

TRANSFORMATIONS

OF THE LINE:

TRACES, THREADS AND SURFACES

Tim Ingold

University of Aberdeen

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This paper is based on the third of a series of six lectures that I first presented in Edinburgh a couple of years ago. The title of the whole series was *Lines from the past: towards an anthropological archaeology of inscriptive practices*, and to give you a context for what I have to say today, I should begin by outlining my objectives for the series as a whole, which I am currently working up into a book. My project is one that, so far as I know, has not been attempted before. It is to lay the foundations for what might be called a comparative anthropology of the line. When I have broached the idea to friends and colleagues, their initial response has usually been one of blank incredulity. The line? This is hardly the kind of thing that has served traditionally as the focus of our attention. We have anthropological studies of visual art, of music and dance, of speech and writing, of craft and material culture, but not of the production and significance of lines. Yet it takes only a moment's reflection to recognise that lines are everywhere. As walking, talking and gesticulating creatures, human beings generate lines wherever they go. It is not just that line-making is as ubiquitous as the use of the voice, hands and feet – respectively in speaking, gesturing and moving around – but rather that it subsumes all these aspects of everyday human activity and, in so doing, brings them together into a single field of inquiry. This is the field that I seek to delineate.

What set me thinking in these directions, however, was a puzzle that, on the face of it, has nothing to do with lines at all. It was the problem of how we have come to distinguish between speech and song. For in fact this distinction, at least in the form in which we recognise it today, is relatively recent in the history of the western world. For much of this history, music was understood as a verbal art. That is, the musical essence of song lay in the sonority of the words of which it was composed. Yet throughout this history, too, these verbal compositions were being written out in manuscript form. It follows that so long as speech had not been finally distinguished from song, or language from music, the written word must also have been a form of written music. In short, the difference between writing and musical notation, which seems so obvious to us today, was not given from the outset but has rather emerged in the course of the history of writing itself. There can, therefore, be no history of writing that is not also a history of musical notation, and an important part of that history must be about how these two came to be distinguished.

Thus I set about thinking what form a more comprehensive history of notation might take. And what immediately came to mind was that any notation consists of lines. Therefore a history of notation would have to be part of a general history of the line. But as I looked at the history of writing

in the western world, and especially at the transition from the manuscript of medieval times to the modern printed text, it became clear that what was at stake was not merely the nature of the lines themselves, and of their production. Most of these lines were either drawn or printed on parchment or paper. Yet the way in which they were understood depended critically on whether the plain surface is compared to a landscape to be travelled or a space to be colonised, or to the skin of the body or the mirror of the mind. Evidently it is not enough to regard the surface as a taken-for-granted backdrop for the lines that are drawn upon it. For just as the history of writing belongs within a history of notation, and the history of notation within a history of the line, so there can be no history of the line that is not also about the changing relations between lines and surfaces. And it is about these relations, and their transformations, that I want to speak today.

Before proceeding, however, some rather fundamental questions have to be addressed. What *is* a line? For there to be lines, do there *have* to be surfaces, or can lines exist without any surfaces at all? A colleague in North America recently drew my attention to a poem published on the *Poetry Daily* website, in March 2003. It is simply called *Line*, and it well describes the profusion as well as the confusion of associations that come to mind as soon as you start to think about what lines might be.

Line

Surface engraved with a narrow stroke, path
 imagined between two points. Of singular thickness,
 a glib remark, a fragment, an unfinished phrase.
 It is any one edge of a shape and its contours
 in entirety. Melody arranged, a recitation,
 the ways horizons are formed. Think of leveling,
 snaring, the body's disposition (both in movement
 & repose). It has to do with palms and creases,
 with rope wound tight on someone's hand, things
 resembling drawn marks: a suture or a mountain ridge,
 an incision, this width of light. A razor blade
 at a mirror, tapping out a dose, or the churn
 of conveyor belts, the scoured, idling machines.

A conduit, a boundary, an exacting
 course of thought. And here, the tautness
 of tent stakes, earth shoveled, the depth of a trench.

We could well take this poem as a starting point for our inquiry. But how do we begin? In order to get started I have found it helpful to draw up a rough and ready taxonomy of the different kinds of line that we may encounter in everyday life, and to consider a few examples of each. It is with this that I begin.

