Introduction

Materials and Design

We live in a world where there are now more materials than ever before. We expect products that will improve our quality of life, incorporating materials and technologies that are efficient, cost-effective, aesthetically pleasing and sustainable, and compliant to the demands of the twenty-first century consumer. And yet, at the same time, we still know very little about how materials are used or developed, or even the processes by which these materials emerge in the world we live in. Many car drivers do not know what the steering wheel of their new car is made from, let alone the history of this material's development in laboratories and amongst users, and when it first began being used by car manufacturers and for what reasons. Seeking answers to these questions reveals important information about the complex lives of materials and their place in our society. In effect, we readily take materials so much for granted that their importance in shaping how we think and what we do is often overlooked.

Until recently, most periods of technological development were linked to changes in use of materials (Boivin 2008; Wengrow 1998). Now, it is becoming increasingly apparent that the driving force for materials innovation and design has been information technology. A range of smart materials such as temperature-responsive fabrics or self-cleaning glass are now able to process data and respond in real time to stimuli in the environment. The impact of materials innovation on our lives is that materials do more and more of the work.

In this book, my concern is to extend these stories of technological development and materials innovation beyond the world of Western societies. I go beneath the surfaces of these taken-for-granted

constituents of everyday life and explore how materials innovation impacts on people's lives in the Pacific. The Pacific is an ideal region to observe and explore materials innovation because there is a long history of materials innovation continuing to the present day: from Papua New Guinea to New Zealand, driven by a variety of actors, such as local craft-makers, builders and artists or those who have visited the region, such as colonial botanists or materials scientists. Like engineered materials of Western technoscience, which were developed precisely because of their inbuilt capacity to respond to certain environments, my goal is to argue that plant materials used in design projects in the Pacific are selected on the basis of their informational capacities and so are productive of thought and action. Their selection is optimized for specific uses in the environment and to a range of contexts to which they will be exposed; and so the technical aspects of biophysical structure together with their aesthetics and design have direct outcomes in the social world.

This book, therefore, concentrates on the way materials innovation helps Pacific societies to manage their lives better, and this is an objective of human-material interaction everywhere. I delve into their rich histories in development and product design because so little is known about materials and their role in social innovation in the Pacific. Moreover, the book reveals the historical and changing nature of materials of a region, probing their complex relation to transformation and display in design activities through a diverse range of case studies from Papua New Guinea, New Zealand and the Solomon Islands. Utilizing an ethnographic framework to explore diverse contexts – such as the laboratory, the village hamlet and the museum storage facility – this book explores the complex relationship of materials to shifting boundaries and interfaces relating to culture and tradition; their relation to personifications of power and human agency; and the ideas, perceptions and associations embedded in the materials themselves, whether pandanus, bark or even digitally augmented. It breaks new ground in understandings of materiality and sociality in the Pacific by bringing the emerging theoretical literature on Western technoscience and materials innovation in direct conversation with the anthropology of material culture in the Pacific.

Game-Changers and Enablers

Western cultures have a lot to learn from indigenous engagement with plants and materials, and this book explores the role of materials as

constituent elements in the formation of people's lifeworlds in the Pacific. The book highlights how through the processes of informed selection, transformation and display, plant materials in Pacific society offer the capacity to create situations and events through their integration in projects of design, whether worn on the body, in architectural design or as 3D digital objects. Plant materials such as leaves, lianas, woods, stems and sap are understood as game-changers, not simply in terms of creating form and function; they are also 'enabling' and so enact forms of sociality through their transformation and the responses these elicit. Following Elizabeth Shove et al. (2007), who introduced the notion that Western materials such as plastic are 'co-productive' (simultaneously productive of new consumer products and new modes of living), I extend this argument to the plant materials of the Pacific to focus on the way materials are generative of certain forms of sociality and modes of being. Indeed, this book demonstrates how materials not only communicate certain ideas through forms of self-fashioning, as Strathern (1979, 1988) has famously argued in relation to articulations of personhood and power in Highlands New Guinea; it is the materials themselves that also perform certain actions in the social world by 'making themselves known' (DeLanda 2006) – information in their constitution linked to their biophysical structure and outward aesthetic.

