'Artistic' Research Procedure:
Research at the Edge of Chaos ?

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Abstract

We use the term 'artistic' with some hesitation and recognise that there are perhaps other terms e.g. pluralist, holist, hybrid. 'Artistic' encompasses Fine Art and Design, and 'artistic method' suggests a complementary phrase to the 'scientific method'.

'Research Procedures / Methodology for Artists & Designers', C. Gray & J. Malins, in: 'Principles and Definitions: Five Papers by the European Postgraduate Art & Design Group', Winchester School of Art, 1993.

This paper attempts to advance some of the ideas proposed in our initial paper on 'artistic' research procedure (Gray & Malins, 1993) and brings together some of the most recent references and ideas in our continuing work on this topic. Rather than provide answers or be prescriptive, we hope it will function as a catalyst for debate.

The paper sets out the importance of procedure for research, examines the 'methodologies' used to date in formal Art & Design research in the UK, and outlines some of the recently completed research for the award of Ph.D. The development of these 'artistic' procedures is taking place simultaneously with advances in other disciplines: as Social Science evaluates a number of alternative paradigms of inquiry, Scientific Philosophy is moving away from a Newtonian position to embrace Complexity. The paper concludes by suggesting that Constructivism in Social Science, and Complexity in Science has implications for the development of modes of inquiry in Art & Design.

Part 1 - Introduction: Why 'methodological' issues are important

'methodology'
1. the system of methods and principles used in a particular discipline.
2. the branch of philosophy concerned with the science of method.

'method'
1. way of proceeding or doing something, especially a systematic or regular one.
2. orderliness of thought, action, etc.
3. (often pl.) the techniques or arrangement of work for a particular field or subject.

(Collins Dictionary, 1982)

As the growth in Art & Design research continues (especially in relation to higher degrees), it is becoming increasingly urgent for us to structure research appropriately. One of the most important aspects of this for any research project is the choice of general 'methodology' and specific 'methods' (from this point on we shall substitute the term 'methodology' with 'procedure' when referring to Art & Design research). We must not lose sight of the simple definitions of 'methodology' and 'method', and must relate their meanings as closely as possible to the nature of 'artistic' practice and research.

There is nothing in these definitions which claims 'methodology' and 'method' as pertaining solely to Science and Social Science. Procedures must be responsive, to solve the problems or tackle the challenges prompted by our disciplines. This is why we must examine procedures of practice, and where appropriate, use them in research. The use of an inappropriate procedure can invalidate the whole of the credibility of a piece of research, or render it invisible.

An examination of procedures used for formal research (Art & Design, UK)

Research for Higher Degrees e.g. MA, M.Phil.,Ph.D

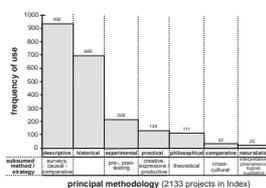*'Allison Research Index of Art & Design', Brian Allison, Leicester Expertise, 1992.*

Until fairly recently, Artists and Designers undertaking formal research drew heavily on the existing and validated methods of the Sciences and Social Sciences. We have opted for safety and convenience! According to the '*Allison Research Index of Art & Design' (ARIAD)* the predominant procedures adopted so far in Art & Design research are illustrated in the graph.

In decreasing order of popularity they are:

• *descriptive* and *historical* -
clearly these 'methodologies' relate to the classic text based dissertation or thesis, and conform to what are the traditionally acceptable research procedures in arts and humanities;
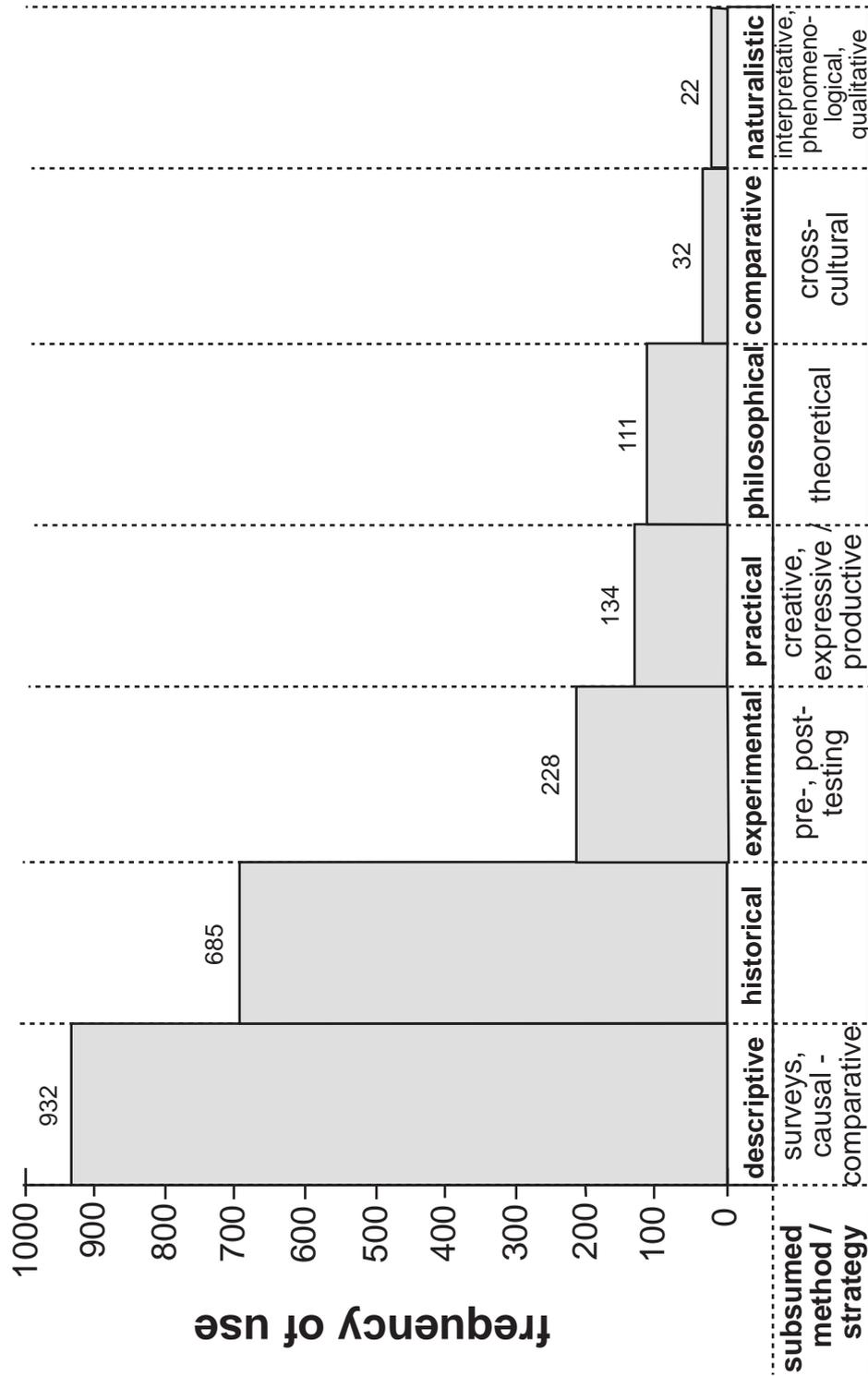
• *experimental* -
quasi-scientific methodologies', demonstrating attempts to perhaps 'objectify' research;

