

Exploring the *Chaîne opératoires* in Irish Quartz Lithic Traditions: Current Research

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Abstract

This article explores the use of quartz as a raw material in the early prehistoric period in Ireland. Archaeologists have invariably ignored quartz as a raw material because of its perceived difficulty in analysis. The basis of the research is the development, through experimental knapping, of an analytical framework for quartz working in Ireland and testing this framework by a detailed analysis of Later Mesolithic quartz assemblages.

List of Figures

Figure 1: Quartz artefacts from Ireland

Figure 2: Quartz finds from Ireland – quantities

Figure 3: Case studies

Figure 4: Possible *chaîne opératoires*

Figure 5: Possible *chaîne opératoires* without use-wear analysis

1. Introduction

This article outlines current research, begun in 2006, investigating the use of quartz in Irish early prehistoric lithic traditions. The widespread use of quartz in this period in Ireland is not well appreciated by the archaeological community, and it is usually associated with megalithic structures and ritual contexts. The aim of this research is to develop analytical frameworks for this material through experimental knapping and to test these frameworks through selected case studies; this will hopefully enable the archaeological community to have a readily accessible, common set of general principles and analytical tools to formulate further discussions, and facilitate and enhance research agendas involving quartz. This article will first briefly introduce the background to quartz research in Ireland and beyond, followed by an outline of the current project, where I will discuss the formulation of a database of quartz finds from Ireland, the case studies chosen for analysis, and the methodology used.

2. Background to Quartz Research

The history of Irish flaked stone research is primarily a history of Irish flint research. Even though a range of Irish Stone Age lithic raw materials, including quartz, has been recognised for a long time (e.g. Knowles [1889](#)), flint has played a predominant role in the minds of antiquarians and archaeologists (see also Driscoll [this volume](#)). The north-east of Ireland is the almost exclusive home of *in situ* deposits of flint – often, but incorrectly, classed as Antrim flint – and a strong tradition of flint collecting has led to the accumulation of tens of thousands of lithics from that region, with intensive collecting and trading of lithics during the 19th and early 20th centuries (see Woodman *et al.* [2006](#)). For a long time the distribution of Stone Age, but especially Mesolithic, activity in Ireland was seen as a primarily north-eastern phenomenon and the Antrim flint deposits were seen as the lynchpin of Stone Age settlement patterns (e.g. Macalister [1949](#)). In fact, in areas where other raw materials were noted, the supposed lack of a trade in flint was seen as evidence of the cultural backwardness of the peoples of those areas (see Brunnicardi [1914](#)), or a lack of a local source of flint was given as a reason for the surmised early adoption of metal (see Macalister [1949](#)).

More recently, the recognition that the island of Ireland was extensively settled from the Early Mesolithic onwards (Woodman [2003](#)) has run alongside an increased awareness of the diverse suite of materials utilised for stone tool production (see discussion in Woodman *et al.* [1999](#)). Nevertheless, materials such as chert or quartz are often still regarded as a substitute for flint (e.g. Herity [1987](#); Woodman and Scannell [1993](#)) as opposed to valid raw materials in their own right, and analytical categories and typologies are primarily based on long-standing categories often derived from flint. In Knutsson's ([1998](#)) terms, and in parallel to some areas of Scandinavia, it would appear that in Ireland an 'unconscious projection of the framework of categories for flint' has had considerable impact on our understandings of prehistory. While the use of quartz as a raw material for stone tools in Ireland has been especially under-acknowledged, it has primarily been seen in terms of its ritual or symbolic attributes, as it is a common find in megalithic tombs and other monuments, and also as part of megalithic architecture (Bergh [1995](#); O'Brien [1999](#); for parallel distinctions between approaches to quartz see Warren and Neighbour [2004](#)).

