CREATIVITY AND THE DESIGN PROCESS

C.T.J. DE BEER

Study project presented in partial fulfillment of the requirements for the degree of Master of Arts in Fine Arts at the University of Stellenbosch, February 1993.

Supervised by Victor Honey and Dieter Dill.
I, the undersigned, hereby declare that the work contained in this study project is my own original work and has not previously been submitted, entirely or in part, at any other university for a degree.

Acknowledgement

I hereby acknowledge and apologise for the way that I have neglected my family and friends during the last seven years.
SUMMARY

In order to examine the role of creativity in the design process, design was defined as creative problem-solving. Problem-solving was defined using a model of Koberg and Bagnall (1974). They divided the problem-solving process into various stages. These stages being acceptance, analysis, definition, ideation, selection, implementation and evaluation.

Creativity was defined regarding the levels of creativity, as proposed by Taylor (1968), and regarding the nature of the product as discussed by several authors. The emphasis being on the creative product being original and appropriate.

Some of the factors that are considered to affect creativity were examined. These factors being blocks, chance, the need to explore and relevant skills i.e. practical and intellectual. In looking at intellectual skills the difference between convergent and divergent thinking was examined. The importance of divergent thinking was stressed.

The various phases that the creative process passes through was then defined. The phases defined were interest, preparation, incubation, illumination, and verification.

I then discussed the link between creativity and problem-solving as I see it.
My practical work was discussed in two ways. Firstly a documentation regarding the development of the oval shaped jewellery that I’ve made, followed by an analysis of a journal (diary) that I’d kept, recording my creative problem-solving process. This process was analysed using the models of problem-solving and creativity as discussed previously.

The conclusion arrived at stressed the importance of divergent thinking in creative problem-solving. It was also noted how difficult it was to separate the different phases of the creative and the problem-solving processes.
Ten einde die rol wat kreatiwiteit in die ontwerpsproses te kon ondersoek was ontwerp gedefinieer as kreatiewe probleem oplossing. ’n Model van Koberg en Bagnall (1974) is gebruik om die probleemoplossings-proses te definieer. Hulle het die proses wat ’n mens volg tydens probleemoplossing in verskeie fases verdeel nl. aanvaarding, analise, definisie, ideevorming, seleksie, implementering en evaluasie.

Kreatiwiteit is gedefinieer volgens die vlakke van kreatiwiteit soos voorgestel deur Taylor (1968), en ook na aanleiding van die kwaliteit van die kreatiewe produk nl. oorspronklik en toepaslikheid.

Faktore wat beskou word as invloede kreatiwiteit is ook ondersoek. Versperrings, toevalligheid, die drang vir eksplorasie en relevante vaardighede nl. prakties en intellektueel word as sulke faktore beskou. In terme van intellektuele vaardighede was die verskil tussen konvergente en divergente denke ondersoek. Die belangrikheid van divergente denke is beklemtoon.

Verskeie voorgestelde fases waardeur die kreatiewe proses gaan was ook gedefinieer nl. belangstelling, voorbereiding, inkubasie, illuminasie en verifikasie.

My praktiese werk was op twee maniere bespreek. Eerstens het ek die ontwikkeling van my ovaalvormige juweliersware gedokumenteer. Ek het ook ’n joernal (dagboek) van my ontwerpsproses gehou en
dit is ook ge-analiseer. Vir die analise het ek verwys na die modelle van kreatiwiteit en probleemoplossing soos reeds bespreek.

Ten einde was die belangrikheid van divergente denke in kreatiewe probleemoplossing beklemtoon. Daar was ook melding gemaak van hoe moeilik dit is om die fases van die verskeie prosesse van mekaar te skei.
CONTENTS

1. INTRODUCTION 1

2. THE PROBLEM-SOLVING PROCESS 4

   2.1 acceptance 6
   2.2 analysis (dissection) 8
   2.3 definition 9
   2.4 ideation 12
   2.5 selection 13
   2.6 implementation 14
   2.7 evaluation 14

3. Summary 16

4. CREATIVITY 17

   Introduction 17

   4.1. Levels (towards a definition) 18

   4.1.1. expressive 18
   4.1.2. productive 19
   4.1.3. inventive 19
   4.1.4. innovative 19
   4.1.5. emergentive 21

   4.2. Definition 21

   4.2.1. the product 21
   4.2.2. original 22
   4.2.3. useful 23
4.3. Factors that affect creativity

4.3.1. blocks

4.3.2. chance

4.3.3. The need to explore

4.3.4. Skills

4.3.4.1. Practical skills

4.3.4.2. Conceptual/intellectual skills

4.3.4.2.1. Convergent thinking

4.3.4.2.2. Divergent thinking

4.3.4.2.2.1. Idea fluency

4.3.4.2.2.2. Flexibility

4.3.4.2.2.2.1. analogous thinking

4.3.4.2.2.2.2. redefinition

4.3.4.2.2.3. Originality

4.4. The Creative Process

4.4.1. Interest

4.4.2. Preparation

4.4.3. Incubation

4.4.4. Illumination

4.4.5. Verification

The link between creativity and problem-solving

5. PRACTICAL WORK

introduction

5.1. THREADS
printmaking 54
sandcasting 56
decorative motifs 57
enamelling 58
pressmoulding 59
casting 63
ceramics 64
found objects 70

5.2. DEVELOPMENT OF OVAL SHAPE 73
shape 74
texture 79
flatness 87
wearability 97
brooches 97
earrings 98

6. ANALYSIS OF THE CREATIVE PROBLEM-SOLVING PROCESS 103

7. ANALYSIS OF THE PROBLEM-SOLVING PROCESS 106

8. JOURNAL 111
   Introduction 111
   skills 111
   blocks 112
   phases 112
9. NOTES

10. CONCLUSION

11. REFERENCES

12. BIBLIOGRAPHY
1. INTRODUCTION

"Design can be defined as the process of creative problem-solving." [1]

Firstly I will examine problem-solving and then creativity. The aim being an attempt to isolate the factors that add a creative quality to problem-solving.

PROBLEM-SOLVING

Problem-solving can be defined as the resolution of any tension that one may experience. I will consider the existence of an inadequate product to be the cause of such tension.

Problem-solving will be discussed in terms of the different phases or stages that the alleviation of tension passes through, from the first awareness of a problem to the final resolution thereof.

The ultimate aim of problem-solving will be assumed to be the establishing of a product.
CREATIVITY

According to Best (1985) one can only determine whether creativity has taken place by examining the product of the creative process [2]. So I will look at the nature of the created product and the creative process as well.

Creativity will be discussed as the ability to generate original solutions to problems. Even though the insistence is on solutions being original, it is also important, according to Mednick (1964), that these solutions "meet specified requirements or are in some way useful".[3]

I will also discuss the various phases that the process of being creative passes through as discussed by Olivier (1985).

OWN WORK

In an analysis of my own work I will attempt to isolate the problem-solving process and I will also try to highlight aspects that might be considered to give my design process its creative quality.

