
CULTURE ON THE GROUND

The World Perceived Through the Feet

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Abstract

Classical accounts of human evolution posit a progressive differentiation between the hands as instruments of rational intelligence and feet as integral to the mechanics of bipedal locomotion. Yet evolutionists were modelling pedestrian performance on the striding gait of boot-clad Europeans. The bias of head over heels in their accounts follows a long-standing tendency, in western thought and science, to elevate the plane of social and cultural life over the ground of nature. This tendency was already established among European elites in the practice of destination-oriented travel, the use of shoes and chairs, and the valorization of upright posture. It was further reinforced in urban societies through paving the streets. The groundlessness of metropolitan life remains embedded not only in western social structures but also in the disciplines of anthropology, psychology and biology. A more grounded approach to human movement, sensitive to embodied skills of footwork, opens up new terrain in the study of environmental perception, the history of technology, landscape formation and human anatomical evolution.

Key Words ◆ body techniques ◆ boots and shoes ◆ feet ◆ human evolution
◆ walking

Is it not truly extraordinary to realise that ever since men have walked, no-one has ever asked why they walk, how they walk, whether they walk, whether they might walk better, what they achieve by walking, whether they might not have the means to regulate, change or analyse their walk: questions that bear on all the systems of philosophy, psychology and politics with which the world is preoccupied?

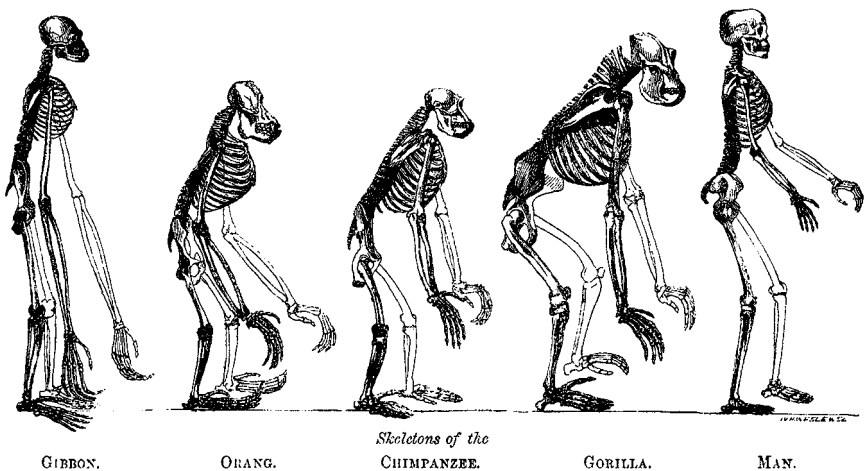
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INTRODUCTION: ON THE RISE OF HEAD OVER HEELS

In the course of human evolution, three developments took place that have made us creatures of a kind recognizably distinct from even our closest cousins among non-human primates, the great apes. The first was the enormous enlargement of the brain, especially the frontal regions. Compared with other mammals, the human brain is pretty large; compared with what would be expected for mammals of our size, it is massive. The second was the remodelling of the hand, and above all the development of that special ability we have of being able to bring the tip of the thumb into contact with the tips of any of our other fingers – an ability that allows us to carry out manual operations with a versatility and dexterity unequalled in the animal kingdom. The third consisted of a suite of anatomical changes – the rebalancing of the head upon the neck, the characteristic S-shaped curvature of the back, the broadening of the pelvis and the straightening of the legs – that underlie our ability to stand upright and to walk on two feet. In the second of his three essays on *Man's Place in Nature*, published in 1863, T.H. Huxley illustrated these changes through a comparison of the skeletons of the gibbon, the orangutan, the chimpanzee, the gorilla and the human being (Figure 1). There is an engaging liveliness about this depiction: the human skeleton seems to be lightly stepping towards you, and preparing to shake you by the hand. Nevertheless the picture has been deliberately constructed to

FIGURE 1 Skeletons of the gibbon, orang-utan, chimpanzee, gorilla and man, drawn from specimens in the Museum of the Royal College of Surgeons.

Reproduced from Huxley (1894: 76)



tell a story, one that has entered the textbooks and been retold on countless occasions ever since. It is the story of how man's eventual achievement of upright posture laid the foundations for his pre-eminence in the animal kingdom, and for the growth of culture and civilization. In the picture, man marches confidently into the future, head high, body erect, while the stooping apes trundle along obediently behind (Huxley, 1894: 76).

But if it was by standing up straight that our ancestors embarked upon the road to civilization, it was not – according to this story – their feet that brought them there. It was their hands. In *The Descent of Man*, Charles Darwin drew particular attention to what he called the 'physiological division of labour' by which the feet and hands came to be perfected for different but complementary functions, of support and locomotion on the one hand, and of grasping and manipulation on the other. In apes this division was but imperfectly established, for while the feet, blessed with toes far more dextrous than ours, retained considerable powers of prehension, the hands continued to play a significant supportive role. By contrast the human foot, with its relatively immobile big toe, has all but lost its original prehensile function, becoming little more than a pedestal for the rest of the body, while all the important work of holding, feeling and gesturing is delegated to the hands. It must have been of great advantage to man, Darwin reasoned, 'to stand firmly on his feet', since this would have left the hands and arms free for the essential arts of subsistence and survival (Darwin, 1874: 77). Above all, bipedal posture liberated the hands for the use and manufacture of tools. And it was the selective advantages conferred by tools, according to Darwin, that ultimately set up the conditions for the enlargement of the brain. The argument ran that the 'most sagacious' of individuals, having bigger and better brains, could design the most ingenious tools and use them to greatest effect. This, in turn, would confer a reproductive benefit, ensuring that intelligence-enhancing variations, more abundantly preserved in future generations, would be ratcheted up in the course of natural selection. Every incremental increase would lead to yet further advance in the technical sphere, and so on through mutual reinforcement (Darwin, 1874: 196–7).

Darwin's account, it must be said, did little more than embellish an old story with a newly conceived mechanism – that of natural selection – to drive it along. The idea that bipedal locomotion liberates the hands, and furthermore that the free hand endows human beings with an intellectual superiority over all other creatures, can be traced back to classical Antiquity. It is to be found in the writings of Xenophon, Aristotle, Vitruvius and Gregory of Nyssa, and was already commonplace among naturalists of the 18th and early 19th centuries (Stoczkowski, 2002: 87–8). Somewhat controversially, however, Darwin

insisted that human superiority was not of kind but only of degree. The rudiments of intelligence, he claimed, can be found in the lowliest of animals, such as the humble earthworm (Reed, 1982), while even the most civilized of men have not altogether escaped the determinations of instinct. As creatures advance along the scale of nature, the proportion of rational intelligence to natural instinct very gradually increases, but only with the emergence of humanity does the balance tip decisively towards the former (Darwin, 1874: 98ff.). For Darwin, then, the descent of man *in* nature was also an ascent *out* of it, in so far as it progressively released the powers of intellect from their bodily bearings in the material world. Human evolution was portrayed as the rise, and eventual triumph, of head over heels.