Worldwide, diverse approaches have been utilised to try and provide some analytical purchase on the material (e.g. Dickson [1977](#); Barber [1981b](#); Knutsson [1988](#); Bisson [1990](#); Saville and Ballin [2000](#); Cornelissen [2003](#)). A review of such research has highlighted that the difficulties of quartz analysis are not easily resolved, much of which concern what Callahan ([1987](#)) described as the gravel effect – many quartz assemblages can at first glance appear to be comprised of amorphous pieces, not easily recognised as humanly modified or forming 'tools'. Outside of quartz research, the processualist movement in archaeology called for a greater degree of quantification in lithic studies in order to present the research on a more rigorous scientific base (see Lyman and O'Brien [2004](#)). This call led to many researchers moving away from analyses based on formal typological characteristics of lithics, and to examinations of the tools and debitage products' technological characteristics; these were to be analysed as part of a technological package in order to develop models of prehistoric societal behaviour, and this emphasis on technology as opposed to typology occurred along with an increase in knapping experimentation and the study of fracture mechanics. Even though quartz was the predominant raw material in various parts of the world, such studies had not been carried out on quartz assemblages because quartz was perceived to be an intractable material to analyse; the apparent irregularity in the fracture pattern of quartz made such studies as attribute analysis and reduction sequences inefficient, or futile, in terms of the results. Therefore, quartz assemblages, and quartz regions, lagged behind in such studies.

One of the chief difficulties in analysing quartz, related to the 'gravel effect', is caused by the expectations that researchers have of what lithic assemblages should be like – as Knutsson ([1998](#)) outlined, it is the conventions of archaeological training that invariably shape ideas of what is expected of the archaeological record. Knutsson ([1998](#)) noted that, as elsewhere, Scandinavian students learn lithic classifications based on a flintcentric research tradition and, consequently, the Northern Scandinavian (primarily non-flint) lithic industries were perceived as 'rough' in comparison to those of Southern Scandinavia and the Continent – '[o]n a subconscious level, this mode of thinking has also been projected onto society as such, which at times has even been apprehended as retarded'. Knutsson outlined how previous Scandinavian research into quartz assemblages, which were based on formal types derived from flint assemblages, led researchers to equate quartz flake fragments with flint 'tools' that had a similar form, therefore bracketing these assemblages into incorrect cultural traditions. Conversely, Gramly ([1981](#)) noted that when quartz assemblages appeared not to include certain types of implements, these assemblages would be incorrectly excluded from the geographical distribution of a culture.

These issues go to the traditional heart, and life-blood, of archaeological endeavours – that of typology. The birth of modern archaeological research occurred at a similar time to that of the assertion of evolution as the predominant scientific and social paradigm among the classes that formed the bulk of archaeological researchers: as Lucas ([2001](#), 80) has put it, typology was the archaeological equivalent of evolution. With the subsequent rise of the Culture paradigm, tool typology thence could define cultures and chronologies; the rise and fall of tool types were seen as witnesses to the ebb and flow of cultures. The utility and validity of tool typology was, of course, debated over the years, in terms of what the types actually represented and meant to both the original users and subsequently the archaeologists (see Adams and Adams [1991](#)). A significant debate revolved around the Bordes–Binford debate (Bordes and de Sonneville-Bordes [1970](#); Binford [1973](#)), where tool types were seen by Bordes as signifying differing (cultural) stylistic preferences or by Binford as differing

activities or functions. As Tomášková (2005, 82) has noted, this debate did not question the actual types themselves or how they were defined, but rather what these defined types represented.

Stone tool typologies were for the most part built on morphological characteristics of artefacts, with differing retouch an especial characteristic in defining tool types. In defining and naming an artefact type, form and presumed function, were, and are, often used – for example, a 'disc scraper' (Woodman *et al.* 2006, 159) is defined by its retouch, its convex shape, along with its perceived function of 'scraping'. In other cases functional and technological criteria are used, such as the burin (for discussion on burins see Tomášková 2005, 83-4). Other categories used by researchers are those of 'formal tool' and the 'expedient tool', as well as the category of 'utilised flake' (for discussion on the difficulties with this latter category see Young and Bamforth 1990) – these categories are not always used in the same manner by researchers, and can mean significantly different things; their meaning is not always explicitly stated and must be inferred (hopefully correctly) by the context of use. Quartz lithics in particular often do not lend themselves to formal typological studies because retouch can be difficult to recognise, and often is not even there in the first place.

