Graveyard Studies: Motifs of the Eighteenth, Nineteenth, and Twentieth Centuries in Mountbagnall Graveyard, Co. Louth, and the Recording of Graveyard Information via 3D Modelling.

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The following dissertation will explore research techniques, used in the study of graveyards, regarding headstone motifs and their patterns of use in the eighteenth, nineteenth and twentieth centuries. The research will be based on a case study of Mountbagnall graveyard in Riverstown, Co. Louth. The paper will also explore the use of 3D modelling regarding picture format. Technology in the field of archaeology has progressed rapidly in recent times. High definition aerial photography, ground penetrating radar, and 3D modelling in both picture and printing, have made sure archaeologists have the most modern tools to complete their research. But how effective are some of these modern approaches? And are they really of any benefit to an archaeologist's study? These questions will be explored and answered based on the research undertaken for this dissertation.

To begin, the paper will look at the cultural significance of death and burial in Ireland. Evidence of the significance of death and its associated rituals stretch right back to pre-history. Recent archaeological excavations, regarding the Mesolithic era (7000BC-4000BC), have revealed important information on Irelands first inhabitants, the hunter-gatherers. The excavation, carried out in 2001, found evidence of early Mesolithic burial practices in Hermitage, Co. Limerick.[2] The excavation can be considered as the first recording of a cemetery in Ireland due to the area consisting of four cremation pits.[3] Tracey Collins and Frank Coyne note that the cremated remains, which had been placed in the pits, had been marked with a wooden post, most likely, representing a grave marker.[4] The earliest date recorded at the site, using radiocarbon dating on the cremated remains, was 7550-7290 cal. BC.[5] Grave goods, such as stone axes, along with other items, such as worked flint and chert pieces, were also discovered during the excavation.[6]

The people of the Neolithic era (4000BC-2500BC), produced some of the most spectacular burial sites in Ireland. The first farmers built grand megalithic tombs, which were monuments constructed using stone, to bury their dead.[7] Four different type of megalithic tomb emerged from this period: court tombs; portal tombs; passage tombs; and wedge tombs.[8] The most prominent and majestic of the four being the passage tomb. Passage tombs are identified by their inner chamber which is accessed by a passage, both of which, are covered by a circular mound.[9] John Waddell states that, the passage tombs located in the Boyne Valley in Co. Meath, "have been described as the greatest architectural achievements" of tomb builders in western Europe.[10] The most well-known of these monuments is the tomb located at Newgrange. Near the site of Newgrange, are the neighbouring passage tombs of Knowth and Dowth.[11]

[1] This dissertation was submitted in partial fulfillment of the BA(Hons) in Digital Humanities, May 2017.
[2] T. Collins and F. Coyne, 'Fire and Water... Early Mesolithic Cremations at Castleconnell, Co. Limerick', in *Archaeology Ireland*, 17, 2, (2003), p. 24.
[3] *Ibid*., p. 25.
[4] *Ibid*., p. 25.
[5] *Ibid*., p. 25.
[6] *Ibid*., p. 26.
[7] J. Waddell, *The Prehistoric Archaeology of Ireland*, (Wicklow, 2000), p. 57.
[8] *Ibid*., p. 57.
[9] *Ibid*., p. 57.
[10] *Ibid*., p. 57.
[11] *Ibid*., p. 58.

In the Bronze age (2500BC- 500BC), burial practices became simpler. The remains were either buried or cremated and placed in a simple pit, or a stone built cist, which was a short rectangular stone lined pit, usually containing a capstone, and sometimes paved floors.[12] There are two types of cemetery recorded for the Bronze age period in Ireland: flat cemeteries; and cemetery mounds, both containing multiple burials.[13] A burial mound can be either a reused earlier mound, or a purpose built circular mound which held multiple burials.[14] Burial mounds are also known as burial barrow's. A ring barrow consisted of a circular ditch and external bank with a mound in the middle.[15] The Iron age (c.500BC-400AD) had similar ring barrows and simple pit burials.[16] The remains were generally cremated, and archaeologists have also found personal items placed with the burial, such as, jewellery and beads.[17] A prime examples of royal burial sites dating to the Iron age are; Tara, Co. Meath, and Emain Macha, also known as, Navan Fort, in Co. Armagh.[18]

