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Unstated Contributions –

How Artistic Inquiry Can Inform Interdisciplinary Research

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Since 1990, many creative disciplines, such as art, design and performance, have engaged increasingly with academic research. Accompanying this has been a good deal of interest in ways to employ their professional and creative practices as instruments of inquiry, just as previous disciplines have developed research methods that employ their specialist skills and knowledge. This raises questions about how research in the creative disciplines might contribute to knowledge and understanding. Research and practice in these fields may deal with matter that changes meaning with time or context, especially in art, where audiences may be expected to complete the meaning of creative works for themselves. This paper offers an oversight of these issues. It sets out some examples from the wider community that illustrate how incomplete or tacit contributions to inquiry can be a valuable and sometimes necessary part of the enterprise of creating knowledge, establishing a research model that is relevant in many areas, especially where disciplines collaborate. It goes on to set out tentative principles for such contributions.

Relevance to Design Practice - The main purpose of the paper is to inform thinking about research, however, it also illustrates how designers can act as provocateurs in the early stages of interdisciplinary work, indicating a wider role for their work in taking responsibility for the genesis of a project as well as, or instead of, its conclusion.

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Chris Rust trained as an Industrial Designer following an eclectic early career as a ship's engineer, musician, carpenter and photographer. His professional work in design has focused on design for disability, including a

British Design Award (1992) for work on electric mobility vehicles. In his academic work since 1991 his research has moved from computer aided design to understanding the role of tacit knowledge in designing and design research. His current research deals with ubiquitous computing in museums and his role as Head of Art and Design Research at Sheffield Hallam University has led him to take an active role in developing the practices and theory of "practice-led" research.

Introduction

In recent years there has been a growing interest in the way that creative or artistic disciplines can contribute to the academic enterprise. During the past two decades these disciplines have become part of the mainstream university system in many places, creating the need to strike a balance between their traditional concerns and the university agenda. Local conditions vary. For example, some United States institutions consider that advanced artistic practice provides an alternative form of scholarship, not constituting research but of comparable value. In parts of Europe and Australasia, by contrast, there is a stronger commitment to developing a research culture in creative or artistic disciplines. The UK has seen a big movement to develop "practice-led" research in the creative and performing arts. The stimulus for this paper has come from that movement.

This academic movement is mirrored by an increasing interest in how the creative disciplines can have a stimulating role in the professional arenas of business and policy, characterised by Daniel Pink's provocative assertion that "The MFA is the new MBA" (Pink, 2004). More concretely, there are examples such as the artist David Cotterrell (2003), who works with urban planners in Britain advising on matters of public art and aesthetics and as a provocateur, creating artworks that aim to engender mindfulness of ideological and institutional forces in the work of his planning colleagues and the wider community. These interdisciplinary developments in professional practice resonate with the growing interest in interdisciplinary research, raising the question of what roles the creative disciplines might play in interdisciplinary inquiry.

Schemes that characterise research, for example university PhD regulations or the criteria of science funding organisations, tend to have a consistent requirement for four important elements. Researchers are expected to identify a problem or question which they will resolve in some way, they must gain an understanding of the wider context of knowledge in which that problem is set, they need appropriate methods for investigating the problem and their research must result in a contribution to our shared knowledge, usually formalised in an explicit way through a peer-reviewed document. This paper will examine an area of research practice in the creative arts where one of these four elements, the explicit contribution to knowledge, can be problematic. From there, it suggests some principles that might be useful in wider fields of research, in particular in interdisciplinary collaborations. The purpose is not to discuss or validate the general principle of practice-led or artistic research, but to see how the idea of "unstated" contributions to knowledge or understanding might be worked out and made useful.

Artistic Research

Academics and practitioners have wrangled over artistic or practice-led research for some time. For example, a 3-week online workshop on this subject (Rust & Friedman, 2006), attracted 240 participants from 12 countries. The debate is illustrated by the "Picasso's PhD" dispute that surfaces from time to time, worrying at the question of whether an artist of Picasso's undoubted originality could be considered to have revealed new knowledge sufficient to merit a PhD. Susan Tebby (2000) examined this question and provided the very convincing conclusion that whatever the evidence of an original contribution to his field, Picasso had not asserted or explained his inquiry, his methods or the nature of his contribution and was therefore disqualified as a doctoral candidate. However, Tebby's response, while satisfying in itself, neatly sidestepped the question of what Picasso might have claimed for his work, had he chosen to do so, and where the "contribution" of his research might lie, thus not testing the underlying proposition, which is posed by a great many novice researchers.