see next page for full scale version

• *practical* and *philosophical* -
the growing use of practical procedures is encouraging, as an increasing number of researchers are drawing on their own preferred practice-led procedures for conducting research); this leaves only relatively few projects which have used a

ARIAD Graph

Most commonly used methodologies in formal Art & Design Research (UK)
(source: Allison Research Index of Art & Design, 1992, p.8)

frequency of use

1000
900
800
700
600
500
400
300
200
100
0

subsumed method / strategy	descriptive	historical	experimental	practical	philosophical	comparative	naturalistic
	surveys, causal - comparative		pre-, post-testing	creative, expressive / productive	theoretical	cross-cultural	interpretative, phenomeno-logical, qualitative

932
685
228
134
111
32
22

principal methodology (2133 projects in Index)

• *comparative* 'methodology', and lastly a

• *naturalistic* 'methodology'.

Naturalistic (with its emphasis on context and human involvement) and **practical** are the ones which perhaps will gain the greatest popularity in the future, and which can be developed into more 'artistic' procedures.

Even though these have been identified as principal procedures used, they are not mutually exclusive; it is clear that most researchers in Art & Design have displayed characteristic eclecticism, adopting a 'multi-method' approach to information gathering, selection, structuring, analysis, evaluation, presentation and communication. This synthesis of procedures is also echoed in recent social science research (Brewer & Hunter, 1989). Discovering the limitations of these individual methodologies will help to develop new hybrids.

'Multimethod Research: A Synthesis of Styles', J. Brewer & A. Hunter, Sage, 1989

We think it is true to say that within most UK art institutions (usually belonging to a larger university structure) research has been manipulated to some extent by the dominant models of established research in Science and Social Science. This may have led us towards adopting a 'reductionist' approach, and the use of quasi-scientific methods to give research an air of 'respectability'; both these things can and do distort research in Art & Design. More positively, this context may have forced us to adopt a less vague approach, and ultimately has prompted researchers working in the field to question just what 'methodologies' are appropriate for Art & Design research. There are still problems, but gradually, as more research projects in Art & Design are completed and validated, a greater confidence in proposing alternative procedures is apparent.

Current Debate - Research Procedures in Design Practice

Current debate, in particular within the process and practice of design, criticises severely the shortcomings of much of industrial design practice this century (Mitchell, 1993). The breaking down of the design process into a 'rational', 'systematised' and 'calculable' scientific method has in fact moved the emphasis of design to the 'end-product' i.e. physical object, rather than bringing design closer to the 'end-user'.

'Redefining Designing from Form to Experience', C.T. Mitchell, Van Nostrand Reinhold, 1993

The concern over the unknown or difficult to measure 'soft design' issues (involving human perception, emotion, colour, touch, smell, sound) has led to the adoption of rigid quasi-scientific design methods and practice. Although capable of producing products that are easy to manufacture and/or function reasonably well, they are in fact further away from satisfying the human needs of 'end-users' than were the

products that evolved through 'craft-based' practice.

In contemporary culture within an industrialised society, this concept of manufactured product with 'craft-qualities' or visual 'metaphor' for cultural continuity is probably best understood by the Japanese. As a nation, the Japanese have remained culturally intact for two thousand years and have retained a deep relationship with the material properties and cultural imagery of the past, without restricting the visual appearance of future design. In recent times they have shown how a greater understanding of people's feelings, and emotions towards inanimate objects can be applied to modern design problems, and that these attitudes are as important (and in some cases more important) than the functional or measurable properties of a given product.

'Manufactured Pleasures',
R.Crozier, Manchester
University Press, 1994

The 'self-concept' and the 'meaning of object' (Crozier, 1994) clearly illustrate the complex nature of trying to define the mental picture of what 'self' means to each individual i.e the visual, spiritual, physical, pyschological image of oneself and the theory of objects as physical and visual symbols of 'self'.

Intuition, innovation, subjectivity, risk, experiment and practice is embedded in the process of 'creation'. Human responses to these 'creations' (be they works of art or products designed for specific functions), are also governed by equally complex systems. 'Taste', for example, is affected by many factors. It has a historical past with association, and memories of people, places, events and objects and can also have a present and future with associated self-reference to portray personal values and aspirations.

The holistic complexity of many of the areas of 'artistic' research practice in Art & Design, sometimes regarded as 'chaotic', cannot and does not conform to conventional measurable systems. Research of this nature is extremely difficult to carry out and evaluate if it tries to precisely emulate research models developed by scientific disciplines.

'Grow Your Own:
New Product Development and the
Designer's Contribution', Ph.D
research in progress.