The earliest Christian burials are dated to the fifth-century.[19] Nancy Edwards states that, there is very little evidence in Ireland for burial practises in this early conversion period.[20] It is known however that many pagan practises still existed up to the seventh century when the church became "fully assimilated into early Irish society".[21] Edwards explains that the lack of evidence is a result of the reuse of graveyards over the centuries; "there has been little archaeological excavation of the cemeteries at large ecclesiastical sites because of their continued use for burial".[22] Evidence suggests that by the eight-century, the early church in Ireland had built monastic settlements.[23] These monastic settlements were enclosed by an outer circular enclosure, with an inner enclosure surrounding a church and graveyard.[24] Edwards suggests that the cemeteries within these monastic settlements, "were either internally divided to cater for different groups of people, or that different groups of people may have been buried in different cemeteries on different parts of the site".[25] An example of an ecclesiastic settlement is Clonmacnoise in Co. Offaly. Unfortunately, the full picture of this settlement will never be known as it was decided in the 1950's that the site would become a modern graveyard without any archaeological work carried out.[26] However, a number of excavations have since been carried out in Clonmacnoise. Conleth Manning notes that, an accidental discovery of Hiberno-Norse coins led to an excavation carried out by Raghnall O'Floinn in 1979.[27] Subsequent excavations took place in 1985 and 1989-90, which produced evidence of, iron smelting, a kiln, and cultivation.[28] Further excavations have been made by Heather King, which have discovered, traces of houses, and corn-drying kilns.[29] Findings from radiocarbon dating have produced an earliest date of the seventh century, with

[12] *Ibid*., p. 143.
[13] *Ibid*., p. 156.
[14] *Ibid*., p. 158.
[15] *Ibid*., p. 365.
[16] *Ibid*., p. 367.
[17] *Ibid*., p. 367.
[18] *Ibid*., p. 325.
[19] Heritage Council, (http://www.heritagecouncil.ie/unpublished_excavations/section12.html) (01 May 2017).
[20] N. Edwards, *The archaeology of Early Medieval Ireland*, (London, 1996), p. 129.
[21] *Ibid*., p. 129.
[22] *Ibid*., p. 130.
[23] Heritage Council, (http://www.heritagecouncil.ie/unpublished_excavations/section12.html) (01 May 2017).
[24] Heritage Council, (http://www.heritagecouncil.ie/unpublished_excavations/section12.html) (01 May 2017).
[25] N. Edwards, *The archaeology of Early Medieval Ireland*, (London, 1996), p. 129.
[26] H. King, 'Excavations at Clonmacnoise', in *Archaeology Ireland*, 6, 3 (1992), p. 14.
[27] C. Manning, *Clonmacnoise*, (Dublin, 1994), p46.
[28] *Ibid*., p. 46.
[29] *Ibid*., p. 48.

a possibility of even earlier activity.[30] Edwards notes, work on the site of Clonmacnoise revealed that, "large numbers of cross-marked stones, recumbent slabs and other carved grave-markers from some sites, such as Clonmacnoise, suggest the careful organisation of cemeteries".[31] These cemeteries and graveyards are the basis for modern day burial sites.

The study of burial practices has shown that the concept of death and burial was regarded with great respect and importance throughout time. Reasons for burial stem from two main concepts: cultural (ritual) and public health. Culturally, different approaches to the research on graveyards are made and consist of, social archaeology, environmental archaeology, cognitive archaeology and the study of art in burial sites.[32] The social approach that can be concluded from death and burial studies, adds to the understanding of society in a particular era. Mike Parker Pearson states that cemeteries "provide evidence about kinship, gender and other indicators of social status.[33] These social conclusions can be met from the research of both the remains of the deceased, if available, and the artefacts that are found with them.[34] The biological remains show various features of a person, including their diet, disease, age, and even how they died.[35] The presence of grave goods (artefacts placed with remains) add to the picture of the deceased and their society, including, the persons status in society, materials used at that time, tools and techniques used, and funerary rituals.[36] A picture of the person and the society they lived in can be made based on these findings. Environmental archaeology studies the world in which the deceased, of a particular era, lived in, by studying varying factors including the remains of vegetation, sea level and animal remains that may be in the burial place.[37] This is known as environmental reconstruction and although not one hundred percent accurate, it does give a picture of the world in which the deceased lived.[38] Cognitive study is a more modern approach to "the study of past ways of thought" discovered through material remains, for example that of grave goods or monument art.[39] These various approaches to the study of death and burial are used to create an overall picture of the world and life of the people of bygone societies.

