Pattern summons an immediate image of human creativity and ingenuity. Generated through numerical sequences and geometric operations, pattern offers a wide range of complexities as it clearly shows how a maker is able to build a pattern through the repetition and transformation of regular elements. Pattern makes a difference by embellishing surfaces; it brings visual pleasure or acts as an attention-drawing device. But equally, pattern makes difference because we tend to classify pattern according to culture, place, and time. As one of a family of practices related to decoration, pattern matters in more than one sense as pattern is itself matter: it may be carried with material objects on the surface of things, whether etched in stone or metal, printed or stamped on canvas. Pattern may also appear in some form of expression: as music, dance, poetry, performance, or art. And yet a crucial quality of the lives of patterns is their ability to translate from one medium to another—to move from, say, textured cloth to musical accompaniment, from musical accompaniment to dance, and back to cloth again. The mobility of pattern is a hallmark, of course, of its indispensable role in human life. As Ruth Benedict (1934) argues, cultures bear remarkable traits or patterns that impress themselves on who we are and what we do, and allow us to recognise, predict, assess, and form conclusions. But what causes pattern to be the most communicable of forms, and why doesn’t it stay put? What gives it this uncanny capacity to spread like a virus through human consciousness and behaviour? It seems that pattern is not just something that appears in and on media but also is in some sense itself a medium, perhaps a meta-medium that transcends any specific material incarnation, even if it must always appear in some expressive form.

Pattern’s capacity to move freely from one form to another has a number of implications for any analytical engagement, providing tangible traces of trajectories and networks that map out social relations. First, it makes it impossible to view patterns as ideological entities. Of course, when a pattern becomes associated with a particular culture or within a specific historical context, a pattern can be given an ideological role to play, such as in the case of ceremonial
houses’ carved-rafter patterns, known as *kowhaiwhai*, that are integral to Maori identity and spiritual power (Thomas 1995a). But when a pattern is adopted by another culture, such as when white settlers appropriated *kowhaiwhai* in the process of nation-making in New Zealand, it may shed its ideological surface and thereby offer the potential to fulfil often contradictory roles.

Second, while it may be useful to talk about an artist’s oeuvre or cultural style, this kind of positivism is always problematic when dealing with pattern. The transformational nature of pattern ensures that it is always in a state of potential flux between its various forms and media, and its location in time and in space, making it difficult to run a clearly delineated iconographical analysis of specific patterns, their constituent motifs, and the corpus of transformations. The emphasis on the vitality of patterns, with their transformative capacity, calls for a new style or tone of analysis that is receptive to their capability to be expressed through a multitude of forms.

As we witness a revival of interest in pattern and the decorative arts in the twenty-first century from within the disciplines of art history, archaeology, and anthropology, scholarly work has, with few exceptions, yet to focus attention on the logical properties of pattern. Its numerical and spatial composition is easily remembered, reproduced, transformed, and transmitted, and its appearance in diverse forms and techniques allows resemblances among media. Given pattern’s communicability across spatial and temporal boundaries, it is surprising that it remains such an elusive entity.

Throughout history, pattern has formed part of our aesthetics, our mythopoetic world, and our symbol systems, in addition to being pervasive through time and cultures (Gombrich 1984). People become familiar with pattern from a very young age and through a variety of means, and it plays an important role in the development of spatial-concept formation (Piaget and Inhelder 1977). In almost every aspect of our lives, pattern forms an intractable dimension of our daily life and routine, from contemplating vinyl wallpaper designs in our grandparents’ houses to appreciating mosaic façades on municipal buildings; from listening to beats generated by a wooden slit drum to participating in a carefully choreographed dance performance. In almost every activity, pattern plays a critical part in bringing to life the most innocuous and mundane aspects of the everyday world in a never-ending multitude of logical forms.

Pattern is, of course, more than a devotion to visual pleasure. Certainly, regular arrangements of geometric tiles may create a stimulating visual effect on the roof of a cathedral, as is the case in many northern European cities. But I believe there is more to pattern than this, and two recent contributions from the fields of art history and anthropology support this claim. First, David Brett has recently revived debates from an art-historical perspective to look at pattern and decoration as a form of visual ideology. He argues that
pattern involves a corporeal engagement that entails the action of extended looking and reflecting on the process of making (Brett 2005). In other words, what Brett’s sensory appreciation of decoration points towards is a notion of pattern that does not involve separating the thinking about a design from the process of thinking about how that design is actually produced. Brett’s analysis focuses on European traditions in the field of the decorative arts, but he is not so much concerned with the logical properties of pattern and how this translates across varying media. Nevertheless, his work makes an important and timely contribution to recent debates within anthropology that focus on agency and cultural exchange (Gell 1998, Thomas 1991), issues that I return to later in this chapter.

The second contribution I want to note is a remarkable piece of work by the anthropologist Tim Ingold (2007) on the history of the line. Ingold’s work offers a fascinating insight into the multiple ideas interwoven into the line, illustrating how wayfaring, singing, calligraphy, weaving, and walking all proceed along lines. He says that lines subsume all these everyday human activities and so bring them together into a single field of enquiry (Ingold 2007, 1). His work particularly resonates with the study of pattern, because pattern, of course, is composed of lines, spatially transformed and arranged in numerical sequences. Like lines, pattern joins forms, ideas, and activities to give structure to human actions.

My approach aims to build on this work to explore pattern as a type of meta-media, an expressive form of thought that robustly moves across forms in time and space. Drawing primarily on ethnographic field research conducted in the Pacific, I present a kind of comparative anthropology of pattern that explores its production and significance in the Pacific and ultimately attempts to challenge our current understandings of pattern in terms of dualisms between style and culture, symbol systems, and iconographic systems. I take this opportunity to think about how we engage with pattern, or conversely, the way pattern engages us: the manner in which, through its inherent logic, pattern can be viewed as a trace of consciousness when it surfaces in the forms and media through which it is incarnated. In doing this, I am mindful of Stafford’s call to rekindle the lost link between image and concept (1999) and so move away from an analytical engagement with pattern as a locus of difference and towards an ideology of thinking about pattern as an agent that forges connections, thus working, in effect, as an analogical tool. In essence, by investigating the technical properties of pattern and its mathematical basis (numerical and geometric), my approach considers pattern as ‘relational’, a dynamic medium that provokes connections among forms, thoughts, and practices, allowing for the articulation of inter-subjective ideas (Bourriaud 1998, Gell 1998, Stafford 1999).