A programme of research currently being carried out is using the potential of new-media technologies to explore single and cross-cultural 'human' responses to visual stimuli, related to the digital control, manipulation and production of new product forms, colour, patterns and texture. Global communications via the Internet, for example, will enable people from around the world to interactively participate in important aspects of the research. This programme will, by its nature, evolve a 'hybrid' research strategy to manage the formidable aspects of 'complexity' (Pirie, 1994).

Emerging technologies, particularly interactive CD ROM, offer the opportunity to comprehensively document and evaluate 'artistic' research. For the first time, Artists & Designers have a readily accessible medium which can include image (still or moving), sound and text, with the ability to cross link, reference and create statistical data. This database of information can then be 'interrogated' and interactively examined, chronologically (linear) or holistically (non-linear).

The breakthrough in the use of computer technologies for 'artistic' research is largely attributable to the development of the intuitive graphical user interface. This, associated with lateral thinking skills (which are a recognised strength in visual artists and designers), have enabled researchers to explore, link, develop and apply various software applications beyond their initially intended function.

Examples of software currently used in research projects to gather, collate, select, analyse, synthesize, interpret, evaluate, present and communicate information - HyperCard, MacroMind and MacroMedia Director, Acrobat, Morph, Photoshop, MacProject,

FileMakerPro, StatView, etc.

Observation of the activities of the researchers based at Gray's School of Art, The Robert Gordon University, reveals the speed with which the majority have recognised the methodological importance of this new technology, regardless of the research topic or discipline area. Also noticeable is the enthusiasm for learning various software packages as researchers investigate and develop personal and appropriate complex 'multi-method' research processes. Recent developments in software and massive improvements to the power of desktop computers enable researchers in Art & Design to collate, manipulate and interrogate visual data in the manner that Scientific researchers have been able to do with numerical data for some considerable period of time. This has had a liberating effect on the organisation and documentation of practice-led research, a process which itself has prompted the need to develop interpretative visual systems. Currently computers are being used to compile extensive interactive visual databases, enabling both comprehensive and appropriate supervision, and complex, non-linear analysis of a given research project. In parallel, researchers often use the same 'visual' computer code to directly generate, influence, control and feed back into their creative process, this cyclical loop mirroring the classic learning patterns of theory, experiment, application and reflection.

Emerging Research Procedures - recent work for higher degrees

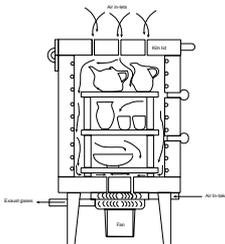*'Structure & Improvisation: The Making Aspect of Sculpture', University of Sunderland, 1992*
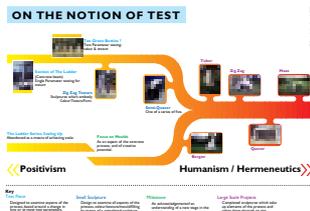
see next page for full scale version

'Zig Zag', Anne Douglas, 1992

'The Monitoring and Control of Specialist Ceramic Kiln Atmospheres and Emissions', The Robert Gordon University, 1993

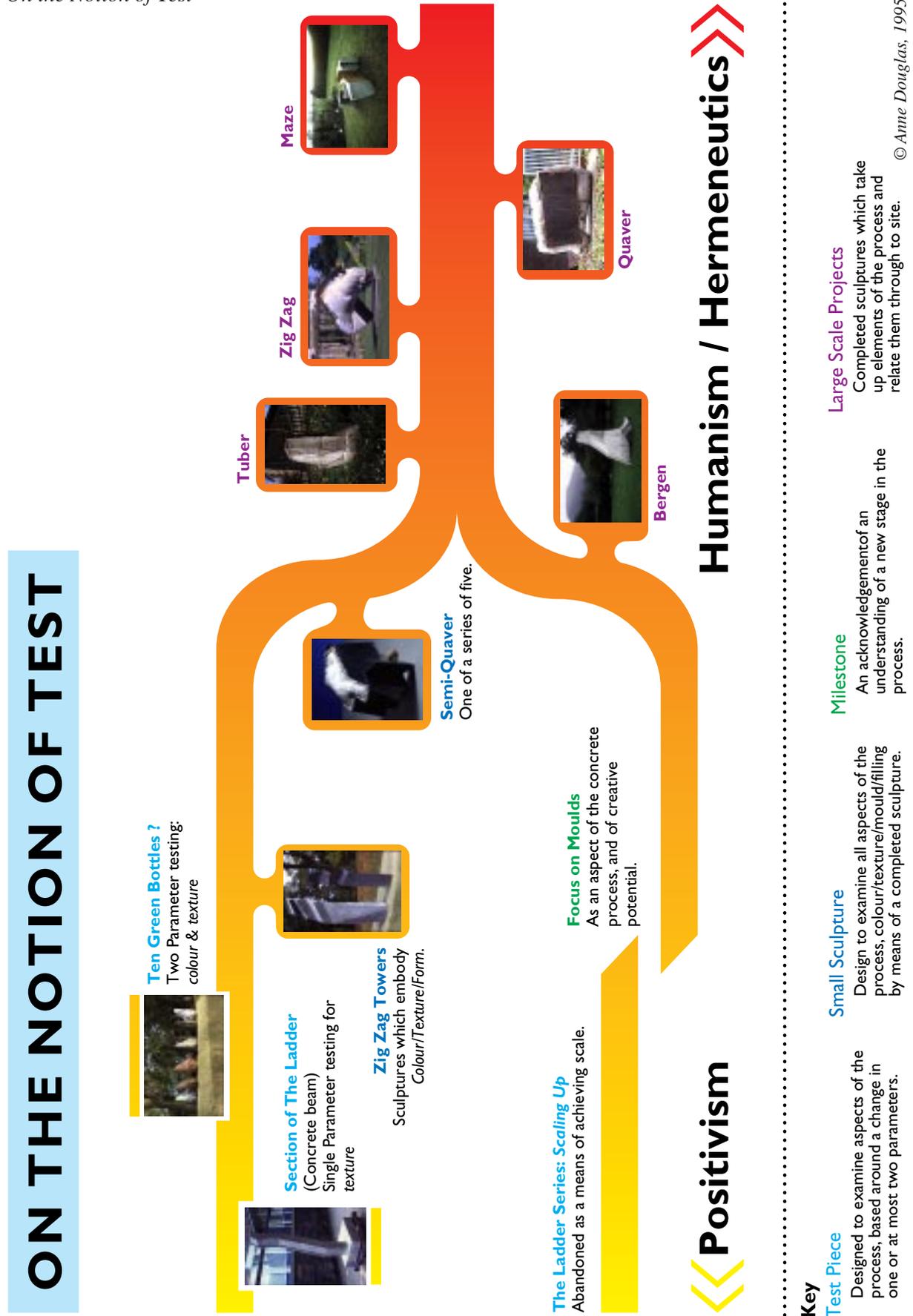*'Psychological Testing', 6th ed., A. Anastasi, Collier Macmillan, 1988*