Alongside the cultural ritual of burial, there is also the aspect of hygiene. Apart from the obvious unsightly form and smell a decaying body would release, it would also have been a possibility that it would contribute to the spread of disease. For these reasons, the remains of the dead were cremated or buried. Harold Mytum covers this topic, stating, "the remains of cemeteries and funerary monuments can throw considerable light on the state of public health from the eighteenth century onwards".[40] Mytum notes that it was changing attitudes in public health that contributed to the changes in the disposal of the remains of the dead over the last two centuries.[41] Hygiene problems occurred when cities increased in size and population.[42] This increase led to overcrowding, not only amongst the living but, more significantly, in the resting places of the dead; the graveyards.[43] It resulted in less time for the

[30]The Heritage Council, (http://www.heritagecouncil.ie/unpublished_excavations/section12.html#Clonmacnoise) (01 May 2017).
[31] N. Edwards, *The archaeology of Early Medieval Ireland*, (London, 1996), p. 130.
[32] P. Bahn and C. Renfrew, *Archaeology: Theories Methods and Practice*, (London, 2000), pp. 11-16.
[33] M. Parker Pearson, *The Archaeology of Death and Burial*, (Sutton, 2003), p. 12.
[34] *Ibid*., p.12.
[35] *Ibid.*, p. 3.
[36] *Ibid.*, pp. 78-79.
[37] P. Bahn and C. Renfrew, *Archaeology: Theories Methods and Practice*, (London, 2000), p. 225.
[38] *Ibid.*, p. 225.
[39] *Ibid*., p. 385.
[40] H. Mytum, 'Public Health and Private Sentiment: The Development of Cemetery Architecture and Funerary Monuments from the Eighteenth Century Onwards', in *World Archaeology*, 21, 2, (1989), p. 283.
[41] *Ibid*., p. 283.
[42] *Ibid*., p. 284.
[43] *Ibid.*, p. 286.

decomposition of previous remains, resulting in shallower graves and newer burials getting close to ground level.[44] Communal graves used by the poor, which were left open until full, were completely unsanitary.[45] This mix of overcrowding left graveyards foul smelling places, with bodies left in an extremely slow state of decomposition.[46] Mytum states that, the rich were the first to change from ground burial to the use of private vaults.[47] This was not an option for the middle-class as their vaults, located under churches, filled up quickly to overcrowding capacity.[48] The French created the model for the reform of graveyard management when, after various trial and error attempts, they happened upon the solution of creating new larger cemeteries located away from the inner city churches.[49] New design of the landscape and elaborate monuments were a feature of these new cemeteries.[50] The contamination from disease contributed from decaying remains was thus contained and a solution to the burial of the dead was achieved.

There are various research methods carried out in the study of graveyards and cemeteries. These include, the recording of head stone inscriptions; the recording of headstone symbols; the recording of monument/headstone type (including material used); archaeological excavations to find burial remains, such as grave goods and biological remains; surveying and map making of the site; the study of the context of the site within its geographic location; photography; aerial photography; and, most recently, 3D imaging.

The most common recording of graveyard information is generally through the recording of gravestone inscriptions. This research involves recording the information on each headstone in the graveyard/cemetery and sorting the information in alphabetical order, using surnames as a reference point. Harold Mytum notes that good practice of the recording of the inscriptions should also include taking photographs and rubbings of the headstones.[51] The recording of headstone symbols and headstone types should take place at the time of recording inscriptions, but unfortunately is not as common and generally not recorded.

