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Catherine Frieman & Sally K. May

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Navigating Contact: Tradition and Innovation in Australian Contact Rock Art

Catherine Frieman¹ · Sally K. May²

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Abstract

In this paper, we look at the ways in which rock art encapsulates and expresses the tension between tradition and innovation in northern Australia during the period of European colonization. The appearance of new motifs and techniques for producing rock art in the recent past sits alongside the continuation of "traditional" practices reflecting thousands of years of artistic expression. Using case studies from Arnhem Land, we reflect on both ethnographic and archaeological evidence in order to interrogate the ways in which innovation impacted upon and was used by Indigenous groups to navigate contact. Our findings suggest that technological conservatism and the resistance to new technologies by Aboriginal communities is both considered and partial, with the overriding logic being about minimizing the disruption of specific values conceptualised as traditional, rather than eliminating or avoiding all outside influence.

Keywords Rock art · Innovation · Contact period · Colonialism · Arnhem Land · Australia

Introduction

In recent years rock art has emerged as a key tool for archaeological studies of interaction between Aboriginal Australians and newcomers to their shores (e.g., Clarke and Frederick 2008; Frederick 1999; Taçon et al. 2012; May et al. 2017a). Thanks to a

✉ Catherine Frieman
Catherine.frieman@anu.edu.au

Sally K. May
s.may@griffith.edu.au

¹ Banks Building, School of Archaeology and Anthropology, The Australian National University, Canberra ACT 2601, Australia

² PERAHU, Griffith Centre for Social and Cultural Research, Griffith University, Gold Coast Campus, Southport, Queensland 4222, Australia

growing body of research focusing on Contact Period rock art in Australia, we are now at a point where we can see emerging themes at local and even national levels. For example, it is clear that firearms played a significant role in the lives of people living in western Arnhem Land, northern Australia, throughout the nineteenth and early twentieth centuries, with detailed paintings suggesting extensive use by Aboriginal people (May et al. 2017a; Wesley 2013). In other parts of Australia (and the world), firearm depictions are rare, generally less detailed and not known to be integrated into traditional painting styles (Wesley 2013: 235). Yet we would argue that there is great potential for further critical or interpretative investigation of this body of rock art. Little attention has, to date, been paid to the evident innovations in style, technique, or subject matter and their connections to or reflections of shifting social relationships within Aboriginal society or between artists and their artistic traditions during the process of colonial contact as well as between Aboriginal people and newcomers to their land. This is especially critical as Aboriginal Australian cultures were severely impacted and intentionally undermined by European settlers and missionaries (see e.g., Cole 1972; Dewar 1992; Levitus 1995). While Aboriginal community leaders and activists are now widely recognized as strong and vocal advocates for their culture, their communities and their country, Aboriginal voices are often muted within or elided by mainstream and written Contact Period narratives which rely largely on texts by western scientists, explorers, missionaries, and sailors.

To that end, rock art depicting the material culture and practices introduced during the long period of contact with Europeans and other non-Australian peoples provides us with an indelibly Aboriginal perspective on this process. In this paper, we look at the ways in which rock art from the Contact Period—the time since Indigenous Australians have come in contact with people from outside Australia—encapsulates and expresses the tension between tradition and innovation in Australia. The appearance of new motifs and techniques for producing rock art in the recent past sits alongside the continuation of “traditional” practices, such as the painting of x-ray fish, reflecting thousands of years of artistic expression. New materials, new technologies, new ways of understanding the connection between people, communities, landscapes, and material culture all had profound effects on traditional lifeways, practices and connection to country. Using examples from north western Arnhem Land, we reflect on both ethnographic and archaeological evidence in order to interrogate the ways in which innovation both impacted upon and was used by Aboriginal groups to navigate contact.

Innovation through the Lens of the Colonial Encounter

The process of innovation incorporates both the development of new tools, technologies, practices, and beliefs and their spread beyond their point of invention. Innovation is regularly framed as a quasi-automatic, functionalist, or evolutionary process through which less efficient or well adapted materials, ideas, or technological systems are replaced by better suited, more efficient ones. However, this process is actually deeply embedded in human social interactions and inextricably tied to larger social and material spheres (Bijker 1995; Lemonnier 1992; Pfaffenberger 1992; Rogers 2003; Torrence and van der Leeuw 1989). Not only is the impulse to innovate or to accept an

innovation socially conditioned, but the desire for a new object, practice, or technology develops out of a pre-existing process of learning about and testing it (Frieman [forthcoming](#); Rogers [2003](#); Rogers and Shoemaker [1971](#)). The successful adoption and spread of any given innovation is a complex process in which the negotiation of relationships—between individuals, between communities and their neighbors or wider political/economic networks, between people and their pre-existing technological worlds—is implicit and pivotal.

More than that, the process of innovation itself is highly politicized. We in the twenty-first century live in an innovation-positive culture, thus, innovation itself carries positive connotations and a resistance to innovation or a preference not to adopt any or most innovations carries negative ones. These ideas have historic weight as they spring from particular strands of Enlightenment thinking about technology, society, and human worth which are tightly bound up both in the Industrial Revolution as well as with the concomitant European colonial expansion in which the technological dominance of Europeans played a major role in their ability to conquer. Technology played a key role in the global expansion of European hegemonic dominance in the form of settler colonialism—not just physically as the source of weapons which were used to subdue Indigenous peoples, but also as a key ideological plank underpinning the morality of the imperialist worldview. Perceptions of technological superiority, of greater capacity for innovativeness in particular, play a crucial role in the European narrative of justified colonial and imperial expansion (Adas [1989](#)). Eighteenth- and nineteenth-century colonizers generally viewed the people they encountered in the Pacific, the Americas, Australia, and beyond as less developed, less civilized, and ultimately less human than their European conquerors, though to differing degrees (Hofstadter [1959](#); Kaye [1986](#); Thomas [2000](#)). The emerging fields of anthropology and archaeology developed alongside and influenced the broad social evolutionary models of human social development which were originally fleshed out in the nineteenth century. Within these models both technology and society could be ranked from simple to complex, savage to civilized along linear trajectories which valorized European social and technological developments and misconstrued or maligned those from other peoples and places (Smith [1999](#): 86; Thomas [2000](#): xxxi).

The Indigenous peoples encountered by Europeans were judged on these criteria to be little more than backwards savages; their material culture and way of life was approximated to the European Palaeolithic and their society was presumed to be largely unchanging and deeply conservative, nowhere more so than in Tasmania (McNiven and Russell [2005](#)). The Tasmanian example is so striking because it is extreme and well known. Tasmanians were believed—even in the face of contemporary scepticism—not to have known how to make fire (Gott [2002](#)) nor to have had the technology for making clothing or the imagination to make art (Tylor in Roth [1899](#): vi). In the social evolutionary models current at the time, Tasmanians were inevitably the lowest stage of human development, the least evolved and the best evidence that non-European people were living fossils of ancient times—a position which was used to effectively absolve their British colonizers of their genocide (Davidson and Roberts [2008](#): 22–24; Reynolds [2001](#)). Yet, even while we decry these descriptions as developing out of grossly racist colonialist perspectives and not accurately reflecting the contemporary state of knowledge about Aboriginal Tasmanians (Bowdler and Lourandos [1982](#); Hiscock [2007](#); Taylor [2008](#)), they continue to have resonance in

the production of contemporary scholarly (Henrich 2004; Jones 1977, 1978) and popular works (Diamond 1993; Haydon 1978).