This particular dispute characterises much of the debate so far, which has focused on methods and forms of knowledge within disciplines, often focused on doctoral research that emphasizes personal, single discipline programmes of inquiry rather than collaborative interdisciplinary work. Biggs (2004), suggesting that our heritage from ancient Greek philosophy undervalues experience, has reviewed the subject of tacit, experiential or non-propositional knowledge in art and design research. He characterises tacit knowledge as "knowing how", which does not reflect the breadth of ideas explored by Michael Polanyi in forming his theories of tacit or personal knowledge. Biggs restricts his discussion to the role of such knowledge within an individual programme of research, considering the form and format of the thesis but not the nature of the contribution.

Neidderer (2007a, 2007b) has gone further. She has addressed the question of contribution to knowledge directly, but again her position deals with contributions determined by the researcher and their question rather than those that might arise from the audience and its context. Katie MacLeod, in correspondence with the author, has proposed that "artists make in order to know what they wanted to make", or to use one of Horst Rittel's principles of the wicked problem in design (Rittel & Webber, 1973, p. 161), "the problem can't be defined until the solution is found"

This apparent contradiction resonates with the position taken by Michael Polanyi at the start of his inquiries into tacit knowledge in the 1950s. Polanyi, a chemist, was interested in the social aspects of science, particularly the significance of the hypothesis and how it is formed. He pointed out that a hypothesis cannot be "proven" by stepwise reasoning from what is already known, the scientist must make a commitment to reach this further shore on the basis of a passionate "heuristic anticipation" rather than dispassionate (explicit) knowledge (Polanyi, 1962, p. 130, pp. 309-310). The author has argued (Rust, 2004), with some recent examples, that these guiding insights may be stimulated by the

work of artists and others who create "new worlds" that help us to reframe and re-examine our ideas, working at Polanyi's tacit level of indwelling as well as in the explicit territory of reasoning.

To return to the question of artists' inquiry, Linden Reilly has examined the epistemological issues facing those who seek to pursue research through art practice. She offers some thoughts on how an epistemology of art practice inquiry might develop, focusing on the ways that artists "stand over" their developing work:

> Think of that famous footage of Jackson Pollock painting in his studio, dripping paint over the canvas on the floor, his concentration on the canvas, though he is physically more active than is conveyed by "standing". The practitioner may go through successive stages of planning, acting, reflecting, revising the plan, then acting again ... The work does not merely emerge in the world, it simultaneously emerges in the practitioner who may see that which has been dimly felt as the work, may see clearly what they have been feeling, only at that point where it "feels right", only as it emerges as a physical form. The making process can be a search. A very careful search. And it can reveal unexpected things, more or other than was searched for. (Reilly, 2002)

A recent workshop by experienced fine art academics, part of a UK review of "practice-led research in art, design and architecture", concluded that while artists were generally comfortable with the framework of question, context and method, the concept of "contribution" was much more difficult to deal with. The workshop members believed that artists' inquiries might contribute to knowledge and especially understanding, but many contemporary artists expect that contribution to be formed by the audience for themselves as individuals. If an inquiry resulted in an artwork (non-propositional knowledge in Biggs' terminology), the effects of that artwork would not be predictable and will have taken place "at a distance" in the understanding or imagination of the audience. To attempt to characterise or predict those effects would be to move into a different domain, of design or communication. Most artists would assert very strongly that their ability to perform as artists would be compromised by that kind of intentional approach, which might be seen as an immovable barrier to their participation in research.

Demonstrating this point, Michael Hohl, a designer undertaking doctoral research into telepresence art, conducted a search for examples of artists who had used scientific techniques to examine the impact of the work on audiences, discovering very few cases (Hohl, 2006, p. 128). Hohl's belief that his own use of audience interviews greatly helped his ability to produce more effective or meaningful works in future, while natural to a designer, does not appear to be shared by many mainstream artists.