Harold Mytum's research covers a wide range of methods used in the recording of graveyard information. Mytum's study of Balrothery and surrounding graveyards in Co. Dublin produced some fascinating findings.[52] The research methods included comparing and contrasting information gathered from the various graveyards, and also others from both Ireland and England, to try and get a general idea of different practices that were used in the area in the eighteenth century.[53] The research compared four different elements of headstones, namely: size, shape, decoration, and textual content, to gather information for his conclusions.[54] Research was conducted via field work in the form of recording each headstone individually by initially giving it a number and then recording all information of the four elements previously mentioned.[55] Obstacles that Mytum faced during the course of the research included the difficulty of photographing the headstones as the lighting conditions

[44] *Ibid*., p. 286.
[45] *Ibid*., p. 286.
[46] *Ibid*., p. 286.
[47] *Ibid*., p. 288.
[48] *Ibid.*, p.288.
[49] *Ibid*., p.289.
[50] *Ibid.*, p.289.
[51] H. Mytum, 'Local Traditions in Early Eighteenth-Century Commemoration: The Headstone Memorials from Balrothery, Co. Dublin, and Their Place in the Evolution of Irish and British Commemorative Practice', in *Proceedings of the Royal Irish Academy. Section C: Archaeology, Celtic Studies, History, Linguistics, Literature*, 104C, 1, (2004), p. 3.
[52] *Ibid*., p. 1.
[53] *Ibid*., p. 1.
[54] *Ibid*., p. 1.
[55] *Ibid.*, p. 3.

were not suitable.[56] This obstacle was overcome by using rubbings of the headstones which he stated provided "the main source of information for interpreting the memorials".[57] Another problem faced, was the dating of headstones.[58] During the course of the research it was found that most earlier headstones had been erected several years after the death of those that were interred in the plot.[59] Further to that study, only one headstone in Balrothery was found which had the erection date inscribed on it.[60] Mytum's study of the headstone designs concluded as containing two elements: specific elements like the motifs; and the headstone as a whole, for example, its shape.[61] The research found various different design elements which he categorised as follows: IHS, symbol, lozenge, heart, scroll and other.[62] He also noted the use of Latin text and decorated letters.[63] Research was also conducted on inscription styles, and from the completed research on all elements of headstone research, it was possible to define the new funerary traditions which had evolved in the eighteenth century.[64] Mytum's research methods are a prime example of how archaeological research methods give a wider picture of cultural traditions within the past.

Mountbagnall graveyard is located near the townland of Riverstown in the Cooley Peninsula, Co. Louth. The topography of the area includes various other archaeological features including; Tober Domhnaigh (a holy well); the location of a motte and bailey fortress; a pit burial site; and a ringfort.[65] These features are all in close proximity to the graveyard. The origins of the settlement area are thought to be medieval, however Neolithic, and even Mesolithic evidence is dotted through the area, for example, the shell middens in Rockmarshall, and the souterrain at Grange Irish, located within a few miles from the site. The lands of Cooley were granted to Bertram de Verdon c.1185, and it is believed that it was his granddaughter Rohesia de Verdon who built the motte and bailey.[66] The presumption that Rohesia de Verdon built the motte and bailey lies in the grant she received to build Roche Castle c.1236. In this grant proposal, a second castle is mentioned but the location is unknown. It is therefore thought that the motte and bailey site at Mountbagnall is the second fortification.[67] Unfortunately, this site was never examined by archaeologists as it was partially destroyed during the building of the railroad in Cooley and then completely destroyed in the making of a modern sand pit.

There is no solid date for the establishment of either the church or the graveyard. Vanessa Ryan notes that the settlement location was "included in the 1301 list of amercements, or fines, which were imposed by a Royal Court at Drogheda".[68] This evidence indicated that at that time a settlement existed and, possibly, the church. Michael O'Hanlon notes that "there was a church at Newtown in 1378, when Thomas Sylvestor was rector".[69] The Cistercians possibly built the church as it is recorded in Archbishop Flemings Register in

[56] *Ibid*., p. 3.
[57] *Ibid*., p. 3.
[58] *Ibid*., p. 8.
[59] *Ibid*., p. 8.
[60] *Ibid*., p. 8.
[61] *Ibid*., p. 9.
[62] *Ibid*., pp. 9-13
[63] *Ibid*., p. 13.
[64] *Ibid*., pp. 16-24.
[65] Historic Environment Viewer, (http://webgis.archaeology.ie/historicenvironment/) (01 May 2017).
[66] H. G. Tempest, *Guide to Dundalk and County Louth*, (Dundalk, 1983), pp. 7-8.
[67] V. Ryan, 'The Archaeology of Medieval Ecclesiastical Settlement in the Barony of Lower Dundalk, Co. Louth', available at TCD online, (http://www.tara.tcd.ie/handle/2262/78616?show=full), p189 (accessed 01 May 2017).
[68] *Ibid*., p. 189.
[69] M. O'Hanlon, 'Newtown Graveyard: Mount Bagenal', in *Lordship and Ballymacscanlon Parish Yearbook 1989-90*, (Dundalk, 1990), p. 26.