A number of research projects for higher degrees, have recently been successfully completed; these have attempted to leave the safe waters of existing 'methodological' approaches: an important contribution has been made by the Ph.D work of **Anne Douglas**.

This research was practice-led, and necessitated a methodological shift from initially a positivist stance to a humanist one (The diagram demonstrates this in relation to the development of the notion of 'test'). The idea of looking at practice as a phenomenon seemed appropriate, as Anne's initial education was in anthropology where Structuralism as a method attempted to make visible what was invisible. She soon discovered the limitations in this structuralist approach (i.e. the data was selected, and could only deal with stable, unchanging contexts - what structuralists describe as 'synchronic'), realising that practice-led research requires 'diachronic' data - which has evolved through time, is unstable and changing. She looked at music, especially of John Cage, whose practice was structured to allow for improvisation; she noted how Cage evolved his own language as he worked, his procedure traceable within the final product - in the same way that drawing can be to sculpture - a visible trace.

Douglas also realised that it was necessary to communicate her research in a dynamic, visual way, and as well as a site-specific exhibition of sculpture, she also used multimedia to capture and communicate the essence of the information.

Julian Malins' Ph.D research was of an interdisciplinary nature supported by both the Faculty of Design and the Faculty of Science & Technology. The ensuing innovative and unfolding research necessitated investigation and enquiry in all of the following areas: kiln and systems design, aesthetic qualities and perceptual evaluation of lustre glazes, new developments in glaze chemistry and computer monitoring and control. The direct link with the Science Faculty gave Malins a sound grounding in the scientific method (one of his supervisors was a chemist). Latterly he explored and developed techniques for aesthetic evaluation of his research results. He used 'semantic differential' techniques to elicit human responses on a range of visual and qualitative issues relating to his lustre glazes produced by his innovative environmentally safe 'clean kiln'. A multiplicity of approaches is now enabling Malins to retrospectively examine his 'hybrid' Ph.D research strategy. Part of his post-doctoral research has been to examine the drawback of existing appropriate 'objective' methods for aesthetic evaluation, and the investigation of more appropriate design

Diagram 2 -
On the Notion of Test

© *Anne Douglas, 1995*

ON THE NOTION OF TEST

Maze

Zig Zag

Tuber

Quaver

Bergen

Semi-Quaver
One of a series of five.

Humanism / Hermeneutics �É〉〉

Ten Green Bottles ?
Two Parameter testing:
colour & texture

Section of The Ladder
(Concrete beam)
Single Parameter testing for
texture

Zig Zag Towers
Sculptures which embody
Colour/Texture/Form.

Focus on Moulds
As an aspect of the concrete
process, and of creative
potential.

The Ladder Series: *Scaling Up*
Abandoned as a means of achieving scale.

〈〈 Positivism

Large Scale Projects
Completed sculptures which take
up elements of the process and
relate them through to site.

Milestone
An acknowledgement of an
understanding of a new stage in the
process.

Small Sculpture
Design to examine all aspects of the
process, colour/texture/mould/filling
by means of a completed sculpture.

Key

Test Piece
Designed to examine aspects of the
process, based around a change in
one or at most two parameters.

© *Gray & Pirie, 1995*

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methodologies, which he believes still needs to be liberated from a 'positivist' tendency. The impact of new media and technology, which may give freedom and control to the user (instead of dictating and dominating action), is an important part of his research.

Irene Leake's PhD involved a practice-led research procedure, stemming from her own work as a sculptor. She demonstrated the value of non-verbal approaches to inquiry by the experiential and interdisciplinary way in which she conducted the research. This research was initiated by a concern that non-verbal skills, such as those of the visual artist, should be taken more fully into consideration in the development and use of new technology. She undertook five drawing/gesture projects, concerned with observing and notating dance performance (live and on video) and also her own movement (in puppet and masked mime performance). Through these, she aimed to make more explicit what is involved in the drawing process, and to make this information accessible also to people outside the art field.

She focussed upon gaining a greater understanding of her Rapid Drawings of human movement, in particular the 'sense of movement' which they convey. This involved taking visual, tactile and kinesthetic factors into consideration. She had developed this type of 'drawing for inquiry' to inform her sculpture practice. The 1200 drawings created during the course of the research were viewed *en masse* by Leake, by dancers (the subjects of the drawings), and by invited observers from various fields.

The resulting observations, together with information from the visual and performing arts, computing, perception and animation aided her subsequent analysis of the visual representation (inclusive of two- and three-dimensional and time-based media) of movement. This was expressed in the form of a morphological chart. The final drawing experiment consisted of an inquiry into whether the performer's conscious control of energy is reflected by the Rapid Drawings; it was also demonstrated how the drawings could be subjected to further analysis by means of computer animated (HyperCard) sequences. The doctoral research was presented as a written thesis, in addition to an exhibition of drawings and computer animated sequences.

'Apprehending movement of the human figure through the medium of drawing, with comments on its possible relationship to computer mediated interaction', University of Brighton, 1993

A Rapid Drawing from Irene Leake's final PhD project. The dancer was concentrating on Laban's Effort quality of 'Strong Weight'.