There is no better place to explore such debates than in the Pacific, where
Chapter 1

Pattern is an enduring hallmark of both everyday and ritual life. From a Pacific perspective, pattern retains special significance as an expression of place, of heritage, and of being and may be located in the intricate form of woven coconut baskets or the fine weaves of a pandanus mat. It may also manifest itself as an index of ancestral presence articulated through orchestrated dance performances or in the rhythmic beats of a wooden slit drum. For anthropologists, moreover, questions about the nature of pattern are ever more pertinent because it is there, in the Pacific, that theories of social anthropology were moulded through classificatory studies of decoration in the ethnographic collections of the late nineteenth century and early twentieth century.

Pattern in anthropology

Perhaps it was in 1852, as a lecturer in the Museum of Practical Art in London (now the Victoria and Albert Museum), that the designer Owen Jones, after studying the wealth of designs evident on the hoards of artefacts shipped in from the British colonies, attributed the ‘evidence of mind’ to those from the Pacific. As Jones was an early exponent of the decorative arts, his observation derived largely from his lingering disdain for the lack of artistic endeavour in nineteenth-century Western society. In his highly influential book, The Grammar of Ornament (2001) (originally published in 1856), Jones famously remarked: ‘It is strange, but so it is, that this evidence of mind will be more readily found in the rude attempts at ornament of a savage tribe than in the innumerable productions of a highly-advanced civilisation’ (2001, 16). His perplexed tone derived from his belief that the technical level of the decorative arts reflected the moral state of a society, acting as a window into the collective consciousness. This view, when brought to bear in relation to so-called primitive societies then considered to lack moral integrity, was challenged by his deep admiration of the designs evident on paddles, clubs, and cloth brought back to London from the Pacific. The urge to ornament was considered to be instinctive so that, for Jones, the ‘savage’ captured a naturalness that appeared lost to those ‘advanced civilisations’ embodied in the artificial decoration of industrial Europe. With the rise of the manufacturing industry in the nineteenth century and the automated and mechanical reproduction of factory-made wares in Western Europe began a decline in the market economy for skilled craftspeople working in the decorative arts.

One reason that I mention this is that his work underlines how, in the mid-nineteenth century, Europeans amassed diverse collections of artefacts in order not only to accumulate knowledge of people, places, and culture but also to exploit their designs and motifs as resources to enhance their own cultural creativity and economic standing. Jones saw that students were encouraged to take patterns and decorative motifs exhibited in museum collections seri-
ously and to engage with them so as to provoke inspiration and good practice. Ethnographic collections and pattern books formed the basis for the learning of the principles of good design whereby illustrations of selected patterns and motifs highlighted skills in handling the line and executing form. A list of thirty-seven rules outline the general principles Jones regards for the arrangement of form and colour in architecture and decorative art, stipulating rules for surface decoration, proportion, harmony and contrast, distribution, radiation and continuity, conventionality of natural forms, colour, colour intensity, tone and shade, and imitation of natural materials.

What is so compelling about Jones’s assertion is his positioning of the decorative arts from Pacific societies alongside those of ancient Greece, Egypt, Italy, and France. Those designs from the Pacific Islands—found in ethnographic collections held at the United Service Museum (now dispersed) and the British Museum—were placed within an evolutionary schema; Jones is careful to draw attention to and appreciate the techniques required in their execution: the refined application of motifs, the treatment of the line, and impeccably observed geometric forms, workmanship that, one supposes, evinces the ‘evidence of mind’ revealed through their creators’ sense of intentionality, ingenuity, calculation, and effect. To illustrate his admiration further, Jones lays out his portfolio of ornamental forms using a newly developed chromolithography process, allowing the images to be revealed in full colour, and studied, copied, and adapted by students and designers as a benchmark of good design practice. Such a presentation can be viewed as a wholehearted celebration of ornament, attributing a positive sense of workmanship to the Pacific mats, baskets, weapons, clubs, and other artefacts in collections. Jones’s position is thus to envisage ornament bound up with a moral economy of the mind, which emerges in the technical mastery of lines and circles, repeated, reflected, and rotated on the surfaces of things.

Jones’s seminal work on the instinctual nature of ornament is a foundation on which to situate our understanding of pattern over the last two centuries. While his work exemplifies an intellectual concern to engage with the technical aspects of design through the comparative investigation of the techniques and skills associated with patterns and decorative motifs, less than fifty years after the publication of *The Grammar of Ornament*, this ideology had been largely superseded by social-evolutionary theories that dwelt on an ideology of classification based on difference, projecting essentialist notions of culture, place, and time. In returning to focus on the mobility of pattern and its conceptual underpinnings in the Pacific, this book sets out to rekindle the presence of mindfulness that appears to be lost to scholars who have come after Owen Jones.

From the late nineteenth century to the early twentieth century, pattern played a central role in the formation of early anthropological theories and
became a focal point for anthropologists to treat as material evidence in demonstrating evolutionary theories of mankind (e.g., Balfour 1893). While Jones attributed the positive qualities of ingenuity and intention to pattern in the Pacific societies, a shift in ideology pointed towards pattern lacking intellectual creativity. One of the most famous of these studies is by the Cambridge curator and anthropologist Alfred Cort Haddon (1895); he proposes that the refined decoration of objects in ‘primitive’ cultures should be perceived as symptomatic of their creators’ lack of social development and could therefore be placed at the lower end of the evolutionary scale. Amongst art historians, decoration was treated as separate and distinct from figuration. For anthropologists, in contrast, the opposite was true: pattern and decoration were considered to be crude attempts at figuration so that patterned designs ended up at the lower end of the evolutionary scale as childlike endeavours at figural portrayal. Within the economy of non-Western design, those patterns composed of abstract shapes were considered to be far more primitive than those composed of naturalistic motifs; thus, it was the former, through a process of salvage ethnography, that anthropologists were keen to document as ethnographic truth of past practices of human society. Geometric designs thus served to fuel the European imagination, substantiating the stereotyped ideas of savagery and headhunting of the time. For example, writing in 1886, Duffield makes the following hypothesis about geometric designs on weapons from New Ireland, Papua New Guinea:

I suppose it may be safely inferred that the ornamenting of spears and clubs, and other missiles of war, indicates the existence among natives of what is known as the religion of blood revenge. One thing is certain, that their spears, arrows, and clubs are beautifully ornamented, and as elaborately as any Eastern gun or sabre. I believe that it is true that the making of weapons of war in the South Seas Islands is still carried on to a large extent, and shows no more sign of ceasing than is to be found among the powerful and polite nations of the world. (120)

Other anthropological approaches to pattern and decoration by the American anthropologist W. H. Holmes (1888) and the Swedish ethnologist Hjalmar Stolpe (1891) are regarded as pioneering works, and Haddon references these. Holmes (1888) describes the decorative art of the Native Americans, arguing that basic forms of ornament are instinctive and reproduced mimaetically before giving way to more purely intellectual methods—a quality of so-called civilised societies—whereby ornament is abstractly treated. Stolpe (1891) also examines art and decoration in Native American populations but extends his study to accommodate Polynesian artworks, again reiterating the relation between ornamental form and intellectual development. Material
culture was instrumental in projecting evolutionary theories of mankind, a model that was extended to understanding clothing (Webb 1907) and representing cultures in nineteenth-century museum displays such as the Pitt Rivers Museum in Oxford.

Early anthropological theories of pattern and decoration shared the same evolutionary frameworks as those theories held by theoreticians in art and design. For instance, the Austrian art historian Alois Riegl (1893) considered ornament to be instinctual, subject to a process of stylistic development. Riegl saw ornamental style as a conventional system—urged on by the creative motivations of the human race but constrained by principles that allowed for the generation of a core body of stylistic features. Riegl’s approach to style was a reaction to the earlier assumptions held by materialists, such as Gottfried Semper, who argued that ornament originated in materials and techniques. The production of pattern was one of necessity rather than of a desire for visual pleasure, and its origin could be traced to zigzag designs in woven textiles or wickerwork enclosures (Semper 1988). Both materials and techniques are approached throughout this book, especially when addressing the effect of colonialism on pattern in the region.

One of the potential pitfalls for anthropologists studying pattern and decoration was the corrupting influences of Western civilisation on non-Western cultures, which, for many theorists at the time, could exert a negative effect on traditional production processes and the resulting designs. Echoing Owen Jones’s earlier concerns about the decadence in Western society that he believed was largely responsible for the production of artificial ornament bereft of ‘naturalness’ in Western societies, anthropologists, missionaries, and colonial collectors alike all felt that local pattern systems would succumb to the onslaught of Western civilisation with the expansion of colonial territory and the opening of trade routes. Such a concern for authenticity in decoration is expressed in diaries of expeditions to the western Pacific in the late nineteenth century, a point I return to in chapter 6.

While anthropological discourses often assume a one-way appropriation of pattern from coloniser to colonised, recent work serves to reinforce the notion of cross-cultural exchange, attributing agency to indigenous craftspeople in their strategic uptake of new materials and new technologies. The work of Nicholas Thomas (1991) is considered pioneering in that it reveals the exchanges between colonial collectors and indigenous people in the heyday of collecting in nineteenth-century Melanesia. His historical perspective draws on entangled items of material culture that flow between Europeans and Pacific Islanders and thereby formed the basis for sustaining social interactions. While his approach sheds important light on the materialist aspects of colonial relations, my argument attempts to go one step further as it seeks to address the conceptual underpinnings of why Pacific Islanders took up cer-
t lain new materials and new technologies, something that Thomas does not explicitly address.

An emerging literature on appropriation points towards the dynamic role of pattern in shaping colonial and settler relations, providing ethnographic case studies that attribute a social life to pattern, suggesting that designs may follow certain trajectories or pathways that are then adopted, transformed, and integrated into local pattern systems. A good example is Ruth Phillips’s study (1998, 1999) of cross-cultural exchanges between Native Americans and Europeans in the American Northeast. She gives a compelling account of how indigenous people appropriated European floral motifs into their clothing, basketry, and other wares. This use of the motifs angered purists but delighted the Christian missionaries, who saw the embracing of floral iconography as symbolic of pacification, domesticity, and acceptance of new moral values. As Phillips wrote, ‘Floral images were incised on trade silver and painted on ceramics, but the most common carriers of these images were undoubtedly textiles. The pleasure that Aboriginal people took in European textiles and their preference for calicos (many of which bore small floral designs) are well documented in European diaries, letters, and travel literature’ (1998, 171). Phillips’s account goes on to reveal that whilst it is often assumed that the indigenous population appropriated such designs after trading with European visitors, it later became apparent that it was French Canadian nuns who first fashioned imitation wares of Native American artefacts before the designs on them were adopted by local craftspersons (Phillips 1999). Such a case serves to highlight the mobility of pattern across boundaries in often unexpected ways and shows how diverging ideas associated with the designs frame different types of action.

Pattern’s hallmark as a communicable form, its capacity to move through networks and across boundaries, has often been seized by anthropologists and archaeologists to trace connections between cultures separated spatially and temporally. In the early half of the twentieth century, such ideas formed the basis for diffusionism, which thrived on notions of origin and movement. Pattern systems and decorative motifs were believed to have spread across island groups and continents, carried by movements of people as they formed trade networks or migrated into new landscapes (cf. Schuster and Carpenter 1996). Arguably the most famous and influential of these studies of Pacific art was Gladys Reichard’s classic 1933 study of wood and turtle-shell carving in Melanesia. This volume transformed studies of Melanesian design by introducing an analysis of one set of objects from a given region that might be expected to typify a local style instead of studying all kinds of objects from a specific locality, as had previously been undertaken (Haddon 1935, 164; Reichard 1933).

Reichard’s method sought to define the underlying principles governing a given art style, revealing elements that, when combined or transformed,
exhibited characteristics that made an artefact recognisable as coming from a specific locale. Her work paid particular attention to wooden bowls incised with decorative designs from throughout the western Pacific but also concentrated on a class of shell valuables collected in vast numbers in the late nineteenth and early twentieth century known for their ‘remarkable appreciation of symmetry and fertility in design’ (Moseley 1877, 410). These striking objects—known by the Melanesian pidgin term kapkap—and explored in the following chapter, consist of a white clam-shell disc with a circular piece of turtle-shell fretwork that, when tied together, create an entrancing regular arrangement of triangles, circles, and lines through a figure-ground effect.