In the lithic studies literature there is a general division between typological studies and technological studies (e.g. Minzoni-Deroche 1985; Callahan 1987; Lindgren 1998; Inizan *et al.* 1999; Andrefsky 2001; Tomášková 2005; Ballin 2008); typological studies are generally geared towards results – the finished artefact; these 'finished' artefacts also include core 'types' in typologies. Technological studies are not restricted to typing 'tools', but concern an entire assemblage, including the 'waste' or 'debitage'/'debris', to understand the mode of manufacture. Of course, the technological studies also use the same methods of typing in their analyses, hence technological studies are sometimes described as debitage typological analysis (e.g. Andrefsky 2001), or typotechnological analysis (e.g. Cornelissen 2003; Ballin 2008). Researchers who focus on the technological aspects of lithics are generally critical of 'pure' typological studies, because lithic assemblages were dynamic entities and what we analyse are the end points of this dynamism – using morphological characteristics to define types, and hence cultural types, does not take into account that a certain type may be the result of resharpening or reuse, and may originally have been morphologically similar to a different type; consequently, morphology can only show the last phase of tool type, and not its original 'type' (e.g. Flenniken and Raymond 1986; Dibble 1991; Clarkson 2005). In addition, while a finished artefact may appear similar to another finished artefact, the mode of manufacture may have been significantly different, or two 'types' may have been part of a sequence of manufacture (Knutsson 1988).

In terms of the quartz research, two broad camps can be discerned – between those who argue that a separate typology is necessary (e.g. Barber 1981a; Knutsson 1988), and those who maintain that quartz can be analysed in a typological framework devised for flint (e.g. Bisson 1990; Saville and Ballin 2000). For the latter group, a separate quartz typology would in effect get in the way of an easy and coherent typology of stone tools that can be compared to assemblages of other raw materials or in mixed assemblages, and the emphasis of these researchers is primarily focused on the analysis of 'tools', with tools being tools if they conform to attributable types, and especially show evidence of retouch. On the other hand, the researchers that have called for a separate typology for quartz have done so with the recognition that the fracture mechanics of quartz entail that fracture characteristics seen in materials like flint do not necessarily occur on quartz and that the prehistoric users took

advantage of the differing fracture mechanics in selecting pieces for use; therefore a schema devised with the fracture mechanics of the material as the lynchpin is crucial. Only with this in place can different raw materials be compared.

Ballin (2008) has been highly critical of the Scandinavian work that has called for a separate typology for quartz; Ballin wants to be able compare assemblages across raw material types regardless of the fracture mechanics of the raw materials and how these affected the manufacture and use of stone. He is explicit in his stance of what a 'tool' is, and how to construct typologies – 'a quartz artefact is not a tool unless it has the distinctive retouch generally associated with a particular tool type' (Ballin 2008). From this, we can see that Ballin takes the restrictive view of a tool being a tool only if it is retouched, which goes against much work in the last 30 years of lithic analysis (of quartz and non-quartz), especially from use-wear analysis, as well as ethnographic accounts (for examples of unretouched artefacts shown to have been used as tools see examples in Man 1883; White and Thomas 1972; Hayden 1979; Flenniken 1981; Symens 1986; Knutsson 1988; Odell 1994; Banks 1996; Kozłowski *et al.* 1996; Read and Russell 1996; Finlayson and McCartney 1998; Briels 2004; Hardy 2004; Setzer 2004; Shott and Sillitoe 2005; Akerman 2006). Consequently, his interpretation becomes a vicious circle – if a quartz artefact does not conform to a particular tool type's retouch, it can be discounted as a tool, and therefore becomes lumped as 'debitage'.

This issue is precisely what the Scandinavian research he disagrees with attempted to prevent: the forcing of quartz into a flint framework of analysis. And Knutsson's (1988) analysis of mixed quartz and flint assemblages shows that by examining them from a technological perspective, with a clear picture of the fracture mechanics involved for each type of raw material, they can be compared, and can only be compared directly taking the fracture patterns into consideration. What is of interest of course are Ballin's (2008) five points where he suggests why quartz assemblages differ from non-quartz assemblages and appear to have less 'formal' tools; here, he notes that quartz fractures differently, implying a need to understand the fracture mechanics of the material, and admits that quartz may have been used without retouch as tools; consequently, according to his own logic, direct comparison with flint assemblages may not be suitable, and contradicting himself, he concedes that 'tools' are not restricted to retouched tool types as devised by archaeologists. Of course, part of this negative attitude by Ballin towards a separate typology stems from the distinction made earlier between a 'typology' implying a 'tool' typology, and that of a debitage typology; Ballin is more critical of the former than the latter, and wants a similar 'tool typology' in order to allow the easy comparative analysis of mixed material assemblages.