Two cards from a corresponding stage of computer animated (HyperCard) sequences of the Rapid Drawing shown at the top. The marks were displayed cumulatively (above) and non-cumulatively (below) in time-based sequences.

A logical extension of the morphological chart analysis would be to present it in the form of a multimedia/ interactive item, or an installation, or a virtual environment.

Summary

'The Reflective Practitioner',
D. Schön, Jossey-Bass, 1991,
and
'Educating the Reflective
Practitioner', D. Schön,
Jossey-Bass, 1987

'knowing-in-action' -
"the sorts of knowledge we
reveal in our intelligent action,
publicly observable / physical
performances and private
operations .... spontaneous
skilful execution ....
constructions .... explicit,
symbolic form from tacit,
spontaneous intelligence ....
dynamic quality."
(Schön)

'reflection-in-action' -
"constructionist's view ....
thinking reshapes action while
we are doing it ....
improvisation, conversation."
(Schön)

'knowing-in-action' and
'reflection-in-action' -
"a process we can deliver
without being able to say what
we are doing .... "
"reflect on 'reflection-in-
action' - verbal description ....
reflect on the verbal
description .... intentional
feedback."
(Schön)

The key characteristics of these emerging procedural approaches seem to be that they are:

• **practice-led**, involving the practitioner as researcher, who reflects-in-action and reflects-on-action

• **interdisciplinary**, demonstrating a willingness to examine other fields and make sensible connections and adaptations

• **holistic** and **contextual** (non linear and inclusive)

• using **varied visual and multimedia methods** of information gathering, selection, analysis, synthesis, presentation / communication, and although the material can be structured around a 'linear' argument (if necessary), it can be accessed in a non-linear way.

There are, no doubt, other very good examples of researchers who have been brave enough to take some risks with methodological approaches, and we as supervisors and examiners should recognise and reward that daring.

Part 2 - A Wider Context: Paradigms of Inquiry

So far we have concentrated on the visual arts, but now we want to explore a broader picture of modes of inquiry. It is necessary to look back in order to go forward. If we have some dissatisfaction with existing methodologies, we need to try to understand them in order to invent other approaches. In an effort to put into context 'artistic' research procedures, we have tried to develop a visual 'map' (Gray & Malins, 1993) attempting to characterise existing and developing paradigms of inquiry. We acknowledge that this 'map' is simply a starting point and needs developing through further debate.

C. Gray & J. Malins, 'Research Procedures / Methodologies for Artists & Designers', 1993 - sections 2 - 6. (See also 'visual map' p.4 in re-issued paper)

RESEARCH PROCEDURES / METHODOLOGIES

© Carole Gray, 1993

The methodology of 'Newtonian' science basically remained unchallenged for three hundred years, as the most 'reliable' way of generating knowledge and explaining natural phenomena. It personifies the positivist paradigm of inquiry.

Most of 20th century inquiry might be characterised by adherence to a post-positivist paradigm, in that many of the classical tenets of inquiry have been (and are being) challenged, in all disciplines. This is not only evident in science, but also in social science, especially in 'new paradigm research' (Guba, 1990), where critical theory and the constructivist paradigm currently holds sway. (See diagram 3 - Paradigms of Inquiry - p. 12)

To understand and articulate procedure in any mode of inquiry, we must take into consideration the starting points that determine what inquiry is and how it should be practised. Guba's work provides us with a useful framework. If we can articulate our 'ontology' (the nature of reality, the 'knowable' in Art & Design), describe our 'epistemology' (the nature of the relationship between the inquirer and the 'knowable', e.g. objective or subjective, etc), we are more likely to be able to propose the most appropriate kinds of 'methodologies' for inquiry in Art & Design, and characterise an 'artistic' paradigm of inquiry.

Positivism - realist ontology; prediction and control; consensuality and consensibility; objectivity; empirical experimentalism. Explanation. (Guba)
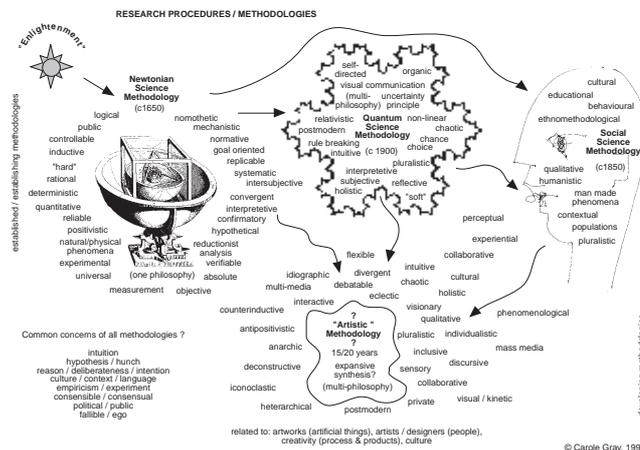
Post-positivism - reality remains a central concept, acknowledgement of the impossiblity to truly perceive it; critical stance important; absurdity of complete objectivity; acknowledgement of interaction of inquirer and subject of inquiry; there is no indisputable foundation for knowledge, knowledge is in principle uncertain and contingent; methodology is historically situated and evolving - it changes over time; continual revision, adjustment. Multi-methodology - critical multiplism. (Guba)

The Paradigm Dialog', E. Guba (ed.), Sage, 1990

Critical theory - ideologically oriented inquiry (e.g. neo-Marxism, feminism, materialism, etc.); inquiry as a political act, to empower, to raise consciousness, facilitate transformation. (Guba)

Constructivism - realities exist in people's minds as personal constructs; relative, contextual; subjectivist position, subjective interaction; interpretation of individual constructs; compare, contrast, confront - come to terms with; reconstructs the world in the minds of the constructors. Understanding. (Guba)