The Problem of Contribution

Here is an example or problem statement that illustrates the contribution problem. Breda Beban, an internationally respected filmmaker and artist (who holds a PhD from the

Croatian Academy of Sciences and Arts in Zagreb, Croatia, former Yugoslavia) has exhibited a video work called "The Most Beautiful Woman in Gucha" at several international venues (Beban, 2006). The artwork is based on video footage captured opportunistically by the artist using a handheld camera during a music festival in Gucha in Serbia, former Yugoslavia. The exhibition consists of two video projections running simultaneously but not synchronised. One projection shows the original video material, not edited, projected at a relatively small size. The other projection is a heavily edited version that isolates significant actions in the melee, processed to achieve a very polished visual quality, as one might expect from a high budget mainstream movie, and projected at large scale.

The edited version (Figure 1) focuses on an interaction between two people: a professional dancer performing at the event and a young man who very briefly dances with her while she is performing. In the context of the complete unedited video this is a very fleeting passage and might not be noticed by a viewer. Beban has homed in on the interaction between her two main characters and by the use of highly selective editing and slow motion passages to amplify the key moments has revealed an intense, if fleeting, engagement. In the normal speed sections we hear the energetic music and hubbub of the event but when the couple move together for their artificially prolonged exchange the soundtrack changes to a slower, romantic, sensual music to accentuate the intimate hidden moments revealed by the artist.

Figure 1. Stills from The Most Beautiful Woman in Gucha, Breda Beban 2006.
Reproduced by permission of Breda Beban.

Beban describes her documentary video work as progressing through distinct stages (personal conversation with the author, June 2007). The initial impetus comes from an insight that it is necessary to record a particular situation in which she finds herself. From comparing experiences with a mathematician, she likens this moment to the aesthetic insight that, according to Michael Polanyi, motivates the early stage of much scientific research. In this first stage of gathering her video footage she experiences a state of "flow"

in which she performs her work without consciously attending to the task, often achieving a high degree of technical quality in difficult conditions.

This first reflexive gathering stage is followed by a longer period of editing that exhibits the characteristics described in Linden Reilly's account, above, of making as searching. By examining the raw footage very closely, Beban moves towards an understanding of where the significant material lies and how it may be revealed in the editing. She collaborates with her editor, Steve Sprung, to create and refine the work until they are satisfied that the hidden matter is revealed The final part of the work is to exhibit it, the design of the exhibition helping to complete the picture, Beban feeling it was essential to demonstrate the relationship between the edited "product" of her search and the original raw material. But this is as far as she is prepared to go.

A social scientist might examine the original video material to code the interactions of the protagonists and analyse the events in Gucha. In the artwork, by contrast, everything is revealed at once. All the small details, so essential to the depiction, become part of a whole that can be recognised by any observer who understands the wider context in some way. But what is revealed?

Since the artist is not willing to impose an interpretation, that question must be answered by the rest of us as viewers and it is reasonable to suggest that our reactions will be individual and only partly predictable. This seems to deny the possibility that the work can be regarded as the outcome of research since we expect researchers to own their work and claim their contribution to knowledge. For the artist it is not only normal, but in fact necessary to avoid the kind of intentionality that would be usual for most other professions. Biggs (2004) suggests that in the arts, multiple meanings are seen as an asset rather than a weakness, for example, in multiple interpretations of Shakespeare's Hamlet. The meaning of the artwork is completed by the viewer.

Artists, Designers and Scientists

We may be able to unpick the question of how such work might find a role in the research enterprise by examining practices in other disciplines. As indicated above, designers tend to be more pragmatic or instrumental in their approach. The concept of investigating/evaluating the outcomes of their work is embedded in the culture of many design disciplines. However, there are some emerging ideas in design that may bear directly on the broader problem that we are investigating here. Henrik Gedenryd (1998, p. 157) has described how designers usually approach new problems by quickly creating a tentative solution, long before the problem is understood. He proposes a theory of cognition in which the environment provided by the object being created (sketch, diagram, drawing, model, description, prototype, etc) is an integral part of the designer's thinking process and the location for a great deal of the complex ideation that is going ahead, our

brains being relatively poor at manipulating very complex knowledge without such an external environment.

These tentative ideas often emerge from inquiries "for practice", to use Archer's (1995) scheme of research about, for and through practice, in which designers observe or engage with the context for their work, including the people who will use a product or environment. However, such inquiries not only produce explicit knowledge about the context in the form of design requirements. The designer will also generate ideas directly from dwelling in the situation, to use Polanyi's concept of "indwelling" to describe the state in which people create and employ tacit knowledge, and from social engagement with the stakeholders, ideas driven by tacit insights as opposed to explicit requirements. Going further, some designers deliberately create novel situations that force their stakeholders to change their behaviour and reveal new possibilities or needs to the designer.