Yet, when we step back from this dominant narrative of technologically dynamic colonizers and obdurately stolid Aboriginal people, the picture that emerges is in fact both more nuanced and much more interesting. As Taylor (2007: 11) notes, eighteenth-century Tasmanian culture, when not viewed through nineteenth-century European social evolutionary lenses, in fact appears to have been extremely dynamic, seeing the rapid adoption of new technologies (guns), materials (woven cloth, glass, ceramic, rust as a colorant) and practices (hunting with dogs, eating European foods and previously unexploited Tasmanian foods, like freshwater mussels) as well as the development of new songs and dances to contextualize them (Murray and Williamson 2003: 320). These observations support the social model of innovation adoption and diffusion developed over the last half century which makes clear that not only is the act of accepting an innovation not passive, but the innovation itself is altered by its slow incorporation into a new social structure (Barnett 1953: 331). Nowhere is this dynamic process of adoption and alteration more clearly visible than when it is observed in the stark cultural differences of the colonial encounter. As in the Tasmanian example, simple explanations based on the rapid assimilation or elimination of Indigenous practices, technologies, and cultures are becoming less and less viable as post colonial critiques re-center our discussions away from European dominance and towards elements of Indigenous resistance, agency, and cultural hybridity (Bayman 2009; Bhabha 1994; Flexner 2014; Lepowsky 1991).

Adopting and Resisting European Technologies

The Aboriginal reaction to non-Indigenous materials and technologies rarely sits comfortably with functionalist or evolutionary understandings of technological change and innovation. There is no question that European culture and technology was used to dominate and eliminate Aboriginal people, practices, and technological traditions; and Europeans reported a great desire for their material culture, whether due to its functionality (e.g., steel) or aesthetic properties (e.g., glass trade beads). Nevertheless, closer examination reveals that the Aboriginal perspective on this material cultural uptake seems better characterized as ambiguous trending to ambivalent.

Sharp's (1952) famous example of the rapid adoption of metal axes by Yir-Yoront people from the Cape York Peninsula, Australia, makes this point quite eloquently. Prior to the establishment of a local mission, access to stone axes had been inextricably entangled with traditional ideas of masculinity, seniority, and privilege, so steel axes offered freely by the missionaries were readily adopted by women and younger men—people who had previously had to seek permission from male elders for the use of an axe—leading to internal conflicts about traditional social structures and the role of technology in maintaining them. Elsewhere in Oceania, the slow replacement of stone axes with metal ones played out differently, but also reflected that same ambiguity. Schieffelin and Crittenden (1991: 101–102) point out that, in their first encounters with steel objects, Indigenous Papuan people were alternately mystified and horrified by the unrecognizable material which was rejected out of hand. However, once a suitable social category for the new material and its origins developed, Papuan people rapidly adopted steel adzes.

By contrast, Bayman (2014) illustrates that the desire for steel adzes in nineteenth-century Hawaii and their extremely slow penetration into the toolkits of native Hawaiian people was mediated by the pre-existing power structures. The elite *ali'i* made use of European materials and practices to enforce their distinction from the Hawaiian commoner class, even in the face of Christianity and the elimination of the *kapu* system. Due to their close control of the spread of iron tools, these were not rapidly adopted by commoners; but the persistence of stone adzes well into the later nineteenth century in Hawaii reflects more than just the scarcity of iron. Bayman (2009: 135) reports an account from 1902 in which stone and metal adzes were used together for the construction of a canoe with the former being preferred for fine work, including delicate decoration as the latter were deemed likely to overcut or otherwise be unsuitable for the task.

Where we see a clear rejection of non-indigenous materials and technologies, this often post-dates a phase of experimentation with, or tolerance of, the new items. For example, Gosden (2004: 98–102) compares Indigenous resistance to the Western products in two Oceanian examples, on Tanga, New Ireland, and among people on the south coast of New Britain. In the former case, Tanga people saw the potential for Western goods to destabilize traditional hierarchies and power structures built around competitive exchange, and the decision was made by the community to exclude these materials from these socially significant contexts. Similarly, in New Britain, ritual contexts and exchange systems in which community cohesion and local identity were created, maintained, and strengthened were intentionally insulated from Western goods and materials, even though these were in daily use in non-ritual contexts (Gosden and Knowles 2001). Gosden (2004: 98) ascribes the conscious decision to resist or exclude European technologies in these examples to *Kastam*, a post-Colonial reinterpretation of traditional practices which formed a key part of the wider resistance to Western practices, including religious and political structures, in the Pacific, through the re-invention of a "traditional" Pacific identity (Keesing 1982, 1984). However, as Lepowsky (1991) makes clear, this form of resistance in the Pacific is both knowing and nuanced and sees the idea of traditional culture and materials being cannily manipulated by knowledgeable social actors in order to maintain an effective check on colonialist incursions in the present, rather than re-create an unaltered, pre-Contact social structure, technological system, and set of cultural practices. Wetmore's (2007) study of Amish technological conservatism, although existing in a very different power dynamic to the post-colonial Pacific, supports the idea that technological conservatism and the resistance of new technologies is both considered and partial, with the overriding logic being about minimizing the disruption of specific values conceptualized as traditional, rather than eliminating or avoiding all outside influence.

In recent years, a number of studies have been carried out which emphasize this knowledgeable agency as a key part of the process of Contact and the development of subsequent colonial relationships between colonizers and subaltern people. This is generally discussed within the context of Bhabha's (1994) model of cultural hybridity, in which post colonial societies are not characterized by the wholesale replacement of Indigenous beliefs and practices by Western ones, but develop a unique hybrid of the two. Moreover, this hybridity should not be understood as a

merging of two static opposing cultural forms, but rather as the ongoing negotiation of identity in the continuing colonial encounter; and the extent of this cultural in-between-ness is open to strategic manipulation by social actors (Benton and Muth 2000). Gosden (2004: 92), following White's (1991) delineation of post-Contact hybridity between Algonquian people and European trappers, refers to this shifting and in-between cultural space as a "Middle Ground," constantly open to negotiation and affecting and developed not just by the colonized but also by their colonizers. Thus, for example, recent work on Isla de Mona in the Caribbean has made clear that Creole Christian identities which intentionally blended native Caribbean and Christian iconography, practices, and beliefs emerged not just among Caribbean converts to Christianity, but alongside and in dialogue with European Christians (Cooper et al. 2016).

Adopting this perspective has given archaeologists a much more nuanced view of how technologies changed at the point of contact with European and other foreign people and goods. For example, Harrison (2002a) shows clearly that Aboriginal Australians in Contact Period Western Australia did not simply adopt non-Indigenous technologies, such as the use of iron tools, they adapted them, producing a new toolkit which blended traditional object forms made in iron and new forms which differed both from pre-existing Aboriginal tools and from European tool types. Bayman (2009: 140–141) identified a similar example of technological hybridism in colonial Hawaii where European missionaries had intentionally introduced the *holokū* as a more modest form of feminine attire; but, while it was rapidly adopted, techniques were invented to manufacture it in the traditional *kapa* textiles from which Indigenous Hawaiian garments were produced, rather than European fabrics.

Harrison's research in Australia demonstrates that, here too, traditional technologies, such as lithic knapping, were not immediately abandoned, but continued to develop and retain meaning and value well into the modern era (Harrison 2002b, 2003, 2004, 2006). In particular, he highlights the example of Kimberley points (a particular kind of knapped artifact made from stone, glass, and other materials in the Kimberley region of Australia), which had been manufactured prior to European contact, but which were produced in more and more formalized and elaborate forms after contact. Although, after the 1880s, the production of Kimberley points—both in lithic raw materials and in European bottle glass—becomes bound up in trade with Europeans, Harrison suggests that the act of knapping these points and maintaining the technological knowledge was a major cultural resource which “allowed Aboriginal people to negotiate issues of masculinity and social identity, while re-creating the relationship between people, object and place” (Harrison 2002b: 372). Moreover, the development of glass knapping traditions in Australia is part of a highly innovative and inventive blending of traditional technologies and new materials resulting in the production of mimetically powerful artifacts that drew together European materials and powerful pre-Contact Period traditions of tool production and identity creation, providing Aboriginal Australians with a new set of materials and practices with which to engage with the new ideas, ways of life and technologies introduced by Europeans and to develop new hybridized identities and ways of being (Harrison 2003).

Contact Rock Art of Australia

Rock art has emerged as a key tool for archaeological studies of culture-contact during Australia's history. Thanks to a growing body of research focusing on Contact Period rock art in Australia, we can now begin to identify themes at local, national, and international levels (Taçon et al. 2012). Yet, little attention has been paid to innovations in style, technique or subject matter and their connections to shifting social relationships within Aboriginal society or between artists and their artistic traditions.