The first distinction I would make is between two major classes of line, which I shall call *threads* and *traces*. Not all lines fall into either category, but perhaps the majority do, and they will be of most importance for my argument. A thread is a filament of some kind, that may be entangled with other threads or suspended between points in three-dimensional space. At a relatively microscopic level threads have surfaces, however they are not drawn *on* surfaces. Here are some common examples: a ball of wool, a skein of yarn, a necklace, a cat's cradle, a hammock, a fishing net, a ship's rigging, a washing line, a plumb-line, an electrical circuit, telephone lines, violin strings, the barbed-wire fence, the tightrope, the suspension bridge. These are all fashioned in one way or another by human hands. Not all threads, however, are artificial. An observant walk through the countryside will reveal any number of thread-like lines, although much of the linear order of nature is hidden underground in the form of roots, rhizomes and fungal mycelia. Above ground plants sprout stems and shoots. The leaf of every deciduous tree has its linear network of veins, while every needle of the conifer is a thread-line in itself. The bodies of animals, too, with their vascular and nervous systems, can be understood as complexly connected bundles of threads. In his *Matter and Memory*, the philosopher Henri Bergson described the nervous system as 'composed of an enormous number of threads which stretch from the periphery to the centre, and from the centre to the periphery'. And if animals are made of threads, some make them too: most notoriously the spider, but also the silkworm. The material for these threads, however, is exuded from the body. For the most part the making of threads is a human speciality, depending as it does on dextrous movements of the hands, sometimes working in conjunction with the teeth – as in the preparation of sinews for sewing. In most of its uses, too, the thread depends on the human hand's distinctive precision grip, which allows it to be held and manipulated between the thumb and forefinger. Indeed I am inclined to think that the making and use of threads could be a good index of the emergence of characteristically human forms of life, which would have brought such critical

innovations in their wake as the garment, the net and the tent. If threads have not received the attention they deserve from prehistorians, this is undoubtedly in part because they are typically made from organic materials that do not preserve well.

The trace is any enduring mark left in or on a solid surface by a continuous movement. There are two kinds of trace, additive and reductive. A line drawn with charcoal on paper, or with chalk on a blackboard, is additive, since the material of the charcoal or chalk forms an extra layer that is superimposed upon the substrate. Lines that are scratched, scored or etched into a surface are reductive, since in this case they are formed by removal of material from the surface itself. Like threads, traces abound in the non-human world. They most commonly result from the movements of animals, appearing as paths or tracks. The snail leaves an additive trace of slime, but animal tracks are usually reductive, caused by imprinting in the soft surface of mud, sand or snow, or, on harder ground, by the wear and tear of many feet. Human beings also leave reductive traces in the landscape, through frequent movement along the same route on foot or horseback or, more recently, by wheeled vehicles. But just as humans are, *par excellence*, makers and users of threads, so they have also come into their own as makers of traces with the hands. It is revealing that we use the same verb, to *draw*, to refer to the activity of the hand both in the manipulation of threads and in the inscription of traces. As we shall see, the two are more intimately linked than we might have supposed. Unaided by any tool or material, humans can make reductive traces – for example in the sand – with their fingers. With an inscribing implement such as a burin or chisel, they can produce traces in much harder material such as wood, bone or stone. The word *writing* originally referred to trace-making of this kind. Additive traces can be produced by means of a range of manual implements that deliver a material pigment to the surface, including pens and brushes. In the case of sandpainting no tool is required, as the material is allowed to run between the fingers. However with the aforementioned instances of chalk and charcoal, as well as with pencils and crayons, the tool doubles up as a source of pigment. The material of the trace, and the implement with which it is put on, are one and the same.

In what follows I shall concentrate on threads and traces, and on the relations between them. There are, however, two other major classes of lines. The first are created not by adding material to surfaces, or by scratching it away, but by ruptures in the surfaces themselves. These are cuts, cracks and creases. In his essay of 1926 on *Point and Line to Plane*, Vasily Kandinsky noted that ‘a particular capacity of line [is] its capacity to *create* surface’. Kandinsky’s example is the way the moving, linear