*Diagram 3 -
Paradigms of Inquiry*

Paradigms of Inquiry

	Positivism	Postpositivism	Critical Theory	Constructivism	? Artistic ?
ONTOLOGY (the nature of reality, the 'knowable')	**Realist** - reality exists 'out there' and is driven by immutable natural laws and mechanisms. Knowledge of these entities, laws and mechanisms is conventionally summarised in the form of time- and context- free generalizations. Some of these latter generalizations take the form of cause-effect laws.	**Critical realist** - reality exists but can never be fully apprehended. It is driven by natural laws that can only be incompletely understood.	**Critical realist** - reality exists but can never be fully apprehended. It is driven by natural laws that can only be incompletely understood.	**Relativist** - realities exist in the form of multiple mental constructions, socially and experientially based, local and specific, dependent for their form and content on the persons who hold them.	
EPISTEMOLOGY nature of relationship between inquirer and the 'knowable'	**Dualist / objectivist** - it is both possible and essential for the inquirer to adopt a distant, noninteractive posture. Values and other biasing and confounding factors are thereby automatically excluded from influencing the outcomes.	**Modified objectivist** - objectivity remains a regulatory ideal, but it can only be approximated, with special emphasis placed on external guardians such as the critical tradition and the critical community.	**Subjectivist** - in the sense that values mediate inquiry.	**Subjectivist** - inquirer and inquired are fused into a single (monistic) entity. Findings are literally the creation of the process of interaction between the two.	
METHODOLOGY How should the inquirer go about finding out knowledge?	**Experimental / manipulative** - questions and/or hypotheses are stated in advance in propositional form and subjected to empirical tests (falsification) under carefully controlled conditions.	**Modified experimental / manipulative** - emphasise critical multiplism. Redress imbalances by doing inquiry in more natural settings, using more qualitative methods, depending more on grounded theory, and reintroducing discovery into the enquiry process.	**Dialogic, transformative** - eliminate false consciousness and energize and facilitate transformation.	**Hermeneutic, dialectic** - individual constructions are elicited and refined hermeneutically, and compared and contrasted dialectically, with the aim of generating one (or a few) constructions on which there is substantial consensus.	

(source: 'The Paradigm Dialog', E. G. Guba (ed.), 1990, pp 18 - 27 - relating to Social Sciences. Adapted by Gray.)

New Scientific Paradigms

'Complexity: the emerging science at the edge of order and chaos', M.M. Waldrop, Penguin, 1994 (first pub. 1992)

Over the last ten years even scientific researchers (especially at the Santa Fe Institute in New Mexico) began to sense that old reductionist approaches were no longer tenable, and that mathematical abstractions ignored the complexities of the real world (Waldrop, 1994).

The study of complexity as a phenomenon has brought Science closer than ever to Art, closer since than perhaps the Renaissance. Knowledge has gone through a cycle – from non-specialism to specialism and compartmentalisation, and now back to interdisciplinarity. Researchers in Art & Design now have the opportunity of sharing with researchers in other disciplines their own research perspectives.

Chaos theory -
"... in essence, that very simple dynamical rules can give rise to extraordinarily intricate, surprising and essentially unpredictable behaviour." i.e. fractals, turbulence, weather, etc.
(Waldrop)

Complex, self-organizing systems *are adaptive and opportunistic, "possessing a kind of peculiar dynamism" - they are spontaneous, disorderly, alive. Not in equilibrium, always unfolding, in transition... "Systems composed of many 'agents' ... constantly organising and reorganising themselves into larger structures through the clash of mutual accommodation and rivalry... new emergent structures ... engage in new emergent behaviours. Complexity ... a science of emergence".*
(Waldrop)

Edge of Chaos -
"... where system components never quite lock into place, never quite dissolve into turbulence; where new ideas and innovation nibble away at the edges of the status quo; constantly shifting battle zone between stagnation and anarchy".

order > complexity > chaos
    (phase transition)

(Waldrop)

With the emergence of **Chaos** theory and attempts to understand **Complex Systems** (e.g. weather, stock market, ecosystems, socio-political systems, cultural systems) scientific researchers acknowledged that new ways of thinking must be applied to complex phenomena, that new methodologies must be developed which were capable of handling changing, complex data. The importance of new technologies in this task was crucial. The emergence of chaos and complexity theories was co-incident with the development of high powered computers, capable of handling many variables, enabling for example the creation of virtual environments, simulations, the visual examination of pattern behaviour, and the ability for simultaneous evaluation and analysis.

Dynamic systems appear to bring order and chaos into a special kind of balance - a balance point called the Edge of Chaos. This idea between complexity and phase transitions has so far only been demonstrated in cellular automata. Whether it applies in the real world is as yet unclear; recent political and economic events e.g. the collapse of the Soviet Union, dramatic fluctuations in global economies, suggest that large complex dynamic systems, in order to survive, must remain in a perpetual state of balance and feedback i.e. on the Edge of Chaos.

It is clear now that such systems are not sustainable if they resist change, become too 'locked-in', or are too rigidly controlled. On the other hand, lack of any structure and direction cancels out the notion of system, and becomes completely counterproductive. Successful systems must be evolutionary – responsive to feedback, change and new conditions.

> "*Instead of relying on the Newtonian metaphor of clockwork predictability, complexity seems to be based on metaphors more closely akin to the growth of a plant from a tiny seed ... or perhaps even the organic, rhythmical, self-organizing patterns created by flocking birds or shoals of fish.*"

(Waldrop, 1994).

Disciplines like economics (which traditionally have adopted a neoclassical framework) have recently been reviewed in terms of complexity (Brian Arthur, in Waldrop, 1994). Complexity can also be looked at in philosophical and in theological terms: Richard Lewontin (the geneticist) identified two philosophical stances that a scientist might adopt: **Platonist** and **Heraclitus**. In theological terms we might consider the Newtonian perspective as essentially a 'Christian' one, especially Protestantism (we rely on God for order); whereas complexity seems essentially 'Taoist' (no inherent order, vast, amorphous, everchanging, patterns that change, re-arrange, never repeat exactly). It seems that the 'artistic' stance has a great deal in common with the Heraclitian and Taoist philosophies.

