

Research Before Restoration

William Cottrell¹

¹ University of Canterbury, Christchurch, New Zealand; cottrellone@gmail.com

Abstract

When presented with an item of historic interest we encounter a cumulative history of every event experienced by that object. Despite offering large areas for investigation, buildings are often severely compromised through neglect, functionality and fashion. Because of their size and complexity there is generally good opportunity to recover much information. Unfortunately inept restorative processes often destroy even more historic evidence and disturbingly when information is known often it is still ignored. Building codes and compliance can further frustrate sensitive restorative processes. The result is always a compromise.

Smaller objects, such as furniture, offer far more for flexibility for sensitive and appropriate treatment. Cost alone is far less a consideration and projects can be managed more intensely because of affordability, portability and size, but this is not always a virtue. Important heritage furniture is often severely compromised because it is small, can be very cheap and is unfortunately all too often historically misunderstood. In some cases a single object may survive to represent a period or genre. In New Zealand and Australia, countries with a relatively short (European) history, such a loss can leave a disproportionately large gap.

Research is vital to the understanding of any historic building or object. Critical observation can be extremely revealing. Mentally undressing later alterations or subsequent damage can then be compared with anecdotal, circumstantial and documented material to provide a very comprehensive, informed and layered picture. Only then should any physical interference be attempted.

All work should be as much as possible reversible and documented. It should not be apparent to the casual observer. All restorative work should mimic the intentions of the original creator/maker as far as possible, but still reflect the object's age. Non-invasive restoration using traditional materials and techniques leave later opportunity to recover more information and maintain harmony with the properties of old and introduced components.

A broad based observational approach can recover information to assist in heritage restoration. A sensitive restorative approach to match materials and traditional techniques for correct restitution of losses and offer long term stability will prevent future damage. Furthermore provenance will add value and interest to secure the wellbeing and safety of any historic artefact.

1. Introduction

The currency for forensic work at a molecular level may over-shadow more traditional observation. A fragment of material, for example a single board from an old building, may reveal a surprising amount of information. If we cumulatively add many such observations from one site or source, then we can get a surprisingly broad and layered picture. This new found information can be then compared to existing documented and anecdotal histories to further expand the picture.

Careful and thorough research of any historic object will provide the most secure approach which should precede any restorative work. Restoration is by nature invasive and there is always real potential for information to be lost and unnecessary damage to occur. Furthermore some intervention may be non-reversible and ostensibly a process designed for protection may be significantly compromise the project.

Sensitive and considered restoration should proceed when all information surrounding the object has been thoroughly analysed. For this process to succeed it is critical to understand and agree on the intended outcome before work begins. That is, work should commence to a clear destination in controlled stages.

Comprehensive research therefore provides a sound basis to underpin cautious and progressive work. It provides security for work to proceed along a predetermined path and offers confidence and certainty of outcome.

2. The Wooden Colonial House

By working backwards from a few fragments we are forced to consider deeply every detail. In 2012 an archaeologist asked me to remark on what I could determine from an old house's wall board [Figure 1]. In this situation I ask for no other

information as I do not want my observations to be affected by 'prior knowledge'.



Figure 1: Reciprocating saw marks, c.1852.

2.1. Tui's Nest

I could tell that it was New Zealand native white pine or kahikatea because of the colour and extensive worm damage. This was a species used by the first European colonists before they realised its poor durability. Also, it is a species more often found at low altitudes, particularly in coastal regions, colder climates and in or near wetlands. In lower areas it sometimes predominated over more durable and attractive timbers. The saw marks, or kerfs, were most unusually from a reciprocating saw. These were rare in New Zealand, early and generally powered by water-wheel. There was one completely hand-made nail still in the short section of board. This type of nail is virtually never found in the colonial context and would not be found after the 1850s.

We have some good information. A species used by the earliest settlers, generally in the 1840s and a nail type that would also agree with that decade. There were saw marks that indicate an early and uncommon water powered saw, probably situated on a stream or river near the sea for transport, and a timber species possibly found in a coastal region typical of where first settlement occurred. The board in fact came from an historic cottage, "Tui's Nest", in Port Lyttelton. [Figure 2]. The house, built about 1853, was owned by John Parsons who captained immigrant ships to Otago and Canterbury after 1848. Totara and kahikatea were the two dominant species on Banks Peninsula and John Pavitt had established a reciprocating saw mill around 1852 in nearby Robinsons Bay. Tui's Nest was demolished in 2012.



