

CHAPTER 2

2

Gender and Sexuality

Gender is a system of classification based on sex 19

Gender stereotypes and gender identities 20

A gender stereotype is the set of beliefs about what it means to be a man or a woman in a particular society 20

Gender stereotyping provides a social shorthand for classifying people by sex 21

Gender identity describes the personal concept of 'me as a man or a woman' 22

Gender differences may not be as great as they first appear to be 22

The origins of gender 23

Hormones, the brain and behavioural dimorphism 24

In animals hormones condition sex differences in behaviour and brain structure 24

Non-human primates show sex differences in behaviour which appear to be influenced by hormonal exposure early in life 24

In humans there may be both sex and gender differences in brain structure and the expression of gender attributes, but the underlying causes are uncertain 26

Gender development may form part of social learning in humans 28

Patterns of interaction between babies and those around them emphasize gender differences 28

Gendered behaviour by babies may affect the way that they are treated 29

Summary 30

Gender and reproduction 30

Sexuality involves the erotic 31

Sexuality can be classified by the stimulus of erotic arousal 31

Genetics, brain anatomy, androgens and social learning have all been implicated in the formation of sexualities 32

The relationship between sexuality and gender 33

Summary 34

Further reading 34

Key learning points 35

In Chapter 1, sex was defined in biological terms as the creation of a genetically unique individual as a result of the equal contribution of chromosomes from two parents: hence, two types of gamete (oocytes and spermatozoa) are produced from two types of gonad (ovary and testis) in two types of individual (female and male). What then is gender, how does it relate to sex, and where does sexuality fit in to all of this? This chapter examines these questions. At the outset, it must be emphasized that there exists considerable variation in the ways that these terms are used. The discussion that follows attempts to clarify the issues, explain common usage and provide a consistent framework through which to consider gender and sexuality.

Gender is a system of classification based on sex

The features by which the two sexes were described and differentiated in Chapter 1 included their chromosomes, genes, gonads, gametes, hormones and anatomical structures (upper part of Table 2.1), and we explored the

developmental relationships between them. There is an assumption, broadly universal across cultures and history, that the identification of one of these features as male or female could reasonably be expected to predict that all the other features would also be concordantly male or female. Thus, the presence or absence of a penis at birth is taken generally as diagnostic of males or females, respectively. Of course, as described in Chapter 1, discordances can and do exist, and we now understand more of the nature and origin of many of them. Estimates of the incidence of ambiguous external genitalia are understandably problematic, but figures of 0.1–0.2% of babies with major ambiguity and 1–2% with less severe ambiguity have been suggested (Box 2.1). Although small in percentage terms, this amounts to a large number of intersex individuals. The traditional approach to genital ambiguity in Americo-European cultures has been to intervene as early in childhood as possible to remove or reduce ambiguity and assign a clear anatomical and thus social sex to the baby. An intersex state was not considered acceptable. However, other cultures have taken a different approach, and accepted intersex

individuals for who they are, often according them a special social status as a distinctive ‘third sex’, for example, the hijra in India or the berdache among some North American indigenous peoples. A move towards a more flexible approach to the clinical management of genital ambiguity has recently occurred in Americo-European society, in part through pressure from people who were assigned a ‘sex’ medically, and in their view inappropriately, as babies (see later).

The bipolar biological classification of individuals as either men or women is paralleled by a bipolar allocation of many other traits, some of which are summarized in the lower part of Table 2.1 as *gender attributes*. Unlike the features characterizing sex, these attributes are based more on attitudes, expectations, behaviour and roles; some of them may appear contentious or less absolute; many are complex; and many vary in detail or substance with different cultures or, within a culture, over historical time. In the table, these attributes have been grouped under the broad heading of gender because they are associated with sex, but not obviously, invariably or simply so. Moreover, any causal relationships between those features listed under sex and those attributes listed under gender are not always immediately obvious. It is for this reason that gender is defined

here as a system of classification *based on sex*. In order to distinguish sex from gender, we reserve the terms *male* and *female* to describe sexual features and the words *masculine* and *feminine* to describe gender attributes. The nature of the relationship between sex features and gender attributes forms the substance of this chapter. First, we will examine in a little more detail some of the gender differences summarized in Table 2.1. Then we will explore the basis of gender differences in behaviour since, collectively, these will influence social interactions and thereby the socially based gender attributes. Lastly we will examine the reproductive and sexual attributes of gender and explore their interrelationship with sexuality.

Gender stereotypes and gender identities

Two quite complex concepts need to be grasped for a sound understanding of gender.

A gender stereotype is the set of beliefs about what it means to be a man or a woman in a particular society

The gender attributes listed in Table 2.1 constitute the elements of *gender stereotypes*. Gender stereotypes provide a

Table 2.1 Sex and gender: oppositional descriptions.

Sexual features	Male	Female
Chromosome	Y present	Y absent
Gene	<i>SRY</i> active in Sertoli cell	<i>SRY</i> inactive
Gonad	Testis	Ovary
Gamete	Spermatozoon	Oocyte
Hormone	Androgens, MIH	No androgens or MIH
External phenotype	Penis, scrotum	Clitoris, labia
Internal phenotype	Vas deferens, prostate, etc.	Oviduct, uterus, vagina
Gender attributes	Masculine	Feminine
Inter-/intra-gender interaction patterns	Pre- and proscribed contact and relational patterns	Distinctive patterns
Social role	Public, extrovert, in the workplace, powerful, independent, forceful, outspoken	Private, domestic, powerless, quiet, care provider
Reproductive role	Disposable and transitory	Essential and enduring
Sexual role	Active, insertive, dominant	Passive, receptive, submissive
Work role	Rule setting and enforcing, leadership, military, ritualistic and priesthood, artistic	Constructive, agricultural, food preparation, domestic, creative, nurturant
Appearance	Characteristic and uniform hairstyle, body decoration, clothes, ornamentation	Characteristic and varying hairstyle, body decoration, clothes, ornamentation
Temperament and emotion	Competitive, combative, aggressive, ambitious, not expressive of vulnerable emotions	Cooperative, consensual, expressive, empathic, affectionate, emotionally free
Intellect and skills	Better mathematical and spatial skills, systematizing	Better linguistic skills, people oriented
Language used	Words reserved for use by men	Words reserved for use by women

BOX 2.1 How frequently is concordance for chromosomal, gonadal and genital sex absent?

Cause	Estimated frequency/ 1000 live births
Non-XX females or non-XY males	1.93
Complete or partial androgen insensitivity	0.08
Congenital adrenal hyperplasia	15.08
True hermaphrodites	0.01
Vaginal agenesis	0.17

In the UK, the birth certificate has to record the baby's sex as male or female; intersex is not a legal option (Births and Deaths Registration Act of 1953). Interestingly, the Adoption and Children Act of 2002 does allow parents to be registered by the 'sex neutral' term 'parent'. This neutrality accommodates adoption by same-sex couples (both male or both female), thereby avoiding two mothers or two fathers. It will be interesting to see whether this precedent leads to pressure for sex-neutral birth and/or death registrations, or even for the recording of 'intersex'. Such pressure may come from the increasingly prevalent clinical practice of conservative surgical and endocrinological intervention in cases of sex ambiguity until the child grows and expresses a gender identity as masculine, feminine or intermediate.

Data adapted from Blackless M *et al.* (2000) How sexually dimorphic are we? Review and synthesis. *American Journal of Human Biology* 12, 151–166.

description which is broadly recognizable as defining what it means to be *masculine* or *feminine* in a society. The precise attributes appropriate to each gender will vary from one society to another, or in the same society over time. However, social, historical and anthropological studies reveal a remarkable consistency in the extent to which each of those attributes listed recurs with greater or lesser emphasis in the gender stereotypes of a range of different societies. For example, the exclusion of women from public life or from particular social or work roles is more evident in strict Islamic societies or traditional Judaeo-Christian societies than in modern secular societies. However, in the latter societies such gender stereotyping still persists in that certain roles remain associated strongly with men (e.g. consultant surgeons, priests) or women (e.g. nurses, midwives) even if many of these associations are much weaker than they once were. The behaviour expected of men and women also differs. Rowdy, aggressive behaviour from men is resignedly expected and often excused ('boys will be boys'), whereas the same behaviour from women is considered 'unladylike'. On a more trivial level, the wearing of earrings by men or of trousers by women was until recently

in British society very gender astereotypic: there were social rules about what constituted appropriately gendered body decoration and clothing, many of which still linger in today's attitudes and values, albeit much attenuated.