This immediately enables us to make sense of Darwin's remarks concerning the relative significance of the hands and the feet. Unlike the quadruped, with four feet planted solidly in the ground of nature, the biped is held down only by two, while the arms and hands, released from their previous functions of support and locomotion, become answerable to the call of reason. Marching head over heels – half in nature, half out – the human biped figures as a constitutionally divided creature. The dividing line, roughly level with the waist, separates the upper and lower parts of the body. Whereas the feet, impelled by biomechanical necessity, undergird and propel the body *within* the natural world, the hands are free to deliver the intelligent designs or conceptions of the mind *upon* it: for the former, nature is the medium through which the body moves; to the latter it presents itself as a surface to be transformed. And in this potential for transformation, inherent in the coupling of hands and brain, lie the conditions for man's mastery and control over his material environment. 'Man could not have attained his present dominant position in the world without the use of his hands', says Darwin, 'which are so admirably adapted to act in obedience to his will'. He goes on to cite with approval the words of Sir Charles Bell, Professor of Surgery at the University of Edinburgh, from his Bridgewater Treatise of 1833. 'The hand supplies all instruments, and by its correspondence with the intellect gives [man] universal dominion' (Darwin, 1874: 76–7).

BOOTS AND SHOES

I shall return to Sir Charles in another connection, but at this point I want to pick up another strand in Darwin's discussion of the division of labour between hands and feet. Presented in an offhand manner, almost as an afterthought, it is of major significance for my argument. Having remarked upon the specialization of the foot for support and locomotion, and the corresponding loss of its original grasping function, Darwin notes that 'with some savages . . . the foot has not altogether lost its

prehensile power, as shown by their manner of climbing trees, and of using them in other ways' (Darwin, 1874: 77). He does not take the point further; indeed it must have seemed to him more or less self-evident. As the savage was regarded as anatomically intermediate between the ape and the civilized human, it would stand to reason that his feet would retain some vestiges of the ape-like form. T.H. Huxley, however, has rather more to say on the matter. He too observes that primitive people seem able to do things with their feet – his examples are rowing a boat, weaving cloth, and even stealing fishhooks – that might strike us civilized folk as pretty extraordinary. But rather than being a function of their innate anatomical endowment, might this not have more to do with their habit of going barefoot? 'It must not be forgotten', Huxley warns us, 'that the civilized great toe, confined and cramped from childhood upwards, is seen to a great disadvantage, and that in uncivilized and barefooted people it retains a great amount of mobility, and even some sort of opposability' (Huxley, 1894: 119). Paradoxically, it seems that with the onward march of civilization, the foot has been progressively *withdrawn* from the sphere of operation of the intellect, that it has regressed to the status of a merely mechanical apparatus, and moreover that this development is a consequence – not a cause – of technical advance in footwear. Boots and shoes, products of the ever more versatile human hand, imprison the foot, constricting its freedom of movement and blunting its sense of touch.

Edward Tylor, in his *Anthropology* of 1881, takes these observations one step further. In order to make the now familiar point that the differentiation between the hand and foot is so much greater for the human than it is for the ape, he presents us with a picture in which the hand and foot of the chimpanzee, and of man, are placed side by side (Figure 2). But he hastens to add that the drawing of the human foot 'is purposely taken, not from the free foot of the savage, but from the European foot cramped by the stiff leather boot, because this shows in the utmost way the contrast between ape and man' (Tylor, 1881: 43). The qualification is remarkable, since it amounts to an admission that the ideal-type human being, the gold standard against which similarities and differences between humans and apes are to be gauged, is one that has to a significant degree been forced into shape through the artificial application of a restrictive technology. Like Huxley, Tylor is able to come up with examples, albeit anecdotal, of the dexterity of the barefoot savage. 'With the naked foot, the savage Australian picks up his spear, and the Hindu tailor holds his cloth as he squats sewing'.² The boot-wearing European, Tylor admits, is helpless by comparison. His foot, the one illustrated in the picture, is nothing more than a 'stepping-machine'. Like Darwin before him, and of course Sir Charles Bell, Tylor was convinced that man's intellectual development was gained by the use not of his feet, but

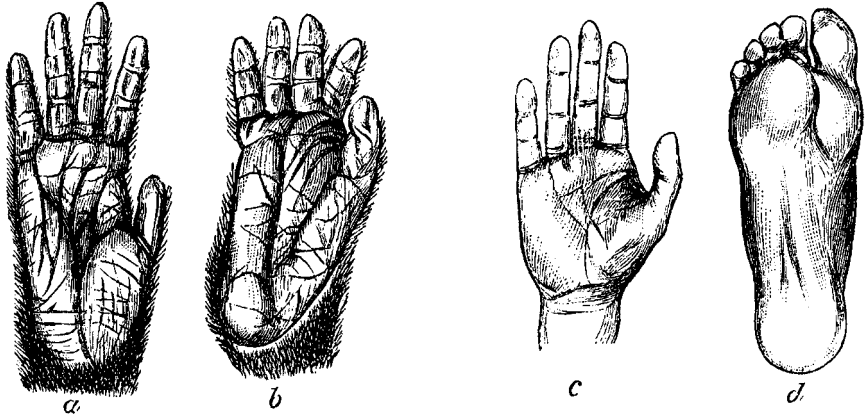


FIGURE 2 Hand (a) and foot (b) of chimpanzee; hand (c) and foot (d) of man.
Reproduced from Tylor (1881: 42)

of his hands. 'From handling objects, putting them in different positions, and setting them side by side, he was led to those simplest kinds of comparing and measuring which are the first elements of exact knowledge, or science' (Tylor, 1881: 43-4). Thanks to his hands and his heavy boots the civilized man, it seems, is every inch a scientist on top, but a machine down below.