edge of the spade cuts the level surface of the soil, as in an archaeological section, creating a new, vertical surface in the process. The dressmaker cuts lines in her material with scissors, as does the puzzle-maker with his jig-saw. A kind of cut that is familiar to me through my own fieldwork in Lapland is made with a knife in the ears of the reindeer, creating a pattern of notches of various shapes that serve to identify each animal's owner. Saami people would traditionally describe each pattern as a word, and the cutting of the mark as an act of writing. Cracks are more often unintentional, resulting from the fracture of brittle surfaces caused by accident or wear and tear. They may be observed in nature – in breaking ice, sun-baked mud, stressed rock, dead wood, and the bark of ancient trees. But of course they are common in artefacts too, whether made of clay, wood, glass or concrete. Unless scratch marks are the ultimate cause of fracture, cracks show no respect for the traces that may have been drawn across a surface. Thus cracks interrupt traces rather as, in the landscape, a path of travel may be interrupted by a precipitous gorge in an otherwise level plateau. To get across, you have to construct a bridge, whereupon the trace becomes a thread. Creases are formed in pliant surfaces which may be folded without breaking. The lines of the face, caused by folds of the skin, are creases, as are the lines on a letter that has been unfolded after having been removed from the envelope, and the lines of pleated fabric on curtains, upholstery or clothing.

The other major class of lines can be called imaginary. They exist, as it were, in the mind's eye, but have no phenomenal presence in the world. If, for example, we observe the stars, and suppose them to be connected by lines into constellations, those lines are imaginary. Survey lines, such as those linking triangulation points, are of a similar nature, as are geodesic lines such as the grid of latitude and longitude, and the lines of the equator, the tropics, and the polar circles. Lines of this sort may of course appear on maps and charts as traces drawn with pen and ink, using a ruler and compass. But they have no physical counterpart in the world that is represented on these maps. Some kinds of imaginary line, however, can have very real consequences for people's movements. I came across such a line while herding reindeer along the border between Finland and Russia, over twenty years ago. The border was marked by a clear-cut strip of forest, down the mid-line of which the actual frontier was supposed to run. It was marked in no other way save by occasional posts. Had I attempted to cross it, however, I would have been shot at from one of the many observation towers on the Soviet side. Equally imaginary but consequential lines partition air-space and fishing waters, and demarcate time-zones. Whether a line is imaginary, however, cannot always be unequivocally determined, and I have

to confess that the category is decidedly problematic. For example the so-called songlines that, in Aboriginal cosmology, criss-cross the entire continent of Australia are said to be the enduring traces of the journeys of ancestral creator beings as they roamed the country during the formative era known as the Dreaming, leaving their mark in such landscape features as hills, rocky outcrops, waterholes and gullies. But these traces, which for Aboriginal people are intrinsic to the constitution of the landscape itself, are for western observers but part of an imaginary construction that is 'pinned on' to it. Likewise, so far as the western doctor is concerned, the meridian lines that according to the principles of acupuncture run through the body, conducting its vital forces and emerging at its surfaces, are entirely imaginary. But for the practitioner of traditional Chinese medicine, they are real threads.

I admit that this taxonomy of lines is far from satisfactory. Indeed we inhabit a world of such profuse linearity that it is virtually impossible to accommodate it all within some neatly ordered system. It is not hard to think of instances that do not fit the categories I have suggested. Where would we place the vapour trail left by a flying aircraft, or by a sub-atomic particle in an experimental cloud-chamber? Or forked lightning? These are surely traces of a kind, yet since they are not inscribed on solid surfaces they have the appearance of threads. Can lines, like veins, be tubes, as in pipelines for oil, gas and water? Do we perhaps need a separate category of *rods*, to denote lines in three-dimensional space whose rigidity allows for the engineering of stable structures? Apart from the obvious case of angling, the combination of rod and line is basic to the construction of the tent. Kandinsky singles out the Eiffel Tower as an 'early attempt to create a particularly tall building out of lines – line having ousted surface'. Buckminster Fuller's geodesic dome is a more recent application of the same architectural principle, known as tensegrity, by which the stability of a structure is engineered by distributing and balancing counteracting forces of compression and tension along its component lines. Tensegrity is common to both artefacts and living organisms, and is found in the latter at every level from the cytoskeletal architecture of the cell to the bones, muscles, tendons and ligaments of the whole body. Indeed lines are everywhere, and they raise more questions than I can possibly answer here.