Although it may appear difficult in a society in flux to define the current gender stereotypes in terms acceptable to all, nonetheless there tends to be a normative social view about those elements constituting masculine and feminine behaviour. The cohesiveness of that view can be particularly strong for the members of each generation: a person's peers. In framing a gender stereotype, no claim is being made that this stereotype is true for all or indeed for any female or male. It is rather a shared cultural belief about what men and women are like. This social consensus about what it means to be a man or a woman is important for individuals' perceptions of themselves and of those around them. It provides a yardstick against which to measure their own masculinity or femininity and that of those whom they meet.

This measuring process is important because those who appear to stray too far from the stereotype are generally regarded negatively or as a focus for rebellion. In societies in which gender plays a strong social role, it is less acceptable for men to appear feminine than for women to appear masculine, although there are boundaries in both directions. This asymmetry may result from the fact that men tend to be more powerful than women, and so their attributes are more valued socially. So in societies in which gender stereotypes are being eroded, there tends to be more acceptance of the perceived masculinization of women's stereotypes and more resistance to the feminization of men's stereotypes. However, as economies shift increasingly towards a service function, in which traditionally feminine attributes are more valued, the employment opportunities for traditionally masculine men are reduced and these men become marginalized as their masculine attributes are less valued. A key message from this brief discussion is the strong cultural contingency of gender attributes.

Gender stereotyping provides a social shorthand for classifying people by sex

We are presented with a bewildering array of social information. Part of the process of our development as children is to learn how to interpret the world around us. Sex differences are an important part of that world. By learning a gender stereotype, or indeed any other stereotype (ethnicity, race, class, age, employment), one is provided with a social shorthand or sketch that enables some rapid preliminary assessments to be made of each individual encountered. Recognizing someone as male or female allows us to associate the various attributes of gender stereotypes and thereby conditions our immediate behaviour patterns in

ways that are socially appropriate for our and their gender. Of course, this process will tend to reinforce the gender stereotype of the society. It does not, however, preclude later reactions to the individual as an individual. If you doubt the importance of social sketching of this sort, consider your reaction on being introduced to someone whose sex and gender are not immediately obvious. How comfortable are you, and how does it affect your behaviour? Or consider how you react when, in a different culture, you find that the accepted gender stereotypes conflict with those of your own culture: for example, men holding hands or kissing in public or women being excluded from public life? Humans are social beings and the rules by which societies function are therefore very important.

Gender identity describes the personal concept of 'me as a man or a woman'

We have a social view that there are two genders defined broadly by the gender stereotypes of our society. Each of us is part of that society. It therefore follows that each of us has a view of ourselves as being masculine or feminine and of conforming to a greater or lesser degree to the stereotype. The extent to which each individual feels confident of his or her position within this bipolar gender spectrum is a measure of the strength and security of their *gender identity*. Most individuals have gender identities that are fully congruent with their sex. Thus, most women and men who are physically female and male, respectively, have *strong gender identities*. Some individuals may feel less certain about their gender identities, although they nonetheless identify congruently with their physical sex: they may be said to have *weak gender identities*. A few individuals may feel that their gender identities are totally at variance with their otherwise congruent genetic, gonadal, hormonal and genital sex. Such people are described as being *transsexual* or *transgendered*. Transgendering may occur in either direction, the *male-to-female transgendered* consider themselves to be females with a female gender identity and brain but with otherwise male bodies, whereas the *female-to-male transgendered* feel themselves to be men in an otherwise woman's body. Traditionally, more male-to-female transgendered individuals have been identified than female-to-male, although this may represent differential reporting more than real prevalence. The transgendered may adopt the gender roles of the physically different sex, and some may undergo surgical and hormonal treatments so as to bring their bodies and their bodily functions (their sex) as closely congruent to their gender identity as is possible (females becoming *trans men* and males becoming *trans women*) (Box 2.2). Transgendered men and women provide us with perhaps the strongest justification for making the distinction between sex and gender. A better

BOX 2.2 The law and trans men and women

Recent legislative changes across Europe permit recognition of trans men and women in their 'new' identities. In the UK, the relevant law is the Gender Recognition Act 2004, which provides for a 'gender recognition certificate' meaning that their legal sex does not match that on their birth certificate. In order to qualify for a certificate, 'expert evidence' must be produced to establish the person's gender identity, effectively a gatekeeper role for clinicians. Then, only after 2 years living in one's 'acquired gender' (the terminology the Act uses) can the person get a certificate. Third, the person's birth certificate remains unamended. Although legally this is not a problem, some trans people argue that this is a failure to accept that the surgery or treatment is to match them to their true sex and that the sex on the birth certificate was an error.

understanding of the basis of trans people may also help us to refine more clearly the boundary between sex and gender.

Gender differences may not be as great as they first appear to be

Intuitively, when looking at the gender attributes in Table 2.1, it is possible simultaneously to recognize the gender stereotypes as familiar while rejecting them as an oversimplification. For example, whereas men in general might not readily express vulnerable emotions through crying and admissions of helplessness, many individual men do express such emotions and show such behaviour. Individual women can be just as competitive and aggressive as men, although overall these attributes are associated much less with women than with men. Many studies have attempted to make objective and quantitative measurements of gender differences, through the use of behavioural and cognitive function tests and the use of questionnaires to address attitudes. For most attributes, the degrees of variation *within* populations of men and of women are so great that the *overlap between* men and women is too large to produce significant differences between the sexes (see Box 2.3). Moreover, rarely if ever do any differences observed have predictive validity: it is not possible from the measurement of a gender attribute in an individual to predict whether that individual is a man or a woman.

There is thus a paradox. Society has a clear and polarized concept of what it means to be masculine and feminine within society. Moreover, most individuals profess a very clear concept of themselves as masculine or feminine and an understanding of what that means for their place in society. Yet both objectively and subjectively it is not

BOX 2.3 Summary of findings from a meta-analysis of studies on sex differences in humans

124 traits were analysed in a range of published studies to see whether there were significant differences between populations of men and women.

- For 78% of these traits, there was effectively no difference.
- For 15% of them, there was a moderate population difference. Traits observed more frequently in the male population included spatial perception, mental rotation, physical and verbal aggression, assertiveness, body esteem, sprinting, activity level, self-efficacy of computer use. Traits more frequently observed in women included spelling and language skills, and smiling when aware of being observed.
- For only 6% of traits were large differences observed. Observed more frequently for men were mechanical reasoning, masturbation, permissive attitudes to casual sex, and for women agreeableness.
- Only 2% of traits showed very large sex differences, throw velocity/distance and grip strength being significantly more frequent in males.

Conclusions and qualifications

It is important to note that for all traits there was overlap. Some are clearly related to the anabolic actions of androgens on muscles, and others may be culturally conditioned—expectations from gender stereotypes perhaps influencing attribute acquisition.

Where statistically significant sex differences are found, it is important to note that scores for some traits may vary with factors such as age and experience, mood, motivation, practice and ambient hormone levels, and that these may differ for the two sexes.

Overall, what impresses is how similar the two sexes are. Humans do not seem very dimorphic!

Gender differences nonetheless are often highlighted

There are two types of reaction to the evidence that men and women show big overlaps in attributes. One reaction

is to focus on those statistically significant average differences that are observed and to seek to understand their origins—the ‘women are from Venus, men are from Mars’ approach. This reaction may also be used to justify the perceived different needs/treatments of men/boys and women/girls in education, health, employment, etc.

The alternative approach, while accepting that some average differences do exist between the sexes, is to focus on people first and foremost, given the overlap between sexes and complex biological and social origins of sex differences. This approach accepts the notion of a less gendered society than hitherto in which people of either sex are freer to flourish without constraint of stereotype. A recent debate about biological sex differences among scientists illustrates these distinctive reactions (see Further reading). These two differing approaches take us into political and social theory, and we simply alert readers to read and interpret the evidence base as objectively as possible despite the strong academic and social reactions that discussion of sex differences evokes.

Further reading

- Baron-Cohen S (2003) *The Essential Difference: Male and Female Brains and the Truth about Autism*. Basic Books, New York (takes quite a strong position about innate biological differences between male and female brains, and relates the analysis to the higher incidence of autism among males; acknowledges considerable overlap and sex-atypical patterns).
- Barres BA (2006) Does gender matter? *Nature* **442**, 133–136 (questions biological origins of sex differences in scientific success).
- Shibley Hyde J (2005) The gender similarities hypothesis. *American Psychologist* **60**, 581–592 (the meta-analysis that emphasizes the similarities rather than the differences between the sexes).
- Lawrence PA (2006) Men, women and ghosts in science. *PLoS Biol.* **4**, e19, 13–15 (takes the approach that biological sex differences are inevitably a part of our makeup as humans and scientists and cannot be ignored).

possible to sustain a strongly bipolar description of a gendered society. Men and women overlap greatly in the attitudes that they express, in their patterns of behaviour, in their skills and, increasingly, in the roles they adopt. There is more a continuum of attributes than a bipolar segregation. Some societies reflect this reality and are relatively non-gendered, but most societies have a bipolar gendered organization despite the lack of evidence for its inevitability. Why? Presumably such social organization is seen to have advantages, for example for the production and raising of children, controlling patterns of inheritance, the division of labour, or the ability to resist external threats.