The effects of the boot on the anatomy and function of the foot were already well recognized by the time that Darwin, Huxley and Tylor were writing. In 1839 a paper was read before the Society of Arts for Scotland entitled 'Observations on Boots and Shoes, with reference to the Structure and Action of the Human Foot'. The author, a certain James Dowie, presented himself to the Society as the inventor, patentee and manufacturer of boots and shoes with elastic soles.³ Explaining the advantages of his invention, Dowie drew attention to some remarks of Sir Charles Bell, the Edinburgh surgeon to whom I have already referred, in which he compares the Irish agricultural labourer, travelling to harvest barefoot, and the English peasant whose foot and ankle are tightly laced in a shoe with a wooden sole. Look at the way the Englishman lifts his legs, observed Bell, and you will perceive 'that the play of the ankle, foot, and toes, is lost, as much as if he went on stilts, and therefore are his legs small and shapeless' (cited in Dowie, 1839: 406). Indeed, Bell was much in favour of James Dowie's patent elastic boots and shoes, going so far as to provide a public testimonial in which he not only affirmed the correctness of Dowie's understanding of the anatomical details, but also declared himself a highly satisfied user. 'I have worn your shoes with pliant soles', he wrote, 'and . . . find them pleasant and easy to the foot'. Yet for all that, the well-heeled of the western world have

continued to strut about, in Bell's graphic phrase, 'as if on stilts', often to their considerable discomfort. To the affluent, the constriction of the feet remains as sure a mark of civilization as the freedom of the hands. Is the conventional division of labour between hands and feet, then, as 'natural' as Darwin and his contemporaries made it out to be? Could it not be, at least in some measure, a result of the mapping, onto the human body, of a peculiarly modern discourse about the triumph of intelligence over instinct, and about the human domination of nature? And could not the technology of footwear be understood, again in some measure, as an effort to convert the imagined superiority of hands over feet, corresponding respectively to intelligence and instinct, or to reason and nature, into an experienced reality?

LEAVING THE GROUND

In what follows I shall argue that the mechanization of footwork was part and parcel of a wider suite of changes that accompanied the onset of modernity – in modalities of travel and transport, in the education of posture and gesture, in the evaluation of the senses, and in the architecture of the built environment – all of which conspired to lend practical and experiential weight to an imagined separation between the activities of a mind at rest and a body in transit, between cognition and locomotion, and between the space of social and cultural life and the ground upon which that life is materially enacted. I begin with travel. What is of interest here is the way in which, in Britain and Europe from around the 18th century onwards, the business of travel came to be distinguished from the activity of walking. For most people in the British Isles, before the days of paved roads and public transport, the only way to get about was on foot. Walking was a mundane, everyday activity, taking them to work, market and church, but rarely over any great distance. Walkers did not travel. But by the same token, as Anne Wallace (1993) has shown in her fine study of the place of walking in English literature, travellers did not walk. Or rather, they walked as little as possible, preferring the horse or carriage even though neither was much faster, in those days, or any more comfortable (Jarvis, 1997: 20–2). Travel was an activity of the well-to-do, who could afford such things. They considered walking to be tedious and commonplace, a view that lingers in the residual connotations of the word 'pedestrian'.⁴ If they *had* to walk, they would do their best to blot the experience from their memories, and to erase it from their accounts.

The affluent did not undertake to travel for its own sake, however, or for the experience it might afford. Indeed the actual process of travel, especially on foot, was considered a drudge – literally a *travail* – that had to be endured for the sole purpose of reaching a destination (Wallace,

1993: 39). What mattered was the knowledge to be gained on arriving there. Thus Samuel Johnson, in the account of his journey with James Boswell to the Western Isles of Scotland, recommended travel as the only way to test the conceptions we may have of places and landscapes against objective realities, and promptly went on to describe the view from a resting place in a beautiful mountain valley where he first had the idea of writing his narrative (Johnson and Boswell, 1924: 35). His interest lay in the scene around him at that spot, not in how he came to it, about which he had virtually nothing to say. For men like Johnson, a trip or tour would consist of a series of such destinations. Were the experience of place-to-place movement to intrude overmuch into conscious awareness, they warned, observations could be biased, memories distorted, and above all, we might be distracted from noticing salient features of the landscape around us. Thus on a visit to the island of Ulinish, Johnson complains that his appreciation of a natural arch in the rock would have been greater 'had not the stones, which incumbered our feet, given us leisure to consider it' (Johnson and Boswell, 1924: 67). Only when the mind is set at rest, no longer jolted and jarred by the physical displacements of its bodily housing, can it operate properly. As long as it is in between one point of observation and another, it is effectively disabled.

So it was that the elites of Europe – at least from the 18th century – came to conduct and write about their travels as if they had no legs. Skimming across the surface of the country, they would alight, here and there, to admire the view. The embodied experience of pedestrian movement was, as it were, pushed into the wings (de Certeau, 1984: 121), in order to make way for a more detached and speculative contemplation. Walking was for the poor, the criminal, the young, and above all, the ignorant (Jarvis, 1997: 23). Only in the 19th century, following the example set by Wordsworth and Coleridge, did people of leisure take to walking as an end in itself, beyond the confines of the landscaped garden or gallery. For them pedestrian travel became, in the words of Rebecca Solnit, 'an expansion of the garden stroll' (Solnit, 2001: 93). Yet the rise of the practice and theory of walking as an inherently virtuous and rewarding activity, despite presenting an apparent challenge to earlier ideas of destination-oriented travel, actually depended on material improvements in transport that greatly increased the volume of such travel, and extended its range and possibility (Wallace, 1993: 65–6). For one thing, as public transport came to be affordable to ordinary working people, walking figured as a matter of choice rather than necessity, and the stigma of poverty formerly attached to its practitioners faded away (Urry, 2000: 51). And for another thing, transport could take people to the places – the scenery – within and around which they wanted to walk. Thus the entire landscape became the destination at

which one had arrived from the very moment of setting out on foot (Solnit, 2001: 93).

If you could choose to walk, however, as well as select for yourself the places where your stroll or hike would begin or end, then the alternative must always have been available of sitting down, whether your seat be immobile or attached to a moving vehicle. Thus the most enthusiastic of peripatetics, even while extolling the physical and intellectual benefits of walking, did so from the comfortable vantage point of a society thoroughly accustomed to the chair. In the history of the western world chairs made their first appearance as seats of high authority and did not come into widespread use, even in the most wealthy houses, until around the 16th century. The 'sitting society' to which we are so accustomed today is largely a phenomenon of the last 200 years (Tenner, 2003: 105). It is probably no accident, nevertheless, that the civilization that gave us the leather boot has also come up with the upholstered chair. Of course, human beings do not *need* to sit on chairs, any more than they need to clad their feet in boots and shoes. As the designer Ralph Caplan wryly remarks, 'a chair is the first thing you need when you don't really need anything, and is therefore a peculiarly compelling symbol of civilization' (Caplan, 1978: 18). Nothing however better illustrates the value placed upon a sedentary perception of the world, mediated by the allegedly superior senses of vision and hearing, and unimpeded by any haptic or kinaesthetic sensation through the feet. Where the boot, in reducing the activity of walking to the activity of a stepping-machine, deprives wearers of the possibility of thinking with their feet, the chair enables sitters to think without involving the feet at all. Between them, the boot and the chair establish a technological foundation for the separation of thought from action and of mind from body – that is for the fundamental *groundlessness* so characteristic of modern metropolitan dwelling (Lewis, 2001: 68). It is as though, for inhabitants of the metropolis, the world of their thoughts, their dreams and their relations with others floats like a mirage above the road they tread in their actual material life. A famous anthropological statement to this effect comes from Clifford Geertz. 'Man', he has declared, 'is an animal suspended in webs of significance he himself has spun.' I think we should perhaps amend this statement, to say that only booted and seated man, artificially insulated – whether in movement or at rest – from direct contact with the ground, would consider himself so suspended (Geertz, 1973: 5; see Ingold, 1997: 238).