Ehn and Kyng (1991) provide one of the earliest and best examples of this in documented practice. They investigated how new software for the newspaper industry might develop in the 1980s, before graphical computers were readily available and before many people outside computing had a concept of digital graphical production. To overcome the conceptual and practical barriers to their research they invented a low-fidelity "Cardboard Computer" that research subjects could manipulate for themselves, such as by drawing new screen layouts on pieces of paper. This created a play space where newspaper professionals could act out and reveal their practices and concerns, much more successfully than in later research with real computers. Again, the knowledge from these encounters may include explicit observations but will also create insights expressed indirectly in design concepts. Recently, some designers have developed practices that have a relation to the role adopted by artists. The idea of "critical design" has emerged, informed indirectly by critical social theory in the sense that it is important to engage with the ways in which the world may change, rather than purely observing the world as it is. Dunne and Raby produce prototype products or mockups that suggest novel functions, designed to engender mindfulness in their audience, directed towards specific issues in society, usually concerning the nature of electronic products in the contemporary world (Dunne, 1999). These tend to be placed in galleries, locating the work alongside gallery/academy art practice, but the design group Human Beans remains within the professional design arena, producing highly realistic packaging or advertising for imagined critical products, for example, a pack of cigarettes on which the price includes an insurance contribution to the smoker's tobacco-related healthcare costs. These are presented in popular public-facing media (eg. YouTube) and in workshops with expert groups and design clients (see Human Beans, n.d.). Designers concerned with mainstream design aims have also developed critical design practices. Nel Janssens (2006) is using speculative concept designs as a tool for engaging urban planners—and eventually the wider community of stakeholders—in debate on how to plan large scale urban development. Simon Bowen (2007) uses critical prototypes, including both simple sketches and highly resolved models or visualisations, in stakeholder workshops intended to discover more relevant concepts for actual products. Bowen's

designs (e.g. Figure 2) invite stakeholders to question and reflect on aspects of their lives where he believes that system products, mostly electronic products, might be beneficial. His initial "crazy ideas" emerge following wide ranging discussions with his stakeholder group. In turn, they are used to provoke another discussion group that leads the designer to produce a second set of designs. A further discussion is used to reflect on the relevance of these designs, several cycles of this activity eventually informing actual product concepts.
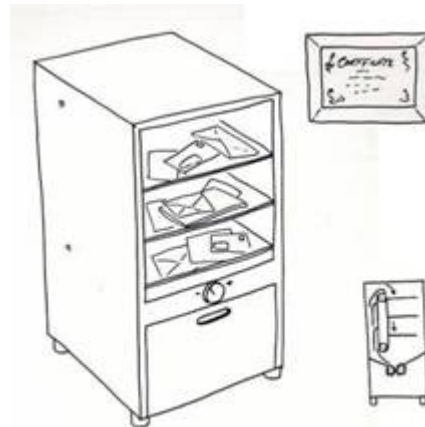

Figure 2. The Prioritiser. A critical design concept by Simon Bowen, intended to provoke stakeholder discussion (the paternoster shelves move down one level each day to drop your letters into a shredder). Reproduced by permission of Simon Bowen.

The key feature of Bowen's work, which is intended to develop new methods for designers of physical products that embody computer-mediated functions, is its focus on developing and employing tacit insights that would not be revealed in situations where nothing has been changed. The designs emerge from social interaction rather than explicit questioning, a process illustrated by Nonaka and Takeuchi (1995, pp. 63-66) who, building on Polanyi's theories, have described how successful organisations in Japan create a social environment where people can both recognise and subsume each other's tacit understanding as part of a collaborative drive to create and refine the organisation's knowledge. Bowen does not seek to analyse the discussions provoked by his artefacts as a social scientist might. Instead, he channels his experience of the discussion into ideation for the next design stage. Subsequent rounds of interaction start with participants' immediate reaction to the design concepts rather than a reasoned discussion of practicalities. The use of prototypes and fictional narratives allows the participants to enter into the situation that the designer has created, giving visceral and tacit reactions as well as reasoned   ones.
This set of practices developing in design, in both research and practice settings, demonstrates how tacit knowledge can be employed, observed and created in a methodical way, with new artefacts playing a role in provoking insights based on tacit understanding. The methods being developed by Janssens and by Bowen are less challenging than Fine Art examples, or the work by Dunn and Raby and Human Beans, since they work towards the explicit formulation of a design proposition or problem statement or other knowledge