My present concern, however, is more limited, and this is to develop an argument concerning the relation between lines and surfaces. Perhaps I could introduce it with a little vignette. On a recent ferry-crossing from Norway to Sweden I observed three ladies sitting around a table in the ship's lounge. One was writing a letter with a fountain pen, the second was knitting, and the third was using a

needle and thread to embroider a design from a pattern book upon a plain white fabric. As they worked they chatted among themselves. What struck me about this scene was that while the life-histories of the three women were momentarily entangled in their conversation, the activity in which each was engaged involved a different use of the line, and a different relation between line and surface. In her writing, the first was inscribing an additive trace upon the surface of the page. The second had a hank of wool beside her, but as she worked, threading the wool through her fingers and picking up the loops with her knitting needles, she was turning the thread into an evenly textured surface. For the third, the embroiderer, the surface was pre-prepared, as indeed it was for her friend the letter-writer. Yet like the knitter, she was threading her lines and not tracing them. Watching these women at work, I began to reflect on the similarities and differences between writing, knitting and embroidery. It occurred to me that while writing, as a form of trace-making, is equally opposed to both embroidery and knitting, these latter two are also opposed to one another. The knitter binds her lines into a surface, upon which the original threads now figure as traces, namely in the regular pattern formed by their entwining. The embroiderer, to the contrary, starts with traces on a surface, as on the page of her pattern book, but in her activity with the needle she translates those traces into threads. In so doing, moreover, she contrives to make the surface of the fabric disappear. For when we look at embroidered cloth we see the lines as threads, not as traces, almost as though the cloth had itself been rendered transparent. Embroidery thus imitates the making of lace, and it is no wonder that the two appear so often together, the first in the central field and the second around the periphery of a finely wrought scarf, kerchief or table covering.

Though I began by presenting threads and traces as though they were categorically differentiated, the examples of knitting and embroidery suggest that in reality, each stands as a transform of the other. Threads may be transformed into traces, and traces into threads. It is through the transformation of threads into traces, I argue, that surfaces are brought into being. And conversely, it is through the transformation of traces into threads that surfaces are dissolved. In what follows I shall present examples to illustrate both directions of transformation. I begin with the latter, and with what is perhaps the most archetypal use of the thread to be found not just in the history of western civilisation but throughout the world. We are all familiar with the story of how the Athenian hero Theseus, cast by the Cretan king Minos into the Labyrinth of Knossos, found his way out again having slain the dreaded Minotaur at its centre. He did so, of course, by means of a thread presented to him by Minos's daughter Ariadne. Now the great artificer Daedalus, who devised the Labyrinth, is alleged to have modelled it

upon the maze that leads to the Underworld. Many classical authors went on to identify the original labyrinth with one or other of the many systems of natural caverns riddling the mountainsides of Crete. Be that as it may, the labyrinth or maze has remained a powerful image of movement and wayfaring in a world of the dead that is believed to lie beneath the surface of the world of quotidian experience.

Just to give an indication of the generality of this image, here is a sketch (figure X) from the classic monograph by Waldemar Bogoras on the Chukchi of northeastern Siberia. It depicts the paths in the underground world of the dead as they were claimed to have been seen, in a deep swoon, by the man who drew it. This world, it is said, is full of intricate passages that are supposed to puzzle newcomers. The circles represent holes through which they enter. These pathways, it seems, are imagined not as tracks etched upon a landscape but rather as narrow channels that run deep below its surface. The dead, like potholers, are doomed to wander these channels, and recent arrivals are as liable to lose their way in them as are travellers in a maze. The ghostly traveller, unlike his living counterpart, does not have the perception of walking upon solid ground, with the earth beneath his feet and the sky above, nor does he have the advantage of all-around vision and hearing. He is not, as we would say, 'out in the open'. To the contrary, he is fully enclosed within the earth, shut up in a medium that affords movement only along its cracks and crevices, and that insulates him from sensory contact with his surroundings. Unable to see where he is going he can have to idea, when paths diverge, of which to take. In short whereas the living, in making their way in the world, follow the traces left by their predecessors *upon* the surface of the earth, the dead have to thread their way *through* its interstices.