Many of the ideas in complexity research - messiness, randomness, non-linearity, adaptivity, feedback, and so on seem familiar to artistic ears, have some resonance in designer's minds. Some scientists (Kaufmann, Farmer, etc) suggest that many of the ideas in complexity research might extend beyond science and be applicable to cultural dynamics. Are the processes and practices of Art & Design complex, adaptive systems on the edge of chaos? If so, what are the implications for research procedures?

Platonist - who prefers the world in basic equilibrium, and whose task it is to restore equilibrium

Heraclitus - who acknowledges that the world is in flow and change - 'you can never step into the same river twice' - it is fluid everchanging, alive.

Paradigms of Practice

Ref. Appendix 1

Our initial paper (in: *'Principles and Definitions', 1993*) did try to set out the characteristics of general methodologies in Design and Fine Art **practice**, and relate these to the processes of creativity and the scientific method. One might say that artists (probably many sculptors) in the 20th Century have been preoccupied, if not obsessed, by process, by procedure, as opposed to product. There are many examples of artworks which demonstrate an openness of procedure, a kind of 'methodological' transparency, an accessibility - works which reveal their own development and making, and acknowledge the impact of serendipity (Watson, 1992) and external context. Some 'artistic' methodologies (in Fine Art at least) are revealed in these works. These artists have placed as much emphasis on process, on methodology, as on product. This has brought a

'An Exploration of the Principle of Chance in the Creative Activity known as Sculpture', Ph.D, The Robert Gordon University, 1992

certain objectivity, transparency, and demystification to the work, and in our view has enhanced their power to communication, and given us an insight in to the research procedures of practice

At a similar point in the 20th Century, Designers who are dissatisfied with the now largely discredited rigid 'design methods' are also looking to process, context and user-involvement in a holistic approach to the design process. A new focus and redefinition of 'Design' is currently taking place. This shifting emphasis requires the designer to adopt a substantially different role and moves the preoccupation with the 'tangible' physical object (form, line, structure, geometry) as the means of providing the 'correct' solution, to the context and environment of the 'user' to the 'intangible' of (feelings, perception, culture, experience).

This convergence of interests between Artists and Designers could perhaps lead to new developments in research methods as a result of collaborative research practice.

New Cultural Paradigms

The notion of interdisciplinarity is completely appropriate in the current cultural context, where in the arts, architecture, aesthetics, and philosophy the issues of fragmentation, boundary breaking, pastiche, collage, and reference characterise 'Postmodernism'. In social, economic, and political structures 'Postmodernity' is characterised by challenges on ownership and authorship, authority, centralisation - exemplified by the collapse of monolithic systems i.e. the Soviet Union. The impact of new technology on global communication, mass media, interactivity, and its central role in gaining an understanding of complex phenomena, shows us sometimes only too graphically that the world is not a stable, rigid system. The system is constantly evolving and changing the way in which we interact with our environment and surroundings.

We construct and manipulate our own reality. Science no longer has, if it ever had, the authority to be the sole source of reliable knowledge - Newtonian certainty has given way to falsificationism, uncertainty, possibility.

New Paradigms in 'Artistic' Research?

In what ways are all these ideas useful to us in developing formal 'artistic' research procedures?

- We might develop 'artistic' research procedures directly out of practice; this after all is our position of strength. We can use in research some of our own procedures of practice. We know the value of the 'reflective practicum' - our phenomenology of practice - reflection on the reflection-in-action of practice (Schön, 1987), where we confront the challenges of real world practice, where situations are not well-formed structures, but messy and indeterminate; in a word they are complex. We could adopt a constructionist perspective - after all we frame and shape our own worlds, and invent procedures for inquiry. The value of this to formal research is in our active awareness of the process and the deliberateness and explicitness of the procedure.

- We might make use of Guba's framework (ontology, epistemology, methodology) to try to elucidate 'artistic' inquiry. We might adopt and/or adapt some of the characteristics of Constructivism as a paradigm of inquiry, as we already can relate to these ideas through practice.

- We might consider the visual arts as a complex system, balanced on the 'edge of chaos', adapting, opportunistic, dynamic, spontaneous, unfolding, disorderly, alive - a system characterised by perpetual novelty. If so, we might adopt a general research strategy which complements this, which is non-linear.

Conclusion

Simplistically, we see three influences on the development of 'artistic' research procedure:
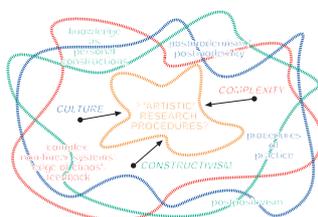
see next page for full-scale version