In this analysis of my work I will also discuss the link between creativity and problem-solving as I perceive it.
Throughout this document I will refer to my own work and aspects of it that I feel illustrate the various concepts that are discussed.
2. THE PROBLEM-SOLVING PROCESS

A definition by Behrens (1984) states that design is

"anything that is arranged, constructed, or organised with some intent or goal in mind. Anything that is purposely done can be said to be designed". [4]

For the purpose of this discussion it is important to realise that to make anything on purpose necessitates the making of decisions, even if it is only to pick up a pencil. The assumption is that in making decisions one is involved with solving problems.

According to Bagnall and Koberg [1973] there is a basic process that one follows in problem solving, regardless of what the problem is. By "process" they do not mean a recipe that one follows slavishly. What is meant is that one passes through various frames of mind on the way to the solution (being a product). The frames of mind that I have recognised when I am involved in the process of solving problems vary from discontent, to expectant, to questioning, to frustration, to perseverance, to critical, to satisfied, and not necessarily in that order.
Or as Bagnall and Koberg (1973) describe it,

"... a series or sequence of events, stages, phases ..." [5]

The steps of the process as identified by them [6], are as follows:

2.1. ACCEPTANCE: where one finds a way of convincing oneself of the merits of pursuing the problem.

2.2. ANALYSIS: the stage where one analyzes the scope of the problem to be solved.

2.3. DEFINITION: the act of defining what one believes the actual problem to be.

2.4. IDEATION: during this phase one comes up with various suggestions (ideas) for solving the problem.

2.5. SELECTION: one then selects what one considers to be the appropriate solution.

2.6. IMPLEMENTATION: this refers to the execution of the supposed solution.

2.7. EVALUATION: one then decides whether the solution is adequate.
An important aspect of these steps, or stages, that can be seen in the analysis of my own design process is that they are not necessarily formal steps that are taken after careful deliberation (see 24.11.91 in the journal ["Too implies...etc."]) 

DISCONTENT

Bagnall and Koberg (1974) regard discontent as a "prerequisite to problem-solving" and constructive discontent as one of the "keys to creativity" [7]. Although discontent is considered a prerequisite for the problem-solving process, it does not necessarily initiate the process. One could just accept the situation without doing anything about it. This is why I consider acceptance, the next stage, to be a necessary and recognisable phase of the problem-solving process.

2.1 ACCEPTANCE

According to Bagnall and Koberg, acceptance is what happens when one decides to do something about a problem and they suggest that it could take place

2.1.1 subconsciously, or

2.1.2. consciously.
2.1.1 Subconscious acceptance, as I understand it, can be recognised as having happened just before one sets about solving the problem. On what might seem a very superficial level, it could be compared to the feeling/thought that one has just before one scratches an itch!

Even though it is a seemingly superficial comparison, this example could be extended to illustrate what I mean by problem-solving. Say, for example, that the itch was in the middle of one’s back and that one was carrying a tray full of glasses. The whole problem-solving process would become a lot more conscious with all sorts of options, such as rubbing against doorknobs and corners of cupboards, considered as possible solutions to the problem.

Subconscious acceptance, as I have experienced it, is not limited to problems like itches, it also precedes design problems. (see 24.11.91 in the journal)

2.1.2. Conscious or formal acceptance seems to me to be synonymous with the statement/question, "Is this my problem?". One would consider how the problem is affecting one. Reaching the conclusion that it is one’s problem and that it would be beneficial to one to solve it implies that one has "accepted" the problem.[8]
2.2. ANALYSIS

Bagnall and Koberg (1974) suggest that this is the phase where one analyses the nature of the problem. In the context of problem solving, analysis could be considered synonymous with dissection.

Dissection means taking apart and examining. This is exactly what I have found this stage of the problem-solving process to be concerned with. It is concerned with finding out what the problem consists of. I can recognise this phase occurring during my own problem-solving process by virtue of the fact that I am asking questions regarding the nature of the problem.

For examples of questions asked during my design process see p.131 (11.11.91).

Asking relevant questions will broaden one’s understanding of the problem. The type of question could play a big role in determining whether one would generate a creative solution or not. Take note of the exploratory/open-ended question "What...if...?" as opposed to the more directed questions such as "Where...?".

Questions will allow one to progress to the next phase which is the exact defining of the problem. [10]
2.3. DEFINITION

Bagnall and Koberg (1974) regard this as the phase where one reaches an understanding of the problem i.e. one defines what one understands the problem to be at that particular point of the problem-solving process. This does not always imply that one formulates the definition in one’s head or that one writes it down. I have often found it to be a realisation that flickers across one’s mind.

I feel that it is important to realise that the taking of an action is always preceded by definition of what one believes the problem to be and what one believes to be the most appropriate solution, regarding the circumstances.

To use the example of the itch again, as soon as one realises what the discomforting sensation is, one scratches. As mentioned before [p.6] this is not necessarily a conscious step that one takes i.e. one need not formally define a problem before solving it.

One’s definition of the problem can change later on in the problem-solving process. Particularly if new aspects of the problem are brought to light during the phases that follow.

If the problem (as defined) is not solved, it may necessitate, amongst other things, a redefinition of the problem. The ability
to redefine is considered by Kettner, Guildford, and Christenson (1959) to be related to creative thinking.

To be creative, I feel, is to realise that one does not have to stick to the realisation (definition) that one has come to. One could set out to deliberately redefine the problem (p.39). Precise definition of the problem could aid in the steps to follow, specifically ideation and selection. Using my cast earring attachments [p.106] as example:

1. I need to attach the hook to the oval.

2. I need to make a link between the hook and the oval.

3. I need to mass produce a fitting that can attach to the disc shape on one side and to a shepherds hook on the other. It must attach firmly to the disc, allowing it to move within the attachment, if desired, and must make the disc lie in the same plane as the ear. It must be mass producable i.e. I must be able to make a rubber mould of it. The shape of it must complement the oval shaped discs that I have been producing.

Looking at these definitions it is obvious to me that the last one will lead to a solution the soonest. However, in terms of creativity, it must be noted that the first two, being more open ended, could lead to more divergent solutions being generated. (see 4.3.4.2.2. for a discussion of divergent thinking)
On analysing the journal I noted two factors that influenced my ability to define the problem I wished to solve. The one was the extent of the dissection that preceded definition. [p.119 in the journal] The other factor was the relevant experience that I’d had before the problem was encountered.

I have found experience to influence definition both positively and negatively. On the positive side it allowed for analogies to be drawn [journal 16.11.91]. On the negative side it prevented divergent definitions in that it presented me with preconceptions and stereotypes to work with. Adams (1976) considers the ability to be original, which is crucial to creativity, to be hampered by such preconceptions and stereotypes.[11]

2.3.1. Sub problems

A phenomenon that is found in this phase (definition) and that is of particular significance in my design process is that of sub-problems. In trying to define a problem one often encounters preconditions that have to be met before a problem can be solved. These pre-conditions would be considered sub-problems. Sometimes a problem consists only of what seems to be sub-problems in that as soon as the sub-problems are resolved the problem is solved.