Figure 2: Tui's Nest, Lyttelton, c.1853.

2.2. Pavitt Cottage

A survey of the second surviving Pavitt Cottage [Figure 3] indicated a change of saw type. The first reciprocating mill had burnt down about 1854 and a new circular saw mill was subsequently built. The oldest front part to Pavitt's house showed all framing was of low-grade circular-sawn totara or kahikatea, consistent with it having been built after the completion of the second mill. This was extremely helpful in dating Pavitt's house since no surviving records indicated when the property was built. Further investigation showed that all timber had been hand dressed and moulded with traditional profiled planes [Figures 4]. The later rear wing, built in 1865, had machine profiled tongue and groove wall linings. This gave an end date to when the building must have been completed.



Figure 3: Pavitt Cottage showing older front part built c.1856-8 and newer rear wing from 1865.



Figure 4.1: Kahikatea circular sawn board with hand planed tongue.



Figure 4.2: Same board as in Figure 4.1 showing reverse side hand planed. The tear lines show that this was done while the wood was still wet soon after felling.

2.2.1. Nails

I will discuss nails and screws to detail how such seemingly minor artefacts can be so revealing. All nail types at the Pavitt site were the Welsh

'Ewebank' sliced and stamped or sheet cut pattern, but none were found to have that maker's characteristic post-1869 star impressed on the head. [Figure 5]. Two head patterns were noted to the largest 3 inch or 75 mm nails. One removed from the interior of the front (older part) downstairs bedroom cupboard had an irregular faceted head, consistent with the earliest Ewebank nail pattern. Historian Chris Howe has surveyed early Australian buildings and notes:

These nails appear to conform to the Cordes-Slocum patent of 1834 for their wrought iron nails. This is the earliest 'Ewebank' pattern from the J. J. Cordes & Co of the Dos Works, Newport, Monmouthshire factory and examples have been found to have arrived in Australia by 1837 [1].



Figure 5: Ewebank nails from 1865 rear wing (top) and older c.1856-8 front bedroom (bottom).

The sample nail had (machine) ejection finger marks to the upper shaft below the head while the shaft middle had the typical Ewebank bulge. The head had compression fractures indicating it may not have been red hot and lost some plasticity while being forged. Most importantly it had raised ridges to top and bottom edges of its parallel sides, caused by eccentric rollers on the 'patented' milling machine squeezing and elongating the nail rod into a new cross-sectional form.

The second nail retrieved was found in the attic part of the newer wing and had consequently degraded more because of damp. There was an unidentified 'Dot X Dot' impression to its head and it had a regular four sided tapering shaft. Another development of Henry Ewebank's was a machine with converging rollers to draw out the nail and taper it to a point. There were clear impressions of machine stamping to form the nail head observed from the folded metal under the nail head. They were on diagonally opposite 'corners' of the nail shaft suggesting two <> shaped vice heads gripping the nail as the head was hammer formed in a mould. Howe has noted that 1850s buildings in western Victoria, Australia, feature several types of nails cut from pre-profiled sheets. The nail shanks were cut from across the shaped sheet and then separately headed, consistent with a later Cordes & Co patent. Pavitt Cottage appeared also to have this pattern.

2.2.2. Nineteenth Century Screws

Four original screws removed from a 'japanned' cast butt door hinge were Sloan/Nettlefold patterns, manufactured prior to 1858. [Figure 6]. Two screws had blunt tips, non-tapering shafts and deeply cut, very sharp threads when compared to the other two shorter (later but still original) screws. The two types were made quite differently, most significantly in the way the thread was formed. The blunt tipped screws had their threads cut on a die which was wound onto the blank screw rod, rotated to cut the thread. This is quite evident where the metal has been pushed sideways by the cutter's pressure to create a double lip to the initial thread. Joseph Whitworth patented his un-locking clamping nut for forming threads in 1839. The advantage was that it did not need rewinding back down the threaded screw shaft. Its use was commonplace when he displayed it at the 1851 Great Exhibition.



Figure 6: 1854-8 pattern screws (left) 1839-54 pattern (right).