Therefore, one of my main concerns is to recognize the natural vulnerability of plant materials and frame the performance of their biophysical structure alongside their operations and effects in the social world. I trace out their complex histories and trajectories as they move through various stages in their lives (Kopytoff 1986) before they deteriorate and decay or are recycled, repurposed or discarded. In this way, their presence as much as their fragility animates thought and action and so materials are not fixed but always in a state of becoming. I emphasize their mobility and biographies precisely because recent work has underlined how materials do not arrive in the world ready to use; rather they emerge in social worlds over time having negotiated a multitude of actors as well as other competing materials – all of which have shaped the way these materials appear in the public domain (Daston and Galison 2007). In uncovering materials, I wish to rekindle the *material* in material culture by putting matter under the analytical microscope and situating it within an expanded political, historical and social framework (Barry 2013; Bensaude-Vincent 2013; Hawkins, Potter and Race 2015). In extending the scope of analysis at the margins of Western technoscience (where studies of materiality have been focused to date) and placing the analytical microscope on

the Pacific, this book reveals the active nature of plant materials in design and innovation in a region where plants have long simply been taken for granted in the anthropology of material culture.[1]

While an increasing body of work on new materialism has focused on the networked assemblages of scientists, consumers, planners, funders and environmentalists in the development of materials including plastics, aluminium and concrete (Barry 2013; Bennett 2010; Hawkins, Potter and Race 2015; Latour 1996; Meikle 1995; Sheller 2014), these studies have exclusively placed their sociological analysis in the dominant realm of Western technoscience. This somehow reinforces the assumption – through its conspicuous absence – that materials innovation does not take place outside any model of Western science; that comparable types of decisions and informational networks do not exist outside the privileged world of Western society. This narrow approach has two consequences for our understanding of materials innovation. Firstly, it prevents us from understanding the dynamic relationship between society and materiality in cultures outside our own. What are the inherent processes of materials innovation in regions of the world that seemingly appear untouched by Western technoscience? Secondly, such an approach also perpetuates an invidious distinction between non-Western/natural materials and Western/synthetic materials and suggests that there is no material, design and innovation transfer between the two categories when, increasingly, this is not the case. Indeed, we simply need to look at the rise of materials libraries and the contemporary uses of botanical collections to recognize the co-dependency of natural and synthetic plant materials and how indigenous knowledge has informed Western technoscience (Gamage et al. 2012; Miodownik 2015).

In order to adopt an integrated approach to fully appreciate the complexities of materials innovation taking place in the Pacific, this book examines a series of projects of materials innovation across the region to challenge this analytical shortfall. I demonstrate how materials are quintessential to ways of being and thinking in the world and how the ever-changing nature of materials drives social transformation of a region. Today, as in the past, I argue that materials innovation is at the vanguard of social transformation because any engagement with plant materials on the part of Pacific people requires an empathy of their potential and performance together with an intellectual engagement of 'working them out'.

My case studies reveal how materials innovation is active and ongoing, expressed, for example, in the creative attempts of women and men to revive material knowledge in order to reinvigorate traditional

craft production techniques. Unlike the Arts and Crafts Movement led by William Morris in Britain in the late nineteenth century, crafting practices in the Pacific are not necessarily orientated towards some nostalgia for a bygone era, a dissatisfaction with modernism and an ideological reform of art production. Rather, as I have already demonstrated in some of my published work (e.g. Were 2010), craft revival is inspired by political and religious aspirations, led by religious movements or political followers, who envisage a better future by rekindling past forms and images and integrating them into elaborate performances and practices. As I show, they have done this in order to tap into new economic, political and spiritual sources of wealth – as a means to extend their political influence beyond their immediate locale – but now are ever more networked through the opening up of mobile phone networks, diaspora communities and cheaper air travel. Sometimes, as is the case amongst Pacific communities living in urban New Zealand or Australia, materials innovation involves radical transformation and change due to the availability or lack thereof of the raw materials necessary. Coupled with a vibrant youth generation, material knowledge is being appropriated to create new visible forms of material culture, making statements about urban identity amongst diaspora communities using fashion, art and performance (e.g. Colchester 2003b).