Reichard concentrated on the kapkap primarily because of its provocative nature. Aside from its visual effect, produced by the high level of craftsmanship invested in its creation, the kapkap is an intriguing object as it appears throughout the western Pacific in various forms. Its production extends from the Admiralty Islands, to New Ireland, to Bougainville, and as far southeast as the Solomon Islands. Throughout these islands, there are slight variations in the arrangement of the turtle-shell designs. Reichard’s analysis concentrates on mapping regions of style through a diffusionist approach, given that many collectors had remarked on the design of the kapkap as ‘the same but different’. Reichard’s analysis is striking because some seventy-five years from the publication of her book, her work is recognised as probably the first to consider in some detail the technical workings of pattern as a system of relations. In concentrating on Melanesia as an interrelated stylistic system, she underlines how the differential spread of a unit motif across island groupings creates systems of difference among closely connected cultural groups that produce similar types of artefacts. Even though Reichard herself did not conduct fieldwork in Melanesia (her survey was restricted to an examination of museum collections), her formal analysis of the multitude of variations among similar patterns exemplifies how pattern works as a kind of technology to create a system of relatedness, an approach I aim to develop throughout this book.

Since then, and with the rise of structuralist anthropology in the mid-twentieth century, a series of anthropological studies has concentrated on pattern in relation to the transmission of knowledge. There are, however, two opposing perspectives. The first of these perspectives approaches pattern as object of metaphorical thought and is concerned primarily with the study of response. This approach includes studies that have examined pattern as an aesthetic medium capable of engendering person–object relations that is intricately related to mythopoeic worlds. For example, in his work on Nuba body art, James Faris (1972) takes the style–culture position to argue that the social concern for patterning of the body objectifies stages in the Nuba lifecycle. Similarly, Kaeppler’s study of Tongan art is a typical example of the many structuralist perspectives on material culture that correlate decora-
tive form to social and spatial organisation within Pacific society; for Kaeppler, the structural composition of elements within Tongan decorative art is a visual representation of social hierarchy (1978). Her work is addressed in chapter 7 of this book.

A number of these studies have looked at pattern as an object of mathematical knowledge. For instance, the art historian Oleg Grabar (1992) contends that the rich complexity of Islamic tiling is a metaphor for the Islamic concern for mathematical ideas. He goes on to argue that person–object relations are founded upon the visual impact of the tiling patterns and act as a basis for attention-drawing qualities. Arguably the most influential study in anthropology is that of Washburn and Crowe (1988), who analysed pattern systems found in cultures throughout the world. Their analysis focuses on the symmetrical transformations that underlie patterns on artefacts such as pots and mats to classify difference between cultures. Their methodology relies on the fact that patterns are composed of combinations of rotations, reflections, and translations and that certain classifiable combinations of symmetries bear the hallmarks of a particular culture. We are told that this methodology is inspired by crystallography; the structure of pattern is treated the same as the crystal structure, both of which are composed of an array of symmetrical transformations. By discovering the range of symmetries in each pattern or crystal, the analyst is able to classify the objects accordingly. Washburn and Crowe’s methodology also purports to trace cultural change: by studying a range of objects from a selected culture, any changes in their symmetrical classification are assumed to be the outcome of internal or external forces of cultural transience.

More recently, the patterns painted on handmade cloth of the Piro of Amazonia offer another way into understanding pattern as an object of metaphorical thought. Peter Gow (2001) describes how woven cloth embodies mythical designs, displayed as abstract shapes and patterns. Gow argues that it is not the meaning of the design that is important but rather the mythical relation of the design to Piro society that people value. We can therefore see how these anthropologists identify pattern as a symbolic vehicle that reflects social structures, concerns, and values. Such approaches typically locate knowledge outside the patterned form itself, so that designs on the surfaces of objects simply stand for or reflect ideas held within society.

The second perspective examines pattern as an externalisation of knowledge technology and thus as an object of knowledge rather than its symbolic vehicle. These types of approach generally focus on the materiality of pattern and the integration of mental with material forms of technology. For example, Brigitta Hauser-Schäublin’s 1996 study of Abelam art of the Sepik region in Papua New Guinea argues that the line, the strip, and the string constitute the three vital elements in the visualisation of patterns that are deemed to hold
paintings together and bring them to life. Her ethnography demonstrates how ways of thinking about an artwork are translated into material form in the process of making. Similarly, Howard Morphy analyses bark paintings of the Yolngu from Northeast Arnhem Land, Australia. He states that patterned images appearing as luminous cross-hatching designs abstractly represent an artist’s dreaming, articulating in material form knowledge of a clan’s relation to the land forged through the movement of mythical ancestors who once roamed the environment (Morphy 1991). Cross-hatched images are highly potent and so their revelation is tightly controlled amongst initiated men, who have earned the right to gain access. The case of the Yolngu bark paintings, like that of Abelam art, underlines how patterned forms assume powerful roles in reproducing links to the ancestral past through making visible the knowledge essential to rites of succession in society.

Most recently, Gell (1998) has provided us with a theory of pattern that enables us to fruitfully combine these two perspectives in a study that pays unique attention to pattern as locus of agency in ritual and everyday domains. He contends that objects are thoughtlike in nature, being material manifestations of the workings of the extended mind that are able to engender social relations. Further, Gell proposes that objects are like exuviae, or reptile skins, that shed, leaving traces here and there. These hollow skins (as representations) are gathered (as perceptions) and internalised (as memories) before later being reconstituted (as objects). Viewing the technical capacity of an object to contain within itself the potential to harbour memories reaching into the past and extending forth as future possibilities and aspirations, he argues that objects are the workings of the mind, objectified in an external form that can be displaced both spatially and temporally.