This 'blunt' screw pattern is typically English and can be found in New Zealand furniture until the middle to late 1850's [2]. The metal on all four screws has been squashed while hot, causing the thread to rise beyond the original extruded rod blank diameter. In 1847 New Yorker Thomas Sloan patented his machine for forming pointed screws and in 1854 Englishman John Nettlefold bought the rights to manufacture those screws from Sloan's invention. By 1858 this machine was further improved to fully taper the screw to the more familiar conical shape. The pattern of the two 'pointed' screws followed the American model. Their counter-sunk heads were angled steeper and the slots wider. Interestingly they had a rounder outer flange as though they were not entirely tool cut on a lathe but possibly stamped. No chuck or grip marks were seen on any screw upper shaft perhaps implying more automation. The important point to note is that those two screws tapered to a point quickly rather than the 'slow' progressive taper of slightly later made screws. These are in fact the first totally machine formed pointed pattern screws. It is clear that both screw types (blunt and

pointed) were available during the construction of the initial stages of Pavitt Cottage. The screws identified for this study from the older part of Pavitt Cottage were all manufactured before 1858.

From small clues such as the use of certain tools and manufacture dates of hardware we have been able to narrow the date of the Pavitt Cottage construction. Other evidence not discussed here established a reasonably precise date of 1856–58.

3. Banksia - Original Furniture

'Banksia' a nearby Akaroa property built in 1860 bore direct comparison in style and materials. Both houses were originally quite modest, consistent with early colonial architecture; variations of a five room plan, containing three bedrooms, a living room and kitchen, with additions some ten to twenty years later. Until 2011 Banksia had retained some original imported and colonial made contents. A quick survey was able to broaden our understanding of relevant period fashions and manufacturing processes. Furthermore these could also be found in the fabric of the building. Everything related, which perhaps should not be surprising, providing reassurance that good comparative information can be found circumstantially.

Two cabinets could be highlighted [Figure 7.1 and 7.2]. A neo-classically inspired chiffonier of hand planed circular sawn totara planks stylistically mimicked the fire surround of the same timber. Both were almost certainly made by the same local cabinetmaker. A simple homemade plate rack dresser in figured totara was likely made from off-cuts when Banksia was first constructed as timber, tool marks and nail types all matched. The crude construction was below that of a cabinetmaker and more in line with a carpenter's skills and familiarity with wood.



Figure 7.1: A classically inspired hand planed totara chiffonier with materials and architectural features original to Banksia, 1860.



Figure 7.2: Primitive circular sawn totara dresser, original to Banksia, likely made c.1860+ from off-cut material after the construction of the house. It would not be possible to associate these two pieces on style. It was done through use of identical materials and a common history at the same property.

3.1. Further Timber Analysis

With timber we can also look at dendrochronology, that is, the width between annular growth rings to determine when a tree was milled. The end grain of a board will exhibit variations of width in the rings which will correspond exactly to local climatic conditions as the tree was growing. This natural 'bar-coding' can be matched to known historic weather patterns. The rings are narrower in colder years. It is the sap-wood area, particularly in centre to edge cut quarter sawn boards that will be most revealing as the tree adds layers in circumference each year. The last ring to the outside of the tree will determine the year it was felled, even the summer or winter season is sometimes possible to predict. This process has been successfully used to date the oldest wooden building in North America, Fairbanks House, precisely to 1641 and is common practice for dating paintings on wood panels and stretched canvases. Furthermore timber samples can be taken to determine the chemical composition of the wood. The identical species growing in different soil types will take up different proportions of minerals which can be plotted against the composition of known regional soil types. Typically this is a destructive process as analysis is done from ash [3].

3.2. Colonial Furniture

The relative simplicity and size of furniture does focus investigative attention to small details and critical scrutiny. This discipline can be transferred to larger structures such as buildings which

present expansive areas for investigation. Furniture interpretation and restoration offers some advantages by comparison to buildings; primarily because of size, portability, project manageability, and significantly, economy. Equally it does come with notable challenges. Furniture size restricts the potential for research material to be recovered and is often frustratingly exacerbated by severe modification. Further, rare and important objects are frequently misunderstood because few clues remain to indicate their origins or historic context. Generally all information must be gleaned from the object itself. Sometimes only one discovered example may survive to represent a particular genre.