In the case of rock art, we have a particularly complicated set of relationships. While rock art is, in many ways, similar to other material culture analyzed by archaeologists, it varies in its remarkable ability to demonstrate graphically cultural belief systems and actions outside of everyday, basic human needs. For example, the rock art of western Arnhem Land includes scenes of important cultural activities, including ceremonies taking place, often in narrative form. Such scenes are not uncommon in western Arnhem Land and, given each scene is different, they collectively and individually have great potential to provide detailed information on the iconography, social, and cultural life of the artists and of their communities (e.g., Chaloupka 1993; May and Domingo Sanz 2010: 36; May et al. 2017b). Internationally, this is also the case with examples of rock art providing unique insights into many different aspects of cultural life such as communal hunting with Reindeer corrals in the Late Mesolithic rock art of Alta, Norway (Helskog 2011), and the use of headdresses in the Levantine rock art of Spain (Galiana Botella 1985). Furthermore, in the regional development and production of Australian rock art, as in shifting lithic technologies (e.g., Clarkson 2007; Harrison 2002a, 2002b), we see a record of how people responded to environmental and social pressures and engaged with innovative ways of doing, living, and seeing.

Colonialism impacted upon existing rock art traditions Australia-wide in various ways. Some groups were so affected by violence, incursions into their land, and forced movement that they all but ceased rock art production (i.e., Taçon et al. 2012: 428) while others were drawn to connect with their rock art traditions in new ways such as by re-working earlier rock art imagery (Taçon et al. 2008). Still others engaged with the new subject matter, depicting introduced material culture and animals (Fig. 1), as though reflecting on its significance; while, at the same time, they continued to produce more traditional motifs long after the novelty of these new subjects had run its course in rock art (May et al. 2010; Fig. 1).

Despite the evident capacity of Australian rock art to reflect major changes—both social and environmental—impacting on human society, the production of rock art is typically discussed in the context of the maintenance of traditional practices with emphasis on the continuity of long term trends (i.e., Chaloupka 1993). In fact, as we demonstrate, Australian Contact Period rock art reveals a dynamic socially embedded series of practices which allowed new ideas, new materials, and new ways of seeing the world to be examined, interrogated, and selectively adopted into pre-existing social structures and practices.

To examine more closely the presence of innovation and innovativeness within Australian contact rock art, we focus upon a series of rock paintings from north west Arnhem Land. These paintings represent one of the largest collections of Contact Period rock art ever documented in Australia (May et al. 2010, 2013), with a rare and historically significant bias towards depictions of European ships. It is not our aim to

Fig. 1 Examples of depictions of animals in Arnhem Land Contact Period rock art. **a** A painting of an introduced animal, Djulirri. **b** One of the most recent paintings found at Djulirri—an X-Ray emu with intricate detail. Not to scale. Photos: Sally K. May

provide an overview of the types and histories of these depictions (see May et al. 2013; Taçon et al. 2010). Instead, we focus on the ways in which Aboriginal artists have, or have not, integrated these new subjects into a long tradition of rock art, whether these paintings provide insights into tensions between tradition and innovation, and how they may have been used to navigate contact.

Djulirri Contact Rock Art

Djulirri sits within the Wellington Range in north west Arnhem Land, an area bordered by the Arafura Sea to the north, King River to the East, and the Cobourg Peninsula to the west, and rich in Aboriginal culture and associated cultural remains (Fig. 2). The cultural significance of Djulirri has been highlighted in a series of publications resulting from the 2008–12 project *Picturing Change: Twenty-First Century Perspectives on Recent Australian Rock Art* (see, for an overview, Taçon et al. 2012). While the wider archaeological context for the site has also been illuminated through the work of Wesley (2014) in his exploration of pre- and post-Contact archaeology in the region. This previous research allows us to delve more deeply into specific aspects relating to innovation in the Contact Period rock art at this particular site.

Map of Northern Australia

Fig. 2 Map of northern Australia. The general location of the Djulirri rock shelter is indicated by circle

Djulirri is the Maung language name for a series of adjoining rock shelters sited along a valley (Fig. 3). Traditional owner, Ronald Lamilami (pers. comm.), describes the site as his history book, a place that can be read, contemplated, and interpreted by current and future Aboriginal clan members. Sitting just 20 km from the coast, Djulirri bears witness to at least 500 years of contact with visitors

Fig. 3 The site of Djulirri. Top: The rock shelter in the wider landscape. Bottom: A panorama of part of the rock shelter showing the painted palimpsests within. Photos: Sally K. May

from overseas, including Indonesian seafarers (Taçon et al. 2010; Wesley et al. 2011, 2016) and European explorers and settlers (i.e. May et al. 2010). When considered in context with the hundreds of other rock art sites in the Wellington Range, Djulirri stands out for the sheer number of artworks (over 3,000) and the time scale represented. In recognition of this remarkable rock art and wider archaeological significance, it has recently been nominated for Australian National Heritage listing – a rare occurrence for individual rock art sites in Australia.

While not wishing to lengthen this paper further with a detailed overview of the chronology of western Arnhem Land rock art, it is important to understand that the “Contact Period” is a very small part of a very long period of rock art production spanning over 10,000 years and arguably much longer (Chaloupka 1993). In terms of the Contact rock art, we know that, at Djulirri, subject matter introduced from outside Aboriginal Australian culture begins before 1664 CE, with the depiction of a yellow-painted Macassan prau (SSAMS ANU-6813). This is the oldest date yet for Contact art in Australia (see Taçon et al. 2010). Many hundreds of paintings were produced at Djulirri after this date with art being produced in abundance throughout the Contact Period, finishing approximately 50 years ago.

Much of the Contact rock art at Djulirri is easily identifiable due to the subject matter and superimposition. However, there is no doubt that some Contact rock art is currently unidentifiable as it is indistinguishable from earlier rock art. At Djulirri, Contact rock art includes both new or introduced subjects and traditional motifs with a long genealogy, among which have been recorded 20 introduced watercraft, a bicycle, a four-wheeled horse drawn buggy (without any horses), firearms, fighters wearing boxing gloves or tape, letters from the English Alphabet, Ngalyod (the Rainbow Serpent), and kangaroos and emus depicted in x-ray form (Table 1). Probably the most recent painting at Djulirri is a depiction of an emu in a traditional style for the region (May et al. 2010). Of all these subjects, European sailing vessels dominate with 20 individual examples (see examples in May et al. 2013).

One Giant Leap? From Long-Practiced Rock Art Traditions to a Sudden Shift in Subject Matter and Styles

This sudden influx of new motifs and perspectives stands in stark contrast to the long history of Australian rock art prior to the Contact Period which some would suggest are conservative in both form and content. Chaloupka (1993) provides a general overview of some of the different styles in western Arnhem Land rock art and how they have emerged and disappeared over, what he argues to be, a 40,000 year period. He suggests that these stylistic changes occur largely as a result of climatic variations and directly links his rock art stylistic periods to environmental periods (i.e., Pre-estuarine, Estuarine, and Freshwater). Multiple styles of rock art are attributed to each environmental period based largely on the superimposition (layering) of styles but also some subject matter. Likewise, Lewis (1988) also developed a chronology for this region based on the technological development of the material culture depicted, with spear throwers being the focus. This chronology, based on changes in material culture, is a far more

Table 1 Some of the identified Contact Period subject matter in rock art from Djulirri, northwest Arnhem Land