Gell’s anthropological theory of art has considerable application to Melanesia: he states that ritual images articulated in the form of objects, performances, or bodies act as vessels through which thought itself is conducted. Gell borrows from Nancy Munn (1986), explaining that kula-shell valuables from the Massim (Papua New Guinea) take on their own trajectories through trading networks across the island, carrying the biographies of former owners as they circulate through generations and across the ocean’s expanse. According to Gell, the shells themselves are the locus for thought itself—devices through which exchange partners direct thought:

The operator must be able to comprehend the manifold innumerable past histories of exchanges, and evaluate their outcomes. He must construct ‘what if’ scenarios that anticipate the future with precision, guiding strategic intervention. His mind, in other words, must work as a simulation device—and this indeed is what all minds do, more or less—presenting a synoptic view of the totality of Kula transactions, past, present, and to come. (1998, 231)
According to Gell (1998), the much-sought-after shells accomplish this by holding a person’s attention—almost coercing the mind, enticing and luring a person to engage in exchange relations. The shine, shape, and the smoothness of a *kula* shell are key qualities that demand attention from rival exchange partners and may mobilise an exchange attempt. The *kula* shell thus acts as agent for instantiating and sustaining social relations.

In extending his argument to decorative art, Gell (1998, 73–95) describes pattern as ‘cognitively complex’, with the qualities to ensnare and entrap persons through its intrinsic nature—that is, its incomprehensibility. He shows that for many societies throughout the world, patterns on walls, in the sand, and as mazes act as apotropaic devices to attract and ultimately repel spirits in an effort to maintain well-being. Hence, a canoe-prow carver in the Trobriand Islands may exert influence over a rival exchange partner on a distant island simply by creating a highly patterned canoe splashboard. The carver—by imbuing magical qualities into the designs on the board—not only gives the canoe greater speed to travel across the open sea but also instils the canoe board with the power to persuade rivals to part with their *kula* shells. The carver’s intention is that the technical ingenuity of the patterns on the canoe prow will momentarily transfix the rival *kula* partners and persuade them to part with their *kula*-shell valuables.

Of considerable importance to the debate developed in this book is Gell’s argument about the nature of style as a system of associations (1998, 155–220). Gell conducts a formal analysis of art from the Marquesas Islands and shows that a set of common relations exists among all the basic elements within the Marquesan system of style. This set enables all past, present, and future stylistic relations to be generated, and it functions, in effect, as a system of parts and wholes. Gell argues that Marquesan artists maintain an oeuvre (the whole); that is, they adhere to a rigid set of basic principles in the technical process of creating Marquesan artworks. However, this set of principles also allows the artist enough leeway to create minute variations in style, a process that generates a system of slight variations between one artwork and another (parts), giving rise to a sense of individualised works within Marquesan art. Artists are acutely aware that any radical innovation may render the artefact they are creating useless, impotent, and therefore ineffectual, so they adhere to stylistic principles in order to make Marquesan art recognisable. Gell goes on to argue that these stylistic relations are evidently a conscious act aimed at creating social difference within a society that places stress on conformity.

Gell’s generative theory of stylistic relations is extremely useful when applied to the context of pattern in the Pacific. In reviewing an entire corpus of motivic variations, it becomes possible to draw out the workings of pattern in a given region, similar to the way Reichard proposed half a century earlier. Using this theory, we can begin to see how pattern is constituted as a system
of relations, not differences, generated through style. For Gell, style acts as
a top-down mechanism that manages the generation of all motifs and their
derivatives so that each derivative is recognisable as coming from a particular
corpus. It is this process of eliciting links between one form and its transfor-
mation within the corpus that allows one to recognise resemblances between
that form and the next. The corpus (the whole) thus encompasses all possible
transformations of a motif (parts). Therefore, we can begin to see how pat-
tern operates as a relational entity, a medium for thinking through one form
to the next. It is the dynamic composition of pattern, its potential to be acted
on through transformation, that creates visual and material ways of knowing
and sets the basis for beginning to understand how we think through pattern,
a point I wish to develop now.

Thinking through images
Barbara Stafford (1999) reminds us that thinking through images—that is,
the innovative process by which we transform images in order to create new
understandings—is one of the most fascinating ways in which we experience
the world. Much of the way we learn—and the intuitive means by which we
often form conclusions or solve problems—involves this process of think-
ing through images. As young children, we are encouraged to explore basic
mathematical concepts by thinking through images available in the world
around us, such as understanding ratios using glass jam jars filled with varying
amounts of water. Similarly, within the mathematical sciences, it is often for-
gotten how physical models played a crucial role in the discipline’s historical
development, underlining the vital importance of the various ways in which
we formulate knowledge. For instance, in the late nineteenth century, Felix
Klein, a mathematician who became famous for the Klein bottle (a seemingly
impossible vessel of only one surface) set up a workshop in Munich in which
mathematicians designed a series of flexible cardboard models in order to
experiment with topological surfaces. The key property of these models was
their transformability. Each model was flexible enough to contort into various
shapes so that many new surfaces could be produced using only one model.
The transformable models went on to play a crucial role in allowing peo-
ple to think through and progress in understanding surface properties using
hands-on techniques to explore possible variations of form within a prototype
model. This is significant for any understanding of pattern because it shows,
as did the cardboard models, how transformable media can become the basis
for the mind at work.

Thinking through images is evidently of considerable importance to
anthropology as this process seems to relate to how people formulate and
shape concepts about their world. As the art historian Barbara Stafford points
out, any analysis of the link between image and concept is central to an anthropo-
logy of the senses, though all discussion of this has been supplanted by an
obsession with difference in Western thought so that images are perceived
as lesser and illusory forms of written communication (1996, 22). To start
on this balance, an exploration of pattern in the Pacific aims to high-
light the ways in which thinking through images becomes relevant to social
processes in the region, where images are presented through forms such as
objects, bodies, performances, and so forth, the media through which pattern
flows (Strathern 1990).

What patterned images appear to do or are expected to achieve, and why
there is such expectation at all in the efficacy of certain images are the recur-
ing questions in recent work from both an art-historical perspective (Brett
2005, Gombrich 1982) and from an anthropological one (Bateson 1973, Gell
1998). Such questions are a central aspect of the work of Barbara Stafford
Europe, a sophisticated form of visual education existed that involved learn-
ing through experimentation with hundreds of images in order to uncover
connections between them and form new categories. Drawing on Western art
history and intellectual movements, she explores these more subtle and sen-
sory forms of knowing in a series of studies that delve into the mind-shaping
powers of sensory skills in the history of education, science, and technology.