that can be set out unambiguously. However, even they require us to accept the validity of the tacit transmission that takes place between each stage of their methods. The artist's method poses a further question, as indicated by Beban's work, of whether it is sufficient for an inquiry to conclude with a tacit assertion: "Here! Look! This needs attention." without suggesting what the viewer might detect in the artwork presented. Fortunately, there are some other examples that help build bridges between these different inquiring practices, including examples of a creative partner contributing the genesis to another discipline's exegesis, in ways that help us to value such declarations as valid research contributions.

In his analysis, referred to above, of the contribution that designers and artists can make to research in the natural sciences, the author (Rust, 2004) building on Polanyi's work on the theory of tacit knowledge, described how the imaginative creation of "new worlds" can help scientists to identify and commit themselves to new hypotheses. That analysis provided case examples of designers creating artefacts that, when put to use in some way, revealed new ideas and research opportunities to different individuals, depending on their particular experience and concerns. Clearly, it was necessary for the scientist to "complete the meaning" for themselves. The designer could not achieve that and their work was done, for the time being, once the artefact was deployed. However, the designer quite clearly owned both the initiative to create the new world and the knowledge and inquiry that were embedded in it, this often being gained through a difficult and rigorous programme of contextual research and experiment.

Other collaborations in projects in which the author has had some direct involvement or oversight, reveal variations on this theme. Peter Ainsworth, who investigates mediaeval French literature, has formed a partnership with Colin Dunn, a photographer, to capture images of important manuscripts from the 100 Years War between France and England, 1337-1453. These are precious and fragile documents, rich in text, illustration and artistry, which are difficult to study as they are kept in controlled conditions in museums and libraries scattered around Europe. By capturing very high resolution digital images of every page from several of these manuscripts (Figure 3), Dunn and Ainsworth have made it possible to study all of them in one place with little practical difficulty. Ainsworth is able to summon any page to a large screen in his office and zoom in on any part in very fine detail. In this case, it is clear that Peter Ainsworth both owns the analysis of the manuscripts and is responsible for knowing about the books, their relevance and their locations, which he has negotiated with the various institutions involved to make them accessible, using his expert knowledge of the field. But what is Colin Dunn's contribution? Is he purely the good technician?

Figure 3. Image from The Chronicles of Froissart Bibliothèque Municipale Besançon, ms 864, fol 150.
Reproduced by permission of Bibliothèque Municipale Besançon.

To carry out this work Dunn had to use special equipment and techniques developed in earlier projects. His expertise and insight, including experience of working as a calligrapher, was also needed in photographing the manuscripts to ensure that tiny details, some of them 3-dimensional in nature, were revealed so that Ainsworth could do his work of detecting clues to the production and meaning of the books. Dunn also produced software to assist in viewing and organizing the images. Ainsworth can only examine what Dunn is able to show him. Without Dunn's knowledge and insight as a photographer, arguably comparable to if different from Ainsworth's knowledge and insight as a mediaevalist, the research would not happen. Dunn may not own its conclusions but he has a clear stake in its foundations. It might be argued that Colin Dunn makes no more contribution than the lens grinder or camera builder but their work is generic, based on existing knowledge. Dunn has studied the actual material of this research and transformed it in line with his understanding of Ainsworth's aims.

Dunn and Ainsworth are each properly aware of their limits and their need for each other. Dunn has the ability to reveal what Ainsworth wishes to examine, but it is absolutely vital that he does not attempt to say what is significant in the landscape he has uncovered. Only Ainsworth can complete the meaning. What is equally important is that another specialist in history, language, art, technology, society or so forth may be able to discover completely different insights in the same material. Again, Dunn has no way to predict what these will be. His contribution can only be to frame the revelation. Any attempt to go beyond that on his own account is not relevant and could be damaging. It would be easy to say that Dunn's contribution is secondary to Ainsworth's, but that assumes that Ainsworth is making the only significant analysis of the material Dunn has captured. If a great many

future scholars were to exploit Dunn's work we may yet conclude that his was the essential contribution.