The debate here, although seemingly academic, is absolutely central to the development of approaches to quartz – as it asks us to consider little less than the purpose of our analytical typologies and the kinds of comparisons they facilitate. Saville and Ballin 2000 are clearly correct in as much as a quartz-based typology should not endlessly recreate new names for old objects: a barbed and tanged arrowhead in quartz is a barbed and tanged arrowhead in any material. However, and crucially, the radically different fracture properties of quartz imply that a different understanding of past technologies is needed. Following Knutsson (1998) there is considerable danger that a focus on formal properties, in the absence of detailed technological models, will lead to the misidentification of supposedly significant artefact types; conversely, as noted by Gramly (1981), a lack of formal types in a quartz assemblage when compared to a flint assemblage can be interpreted erroneously as resulting from a different group of peoples, instead of the same peoples approaching the material differently.

The stance taken in this project is that certain, highly formalised artefacts may have direct typological comparanda in alternative materials, and that in these instances such relationships should be highlighted. However, it will also be critical to understand those objects in terms of the technical sequences, the *chaîne opératoires*, which have led to their formation – and that these sequences may not be comparable across materials. Such an understanding can only be generated through detailed understanding of the properties of varied materials.

3. Current Project

3.1 Quartz database

The initial stage of this project has been the setting up of a database of quartz finds from excavated and non-excavated contexts. This database has been formulated by a literature review, a search of the online database of Irish excavation reports, excavations, and an archive search in the National Museum, Dublin. The database will eventually appear as an interactive, online map. It is important to note that this database is heavily constrained by the primary data in four key areas. Firstly, the database currently includes both 'worked' and 'unworked' finds – i.e. deposits of quartz in ritual and funerary contexts that do not necessarily include 'worked' quartz (Herity [1987](#); O'Brien [1999](#)). 'Worked' and 'unworked' finds are differentiated in the database, and the maps here include only 'worked' finds. However, this distinction is based on the description in the primary source, and, as Warren and Neighbour ([2004](#)) have argued, the differing contexts of quartz use are associated with different sets of archaeological terminology. Many 'unworked' finds may, in fact, include worked pieces; and many 'worked' finds may need considering in the light of the use of quartz in ritual contexts. Secondly, and related to the first point, the identification of the quartz as worked or possibly worked has not been checked, but rather simply referenced as stated. Thirdly, this count should be seen as a minimum amount, as it is apparent that even though quartz may have been found during excavations, it may not be stated explicitly as quartz in the reports or publications but instead called 'stone' artefacts/lithics; this also applies to the National Museum archives. And finally, the point made earlier, that quartz will be under-accounted for in both surface collections and excavations, must also be borne in mind.

These problems demonstrate that any current 'total' for quartz in Ireland would be incorrect – but in a context where over 1000 licences for archaeological excavation have been granted in Ireland every year since 2001 (Anon. [2006](#)), any static figure would be meaningless in any case. More significantly, and accepting the caveats above, this simple database explicitly highlights the extent of the 'quartz problem' in existing archives. A recently published review of Irish prehistoric stonework has highlighted eight instances of quartz lithics (admittedly not attempting to list all quartz use) and mentions that quartz occurs at a number of other Neolithic structures (Woodman *et al.* [2006](#)). This project's database has shown that over 150 townlands (the smallest official land unit in Ireland) have quartz artefacts that are described in the literature as either worked or possibly worked, and some of these have more than one findspot.