For Stafford, the term ‘analogy’ expresses the capacity to think through
images. Her argument is that analogy is inherently visual and consists of
the power to intuitively create connections and inferences in order to solve
problems. Analogy consists of the capability to disassemble and reconnect
countless numbers of images into innovative forms; she notes, ‘the capac-
ity to generalize to new objects from those already encountered is based on
perceiving common traits and matching them according to a shared category’
(Stafford 1999, 61). Though Stafford’s point is that we in the West were once
schooled into thinking analogically (she states that analogy has virtually been
ignored in the arts and humanities since the eighteenth century), her theoreti-
cal insights can be fruitfully applied to non-literate societies such as those in
the Pacific, the focus for this book, where people are still especially adept at
thinking through images (Were 2005b).

The notion of analogy has been taken up indirectly in a number of recent
anthropological studies on pattern. Gary Urton (1997), writing on Quechua
weavers in the Peruvian Andes, shows how people think through coloured,
patterned cloth to express their cosmological ideas. As cloth is woven by
women on a handloom, the brightly coloured patterns on the cloth are visual-
ised as mathematical arrays of numbers. Girls, under the guidance of elderly
women, start to learn to weave by memorising sequences of numbers that
correspond to patterns in the cloth. Gradually, as the young women become
more proficient at weaving, the numbers become incorporated as bodily gestures until eventually the technique of weaving cloth is remembered as a series of rhythmical movements that relate to a complex array of numbers. What is important to understand is that, in Quechua society, numbers take on cosmological significance: natural numbers are related to key stages in cosmogenic formation. Urton’s study reveals how the numerical series learnt in the production of patterned cloth allows Quechua women to articulate and thus transmit ideas about creation myths through the production and circulation of patterned cloth. Moreover, this study reminds us how pattern acts in sustaining, in material, visual, and gestural form, ritual knowledge in a non-verbalised and highly practical way.

While Stafford’s notion of analogy concentrates on the visual element of the senses, ethnographic studies from the Pacific offer a critique of this, suggesting that analogical thought may be expressed materially through the coordination of tactile engagement and verbal articulation. One of the most insightful studies was made by the anthropologist Jürg Wassmann (1991), who concentrates on the workings of the kirugu, a knotted cord produced in the Sepik region of Papua New Guinea. During clan song cycles, a knowledgeable man passes the kirugu knotted cord through his hand, reciting ancestral names. As he moves his fingers along the cord, he feels small and large knots, devices for ordering the interjection of clan stories. Only senior clan members have knowledge of these stories, but their articulation in ceremonies as small fragments allows less senior men to recompose the stories and thus learn the origin story of their clan. In effect, we can see how the knotted cord becomes an active surface forging a relation between material object and mental process through the movement of the hand as it feels it way across smooth spaces and knotted contours, generating responses from the holder of the cord. In this context, this work offers insights into the relationship between material and mental processes that help shape intellectual activity in the production and articulation of knowledge. Moreover, both the Andean and Sepik examples highlight how tactile engagements with topological surfaces such as knots, threads, warps, and wefts engender various models of thinking about the world through the physical process of manipulation, gesture, and transformation.

Like the cardboard models built in Felix Klein’s Munich workshop, analogy shows how the properties of assorted media allow for variation to be built into the forms that emerge, offered by the possibility of being transformed into another form. In this case, variation can thus be achieved by altering numerical sequences (as in warp and weft combinations of Andean weaving) or spatial distance between elements (as with the kirugu cord). Each change signals an innovation in the subsequent form, though ultimately this new form results as an index of its predecessor, acting as a kind of prototypical model. The inbuilt
capacity of objects to create variation is evidently of considerable importance to this study of pattern as the properties of pattern offer the basis for an endless source of innovation through transformations of symmetry (repetition, rotation, reflection, etc.) and compositions of numerical sequences. Each new pattern emerging is an index of the pattern before, enchaining all successors to their predecessors, creating, in effect, a corpus of relational designs. This inbuilt variation seems therefore to be rooted in calculative and spatial tasks, of which new patterns are generated from old ones. Any discussion of spatial or numerical knowledge naturally leads us to ask further questions about the nature of pattern and its relation to mathematical thinking.

**Pattern and ethnomathematics**

Since Claudia Zaslavsky’s groundbreaking research in *Africa Counts* (1973), which brought into sharp focus the contexts in which non-Western cultures utilise complex mathematical ideas, a wealth of studies in ethnomathematics have highlighted the calculative and spatial ideas employed in the processes of doing, making, and thinking. Challenging the perception that mathematics and culture lie at opposite ends of a spectrum, ethnomathematics brings to the fore numerical and geometric ideas utilised in tracing out kinship ties, organising and modelling local conceptions of space, and deploying strategies to win games or to predict the future (Ascher 1991, 2002; Bishop 1988; Eglash 1999; Gerdes 1985).

The study of pattern obviously falls squarely within this field as it evidently relates to the performance of numerical and spatial operations in the process of making and doing. There are, indeed, a number of studies that focus on the articulation of mathematical ideas in the production of material culture or performance. For instance, we find this expressed in mancala counter games from Nigeria, divination devices from Madagascar, and complex geometric designs known as *kolam*, placed on the thresholds of houses in southern India to ward off malevolent spirits. Despite the fact that these ideas may not themselves be considered or categorised as ‘mathematical’ in any given society, ethnomathematics raises pertinent questions about the role of mathematics in culture (offering a weighty critique of anthropological approaches that situate art as a form of languagelike communication) and may even challenge accepted Western mathematical concepts. For instance, a compelling work that brilliantly confronts Western mathematical conventions concentrates on the Iqwaye of Papua New Guinea and their conception of infinity. In this work, the anthropologist Jadran Mimica (1998) shows that rather than conceive of infinity as unbounded and unknowable (a Western understanding), the Iqwaye believe that infinity is intimately tied to creation myths and local cosmology and is always equal to one.
While this novel ethnographic case study raises clear issues about Western epistemology, it is grounded firmly within social anthropology and is not so much concerned with the material aspects of mathematical thinking. While we could say that most studies within ethnomathematics privilege objects, performances, and practices in their analysis, in general these studies fall between two camps. The first of these is the work of curriculum planners and mathematics educationalists, who are keen to enhance mathematics programmes in developing countries by making curricula more sensitive to specific cultural contexts. The limitation of these studies is their failure to tackle questions about the materiality of cultural objects that act as such powerful devices for the articulation of mathematical ideas. The outcome of this is that many such studies foreground the calculative processes bound up with objects at the expense of providing any anthropological depth into their material underpinnings. The second body of recent research was conducted by anthropologists working within the field of ethnomathematics; these scholars have sought to redress the balance between the materiality of objects and their mathematical relations.