1390.[70] At that time the area was known as Newtown. It wasn't until King Henry VIII granted the lands to Sir Nicholas Bagenal in 1544 that the area eventually was renamed Mountbagnall.[71] Michael O'Hanlon notes that there is no further mention of the church after 1614 and "it is possible that it continued (to be used) down until the Penal Law times, after 1692, and then fell into disuse".[72] The graveyard was, however, used for burials until the 1960's when it was finally closed.[73]

Two archaeological surveys have been published about the graveyard. The first by Oliver Davies in 1941 and the second by Victor Buckley in 1966. The results of the survey by Davies were published in the *County Louth Archaeological and Historical Journal* in 1941. The short survey mentions "the foundations of a long narrow church" and the remains of "an unbevelled ashlar door-jamb".[74] The second survey, carried out by Buckley and published in 1986, are also very short and briefly mention the motte and bailey site and the measurements of the "overgrown foundations of a church".[75] It is noted by Ryan that a similar short survey was published in the Archaeological Survey of Co. Louth in 1991 by Buckley and Sweetman.[76] Mamie McDermott recorded inscriptions which appeared on some specific headstones, namely those with shell motifs.[77] Noel Ross made a full recording of headstone inscriptions, though his work is unpublished. A FÁS scheme 'clean-up' of the graveyard in the 1980's, unknowingly, destroyed archaeological features, including the church, as it was recreated during the process. The author was also told by local historian, Michael O'Hanlon, that the relocation of some headstones also took place at the time of the 'clean up'. Thankfully this practise of unsupervised and damaging 'clean-ups', which were "a popular source of employment", according to Suzanne Zajac, were regulated in 2009, after damage to a medieval church in Co. Mayo occurred during one of the schemes.[78]

Local historian, Michael O'Hanlon shared previously unrecorded information with the author on the building of the walls that surround the graveyard. A man named Mick Rice built the gate pillars in 1909 and a local blacksmith named, Hugh Hanlon made the gates. Michael O'Hanlon also said that the main wall around the graveyard was constructed in the late 1800s or early 1900s and before that, yew trees, which are poisonous to cattle, had been planted there to deter the animals from entering the grounds. Michael also noted that, on each side of the entrance lane are the graves of unbaptised infants that go unmarked, even to this day, the knowledge of their existence only being recorded though local memory.[79]

Research for this dissertation was undertaken via field work at the site of the graveyard in Mountbagnall. The research was planned on the objectives previously mentioned. The field work was achieved on several occasions in a restricted timeframe from

[70] V. Ryan, 'The Archaeology of Medieval Ecclesiastical Settlement in the Barony of Lower Dundalk, Co. Louth', available at TCD online, (http://www.tara.tcd.ie/handle/2262/78616?show=full), p189 (accessed 01 May 2017).
[71] *The Dundalk Democrat,* 14 March 1970, Michael O'Hanlon, 'Newtown Mountbagnal'.
[72] *Ibid*.
[73] *Ibid*.
[74] O. Davies, 'Old Churches in Co. Louth: Baronies of Lower and Upper Dundalk', *in Co. Louth Archaeological and Historical Journal,* X, 1, p14.
[75] V. Buckley, *Archaeological Inventory of Co. Louth,* (Dublin, 1986), p. 77.
[76] V. Ryan, 'The Archaeology of Medieval Ecclesiastical Settlement in the Barony of Lower Dundalk, Co. Louth', available at TCD online, (http://www.tara.tcd.ie/handle/2262/78616?show=full), pp. 193-194, (accessed 01 May 2017).
[77] M. Mc Dermott, 'Four Tombstones in Newtown Mount Bagnal Graveyard, Four Pilgrimages to Compostella?', in *Lordship and Ballymacscanlon Parish Yearbook 2003,* (Monaghan, 2003), p. 12.
[78] S. Zajac, 'Graveyard 'Clean-Ups' in County Mayo, in *Archaeology Ireland,* 26, 1 (2012), pp. 34-35.
[79] Michael O'Hanlon, 'Newtown Graveyard: Mount Bagenal', in *Lordship, and Ballymacscanlon Parish Yearbook 1989-90,* (Dundalk, 1990), p. 28.