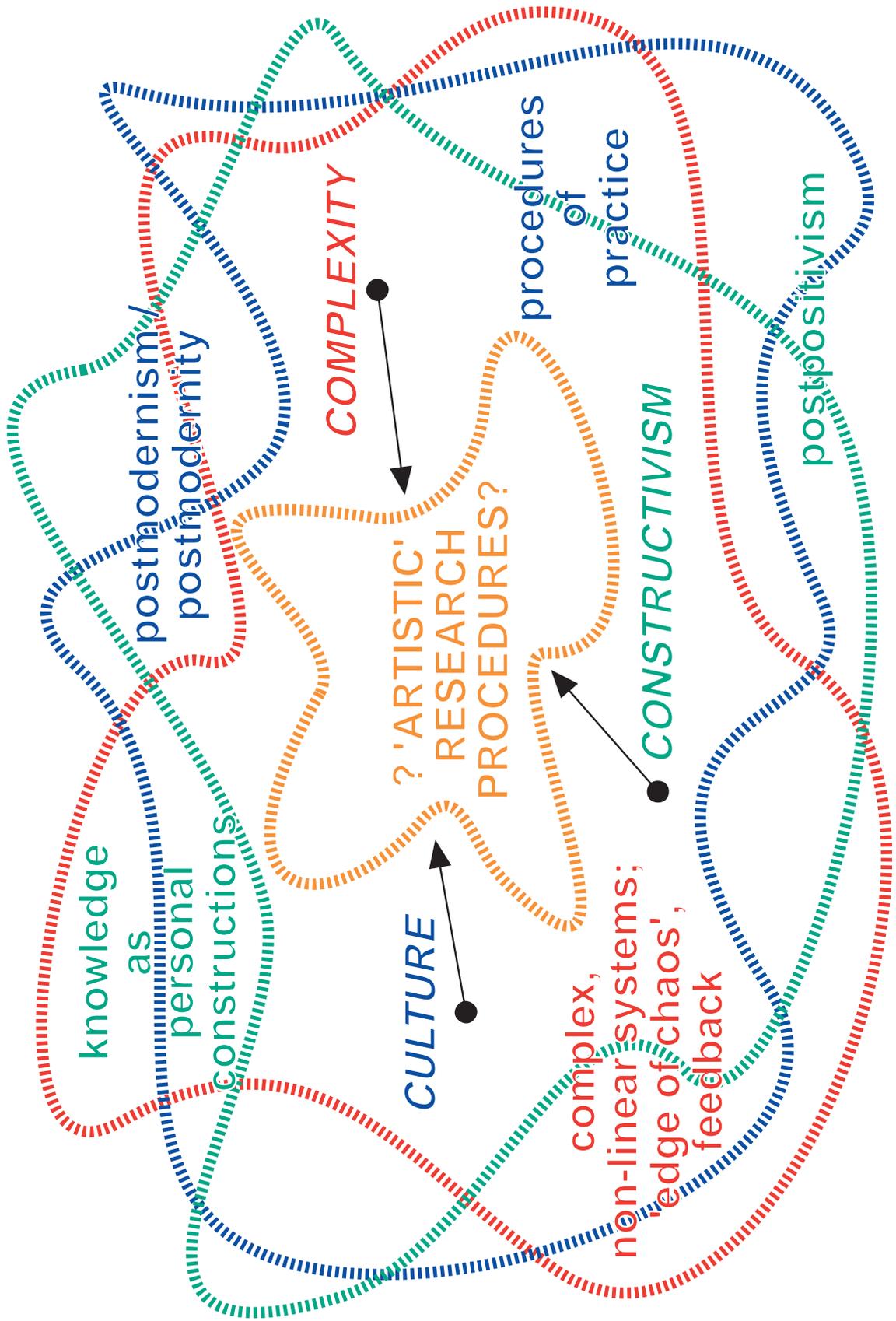|	
Culture	predominantly postmodernist, embracing 'artistic' practices and procedures, and with which Artists & Designers are familiar
Complexity	as the pervasive state of things, acknowledging non-linearity, dynamic systems, change, uncertainty
Constructivism	(in the Social Sciences) **-** as the closest appropriate paradigm of inquiry to research in Art & Design, from which we could build.

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Context for the development of 'artistic research procedures'

COMPLEXITY

procedures of practice

postmodernism/ postmodernity

post-positivism

? 'ARTISTIC' RESEARCH PROCEDURES?

CONSTRUCTIVISM

knowledge as personal constructions

CULTURE

complex, non-linear systems; 'edge of chaos', feedback

These are 'big' influences and ideas, but we believe that specific procedural techniques ('methods') can only be developed in response to this wider context of inquiry, as well as the particular research project. Researchers cannot afford to take a narrow view, for if they do they run the risk of developing research procedures which are completely esoteric, hermetic, and irrelevant outside the specific context of the research project. Recent developments in 'artistic' procedures (as outlined previously) could be used as the basis for developing new 'hybrids' appropriate to specific project needs. New media technologies enable the development of such 'synthetics' in a way which previously was not possible.

What is required is an attitude shift - our research is not scientific, nor does it wish to be. It is 'artistic'. It is research by Artists and Designers, into, through, and for the development of Art & Design research as a discipline. Perhaps *we* do not need convincing of this - we all would recognise the strategies for operating in a complex world. We have enough experience, and confidence in this to put forward our own research procedures; these procedures, comprising specific research techniques, are rooted in practice and in the philosophies and theories of Art & Design.

We have no wish to ignore the raft of existing scientific and Social Science methods - indeed many can be appropriately used. Social researchers called themselves social 'scientists', adopting and adapting some of the methodologies of science: although they made a great step forward in advancing research in their fields, in our opinion they have not gone far enough. We must be brave enough to propose, use and validate our own procedures, or else our research will never be released from the grip of the 'scientific method', and will never be a powerful mode of disciplined inquiry.

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Appendix 1

Some examples of 20thC Artists who have externalised their working methodologies - *(ref. pages 14 - 15)*

Picasso, Tatlin - *use of real materials in real space, <u>revealing their making</u>;* ***Gabo*** *- interest in engineering, natural inclination to use <u>drawing</u> and <u>experiments</u> with materials <u>to explore</u> positive & negative space; similarity to mathematical models; Science and Art fused through methodology (coincident with the development of Quantum Theory)*

Arp, Duchamp *- use of <u>chance</u> and Dadaist notions of <u>anti-method</u> (Heisenberg's Uncertainty Principle)*

K. Martin *- <u>chance</u> and <u>order</u> <u>series</u> (and other <u>Systems</u> artists - Tebby, Hughes, Kidner, Ernest, Steele, etc.) - use of <u>rules</u> and mathematics, <u>process</u> as important as product*

LeWitt *- <u>serial</u> art, <u>systems of drawing</u> which could be <u>carried out by others</u>;* ***Judd*** *- factory fabricated, necessitated clear drawings and instructions, <u>open</u> and <u>transferable</u> <u>methodolog</u>*

Christo, Long, Nash, Goldsworthy *- <u>process</u>, event, <u>time-based</u>, ephemeral, <u>documentation</u> essential*

Woodrow *- inventive process, <u>self-revealing method of making</u>;* ***Deacon*** *- use of fixings as functional and decorative, <u>not hidden</u>, refers to himself as a 'fabricator', enjoyment of <u>revealing</u> fabrication <u>method</u>*

Whiteread *- literally <u>externalised</u> internal and unperceived spaces (as in 'House'), <u>procedure as important as product</u>; in fact product destroyed!*

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