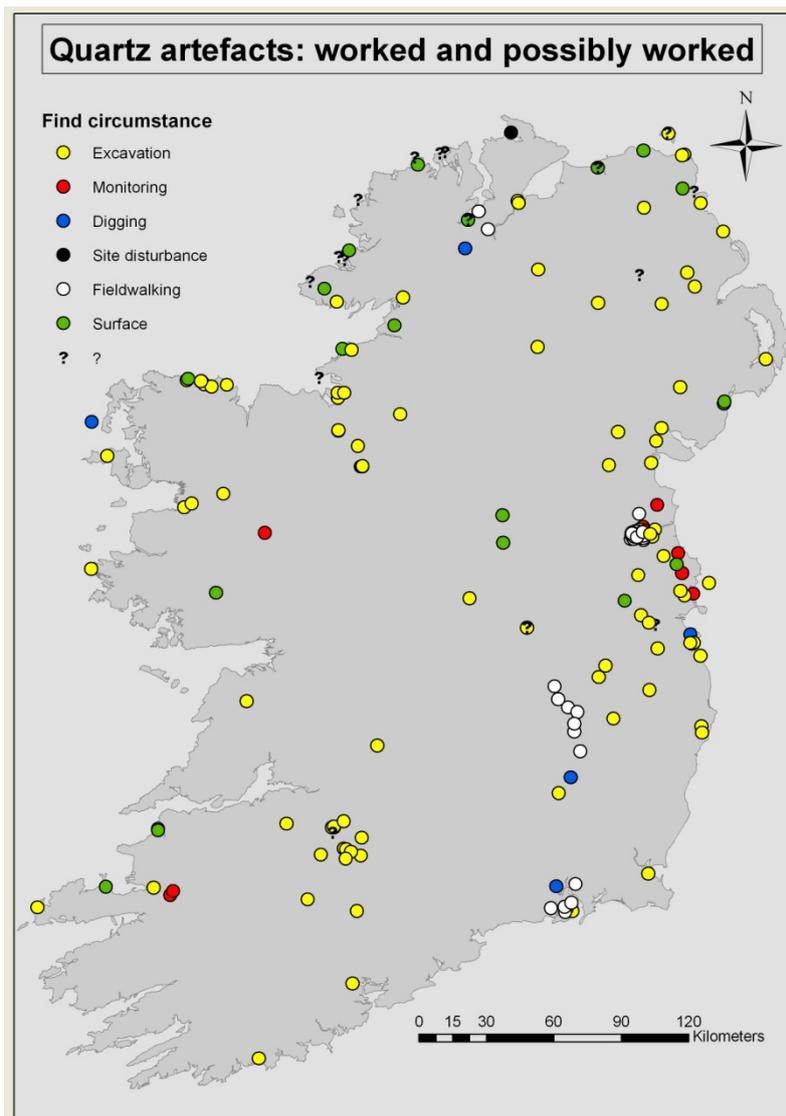


Figure 1: Quartz artefacts from Ireland

The map in [Figure 1](#) shows that quartz artefacts are found throughout Ireland. As with any distribution map, this mainly informs us of modern archaeological practice: for example, infrastructural developments in eastern Ireland are clearly evidenced in the distribution. The map should also be seen in the context of the general distribution of finds of other raw materials; for instance, the south-west and the midlands both have a relative lack of non-excavated finds of any material, and both have a minor amount of research and development-led excavations. Whereas finds of flint are more common from non-excavated contexts, this map highlights that quartz is relatively rare from such contexts due to the difficulties in identifying surface finds of worked quartz mentioned earlier. In the map a distinction is made between 'surface' finds and 'fieldwalking' finds – 'surface' finds denotes quartz found on the surface, including those resulting from antiquarian lithic-collecting activities, while 'fieldwalking' denotes surface finds collected during research projects, such as ploughzone surveys. While it is apparent that quartz is far more common from research excavations than

from development-led excavations, a caveat is that this interpretation may be skewed because more research excavations have been published.