Like Hau'ofa's 'sea of islands' (Hau'ofa 1994), which asserts a connected model of island spaces (rather than a Eurocentric one of borders and imaginary lines), this book asks how natural resources such as plant materials connect people (rather than be classified scientifically and in terms of difference) and so act as a tangible provision as a means for mobility, communication and fashioning. Equally, given the finite constraints of island societies – manifest in rights to access to land, gardens and marine resources, the impact of development and global market forces and the threat of rising sea levels and pollution from plastics and other waste products – how does the use of plant products raise important questions about sustainability and political rites of succession? Henceforth, a key question that runs throughout this book is: in what ways are plant materials optimized to take on such a pronounced role in managing informational environments in Pacific society? I explore how materials work on behalf of persons and analyse how their tooling equips them to exert influence in people's lives. In a changing Pacific, I explore the significance of sustaining material knowledge for communities, questioning how imported materials like synthetics, metals and plastics as well as new digital technologies have impacted on local forms of knowledge and skills.

And in a shifting social, religious and political space, where access to plant materials is regarded as a valuable resource, I ask how holding onto or reviving particular technical knowledge associated to plants empowers communities in a way the use of newly available ready-made materials may not.

This book frames these questions through an examination of the diverse role of materials in social transformation, focusing on their innovative use in diverse projects that reflect the changing nature of Pacific society. The fine-grained analyses of plant materials presented in this book reveal the relational nature of materials and their connection to changing gender roles and new forms of self-fashioning, which have implications for personifications of power in the region. Probing the nature of plant materials emphasizes how material identities are constantly shifting in the region and reveals the opportunities and challenges that are opened up to persons who engage materials in this way. The questions addressed in this book appear to be central to an anthropology of material culture and of the Pacific region, which has long focused on debates of materiality and personhood that have often subordinated the role of plants as derivative of human agency.[2] More generally, the book offers a departure from such conventional approaches and leads us towards an appreciation of the capacity to which materials drive society towards transformation and change, not simply in adapting materials to new uses but through their sophisticated role in managing complex informational and social environments. In so doing, it extends the concepts and theories of new materialism and Western technoscience to the Pacific (Bennett 2010; Barry 2013; Bensaude-Vincent 2011; Hawkins, Potter and Race 2015), which by the region's very omission implies that somehow the plant materials are less worthy of serious attention, which is surprising given the region's biodiversity and contribution to colonial science.

Made to Measure

This book has been inspired, in part, by Philip Ball's landmark science text *Made to Measure* (Ball 1997). In his book, Ball uses the term 'made to measure' to refer to a class of advanced materials that have been designed with particular applications in mind; in some cases, by altering their molecular structure and so enhancing their performance. Such materials have been especially engineered in laboratories to overcome specific problems for which they are designed to solve. Through their inbuilt functionality they hold capacities to 'do things

that no others can' (1997: 5) and so they possess huge potential for driving innovation and change in society. Such capacities may involve using a special heat sensitive material in a thermostatic control system or a glass composite that is resistant to dirt and so can be used in office windows. As advanced materials are unique and generally expensive to make, Ball states how they are designed to fill niches in the market rather than replacing older, cheaper materials like wood or stone.

I apply Ball's concept of 'made to measure' to plant materials of the Pacific because, I argue, materials are especially selected for their known performance in the social domain. As Bensaude-Vincent (2011) states in the context of Western materials science, materials are the machines. Materials, therefore, operate as the fulcrum between technical and social worlds. In moving beyond the assumption that materials innovation is a singular act of discovery or genius, I adopt Ball's concept of 'made to measure' in order to analyse the reasons why particular plant materials are selected and transformed in design activities for the purpose of filling niches and fulfilling outcomes in the social domain, and how, as a result, materials make things happen, driving change in a society. Such a focus on materials innovation reveals the transformations taking place in the Pacific and reflects on the shifts in material identities, personhood and modernity of a region. In doing so this book presents an ethnographic description and analysis of the intentionalities of materials in design and innovation; how their informed selection, transformation and display situates anthropological discourse on the capacities of materials beyond relations to form and function and within a discussion of the nature of human agency.

Material Agency

Over the last decade or so, there has been a growing interest in anthropology on the relation between art, material culture and agency (Coupaye 2013; Harrison, Clark and Byrne 2013; Henare, Holbraad and Wastell 2007; Lemonnier 2012; Morphy 2007). Alfred Gell's 1998 *Art and Agency* has arguably been the most influential in the discipline in recent years. Gell's approach merges persons with objects and objects merge with persons in ways that suggest objects are person-like. A central feature of his theory is his analysis of the relation between style and culture. Undertaking a formal analysis of Marquesan artworks from Polynesia, Gell argues that variations and constraints (in the application of style) in the design of objects from a given region

adhere to a logical system of principles. This logic, Gell argues, not only governs how style is generated but it also extends to configure the way social relations are structured. Thus what Gell presents is a model of agency in which artefactual relations map directly onto the dynamic workings of social relations in ways that challenge conventional anthropological understandings of style and culture.