Djulirri Introduced Subject Matter	Innovative Elements	Traditional Elements
Aeroplane	<ul style="list-style-type: none"> • Subject matter • Perspective: The plane is in multiple perspective with the body of the plane as though viewed from below and the front of the plane as viewed front on. 	<ul style="list-style-type: none"> • Method and materials • Style: The artist is trying to communicate information on the key aspects of the plane (and has used 2 x perspectives to do this). The focus on key features (i.e., in this case the engine, wings and body) is traditional in rock art in this area, e.g., many examples of human figures appear with headdresses but no heads.
Bicycle	<ul style="list-style-type: none"> • Subject matter 	<ul style="list-style-type: none"> • Method and materials
Can	<ul style="list-style-type: none"> • Subject matter • Perspective 	<ul style="list-style-type: none"> • Method and materials
Firearm	<ul style="list-style-type: none"> • Subject matter 	<ul style="list-style-type: none"> • Method
Four-Wheeled Horse-Drawn Buggy	<ul style="list-style-type: none"> • Subject matter • Style: Line underneath buggy indicating ground (most rock art in this region is deliberately floating free, whereas in this painting the artist has deliberately grounded it). 	<ul style="list-style-type: none"> • Method
Horned Animal	<ul style="list-style-type: none"> • Subject matter 	<ul style="list-style-type: none"> • Method • Style
Human (in Contact pose with moustache and/or with introduced accessories)	<ul style="list-style-type: none"> • Pose: hands on hips (rarely seen pre-Contact) • Perspective: some portraiture (not seen in pre-Contact art). The individual features of the person suddenly become important, something rarely seen in pre-Contact rock art. 	<ul style="list-style-type: none"> • Style: Exaggeration of key features with a focus on important elements such as the nose, pipe, hat, etc.
Row Boat with Harpoon	<ul style="list-style-type: none"> • Subject matter: harpoon 	<ul style="list-style-type: none"> • Method and materials
Sailing Vessel – European	<ul style="list-style-type: none"> • Perspective: Some ships shown front-on, in perspective and/or with a clearly depicted waterline (Fig. 6). 	<ul style="list-style-type: none"> • Method and materials: Fig. 4 shows re-touch or really re-using an old image to make a new one. This is rare in western Arnhem Land but does occur.
Sailing Vessel – Prau	<ul style="list-style-type: none"> • Subject matter: These are the first depictions of sailing vessels in western Arnhem Land art 	<ul style="list-style-type: none"> • Methods and materials
Smoking Pipe	<ul style="list-style-type: none"> • Subject matter 	<ul style="list-style-type: none"> • Style: Always depicted side-on, standard for western Arnhem Land art.
Writing (English letters or numbers)	<ul style="list-style-type: none"> • Subject matter • Methods: Layer of beeswax is unusually thick, to the point of “wasting” the material. 	<ul style="list-style-type: none"> • Materials: Use of beeswax to make rock art is traditional

detailed and convincing approach to chronology for western Arnhem Land art. Even more convincing are the detailed analyses of individual sites and their superimposition to discuss chronology at a more local level (i.e., Chippindale and Taçon 1993). It is increasingly clear, however, that while there is great benefit in exploring the key styles that have been identified in the rock art, most rock art in this region does not fit into these larger regional stylistic chronologies (see, e.g., Chippindale and Taçon 1993; May et al. 2017c).

Is it possible to say then that the pre-Contact rock art of western and northwestern Arnhem Land represents a conservative tradition of making art? If we focus on one example, it is indeed possible. X-ray depictions (paintings of animals with internal features illustrated) were produced over 2,000 or 3,000 thousand years with little change to their general form (Taçon 1989). So, while there may have been variation at all times in the style of art being produced, some rock art styles or forms were produced over significant lengths of time, perhaps hundreds of generations, and with relatively little change.

Moreover, it was not just the techniques of making art that appear to have been quite resistant to change; artists were also notably conservative in the motifs which they chose to depict. Despite the fact that artists were painting familiar elements of daily life—animals, material culture, and activities, like ceremonies—in fact a key aspect of Australian rock art, and one which is reflected throughout the long history of the practice, is that only a very small section of material culture and the surrounding environment are depicted. For example, despite the fact that lithics were a key item of material culture used in western Arnhem Land for over 50,000 years (see e.g., Clarkson 2007; Clarkson et al. 2017) there are very limited examples painted in the rock art (May et al. 2017c). The range of animals depicted is also restricted with, for example, the site of Madjedbebe (Malakunanja II) in western Arnhem Land being home to 86 depictions of fish but only seven different types and an obvious bias toward catfish (May et al. 2017c).

In other words, pre-Contact rock art, while presenting us with a highly textured view of ancient Aboriginal lives and worlds, was highly selective. What this implies is a complex process of apprenticeship in which considerable social control was deployed to preserve the integrity of the art making process from one generation to the next, with both content and technique being highly proscribed. Systems of teaching and learning specific technologies often reflect social values, specifically those related to the material, practice, or technology in question (Coy 1989). As Crown (2001) demonstrates, conservatism in both motif and technique are promoted, in her case in the production of Hohokam decorated ceramics, through teaching and learning structures which feature hands-on instruction by skilled teachers and high social value placed on the capacity of learners to imitate their teachers' techniques. Taylor (1996) and May (2006, 2008) observed a similar—though not identical—dynamic at work in the training of Aboriginal artists by elders in contemporary Arnhem Land contexts. As May (2006: 171) states, in relation to young Aboriginal community members beginning to produce art for screen printing in Gunbalanya in the early 1990s:

Suddenly, the group was attracting the attention of senior artists in the community and learning the hard way about artistic protocols. After many arguments and confrontations or, as Wendy [Kennedy] puts it 'jostling for designs' a method was

worked out whereby permission was sought for the use of particular images from the appropriate artist or family member. ... This must have been a steep learning curve for the young men and women involved. It is clear that elders were closely observing the work of these screen printers.

In other words, the introduction of new art production technologies and materials, in this case screen printing, was rapidly accommodated into the artistic traditions in Arnhem Land and the social structures which developed around them, limiting the various screen printers' capacity, and perhaps also desire, to creatively rework older motifs or develop new ones. This suggests that the flurry of innovation evident in early Contact Period rock art did not overrun the traditional rules and regulations surrounding the production of art, but emerged through a process of social and interpersonal negotiation about tradition, artistic practice and the appropriateness of specific artists, methods, and motifs.

Nevertheless, this burst of new imagery and technique certainly reflects shifts or strains in the restrictive rights and regulations which governed the production of rock art in the region. With the introduction of new subjects there was likely a period of freedom and experimentation permitted. These subjects needed to be incorporated into traditional systems of knowing and painting, and their inclusion in traditional belief systems today is evidence of this process taking place. Indeed, introduced animals may have rapidly made their way into cultural belief systems of the region. For example, Asian water buffalo, introduced by the British during their earliest attempts at settlement in northern Australia, were noted by Berndt and Berndt (1970) and Altman (1982) as playing an important totemic role in Arnhem Land. Indeed, Altman (1982:282–283) notes that the buffalo's ears and horns were incorporated into depictions of the Rainbow Serpent (Ngalyod), and he hypothesized that the integration of this new animal into local customary traditions possibly extended back five generations or more.

That said, the striking thing about the appearance of these introduced animal species is how non-disruptive they were within the local rock art traditions. Traditional depictions of Australian species continued throughout the Contact Period and into the recent past, and were not superseded by introduced species. In fact, they remain dominant within the local rock art tradition. Although the introduction of new animals, foodways, and lifestyles into Arnhem Land was likely already disrupting Aboriginal people's traditional subsistence activities and patterns of movement through the landscape, in their art, we see ongoing relationships to country and to the wider world which do not always reflect these changes.

So, in this cultural context, there was obvious and intense social pressure to conform to specific traditional styles of painting and to only make use of culturally appropriate motifs; but the early Contact Period offered a small window of opportunity for innovation. What we have then is an activity in which conservatism and tradition are valued. Indeed, it is one in which both the process of becoming an artist—through engagement with ceremony and oral histories as much as through the process of learning to hold a brush and make designs with paint—and the formation of a strong community of practice (*sensu* Wenger 1998) dominate the choice of both technique and motif. Arnold (2012: 279) links these sorts of vibrant and coherent communities of practice to the development of homogeneous technological systems in which variation and

innovation are rare, but also suggests that they provide a social framework for the rapid dissemination and adoption of innovations, once these latter are found acceptable.