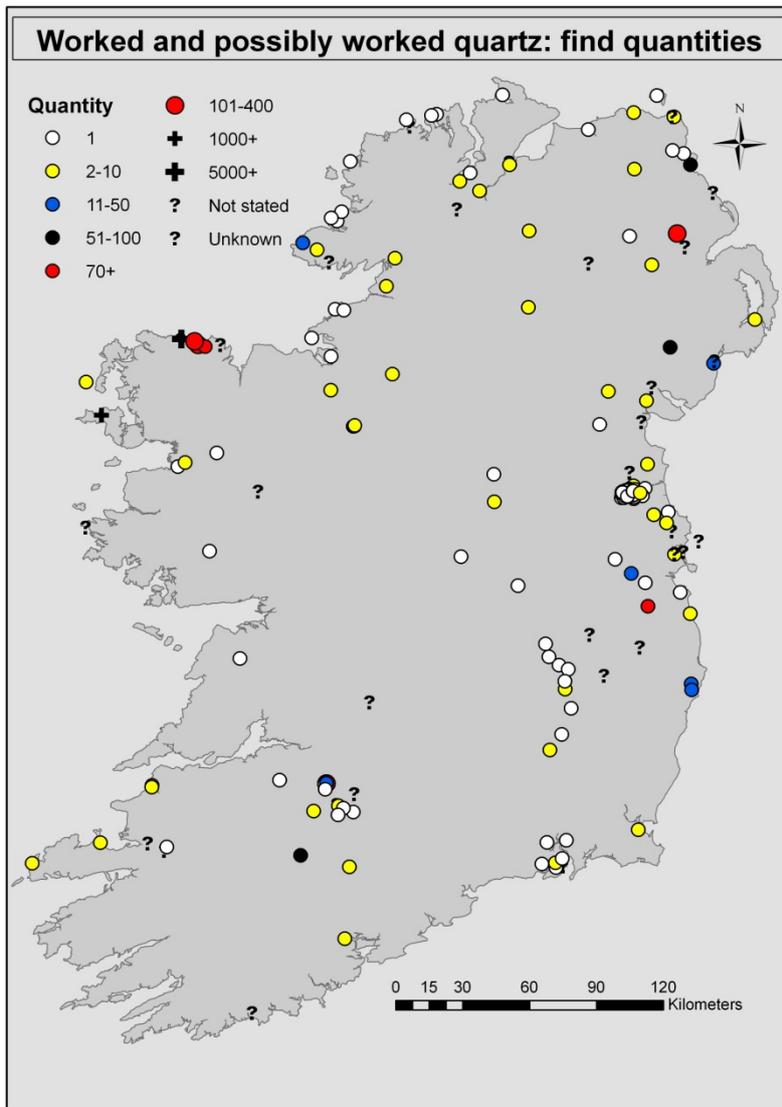


Figure 2: Quartz finds from Ireland – quantities

For most of the assemblages the amount of quartz finds is small (Fig. 2). However, this should be seen in context of the overall number of lithics from these areas: for instance, while only five quartz lithics were found at the Neolithic structure at Drummenny Lower, Co. Donegal, these accounted for 33% of the lithic assemblage (the rest being six flint and four chert) (Dunne 2003); at the Neolithic house at Enagh, Co. Londonderry, the quartz finds were a 'few' flakes, yet only one flint artefact was recovered, making the quartz the majority of the assemblage (McSparron 2003). Given all the difficulties of collection and curation highlighted above, it is clear that any comment on the comparative significance of the raw materials is impossible at this stage.

3.2 Case studies

In order to understand the *chaîne opératoires* of the quartz technology, three excavated assemblages have been chosen as case studies – Belderrig, Co. Mayo, Thornhill, Co. Londonderry, and Lambay Island, Co. Dublin (Fig. 3). The primary case study is a Later Mesolithic and Early Neolithic site at Belderrig, Co. Mayo, a research excavation directed by Dr Graeme Warren, UCD School of Archaeology. This site is located immediately on the shore of the modern Belderrig Harbour. The site is characterised by a complex archaeological sequence buried beneath up to 2m of blanket bog. In brief, a series of activities appear to have taken place from c. 4800-4300 cal BC to c. 3600-3300 cal BC, resulting in the deposition of stone tools, faunal remains, and evidence for the laying out of stony surfaces and some stake-holes and pits. Also within the excavation trenches are dykes of the pre-bog field systems of the region, most widely known as the Céide fields (Caulfield *et al.* 1998). The latter date relates to the active use of the field system. Abundant lithics have been recovered from Belderrig, mainly in quartz (both vein quartz and rock crystal); most of the quartz lithics are derived from a platform technology producing large flakes and some blades. As excavation is ongoing and many samples still require processing the overall size of the assemblage is not currently known, but is in excess of 10,000 pieces.