In order to take this discussion further, we will turn to a consideration of how a gendered society might arise.

The origins of gender

It will be clear from the foregoing discussion that gender is a concept applicable to humans. Does this therefore mean that studies on the origin of sex differences in the behaviour of animals are of no use to us in trying to understand gender differences in humans? We examine this question first for non-primates, and then for non-human primates, before finally considering whether and how this evidence applies to humans.

Hormones, the brain and behavioural dimorphism

In animals hormones condition sex differences in behaviour and brain structure

Exposure of animals to sex hormones during a critical period of early life is associated with *sexually dimorphic behaviour* displayed later in adulthood, for example, the distinctive urination patterns shown by the dog (cocked leg) and bitch (squatting). This critical period may be in late fetal life (e.g. guinea-pig, sheep) or neonatally (e.g. rat, mouse, hamster). The most intensively studied behaviour patterns are those associated with copulation. Thus, during sexual interaction with females, adult male rats show *courtship behaviour* (e.g. *pursuing females* and *anogenitally investigating them*), *mounting*, *intromission* and *ejaculation* (Fig. 2.1). Conversely, adult females display *soliciting* and *receptive postures*, such as *lordosis* (Fig. 2.1). These behaviours are *predominantly, but not exclusively*, typical for each sex. Thus, normal males will occasionally solicit and even accept mounts by other males, while females in heat will often mount one another. *The differences in behaviour are not absolute but quantitative.*

Treatment of female rats with testosterone during the first 5 days of life increases their display of masculine patterns of sexual behaviour in adulthood and reduces their display of feminine patterns. Castration of male rats to remove the influence of androgens during this same critical period has the reverse effects. Thus, '*masculinization*' in the rat (and other non-primates) is accompanied by '*defeminization*'. How do androgens influence the development of these behavioural differences?



Fig. 2.1 Sex-dependent behaviour patterns in male and female rats. Note the immobile *lordosis* posture shown by the *receptive* female, which enables the male to *mount* and achieve *intromissions* which will result in *ejaculation*. Receptivity and lordosis are shown predominantly by females; mounting, intromission and ejaculation patterns of behaviour are shown predominantly by males.

Exposure to steroids over the critical period affects the *structure of the developing brain*, generating many neuroanatomical sex differences, some of which seem to explain the sex differences in behaviour. Most attention has focused on structural sex differences in a region of the brain called the *anterior hypothalamus* and adjacent *medial preoptic area* (the anatomy of these regions is discussed in more detail in Chapter 6). Both of these areas are known to be intimately involved with the control of sexual behaviour in adult animals (see Chapter 8). Indeed, neonatal implantation of androgens directly into the anterior hypothalamus of female rodents not only masculinizes the local brain structure but also results in increased reproductive male behaviour in adulthood (Fig. 2.2).

In animals, then, there is clear evidence that hormones lead to neuroanatomical and behavioural changes, in much the same way that they also lead to the development of sexually dimorphic genitalia. However, it is important to remember that it is *quantitative* sex differences in behaviour that are observed, not *absolute* differences of a qualitative nature. It is therefore oversimplistic to believe that particular sexually dimorphic areas of the brain are *reliably* associated with specific behavioural functions. Some behavioural flexibility persists. However, our broad understanding of these animal studies enables us to fit sex differences in brain structure and in behaviour into the same conceptual framework of sex, as we did for the gonads, hormones and genitalia in Chapter 1. There is then no need for a 'gender category' in these species.

Non-human primates show sex differences in behaviour which appear to be influenced by hormonal exposure early in life

To what extent do androgens exert the same effects on the development of sexually dimorphic behaviour in non-human primates? Results from experiments on rhesus monkeys suggest some similarities. Young females, exposed to high levels of androgens during fetal life, display levels of sexually dimorphic behaviour in their patterns of childhood play that are intermediate between normal males and females (Fig. 2.3). Moreover, although both male *and* female infant monkeys will mount other infants (Fig. 2.4a), only males progressively display mounts of a mature pattern (Fig. 2.4b). Androgenized females, however, do develop this mature mounting pattern. Moreover, as adults they attempt to mount other females at a higher frequency than do non-androgenized females. Thus, neonatal androgenization produces persistent '*masculinization*' of behaviour. However, the androgenized female monkeys as adults show normal menstrual cycles and can become pregnant. They must therefore display patterns of adult feminine sexual behaviour at least adequate for them to interact

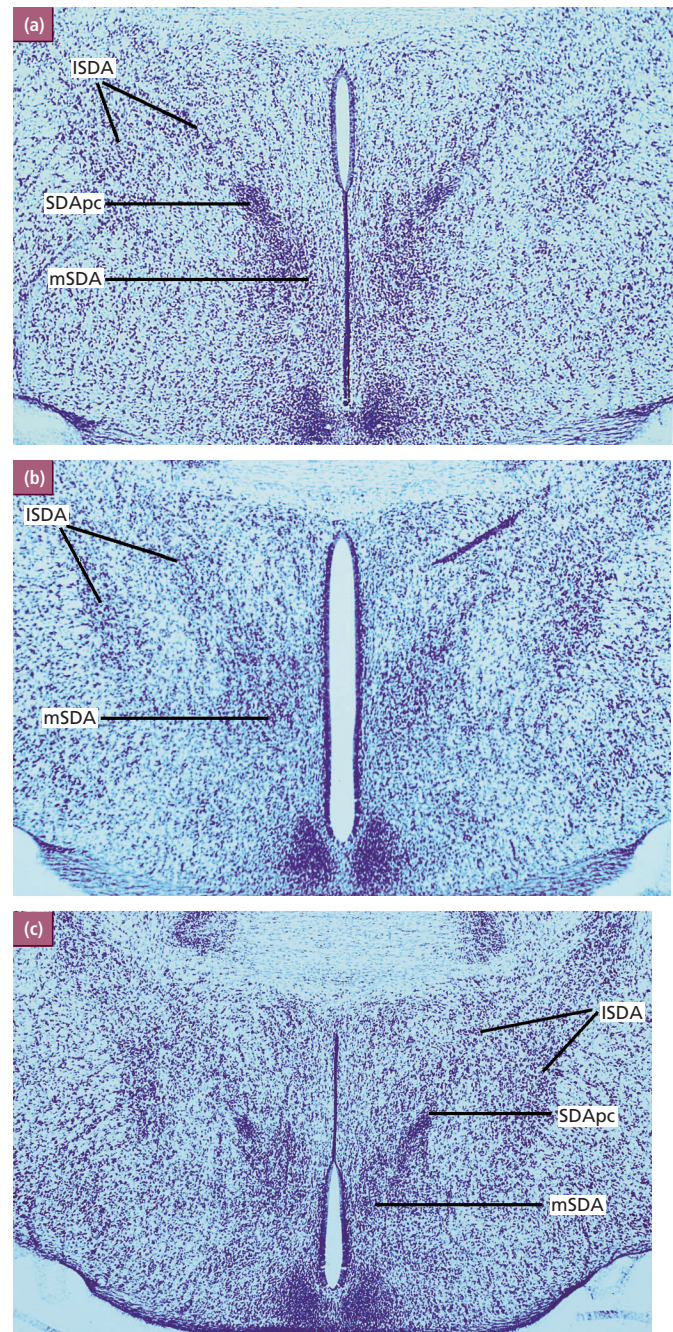


Fig. 2.2 Photomicrographs of coronal sections through the preoptic area of three 21-day-old gerbils (*Meriones unguiculatus*). Section (a) is taken from a male, (b) from a female and (c) from a female treated neonatally with androgens (testosterone propionate: 50 mg on the day of birth and 50 mg the next day). The sexually dimorphic area (SDA) can be divided into several regions: medial (mSDA); lateral (ISDA); and pars compacta (SDAPc). The SDA differs between males and females in a number of aspects: prominence (not necessarily size); acetylcholinesterase histochemistry; steroid binding; and various other neurochemical characteristics, but most obviously in the presence or absence of the SDAPc. Thus, the SDAPc is virtually never found in females (compare a with b). Note that in females treated neonatally with testosterone, there is a clear SDAPc (compare c with b). These pictures provide clear evidence of the impact of hormones during a critical period of early life on the differentiation of this part of the brain. The medial preoptic area in general is closely involved with the regulation of sexual behaviour (see Chapter 8), and some progress has been made in relating specific aspects of sexual behaviour to subdivisions of the SDA. It is also important to note that such sex differences in the structure of the preoptic area are found in many species, from rats to humans, but the precise details of the dimorphism vary considerably.

successfully with males, suggesting that they are not totally or permanently 'defeminized'.