For many decades, and despite its cross-cultural resonance, the maze has been a neglected topic in anthropology. However it has been recently revived in the work of Alfred Gell. In his influential book, *Art and Agency*, Gell treats the maze as a prime example of what he calls 'the apotropaic use of patterns'. By this he means the practice of inscribing complex and visually puzzling designs upon surfaces in order to protect those sheltered behind them from attack by evil spirits or demons. The idea is that the demons are lured to the surface by their fascination with the pattern, but are so tantalised by it that they cannot bear to pass through without first having unravelled it, or solved the puzzle it presents. Becoming myopically entangled in the attempt, they are forever stuck on the surface, and never make it through to the other side. Apotropaic patterns, Gell suggests, function as 'demonic fly-paper'. The idea is an attractive one, and it is of course possible that certain kinds of pattern are used in this way. But as an explanation of the labyrinth, Gell's suggestion is wide of the

mark. This is because it assumes from the outset a kind of ‘demon’s eye view’ – an aerial perspective from which the overall layout of the maze may be surveyed and represented in a pattern-like form. Such a perspective, however, is not available to the terrestrial traveller who is already embarked upon a journey across the earth’s surface – a journey that is tantamount to life itself. The entrance to the maze marks the point not at which he touches down upon the surface, but at which he *goes underground*. Now as an interface between earth and air, the ground is a kind of surface that is visible from above, but not from below. It does not have another side. Thus at the very moment of going underground, of entering the labyrinth, the surface itself disappears from sight. It appears to dissolve. This moment marks the transition from life to death. Thenceforth – and quite unlike Gell’s demon which, caught in the meshes of an apotropaic pattern, is glued to a surface – the ghostly traveller finds himself in a world without any surface at all. Every path is now a thread rather than a trace. And the maze of passages, never visible in its totality, can only be reconstructed by those few – such as the hero Theseus, or the Chukchi shaman who drew the sketch for Bogoras – who have visited the world of the dead and made it back again.

My second example of the way in which surfaces are dissolved through the transformation of traces into threads comes from a study by Brigitta Hauser-Schäublin of the decorative art of the Abelam, a people of East Sepik Province in Papua New Guinea. Abelam decorations are assembled from strings, strips and fronds, mainly of plant material, so as to form an open mesh of flowing or intersecting lines. This approach to decoration, which the Abelam share in common with most other Melanesian peoples, is radically different from that of the ‘cloth cultures’ of Polynesia and Indonesia, which make use of woven textiles, plaited mats or bark cloth to wrap things up so that they can be alternately concealed and revealed. The aesthetic focus of the Abelam is not on the surface but on the line. ‘All patterns’, according to Hauser-Schäublin, ‘are perceived from the perspective of the line, or “visual open-work”, rather than from that of the homogeneous plane so abundantly displayed and represented in cloth’. However, besides making things from strips of leaves or lengths of string, Abelam also paint. These paintings are done on spathes of the sago palm that have been covered in grey or black mud. A line is first painted on the spathe, using a feather dipped in white pigment. This is the most important line, which acts as a template for the rest of the pattern. Once it is done, additional lines are added in red, yellow and black. In a large, complex painting, such as for the façade of a ceremonial house, the painter starts from the top and works in rows. However, he always leaves a white

line hanging like a string from the bottom of the designs on each row, so that he can take it up and continue it on commencing the next. As a result, all the rows of the complete work are connected together by continuous white lines (called *maindshe*). The lines in the other colours, by contrast, are discontinuous and serve only to highlight the white *maindshe*.

Now what is remarkable is that exactly the same principle is involved in making the net bag or *bilum*, one of the most ubiquitous and multifunctional accessories to everyday life among the peoples of inland Melanesia. The string of the *bilum*, made from the bast of various trees and shrubs, is naturally of a beige colour, but it is taken to be white. Just as in the painting, where the artist picks up the 'loose end' of the *maindshe* from the previous row in proceeding with the next, so in the making of net bags every additional length of string is attached to the one before – by twining the fibres and rolling them on the thigh – so as to form one continuous line from which the whole bag is produced. This line is known by the same term, *maindshe*. Patterns are formed through the addition of strings dyed in red and black. Although we might be inclined to see the coloured designs as standing out against a white background, for the Abelam it is the other way around, as it is in their paintings. Indeed, Abelam men say that the designs painted on their ceremonial house façades have their origin in women's net bag patterns. Evidently, the *maindshe* of the painting, though it is formed as an additive trace upon an opaque surface, is treated as a thread of the same kind as the *maindshe* of the bag. And in the transformation of the painted line into a looped thread the surface is contrived to disappear, so that the painting has the same texture of 'open work' that is so characteristic of all Abelam art. Another way of dissolving a surface, of course, is by cutting it up. This is exactly what happened when Hauser-Schäublin, at the request of some Abelam women, brought back some plain black and red cloth from a shopping trip to a nearby town. Instead of using it as cloth, they first cut it into strips and went on to unravel the shredded fabric into its individual threads. These were then twined and rolled to form strings, from which they made colourfully patterned net bags.