3.3. Researching Extant Historic Furniture

Very careful observation cannot be overstated as the single most important aid to recovering information. This should be done before comparison to existing provenance or anecdotal material. Initial impressions should be recorded within a few minutes as they will quickly fade with familiarity. The perpetrator of any alterations will rely on an overall first impression to convince the observer of authenticity. Invariably this will not be supported by detailed inspection, particularly of hidden 'dry' surfaces such as backs, interiors and bottom boards.

Later 'improvements' or modernisation would have been undertaken for several obvious and explainable reasons while natural degradation can largely be accounted for by poor construction, low-grade materials and neglect. Motivations for these are generally:

- Economic gain or to add value.
- Fashion and style changes.
- Change of use and need.
- Degradation due to breakage or decay.

The first two points should be regarded with suspicion as generally there will be some attempt to disguise any modifications. It is extremely difficult to successfully achieve either point's outcome and evidence usually abounds, although at first glance not always apparent. Typically there will be fresh cuts and timber will be left with partially oxidized surfaces where it has been reshaped. Likely there will be heavy use of introduced colour, incorrect tool marks, modern adhesives (that is non-gelatine), later nail/screw types, inconsistent decorative adornments or out of period details. The existence of one later component or evidence of interference is enough to indicate compromised authenticity and certainly should arouse suspicion. If even one original nail or screw can be found then all others can generally be discounted and timeframes can be significantly narrowed for corroborating period features.

The latter two points usually occur for more obvious reasons, but unfortunately often result in

larger original material loss. Modification is generally self-evident where an object has been altered to perform a different use. An example might be a pedestal sideboard where the back has been removed and converted into a bed head board and the pedestals made into bedside cabinets. Generally little attempt is made to hide the origins of the remodelled furniture as the process is mostly one of partial deconstruction.

The reverse happens less frequently where a modest item is embellished or incorporated into another piece. To achieve reasonable success it involves higher levels of cabinetmaking skill and knowledge of period style. The trade term 'marriage' is where two unassociated pieces are combined. A common example would be a glazed bookcase top fitted to a chiffonier or secretaire base of vaguely similar timber and age. Any inconsistency of cabinetmaking style, such as joint formation, edge mouldings or even screw or nail types, will reveal such combinations. Honest repairs can be viewed and explained as such, despite almost invariably being of poor competency.

Moving components, such as doors and drawers, are particularly prone to user damage. Distortions in timber such as severe cupping and splitting again are understandably subject to sometimes crude remediation. Woodworm infestation frequently and unnecessarily results in the replacement of large areas of secondary timber, such as backboards and framing, with the consequential loss of much original and informative material. It is more serious than might be imagined. Although the higher quality front 'show-wood' may have been refinished more than once in the life of a piece of period furniture, the loss of original and untouched bottom and back boards removes all hand tool marks and securing nails which may have been the only remaining indicators of the objects true age and origins. Expensive imported timbers can be used in 'seen' surfaces but cheaper indigenous woods are always used for basic construction. Strangely they provide most useful information.

Subsequent interference can be 'undressed' and discounted as non-original once the perpetrator's motivation is explained. Initially this is purely academic but ultimately will happen in practice. This is vital to begin the process of gathering information prior to restoration. As previously discussed with the house examples tool marks, both hand and mechanical, timber types and hardware should be compared to known dates of popular use. Laziness should never be ignored! No cabinetmaker would hand saw wood when a machine was available. Each wooden component, sides, tops, backs, rails, feet, bases, mouldings, should be noted for originality and their relationship with mating elements. All dry surfaces should

appear consistent in colour and texture as should a logical use of primary and secondary timbers. Modern synthetic adhesives developed after the 1930s should not be present with only traditional animal based gelatine, glue evident.



Figure 8: This c.1830 mahogany chest is possibly the oldest New Zealand made example. It was identified from its rimu and tawa drawer linings. Period design, pit-saw marks, nail types and pre-1839 screws with hand forged locks aided in dating and location of manufacture.

Occasionally supporting information is found from another piece of furniture by the same craftsman with a distinct woodworking signature just as reference can be made to historic cottages in a similar location. The portable nature of furniture does mean most often that this context is lost. Some timber species were more popular in specific regions, for example cedar exported from New South Wales to Dunedin, black wood in Western Australian, Huon pine in Tasmania, kauri in as the primary show-wood in Auckland but totara and rimu in central and southern New Zealand. Hardware specific to certain English, usually Birmingham, manufacturers and foundries was often imported by a single colonial agent. Handle patterns, lock and hinge types display regional variations depending through which port they were originally shipped. Nineteenth century newspaper accounts of new stock arrivals and advertisements can be remarkably detailed and word recognition software makes searching now fascinatingly easy [4].