In most non-western societies the usual position of rest to adopt, while awake, is the squat. 'You can distinguish squatting mankind and sitting mankind', wrote Marcel Mauss in his essay on body techniques (Mauss, 1979: 113–14). My guess is that squatters still considerably outnumber sitters, despite the export of chairs around the globe.

However for those of us brought up to sit on chairs, to have to squat for any length of time is acutely uncomfortable. It seems that the chair has blocked the development of the normal capacity of the human being to squat, just as the boot has blocked the development of the prehensile functions of the foot. Only with much practice and training can these blockages be overcome. Yet in western society, where uprightness or 'standing' is a measure of rank and moral rectitude, the squatting position is reserved for those on the very lowest rung of the social ladder – for outcasts, beggars and supplicants. Armed with a battery of devices from high-chairs to baby walkers, western parents devote much effort to getting their infants to sit and stand as soon as is physically possible, and worry about any delay in their development.⁵ Older children are urged to stand up straight, and to 'walk from the hips' with minimal bending at the knees. To succeed in this, they must be fitted with appropriate footwear. Indeed one of the most essential bodily skills that every child has to master before being able to make his or her way in a boot-clad society such as our own, is the art of tying shoelaces. With loose shoelaces, the walker can only prevent his shoes from falling off by adopting a shuffling gait that is widely regarded as a mark of impotence, infirmity or decrepitude. He is, moreover, at constant risk of tripping up. I was struck by a recent radio interview with one of ex-president Slobodan Milosevic's erstwhile friends and supporters, who was describing his circumstances in a Belgrade gaol. Of all the indignities he had to suffer, the interviewee said, the worst was that he had to go around in boots *without laces*.

The historian Jan Bremmer has traced the western ideals of upright posture, and a gait with long measured strides and straight legs, to the culture of ancient Greece, passed on to early modern Europe by way of the works of Cicero, Saint Ambrose and Erasmus. The origin of the Greek gait, Bremmer suggests, lies in an earlier age when every man had to carry arms, and be ready to fight to protect both reputation and possessions (Bremmer, 1992: 16–23, 27). In this respect the positioning of the hands is particularly significant. Not only should they be ready for use, held slightly in advance of the trunk (an injunction that translates into contemporary disapproval of standing with one's hands in one's pockets), they should also be downturned. For a man with upturned hands would be one without weapons – one who had, by that token, symbolically abdicated his manhood, presenting himself in an effeminate pose. In addition the free man should keep his head erect, as Bremmer puts it, with 'the eyes openly, steadfastly, and firmly fixed on the world' (1992: 23). Now if we return to T.H. Huxley's comparative depiction of man and the great apes, with which I began (Figure 1), we find that the man is precisely in the recommended posture of ancient Greece. He is upright, proceeding forward with a measured gait. He is

looking directly ahead, not downwards, and sure enough, the palms of his hands are downturned. Indeed, a man he most certainly is. For had the figure been of a woman, following the same conventions, the head and eyes would be downcast, the palms turned upwards, and the step smaller and more nimble.

The Japanese anthropologist Junzo Kawada (1996) has drawn a fascinating comparison between expected European (or more particularly, French) ways of walking and carrying things, and those customary in Japan - roughly from the 12th to the mid-20th century. Whereas the European, as I have already observed, walks from the hips while keeping the legs as straight as possible, Japanese people traditionally walked from the knees while minimizing movement at the hips. The result is a kind of shuffle, not unlike that of a man who has lost his shoelaces, which to European eyes looks most ungainly. Walking from the knees, however, is very effective on rough or hilly terrain, since with the lowered centre of gravity the risk of tripping and falling is much reduced. It is also ergonomically consistent with the technique, once widely used in Japan, of carrying heavy loads suspended from a long, supple pole resting athwart the shoulder. Kawada is able to relate the postural difference in walking, respectively from the hips and from the knees, not only to alternative methods and devices for load-carrying, but also to traditional dance styles, artisanal techniques and practices of child rearing. European dancers aspire to verticality, using their feet like stilts, a posture taken to its most stylized extreme in classical ballet where the female dancer balances on the tips of her toes, arms stretched heavenwards, while her male partner, with his leaps and bounds, temporarily loses contact with the ground altogether. Japanese dancers, by contrast, through flexible movement of the knees, glide their feet across the smooth floor without ever lifting their heels. Again, whereas European artisans (with the singular exception of the tailor) work either standing or seated on a firm, raised support, their Japanese counterparts typically work from a squatting position, which confers no loss of status. Finally, Japanese parents are glad to see their children crawling everywhere on all fours, displaying none of the anxiety of Europeans who regard crawling as a stage to be superseded as quickly as possible, through rigorous discipline and the use of artificial aids. All in all, Japanese posture and gesture seem to be strongly and positively oriented towards the ground, in striking contrast to European efforts to rise above it. Indeed for Japanese people the achievement of bipedalism carries none of the significance that it does in the West, as raising human beings above the limitations of nature and establishing the conditions for their control over it.⁶ For the Japanese do not, as a rule, oppose the conditions of animality and humanity as we do, nor do they consider the quadruped as necessarily a being inferior to man.

WALKING THE STREETS

The western proclivity to walk as if on stilts has of course been taken to its most absurd extreme in the military drill. This evoked some wry observations from Marcel Mauss, under the heading of 'walking':

We laugh at the 'goose-step'. It is the way the German army can obtain maximum extension of the leg, given in particular that all Northerners, high on their legs, like to take as long steps as possible. In the absence of these exercises, we Frenchmen remain more or less knock-kneed. (Mauss, 1979: 114-15)

Why do we laugh at the goose-stepping German soldier? Surely it is because his movements are so oddly mechanical. No one naturally walks like that; indeed if they did, they would forever be tripping over things. The goose step is only possible on the artificially monotonous surface of the parade-ground.⁷ Nevertheless by public works, most metropolitan societies have transformed their urban spaces into something approximating the parade-ground, by paving the streets. In so doing, they have literally paved the way for the boot-clad pedestrian to exercise his feet as a stepping machine. No longer did he have to pick his way, with care and dexterity, along pot-marked, cobbled or rutted thoroughfares, littered with the accumulated filth and excrement of the countless households and trades whose business lay along them. Dirt is the stuff of tactile (and of course, olfactory) sensation. It could trip you up, or soil your boots. But as the geographer Miles Ogborn has shown in his study of the paving of the streets of Westminster in the City of London, during the mid-18th century, the construction of pavements offered pedestrians a street surface that was smooth and uniform, regularly cleaned, free from clutter and properly lit. Above all, the streets were made open and straight, creating a fitting environment for what was considered the proper exercise of the higher faculty of vision – to see and be seen (Ogborn, 1998: 91–104).