An example of such sub-problems can be seen in the development of my oval shaped earrings and brooches [p.77-107]. The sub-
problems in this case being; an acceptable shape, the texture, the motifs, dimensionality i.e. flatness, and wearability.

The sub-problems could also have sub-problems, making these sub-sub-problems. For example, regarding the flatness of the oval discs, a sub-problem was how to twist the discs [p.100].

Having defined the problem the next step would be the generation of a solution.

2.4. IDEATION

I have found that design students tend to consider this stage to be synonymous with creativity. In fact, this is considered, by Bagnall and Koberg (1974), to be the stage where one generates possible solutions to the problem as it has been defined.[12]

The emphasis here is on the generation of the ideas. The amount of ideas generated would be influenced by one’s flexibility [4.3.4.2.2.2.] and the ease with which these ideas are produced would be influenced by one’s fluency [4.3.4.2.2.1.].

There are many specific techniques for the generation of ideas. These are discussed extensively by Bagnall and Koberg in "The Universal Traveller".
A technique used extensively by me is analogous thinking. For an explanation of this technique see 4.3.2.2.2.2.2.1. Some instances of analogous thinking in use can be seen in the journal 19.11.91 and 16.11.91.

As explained (4.3.4.2.2.2.1.), analogous thinking is a mode of divergent thinking. This means that this phase (ideation) could be where the problem-solving process can obtain its creative qualities because divergent thinking is considered to be "an essential ingredient of creativity ".[13]

2.5. SELECTION

If, during the ideation phase, one had only one idea, then selection would not be a problem. However, if there are two or more ideas, then one would need to decide which one to choose. A very precise definition of the problem would facilitate selection.

Compare:-

Everything is getting wet!
How do I stop the water from coming in?
What can I put under the door to prevent the water from coming in?
Where does the water come from?

For an example of selection and how a more precise definition aided such selection see the journal 26.11.91 [p.152]. See also 2.3.

2.6. IMPLEMENTATION

Bagnall and Koberg (1974) suggest that after having selected what one considers to be the best idea, one would then implement it. They state that this is the stage where a specific action takes place. The way that I understand this phase and to use the "itch" example again, implementation would be when one scratches.

I have found this phase to be where one becomes aware of sub-problems. (see 2.3.1.)

2.7. EVALUATION

Having scratched the itch, one then decides whether one has scratched enough, whether one has scratched in the right place, whether one should have scratched? In other words, at the end of the problem-solving process, to refer to Bagnall and Koberg (1974), one evaluates the adequacy of the solution.

An example of evaluation taking place can be found in the journal on 24.11.91 p.147. Amongst others, the use of the word 'too', as
in 'too big', 'too flat' indicates, to me, that I am evaluating a product.

I have found the result of such evaluation to be that one starts all over again because the solution was not satisfactory or that one can go forward to face the next problem that might arise.

Bagnall and Koberg (1974) feel that, in the former case, it might not be necessary to start at the beginning (ACCEPTANCE). It might only be necessary to go back one or two stages eg. to ideation - because there were not enough ideas to choose from - or selection - because one had selected an inappropriate option i.e. use the other hand, because this one did not reach (regarding the "itch").

This raises an important issue as far as the progress of the whole problem-solving process is concerned. It is not necessarily a linear step-by-step process that leads to a solution in the minimum amount of steps i.e. 8. From my experience, it seems to be a constant scurrying about from one step to the next and back again. This should be borne out by inspection of the JOURNAL and noting the steps leading to a solution i.e. a product.
3. SUMMARY

Having examined the problem-solving process I pointed out the various stages that it is thought, by Bagnall and Koberg (1974) to pass through. These being discontent, acceptance, analysis, definition, ideation, selection, implementation, and evaluation.

I also pointed out some ways in which the problem-solving process can result in a creative product. This centres mostly around employing divergent thinking in the definition and ideation phases.

Constructive discontent as a starting point for the design process could also contribute to the possibility of generating a creative product.
4. CREATIVITY

INTRODUCTION

I will discuss creativity as a quality of problem-solving. In other words, as mentioned before problem-solving can be regarded as resulting in a product. A conclusion that I have come to on examining the products that I produce is that, depending on the creativity involved in the problem-solving process, the originality and appropriateness of the product will vary. Originality and appropriateness being the measure of creativity according to Bishop and Chace (1971). [14]

4.1. Firstly I will examine the types of creativity as defined by Taylor (1959).

4.2. Then I will define creativity in relation to the quality of the product. This definition will revolve around 4.2.1. the product 4.2.2. its originality and 4.2.3. its usefulness or relevance.

4.3. I will also focus on aspects of creativity that I have come to recognise in my design process. These are the factors that I have found to affect my creativity.

4.4. I will then discuss the stages that the creative process is said to go through and aspects of these stages.
4.1. TOWARDS A DEFINITION

To facilitate an explanation of what I consider creativity to be, it would be helpful to discuss an analysis done by Irving Taylor (1959). He examined one hundred definitions of creativity and on analyzing them, he proposed a division of creative thinking into five levels. They were:

4.1.1. Expressive
4.1.2. Productive
4.1.3. Inventive
4.1.4. Innovative
4.1.5. Emergentive

[15]

4.1.1. EXPRESSIVE

To Taylor, creativity on an expressive level is concerned with "independent expression where skills, originality, and the quality of the product are unimportant"[15]

To him, this is the level where free play happens.

4.1.2. PRODUCTIVE

On this level, creativity is characterised by the fact that play is restricted and controlled. Another characteristic of
4.1.2. PRODUCTIVE

On this level, creativity is characterised by the fact that play is restricted and controlled. Another characteristic of productive creativity is the fact that technique starts playing an important role. Examples of what Radford and Burton feel could be productively creative are

"...games, routine arts & crafts, domestic skills such as cooking..." [15]

4.1.3. INVENTIVE

A characteristic of this level is flexibility when one perceives

"new and unusual relationships between previously separated parts". [15]

It is at this level that one comes up with a new way of doing something or invents a new tool or gadget. It is also the level that produces art that is original (to oneself) as opposed to traditional or copied.

4.1.4. INNOVATIVE

Creativity at this level involves
"significantly modifying the basic foundations or principles underlying a whole field of art or science".[15]

An example that might be cited here is Impressionism in the field of painting.

4.1.5. EMERGENTIVE

To be labelled emergentive, it is necessary for creativity to result in

"an entirely new principle or assumption at a most fundamental and abstract level".[15]

A good example of such a principle is Einstein's relativity.

Please note that each type of creativity results in a product. The types of product range from emotions (expressive) to games, arts, crafts, skills (productive) to relationships (inventive) to modified principles (innovative) to assumptions (emergentive).
4.2. A DEFINITION OF CREATIVITY

When I talk about creativity, I mean, in terms of Taylor’s (1959) definitions, inventive creativity, with the possibility that it might lead to innovative creativity. I feel that if one is constantly busy with relationships between parts, as in inventive creativity, one must inevitably become aware of the "basic foundations or principles". An awareness of such principles would be a prerequisite for "significantly modifying" these principles or foundations.