For a third example of the transformation of traces into threads I turn to a study by Angelika Gebhart-Sayer of the Shipibo-Conibo Indians of the Peruvian Amazon. Until about two centuries ago, according to Gebhart-Sayer, Shipibo and Conibo villages were covered in continuous zig-zag lines. They spread over the interior surfaces of houses, over the outer surfaces of ceramic pottery, over boats, hunting gear and cooking utensils, over finely woven cotton garments, and over the faces, hands and legs of their wearers. Today this preoccupation with the line continues in textile embroidery, ceramic

painting, plaited beadwork, and occasional facial marking. Line-making is exclusively the province of women, and is perceived by them as a matter of tracing visible lines across opaque surfaces. The painter or embroiderer commences by drawing the basic formlines. These are relatively thick, but twist and turn like snakes so that they have no clear direction. Secondary lines are then drawn parallel to the formlines, on either side. Any vacant space is filled with tertiary lines, to ensure that the surface is covered in its entirety. The regular repetition of the formlines lends the overall pattern a certain symmetry. These surface patterns, however, are only the visible manifestations of design. In addition, Shipibo-Conibo people hold that every individual is invisibly marked with designs that are bestowed, from early childhood onwards, in the course of shamanic healing sessions. These designs, which are permanent, are understood to permeate and saturate the entire living body, and remain after death with a person's spirit. In the healing ceremony the shaman – who is generally but not invariably male – 'sings' the design, but as the vocal sound meanders through the air he sees it transformed into a pattern that *sinks into* the patient's body. It is a transformation, however, that is visible only to the shaman himself. In this vision the lines are seen to be spun by the spirit of the humming bird, Pino. Hovering above the patient, the spirit busily swishes and whirrs with his beak in rapid, tiny movements. Though Pino is described as a 'writer' or 'secretary' among spirits, it is clear that the lines that issue from his restless beak are threads and not traces. For the patterns he writes, far from being inscribed across the surface of the patient's body, are said to drop down upon it, and to penetrate it. Thus as traces are transformed in the shaman's vision into threads, it is the very surface of the body that is dissolved, allowing the lines to penetrate its interiority where the cure becomes effective.

In these three examples – the labyrinthine underworld of the Siberian Chukchi, the painting of ceremonial house façades among the Abelam of New Guinea, and the shamanic healing of the Shipibo-Conibo Indians of eastern Peru – we have seen how the transformation of traces into threads dissolves the surfaces of the earth, the house and the body respectively. It is now time to turn to the reverse transformation, that of threads into traces in the constitution of surfaces. The etymology of the word 'line' itself offers an exemplary instance of this transformation. Derived from the Latin *linea*, it originally meant a thread made from flax, *linum*. These threads were woven into cloth that we now call *linen*, and that could be used to *line* garments by providing an extra layer of warmth. The verb 'to weave', in Latin, was *texere*, from which are derived our words 'textile' and – by way of the French *tistre* – 'tissue', meaning a delicately woven fabric composed of a myriad of interlaced threads.

Anatomists would go on to adopt this compositional metaphor to describe the organs of the body, said to be comprised of epithelial, connective, muscular and nervous tissues. They would write of how the surfaces of these organs, illuminated by skilled anatomical vision, are rendered transparent, revealing their underlying linear structure. Thus the anatomical gaze, not unlike that of the shaman, resolves bodily surfaces into their constituent threads. But whereas the shaman heals by dropping lines into the body, the western surgeon stitches up the lines he already finds there, whose ruptures are the cause of the malaise, so as to reconstitute the surfaces of the whole.

As this little excursion into the etymological derivation of line and tissue suggests, it is perhaps in stitching and weaving that we find the most obvious example of how surfaces are constituted from threads, and of how traces are generated in the process. The weaver starts with her warp and weft, the former strung lengthwise, the latter threaded crosswise through it, alternately over and under the warp strings. If the weft is all of one colour, then the finished cloth will appear as an unbroken, homogeneous surface. However by introducing wefts of different colours it is easy to produce straight, transverse stripes of any desired thickness. From a distance, these look like lines drawn across the material. Thus as the textile is built up through the process of weaving, the coloured threads of the weft gradually give rise to the appearance of a trace upon its surface. The production of diagonal or longitudinal lines is more complex. In her classic account of how to weave a Navaho blanket, Gladys Reichard shows how diagonals may be made at inclinations of 40 or 52.5 degrees to the transverse direction by carrying the weft in the base colour one warp-line further either in every row, or in every second row, while the contrasting colour, coming in from the other side, correspondingly loses a warp (Figure X). The point at which the two colours meet, known as the lock, accordingly shifts from row to row at regular intervals. To produce longitudinal stripes the two weft colours, coming in from opposite sides, always loop back around the same warps, so that the transverse position of the lock remains constant.