John Gay's satirical poem *Trivia: or, the Art of Walking the Streets of London*, dating from 1716, presents a marvellous account of the pedestrian experience of those days, when the pavers were hard at work. Sensibly, Gay begins with some advice on footwear: 'Let firm, well-hammer'd Soles protect thy Feet' (Gay, 1974: 136). And he recognizes, too, that if we are to walk without tripping, soiling our clothes, or becoming drenched in water from overhead gutters, we need to mobilize all our senses – of smell and touch as well as vision – especially when out after dark.

Has not wise Nature strung the Legs and Feet
With firmest Nerves, design'd to walk the Street?
Has she not given us Hands, to groap aright,

Amidst the frequent Dangers of the Night?
 And thinks't thou not the double Nostril meant,
 To warn from oily Woes by previous Scent? (Gay, 1974: 167)

Nevertheless, vision remains paramount. A way of walking is recommended which, while preserving the independence and autonomy of the individual, maintains a constant visual vigilance – not of the ground surface but of *other people*.

Still fix thy Eyes intent upon the Throng
 And as the Passes open, wind along. (Gay, 1974: 160)

This vigilance extends, moreover, to the observance of a certain etiquette. One should make way for ladies, the old and infirm, the blind and lame, and the heavily loaded porter. It is also wise to give a wide berth to those who are liable to cover you with dust, from the toff with his fancy wig to the miller with his bags of flour.

You'll sometimes meet a Fop, of nicest Tread,
 Whose mantling Peruke veils his empty Head . . .
 Him, like the *Miller*, pass with Caution by,
 Lest from his Shoulder Clouds of Powder fly. (Gay, 1974: 145)

In nearly 300 years, not much has changed, except that the 'throng' is more intense, you are more likely to find gangs of workmen digging up the streets than laying pavements, and the greatest threat to those who do not, as Gay puts it, 'maintain the Wall', comes from being driven over by an automobile rather than a horse and carriage.

Some of the most acute observations on walking the streets in a contemporary city come from the sociological writings of Erving Goffman. Indeed he begins his classic study, *Relations in Public*, with a detailed account of how the individual pedestrian, conceived as a pilot encased in the soft shell of his clothes and skin, succeeds in getting around without falling over or bumping into other people (Goffman, 1971: 6–7). What is so striking about Goffman's account is that he describes walking, almost exclusively, as a *visual* activity. The pilot is supposed to use his eyes to guide his body about. He does this through a process that Goffman calls 'scanning'. Every individual continually scans or checks out an area that takes the form of an elongated oval, narrow at either side and longest in front. As other people approach, he checks their direction while they are still three or four pavement squares away, making any necessary adjustment in his own path at this stage. They can then be allowed to come nearer without further cause for concern, since any interference at such close range would require them to make a very abrupt turn. In order to maintain his scanning area, the individual may have to angle his head so that his visual field is not blocked by the pedestrian in front. But he also keeps an eye on the faces

of those coming towards him which, rather like a rear-view mirror, reveal in their expressions possible sources of interest and danger that have already passed behind his sight-line (Goffman, 1971: 11-12). Finally, if the street is so crowded that normal scanning becomes virtually impossible, the individual has resort to a special manoeuvre that Goffman (following an earlier study by Michael Wolff) calls the step-and-slide - 'a slight angling of the body, a turning of the shoulder and an almost imperceptible sidestep' (Goffman, 1971: 14). It is, as Goffman notes, thanks to their ability to 'twist, duck, bend and turn sharply' that pedestrians are generally able to extricate themselves at the very last moment from impending impact (1971: 8). This advantage is not shared by the motorist nor, in the past, by the horse-rider.⁸

What Goffman shows us, through his study, is that walking down a city street is an intrinsically social activity. Its sociality does not hover above the practice itself, in some ethereal realm of ideas and discourse, but is rather immanent in the way a person's movements - his or her step, gait, direction and pace - are continually responsive to the movements of others in the immediate environment. Yet Goffman's walkers, each a 'vehicular unit' comprising the visually guided pilot within a soft bodily shell, still seem somehow detached from the solid ground beneath their feet. They could almost be floating in thin air. Admittedly Goffman does recognize - albeit in passing - that besides scanning for other people, the individual also scans the flooring immediately before him, in order to avoid small obstructions or dirt. Thus 'within the oval scanned for oncomers . . . is a smaller region that is also kept under eye' (1971: 16). There is some evidence that the intensity of the downward scan varies by age and gender, in a way that fully accords with established cultural conventions. Michael Hill, in a recent review of studies of pedestrian behaviour, reports on a psychological experiment that purported to show that women look down when they walk, more than men. But whether this was because they were walking more slowly and had more time to look, or because they were conforming to rules of female modesty, or because they were wearing dangerously impractical high-heeled shoes, the experimenters could not say (Hill, 1984: 9-10). When it comes to children, Michael Wolff notes that city parents are inclined to treat under-sevens as 'baggage', dragged along by the hand rather like a suitcase on wheels. Often the children neither look nor even know where they are going, nor are they looked at by those coming in the opposite direction. Oncoming pedestrians, it appeared, 'would "sight" the adult and negotiate the right-of-way with him', while ignoring and being ignored by the child whose eyes, besides being at a lower level, would be resolutely downcast (Wolff, 1973: 45). The child's-eye view of this has of course been immortalized in the lines of A.A. Milne:

Whenever I walk in a London street,
I'm ever so careful to watch my feet.⁹

The message of these lines is that before a child can begin to negotiate a right-of-way for himself, in horizontal eye-to-eye contact with others, he has to acquire a complex set of social skills: 'It's ever so portant how you walk'.

Nowadays, of course, the steadfastly forward-looking urban male is more likely to go by car, the female rather less so. By far the greatest number of journeys by foot are made by children under the age of 15 (Hillman and Whalley, 1979: 34). They are the real walkers of our society. But my point has been that the reduction of pedestrian experience that has perhaps reached its peak in the present era of the car, is the culmination of a trend that was already established with the boot's mechanization of the foot, the proliferation of the chair, and the advent of destination-oriented travel. I have but one further observation to make in this regard, which brings me back to the subject of paving. It is simply that boots impress no tracks on a paved surface. People, as they walk the streets, leave no trace of their movements, no record of their having passed by. It is as if they had never been. There is, then, the same detachment, of persons from the ground, that runs as I have shown like a leitmotif through the recent history of western societies. It appears that people, in their daily lives, merely skim the surface of a world that has been previously mapped out and constructed for them to occupy, rather than contributing through their movements to its ongoing formation. To inhabit the modern city is to dwell in an environment that is already built. But whereas the builder is a manual labourer, the dweller is a foot-slogger. And the environment, built by human hands, should ideally remain unscathed by the footwork of dwelling. To the extent that the feet *do* leave a mark – as when pedestrians take short cuts across the grass verges of roads, in cities designed for motorists – they are said to deface the environment, not to enhance it, much as a modern topographic map is said to be defaced by the itineraries of travel drawn upon it.¹⁰ This kind of thing is typically regarded by urban planners and municipal authorities as a threat to established order and a subversion of authority. Green spaces are for looking at, not for walking on; reserved for visual contemplation rather than for exploration on foot. The surfaces you can walk on are those that remain untouched and unmarked by your presence.