In cases where I had evolved a particular type of earring and I then set out to manufacture say ten pairs of them then I would consider the creativity involved to be productive creativity.

For the sake of this dissertation, I will use Bishop and Chace’s (1971) definition of creativity in that it is regarded as the ability to produce: 4.2.1. something that is 4.2.2. original and 4.2.3. useful.[14]

4.2.1. SOMETHING i.e. THE PRODUCT

To recognise the fact that one has been creative, there has to be a product. David Best (1985) stresses this fact when he says that
"...the creative process cannot intelligibly be regarded as logically distinct from the creative product. That is, the process can be identified only by the product;...". [16]

As mentioned on the previous page, the types of product can range from games, arts, crafts, skills (productive) to relationships (inventive) to modified principles (innovative) to assumptions (emergentive), or, to use Mednick's [1962] words, it is something that is "in some way useful". (4.2.3.)

4.2.2. ORIGINAL

By original is meant anything that is new to the creator (designer, artist etc.). I am not concerned with the views of other people regarding the originality of the product.

Analyzing a definition of Rollo May's, Olivier (1985) states that

"As long as that which the creative person makes, discovers, invents, or his thinking generates, is new to him, it can be claimed that he has been creative."[17] (my italics)

Although the search is for something that is new it does mean that it is so new as to be foreign. Whatever is made has to be an extension of what is familiar if it is to count as creative. As Best (1985) puts it
"The sense of creativity is given by the criteria which are already in use, although the creative person may modify and extend those criteria to some extent."[18]

4.2.3. USEFUL

Mednick (1962) feels that creative products, besides being new, must

"either meet specified requirements" or be "in some way useful".[19]

"In some way useful" can be interpreted in its widest sense and, I feel, would then still be valid as a criterion for creativity. This concept could be expanded to include ideas that enlighten and devices that labour. The nature of the product would obviously dictate the way its usefulness would be measured.

A word that encompasses this wide definition of utility is appropriateness.[20]
4.3. FACTORS THAT AFFECT CREATIVITY

Under this heading I will discuss some factors regarded as having an influence on creativity and attempt to show how these factors relate specifically to my creative problem-solving process.

4.3. FACTORS

Some factors that I believe influence my creative problem-solving process are:

4.3.1. Blocks
4.3.2. Chance
4.3.3. The need to explore
4.3.4. Skills

4.3.1. BLOCKS

Anything that prevents one from solving a problem in a desired way could count as a block. It could be a physical restraint, such as a shortage of material, or a mental restraint, an attitude or preconception for example. Physical blocks are easier to recognise than mental blocks, therefore I would like to draw attention to the existence of mental blocks.
Adams (1976) calls these "conceptual blocks" and De Bono (1976) refers to blocks as "errors in thinking". Both these terms are concerned with the perception of the problem. The way a problem is perceived could have a direct bearing on how one approaches the solution thereof.

A typical example of the relationship between such perception and the approach to the solution is the well known nine dot problem.

One has to connect all nine dots using not more than four straight lines and without lifting one's pen from the paper.

The way one perceives (defines) the problem will determine whether one can solve it or not. Perceiving the solution to lie within the square formed by the dots is the block that prevents one from solving the problem.
Redefinition of the problem i.e. changing one’s perception of it, will facilitate a different solution, as can be seen from the illustration on the next page.

No matter how one perceives a problem, such a perception could be a block in some way. It will be up to oneself to become aware of the existence of a block. If one realises the connection between the block and one’s perception of the problem it could enable one to circumvent that particular block by redefining the problem.
I have often encountered blocks when designing. The most recent one occurred when I was trying to design and make a frame for setting domed oval shapes in. My direction of work was based on a suggestion of a colleague’s. The solutions that I attempted were rather heavy and constructed.

On tracing my steps (thoughts) back to the beginning I encountered the origin of the block and then managed to come up with an improved solution.

These next few diagrams will illustrate what happened. All the diagrams are sections through an oval frame. The drawing that caused the block is on p.30a.

My colleague suggested that I file the outside frame halfround and solder a ledge on the inside....
I thought that I would press the outside frame halfround instead of filing it and solder a rim against the inside edge, like this....
When I started encountering technical problems I realised that I could simply solder a rim onto a domed oval with the metal inside the rim cut out.

"Realised" implies both the recognition of a block and the redefinition (p.38) that takes place as a result of such recognition.

4.3.2. CHANCE

By "chance" I mean anything unforseen that happens and contributes to the successful solution of a problem. Austin (1977) went as far as defining different types of chance eg. pure luck and chance that occurs as a result of being busy, to name two of the four types. [21]

To ignore chance could imply that one is limiting one's perception of a problem and/or solution. When solving a problem one necessarily is limited to one's understanding at that particular stage. Austin (1977) feels that chance brings new factors into account and thus extends one's perception of the problem and/or the solution.
Notes: Leszek's drawing for construction of frame.
4.3.3. THE NEED TO EXPLORE

Austin (1977), who is a professor of neurology, feels that the need to explore "is a deeply rooted instinctual response found throughout the animal kingdom" [22]

He calls this instinct "the search for novel stimuli".[22] This idea is also raised in the definition of creativity in the Encyclopedia Brittanica. It states that "Psychological experiments in the fields of motivation and learning have disclosed the power of novelty as an inducement to action." [23]

Austin refers to experiments done in the field of exploration and states that "...when rhesus monkeys are exposed to a simple mechanical puzzle, they persist in trying to solve it for the inherent satisfactions of problem-solving per se, needing no food to sustain their strong exploratory behaviour".[24]
"If you show a one-year-old infant a small object of a certain size and shape, he will look at it, reach out for it, and try to grasp it. Suppose you next show him, simultaneously, both the now familiar first object and a second dissimilar object, he will reach out for the new object".[24]

This leads him to the conclusion that

"the preference for novelty is an innate phenomenon".[24]

Austin also raises another very interesting possibility. It has been suggested that certain cells in the brain, when stimulated, release "biogenic amines" (hormones) that are similar to adrenalin. These may be responsible for the "satisfying state of alertness and pleasurable excitement" [25] that comes about when one experiences something new.

Research also suggests that this is a type of reward that the brain gives itself on detecting novel stimuli. Furthermore, it is suggested that this type of activity could be habit-forming i.e. one could be searching for novelty for the sake of novelty.[25]

A concept that I consider to be linked to the search for novelty is that of constructive discontent [7]. By this is meant the exploitation of dissatisfaction to produce something creative. In other words one uses the feeling of discontent as a starting point for the design process. At times I have found this feeling
of discontent to occur simply because I was 'bored' by what I had just discovered and needed a new stimulus. The tension arising from constructive discontent and from the search for novelty seem to be my strongest motivation for designing.
4.3.4. SKILLS

Under this heading I will discuss 4.3.4.1. practical skills and 4.3.4.2. conceptual/intellectual skills.

