T. Goetz and Todd K. Shackelford
Florida Atlantic University

Rape of women by men might be generated either by a specialized rape adaptation or as a by-product of other psychological adaptations. Although increasing number of sexual partners is a proposed benefit of rape according to the "rape as an adaptation" and the "rape as a by-product" hypotheses, neither hypothesis addresses directly why some men rape their long-term partners, to whom they already have sexual access. In two studies we tested specific hypotheses derived from the general hypothesis that sexual coercion in the context of an intimate relationship may function as a sperm competition tactic. We hypothesized that men's sexual coercion in the context of an intimate relationship is related positively to his partner's perceived infidelities and that men's sexual coercion is related positively to their mate retention behaviors (behaviors designed to prevent a partner's infidelity). The results from Study 1 (self-reports from 246 men) and Study 2 (partner-reports from 276 women) supported the hypotheses. The Discussion section addresses limitations of this research and highlights future directions for research on sexual coercion in intimate relationships.

Human Nature / Fall 2006

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

Les comportements de coercition sexuelle existent également chez les chimpanzés et peuvent avoir un impact sur le succès reproductif de ceux qui les pratiquent

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

Current Biology 24, 2855–2860, December 1, 2014 ©2014 Elsevier Ltd All rights reserved http://dx.doi.org/10.1016/j.cub.2014.10.039

Report

Sexually Coercive Male Chimpanzees Sire More Offspring

Joseph T. Feldblum,[1,*] Emily E. Wroblewski,[2] Rebecca S. Rudicell,[3,4] Beatrice H. Hahn,[5] Thais Paiva,[6] Mine Cetinkaya-Rundel,[6] Anne E. Pusey,[1] and Ian C. Gilby[7]
[1]Department of Evolutionary Anthropology, Duke University, Durham, NC 27708, USA
[2]Department of Structural Biology, Stanford University School of Medicine, Stanford, CA 94305-5126, USA

Données pendant 17 ans, parc de Gombe, Tanzanie

- Mesure du taux de comportements agressifs - mâles dirigés vers femelles durant leur cycle ovarien

Résultats

- Taux d'agressions durant la période d'ovulation corrélé avec fréquence des accouplements **mais pas prédictif de la paternité**
- **Taux d'agressions en dehors de la période d'ovulation est positivement corrélé à la probabilité de paternité**

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

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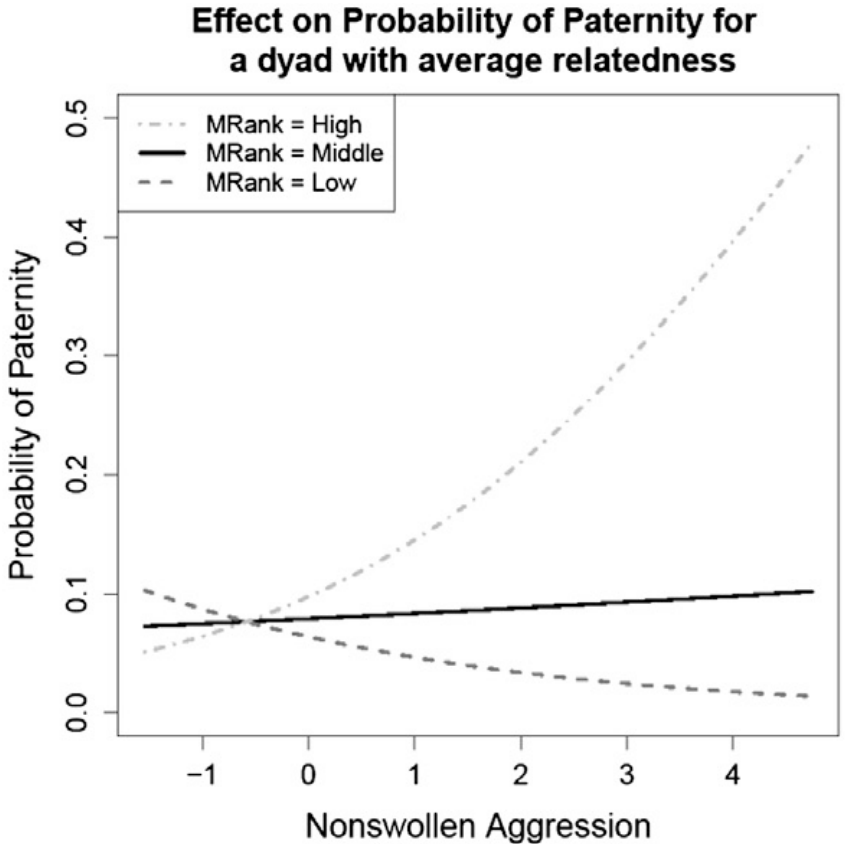

Chez les mâles dominants, le taux d'agressions en dehors de la période d'ovulation est positivement corrélé à la probabilité de paternité

III. Les comportements agressifs des hommes comme solution à des problèmes adaptatifs

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[1]Department of Evolutionary Anthropology, Duke University, Durham, NC 27708, USA
[2]Department of Structural Biology, Stanford University School of Medicine, Stanford, CA 94305-5126, USA

"This indicates that long-term patterns of intimidation allow high-ranking males to increase their reproductive success**, supporting the sexual coercion hypothesis. To our knowledge, **this is the first study to present genetic evidence of sexual coercion as an adaptive strategy in a social mammal."

Conclusion

Pourquoi la violence est-elle présente dans la nature ?

- L'explication ultime pour n'importe quel trait de comportement est à chercher dans l'effet qu'il a sur la survie et la reproduction

- Il est raisonnable de penser que certains (pas tous) comportements agressifs sont des adaptations, dans le sens où ils ont permis de résoudre des problèmes de survie ou de reproduction
  - -ces comportements ont permis à nos ancêtres d'accéder à des ressources leur permettant de survivre et d'augmenter leurs opportunités d'accouplement
  - - font partie du répertoire comportemental constitutif de la nature humaine : une proportion importante d'individus est prédisposée a avoir, **dans certains contextes**, ce type de comportement

Que faire ?

- L'évolution biologique a doté les humains d'un cerveau très plastique. Mieux comprendre les déterminants des comportements agressifs, c'est se donner les meilleurs moyens de les faire diminuer, notamment en agissant sur les caractéristiques de l'environnement susceptibles de les déclencher, mais aussi en éduquant et en informant mieux les personnes