October 2016 to May 2017. Initially, field work was undertaken to gather data from the headstones based on their motifs and earliest date. Following that, the author took pictures of various headstones, from several angles, for use with 3D software. Photography of the headstones depended on weather conditions and lighting, so several attempts had to be made regarding taking pictures. Aerial pictures were taken of the site by Masterpiece Aerial Photography for map making and to create a 3D model of the graveyard. The following sections will outline the findings of the data research, and the process, and results of 3D models.

Several headstone motifs appear on the headstones in the graveyard. These can be divided into the following categories: Cross, IHS; Sheep/Lamb; IHS and Angels; 'The Doller Sign' (the IHS letters superimposed on to each other); and other. Headstone designs included: cross shapes; Celtic cross shapes; rectangular shape with round top; rectangular shape with flat top; rectangular shape with cross on top; and table graves. There are also many worn headstones which have been reduced to eroded stumps. The graveyard is located near the Irish sea, so many of the stone types used to create the headstones have been eroded severely over time by the sea air and weather conditions.

During the research for this dissertation, a study of each headstone, its motif; and earliest date, was undertaken. The results can be seen on Table 1. There are thirty-six cross motifs on the headstones, eighteen of which featured a legible date on the headstone. There are twenty-three IHS motifs on headstones, though only eleven have legible dates of first burial. There are ten identifiable sheep/lamb motifs, only eight of which had legible dates. There are ten headstones bearing IHS and angels, nine of which had full legible dates, the remaining headstone only hinting half a legible date. There are seven headstones which have the 'dollar sign' motif, only three of which had legible dates. Other motifs include: heart (six in total, only three with legible dates); Gloria in Excelsis Deo (one, with date); shell motif (four in total, one legible date); and Celtic designs (two in total, both with dates).

Cross (36)	**IHS (23)**	**Lamb/Sheep (10)**	**Angel wings & IHS (10)**	**'Dollar Sign' (7)**	**Other**
1817	1775	1760	17??	1944	**Heart (6)**
1826	1782	1841	1789	1947	1916
1831	1834	1846	1809	1950	1920
1840	1855	1856	1834		1924
1846	1865	1869	1838		
1850	1868	1878	1840		**Shells (4)**
1860	1883	1889	1840		1799
1862	1903	1906	1845		
1868	1906		1852		**Celtic**
1872	1911		1860		**Design**
1889	1943				**(2)**
1894					1881
1905					1933
1911					
1924					**Gloria in**
1946					**Excelsis Deo**
1949					**(1)**
1956					1809

Table 1

It is evident that the cross motif is the most popular and was used from the earliest date, according to the author's research from 1817 up to 1956, which was around the time the graveyard neared closing. The IHS motif is the second largest group. Similar to the cross, it was used from 1775 to 1943, according to the author's research. There are ten lamb/sheep motifs and ten IHS & angel motifs on the headstones. Eight of the ten lamb/sheep motifs have legible dates and nine of the IHS & angel motifs have full dates, one has just half a date, the other half worn away. Dates for the lamb/sheep begin at 1760 and continue sporadically until 1906. The IHS & angel motif begins at the half date, of sometime in the 1700s, or full date of 1789 up to 1860, according to the author's research data. In the other category, there are four more types of motif: heart; Gloria in Excelsis Deo; shells; and Celtic design. The heart motif appeared on six different headstones, but only three of these had visible dates: 1916, 1920, and 1924. The motif bearing the words 'Gloria in Excelsis Deo', was only marked on one headstone and bore the date 1809. The shells appeared on four different headstones, only one date was legible, that of 1799. Lastly, Celtic designs appeared on two headstones, both bearing dates of 1881 and 1933. The popularity is charted on table 2.