4.3.4.1. PRACTICAL SKILLS

To quote David Best

"...a competent grasp of the discipline, techniques and criteria of an activity is necessary for the possibility of being creative in it". (my italics)[18]

or to put it even better,

"the greater the mastery of the discipline, the greater is one’s possibility of creativity, as will be clear from the example of language".[26]
4.3.4.2. CONCEPTUAL/INTELLECTUAL SKILLS

It is emphasised, by Guilford (1968),

"... that the creative person thinks both divergently and convergently, being able to maintain a fine balance between these two styles of thinking."[28]

4.3.4.2.1. Convergent thinking is regarded by Jordaan and Jordaan (1987) to be the type of thinking that leads the problem-solver to "conventional and 'correct' answers or solutions to questions and problems". In other words ...

"Problems whose solution requires that a particular answer be found by means of logical inference from the available information, calls for convergent thinking."[28]

Looking critically at my own problem-solving processes, I would assume convergent thinking to be employed when one is involved in 'uncreative' problem-solving. This does not mean that convergent thinking is considered unimportant in terms of creativity.
Hudson (1966) felt that

"Deductive thinking (convergent thinking) is complementary to creativity in problem-solving, because it is central to the evaluation of possible solutions." [29]

4.3.4.2.2. Divergent thinking would be required if the need is to generate "a great many unusual, strange and unconventional answers or solutions" [30] (what I would be tempted to call original solutions). Jordaan and Jordaan (1987) suggest that "divergent thinking occurs in situations where there are several possible solutions but no obvious solution". [30]

According to Jordaan and Jordaan (1987) there are three components to divergent thinking [30], i.e.

4.3.4.2.2.1. idea fluency
4.3.4.2.2.2. flexibility and
4.3.4.2.2.3. originality

4.3.4.2.2.1. FLUENCY

By fluency is meant the ease with which one thinks. More specifically, the ease with which one produces ideas. It is measured by the amount of ideas produced in a specified time. Or as McKim (1980) puts it,
Where can I find a towel to put under the door?
"the yardstick of fluency is quantity - not quality or originality".[31]

A typical test of fluency is to generate, in two minutes, as many uses as possible for a brick or a paperclip, or some other object that one might perceive as having a limited use.

In the problem-solving process, fluency would play an important role during the ideation phase. It is the ability that would enable one to generate a lot of ideas from which to select an appropriate one.

4.3.4.2.2.2. FLEXIBILITY

Flexibility (of thinking) is a component of divergent thinking [30] that I have recognised in my creative thinking. If one were asked to list all the possible uses for a brick then flexibility would be "the ability to develop ideas over a wide range of possible uses".[30]

Flexibility is related to the ability to perceive an object on different levels (see redefinition 4.3.4.2.2.2) whereas fluency is the ease with which such a shift of perception takes place.

There are two particular modes of creative thinking that I employ where I can recognise such flexibility of thinking.
4.3.4.2.2.2.1. ANALOGOUS THINKING

Analogous thinking refers to the ability to produce analogies to generate possibilities/ideas for solving problems.

To make an analogy is to find out how two (not necessarily similar) things are related and then to exploit this relationship. Another way of using analogy is to define one's problem in such a way that one could find a similar problem solved somewhere else. One would then attempt to implement a similar solution in one's own problem.

An example of analogy being used in problem-solving is given by Gordon (1962). He defined and utilised four types of analogy in problem-solving i.e. PERSONAL, SYMBOLIC, DIRECT and FANTASY. This next example is one of DIRECT ANALOGY and occurred while tetraethyl lead was being invented.

"Speculating then on why kerosene knocked worse than gasoline, as it was known to do, the two men reasoned that it might be
because kerosene did not vaporise as readily as gasoline. They recalled that the wild flower, the trailing arbutus, with its red-backed leaves, blooms early in spring, even under the snow. If only kerosene were dyed red, they speculated, it might - like the leaves of the trailing arbutus - absorb heat faster, and so vaporise quickly enough to burn in the engine like gasoline". [32]

This example also highlights the need for an interest in, and knowledge of a wide range of subjects.

For an example of analogous thinking in use in my work see p.150 of the journal 26.11.91.

4.3.4.2.2.2.2. REDEFINITION

To define is to "give the exact meaning of" (Oxford Concise), or to "state contents or meaning of" (Collins Gem).

To redefine is to define again. In terms of creativity, as I understand Guildford (1968), it means to define again but from a different perspective. This implies, and by implication demands, an ability to shift one's point of view i.e. flexibility when regarding/considering something. In order to redefine, it is necessary to be able to regard, for example, an object on many levels, varying from conceptual to physical to emotional to whatever point of view might be considered to be relevant.
Watzlawick (1974) feels that each time one redefines, one considers an aspect of, for example, an object that is shared with other objects and then defines it accordingly. For the sake of redefinition all aspects of an object i.e. abstract and physical can be relevant.

A toy fire engine, therefore, could be redefined as a red object, something with wheels, a miniature, an object of affection, a wooden (whatever material it is made from) object, a potential fire hazard, an object found in toy shops or an object that could be handmade/machine-made.

Doing the above exercise could relate a toy fire engine to a tomato, a motor bike, whisky, one’s dog, a toothpick, paint, a frisbee or a woollen jersey.[33]

In jewellery terms (and using Roget’s Thesaurus) a joint could, amongst other things, also be defined as ...meeting, concurrence, conjunction, contact, concatenation, suture, stitching, knotting, tying, fastening, earthing, grafting, coupling, riveter, welding, splice, hinge, knuckle, node and intersection to name some.

It can be seen from the examples above that redefinition could play a vital role in analogous thinking. It could also play a role during the analysis [2.2] and definition [2.3] phase and by implication during selection [2.5].
4.3.4.2.3. ORIGINALITY

originality n. power of producing something individual to oneself

original a. thinking or acting for oneself; eccentric

eccentric a. odd and unconventional

Collins Gem (1987)

"To produce something individual to oneself" could happen by letting the way that one sees the world manifest itself. In other words, one could try not to resort to stereotypes (see 4.3.1.1.). An awareness of other social and cultural blocks such as myths ("a widely held but false notion")[34], could enhance the possibility of being original.