These results suggest a less complete or persistent effect of androgens on the development of sexually dimorphic behaviour in primates than in non-primates. Why might this be? One explanation lies in the timing of the critical androgen-sensitive effect on brain structure. In rats, this occurs neonatally, after genital phenotype is established, so making it easily accessible to selective manipulation. If a

critical period exists in primates, it occurs during fetal life, and may be prolonged. Attempts to androgenize primate fetuses *in utero* often lead to abortion if doses of administered androgens are too high. The genitalia also tend to be masculinized, which might affect the subsequent social interactions and learning of the infant. Thus, a specific selective effect of androgen on the brain may not yet have been achieved. Alternatively, it is possible that in non-human primates, the rather rigid hormonal determination

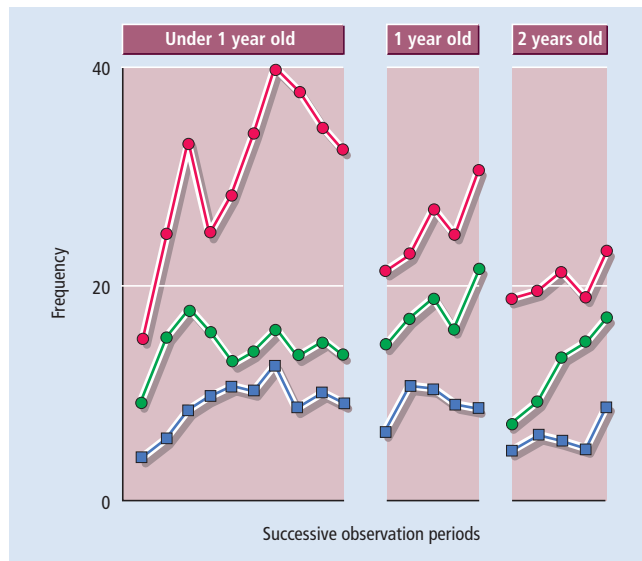


Fig. 2.3 Frequency of 'rough-and-tumble play' during the first, second and third years of life of a rhesus monkey male (red circles), female (blue squares) and female that had been treated with androgens prenatally (green circles). Note that males display this behaviour at a higher frequency than females and that androgenized females are intermediate.

of sexually dimorphic behaviour seen in non-primates simply does not occur. Androgens may predispose to masculine patterns of behaviour, but other factors may also influence the degree to which they are expressed.

What about sex differences in brain structure in non-human primates? As for non-primates, a few such differences exist, including some in the hypothalamic region particularly concerned with reproductive and sexual behaviours. However, although it seems probable that most of these neuroanatomical differences result from endocrine exposure in early life, this has not been demonstrated formally. Neither has a strict association between sexually dimorphic brain structures and behaviour been shown.

In humans there may be both sex and gender differences in brain structure and the expression of gender attributes, but the underlying causes are uncertain

Not surprisingly, the difficulty in studying non-human primates is exacerbated further when the human is considered. The requirement to use post-mortem brains for neuroanatomical analysis restricts both the amount and quality of the material, and observations are complicated by variations in age, pathology, experience and structural

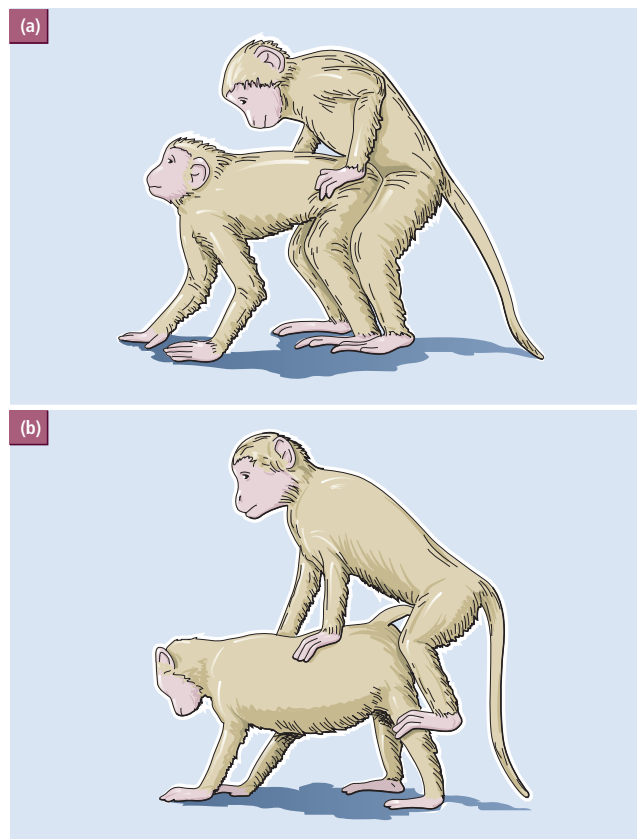


Fig. 2.4 Sexually dimorphic patterns of mounting behaviour in young rhesus monkeys. (a) Early in life, both males and females show immature mounts by standing on the cage floor. (b) During development, males show progressively more mature mounts in which they clasp the female's calves so that she supports his weight entirely. Androgenized females display more of the latter type of mature mounts than do untreated females.

artefacts. Although studies are limited and often conflicting, a few consistent sex differences in the structural organization of the brain have been reported, for example in a small region of the anterior hypothalamus called the *3rd interstitial nucleus (INAH3)*. However, the significance of these sex differences for gender identity and attributes is less clear. A claim has been made that the size and organization of the *central bed nucleus of the stria terminalis (cBST)* is associated specifically with *gender identity* as opposed to sex. Thus, it is reported as being smaller in women than in men, and also smaller in trans women (male-to-female transgendered; Fig. 2.5). However, the number of individual brains studied is small, as are the measured gender differences, and there is overlap between genders such that nuclear size is not predictive for gender. It is also not clear when these size differences first appear or what causes

them. Until we know more about the time at which brain differences emerge and we are able to study more brains from a larger range of individuals with gender or endocrine anomalies, it will be difficult to draw firm conclusions.

More recently, neuroanatomical imaging techniques have been used to search for male/female differences in the functional organization of the living brain. A number of these studies has now shown that there are population sex differences in brain lateralization of some functions, females showing more left-lateralized language and emotion processing, whereas males tend to show right-lateralized visuospatial activity. There is also evidence for sexual dimorphism in the *amygdala*, a region of the brain involved in emotional processing. Overall, more study is needed for secure identification of sex and/or gender based brain organizational differences. Certainly, claims as to the hormonal cause(s) of any differences must be viewed cautiously. For example, genetic differences (one versus two X chromosomes) have been claimed as responsible for amygdala dimorphism.

What about the relationship between hormones and gendered *behaviour* in humans? This question has been studied in both adults and children using various of the gendered attributes summarized in Table 2.1. It is important to re-emphasize that in humans the two sexes differ quantitatively in gender attributes, with much overlap. The influence of prenatal hormones on subsequent behaviour

has been fruitfully investigated in genetic females with adrenogenital syndrome (AGS; see Chapter 1)—nature's counterpart to experimental animals treated exogenously with androgens during the critical period of neural differentiation. However, it is important to note that we are not dealing with 'pure' androgen effects in these girls/women, as under- or (therapeutic) overexposure to corticosteroids is known to affect brain structure and behaviour directly. Studies of girls with AGS has revealed *increased* levels of energy expenditure and athletic interests more characteristic of boys, and a *decreased* incidence of 'rehearsals' of maternal behaviour and doll-play activities, together with diminished interest in dresses, jewellery and hairstyles. This spectrum of behaviour, termed *tomboyism*, is well recognized and accepted in Western culture, and provides few if any problems for children so affected. Tomboyism might be thought to be a consequence of the effects of androgens on the fetal brain, rather like the changes in rough-and-tumble play in infant monkeys exposed prenatally to androgens. However, as a group, AGS girls had *stronger* feminine gender identities than a group of non-AGS tomboys, and only slightly weaker gender identities than control girls. Moreover, among AGS girls there was no clear relationship between weak feminine gender identity and the degree of genital virilization. Further study of AGS females as adults has revealed only slender evidence of enduring behavioural consequences. Thus, they show only slight evidence of a higher incidence of dissatisfaction with their female gender identity and of lesbianism than did controls, but again not related to the degree of presumptive androgenization. A small group of AGS women do identify as trans men, but again not necessarily the most androgenized. Thus, overall the studies on AGS girls/women provide little support for either androgens or masculinized genitalia being an exclusive or necessary determinant of defeminization in humans. However, it is important to note that the AGS girls and women studied will, by definition, span the low to moderate part of the androgenization scale, where genital virilization is incomplete.