In fact, we see major and rapid shifts in both choice of content and technique in the Contact Period rock art comprising introduced subjects (see Table 1). New materials were incorporated into the art making tool kit, for example at nearby sites in western Arnhem Land, Reckitt's Blue Bag washing cubes were used to produce paintings (Chaloupka 1993: 84–85). At the same time, we see traditional materials, like beeswax, used in new ways. For example, at Djulirri, letters and numbers were formed from beeswax, a traditional material, but used in unusually large amounts to create very thick layers (Fig. 4). Gathering beeswax can be a time and labor intensive activity, and the choice to "waste" so much of it in art-making is itself a form of innovation which might reflect other cultural changes (i.e., that, by the time this art was produced, beeswax may not have been as necessary for traditional uses).

Moreover, the numerous sailing vessel paintings are innovative not just in their depiction of a new form of material culture, one which was introduced from outside and had no long-term presence in Arnhem Land culture, but also because the artists who depicted them used a suite of new techniques in their portrayal. The first and most obvious is the level of realistic detail which artists brought to bear in their depiction (Fig. 5). This demonstrates a change in practice, but also a change in perception, with more of the physical and material details of the ships being deemed worth illustrating than was normal in traditional depictions of much Aboriginal material culture such as bark canoes (e.g.

Fig. 4 Beeswax rock art of letters from the English alphabet, Djulirri. Photo: Sally K. May

Fig. 5 A European ship from Djulirri depicting a high level of realistic detail and also evidence of the painting being re-worked over time. Photo: Sally K. May

Chaloupka 1993). Although, having said this, over the many thousands of years that rock art has been produced in Arnhem Land, attention to detail has varied enormously.

Moreover, and perhaps more significantly, in the ship and human paintings we see obvious experimentation in artistic perspective and angle of depiction. It is particularly striking that in this body of art we see both front-on views of material culture (Fig. 6) and full face portraiture (Fig. 7) as well as obvious attempts at formal perspective, with two-point perspective (two vanishing points) being clearly incorporated into at least one front-on view of a steamship (see Fig. 6). In fact, some may question whether these images were produced by Aboriginal people at all, but given the use of traditional materials and methods and the remote location of the site, as well as co-location of the art alongside and in palimpsest with more traditional profile views and isometric perspective depictions of more traditional motifs, this is certainly not the case.

Fig. 6 Two examples of shifting perspective in the Contact rock art at Djulirri. Left. A front-on view of a ship. Right. A ship depicted with innovative use of perspective and waterline illustrated. Photos: Sally K. May

Fig. 7 Examples of shifting perspective in the Contact rock art at Djulirri. In this case two side-on portraits of European people. Not to scale. Photos: Sally K. May

This sudden shift in perspective is, to our eyes, a major innovation in its own right, perhaps even more so than the choice to illustrate new or introduced material things. How we perceive the world and make sense of the images which travel through our eyes and into our brains is itself as much of a social process, learned through habit, training and experience, as the production of art in which those perceptions are rendered into two or three dimensions (Kitayama et al. 2003; Mangan 1978; Park and Hong 2016). For example, experiments have demonstrated that populations of different ethnic or national origins perceive geometric forms in different ways and then reproduce them differently as well (e.g., Blais et al. 2008; Segall et al. 1966). Certainly, the emerging field of the anthropology of the senses makes clear that all perception—visual, auditory, haptic, etc.—is mediated by cultural factors and given value through social acts. Different cultures value sensory input in different ways; and not only is the hierarchy of the senses familiar to Westerners, in which visual acuity is of primary value, far from universal, the very modalities of the senses are profoundly cultural, not to mention historically specific (Classen 1993; Frieman and Gillings 2007: 6–7; Howes 2005; Ingold 2000). In other words, appreciating, creating, altering and consuming art occurred within a sensorium in which visual perception was likely profoundly differently understood and communicated than it would be in a Western and Modernist sensorial context (Wright 2008).

Moreover, as Ingold (2013: 125–126) reminds us, the act of drawing is not just a visual practice but a haptic engagement in which the body is implicated as well. Thus, the introduction of a new way of depicting imagery, a new perspective, represents not just a stylistic difference, but a fundamental—and extremely rapid—change in how visual imagery was perceived, understood and reproduced by Aboriginal people in Contact Period Arnhem Land. That is, we see in this artistic innovation evidence for both new ways of seeing the world as well as new ways of bodily engaging with it.

The body itself and changing ways of seeing and depicting it is another key innovation found within Contact rock art in Djulirri. In particular, the use of portraiture to depict individuals is a key innovation in Contact Period rock art (see Fig. 7). While the depiction of the human form is one of the most common subjects in western Arnhem Land rock art generally, the perspective and the facial detail used in the Djulirri portraits is unique. The exaggeration of key elements of the portrayed individuals is also telling, with enlarged pointed noses indicating European rather than local Aboriginal subjects (R. Lamilami, pers. comm.). With these portraits the artists are using facial detail not seen before in western Arnhem Land rock art, an exaggerated realism clearly meant to indicate a particular European individual living in or visiting this region or, possibly, a portrait copied from another source such as a tobacco tin or newspaper.

Some of the other Contact Period human figures also feature the hands-on-hips pose (Fig. 8), a commonly recognized symbol of invading cultures found elsewhere in Australia (e.g., May et al. 2017a; Paterson 2012) and overseas (e.g., Mokhtar and Taçon 2011; Hall and Mazel 2005). However, there are elements of the human figures

Fig. 8 Human figures with their hands on hips and smoking exaggerated pipes, Djulirri. Photos: Sally K. May

that also appear to draw upon earlier rock art painting traditions and techniques. Just as x-ray rock paintings in this region exaggerate or emphasise key elements of the subject, so too, do the Contact human figures. The exaggerated noses discussed above are an example of this, as are the exaggerated smoking pipes (see Fig. 8). Much of the exaggeration in earlier rock art has been attributed to artists emphasizing the power or the importance of the subject matter (e.g., Taylor 1996; Taçon 1989). For example, Fig. 9, from the site of Injalak Hill, illustrates a hunting scene whereby the prey is far bigger than the hunter. It is, perhaps, not surprising to see smoking pipes depicted in a similar way given the importance of tobacco as a trade item and high levels of addiction in this region throughout the recent past (e.g., Brady 2013).

The exaggerated knee in Fig. 10 is a particularly interesting case. In this painting, the artist is highlighting this part of the figure maintaining an artistic convention (compare to Fig. 11). However, it is not clear in this case why the artist chose to highlight the knee. Among the possible interpretations is that this emphasis shows the power of the kick and, concomitantly, of the act of violence. Alternatively, it may be being used in line with earlier sorcery images whereby swollen joints are painted to curse the person pictured (Chaloupka 1993: 208–209; see Fig. 11); or it could simply be helping to draw the viewer to the primary message of this painting, seemingly the aggression of the act. In this particular scene, we see continuation of artistic conventions but possible innovation in their use.

The Boom Years – Innovation in a Rush

Although continued European contact provoked a massive upheaval in Aboriginal lifeways in the Northern Territory, its impact on art production was more fleeting. As described above, we see a sudden and rapid transformation of artistic techniques contemporaneous with an influx of new motifs, suggesting an openness to new perspectives, new practices and new ways of seeing the world. Yet, this boom in stylistic and technical innovation was always tempered by the continuation of traditional practices, both in the contemporary production of longstanding imagery and in

Fig. 9 Injalak Hill hunting scene with the prey (Kangaroo) far bigger than the human hunters. Photo: Sally K. May

Fig. 10 Continuity in artistic traditions visible in the exaggeration of joints and limbs in Contact Period rock art. In this case the artist has emphasized the knee and foot, Djulirri. Photo: Sally K. May

the use of traditional material, gestures, and practices to depict non-Aboriginal people and their material culture. Eventually, the innovation that characterizes Contact Period art was abandoned, rejected, or simply forgotten in favor of a return to the depiction of traditional subjects and use of traditional perspectives and techniques (e.g., May et al. 2010). It is interesting to consider this issue in line with what we know of Contact art assemblages globally. If the nature of this contact allowed for their survival and access

Fig. 11 Rock painting of a woman with exaggerated or swollen joints believed to be indicative of sorcery, Injalak Hill (Chaloupka 1993: 208; T. Yulidjirri 2003, pers. comm.). Photo: Sally K. May

to the sites to produce the art, people with existing rock art traditions nearly always respond to periods of invasion and conflict with innovations in their rock art corpus (see, e.g., Dowson 1994; Troncoso and Vergara 2013). However, the overall return to more traditional styles, techniques, and subjects, as happened in Western Arnhem Land, is not common.