What is most striking about the Navaho blanket, however, is that while the coloured designs on its surface are strongly linear, these lines are not themselves threads. Nor are they really traces. Indeed when we look for the line in the blanket, however closely, we find only differences – namely, variations in the colour of the threads, and row-by-row displacements in the locking position of the weft for each colour. We could say that the line on the blanket exists not as a composite of the threads of which it is made, but as an ordered system of differences among them. Taken together, however,

these differences add up to something positive, namely the perception of a continuous line on a coherent surface. And it is this perception that gives the line the appearance of a trace. Nevertheless the line formed on a woven surface as it is built up from threads is in reality quite unlike a line that is drawn on a surface that already exists. The difference may be highlighted by contrasting the blanket with another major focus of Navaho artistic practice, the sandpainting. This is made by dribbling a fine stream of dyed sand, first in one colour and then in another, to form a linear design upon the naturally earth-coloured sand of a smooth, pre-prepared floor. The sand is allowed to trickle between the index and middle finger, while controlling the flow with the thumb. In this case, the line is clearly an additive trace, a crystallisation of the precise movements and gestures involved in producing it. Some Navaho weavers, under pressure to produce ‘authentically Navaho’ designs for the tourist market, have taken to copying the sandpainting designs on their blankets. But the results, Reichard tells us, are generally unsatisfactory, not only because it is virtually impossible to achieve the right colours, but also because the technique of weaving is inappropriate to producing designs of this kind. They are too intricate.

In short, whereas the line on a pre-existent surface – such as that of the sandpainting – is the trace of a movement, the line on a surface that is being woven from threads – such as that of the blanket – grows organically, in one direction, through the accumulation of transverse, back and forth movements in the other. This distinction, in turn, provides the key to understanding the relation between weaving and writing. An indication of the significance of this relation lies in the common derivation of the words ‘text’ and ‘textile’ from *texere*, ‘to weave’. How was it that writing, which generally involves the inscription of traces upon a surface, came to be modelled on weaving, which involves the manipulation of threads? How did the thread of the weaver become the trace of the writer? The Chinese philosopher Liu Hsieh, who lived in the fifth century AD, placed this question at the very birth of writing in his intriguing but enigmatic remark that ‘when bird’s markings replaced knotted cords, writing first emerged’. What he had in mind, apparently, was the replacement of a notational system based on the knotting and looping of threads or strings with one based on inscriptive traces analogous to the footprints of birds and animals.

Not everything that is done in a notation, after all, need consist of traces. For example among the people of Kandingei, on the Middle Sepik River, Papua New Guinea, the most important man in every group keeps a knotted cord – some six to eight metres long and three centimetres thick – which is said to represent the primal migration in which the founder of the clan, following in the path of a

crocodile, journeyed from place to place. Each large knot in the cord, into which is woven a dried piece of betel-nut shell, represents a primal place, while the smaller knots preceding it stand for the secret names of the totem dwelling in that place. In important ceremonies, the owner of the cord lets it run through his fingers, rather as though he were handling a rosary, ‘singing’ each place and its associated totems. Thus the movement of slipping the cord through the fingers corresponds to the movement of the clan founder as he journeyed from one settlement to the next. In mortuary ceremonies it also corresponds to the movement of the ghost as it travels to the land of the dead, borne on a grass island that nevertheless runs aground at one place after another along the way.