The anthropologist Ron Eglash, who concentrates on fractal design in Africa in order to address issues of complexity in Western scientific thought, has made a major contribution in this area (1999). Fractal design is a kind of non-linear geometry that consists of iterative patterns and that involves complex operations such as scaling and repetition of self-similar motifs captured, for example, in the design of fern-leaf patterns. Eglash challenges us to envisage a new kind of relationality based on a complex set of iterative scaling relations. He argues that in African architecture, aerial studies of traditional settlements reveal the use of fractal structures—circles of circles of circular dwellings, rectangular walls enclosing ever-smaller rectangles—in their formation. These fractal-scaling patterns also resonate throughout other forms and knowledge systems and find their expression in hairstyles, textiles, carved masks, and ritual performances. The main thrust of his critique centres on Western assumptions about mathematics and intellectualism: using his ethnographic material of fractal design, he puts forward the powerful argument that highly developed thinking about spatial and numerical relations existed in African societies long before the discovery of chaos theory in Western society (from which scientific discourse on fractals derives). In so doing, Eglash is keen to distance himself from other ethnomathematicians whose analyses inadvertently draw attention to basic mathematical thinking, which he says could be misconstrued as reinforcing primitivist conceptions.

Eglash’s work is important because it underlines how the articulation of fractal geometry can be understood as an expression of complex thought and intentionalities at play. This analytical focus on ‘relations between relations’ derives from another perspective in the well-documented case of the Inca
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*khipu*, a device that relies on the manipulation of strings and knots to communicate between settlements and to keep historical records integral to social memory in the Inca state. At first, one might imagine that the string device works through simplistic binary configurations of knots and pebbles tied to its threads. However, according to Gary Urton (2003), the *khipu* encodes and stores this information through combinations of knots and pebbles tied in relation to one another and placed in a hierarchical system of main thread and sub-threads. Urton argues that the coding system of the string device acts analogously to the way modern computers operate, with data stored in binary form. For Urton, the *khipu* is a vehicle for a mathematical language expressed in the form of strings, knots, and pebbles encoding complex ideas and associations.

The implications of both these studies for our understanding of pattern are profound because they underline the complex relation between the mental and the material and demonstrate how mathematics is fundamental to structuring this knowledge. Yet, while these studies underline the workings of objects in Africa and the Americas, surprisingly little work has set out to investigate the mathematical ideas held by people in the Pacific, a region well known for topological forms such as knotted and looped configurations (Küchler 1999, 2001) and comparable to the cardboard models made in Klein’s workshop.

One notable exception I want to highlight, though, is the work of Marcia Ascher (2002). Her compilation and analysis of a series of anthropological studies of mathematical ideas embedded in practices and objects reveal how mathematical knowledge is central to sustaining social relations. The most fascinating example is her analysis of the famous Marshall Island navigation stick charts. Here she shows how seemingly incongruous arrangements of sticks in grid formation are quintessential tools for learning how to navigate the open ocean by outrigger canoe. At first glance, one sees what appears to be a simple arrangement of bound sticks secured in a gridlike formation; Ascher shows how these types of stick chart, called *mettang*, are prototypical devices for representing the topography of wave reflection and refraction around tiny coral atolls in Micronesia. *Rebbelith* and *meddo* comprise another class of stick charts and are maps of entire archipelagos or smaller sub-regions; small shells mark the position of atolls, while straight or curved sticks represent the wind and sea interaction in and around known groups of atolls (Ascher 2002, 89–126). Her study goes to show how regular alignments of sticks arranged into a geometric formation can be considered an economic form of knowledge vital for the transmission of navigational expertise from one generation to the next.

It appears that pattern in the Pacific, as elsewhere, plays a vital role in processes of memory and knowledge transmission, and this book sets out to address
these themes. Strings, stick charts, and so forth are objects that may appear trivial, but their construction, articulation, assimilation, and transformation within the course of activities warrant a careful analysis and understanding of how seemingly prototypical configurations are transmitted between persons, and the social conditions under which this occurs. Indeed, as Marcia Ascher points out in her analysis of the Marshall Islands stick charts, what is baffling is that the charts are not carried on voyages with seafarers but appear to instead be recalled from memory. Any engagement with pattern should thus examine the social context for the internalisation of pattern, whether in everyday or ritual life, a point I come to now with regard to anthropological approaches to learning and knowing.

Ways of knowing

Although most research into learning has been carried out in the field of education, there are three approaches in anthropology that address the construction of spatial and numerical knowledge that are germane to an anthropological understanding of pattern. The first perspective focuses primarily on socio-historical processes in the construction of knowledge. A good example of this is Christina Toren’s 1990 study on the learning of social hierarchy in Fiji. Her work examines the acquisition of an understanding of spatial relations and categories in social practice as evinced in the *kava*-drinking ceremony. Toren states that a person’s concept of hierarchy is related to spatial reference points during *kava* drinking. The position in which persons acquaint themselves spatially is concretised through reference points within buildings and the ritual space. Utilising children’s drawings, Toren demonstrates that ideas about hierarchy are internalised over the course of *kava* activities, when children gradually acquire the logic of spatially ordering social relations. Her work shows that representations are by no means ready-made but take shape in practice (1990, 17).

The second approach, that of cognitive anthropologists, explores the acquisition of cognitive skills in a specific context—a process called ‘situated learning’. In one study, Saxe (1991) argues that people acquire mathematical skills whilst performing specific everyday tasks and activities. Examining the mathematical performance of street children in Brazil who sell confectioneries for a living, Saxe found that children developed cognitive styles and skills specific to the numerical and spatial problems encountered in their daily routines. As the trade prices of sweets fluctuated, the children made new calculations of unit prices. That there were rival confectionery sellers meant that children had to adapt their unit prices to compete with special prices on offer by rival sellers. Incredibly, tests showed that the street children could outperform their schoolmates on a set of mathematical tests so long as these tasks
were presented in physical form (confectionery boxes) and within the process of doing (selling sweets).