Figure 3: Case studies

The second case study is the quartz component from the Neolithic palisaded enclosure site from Thornhill, Co. Londonderry, a development-led excavation directed by Dr Paul Logue, Environment and Heritage Service, Dept of Environment, Northern Ireland (Logue [2003](#)). This site overlooks the mouth of the River Foyle. This extensive site, as yet with no radiocarbon dates, uncovered five potential buildings – related to the multitude of other Neolithic 'houses' discovered throughout Ireland – within the palisaded enclosure, as well as evidence for numerous pits. Logue ([2003](#)) noted that '[t]he wealth of archaeological features exposed during the initial phase led to a change in emphasis ... from rescue excavation to identification and preservation'; furthermore, 'Area 1 was excavated very rapidly as only five days were available to investigate an area measuring 50m x 40m'. The artefactual evidence comprised flint (c. 1000 artefacts) and stone tools, stone axes, saddle querns and ceramics as well as the quartz (vein quartz and rock crystal) component which is c. 4000 artefacts.

The third, smaller, study focuses on a cluster of quartz identified at Lambay Island, Co. Dublin during research excavations of a Neolithic stone axe quarry, directed by Prof. Gabriel Cooney of the UCD School of Archaeology (Cooney [2005](#)). This small group of artefacts (c. 70 pieces in total) appears to be a complete knapping episode, deposited against a face of worked porphyry. Preliminary examination indicates that a high-quality platform technology has been used. Using the framework developed in the main case study, this assemblage will be analysed, and a refitting exercise will be conducted to ascertain whether this represents a knapping episode.

3.3 Methodology

The database of Irish quartz finds clearly highlights that the quartz problem in Ireland is significant, and the international context of quartz research highlights that many researchers maintain that an understanding of quartz must be derived from a detailed knowledge of fracture mechanics – ideally developed through experimental work. In essence, this is the approach taken by this project in analysing the selected assemblages from the case studies. However, some caveats are needed. There is a tendency to treat the results of experimental work, especially those based on fracture mechanics, as 'hard' facts. This sometimes fails to recognise that technology is not primarily constituted of material production but is fundamentally social (see Pfaffenberger [1988](#); Reynolds [1993](#); Dobres [2000](#); Ingold [2000](#)). The sociality of technology is not an after-the-fact addition to material considerations; the social factors of technology cannot be appended on to discussions after the analysis of the seemingly more grounded material side of technology, nor can they reside in a separate analytical chapter from technological considerations. Rather, from the first instance the study of past technologies must be approached from a perspective that implicates the sociality with the materiality of technology. To take a concrete example, extensive programmes of quartz analysis in Scandinavia (e.g. Holm and Knutsson [1998](#); Rankama *et al.* [2006](#)) are founded upon detailed experimental work within a framework of fracture mechanics, leading to the development of analytical frameworks based on the fragmentation of a material prone to shattering. A simple approach to quartz analysis in Ireland would be to borrow these frameworks and apply them to our material. However, this would fall foul of the materialist fallacy of technology: quartz working was not just a matter of fracture mechanics but was social – choices in how to work rock, and what rock to work, arose from the interplay of local identities, local traditions, and local materials and as a consequence our understanding must be grounded locally, and build outwards from these points.

This project uses the concept of the *chaîne opératoire*, which was developed as a methodology for comprehending and analysing the operational sequences undertaken in the creation and use of material culture. At base, the *chaîne opératoire* looks at all the operational sequences in play from an artefact's birth to death, with the initial concept having an explicitly social, cognitive, and evolutionary focus in its contemplation and analysis of technological practices. Whereas typological systems of analysis focus on results – the finished artefact – the *chaîne opératoire* focuses on action. In terms of the possible *chaîne opératoires* with stone tools, [Figure 4](#) shows the basic possible broad-scale sequences as seen in the archaeological record; therefore you can see that there are a myriad of possibilities even at this very basic representation and scale. Unfortunately, use-wear analysis is beyond the scope of this project; consequently, [Figure 5](#) highlights that the lack of use-wear analysis invariably cuts down on the depth of possible information that can be examined, and the interpretations of the possible *chaîne opératoires* are consequently weakened. This current project, however, should be seen as a first step in analysis, and it is hoped that use-wear analysis can be carried out at a later stage.