Another way that this (originality) could happen would be if one drew an analogy with things that one was specifically interested in. For example, if I defined "joining" (where the hook meets the earring) as "confluence", then I could look at "the place where two rivers meet" like (presumably) everybody else, or I could employ divergent thinking and look at other things that meet in a confluent-sort-of-way eg. the leaves of a ginger plant (which I consider to be particularly beautiful). This could
most likely result in an original solution to the earring problem. I would of course not consider it to be original if I had used this particular analogy in this context before.
4.4. THE CREATIVE PROCESS

As one proceeds from the first stirring of interest to the successful manifestation of a creative product one passes through various stages. These stages were defined as long ago as 1928 and have been discussed by several writers.[35] The stages are:

4.4.1. INTEREST
4.4.2. PREPARATION
4.4.3. INCUBATION
4.4.4. ILLUMINATION
4.4.5. VERIFICATION

These stages have been identified as:

"...interwoven processes rather than as a temporal sequence of events."[36]

This interwovenness of the various stages of the creative process will become clear in the discussion of my own work. (see chapter 10)

I will also indicate the links, that I assume to exist, between these stages and those of the problem-solving process.
4.4.1. INTEREST

This has been included as a distinct phase by Austin (1977). He feels that the more interest one has in a particular problem, the more creative the solution is likely to be.

I have found, in my own work, that the more interest I have in solving a problem the more readily acceptance (2.1) takes place.

4.4.2. PREPARATION

Jordaan and Jordaan (1987) state that this is the phase where "all possible information in connection with the problem is collected". [37]

To me it is not just the collection of information that is important in this stage, but also the equipping of oneself in terms of skills and techniques that would facilitate the production of the solution. In my case such solutions would be in the shape of pieces of jewellery and various other objects that would depend on a certain minimum level of skill for their production. (see 2.2.2.1.) This assumption of mine is borne out by Olivier (1985) when he says that, during this preparatory stage, the creative person must

"enhance his knowledge and better his skills".[38]
However, I feel that if one is going to produce a creative solution then one will not limit one’s information gathering to the immediate area around the problem. One would investigate areas further afield hoping to facilitate the formation of ‘fertile’ analogies.

To quote Henri Poincare (1924)

"Creative ideas reveal to us unsuspected kinships between other facts well known but wrongly believed to be strangers to one another. Among chosen combinations the most fertile will often be those formed of elements drawn from domains which are far apart."[29]

Preparation, as such, would not necessarily ensure a creative product. If, however, part of preparation is concerned with the cultivation and application of divergent thinking in general then, if one considers the importance that Guilford (1968) attaches to this mode of thinking in relation to creativity, the chances of producing a creative product are greatly enhanced.

If preparation is seen as enhancing knowledge and improving skills that are directly related to a specific problem then this stage could be regarded as synonomous with the analysis and definition phases of problem-solving [2.2. and 2.3.].
4.4.3. INCUBATION

Radford and Burton (1974) state that "it is common experience that solutions often appear after a period of rest".[36]

By rest I assume that they mean relaxation but also a setting aside of the problem.

This period of lapsed time is what is known as the incubation period.[36] According to Jordaan and Jordaan (1987) this incubation period could range, in time, from minutes to years and during this time the problem is not necessarily thought about, but

"somehow or other, at an unconscious level, the person (solving the problem) is prepared for receiving information that could lead to a solution to the problem".[37]

I assume that incubation does not occur during convergent thinking because convergent thinking calls for an answer to be found

"by means of logical inference from the available information" [37].

In other words, I assume that one experiences incubation when involved in creative problem-solving and not during 'standard' problem-solving eg. when doing calculations.
4.4.4. ILLUMINATION

Illumination is only a term to describe "the kind of experience a person went through when a general idea of how the problem can be solved suddenly developed".[37]

It is not the solution, just a realisation of what the solution could be. It is the having of what one considers to be a "bright" idea i.e. "a sudden flash of insight"[39] and is the culmination of incubation. It is also known as the AH-HA! or EUREKA! effect[40].

I would not regard illumination to be synonymous with ideation (2.4.). Ideation is concerned with the generation of ideas whereas illumination is the recognition of an idea that could work i.e. it can be seen as ideation and selection (2.5.) occurring at the same time.

4.4.5. VERIFICATION

The creative process does not end with the having of the 'bright' idea. The viability of the prospective solution has to be confirmed. I have often found this stage to necessitate more work and to lead to new problems.

In my design process I have found verification to be the part of the creative process that results either in a product or in a conclusion that leads to a new problem statement. The conclusion
itself could, I feel, be regarded as a product of the creative process.

Seen in the context of problem-solving, verification is another word for implementation and evaluation combined.
5. THE LINK BETWEEN CREATIVITY AND PROBLEM-SOLVING

It is possible to solve problems without necessarily being creative. Satisfying one’s craving for coffee, for example.

Seen in the light that the existence of a product is a prerequisite for a discussion of creativity [4.2.1.] and that the aim of the problem-solving process is to establish a product, then it seems plausible to assume that when one becomes creative, one necessarily involves the whole problem-solving process from ACCEPTANCE to EVALUATION in order to arrive at a product. The quality of the product being the measure of whether or not one has been creative.

Creativity, as I have discussed it, can be considered a quality of the product (4.2.1.), and of the process that results in the creative product.

Problem-solving and creativity both result in products. Both the creative and uncreative products will be useful i.e. produced to meet a certain need. The difference being that the creative product will be new (original) to the designer (problem-solver) and the uncreative product won’t.

A conclusion that I come to is that for the problem-solving process to be regarded in any way as having a creative quality it must employ divergent thinking processes.
5. **PRACTICAL WORK**

I will discuss my practical work in two ways.

5.1. Documentation and analysis of work done over the last approximately seven years. I will give a summary of some of the directions that I have worked and explored along. These directions will also be referred to as "threads" because they seem to have come together and to have become entwined like the threads of a rope, forming a single unit consisting of many separate strands. I could have called these 'threads' techniques except that one of them is the development of decorative motifs.

I will then document the development of the oval shaped earrings and brooches that I make now.

5.2. Documentation and analysis of a journal (diary) kept of work done over a period of about a month.

For the whole of November 1991 I tried to keep a record of everything I did and thought that might explain aspects of my design process. The aspects I am particularly interested in are:

1. isolating the phases of the design process (problem-solving and creative)

2. factors that prohibit creativity (blocks)
(3) conceptual/intellectual skills that are employed in the design process i.e. trying to isolate divergent thinking in my design process.
5.1. THREADS

I will not discuss all the work that I have done. There seems to be a few threads that run through the last approximately seven years and I will discuss one of them, using that thread to elaborate on concurrent developments. The thread that I will focus on appears in the development of my oval earrings and brooches. Before departing on this discussion, I would like to mention some of the concurrent threads. The following pages will show some examples of representative work.

5.1.1. PRINTMAKING
5.1.2. SANDCASTING
5.1.3. DECORATIVE MOTIFS
5.1.4. ENAMELLING
5.1.5. PRESSMOULDING
5.1.6. CASTING
5.1.7. CERAMICS
5.1.8. FOUND OBJECTS
5.1.1. PRINTMAKING

Doing printmaking as part of my undergraduate program, I became interested in embossing i.e. printing without ink, doing relief printing. This contributed directly to the investigation into roll-on paper textures.
PRINTMAKING

Other lines (threads) of investigation influenced by printmaking include glass etching and the anodised patterns on niobium and titanium.