Saxe suggests that we often forget that complex calculations are often performed outside of the formal space of the mathematics classroom, a point raised by Jean Lave (1988) in her study of supermarket shoppers. Lave shows that persons acquire mathematical skills while assessing best-price deals in the supermarket, whereas shoppers using formal mathematical techniques cannot successfully reproduce the same calculations. These two studies indicate that mathematical ideas are employed and interwoven into specific aspects of everyday life and that material culture plays an important role in our thinking through calculative processes in the process of doing.

Educationalists’ recognition of informal and ad hoc ways of knowing within underrepresented or marginalised groups leads me to a third anthropological approach to learning, one that explores pluralistic ways of knowing. Turkle and Papert (1990) assert that there can be no one way of knowing; instead, people employ many ways to arrive at conclusions and representations. Drawing on their research amongst U.S. computer programmers, they show how programming problems are tackled using a combination of formal and abstract models, in addition to multiple other techniques besides standard computational methods. Similarly, Wassmann (1994) states that, amongst the Yupno of Papua New Guinea, people employ three different techniques in spatial perception. Whereas Western concepts of space are egocentric, the Yupno use object-centred locations such as relative positioning, absolute positioning (north, east, south, and west), and anthropomorphic projection to locate themselves in space. These may be employed at different times and are context dependent.

These approaches, by asserting the significance of multiple ways of knowing and thinking, raise some important issues about any understanding of pattern. As we have seen with the stick navigation charts from the Marshall Islands, people acquire cognitive skills and abilities specific to their social environment, and these may be employed at certain times. It is with this recognition in mind that we can really begin to reengage with pattern and fully appreciate how people exploit pattern to operate effectively in their life-worlds.

Trajectories

This book leads us on a path through objects and photographs, historical literature and contemporary ethnographic case studies to explore pattern and its logical workings. The first of the following seven chapters, chapter 2, introduces and explores the central argument of the book. It concentrates on a group of people called the Nalik in northern New Ireland, Papua New
Guinea, where I conducted fieldwork (2000–2001) and develops the idea that for people on this island, pattern is a form through which they think. This assertion is explored by focusing on a well-known patterned-shell valuable called a *kapkap*, which is carved throughout the region and presented to clan leaders at mortuary feasts in order to transfer power from one clan generation to the next. In the nineteenth and twentieth centuries, Europeans collected the *kapkap* in vast quantities largely because of its decorative appeal, but this chapter shows that rather than being merely decorative, the patterns on the *kapkap* are forms for expressing relations to the land and to the dead, and for recalling social history, and are thus a material form of knowledge. In doing so, the chapter provides the first ethnographic account of the *kapkap*.

Chapter 3 explores the conditions under which pattern no longer connects images to ideas. It does this by questioning the role pattern played in the Nalik people’s conversion to Christianity, giving an historical account of the tensions between the missionaries and local people in New Ireland with the missions’ arrival in the late nineteenth century. My study, like others in the history of mission Christianity, shows that Naliks embraced certain images associated with the Christian mission and situated them within the ritual economy, a set of rites tied to a recognisable pattern of spatial and temporal events. Examining new patterned forms of funerary art that emerged with missionary activity on the island—such as decorative pillars in mission buildings, gravestones, and carvings depicting biblical scenes—I look at the difficulties local people experienced in engaging with these new religious forms.

Under what conditions does pattern become an index of a person’s belief in new ideas? This question is investigated in chapter 4, through an exploration of the Baha’i faith, which first came to New Ireland in the 1950s and took hold in the Nalik-speaking area. I examine how the new ideas and beliefs appealed to local people, particularly because of Baha’i efforts to reinstate traditional performances as a form of worship. What is key to thinking about religious change in a region, I argue, is to consider how pattern is translated into performances to express notions of newly located ancestral power and ritual efficacy. The contrasting successes of both the Christian and Baha’i missions therefore seem to be an index of the capacity of New Irelanders to think through such performances and encompass new forms of social relations within them.

In chapter 5, I address how pattern is constituted, managed, and transmitted in New Ireland society. I examine pattern as a logical entity and consider how it is internalised and reproduced in various contexts. Rather than seeing pattern as appearing as a phenomenon solely confined to ritual events through its articulation on carved objects and in performances, I consider how features of everyday life and understandings of the social and ritual environment provide a conceptual understanding of the associative nature of pattern. What is
important here is how young people develop their knowledge of pattern and how this knowledge surfaces in representations and understandings of events in which patterned forms play a prominent role. It becomes evident that pattern is ‘good to think’—and this is examined through local counting systems and mathematics curricula, where pattern is prominent. Such an analysis of pattern makes a timely comment on a burgeoning area of research in the field of ethnomathematics.

Chapter 6 explores how pattern has been instrumental in instigating change within the Pacific. Taking a broader focus on Melanesia, I explore how new materials flooding into the region brought with them new ideas carried by pattern. This approach critiques the general assertion that the adoption of new materials in the form of cloth and clothing can be viewed simply as a blind conversion to Christianity—as the missionaries believed. I argue instead that this adoption helped carry old ideas in the new forms that emerged, aided by the new economy in pattern carried by European cloth. I support my conclusions with historical photographs, missionary narratives, and other documents to show how new materials were selectively adopted by local people for their patterns, colours, and textures. Often, newly acquired clothing was worn by local people similar to the way it was worn by Europeans, but a lot of clothing was shredded, unpicked, or re-stitched to create forms that bore resemblances to the patterned forms of traditional shell ornaments and other clothing and ornament valuables.

In chapter 7, the book widens its analysis of pattern to encompass the western Polynesian islands of Tonga, where I conducted field research in 2004. I concentrate on openwork patterns primarily fabricated in cordage in the form of string figures, intricately adorned girdles, and contemporary forms of body wrappers, known as kiekie and ta’ovala. While cordage offers an ideal medium in which pattern may flourish, an important question remains: Why did the needlecraft technique of crochet brought to the island by French Marist laywomen in the nineteenth century succeed in Tonga, whereas other needlecrafts fell into disuse? In attempting to answer this question, I explore how cordage and openwork patterns used in the fabrication of crocheted body wrappers transformed women’s work in wealth production and facilitated a new form of agency through the production and exchange of pattern. The final chapter summarizes the key points in each of the chapters and explores the mathematical mind and the implications of it for anthropological debates in the Pacific.