It is clear then that the rock art is playing a role in the contact “process” but what is the nature of this role? It has been argued that Contact rock art was being used in the same way as other rock art: to help educate community members about threats and opportunities (see, e.g., May et al. 2010, 2013). If we accept this argument, innovations appearing in this rock art corpus must be necessary to assist in this educational process. The implications of this are clear. If Contact Period art demonstrates the need for innovation in cultures and artistic systems impacted by massive changes brought about by colonialist incursions then earlier innovations in western Arnhem Land rock art might also indicate significant societal change.

It is also interesting to consider how Contact rock art may have been used to help minimize disruption to special values conceptualized as traditional (cf., Wetmore 2007). Importantly, Aboriginal artists in this region simply added a relatively small number of new subjects and techniques to their rock art corpus rather than replacing entire rock art traditions. Most Contact rock art at Djulirri, and more broadly in the whole of western and northwestern Arnhem Land, is traditional or pre-Contact in nature, meaning that the subjects of rock art were not being replaced. Instead, we argue that the Contact rock art was used to help minimize disruption to culture far more generally. By painting ships, a subject tied intimately to the bringing and the taking away of people and goods, Aboriginal artists could communicate important information regarding threats and opportunities. The same could be said for the use of portraiture at Djulirri, and we are left wondering who these individuals depicted with such detail and care were and what stories the artists were telling as they painted them and revisited them with family and other Aboriginal community members. Were they warning people about these newcomers, or simply arming their community members with knowledge to navigate these difficult times? In this way, these innovations perhaps assisted in minimizing the “damage” or helped communities navigate this massive social upheaval the best they can.

The adoption of new materials and techniques into the suite of art-making practices stands somewhat in contrast to the way new motifs were incorporated into the art. Traditional paints, brushes, and other materials (i.e., beeswax) remained in use as new types of colorants were experimented with and adopted into the art. The Reckitt's Blue pigment, for example, was used not just in the production of art depicting non-Aboriginal people and materials, but also in more traditional depictions of native animals, Aboriginal people, etc.; and these are not abandoned as more traditional motifs and art-making practices return to dominance in western Arnhem Land. In fact, the use of new and introduced materials, color palettes and gestures to produce art remains a characteristic of contemporary Aboriginal art and contribute to its dynamism and power. The new materials and techniques—whether they are Reckitt's Blue, acrylic paint, or screen printing technologies—are used by artists to tell stories that assert their traditions, strengthen their relationships within their communities and maintain their connection to country. In this blend of innovation and tradition, new identities are negotiated, and old stories are reinvigorated for the challenges of the present.

Conclusions

What we see in this Contact rock art is a similar sort of hybridisation that can be identified in the material culture referred to earlier: traditional practices, materials, and ways of bodily engagement with the world are blended with new ideas, technologies, and ways of life to produce something distinctly new and innovative. We find the artistic tradition a particularly valuable case study for examining this process because, unlike in the case of knapped artifacts or stone and steel axes, European themes did not come to dominate. After the introduction of a flurry of new motifs and artistic techniques, older rock art traditions—which had never disappeared—were returned to and the new imagery and associated gestures of production were largely abandoned. We see this process of abandonment or rejection of innovations as a conscious choice made by generations of Aboriginal artists, a form of colonial resistance. Although both conservatism and innovation rejection suffer from a lack of research, work in the Pacific (e.g., Lepowsky 1991) and among contemporary groups like the Amish (e.g., Wetmore 2007) makes clear that, particularly in situations of power asymmetry, such as we find in phases of colonialist contact, technological conservatism and the resistance to new technologies by the less powerful or less culturally dominant group is both considered and partial, with the overriding logic being about minimizing the disruption of specific values conceptualized as traditional, rather than eliminating or avoiding all outside influence.

In fact, the retention of traditional ways of seeing the world and producing art alongside the more innovative motifs and themes we find in the Djulirri Contact rock art gives us further insight into the ambivalence and ambiguities with which Aboriginal people approached contact with Europeans and others new to their land. As we have discussed, innovations in Contact rock art demonstrate major shifts in how people saw the world (their perspective, but also their identification of important visual details) and existed haptically within it. At the same time, however, this art also allowed those impacts to be negotiated, rationalized, and incorporated into pre-existing structures, so, for example, we see the emergence of hybrid Rainbow Serpents with buffalo horns. As such, we argue that Contact art was a particularly important practice and place for the negotiation of new, socially meaningful identities among Aboriginal communities. Not only was this art a form of dialogue between the past and present, and between different members of the community, it was a dialogue that would have been largely invisible to, and uninterpretable by, the non-Aboriginal people whose faces and technologies featured within it – a safe space to grapple with the realities of a rapidly shifting world and way of life.

In the Contact rock art at Djulirri, we find considerable data for the material impact of non-Aboriginal colonists and their technology; but we also find a rich body of evidence for the complex, nuanced, and ambiguous ways Aboriginal artists engaged with and interpreted these new things, ideas, and practices. Thus, it seems clear to us that the choices to innovate or to resist innovations are not binary. They emerge from complex social processes and reflect shifting relationships between individuals, artists, traditional practices, new technologies, outsiders, and society at large. In this case, they give us a window into the delicate process of navigating colonial contact while maintaining traditional cultural practices, values, and connections to country.

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References

- Adas, M. (1989). *Machines as the Measure of Men. Science, Technology and ideologies of Western Dominance*. Cornell University Press, Ithica.
- Altman, J. (1982). Hunting buffalo in north-Central Arnhem Land: a case of rapid adaptation among aborigines. *Oceania* **52**: 274–285.
- Arnold, J. A. (2012). Detecting apprentices and innovators in the archaeological record: the shell bead-making industry of the Channel Islands. *Journal of Archaeological Method and Theory* **19**: 269–305.
- Barnett, H. G. (1953). *Innovation: The Basis of Cultural Change*. McGraw-Hill, New York.
- Bayman, J. (2009). Technological change and the archaeology of emergent colonialism in the kingdom of Hawai'i. *International Journal of Historical Archaeology* **13**: 127–157.
- Bayman, J. (2014). Fishhooks and adzes: the pointed and edgy nexus of culture, technology, and early capitalism in Hawai'i. *Journal of Pacific Archaeology* **5**: 98–108.
- Benton, L., and Muth, J. (2000). On cultural hybridity: interpreting colonial authority and performance. *Journal of Colonialism and Colonial History* **1**. <https://doi.org/10.1353/cch.2000.0002>.
- Berndt, R., and Berndt, C. (1970). *Man, Land and Myth in North Australia: The Gunwinggu People*. Ure Smith, Sydney.
- Bhabha, H. K. (1994). *The Location of Culture*. Routledge, London.
- Bijker, W. E. (1995). *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*. MIT Press, Cambridge.
- Blais, C., Jack, R. C. E., Scheepers, C., Fiset, D., and Caldara, R. (2008). Culture shapes how we look at faces. *PLOS ONE* **3**: e3022.
- Bowdler, S., and Lourandos, H. (1982). Both sides of Bass Strait. In Bowdler, S. (ed.), *Coastal Archaeology in Eastern Australia, 1980 Valla Conference of Australian Archaeology*. Department of Prehistory, Research School of Pacific and Asian Studies, The Australian National University, Canberra, pp. 121–132.
- Brady, M. (2013). Drug substances introduced by the Macassans: The mystery of the tobacco pipe. In Clark, M., May, S. K. (eds.), *Macassan History and Heritage: Journeys, Encounters and Influences*. Australian National University Press, Canberra, pp. 141–157.
- Chaloupka, G. (1993). *Journey in Time: The 50,000 Year Story of the Australian Aboriginal Rock Art of Arnhem Land*. Reed Books Australia, Chatswood.
- Chippindale, C., and Taçon, P. S. C. (1993). Two old painted panels from Kakadu: Variation and sequence in Arnhem Land rock art. In Steinbring, J., Watchman, A., Faulstich, P., Taçon, P. S. C. (eds.), *Time and Space: Dating and Spatial Considerations in Rock Art Research*. Australian Rock Art Research Association, Melbourne, pp. 32–56.
- Clarke, A., and Frederick, U. (2008). The mark of marvellous ideas Groote Eylandt rock art and the performance of cross-cultural relations. In Veth, P., Sutton, P., and Neale, M. (eds.), *Strangers on the Shore: Early Coastal Contacts in Australia*. National Museum of Australia Press, Canberra, pp. 148–164.
- Clarkson, C. (2007). *Lithics in the Land of the Lightning Brothers: The Archaeology of Wardaman Country Northern Territory*. Terra Australis 25, Australian National University Press, Canberra.
- Clarkson, C., Jacobs, Z., Marwick, B., Fullagar, R., Wallis, L., Smith, M., Roberts, R. G., Hayes, E., Lowe, K., Carah, X., Florin, S. A., McNeil, J., Cox, D., Arnold, L. J., Hua, Q., Huntley, J., Brandl, H. E. A., Manne, T., Fairbairn, A., Shulmeister, J., Lyle, L., Salinas, M., Page, M., Connell, K., Park, G., Norman, K.,