How to summarize? It seems clear that there *are* some sex differences and even perhaps a gender difference in brain structure in humans, but these differences are small. It is unclear when they arise and what causes them. There is no direct evidence relating them *causally* to particular behavioural differences between genders. Evidence from animals suggests that hormones *can* influence brain organization and thereby behaviour, but even in animals there is not a rigid and absolute causal relationship between the two. In humans, where there is even greater flexibility and overlap of sex-related behaviour patterns and of gendered attributes, a role for hormones prenatally or neonatally is plausible but more research is needed to find out the full extent and nature of any influence (see also p. 119).

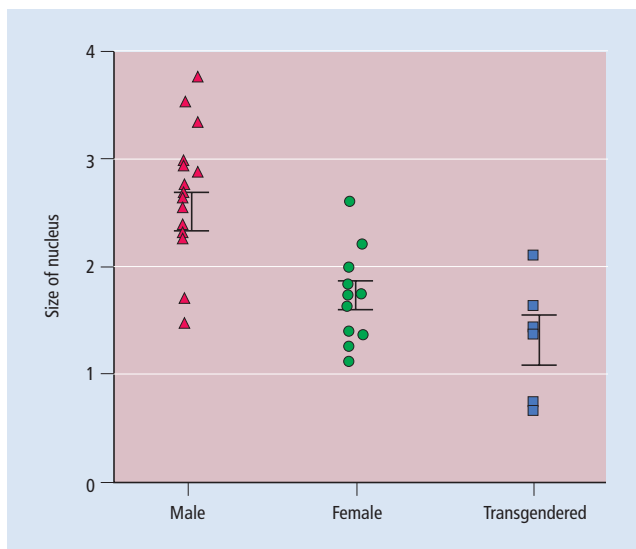


Fig. 2.5 The scatter of sizes of the central bed nucleus of the stria terminalis (cBST) in human adult males, females and trans males (male-to-female transgendered). Error bars \pm SEM. Note the sex difference and that the trans male nuclear volume is closer to the female pattern. Data redrawn from Zhou *et al.* (1995).

Gender development may form part of social learning in humans

In the discussion above, we referred again to the significance of the assignment of sex to a baby as a boy or a girl depending on the presence or absence of a penis. It was pointed out that this assignment might then affect both how the individual saw him- or herself and how the parents and peers viewed and treated the developing child. We now explore this area further in our analysis of gender development.

Patterns of interaction between babies and those around them emphasize gender differences

Starting from birth, mothers attribute different characteristics to male infants than to female infants. Thus, when individual adults are handed the same baby, having been told variously that it is a girl or a boy, *their play, handling of and communication with it differ according to their perception of its sex*. This sort of study shows that babies of different sexes are likely to be treated differently simply because they are of different sexes. A second example makes an additional point. When adults are shown the same video sequence of a child playing, and some are told that it is a boy and others a girl, *their interpretations of its behaviours depend on the sex that they believe it to be*. For example, when the child was startled and believed to be a boy, it was perceived more often as being angry, whereas the same startled behaviour, when believed to be that of a girl, was perceived as fearful distress. This sort of study tells us that expectations about how a male or female baby *should* behave can lead adults to interpret the same behaviour very differently. It raises the possibility that some behaviours may be reinforced or responded to in different gender-specific ways as a result of the expectations of others. Several studies have shown very clearly that the expectations that adults have of a boy differ from those expected of a girl; and men tend to be much more prone to gender stereotyping in this regard than women. Thus, girls are expected to be softer and more vulnerable and are played with more gently. They are also expected to be more vocal and socially interactive, and parents spend more time in these sorts of behaviours with girls. Boys in contrast are encouraged to do things, are less directly communicated with and are disciplined or roughly handled more often.

These sorts of observations emphasize how important and subtle gender stereotypes are and how they are applied to children from the moment of birth. Indeed, parents seem quite anxious to encourage differences between boys and girls by the types of toys they offer them, the clothes they provide for them, and the activities they encourage

and discourage. Rewards and approval are offered when children conform to parental gender stereotypes. These parental gendering activities are particularly marked for the first 2–3 years of a child's life. It is precisely over this period that a child develops its own sense of gender identity. By 2 years children label themselves consistently as male or female, and soon thereafter reliably associate certain sorts of behaviour and activities with males and females. They appear to have both a gender identity and a gender stereotype. They also by 5 years of age seem to realize that gender is fixed and cannot be changed across time or situation: they have a sense of *gender constancy*. Indeed, if 3–6-year-old children are shown a video of another child, their descriptions of its behaviour are very different if told that it is a boy than if told it is a girl. They actually seem to be even more rigidly gender stereotyping than their parents when performing the same task! Since children spend a lot of time with one another, they are likely to reinforce gender stereotypes in each other: peer pressure in action.

Children are, of course, cognitive beings. They do not simply absorb subconsciously impressions of the world around them, although that does occur. They see and hear what goes on around them in the household, in the media, at school. They see men and women and what they do and don't do. Models of male and female behaviour are provided all round them. So there may also be a copying element in the development and elaboration of their growing gender identity and the ways in which they express it. However, copying a model implies identification with that model in the first place and so it is likely that copying is a secondary process that may relate more to the expression of a gender identity than its initial establishment.

Thus, a lot of evidence supports the view that gender stereotypes are applied to babies and children very early in life, and that children also use them and apply them to their world from an early age. The child's environment is thus immersed in gender stereotyping. Does this mean that the way in which babies are treated and gender stereotyped *causes* their own gender to develop? It is entirely plausible to suggest that at least some gendered patterns of behaviour that develop in boys and girls may be induced differentially by the way in which they are treated by others and as a result of the expectations of others. In effect, the gender stereotype of a society may be 'taught' to its children by the way they are treated. If this were so, it might be suggested that ambiguity on the part of parents about the sex of their child could affect the development of gender identity. Cases of transgendering might be associated with a sexually ambiguous childhood: for example, parents treating their son more as a girl, clothing him in dresses and not reinforcing 'boyish' activities in play and sport. The evi-

dence on this suggestion is far from clear. Just because a suggestion is plausible, it does not mean that it is true. What is the evidence?

Gendered behaviour by babies may affect the way that they are treated

In an earlier section, the evidence that exposure to androgens during fetal or neonatal life might influence gendered behaviour was reviewed. The evidence was consistent with there being a possible influence on childhood play patterns. There are indeed claims of intrinsic behavioural differences between newborn male and female babies, although these are not yet strong enough to convince. However, it is at least plausible to suggest that just as babies may respond differently to adults who show gender-specific behaviour towards them, so sex differences in baby behaviour might induce different responses in adults. Clearly, the experiments described above, in which adults were (correctly or incorrectly) 'told' the sex of a child and responded in ways typical for the believed gender, cannot be explained in this way. However, in these experiments when a male baby was handled by adults, half of whom thought it was male and the other half of whom thought it was female, and they were then asked about their experiences, there were differences. Thus where reality and belief were congruent the adults had felt more 'comfortable' than when there was conflict. This may mean that they were picking up on inconsistencies in the baby's behaviour that conflicted with expectations. What this may be telling us is that adults are sensitive to the baby's behaviour as being boy-like or girl-like. It does not, of course, tell us whether these sensed differences in behaviour were due to hormonal influences on the baby or to previous social learning by it. Here is the core of our dilemma. From the moment of birth, boys and girls are likely to be treated differently, so how can we separate cleanly the effects of hormones from those of learning?

One way to achieve this might be to look at babies who were born boys but 'became' girls postnatally (or rarely vice versa). A single highly influential case was provided in the 1960s by monozygotic male twins—the so-called Money twins, named after the clinician who described the case. One twin (John) was genitally damaged at circumcision. This boy was reassigned as a girl (Joan), given genital plastic surgery, provided with hormone therapy and brought up as a girl. Joan was described as having a female gender identity and was taken by John Money as decisive evidence that sex of rearing 'trumped' genetic, endocrine and gonadal sex in the establishment of gender identity. However, it was later found that in adulthood, Joan rejected her female identity, reverted to John, married and had an adopted child. Amazingly, this one case determined paediatric

BOX 2.4 The Money twins and their impact on paediatric practice

John Money was an eminent sexologist, and the John/Joan twin case was highly influential on paediatric policy in cases of sexual ambiguity. The general principle that developed from it was that clinicians alone should decide on a course of sex assignment and then reinforce that decision in all that was said to parents and the child concerned. Thus, early surgical and endocrine interventions were undertaken, and neither parents nor developing child were told about the ambiguity of sex ('just treating a developmental incompleteness'). This well-intentioned clinical paternalism was intended to foster clear parental commitment to a clinically agreed sex of rearing, so as to facilitate the child's entrance into a highly gendered society. However, when the outcome of the John/Joan case became known, with Joan rejecting her feminine identity, this policy was undermined and was abandoned by the American Academy of Pediatrics in the late 1990s. Both in the USA and elsewhere attempts are now under way to develop and review more sensitive policies for the management of sexual ambiguity. These take account of recent outcome studies, such as Reiner's below, of changing social attitudes as well as of the parents' concerns. These policies encourage minimal early interventions, as far as possible restricted to those necessary for medical reasons.