ENVIRONMENT, TECHNOLOGY, LANDSCAPE

The groundlessness of modern society, characterized by the reduction of pedestrian experience to the operation of a stepping machine, and by the

corresponding elevation of head over heels as the locus of creative intelligence, is not only deeply embedded in the structures of public life in western societies. It has also spilled over into mainstream thinking in the disciplines of anthropology, psychology and biology. I now turn to a brief review of three thematic areas in which this overspill has manifestly occurred. The first concerns the perception of the environment, the second the history of technology, and the third the formation of the landscape. For each of these areas I ask what the effect would be of overturning prevailing assumptions and of adopting, with the Japanese as described by Kawada, a fundamental orientation towards the ground. What new terrain would be opened up? Here I have more questions than answers, and my purpose in this section is less to state my conclusions than to set an agenda for future research. I shall return in the final section to the theme with which I began, of the evolution of human anatomy.

THE PERCEPTION OF THE ENVIRONMENT

It is almost a truism to say that we perceive not with the eyes, the ears or the surface of the skin, but with the whole body. Nevertheless, ever since Plato and Aristotle the western tradition has consistently ranked the senses of vision and hearing over the contact sense of touch. I shall not go into the relative standing of vision and hearing, since this is a lengthy and complex story in itself (Ingold, 2000: 243–87). But my first and most obvious point is that a more literally *grounded* approach to perception should help to restore touch to its proper place in the balance of the senses. For it is surely through our feet, in contact with the ground (albeit mediated by footwear), that we are most fundamentally and continually 'in touch' with our surroundings.¹¹ Of course matters are not quite that simple, for we touch with our hands as well as with our feet. By and large, however, studies of haptic perception have focused almost exclusively on manual touch. The challenge is to discover special properties of pedestrian touch that might distinguish it from the manual modality. Is it really the case for example, as intuition suggests, that what we feel with our hands, and through the soles of our feet, are necessarily related as figure and ground? In other words, is the ground we walk on also, and inevitably, a ground against which things 'stand out' as foci of attention, or can it be a focus in itself? What difference does it make that pedestrian touch carries the weight of the body rather than the weight of the object? And how does the feel of a surface differ, depending on whether the organ of touch is brought down at successive spots, as in walking, or allowed to wrap around or slide over it, as can be done with the fingers and palm of the hand? Further questions arise when we consider the involvement of the other senses in pedestrian experience.

From Goffman's studies, we can recognize the importance of vision to the walker. But let us not forget the experience of the blind. I wonder whether manual and pedestrian touch are differentiated by blind persons to the same extent or along the same lines as they are by the sighted. Finally, apropos hearing, we should recall the involvement of the ear in maintaining balance, essential for standing and walking, and that persons who are deaf report being able to hear through the feet, provided that they are standing on surfaces, such as floorboards, that conduct vibration.

The bias of head over heels influences the psychology of environmental perception in one other way. We have already seen how the practices of destination-oriented travel encouraged the belief that knowledge is built up not along paths of pedestrian movement but through the accumulation of observations taken from successive points of rest. Thus we tend to imagine that things are perceived from a stationary platform, as if we were sitting on a chair with our legs and feet out of action. To perceive a thing from different angles, it is supposed that we might turn it around in our hands, or perform an equivalent computational operation in our minds. But in real life, for the most part, we do not perceive things from a single vantage point, but rather by walking around them. As the founder of ecological psychology, James Gibson, argued in his classic work on visual perception, the forms of the objects we see are specified by transformations in the pattern of reflected light reaching our eyes as we move about in their vicinity. We perceive, in short, not from a fixed point but along what Gibson calls a 'path of observation', a continuous itinerary of movement (Gibson, 1979: 195–7). But if perception is thus a function of movement, then what we perceive must, at least in part, depend on how we move. Locomotion, not cognition, must be the starting point for the study of perceptual activity (Ingold, 2000: 166). Or more strictly, cognition should not be *set off* from locomotion, along the lines of a division between head and heels, since walking is itself a form of circumambulatory knowing. Once this is recognized, a whole new field of inquiry is opened up, concerning the ways in which our knowledge of the environment is altered by techniques of footwork and by the many and varied devices that we attach to the feet in order to enhance their effectiveness in specific tasks and conditions. Examples are almost too numerous to mention: think of skis, skates and snowshoes; running shoes and football boots;¹² stirrups and pedals; and of course the flippers of the underwater diver. Nor should we ignore hand-held or underarm devices that aid locomotion such as walking sticks, crutches, and the oars of the rowing boat.

THE HISTORY OF TECHNOLOGY

This brings me to my second theme. Nothing better exemplifies the assumed superiority of head and hands over feet, in human endeavour, than this wonderfully pithy statement from the *Grundrisse* of Karl Marx. Tools, he says, are 'organs of the human brain, created by the human hand; the power of knowledge, objectified' (Marx, 1973: 706). For Marx, history is the process in which human beings, through their labour, have progressively transformed the world of nature and, in so far as they also partake of this world, have also transformed themselves. Recall that in the classic, dualistic view to which Marx fully subscribed, humans are in nature from the waist down, while the hands and arms impress the mind's intelligent designs upon the surface of nature from above. The foot, from this point of view, is not so much empowered by human agency as a force of nature in itself which – as in numerous treadle-operated machines – may be harnessed to power the apparatus of manufacture. The hand makes the tool; the foot drives the machine. Men have made history with their hands; they have mastered nature and brought it under control. And the nature thus controlled includes the foot, increasingly regulated and disciplined in the course of history by the hand-made technology of boots and shoes.

Now to overturn the bias of head over heels is also to dispense with the dualism that underpins this argument. Rather than supposing that the hand operates *on* nature while the feet move *in* it, I would prefer to say that both hands and feet, augmented by tools, gloves and footwear, mediate a historical engagement of the human organism, in its entirety, with the world around it. For surely we walk, just as we talk, write and use tools, with the whole body. Moreover in walking, the foot – even the boot-clad foot of western civilization – does not really describe a mechanical oscillation like the tip of a pendulum. Thus its movements, continually and fluently responsive to an ongoing perceptual monitoring of the ground ahead, are never quite the same from one step to the next. Rhythmic rather than metronomic, what they beat out is not a metric of constant intervals but a pattern of lived time and space. It is in the very 'tuning' of movement in response to the ever-changing conditions of an unfolding task that the skill of walking, as that of any other bodily technique, ultimately resides (Ingold, 2000: 353). Indeed it could be said that walking is a highly intelligent activity. This intelligence, however, is not located exclusively in the head but is distributed throughout the entire field of relations comprised by the presence of the human being in the inhabited world.