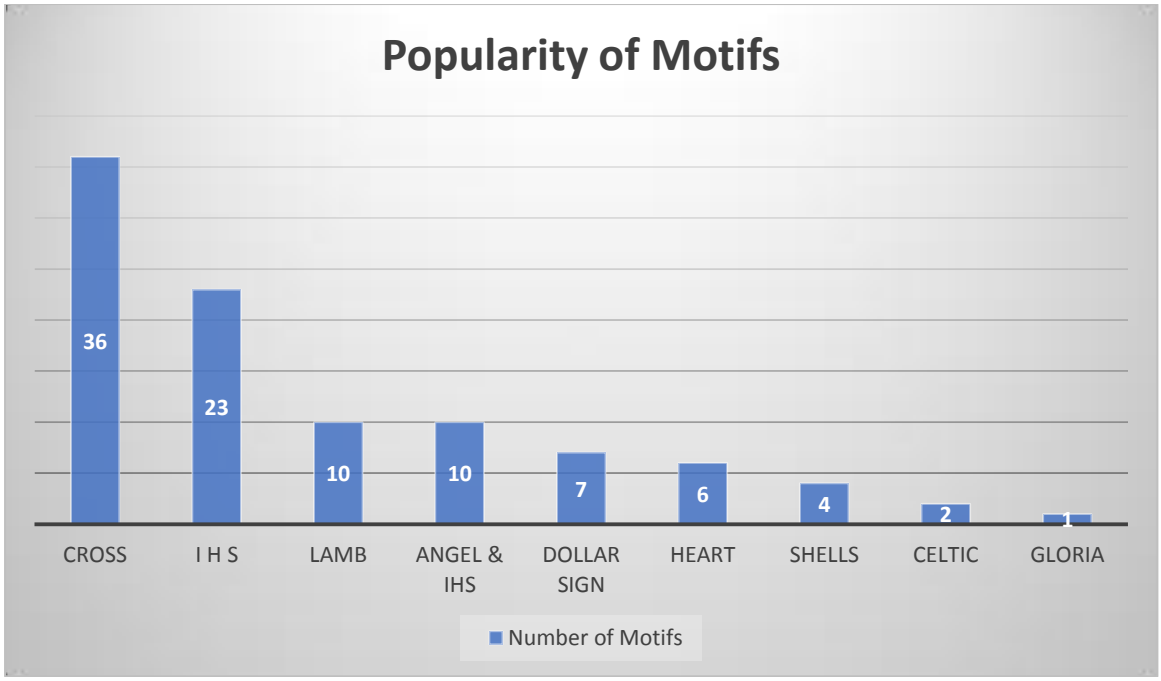

Table 2

Based on the data collected from the headstones, various trends can be identified. The cross and IHS motifs were used from the earliest recorded date up to the closing of the graveyard. The lamb/sheep motif and the IHS & angel motif were largely used in the nineteenth century. The 'dollar sign' motif, although limited to only three dates out of seven for analysis, were restricted to the decade of 1940 to 1950. Like the 'dollar sign', the heart motif, although restricted to only half of dates for headstones, is confined to the period of 1916 to 1924. With only one Gloria in Excelsis Deo motif visible, it does not add to any trend. The two Celtic design motifs at two different dates (1881 and 1933), also do not have any bearing on trends.

The most interesting of the headstone motif's in Mountbagnall graveyard are the shell designs. Mamie McDermott recorded in 2003 that there were four different headstones with the shell motif.[80] McDermott notes that the shells were placed on the headstones of those who

[80] M. Mc Dermott, 'Four Tombstones in Newtown Mount Bagnal Graveyard, Four Pilgrimages to Compostella?', in *Lordship and Ballymacscanlon Parish Yearbook 2003*, p. 12.

had completed the pilgrimage of *Compostella di Santiago*, in tribute to the walk St. James undertook to reach Spain.[81] Those who walked the pilgrimage wore a cockle shell "to distinguish themselves from other travellers on the road.[82] Thus the shell became a symbol of both St. James and the pilgrimage. McDermott also notes how three of the four headstones have the name James inscribed on them, a further tribute to the Camino and St. James.[83] What is most interesting about the article is the recording of the inscriptions on the headstones. All four headstones, bearing shell motifs, had dates which McDermott recorded. This is an invaluable source of information as, presently, which was noted during the author's research, three of the fours dates have worn away. The author recorded the only remaining legible date of 1799. McDermott's research provides the locations, and remaining three dates of the headstones as: 1784, 1791, and 1796.[84]

Recording of the site using photography form was also undertaken during the research for this dissertation. Eamon Gosling of *Masterpiece Aerial Photography* took aerial pictures of the site using a telescopic camera mount.[85] The author took pictures of headstones. Aerial pictures were used to convert the images into a map of the graveyard by Conor Brady, using Adobe Illustrator CS4.