Further reading

- Chau P-L, Herring J (2004) Men, women, people: the definition of sex. In: *Sexuality Repositioned: Diversity and the Law* (ed. B. Brooks-Gordon *et al.*), pp. 187–214. Hart Publishing, Oxford.
- Money J, Ehrhardt A (1973) *Man & Woman/Boy & Girl: The Differentiation and Dimorphism of Gender Identity from Conception to Maturity*. Johns Hopkins University Press, Baltimore, MD.
- Reiner WG (2005) Gender identity and sex-of-rearing in children with disorders of sexual differentiation. *Journal of Pediatric Endocrinology & Metabolism* **18**, 549–553.

iatric policy on genital ambiguity until the late 1990s (see Box 2.4).

Recently, more systematic prospective studies on the development of gender identity in a range of patients with different combinations of genetic, gonadal, genital and rearing sex have begun to appear. These are based on thorough descriptions of each sex-variable in relation to the measured outcome of gender identity. At best, conclusions are highly provisional, but suggest that many XY individuals exposed to normal prenatal androgens but reared as females are likely to declare male sexual identities later in life. XX individuals exposed to high prenatal androgens and reared as males are more likely to develop male identities. Such evidence is important if assignment of sex at birth or soon thereafter is to be attempted. Of course, the

alternative, as described earlier, is to accept the intersex state as a valid interim and/or long-term option—a situation that would require both social and legal sanction for it to be acceptable to many parents.

These studies indicate that the establishment of gender identity is clearly complex and roles for both the gender of rearing and fetal androgens are likely, perhaps interacting in ways we do not yet understand. In this context, the male transgendered are of particular interest. We need to understand whether their exposure to androgens was normal and whether they were reared unambiguously as boys according to their genital sex. They develop a feminine gender identity, but why? Understanding how the transgendered develop may throw interesting and important light on the relative roles of hormones and environment in gender development.

Summary

Four potential elements that might contribute towards the establishment of gender have been considered: sex chromosome constitution, hormones, social learning and brain structure. The brain is central since the expression of attitudes and behaviour, which form the basis of social interactions, is the result of neural processes. Both the organization and function of the brain can be influenced by genes, hormones and learning. Hormones affect brain structure and behaviour in non-primates and modulate behaviour sex-dependently in primates, although their impact is less rigid. The patterns of usage of neuronal circuits that come from interactions with the environment, including social learning, can affect brain organization and function, so that learning and rehearsal are associated with changes to the 'hard wiring' of the brain. When we consider the development of gender, a clear separation of endocrine and social factors has not been achieved. It might be suggested that such a rigid separation is also impossible, since each may interact with and reinforce the other. Small gender differences in the behaviour of newborn babies may be induced by androgens. These subtle differences may be detected by parents and peers who also have clear expectations and beliefs derived from gender stereotypes that condition their behaviour towards the baby's actions and anatomy. These interactions tend to amplify small differences into larger ones. Soon the baby/child engages in the process actively. The process is a dynamic one, susceptible and responsive to cultural difference and change, based on the undoubted cognitive flexibility of humans, and well suited to the development of a social mammal.

Gender and reproduction

Gender has been defined and discussed as a system of classifying individuals based on their sex. Sex in mammals, as

we saw in Chapter 1, is fundamentally about reproduction and genetics. The process of reproduction involves the bringing together of a male and a female (*courtship*) so that their haploid gametes can unite at fertilization. In mammals, one of each type of gamete is obligatory for the successful production of a new individual. As we will discuss further in Chapter 9, in mammals fertilization is *internal*: it involves the process of *coition* in which the spermatozoa are deposited in the vagina. Courtship and coition can involve elaborate rituals and behaviours in which males and females express sex- or gender-dependent patterns of behaviour. Even a brief look at the gender attributes listed in Table 2.1 reveals that many can be related plausibly to the different reproductive roles of males and females. The generally nurturant, emotional, consensual, creative and private attributes of females and the more aggressive, competitive, powerful attributes of males seem well suited to the explicitly reproductive gender roles. Thus, males are essentially disposable. Their only *necessary* role in reproduction is briefly discharged, whereas females have an *extended essential* role. Because of this, females are a *precious resource* who, in times of danger, must be given protection if the social group is to survive. A single male could, in principle, provide all the sperm needed for many females. Moreover, all those unnecessary males will be a drain on resources if food is limited: males are costly biologically. They are therefore *disposable* in war or in risky competition with one another. It is thus tempting to *explain* gender differences in human societies entirely in terms of their value to the reproductive process. It is also tempting to conclude that the broad similarities between the reproductive roles of animals and humans must mean that gender differences in humans, like sex differences in animals, are the product of an evolutionary process which is, at its heart, genetically programmed and so ultimately genetically determined. These temptations should be resisted.

Undoubtedly the genetic inheritance of humankind exerts powerful effects on us and our behaviour. However, what distinguishes humans from most other animals is the powerful additional legacy left to us by our culture. Humans are distinguished by our capacity to use information around us, to learn as we grow, to conceptualize and to establish and transmit cultures, including complex language, in ways not open to most animals. This mental flexibility may operate within limits imposed by our genetic inheritance, but it also operates on opportunities presented by that same inheritance. Even a superficial view of the widely different cultural roles that men and women have in different societies, how they are treated, are valued and behave, shows the power of cultural inheritance. This is not surprising, given what we saw of how children learn about gender stereotypes from the society around them.

So reproduction and sex are tightly, inevitably and invariably linked through our biological and genetic inheritance, whereas reproduction and gender are linked more loosely and elastically through our cultural inheritance. This point is made more clearly when we examine the varied functions associated with courtship and coition in humans. Reproduction is obviously one such function. However, erotic pleasure quite distinct and separable from reproduction is another: humans can and do mate regardless of their fertility. The process of mating is an object in itself. Courtship and coition can also serve a wider emotional purpose, involving feelings such as dependence, power, self-worth, and security. Courtship and coition also have social and economic functions: when formalized in kinships they establish patterns of inheritance and power in a society. We should also remember that coition has a consequence not always welcomed by humans, but essential for some micro-organisms, of transmitting them and the diseases they may cause through a society. These varied and wide-ranging functions of and consequences for courtship and coition mean that society tries to control the processes with customs and laws (see Chapter 15). These then of course form part of the cultural inheritance that we learn as part of the gender stereotype of our society.

The relationship between sex, gender and reproduction raised in this section will be revisited in many chapters later in this book. Now, however, we will complete our preliminary consideration of sex, reproduction and gender by looking at the relationship of all three to sexuality.

Sexuality involves the erotic

As mentioned in the previous section, courtship and coition can involve intense and pleasurable sexual fantasies and

feelings. This state of sexual excitement in humans is described as the *erotic*. In this book, we reserve the use of the term *sexuality* for this erotic experience and its expression in human lives. This definition is not uniformly agreed and would be considered by some to be controversial and too narrow. Sometimes, sexuality is used to describe all that it means to be a man or a woman, a sort of all-pervasive state that is difficult to distinguish clearly from gender itself. We find this definition too diffuse to be useful. Of course, the erotic and its associations can be very pervasive and, as we will see, not limited simply to the events surrounding courtship and coition. However, at heart, our sexuality is about inner erotic excitement and fantasy and its outward expression in sexual erotic behaviour. A *sexual individual* is one who is erotically functional mentally and/or behaviourally, an *asexual individual* lacks erotic experience and fantasy.

The biology of erotic arousal seems to be similar for men and women, and descriptions of what it is like to be in an erotically aroused state are not gender specific (see Chapter 9 for further discussion). What then distinguishes erotic experiences in different individuals and genders?

Sexuality can be classified by the stimulus of erotic arousal

A commonly used system for classifying sexuality uses the object of sexual arousal as its starting point. Examples of such a classification are shown in Table 2.2. Four things are striking about the contents of this table.

- First, there is a wide range of erotically arousing stimuli. It is important to note that they are not necessarily *mutually exclusive*. For example, a person may be aroused by both men and women (*bisexual*), or by the opposite sex and

Table 2.2 A classification system for sexualities.