While Gell's work has had a profound influence on debates around artworks and non-human agency, his model of agency does not deal directly with the materials of material culture. Instead, as Conkey (2006) argues in relation to anthropology in general, Gell's work takes a methodological approach in which materials are presented as subordinate to form and style.

As a means of redressing this imbalance, more recent work has approached the relation between materials and agency from a cross-disciplinary perspective. For instance, the term 'material agency' has been applied by Knappett and Malafouris (2008) to refer to the fluidity of boundaries between persons and things and the capacity of the latter to embody and objectify, as well as produce, social consequences (Knappett and Malafouris 2008: x). Their cross-disciplinary approach draws out the historical, political, social and intercultural dimensions of materials and agency from an archaeological standpoint in order to explore social worlds as they emerge through human engagement with materials.

Within anthropology, two key approaches have recently developed the debate on the nature of material agency. The first argues that materials help forge human lifeworlds through the human activity of making. This approach privileges technical understandings of materials and emphasizes the situated relation between material and maker. Key protagonist Tim Ingold has examined materials adopting a focus on the relationship between maker and material in crafting activities such as basketry and weaving (Ingold 2000b; 2007). He argues through hands-on interaction with materials – bending, twisting, moulding and so forth – there is an intimate relationship that connects maker and material through which the form of the artefact emerges in the world. For Ingold, material agency is expressed by the 'field of forces' that conjoins maker and material, which shapes the way in which artefacts emerge in the world (Ingold 2000b: 342).

Ingold's approach says much about the emergence of artefact form in the process of making; however, it does so at the expense of ignoring the question as to why certain materials are selected in making – a question that is central to this book. Similar to the way Gell's (1998) analysis subordinates the role of materials in material culture, in

Ingold's analysis materials appear predisposed to making, with little reflection on their affordances, aesthetics, performance and potential. Trapped within 'meshworks' (Ingold 2011), the operational qualities of materials are subordinated to the flow of emerging forms, which Ingold foregrounds in his analysis of making. In this way, I worry that a craftswoman's intimate knowledge and experience of material properties and their biophysical and aesthetic diversity makes way for an analytical focus on emergent products and corporeal forces.

An alternative approach – which draws on archaeological and anthropological perspectives – is put forward by Chris Tilley (2004), who approaches materials in terms of their materiality. Tilley (2004) has examined archaeological sites in the European landscape, arguing that the visual and tactile transformation of stone surfaces, e.g. shimmering states when wet, moss-clad, honey and ochre tones etc., can be understood to create ancestral and spiritual connections. Stones, he claims, exert their muted agency, as they impact on persons. Stone monuments embody ideas and associations and act as material metaphors by which worlds became known and inhabited (Tilley 2004: 219). Tilley concludes by stating how prehistoric social identities were created or sustained, reproduced and transformed through the agency of stones (2004: 217).

Tilley argues that material agency brings into focus an understanding of how stone helps shape human experience of landscape and cosmology (2004, 2007). Ingold, in his critique, claims that Tilley's analysis loses sight of stone's physical properties. From this perspective, culture appears to rest on the surface of stone, not permeate it (Ingold 2000, 2007). Ingold adds that in regard to the materiality approach, the transformational nature of stone surfaces appears to stand for everything out there: 'the stone is instantly swallowed up by the landscape whose surface marks an interface not between earth and air but between nature and culture, the physical world and the world of ideas' (Ingold 2007: 14).

While I agree with Ingold's critique of materiality, one could equally argue that his own approach restricts materials to a very narrow framework of making (see Knappett 2007). Ingold's aim is to examine objects as they emerge in the world *in situ*, through a material-maker interaction. I argue, in contrast, that the creative process of design involves many forms of knowledge from material knowledge, economics, markets and branding (Norman 1988; Pye 1968). A craftswoman must know how to pick the correct tools for each job in hand, costs of sourcing materials and production as well as the appearance of the product when complete. Moreover, a craftswoman is

also aware that the selection of appropriate materials is crucial to design because this provides technical functionality and product identity (Ashby and Johnson 2010; Forty 1986; Shove et al. 2007). Cultural and logical perceptions may also influence her uptake of materials as well as understandings of their performance under specific conditions (Norman 1988). Therefore, materials are laden with knowledge and experience that spills out through selection and transformation in the process of design. As Bijker (1995) has demonstrated in his analysis of the design of bicycles, materials intersect with social worlds through thought and action and are mutually constitutive.