- Murphy, T., and Pardoe, C. (2017). Human occupation of northern Australia by 65,000 years ago. *Nature* **547**: 306–310.
- Classen, C. (1993). *Worlds of Sense: Exploring the Senses in History and Across Cultures*. Routledge, London.
- Cole, K. (1972). *Oenpelli Pioneer: A Biography of the Reverend Alfred John Dyer, Pioneer Missionary among the Aborigines in Arnhem Land and Founder of the Oenpelli Mission*. Church Missionary Historical Publications Trust (Victoria), Parkville.
- Cooper, J., Samson, A. V. M., Nieves, M. A., Lace, M. J., Caamaño-Dones, J., Cartwright, C., Kambesis, P. N., and Frese, L. D. O. (2016). “The Mona Chronicle”: the archaeology of early religious encounter in the New World. *Antiquity* **90**: 1054–1071.
- Coy, M. W. (1989). From theory. In Coy, M. W. (ed.), *Apprenticeship: From Theory to Method and Back Again*. State University of New York Press, Albany, pp. 1–12.
- Crown, P. L. (2001). Learning to make pottery in the Prehispanic American southwest. *Journal of Anthropological Research* **57**: 451–469.
- Davidson, I., and Roberts, D. A. (2008). 14,000 BP—On being alone: The isolation of Tasmania. In Roberts, D. A., Crotty, M. (eds.), *Turning Points in Australian History*. University of New South Wales Press, Sydney, pp. 18–31.
- Dewar, M. (1992). *The “Black War” in Arnhem Land: Missionaries and the Yolngu 1908–1940*. North Australia Research Unit, Australian National University, Darwin.
- Diamond, J. (1993). 10,000 years of solitude. *Discover* **14**: 48–57.
- Dowson, T. A. (1994). Reading art, writing history: rock art and social change in southern Africa. *World Archaeology* **25**: 332–345.
- Flexner, J. (2014). Historical archaeology, contact, and colonialism in Oceania. *Journal of Archaeological Research* **22**: 43–87.
- Frederick, U. (1999). At the centre of it all. Constructing contact through the rock art of Watarrka National Park, central Australia. *Archaeology in Oceania* **34**: 132–144.
- Frieman, C. J. (forthcoming). Make new things but keep the old: imitation, innovation and the communication of new ideas. In Klimscha, F. (ed.), *Contextualising Technical Innovations in Prehistory*. TOPOI, Berlin.
- Frieman, C. J., and Gillings, M. (2007). Seeing is perceiving? *World Archaeology* **39**: 4–16.
- Galiana Botella, M. F. (1985). Contribución al arte rupestre levantino: análisis etnográfico de las figuras antropomorfas. *Lucentum* **4**: 55–87.
- Gosden, C. (2004). *Archaeology and Colonialism: Cultural Contact from 5000 BC to the Present*. Cambridge University Press, Cambridge.
- Gosden, C., and Knowles, C. (2001). *Collecting Colonialism: Material Culture and Colonial Change*. Berg, Oxford.
- Gott, B. (2002). Fire-making in Tasmania: absence of evidence is not evidence of absence. *Current Anthropology* **43**: 650–656.
- Hall, S., and Mazel, A. (2005). The private performance of events: colonial period rock art from the Swartruggens. *Kronos* **31**: 124–151.
- Harrison, R. (2002a). Australia’s Iron age: aboriginal post-contact metal artefacts from old Lamboo Station, Southeast Kimberley, Western Australia. *Australasian Historical Archaeology* **20**: 67–76.
- Harrison, R. (2002b). Archaeology and the colonial encounter: Kimberley spearpoints, cultural identity and masculinity in the north of Australia. *Journal of Social Archaeology* **2**: 352–377.
- Harrison, R. (2003). The magical virtue of these sharp things. *Journal of Material Culture* **8**: 311–336.
- Harrison, R. (2004). Kimberley points and colonial preference: new insights into the chronology of pressure flaked point forms from Southeast Kimberley, Western Australia. *Archaeology in Oceania* **39**: 1–11.
- Harrison, R. (2006). An artifact of colonial desire? Kimberley points and the technologies of enchantment. *Current Anthropology* **47**: 63–88.
- Haydon, T. (dir.) (1978). *The Last Tasmanian*. Artis Film Productions.
- Helskog, K. (2011). Reindeer corrals 4700–4200 BC: myth or reality? *Quaternary International* **238**: 25–34.
- Henrich, J. (2004). Demography and cultural evolution: how adaptive cultural processes can produce maladaptive. *American Antiquity* **69**: 197–214.
- Hiscock, P. (2007). *The Archaeology of Ancient Australia*. Routledge, London.
- Hofstadter, R. (1959). *Social Darwinism in American Thought*. Rev. ed. G. Braziller, New York.
- Howes, D. (2005). *Empire of the Senses: The Sensual Culture Reader*. Berg, Oxford.
- Ingold, T. (2000). *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill*. Routledge, London.
- Ingold, T. (2013). *Making: Anthropology, Archaeology, Art and Architecture*. Routledge, London.