THE FORMATION OF THE LANDSCAPE

What I have to say regarding my third theme follows from this. In conventional accounts of the historical transformation of nature, the landscape tends to be regarded as a material surface that has been sequentially shaped and reshaped, over time, through the imprint of one scheme of mental representations after another, each reshaping covering over or obliterating the one before. The landscape surface is thus supposed to present itself as a palimpsest for the inscription of cultural form. My argument suggests, on the contrary, that the forms of the landscape – like the identities and capacities of its human inhabitants – are not imposed upon a material substrate but rather emerge as condensations or crystallizations of activity within a relational field. As people, in the course of their everyday lives, make their way by foot around a familiar terrain, so its paths, textures and contours, variable through the seasons, are incorporated into their own embodied capacities of movement, awareness and response – or into what Gaston Bachelard (1964: 11) calls their ‘muscular consciousness’. But conversely, these pedestrian movements thread a tangled network of personalized trails through the landscape itself. Through walking, in short, landscapes are woven into life, and lives are woven into the landscape, in a process that is continuous and never-ending (Tilley, 1994: 29–30).

This idea may sound rather abstract, but can be readily grasped by reflecting on the phenomenon of footprints. ‘You know my methods, Watson’, says Sherlock Holmes in the case of *The Crooked Man*. ‘There had been a man in the room, and he had crossed the lawn coming from the road. I was able to obtain five very clear impressions of his footmarks . . . He had apparently rushed across the lawn, for his toe marks were much deeper than his heels.’¹³ But if Holmes could recognize the man’s gait from the patterns of his footprints, and even read off from them something of his intentions, this was not because the gait served to translate from a conception in his mind to an impression on the ground, but because both the gait and the prints arose within the intentional movement of the man’s running. He was evidently in a hurry. Of course, as this example shows, pedestrian activities can mark the landscape. When the same paths are repeatedly trodden, especially by heavy boots, the consequences may be quite dramatic, amounting in places to severe erosion. Surfaces are indeed transformed. But these are surfaces *in* the world, not the surface *of* the world. Indeed strictly speaking, the world has no surface. Human beings live in the world, not on it, and as beings in the world the historical transformations they effect are part and parcel of the world’s transformation of itself (Ingold, 2000: 199–200, 241).

CONCLUSION: ON THE EVOLUTION OF HUMAN ANATOMY

To conclude, let me return to the observations of Darwin, Huxley and Tylor with which I began. Recall that Darwin regarded the relatively prehensile foot of the unshod savage as intermediate between that of the ape on the one hand, and the civilized man on the other. This view is no longer admissible today. We know that the boot-clad European is, genealogically speaking, no further removed from the ape than the barefoot Aborigine. Yet human feet do indeed vary a great deal, not just morphologically but in the operations they can perform. Describing a group of elderly Marquesan Islanders in his semi-fictional narrative of travel in the South Seas, *Typee* (1846), Herman Melville observed that

the most remarkable peculiarity about them was the appearance of their feet; the toes, like the radiating lines of the mariner's compass, pointing to every quarter of the horizon. This was doubtless attributable to the fact, that during nearly a hundred years of existence the said toes had never been subjected to any artificial confinement, and in their old age, being averse to close neighbourhood, bid one another keep open order.¹⁴

Melville surely allowed himself some licence to exaggerate. Nevertheless there is ample corroborating evidence of a more scientific nature to suggest that the feet of unshod peoples are very differently formed from those of people who are accustomed to wearing shoes of various kinds. Research has shown that 'even the simplest footwear starts to rearrange the bones of those who habitually use it' (Tenner, 2003: 58). The fourth and fifth toes of the normally bare foot, according to orthopaedist Steele Stewart (1972), have an unmistakable prehensile curl, and in walking they pick over the ground with almost manipulative precision (Carlsö, 1972: 12). In regular users of footwear – even rudimentary sandals – this trait is less developed. Wearing sandals tends to enlarge the gap between the big and second toe, but in other ways the form of the sandalled foot is closer to that of people who wear shoes, since both sandal and shoe wearers lose the characteristic rolling motion of the bare foot which starts from the heel and runs along its outer edge, ending with the ball of the foot and the toes (Ashizawa et al., 1997).

It is not only the morphology of the booted European foot that is peculiar – in the straightness and parallelism of the toes, and the lack of space between them. Equally peculiar is the so-called 'striding gait' with which the walkers of western civilization (especially men) have been enjoined since Antiquity to sally forth into the world, asserting as they go their superiority over subject peoples and animals. In a now classic study, John Napier asserted that the stride 'is the essence of human bipedalism and the criterion by which the evolutionary status of a

hominid walker must be judged' (Napier, 1967: 117). This reification and universalization of the striding gait as the quintessential human locomotor achievement betrays an ethnocentrism that, as John Devine has shown, has long plagued the literature of human evolutionary biology. In fact, with their oddly formed feet and eccentric gait, 'Westernized men and women . . . may present us with the exception rather than the rule in the area of locomotor skills' (Devine, 1985: 554). It is not just that people around the world walk in all sorts of ways, depending on the surface and contours of the ground, the shoes they are wearing (if any), the weather, and a host of other factors including culturally specific expectations concerning the postures considered proper for people of different age, gender and rank. They also use their feet for sundry other purposes such as climbing, running, leaping, holding things down, picking them up, and even going on all fours. In emphasizing these variations, my purpose is not to claim that the feet and gait of the barefoot hunter-gatherer who 'runs, creeps and climbs' (Watanabe, 1971) are somehow more 'natural' than those of the striding, boot wearing European. As Marcel Mauss recognized in his essay on body techniques, there is simply no such thing as a 'natural' way of walking, that may be prescribed independently of the diverse circumstances in which human beings grow up and live their lives (Mauss, 1979: 102). But he could just as well have said that every existing technique is as natural as every other, in that it falls within the range of possibility and comes as second nature to its practitioners.