In this book, I develop an approach to materiality that, in contrast to Ingold and Tilley, situates materials within a relational field of connected and competing materials, objects and environments. In privileging the material substance and its co-dependency with the object world, my holistic approach is distinct in anthropology because it recognizes how the process of material selection involves an intellectual engagement or 'working it out' on the part of local craftspersons, who think through how certain materials with their complex positioning within natural and cultural environments and their performance as objects can fill niches or solve particular problems in society. Thus, I focus on the affordances of certain materials (ranging from recognition of their biophysical properties to their aesthetic attributes) and how technical knowledge and experience of particular plants gives rise to projects of design and making. Therefore, the informed selection of materials, like Ball's advanced materials, involves an appreciation of how materials innovation in Pacific society can be seen as a process of 'value-adding' because, as I will show, their selection is based on the premise that the materials improve people's lives by doing all the work (the material is the machine, as Bensaude-Vincent so persuasively argues) – though they may never go away, as they undergo a continual cycle of transformation, reuse and reinvention.

Materials, I will show, never really act alone but operate within complex environments through collaborations, social forces and natural cycles (Barry 2005). As Bennett (2010) rightly states, current theories about objects have been framed in terms of individualism and to an atomistic rather than congregational understanding of agency. Following Bennett's call for a more holistic understanding of agency, I will offer an analysis of the interrelation of materials to sociopolitical environments in the Pacific. This approach is similar to Shove et al. (2007), in their examination of the emergence of plastic in Western society. Their work is important to developing my own model of material agency because it draws out an understanding of the

emergence of plastic in Western society by describing how plastic had first to be framed alongside other materials in order for it to be readily accepted as an alternative to existing materials. Plastic's relation to hygiene, to comfort and ease of use was as important as its physical properties: hard-wearing, easily cleaned and heat resistant. This emphasizes the mutability of materials in the course of their history as their environments shift and change (Ingold 2012).

Materials and Social Transformation

The question as to how materials enact transformations in society is an especially important one in the humanities and social sciences. While a notable number of scholars have examined the impact of cloth and clothing as they were introduced across the Pacific (e.g. Colchester 2003a; Kuechler and Were 2005; Thomas 1999) as a means to better understand the process of missionization and colonialism, there still remains little analysis of how materials are designed to perform particular tasks in society or are 'made to measure'. As Thomas (1999) has claimed, there has been a tendency in the anthropology of material culture to argue that indigenous cultures employ conservative strategies to preserve an existing order rather than transform an existing one (a factor that is reinforced through the literature on new materialism and its focus on Western technoscience – i.e. Western materials are advanced).

And yet, there is ample evidence put forward by anthropologists and archaeologists to demonstrate that materials are at the vanguard of social transformation and change. In archaeology, for example, Boivin (2008) demonstrates how the use and application of soil transformed Near Eastern Neolithic society. Her work reveals how the malleability of soil may have enabled new forms of social transformation to take effect, particularly through the application of heat and water. Of significance, Boivin states how soil was mixed with water to make a range of material artefacts, including figurines. This led, she suggests, to the emergence of material symbols that could be transported and communicated on wider scales than previously. Similarly, anthropologist O'Connor (2011) points to the transformative potential of new synthetic materials in Western society. Focusing on the development of Lycra, O'Connor demonstrates how the emergence of this synthetic in fashion clothing has helped shape and reflect new body images and social roles for Western women. Equally, in Melanesia, the influx of new materials such as calico, iron and, more recently, plastics and synthetics radically altered material culture and fostered new

forms of social being in the region (Were 2005a). Colchester has argued that the emergence of cloth transformed female gender roles and led to new modes of domesticity and deportment for Pacific women in the nineteenth century (Colchester 2003a). As Thomas (1999) points out, in his analysis of how the introduction of cloth in Polynesia radically altered the ritual economy and displaced traditional materials such as barkcloth, cloth could be understood as a kind of technology; not just an expression of a new context but a technology that created that context anew (Thomas 1999: 18).