Object causing arousal	Classification of person aroused	Comments
Person of opposite sex	Heterosexual	Social norm in most cultures
Person of same sex	Homosexual	Acceptable in some forms in many societies; illegal or disapproved in others
Immature person	Paedophilic	Generally unacceptable
Inanimate objects	Paraphilic	Acceptable if not causing harm to others or distress to paraphilic him- or herself
Excrement	Coprophilic	Generally disapproved of
Wearing clothing of other gender	Fetishistic transvestite	Often confused with transgendered but is not a gender issue; may be accepted or ridiculed
Watching others naked and/or engaged in sex	Voyeur	Broadly disapproved of unless 'formalized' or paid for
Self displaying naked or engaged in sex	Exhibitionist	Broadly disapproved of unless 'formalized' or paid for
Receiving or inflicting pain during sex	Sadomasochist	Recently held to be illegal in Europe

by objects or cross-dressing, or be sadomasochistic with the same and/or opposite sex partner(s). The sexuality of humans is complex. Moreover, the stimuli of erotic arousal may change for an individual with age, experience or social expectation. So this labelling system is imperfectly rigid, and the use of labelling as a shorthand can be misleading.

- Second, the stimuli are a mixture of objects, people and activities and in some cases are described in terms of how they are used erotically but in others are not. When we deal with the sexual, there are two levels of description. There is the inner world of conscious arousal, imagination and fantasy: this is usually given the name *sexual identity*, akin to the conceptual inner state of gender identity we described earlier. It is an acknowledgement by a person of their own state of being as a sexual individual. Their own state may or may not fit with the categories used in Table 2.2, although most people will tend to use the labels that society provides for them. Thus, someone might say ‘I am a heterosexual/homosexual/bisexual being’: that would be the verbal expression of their sexual identity. This inner world may or may not be expressed through behaviour and sexual attitudes. Society usually has a clear expectation of how people with different sexualities will behave and what their attributes will be, a sexual stereotype, and this will be absorbed as a part of the sexual identity of people.

- Third, most of the stimuli clearly have nothing to do with procreative sex, since procreation is impossible or unlikely in the context of arousal by them. This emphasizes the clear separation of reproductive and erotic activities that can be observed in humans compared with other mammals in which reproduction and sexual arousal (especially in females) are very closely co-regulated (see Chapter 8). In this regard humans resemble their closest evolutionary relatives among the higher primates and especially chimpanzees and bonobos. Thus, these species show quite clearly that sexual interactions, both within and between sexes and across age groups, can have a social role in addition to a sexual role. Genital showing and looking, touching and rubbing, erection and mounting are commonly observed between individuals of the same sex, and are seen as pleasurable and reassuring. Such same sex interactions are often called *socio-sexual* to distinguish them from the *eroto-sexual* interactions between males and females, although it is unclear how real this distinction is. The main point to understand is that sexual stimulation can form part of the social cement for social species.

- Fourth, the social acceptability of different sexual stimuli varies with the stimuli, the type of person involved and the society in which they are experienced. Thus, homosexual acts between men have been viewed variously as essential, desirable, acceptable, immoral, illegal and pathological in different cultures and at different times, whereas those between women have been ignored, ridiculed, politicized,

accepted, encouraged and celebrated. Similarly, paedophilia has been, and still is, variously defined according to a wide range in the age of sexual consent in different societies—both historical and contemporaneous. Heterosexuality, although a social norm in most societies, is circumscribed heavily by restrictions on its expression in many, for example within marriage, caste or ethnic group or by the relative age differentials of the partners. The social regulation of sexual expression is usually strict, whether by law or social sanction. In many cases, it is so strict that individuals will hide or deny any sexual feelings that do not conform to approved sexual stereotypes, or may only express those feelings covertly. This strong social and self-censorship makes research in the area of sexuality very difficult. People may lie, distort or remember selectively in retrospective studies using questionnaires or interviews. Even in prospective studies, the behaviour and attitudes observed and recorded may reflect a strong impact of social expectations, as we will see in the next two sections, which consider how we acquire sexual identities.

Genetics, brain anatomy, androgens and social learning have all been implicated in the formation of sexualities

Given the wide range of erotic stimuli, it would seem very unlikely that there is a direct genetic basis for our sexualities. It is difficult to see why evolution should have selected genes for fetishistic transvestism. It would be more reasonable to expect that evolution might have selected genes that encouraged sexual arousal in general and by the opposite sex in particular, since that would presumably promote the most effective transmission of those same genes to future generations. So might there be something qualitatively different about the basis of sexual arousal by people as stimuli as opposed to by objects or situations? There is little clear evidence on this point. However, just as in humans there appears to be considerable emancipation of our gender from our genes, such that social learning plays a larger role, so the same may have happened with our sexuality. There may be evolutionary advantages to flexible and adaptive social and sexual structures that came with this emancipation. Thus, whether or not there are genetic or anatomical correlates and even causes of human sexualities, there seems likely to be an element of social learning too. As with gender identity, it is difficult to disentangle the threads.

Twin and familial studies have suggested that there may be a genetic element in the establishment of our sexuality—a finding much trumpeted in the popular press. However, the results are far from decisive. The studies have focused almost exclusively on the question of how male homosexuality is determined. Monozygotic twins are reported to show a higher concordance of homosexuality

than same-sex dizygotic twins. However, this finding does not demonstrate a 'gene for sexuality'. Indeed, although some familial studies have suggested that some homosexual men are more likely to carry a particular set of genetic markers on the X chromosome, none of these results has been confirmed in other studies. Caution is required in interpreting these sorts of genetic study of complex behavioural traits. Thus, genetically more similar individuals are likely to share common experiences because they have similar characteristics. This might predispose them to responses more likely to lead to development of a particular sexuality. Imagine that our sexuality is learnt in early childhood. The way in which it is learnt may depend on the maturation of the nervous system as well as the social surroundings. Imagine a gene or genes that advanced slightly the maturation of one part of the nervous system over another part. That might change the learning pattern and so influence the probability of a particular sexuality developing. This hypothetical scenario is presented to illustrate that, although there must be a *genetic influence* on sexuality, this does not mean that there is a *genetic cause*. The origins of sexuality are likely to be more complex and multifactorial.

A second line of evidence comes from studies on the structure of the brain. Earlier, examples were given of suggested sexual dimorphism in brain structure and organization in humans. There are reports that the 3rd interstitial nucleus of the anterior hypothalamus (INAH3), which is larger in men than in women, is of intermediate size in the brains of self-declaring homosexual men. However, the number of men in the studies is small and the overlap in the size values between gay men and non-gay men is too great to be significant in some studies. The validity of these much publicized claims needs to be established more carefully. If they do prove to be true, then the origins and time of development of the size differences must be established. At present, the evidence certainly does not warrant any suggestion that size differences in hypothalamic nuclei either cause or are caused by homosexuality. There are no experimental data from animals to suggest a direct relationship between this area of the brain and something as complex as homosexual orientation and behaviour. Indeed, studies in animals (see Chapter 8) suggest this to be very unlikely, as this hypothalamic area appears to be much more concerned with the organization of copulatory reflexes than with the expression of partner preference.

Since, in animals, some hypothalamic nuclei differ in size as a result of perinatal androgen exposure, is there any evidence linking exposure to androgens to sexual attraction towards women? We have the same problems here that we encountered when considering androgens and gender development. However, although women who have adrenogenital syndrome do show a higher incidence of attrac-

tion towards other women, *most* such women have a heterosexual attraction to men. Numerous other women with *no* evidence of androgen exposure are attracted to women. Conversely, gay men show no evidence of reduced androgens in comparison with heterosexual men. So androgens seem unlikely to cause lesbianism, although they might predispose to it indirectly, and lack of androgens is unlikely to cause male homosexuality.

So where does social learning fit? There is some evidence from work on paraphilias and fetishisms relating sexual arousal experiences in early childhood to the stimuli likely to arouse in the adult: associative learning. Children do show evidence of arousal, such as phallic erection, from an early age, and seem to derive pleasure from phallic stimulation. It is possible that the coincidence of arousal with an emotionally charged event or object in childhood might lead to the association of eroticism with that event or object in later life. However, the evidence on this point is far from clear, and we simply do not know how we become eroticized to particular stimuli. The question of social learning in the development of sexuality is considered further in the next section.