Modern approaches to archaeological surveying use the technique of 3D imaging. This technique processes multiple 2D images of an object, for example pictures of a headstone, on computerised software to create a 3D model that captures the shape and appearance of the object. This method was used for the purpose of this dissertation. Various software systems, that process 2D images into 3D models, such as Agisoft PhotoScan, Arch 3D, 123D Catch and Photosynth, were analysed before the choice was made to use Autodesk ReMake. The reasons why Autodesk ReMake was chosen are as follows; Photosynth software was shutting down in February 2017: this was immediately not an option; Arch 3D only creates 3D simplistic point clouds (data points that represent the external surface of an object) with photographic colour: this would have been only useful in creating 3D models for headstones; Agisoft PhotoScan offered a thirty day trial for students on application; 123D Catch was closing down in early 2017 so it was not viable to use this software. It was however, replaced by Autodesk ReMake, this software offered the full range of services on a free trial basis that was needed to create the 3D models. The author chose Autodesk ReMake for the research as initial testing of the software produced excellent results.

The process for making 3D models from both the aerial photographs, and the headstone photographs was the same using Autodesk ReMake. The process involved uploading multiple pictures which the software would then use to generate into 3D images. Processing time depended on the amount of 2D pictures uploaded to the software. The software compiled all the images together during the process to analyse all angles of the object and then create the 3D model. Once the images were processed they had to be edited. This consisted of tidying up the edges of pictures by erasing unwanted parts of the image and therefore enhancing the viewing quality of the 3D model; filling in blank spaces; creating stills and short films of both the aerial 3D model and the headstone models.

The results produced were 3D models of the graveyard and various headstones. The 3D models can be seen as a very useful tool for research. The models of the headstones show intricated detail, including all aspects and angles of the stone. This method, along with more traditional ways of recording headstones are invaluable, as weathering or even vandalism can destroy these details resulting in them being lost forever. The advantage that 3D models

[81] Ibid., p. 12.
[82] Ibid., p. 12.
[83] Ibid., p. 12.
[84] Ibid., p. 12.
[85] Masterpiece Aerial Photography, (http://aerialphotographyhq.ie/).

provide, is the opportunity to capture all aspects of a headstone before the inevitable happens, therefore creating a permanent record of the headstone in its entirety. The 3D aerial model also proves to be a useful tool. The image shows the topography of the landscape in which the graveyard is set. This is a great visual aid for a researcher who may be unable to visit a site.

To conclude, the scope of graveyard and cemetery studies is vast. The potential to collect information, by using the techniques mentioned in the paper, is vital to record the various aspects of graveyard information before inevitable wear and tear, through erosion or vandalism, takes place. The vital importance of gathering information became apparent to the author when it was witnessed, in May 2017, that vandals had destroyed several headstones since the author's research initially began on the graveyard, in October 2016. Pictures and 3D models created by the author are now a vital source of information of headstones in their original state. The importance also became apparent when researching the shell motifs in the graveyard. As already mentioned, three of the four headstones inscriptions have worn away and are partially or completely illegible. Mamie McDermott's recording of these inscriptions are now a vital source of information. The author also recognises that the research conducted for this paper was limited due to time constraints and man power.

The collection of data proved important in showing different trends in the use of headstone motifs over the past few centuries. However, it should be noted, that results from the collection of data may not show the true trend, as erosion over time made it impossible for some dates to be acquired. A better understanding may be achieved by collaborating information gathered from Noel Ross's recording of the headstone inscriptions, if a map was also made at the time they were gathered, to indicate positions of headstones. Time constraints meant that the author was unable to compare findings with different graveyards in the area.

The making of the 3D models proved a great insight into modern day archaeological graveyard studies. The results showed how these models are now the best way to record images from a graveyard, as they hold immense detail in just one model, instead of several pictures. The aerial 3D map, in particular, showed how the topography of an area can be viewed by those who could not visit a site.

In summary, the study and recording of graveyard information, which is wide and varied, is vital to achieve stories of periodical cultures that have evolved over time. This information needs to be recorded now, not in five years, or ten years, but now, before it is lost forever in the sands of time.

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