Thomas's claim that materials, namely cloth, could be understood as kinds of technology echoes strongly the argument made by Ball (1997) that advanced materials possess the inbuilt capacity to 'do all the work' on behalf of persons. Like wood composites or biomaterials, I argue that plant materials can be understood as technologies that, through their informed selection, transformation and display and can make things happen. They are the machines that create and recreate events and relations as their materiality changes through growth, aging and decay and so are reasons for driving sociality (Coupaye 2009). My concern therefore is to investigate the emergence of 'new' materials in the Pacific context, not as a way to maintain a status quo or existing social order; but rather as a calculated means to fill a niche (Kuechler and Were 2005; O'Connor 2011). This niche, I contend, can have a pervasive effect and may lead on to social transformation.

Drawing on ethnographic research based in Papua New Guinea and New Zealand, together with in-depth analyses of Melanesian objects in museum storage facilities in the United Kingdom and Australia, I reveal the ways in which materials emerge in the world much in the same way as Ball's engineered materials: that is, they offer bespoke design and perform for specific purposes and so are 'made to measure'. I show that the processes of informed selection and calculated design are embedded in complex social, historical, political and natural environments; and how materials emerge in the world infused in these environments.

Material Identities

It is symptomatic of the global concerns of environmental impact, waste management and sustainability that product designers are re-engaging with natural materials to offer design solutions. Consider the connotations of bamboo, a natural material that grows abundantly in tropical counties. For those fortunate enough to have visited or lived in

Hong Kong or Hanoi Vietnam, now modernized concrete cityscapes, many will have noticed kitchen utensils or even scaffolding crafted from the plant material. Then imagine learning how this abundant material is now used in the design of bicycle frames. Its lightness, stability and elasticity has made it an ideal material to withstand the stresses and strains of cycling and to absorb any vibrations from the road. How have perceptions of these everyday materials shifted so dramatically and what are the factors that led this everyday plant material to be reimagined in new ways?

This question could equally be applied to the many other materials of the Pacific. There, material identities are constantly shifting as the environments change around them. Materials are situated in fluid environments that redefine their use and effect. This is evident in the way craftswomen and men alike seek out new types of materials to inspire design projects, much in the same way as bicycle manufacturers have used bamboo in their innovative design. This means that materials are not placed in any static classificatory schema: rather, they are continually redefined as new materials become available and new opportunities and challenges arise in society.

To highlight the shifting identities of materials in their historical and political context, this book focuses on the selection, use and application of traditional or 'old' materials – such as beaten bark strips and woven plant fibres – and the means by which they are reinvented in ways that allow makers to take control of modes of commodity production and so enact a new and emerging form of individualized agency in society. Indeed, I demonstrate how this transformation of the natural environment into the confines of a commodified and branded world has repercussions for their operation and effects in society. For instance, taking control of natural resources such as palms and barks is to make claims to innovation and intellectual property. In (re)claiming material knowledge as one's own and utilizing this in design projects, communities in the Pacific are enacting changes in the classification of materials and bringing processes of 'heritagization' into play. Such a process, I argue, positions old materials alongside competing new materials and provides a perspective from which to understand and explore materials innovation as a relational form of action. In this way, I extend Ball's application of 'made to measure' materials to demonstrate how, in the Pacific, this concept also applies to the way materials are 'engineered' in new and innovative ways and for specific purposes in mind. This focus on materials innovation, I believe, presents an opportunity for this book to extend anthropological understandings of contemporary Pacific identities

and leads to a better understanding of the dynamic role materials play in the region and beyond.

Book Orientation

This book draws together themes and contexts regarding materials and their innovation in the Pacific, engaging theoretical literature in new materialism to explore ways in which plant materials enable diverse forms of sociality – machines of nature that drive social innovation. The collection of chapters in this volume is interested in the historical and changing nature of materials, exploring the context of their transformation and display in activities in Papua New Guinea, New Zealand and the Solomon Islands. The book also unravels the relation of materials to culture and tradition and to the forms of social power these activities elicit, and provides an ethnographic context for exploring the ideas and associations embedded in the materials themselves. Each chapter points to the centrality of materials in anthropological analysis, their enduring nature as a hallmark of personifications of power and human agency and their complex relation to shifting boundaries and interfaces relating to identity.