The relationship between sexuality and gender

Highly gendered societies, in which heterosexuality is the social norm and homosexuality is disapproved of, place a strong emphasis on the link between gender and heterosexuality. Thus, an integral part of being feminine is to be attracted to men and of being masculine is to be attracted to women. A heterosexual identity thus becomes subsumed into a gender identity such that the two are conflated conceptually. This conflation is evident in the sexual stereotypes of traditional Judaeo-Christian-Islamic societies. Thus, *masculine men* are seen as sexually dominant, active, insertive and initiating whereas *feminine women* are sexually passive, receptive and submissive. Deviations from these stereotypes are stigmatized, witness the stereotypes of the sexually passive, effeminate and 'unmanned' gay and the sexually aggressive, masculine and defeminized lesbian. However, in practice heterosexual individuals show a much wider range of astereotypical sexual behaviours and, as we have already seen, heterosexuality need not be 'pure' but can coexist within an individual with wider sexual interests such as sadomasochism, paraphilias and bisexuality. Moreover, although some gay men and lesbians may have insecure gender identities as men and women and may indeed conform to effeminate and butch stereotypes, respectively, many others, especially those who are confident of their homosexuality (are 'out'), do not. There are many gay men who are both homosexual and masculine, and lesbians who are both homosexual and feminine. Insecurity of gender identity for homosexuals is,

of course, a likely outcome in a society in which sexual and gender stereotypes are conflated and variation from accepted gender and sexual stereotypes is stigmatized. In other societies, in which this conflation of gender and sexuality does not occur, there appears little problem in masculine men and feminine women expressing homosexual emotions and behaviour. In this regard, the transgendered are again instructive. Both male-to-female and female-to-male transgendered individuals may find men, women or both sexually arousing. Thus, a transgendered individual of the male sex with a feminine gender identity may find men sexually attractive, in which case he is homosexual before surgery and hormone treatment and she is heterosexual afterwards. Trans people emphasize the importance of uncoupling sexuality from gender conceptually, even if in Judaeo-Christian and Islamic cultures they have been conflated socially.

The conflation of sexuality and gender further complicates study of the possible social learning of sexuality. A number of retrospective studies suggest that gays and lesbians recall having more ambiguous gender experiences in childhood than do self-defining heterosexual men and women. For example, gay men recalled playing with girls and girls' toys and games, and lesbians recalled being tomboyish. However, retrospective studies suffer from the dangers of selective recall and denial, which, as we saw earlier, is a dangerous possibility in an area as sensitive as this. Prospective studies of children referred to clinicians precisely because they were displaying gender-atypical play patterns have shown that as adults these individuals manifest a higher incidence of homosexuality than control children. It is difficult to know how to interpret these findings, especially as they are based on children so seriously different (or perceived to be so) as to be referred to a gender clinic. Precisely because society, parents and children themselves associate gender and sexual stereotypes, they are more likely to develop in tandem: there is after all the basis of a socially learned element to each. The results do not mean that they *must* develop in tandem or that having one identity *causes* a person to have the other (in either direction).

Summary

We do not understand how people acquire a sexual identity. Indeed, our understanding of the complex nature of sexual identity is incomplete. Our systems for classifying sexuality are at best approximate and still based largely on a historical view of all sexual deviation from a narrowly defined heterosexuality as being pathological and socially undesirable. This is not a helpful starting point for looking at the natural expression of sexuality. There undoubtedly are influences of genes, hormones, brain structure and social learning on how our sexualities develop, but there is

little evidence that any one of these actually causes each of us to have a particular sexual identity. The fact that different societies construct different systems of sexual stereotypes and that these become absorbed (internalized) through social learning into each individual's sexual identity implies that social learning must play a large part in the construction of sexuality, perhaps building on or interacting with the various influences of genes and hormones to affect brain function and structure.

It is perhaps not surprising that the relatively simple rules governing the development of sex differences in the behaviour of rodents cannot easily be applied to primates and humans. The finding in animals that exposure to androgens during a critical period of early life both alters the structure of the brain and affects patterns of sex-dependent and sexual behaviour in adulthood, does not find a simple counterpart in monkeys or humans. In both the latter species, behavioural evidence of the effects of exposure of the fetal female brain to androgens is present in the form of sexually dimorphic childhood behaviour, but affected individuals can display apparently typical patterns of feminine gender identity and heterosexual behaviour as adults. Sex assignment at birth and the subsequent gender-specific patterns of social behaviours and interactions that flow from gender and sexual stereotypes seem to play a major role in shaping behavioural dimorphism, gender identity and sexual identity.

In these first two chapters, we have examined both the foundations of sexual reproduction in mammals and the many and wide-ranging aspects of the social life of mammals that flow from them. In subsequent chapters, we will look at the physiological processes regulating fertility and sexual behaviour that result in conception, pregnancy, parturition, lactation and maternal care.

FURTHER READING

General reading

- Golombok S, Fivush R (1994) *Gender Development*. Cambridge University Press, Cambridge (an excellent account of gender development, despite its age).
- Hinde R (1996) Gender differences in close relationships. In: *Social Interaction and Personal Relationships* (ed. D. Miell & R. Dallos), pp. 324–335. Sage, London (an account of gender relationship patterns by an eminent behavioural scientist).
- Hines M (2004) *Brain Gender*. Oxford University Press, Oxford (a measured account of the behavioural and neuroanatomical studies on sex and gender).

More advanced reading (see also Boxes)

- Bancroft J (1989) *Human Sexuality and its Problems*. Churchill Livingstone, London (despite its age, a rich repository in which to dip).

KEY LEARNING POINTS

- Gender is a system of classification based on sex.
- A gender stereotype is a set of social beliefs about what it means to be a man or a woman. It may include appearance, behaviour, role (social, sexual and employment) and emotional and attitudinal attributes. It provides a shorthand for classifying people socially by sex.
- A gender identity is an inner state of awareness of one's own identity as a man or a woman in society. It is usually congruent with one's sex. Trans people have a gender identity that is not congruent with their sex.
- Although gender is a bipolar system based on two distinct sexes, when gender differences are measured in populations of men and women they are not found to be bipolar. Indeed, most attributes show large overlap between genders and none are reliably predictive of gender.
- In non-primate animals, hormones condition sex differences in both brain structure and behaviour. However, the behavioural differences are not absolute but quantitative.
- In higher primates and humans, there is evidence of differences in brain structure between both the sexes and the genders but these differences are not large and their cause is unknown. Likewise it is not clear whether the differences have any direct effect on behaviour.
- The hormonal environment of higher primate and human fetuses and neonates has some effects on behaviour in infancy, some of which may persist into adult life. It is not known how these endocrine effects are exerted. It is not clear whether they are exerted directly on the brain, indirectly via effects on, for example, genital anatomy, or by a combination of both routes. The effects are not absolute but quantitative.
- In humans, the newborn baby is treated differently from the moment of its birth according to its perceived gender.
- In humans, the behaviour of a baby is interpreted to mean different things depending on its perceived gender.
- Babies of different sexes seem to show different behaviours quite early in neonatal life, but it is not clear whether the origin of these differences is endocrine, genetic, socially learnt or a mixture of all three.
- Human infants establish a gender identity by 3 years of age and start to develop a gender stereotype shortly thereafter. They develop a sense of gender constancy by 5 years of age. They then develop the expression of their gender identity by copying the sex-stereotyped behaviour that they observe around them.
- Gender stereotypes in most societies include reproductive roles and share attributes relevant to these reproductive roles. However, gender stereotypes are not limited to reproduction and reflect the fact that in humans sexual activity is not exclusively or even primarily a reproductive activity. There appears to be a large element of social learning in the construction of gender stereotypes and identities, and this forms part of the cultural inheritance that is transmitted transgenerationally.
- Sexuality involves the erotic and may be classified by the stimulus of erotic arousal. This system of classification is unsatisfactorily rigid. Many people find a range of stimuli arousing and the range may change with time. Asexual people are not aroused erotically.
- A sexual stereotype is the constellation of attributes and behaviours associated with people whose erotic arousal is classified according to a particular type of stimulus.
- The sexual identity of a person describes their inner state of feeling as a sexual being.
- Genes, brain structure, hormones and social learning have all been implicated in the development of sexuality, but there is no clear evidence directly linking any one element causally to a particular sexual identity.
- In some societies, attributes of sexuality and gender have been conflated implying that heterosexual arousal and a strong sense of gender identity are linked.
- Anthropological and social studies, as well as studies on trans people, show that it is possible to separate out sexuality from gender identity.

Berenbaum SA, Bailey JM (2003) Effects on gender identity of prenatal androgens and genital appearance: evidence from girls with Congenital Adrenal Hyperplasia. *Journal of Clinical Endocrinology & Metabolism* **88**, 1102–1106 (studies on AGS girls/women that suggest no simple link between either androgen exposure or genital masculinization and the defeminization of identity).

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orientation, and HIV status. *Hormones and Behavior* **40**, 86–92 (a study that confirms a correlation between brain structure and sex, but not with sexuality).

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