The most celebrated example of a notational device that consists entirely of threads is of course the Inka *kipu*. The *kipu* comprises a plied cord to which secondary cords are attached with knots. Further, tertiary cords may be knotted to secondary ones, fourth-order to tertiary, fifth-order to fourth, and so on. Scholars still argue about the function of the *kipu*, whether it served to prompt the memory or to record information, and – if the latter – whether that information was merely numerical or involved elements of narrative. It seems beyond doubt, however, that almost every element of its construction carried meanings of one sort or another, including the types of knots and their placement on the cords, the ways the cords are plied, and the colour combinations used. Moreover as a kind of fabric the *kipu* is constructed on the same principle, involving the combination of a suspension line with pendants, as many other kinds of Inka fabric including necklaces, headbands and of course the suspension bridge. But although the weaving of textiles was highly developed among the Inka, the *kipu* is not woven, and it is not a textile. It has no surface apart from the surfaces of the cords from which it is made.

For an example of writing that is actually woven into textiles we can move from the Andes to Mesoamerica, and to the Maya peoples, renowned for their ancient hieroglyphic script. In the *Popol Vuh*, a Mayan hieroglyphic book put into alphabetic writing in the sixteenth century, it is said of the monkey gods that ‘they are flautists, they are singers, and they are writers; and they are also engravers, they are jewellers, they are metalworkers’. In this passage the writer is called *ajtz’ib*, from the word for written characters, *tz’ib*. But according to Barbara and Dennis Tedlock, on whose authoritative work I draw for the current discussion, *tz’ib* could also refer to ‘figures, designs, and diagrams in general, whether they be drawn, painted, engraved, embroidered, or woven’. Scarves woven in recent times by the Quiché Maya of Guatemala include brocaded zoomorphic figures, together with additional designs

that indicate the identity of the weaver. These are all *tz'ib* (whereas the vertical bands of colour that run through the textiles are not). An example is shown in Figure X. This particular scarf also carries the name of its owner, embroidered in alphabetic capitals. Though the juxtaposition of letters and designs seem incongruous to us, for contemporary Quiché it is entirely unremarkable, for both are instances of *tz'ib*. Critically, however, whereas the embroidered letters were added after the weaving was complete the brocaded designs were incorporated, during the weaving process itself, through the addition of supplementary wefts. Thus these *tz'ib*, although they look like traces on the surface of the scarf, are actually built up – along with the surface itself – from threads, through their cumulative displacement. In the technique of brocading, weaving and writing become one and the same.

I turn finally to the kinds of texts that have come down to us within our own Western tradition. The idea of the text as a woven tapestry may seem strange to modern readers accustomed to seeing letters and words in print. But it would have seemed perfectly natural to the citizens of ancient Greece and Rome when, thanks to the introduction of papyrus from Egypt and the ink-filled reed pen as an instrument of writing, they first began to employ the cursive script. Until then, letters could only be scratched or incised on hard surfaces with short, separate strokes. With pen on papyrus, however, it was possible to produce a continuous line. The subsequent introduction of the more durable and smooth-surfaced parchment or vellum, in the fourth and fifth centuries AD, allowed this line, now made with a quill-pen, to flow even more freely. Figure X shows an example of a script from the ninth century: it comes from a charter written by one Walto, notary to the father of the Frankish Emperor Charles the Fat.

One has only to glance at this example to appreciate the force of the analogy between writing and weaving. Just as the weaver's shuttle moves back and forth as it lays down the weft, so the writer's pen moves up and down, leaving a trail of ink behind it. But this trail, the letter-line, is no more the same as the line of text than is the line on a tapestry the same as the lines of its constituent threads. As with the woven tapestry, when we look for the text-line we do not find it. It exists neither as a visible trace nor as a thread. Rather, it emerges through the progressive lengthwise displacement of the letter-line as it oscillates up and down within a determinate 'band-width' (though with many trailing ends), in much the same way that the woven stripe is built up through the longitudinal displacement of the weft as it oscillates transversely between selected warp-lines. In the fifteenth century Gothic book-hand known as *textura*, this parallel was drawn quite explicitly: the hand was so-called on account of the

resemblance of a page of writing to the texture of a woven blanket. Just as the letter-line had its figurative source in the weaver's yarn, so the prototype for the straight, ruled lines of the manuscript, between which the letters were arrayed, lay in the warp strings stretched taut on the loom. Originally these ruled lines were scored, and – as with warp lines – were faint or invisible. When Gutenberg adopted *textura* for his first printed type, the lines disappeared altogether. What had begun with the interweaving of warp and weft ended with the imposition of preformed letter-shapes, pre-arranged in rows, upon a pre-prepared surface. From that point on, the text was no longer woven but assembled, pieced together from discrete graphic elements. The transformation was complete.