The book is divided into three parts around which seven chapters are organized, challenging readers to think about plant materials in Pacific society as tooling for social transformation. Part I of this book engages design theory and material culture approaches to reveal ways in which plant materials possess the capacity to manage complex informational systems in the Pacific. Focused on a study of the operations and effects of particular plant materials, this work describes how materials invoke thought and action, their propensity towards designing the future and how future forms help engineer tangible outcomes in society. Each chapter takes the case of an indigenous organic material and examines its use and application within society. The aim of this exploration is to frame materials within recent theoretical debates as to their role within society and their agentive capacity. Each chapter is focused on asking what it means to liken plant materials to machines that manage complex informational systems. What are the complex environments in which material selection takes place? And, what does the selection of specific materials in design tool and equip society for?

Chapter 1 begins by examining the affordances of a class of materials. It focuses on how small differences in the appearance of plants are understood in quite different ways as to their properties in

design, drawing on the pandanus, a ubiquitous plant in the Pacific that has different varieties and whose leaves are understood quite differently in terms of the biophysical properties and their use in crafting. A theoretical focus on J.J. Gibson's Theory of Affordances (Gibson 1979) aims to reveal the material engagements on the part of local craftwomen, their material knowledge of pandanus and the plant's relation to the construction of the social body and modes of kinship and exchange. A key argument introduced in this chapter is to shift anthropological understandings of materials beyond surface and visual analysis. Whereas a great deal of Melanesian ethnography has focused on kinship through the visual articulation of certain types of material and substances (e.g. Strathern 1988), this chapter innovatively reorientates this approach towards ideas of permeability and natural decay as indexes of relations in the social world.

If Chapter 1 sets the groundwork for rethinking the relation between people and things, in which things are determined through a deeper understanding of their materiality and substance and their 'co-productive' possibilities, then Chapter 2 extends this notion further through an analysis of barkcloth or *kapiak* in New Ireland society, which has recently been revived and innovated. Once manufactured in the recent past for making garden baskets and wall hangings featuring religious symbols, barkcloth has been revived by women in crafting practices for entirely different purposes. The chapter focuses on barkcloth's use in novel forms of fashion baskets, worn over the neck or on the shoulder, and emblazoned with decorative designs and pieces of coloured wool. The reintroduction of the material as something new and distinctive is crucial to establishing the success of the basket as a commodifiable product in a market saturated with many styles of baskets. I explain how barkcloth offers the basket a niche in the market, tethering the product to place, and also asserts a new form of female agency in the community through its sale in roadside stalls or the market place and its positioning outside the male dominated sphere of ritual.

Chapter 3 examines the story of *harakeke* or New Zealand flax. As a plant associated with the production of Maori treasures (*taonga*), harakeke was also cultivated by white settler society to feed the colonial economy. This chapter explores the highs and lows of the New Zealand flax industry, focusing on developments and innovations in the global hard fibre industry. Drawing on Bennett's (Bennett 2010) notion of networked materials – the idea that materials do not act alone – this analysis of New Zealand flax focuses on the wider social and political environments in which the plant fibre has been

situated. Taking such an approach demonstrates how the success of this material should not be understood in isolation; rather how its performance is measured against other types of plant fibres in the global fibre industry. In particular, this chapter extends analysis to the more recent success of harakeke as a new environmentally friendly biomaterial and how its performance has now been framed within a branded context alongside the nation-branding of New Zealand as a clean, green country.

Part II of this book introduces the concept of material computation to capture design thinking and the strategic process of selecting one type of material over another. I use ethnographic case studies to frame the ways in which various timbers and plant fibres are used to create and manage social relationships on varying scales. Taking two similar objects as a starting point, Chapter 4 examines the relations between forms in the material selection of a canoe and food trough, two iconic objects of Melanesian collections. What can the expansive additive techniques of a plank canoe construction – planks of seasoned timber stitched together to form a hull – tell us about the way connections are mapped and understood as opposed to the food trough, made by hollowing out a tree trunk using a subtractive technology? Important to this discussion are the calculative processes of scale that distinguish the construction of these artefacts. My focus is to emphasize how diverse forms of relations are built into the design of vessels through calculated technical acts of making in ways that create and manage connections in the region.