Above are some examples of glass etching, including exploration into the effect of mirroring the etched glass.
5.1.2. SANDCASTING

Intending to live and work on a farm on the Lesotho border, I looked for a relatively primitive technique of reproduction that I could employ there. Initially I made sandcast beads and later on I made moulds for pressing shapes (see PRESSING). The patterns for the moulds were made from ceramics and lino-cuts.
5.1.3. DECORATIVE MOTIFS

Two of the motives that I’ve used are the dragonfly and the crocodile. The dragonfly motif I first noticed on a Japanese textile design. The crocodile I developed from clay redefinitions of a crocodile’s anatomy i.e. I reinterpreted the way that a crocodile could be assembled or portrayed.
5.1.4. ENAMELLING

Having done the basics of enamelling for my diploma in Jewellery Design, I then experimented with enamelling on the oxide layers that were left on annealed copper shapes.

I enamelled on top of paper textures and press moulded textures. (See overleaf)
5.1.5. PRESSMOULDING

I have employed this principle with (1) bronze dies and (2) clay dies.

5.1.5.1. Utilising the fly-press, I pressed textures onto silver and copper sheet using a sandcast bronze slab with a pattern on it. I also pressed three-dimensional shapes in bronze moulds.
BRONZE DIE PRESSMOULDING
5.1.5.2. I would use wet clay to take an impression of something and then I would pour or press wax into the clay "mould". This wax model would then be cast (see Casting).
PRESSMOULDING
5.1.6. CASTING

There are three facets to casting as I employ it. They are (1) mass production, (2) creative/exploratory work and (3) a combination of the two.

5.1.6.1. Mass production is used to do monotonous work faster, an example being the earring attachments (as seen above) and the oval brooch frames as discussed in the journal.
5.1.6.2. My creative/exploratory work consists of

1. manipulating the wax in new and interesting ways (see Bodies and rings),
2. exploring the technique of casting (casting metal onto metal),
3. using paper instead of wax - "lost paper casting") and
4. casting found objects (Malu creeper).
"Lost paper casting" (brooches at bottom)

CASTING
5.1.6.3. The previous two aspects are combined in the oval cast frames (particularly in Boats), the bird beads (as discussed in the journal) and co-operative jewellery i.e. jewellery that is not made solely by me.

The outside frame of the "Boat" was initially put there to ensure the proper flow of the wax and the metal. (CHANCE !!!)
"Oval frames and bird beads"

CASTING
5.1.6.3 Examples of co-operative jewellery are my "indigenous" rings and my oval brooches. With the brooches the idea is that I produce the frame and someone else the plaque.

As far as the rings are concerned, I supply the wax blank and cast them after someone else has carved them.
5.1.7. CERAMICS

Having had experience of ceramics prior to my studies enabled me to utilise this medium extensively. I used clay for making models for sandcasting (see Sandcasting and Pressmoulding), to take impressions from found objects, to make crucibles and for its own sake i.e. making ceramics objects.
5.1.8. FOUND OBJECTS

Spending time on the mountains of the North eastern Cape and on the beaches of the South western Cape I found many interesting objects, some of which I have utilised in my design process. These include shells to take impressions from, stones to cut and polish and sticks to cut into pieces. The spirals are from a "Malu creeper". The top row consists of agate found on "Halstone" a mountain in the North-eastern Cape.
As can be seen from the preceding pages there is a considerable amount of overlapping that takes place between the different directions (threads). I have found this inevitable and, in fact, desirable. I find it conducive to the formation of analogies(4.3.4.2.2.1.) and, I feel, it aids preparation (4.4.2.) and incubation(4.4.3.).
6. DEVELOPMENT OF OVAL SHAPE

What follows is a description of the design process as I can recall it happening, concerning the oval shaped earrings and brooches that I am making at present.
While making some fashion jewellery, I put some brass squares with shapes cut out of them through the roller.

I put them through the roller in two’s, one on top of the other - trying to make a "conceptual" pair i.e. trying to make two earrings that belonged together because they helped form and decorate each other.
As a result of the distortion that I had observed on the previous page, I put some discs with cuts in them through the roller, to see how the cuts would distort. The result, I thought, wasn’t amazing, so I thought,

"Why cut them at all?"
So I rolled some whole discs to see what they would look like. The discs went through the roller in one direction and the result was not satisfactory.

So I thought, "Why not put them through again?", and put them through at 90 degrees to the longer axis.
The resulting shape seemed to satisfy my yearning for novel stimuli (4.3.1.3.). It surprised me, it had something new to it, something I had not seen before. It was not totally predictable. It was as if the roller had added something of its own to my experiment. Was this chance establishing itself?

I would often try to use a process that was not totally predictable. Examples of such unpredictability could occur when etching (if one "forgets" the object in the acid), when overlaying textures over each other, when overfiring enamels or any process where one loses visual contact with the piece that one is making. All these examples could be considered to be examples of chance.

Concerning the oval shape, I did not continue rolling out discs when I wanted ovals. Eventually I resorted to using existing ovals, that had been rolled, as templates for cutting out shapes.
Having rolled discs I then rolled other circular shapes such as spirals and washers. These did not appeal to me as much as the oval disc did.
Now that I had an acceptable shape, I became aware of the texture. The disc had the roller’s texture on it, which I felt was terrible. I’d read somewhere that to roll metal with a sheet of paper on either side would protect the sheet metal from the roller texture, so I tried it, using an old photocopy lying in my studio. Not only did the paper protect the metal, it actually imparted a texture to it that I thought was wonderful. After rolling a few more, I wondered, "What if I interfered with the texture?", so I cut the paper before rolling.
I started cutting and folding and rolling with a purpose! I cut and folded the paper in any way I could conceive. I tried out all the metals and all the types of paper at my disposal. In the end I used photocopies. Sometimes the carbon from the photocopy would make an additional imprint on the metal, particularly on the softer metals like aluminium and fine silver. If I used too much pressure when rolling, the paper would crack, producing a beautiful lightning sort of pattern, as well as the cut out pattern.
At this stage, I had run out of ways to cut the paper using only a blade. I had also run out of patterns to cut into the paper, with the result that I started looking for subject matter to utilise. I started looking at fish, crocodiles and shells.

Note the imprint, from the carbon of the photo copy, next to the bottom left hand crocodile’s tail.
I discovered that I could saw paper with my jeweller’s saw provided that I had made a thick sandwich of approximately ten layers of paper with mounting board on the outsides. So I sawed out some fish and crocodiles and spirals and zig-zags and imprinted them on the metal.

The shape above is an aluminium earring derived from the oval shape that I’ve been making.
These textured/patterned shapes would also be formed in bronze pressmoulds and/or enamelled. For a clearer picture of the bottom oval shape see the colour print of the enamels.
I was using a special die to cut uniform discs with the result that I was limited as to how big I could roll out the oval. One way around this problem was to solder two discs together for added thickness. My first thought was to solder them as well as possible so that the joint did not show. But then I thought, "Why not let it show? It could become a focal point." To make the joint more noticeable, I then folded the discs in half and soldered the straight edges together. The bottom oval shape is a brooch.
After developing my sandcasting technique, i.e. about six months later, I cast some bronze slabs with patterns on them. The patterns were made by rolling found objects, like shells, onto clay slabs. These slabs were then fired and acted as patterns for embedding in the sand. These I would use to press a texture on top of the rolled paper pattern.