For a further example, which deals with communication between individuals of different disciplines, recent work on creating valid visual metaphors for the molecular actions of nanotechnology illustrates the importance of tacit transmission. A design group consisting of Jeff Baggott, a filmmaker, and Nick Dulake, an industrial designer with specialist skills in computer modelling, have worked with a group of scientists to create video material (eg. Baggott, Dulake, Jones, & Ryan, 2005) that provides a general audience with an understanding of effects that physicists would normally describe through mathematics. It is not possible to create an intelligible, literal 3-dimensional representation of these molecule-scale events and the metaphors that had been used previously were naive and, if anything, impeded understanding of the science.
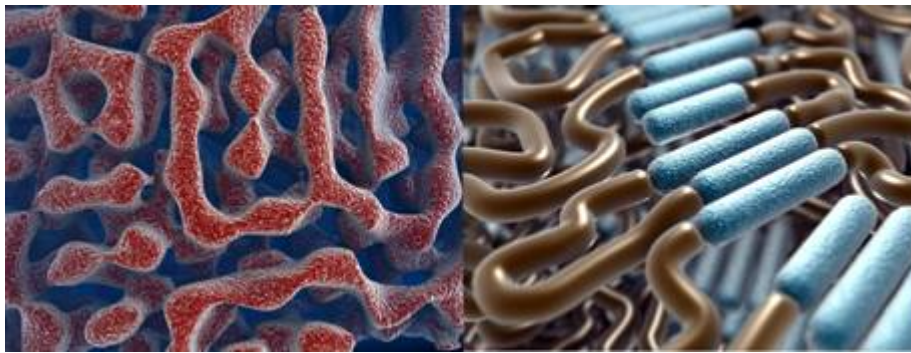

Figure 4. Still images from Nanotechnology – Shock Revelation public understanding of science video.
Reproduced by permission of Jeff Baggott and Nick Dulake.

Dulake described their process (personal communication with the author, June, 2007), making it clear that the physicist and he lacked any shared formal language to deal with the situation. Instead, he uses the very limited understanding he can glean from the scientists', largely incomprehensible, mathematical descriptions to create a tentative sketch for a possible visual metaphor. From the conversations that ensue, he and Baggott gradually refine and direct his efforts until the physicist is satisfied that the visualisation (e.g. Figure 4) is a valid metaphor of the principles at work. The second stage of the work, led by Baggott, is to sustain that metaphor into a time-based work, a video, which demonstrates the nanotechnology actions and relates them to their human scale effects. Again, the aim is always to ensure that the visual narrative remains true to the physicists' scientific understanding while being meaningful to the audience.

The reason for introducing this account is to show how tacit or visceral communication can be the only way that some knowledge can be transmitted, even in a natural science setting. The physicists must look for reflections of their own understanding in the designers' non-literal representation. The designers must detect the physicists' meaning, despite having no real grasp of their language. Finally, the eventual audience

must gain a useful, "true" sense of the physicists' knowledge from the designers' work, even though it contains no true factual information and uses a novel metaphor. The designers have a well-refined expertise in creating non-verbal communication that also relies heavily on tacit insight on their part.

The examples above illustrate different aspects of the problem at hand but they are all partial and inconclusive. The final example, by contrast, is of research undertaken explicitly to engender insights in others. Lucy Lyons (2006) conducts research that aims to reveal new understanding of a particular disease, *Fibrodysplasia Ossificans Progressiva* (FOP). This is a dramatic physical condition that affects very few people. Lyons has taken the initiative to record a diverse set of human remains and living sufferers through the use of drawings, which she describes as "delineations" (Figure 5). The practice of drawing what she observes in a specific case contrasts with the more generalised conventional medical illustrations produced to describe established knowledge. Lyons has taken the initiative to track down the skeletons and specimens in a variety of locations, including non-medical museums. She has built up a network of interested parties, including pathologists and patients, and developed a methodology that includes working in partnership with a specialist technician who is macerating (dissecting and preserving) a cadaver while she draws it. She bases her work partly on that of the 19th Century pathologist Richard Carswell whose exceptional drawings revealed the physical nature of a disease and insights into the experience of sufferers. Lyons's work so far has been validated partly by confirmation from pathologists that her delineations do reveal new insights into the physiological effects of the disease.