Chapter 5 maintains focus on material computation through an examination of some of the classic symbols of Melanesian material culture. It explores the men's house – a ceremonial structure – and compares this to the cemetery and garden enclosure in the Nalik-speaking region of New Ireland, Papua New Guinea. Looking at how the material identity of a newly established men's house was 'built without nails' or a clan cemetery enclosure had been erected using a special kind of fish design, this chapter explores diverse forms of design thinking and the possibilities and opportunities this presents for Nalik society. Of significance is the way in which the materials are foregrounded as a particular strategy to engage new resources such as government grants and funding to help support Nalik society and place it on a national agenda. In this way, the chapter demonstrates how shifting material identities attract new forms of connections and personifications of male power through their integration into architectural forms and positioning within political spheres of display.

Part III raises the question of the future of plant materials in the Pacific, asking how new digital technologies now present in the region offer possibilities to support or disrupt knowledge networks and so transform crafting practices. This also has implications for the future of museums, and I focus on the ways in which material knowledge is recovered from museum storage facilities, reconfigured and then transmitted to communities of origin in the Pacific. If Conn (2010) questions whether museums need objects any more, then this section interrogates the rise of digital return projects that link museums to source communities to ask the provocative question: do people still need to remember crafting knowledge? Two chapters examine the nature of material knowledge as it circulates and is transmitted, taking into account traditional modes of observation and mimicry together with new forms of knowledge transmission, such as digital technologies, that are encroaching in the region.

While metal nails, woven cloth and other materials introduced by colonial officials and missionaries had a huge impact on material identities in the Pacific, it is now digital technologies that are transforming the nature of materiality and material aesthetics in the region. Maintaining a focus on the Nalik region of New Ireland in Papua New Guinea, Chapter 6 explores how new digital technologies are transforming the transmission of material knowledge in design practices. The use of these technologies, I demonstrate, is shifting the way the ancestral past is represented and indexed to a new generation of New Irelanders. In exploring the way new technologies retrieve the material past through a collaborative museum project, this chapter explores the outcomes of accessing new digital resources for the community, who claim 3D digital objects as their own. In particular, this chapter examines the digital practices performed by community members and how this integrates into the social and political context of the management of material knowledge. In doing so, this chapter draws attention to the changing nature of museum collections and the challenges and opportunities this poses for material histories of the future.

Innovative digital practices are again under scrutiny in Chapter 7 of this book. Here, the museum is the focus for a project in which material knowledge is recoded into digital formats and returned to the Solomon Islands via digital media as a way for the museum to enter into a form of 'digital repatriation'. This chapter explores the visual limits of photographic 2D and 3D representations of artefacts for the purpose of material identification and crafting revival for the benefit of communities of origin. It asks: what are the legacies of colonial

collecting in today's networked society in which digital reproductions can be hastily assembled and transmitted large distances across the world's surface? It also considers how digital images are perceived by a community in the Western Solomon Islands, who claim the 3D digital object as their own. In a similar way to Chapter 6, it explores the perceptions and understandings of engagement with the 3D digital objects and the implications of this for the transmission and sustainability of material knowledge and its innovation.

The final part of this book, Chapter 8, draws together the key issues and arguments covered by this book to present the framework for a new approach to understanding materiality. By returning to the key debate in anthropology regarding the nature of materials in material culture, this chapter sets out a new framework for acknowledging the agentive capacities of materials and their relation to human thought and action. While I have shown how materials evoke thought and action in various different contexts and situations, I hope this book clearly demonstrates how materials are entirely political substances situated in environments in which knowledge, display and action are unpacked and interpreted. In this way, we can begin to appreciate how materials are potent in Pacific society; they exert particular forms of intellectual responses and they help people create, order, manage and make sense of their social world. It is the world of materials, I argue, that embodies and expresses the richness of life across the Pacific and through which sociality takes shape.

Notes

1. There is a rich history of ethnobotanical work in the Pacific that focuses on plant classifications and their uses (e.g. Bulmer and Pawley 1991; Hyndman 1984; Kwa'ioloa and Burt 2001; Nombo and Leach 2010; Sillitoe 1983). Little anthropological analysis to date has focused on plant materials as a locus of thought and action.
2. There are, however, some notable exceptions in anthropology that have approached the way plants act as agents for human sociality. These include: Coupaye (2013), Mosko (2009) and Mackenzie (1991).