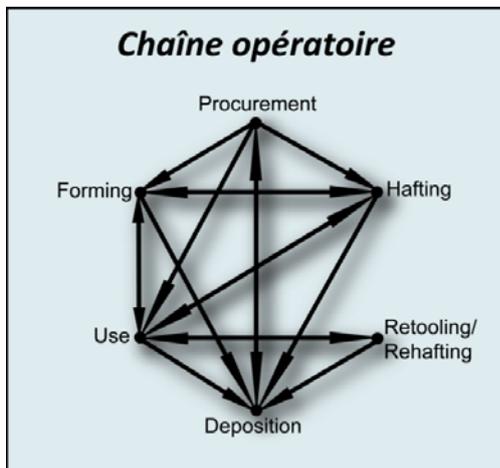


Figure 4: Possible *chaîne opératoires*

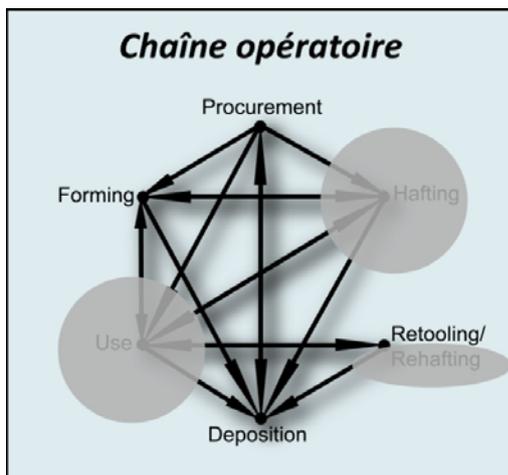


Figure 5: Possible *chaîne opératoires* without use-wear analysis

In order to explore the possible *chaîne opératoires* in the case study assemblages, the experimental work will involve assessing the fracture mechanics of the quartz by knapping the material using various techniques. As mentioned earlier, before we can begin to understand the *chaîne opératoires*, the fracture mechanics of the raw material in question must be understood. Therefore, a series of knapping experiments will be conducted that will produce an experimental assemblage which will be analysed through attribute analysis and used to devise a core and debitage typology for comparison with the excavated assemblages. During the analysis of the case study assemblages, further experimental knapping will be conducted to clarify any questions that may arise.

The initial stage of the knapping exercise has been to collect the raw material from near the main case study assemblage from Belderrig. The material collected has been from both *in situ* veins, disturbed veins, and beach cobbles (which are also vein quartz). Samples from three different veins and a beach cobble have been analysed macroscopically and in thin-section by Dr Julian Menuge, School of Geological Sciences, UCD. This has shown that the vein quartz naturally available near Belderrig is variable in character in terms of crystal size, orientation, and fracture development. An initial overview of the vein quartz variability from the excavated assemblage has shown that other possible 'subtypes' of quartz were utilised beyond those sampled so far; the next stage is to identify possible outcrop sources for these types and to conduct further programmes of thin-sectioning. The implications of the variability of the quartz for knapping is poorly understood, and this aspect will be examined during the experimental exercises.

4. Conclusion

The down-playing of the extent and nature of quartz use in prehistoric Ireland stems primarily from the relationship between the physical properties of quartz and the history of archaeological research discussed above. Ballin (2008), reviewing approaches to quartz, commented that 'many publications of Scottish quartz assemblages, as well as quartz reports world-wide, tend to be characterised by a lack of enthusiasm, detail and precision'. The difficulties with quartz are compounded by the common occurrence of quartz deposits in most of Ireland. Consequently, quartz can be difficult to identify during fieldwalking and quartz lithics are probably under-represented in such collections (cf. Kimball 2000), and during excavations they are also often missed (Warren and Neighbour 2004). This is perhaps especially significant in a context where, for non-specialists, lithics are all too often equated with flint, and many excavators have not been trained in the recognition of 'flint alternatives' or how to deal with them: the recovery of worked quartz on many sites is very unsystematic. Moreover, too many people continue to equate 'tools' with formal retouched artefacts and downplay the analytical significance of the rest – the 'waste': as retouch is very difficult to identify on quartz, this bias further limits the recovery of quartz. In parallel with other areas worldwide (e.g. Gramly 1981; Holm and Knutsson 1998), the neglecting of quartz-focused research in Ireland is leading to a systematic misunderstanding of the nature and extent of prehistoric activity in large parts of the island. This project aims to offer a coherent framework for analysing quartz assemblages, and further our understanding of lithic traditions in Ireland.

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