Unlike Colin Dunn, Lyons owns the whole process up to the point where she positions the work to allow the scientists to become involved with it. It can be argued that she "owns" the result, but however much she engages with pathologists and what they know the one thing she cannot and should not do is to predict what they will learn from her work.

Figure 5. Delineation of FOP cadaver. Reproduced by permission of Lucy Lyons.

Conclusion—Tentative Principles

Grounded in the examples presented above, a set of tentative principles is offered that indicate how unstated or generative contributions might operate, especially in interdisciplinary research. With the exception of the work of Lucy Lyons, no claim is made that any of these examples, as briefly presented in this paper, are valid as research in themselves, although in several cases they are drawn from wider research projects that can stand up to more detailed scrutiny. An example is the quality of communication achieved by Baggott and Dulake, which validates their hypothesis that their novel methods of working with scientists will generate valid and useful metaphors for difficult scientific concepts.

It is proposed that there can be valid research whose contribution to knowledge cannot be stated fully or precisely by the researcher. This is particularly relevant to research by creative artists, but it also has implications for interdisciplinary or multidisciplinary research that might result in contributions in different domains and where not all participants can "own" the conclusions unless their partners are prepared to acknowledge the importance of the developmental contributions.

The underlying principle is that some contributions are necessarily generative, providing a point of departure for others in the sense that Dunn provides the environment for Ainsworth's analysis and Lyons provides a means for pathologists to examine a disease. The artist's position that the viewer completes the meaning is compatible with this. It is not necessary for these generative contributions to be specific. As discussed above, the value of Colin Dunn's work lies in providing access to a "landscape" of material and it is important that he makes no strong judgement about what might be significant in that landscape, although he will do his utmost to reveal as much and as many different kinds of data as he can.

The nature of the contribution can vary. For example, the work may draw attention to an issue or engender insights into that issue. In Ainsworth's research some of the fine detail revealed enabled him to identify people involved in the production of the manuscripts and some organisational aspects of their production. It may provide a resource for reflection or analysis as in Lyon's work aimed at pathologists. It may indicate directions or techniques for the disciplines concerned or it may provoke critical reflection on the audience's own situation. These kinds of contribution, or the possibility of them, can be seen in the material discussed above, but this is not intended to be an exhaustive list. The most important feature is that while they should result from an intentional inquiry there is no need for them to be predicted by the researcher except in the broadest terms. Only the audience can determine what is relevant.

The methodology for such research must acknowledge the role of tacit transmission. Completing the meaning of the work is likely to draw on the tacit knowledge of the viewer.

As previously described (Rust, 2004) the process may reveal aspects of that tacit knowledge as an outcome in itself. Similarly, as set out above, the inquiry itself may have to rely on indwelling and tacit acts of translation between, for example, observation and synthesis, or in the social process between researcher and subject or collaborator, as in the work by Dulake and Baggott.

Finally, having acknowledged the need for artists and some others to avoid convergence in their research, we come to the quid pro quo implied by the artists' workshop that identified this issue. Those who wish to be regarded as researchers—as well as being artists or photographers or designers—must "own" their research in several important ways. They must declare the subject of their inquiry and their motivation for investigating it. They must demonstrate that they have a good understanding of the context for the work and what has gone before. They must have both methods and methodology and they must set all these things out in ways that the rest of us can recognise and understand, although we need not be prescriptive about the actual means of doing that.

Beyond that, any researcher would be wise to attend to the consequences of their work. An artist may not predict the results of their contribution, but after the event they have the opportunity to inspect what has happened and own it. Whether they do this by their own efforts or by ensuring that suitable others are doing the work required is less important than that it is done. Simon Bowen's research embodies the useful principle of tacitly processing the events following one "artistic" work into a subsequent work, crystallising some of the potential of the first while opening up new areas of uncertainty. This might provide a more suitable way for the artist to observe and "analyse" the consequences of their work than engaging in a perhaps unnatural act of explicit scientific analysis.

This paper was conceived, originally, as an effort to understand an issue arising from research in creative disciplines. The inquiry has used the stimulus of "artistic" research to consider the nature of generative contributions across a variety of inquiries in different disciplines. It is hoped that the ideas set out here will be of value beyond its original context.

Acknowledgements

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