- Jones, R. (1977). The Tasmanian paradox. In Wright, R. V. S. (ed.), *Stone Tools as Cultural Markers*. Australian Institute of Aboriginal Studies, Canberra, pp. 189–204.
- Jones, R. (1978). Why did the Tasmanians stop eating fish? In Gould, A. (ed.), *Explorations in Ethnoarchaeology*. University of New Mexico Press, Albuquerque, pp. 11–47.
- Kaye, H. L. (1986). *The Social Meaning of Modern Biology: From Social Darwinism to Sociobiology*. Yale University Press, New Haven. CT
- Keessing, R. M. (1982). Kastom in Melanesia: an overview. *Mankind* **13**: 297–301.
- Keessing, R. M. (1984). Traditionalist enclaves in Melanesia. In May, R., Nelson, H. (eds.), *Melanesia: Beyond Diversity*. Australian National University Press, Canberra, pp. 39–54.
- Kitayama, S., Duffy, S., Kawamura, T., and Larsen, J. T. (2003). Perceiving an object and its context in different cultures: a cultural look at new look. *Psychological Science* **14**: 201–206.
- Lemonnier, P. (1992). *Elements for an Anthropology of Technology*. University of Michigan Museum of Anthropology, Ann Arbor.
- Lepowsky, M. C. (1991). The way of the ancestors: custom, innovation, and resistance. *Ethnology* **30**: 217–235.
- Levitus, R. (1995). Social history since colonisation. In Press, T., Lea, T., Webb, A., Graham, A. (eds.), *Kakadu: Natural and Cultural Heritage Management*. ANCA and NARU, Darwin, pp. 64–93.
- Lewis, D. (1988). *The Rock Paintings of Arnhem Land, Australia: Social, Ecological and Material Culture Change in the Post Glacial Period*. Archaeopress, Oxford.
- Mangan, J. (1978). Cultural conventions of pictorial representation: iconic literacy and education. *Educational Communication and Technology* **26**: 245–267.
- May, S.K. (2006). *Karikadjurren – Creating Community with an Art Centre in Indigenous Australia*. Doctoral dissertation, Australian National University, Canberra.
- May, S. K. (2008). Learning Art, Learning Culture: art, Education, and the Formation of new artistic identities in Arnhem Land, Australia. In Domingo Sanz, I., Fiore, D., and May, S.K. (eds), *Archaeologies of Art: time, place and identity*. Left Coast Press, Walnut Creek, pp. 171–194.
- May, S. K., and Domingo Sanz, I. (2010). Making sense of scenes. *Rock Art Research* **27**: 35–42.
- May, S. K., Taçon, P. S. C., Guse, D., and Travers, M. (2010). Painting history: indigenous observations and depictions of the “other” in northwestern Arnhem Land, Australia. *Australian Archaeology* **71**: 57–65.
- May, S. K., Taçon, P. S. C., Wesley, D., and Pearson, M. (2013). Painted ships on a painted Arnhem Land landscape. *The Great Circle: Journal of the Australian Association for Maritime History* **35**: 83–102.
- May, S. K., Wesley, D., Goldhahn, J., Litster, M., and Manera, B. (2017a). Symbols of power: the firearm paintings of Madjedbebe (Malakunanja II). *International Journal of Historical Archaeology* **21**: 690–707.
- May, S. K., Johnston, I. G., Taçon, P. S. C., Domingo Sanz, I., and Goldhahn, J. (2017b). Early Australian anthropomorphs: the global significance of Jabiluka’s dynamic figure rock art. *Cambridge Archaeological Journal* **28**: 67–83.
- May, S. K., Taçon, P., Wright, D., Marshall, M., Goldhahn, J. and Domingo Sanz, I. (2017c). The rock art of Madjedbebe (Malakunanja II). In David, B., Taçon, P., Geneste, J. -M. and Delannoy, J. -J. (eds.), *The Archaeology of Rock Art in Arnhem Land, Terra Australis*. Australia National University Press, Canberra, pp. 87–107.
- McNiven, I. J., and Russell, L. (2005). *Appropriated Pasts: Indigenous Peoples and the Colonial Culture of Archaeology*. AltaMira Press, Oxford.
- Mokhtar, S., and Taçon, P. S. C. (2011). The recent rock drawings of the Lenggong Valley, Perak, Malaysia. *Antiquity* **85**: 459–475.
- Murray, T., and Williamson, C. (2003). Archaeology and history. In Manne, R. (ed.), *Whitewash: On Keith Windschuttle’s Fabrication of Aboriginal History*. Black Inc Agenda, Melbourne, pp. 311–333.
- Park, I., and Hong, Y. (2016). Culture and sensory response to visual stimuli. *International Journal of Psychology* **53**: 77–81.
- Paterson, A. (2012). Rock art as historical sources in colonial contexts. In Oland, M., Hart, S. M., Frink, L. (eds.), *Decolonising Indigenous Histories: Exploring Prehistoric/Colonial Transitions in Archaeology*. University of Arizona Press, Tucson, pp. 66–85.
- Pfaffenberger, B. (1992). Social anthropology of technology. *Annual Review of Anthropology* **21**: 491–516.
- Reynolds, H. (2001). *An Indelible Stain? The Question of Genocide in Australia’s History*. Penguin Books Australia Ltd, Melbourne.
- Rogers, E. M. (2003). *Diffusion of Innovations*. 5th edition. Free Press, London.
- Rogers, E. M., and Shoemaker, F. F. (1971). *Communication of Innovations: A Cross-Cultural Approach*. 2nd ed. Free Press, New York.
- Roth, H. L. (1899). *The Aborigines of Tasmania*. 2nd ed. F. King & Sons, Halifax.

- Schieffelin, E. L., and Crittenden, R. (1991). *Like People You See in a Dream: First Contact in Six Papuan Societies*. Stanford University Press, Stanford.
- Segall, M. H., Campbell, D. T., Herskovits, M. J., and Bender, D. (1966). *The Influence of Culture on Visual Perception*. Bobbs-Merrill, Indianapolis.
- Sharp, L. (1952). Steel axes for stone age Australians. In Spicer, E. H. (ed.), *Human Problems in Technological Change: A Casebook*. Russel Sage Foundation, New York, pp. 69–90.
- Smith, L. T. (1999). *Decolonizing Methodologies: Research and Indigenous Peoples*. Zed Books, London.
- Taçon, P. S. C. (1989). From rainbow Snakes to “X-Ray” Fish: the Nature of the Recent Rock Painting Tradition of Western Arnhem Land, Australia. Doctoral dissertation, Australian National University, Canberra.
- Taçon, P. S., Kelleher, M., King, G., and Brennan, W. (2008). Eagle’s Reach: a focal point for past and present social identity within the Northern Blue Mountains World Heritage Area, Australia. In Domingo Sanz, I., Fiore, D., and May, S. K. (eds.), *Archaeologies of Art: Time, Place, and Identity*. Routledge, London, pp. 195–214.
- Taçon, P. S. C., May, S. K., Fallon, S. J., Travers, M., Wesley, D., and Lamilami, R. (2010). A minimum age for early depictions of southeast Asian praus in the rock art of Arnhem Land, Northern Territory. *Australian Archaeology* **71**: 1–10.
- Taçon, P. S. C., Paterson, A., Ross, J., and May, S. K. (2012). Picturing Change and Changing Pictures: Contact Period Rock Art of Australia. In McDonald, J. and Veth, P. (eds.), *A Companion to Rock Art*. Blackwell, Chichester, pp. 420–436.
- Taylor, L. (1996). *Seeing the Inside: Bark Painting in Western Arnhem Land*. Oxford University Press, Oxford.
- Taylor, R. (2007). The polemics of eating fish in Tasmania. *Aboriginal History* **31**: 1–26.
- Taylor, R. (2008). The polemics of making fire in Tasmania: the historical evidence revisited. *Aboriginal History* **32**: 1–26.
- Thomas, D. H. (2000). *Skull Wars: Kennewick Man, Archaeology, and the Battle for Native American Identity*. Basic, New York.
- Torrence, R. and van der Leeuw, S. E. (1989). Introduction: what’s new about innovation? In van der Leeuw, S. E. and Torrence, R. (eds.), *What’s New? A Closer Look at the Process of Innovation*. Unwin Hyman, London, pp. 1–15.
- Troncoso, A. and Vergara, F. (2013). History, landscape, and social life: rock art among hunter-gatherers and farmers in Chile’s semi-arid north. *Time and Mind* **6**: 105–112.
- Wenger, E. (1998). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge University Press, Cambridge.
- Wesley, D. (2013). Firearms in rock art of Arnhem Land, Northern Territory, Australia. *Rock Art Research* **30**: 235–247.
- Wesley, D. (2014). Bayini, Macassans, Balanda, and Bininj: Defining the Indigenous past of Arnhem Land through Culture Contact. Doctoral dissertation, Australian National University, Canberra.
- Wesley, D., Fenner, J. N., Theden-Ringl, F., and Lamilami, R. (2011). Buried on foreign shores: isotope analysis of the origin of human remains recovered from a Macassan site in Arnhem Land. *Australian Archaeology* **73**: 41–48.
- Wesley, D., O’Connor, S., and Fenner, J. (2016). Re-evaluating the timing of the Indonesian trepang industry in north-west Arnhem Land: chronological investigations at Malara (Anuru Bay A). *Archaeology in Oceania* **51**: 169–195.
- Wetmore, J. M. (2007). Amish technology: reinforcing values and building community. *Technology and Society Magazine, IEEE* **26**: 10–21.
- White, R. (1991). *The Middle Ground: Indians, Empires, and Republics in the Great Lakes Region, 1650–1815*. Cambridge University Press, Cambridge.
- Wright, T. (2008). *Visual Impact: Culture and the Meaning of Images*. Berg, Oxford.