Figure 9: Restored rimu and kauri chest c.1838-9 made by Northland cabinetmaker and missionary William White. Identified by timber species, saw marks, screw & nail types, knob patterns, neo-Grecian style and provenance.

Patterns by major nineteenth century designers, cabinetmaking enterprises and large retailers both in Britain and Australasia offer excellent supporting documentation. Attempts to modernise antique colonial furniture typically focus on the removal of decorative features identifying an object with a past style. Furniture follows proscribed fashions and while there are a myriad of design variables they conform to identifiable patterns which can prove invaluable for the accurate recreation of lost decorative features such as carvings, mouldings, veneers, turnings, handles and surface colour treatment. An individual cabinetmaker's style can be mimicked, be it clumsy or accomplished, to replicate lost ornamentation.

New research has proven identical designs were used across the colonial world during the same periods [5]. Patterns were no more than simple line drawings, while fine detail was usually left to individual craftsmen's personal taste or his client's whims. Intensive hand produced decoration added cost and furniture designs were almost invariably modified. Additionally several patterns may have been blended together for individuality so the original inspiration may be obscured. Cabinetmaking had agreed rules of construction controlled by the unique properties, notably the directional grain restrictions, of wood. This demanded certain joints be formed with regard to expansion and contraction, longitudinal strength and lateral weakness. The peculiarities of timber were trade knowledge understood by any apprenticed cabinetmaker. In other words, a good current knowledge of cabinetmaking will fill in a lot of gaps.

4. Restoration

In some circles restoration is considered extreme. Conservation is much the preferred choice where

an object is protected in an inert and stable state with no radical intervention. This does however deny severely damaged items opportunity to be displayed or viewed as they once were when first created. The morality of careful restoration therefore needs to be appreciated and very strict guidelines must be put in place.

Restoration is an honest and informed effort to reinstate an object back to its original state as nearly as possible.

- During the process no original material should be removed or lost.
- Where practicable all work should be reversible.
- As far as reasonable only materials and tools available to the original creator/maker should be utilized to provide interactive and visual harmony.
- No effort should be made to reconstruct an artefact beyond the talents and resources of the original creator/maker or what the accumulated evidence suggests.
- There should little or no evidence of restoration. All work and observations should be documented.

Restoration is a complex subject, but if these five principles are adhered to then it very much narrows the options available and aids decision making.

In short, it should appear as though no recent work has been undertaken and that history has been kinder to the object than was in fact the case. It is simply putting back the history. Work should be done to ensure the long term preservation of the item; to add strength and durability, to add interest, add value and aesthetic appeal. To give an artefact status will protect it from future interference and intervention.

5. Conclusion

When faced with even minimal original material we are forced to tease out every clue to recover usable facts. The important message is that careful observation and research can recover significant historic data. Understanding the way constructional materials have been modified and worked provides a layered view of the past. For example, the availability of timber species and how they have been processed is very telling. All man-made components carry the evidence of their manufacture and those processes are often well researched. Even a single nail carries a surprising amount of information while backgrounding equally esoteric perspectives, such as fashion or altered need may add additional clarity to support previous observations. This can then be cross-referenced against archival research and provenance. If multiple histories are collated then timelines can be graphed, locations plotted, various motivations,

crafts and styles recognised to allow restoration with integrity to cautiously proceed.

6. References

- [1] Howe, C.
http://www.bma.arch.unige.it/PDF/CONSTRUCTION_HI STORY_2009/VOL2/HOW-chris_Paper-revised_layouted.pdf
- [2] Cottrell, W; *Furniture of the New Zealand Colonial Era 1830-1900*, Reed, Auckland, 2006, p. 429.
- [3] Ragland, K. and Aerts, D.,
Properties of Wood Combustion for Analysis,
http://www.marioloureiro.net/ciencia/ignicao_vegt/ragla91a.pdf
<http://en.wikipedia.org/wiki/Dendrochronology>.
- [4] <http://paperspast.natlib.govt.nz/cgi-bin/paperspast>.
- [5] Cottrell, W., p.367-70.