What would certainly be unnatural, however, and beyond the realm of possibility, would be for any human being to spend his or her life, when not sitting or lying down, either standing bolt upright on one spot, like a statue, or striding about without carrying any significant load on a hard level surface. The western body image, which underwrites so much of the discourse on human anatomical evolution, rests on an ideal that is practically unattainable outside the highly artificial setting of the laboratory. Yet it is in such laboratory settings that most systematic studies of bipedal locomotion have been carried out (Johanson, 1994). These studies are often illustrated with pictures of more or less naked figures pacing a bare floor.¹⁵ It is as though, by stripping the body of all appurtenances and the ground of all features, the universal essence of human walking will be revealed in a form untrammelled by the particularities of environment and culture. In truth, however, there is no such essence. For the experimental subjects of gait analysis already bring with them, incorporated into their very bodies, the experience of architecture, dress, footwear and baggage drawn from life outside the laboratory. Indeed many of the earliest subjects to be roped into locomotion research were in fact soldiers, already trained in the routines of the drill. It is hardly surprising that when commanded to walk they

stepped out as if on parade! As Mary Flesher (1997) has shown, the scientific study of human locomotion has its roots in military discipline.

We cannot, then, attribute bipedality to human nature, or to culture, or to some combination of the two. Rather, human capacities to walk, and to use their feet in countless other ways, emerge through processes of development, as properties of the systems of relations set up through the placement of the growing human organism within a richly textured environmental context. As psychologist Esther Thelen and her colleagues have shown in their studies of infant motor development, it is not possible to characterize 'bipedal locomotion' in isolation from the real-time performance of the manifold pedestrian tasks with which we have grown up (Thelen, 1995: 83). In what sense, then, can we speak of the evolution of the human foot, or of bipedalism as a distinctively human achievement? If by evolution we mean differentiation and change over time in the forms and capacities of organisms, then we must surely admit that as fully embodied properties of the human organism, these traits have indeed evolved. We cannot however understand this evolution in terms of the genesis of some essential body plan, given for all humans in advance of the conditions of their life in the world, to which particular inflections are added by dint of environmental and cultural experience. For no such plan exists. There is no standard form of the human foot, or of bipedal locomotion, apart from the forms that actually take shape in the course of routine pedestrian operations. Two points of capital importance follow. First, an explanation of the evolution of bipedality has to be an account of the ways in which the developmental systems through which it emerges are reproduced and transformed over time. And second, by way of their activities, their disciplines and their histories, people throughout history have played – and continue to play – an active role in this evolutionary process, by shaping the conditions under which their successors learn the arts of footwork. Thus the evolution of bipedality continues, even as we go about our business on two feet. We have been drawn, in sum, to an entirely new view of evolution, a view that *grounds* human beings within the continuum of life, and that situates the history of their embodied skills within the unfolding of that continuum.

... AND FINALLY

The philosopher Jacques Derrida wondered how there could be a history or a science of writing, when the practice of writing is already implicated in the ideas of history, and of science (Derrida, 1974: 27). For my part I wonder how there could be a cultural history of bodily techniques when the technology of footwear is already implicated in our very ideas of the body, its evolution and its development. Boots and shoes support our established notions of the body and of evolution, just as writing

supports our notions of science and of history. To extricate ourselves from these circularities, we should perhaps take the advice of Giambattista Vico, offered in his *New Science* of 1725. To understand the origins of writing, Vico wrote, 'we must reckon as if there were no books in the world' (1948 [1744] §330). To understand the evolution of walking, likewise, we must imagine a world without footwear. For our earliest ancestors did not stride out upon the land with heavy boots, but made their way within it lightly, dextrously, and mostly barefoot.

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Notes

1. From 'Théorie de la démarche', by Honoré de Balzac, in *Oeuvres diverses de Honoré de Balzac*, Vol. 2 (1830–1835), Paris: Louis Conard, 1938, pp. 613–43. Balzac's 'Theory of walking' was originally published in 1833. The translation of this passage, from p. 614, is mine.
2. Many more examples could have been adduced. Devine (1985) has drawn attention to the frequency with which early travel accounts, missionaries' reports and ethnographic literature allude to the dexterity of the toes and the prehensile powers of the feet among 'primitive' people accustomed to going barefoot.
3. The pliancy of the soles was achieved through the use of caoutchouc, later known as India rubber (Dowie, 1839: 407–8). In the United States, a way of 'attaching India Rubber soles to boots and shoes' had been patented in 1832. But the natural rubber did not wear well in the cold winters and warm summers of North America. It became hard and brittle in freezing weather, and soft and sticky in heat. Only after Charles Goodyear's invention of a method of treating the rubber so that it became serviceable at all temperatures did the rubber-soled shoe industry really take off (Tenner, 2003: 83).
4. These connotations probably have their source in the division of military rank between pedestrian foot soldiers and the cavalry.
5. There is some evidence to suggest that baby walkers actually delay the onset of upright posture, as they restrict infants' freedom to explore and interact with their environment (Tenner, 2003: 9–10).
6. Wiktor Stoczkowski has traced the symbolic valorization of uprightiness, still so prominent in palaeoanthropology, in a wealth of classical and early Christian sources: Plato, Xenophon, Aristotle, Pliny the Elder, Vitruvius, Ovid, Cicero, Prudentius and Gregory of Nyssa. The idea expressed throughout is that the human, by standing upright, can gaze heavenwards, know the gods (or God), and exercise dominion over all other creatures (Stoczkowski, 2002: 73–4).

7. The goose step has its origins in marching styles developed by the Prussian army in the early 18th century, and survived for almost three centuries until it was abolished by the East German Ministry of Defence in 1990 (Bremmer, 1992: 15, Flesher, 1997).
8. Writing in 1791 and citing Rousseau in his support, Adam Walker opined that 'there is but one way of Travelling more pleasant than riding on horseback, and that is on foot; for then I can turn to the right or the left' (cited in Jarvis, 1997: 9, 29).
9. From *When We Were Very Young*, by A.A. Milne, London: Methuen, 28th edition, 1936, pp. 12–13. The drawing by Ernest H. Shepard that accompanies this rhyme shows Christopher Robin wearing knee-length lace-up boots and striding like a true soldier!
10. For an example from the hyper-modern city of Brasilia, see Ribeiro (1996: 149).
11. The foot is a very sensitive organ. For every square inch of sole, there are no fewer than 1300 nerve endings (Tenner, 2003: 52).
12. The hard, rigid boots employed in sports such as skating, skiing and football present a particular puzzle. For far from reducing the foot to a stepping or pedalling machine, these boots enable the wearer to perform movements of great skill and dexterity. These movements, however, are not prehensile, and do not involve curling the toes. Rather, the boot appears to convert the foot into a rigid extension of the ankle.
13. From *The Memoirs of Sherlock Holmes*, by Sir Arthur Conan Doyle. Penguin edition, 1950, p. 146. One wonders what Holmes would have made of the bipedal footprints left in volcanic ash from 3.5 million years ago at the East African site of Laetoli (see Tuttle et al., 1992).
14. From *Typee: Narrative of a Four Months' Residence among the Natives of a Valley of the Marquesas Islands; or, a Peep at Polynesian Life*, by Herman Melville, Penguin Edition, 1972, p. 142.
15. See, for example, the series of photographs from the Muybridge collection reproduced in Napier (1967).

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