The center oval is a brooch. Note the "lightning" pattern (p.84) on the bottom of the earring on the left hand side.
Now that I had a textured shape that I was happy with I became aware of two characteristics that I regarded as negative, i.e. problems:

(1) its flatness; i.e. lack of three dimensionality.

(2) its wearability. "How to make this shape wearable?" i.e. "What sort of fitting am I going to put onto this and how?".
1. FLATNESS

At first I just domed the discs because it was the easiest way to add volume in a way that I felt suited the oval shape. I domed the discs in various ways looking for the one that appealed to me the most.

The pieces shown above are only experiments, not actual pieces of jewellery.
When I started making earrings, I felt that flat or domed discs weren’t suitable. This is a concept I started examining in 1984 as part of a student project. A conclusion that I came to was that an earring should be visible, and attractive, from all sides. From a certain direction, a flat shape will look like a straight line.
In 1985, I had started examining the possibility of simply folding a shape to make it three dimensional.

This is a photo copy of a page from my sketch book from 1985.
In 1985, I had started examining the possibility of simply folding a shape to make it three dimensional.

So I tried it again as an extension of the two folded discs soldered together. The aim was also to provide a connection, between the shape and the earring catch, that looked like it was not just soldered on i.e. to look like it belongs there.
This is similar to the previous page.

The object on the left was photographed on top of a photocopy that charted the progression of the shape as it was rolled and ultimately folded over.
FLATNESS

Folding a shape to make it three dimensional.

The pattern is from rolling with a paper "doiley".
FLATNESS

Folding a shape to make it three dimensional.

The ovals are made from fine silver and the cross bar from 18ct gold.

The earrings are photographed on top of a photocopy.
FLATNESS

Folding a shape to make it three dimensional.

This shape is an extension of the work on the previous two pages.
This is a close up view of the cross-bar on the earring shapes from the preceding pages.

Take note of how I have tried to integrate the attachments into the oval shapes.
Having tried folding and doming, I thought of twisting the discs, "BUT HOW?" I tried a few things that did not work and then a jigsaw was stored in my studio. I experimented with it and the result was a die made from wood that was sawn through as it was twisted. The disc would be put inside and then the block of wood hit with a hammer, resulting in a twisted disc.
2. WEARABILITY (Brooches)

Initially, I domed the discs and soldered the catches straight onto the backs. As can be seen from the brooch at the top. When I started using enamels and other media that made the soldering on of catches impossible, I presumed that I had to make frames to set the domed ovals into. At first the frames were handmade and the catches soldered on e.g. the brooch second from the top.
BROOCHES (wearability)

When I started casting, I tried to cast the frames with the catches incorporated in the cast. The results were not very encouraging as far as wearability was concerned although interesting from a conceptual point of view. So now I am back to soldering the catches on. The frames are still cast though. The above brooches being examples of such cast frames.
WEARABILITY (Earrings)

With the type of earring that I am making, the hook is visible. I would like the fitting to look like it belongs there, the way the stalk looks on a leaf.

The first earrings had plain holes drilled through them. To try and "incorporate" the catches I drilled the ovals before rolling so that I had oval discs with oval holes. I wasn't happy with that so I just made the hole after rolling the oval and reinforced it with a jump ring soldered around it.

The example on the left shows a rolled hole and enamel on a spiral paper pattern. The center one shows a plain hole and the one on the right a reinforced hole.
EARRINGS

I then designed my own hook. It was made through forging and based on work done the year before.

On the right is a hook I designed for a pendant in 1985.
EARRINGS

I also tried to integrate the hook by soldering it onto the disc and then hammering the two together. This was a development from the attachments made for the folded shapes. The two shapes at the top still have to have the hooks bent over. These earrings all have rolled paper textures / patterns on them. Some are domed and some spiralled in a die (see p.96).
EARRINGS

Lately, I’ve realised that instead of trying to make the fitting look like it "grew" out of the earring, I could also do the opposite and make it stand out more. Using casting, I designed and made an attachment that could be put onto any disc-sort-of-shape that needs to become an earring. The development of this attachment is discussed in the journal.
7. ANALYSIS OF THE CREATIVE PROBLEM-SOLVING Processes

Having documented the basic process that led up to the final oval brooch and earrings, I now wish to elaborate on some aspects of the design process as they occurred.

Firstly, I must emphasise the fact that I did not set out five years ago with the aim to produce the perfect brooch or earring. My problem statement was much vaguer than that. It was "to make something worthwhile". It wasn’t formulated as such either. It was more a feeling that I had that what I had done was not sufficient i.e. I wasn’t satisfied. This could have been because of creative discontent and the need for novel stimuli (4.3.1.3.).

At that stage, I did not know what "worthwhile" would constitute, so I started exploring various techniques. I did not consciously decide to explore so that I could find something "worthwhile". It is only now that I recognise my "playing" of that time as exploring (4.3.1.3.). In fact, I think it was only once I was busy designing the fittings for the earrings that I realised I was involved in a process of problem-solving (as far as the oval shapes were concerned). Until then it felt as if I was just playing.

Looking back now, I can isolate the various factors that played a role and the various phases my creative problem-solving process went through.
INTEREST

My initial playing was a way of finding out what interested me. What kept me interested (and encouraged acceptance) was the search for novelty (4.3.1.3.). Not just new things but things that I could relate to i.e. things that were based on previous criteria but somehow extended them (see p.23).(36)

PREPARATION

All the skills and information that I’d gained, from exploring, combined with the knowledge gained from relating these to my conceptual investigation enabled me to produce and recognise the "acceptable" shape, texture or fitting.

"Recognition" in this case is a synonym for illumination.

Another way of saying 'acceptable' is 'nice'. I realised that when I say that something is 'nice' or that I like it, I am actually referring to the way that I am feeling and not to the appearance of the object. This feeling, I assume, is the result of the resolution of tension brought about by constructive discontent and the yearning for novel stimulii (see 4.3.1.3.)
INCUBATION would have preceded ILLUMINATION and the mere fact that I ended up with pieces of jewellery means that VERIFICATION had to have taken place.
8. ANALYSIS OF THE PROBLEM-SOLVING PROCESS

If the phases seem rather loosely defined it would be because I was encountering many subproblems and therefore causing a lot of overlapping of processes. I might have found a subproblem during the implementation phase and a sub-sub-problem in the sub-problem's selection phase, which would have meant that I would be involved in different phases of the problem-solving process at the same time.

For example, while I was trying to design a fitting for the earrings I also became aware of the three dimensional shape of the ovals. Because it would have had an impact on the design of the fitting I had to consider the shape at the same time.

I will look particularly at the shape and texture seeking aspects of the previously discussed creative problem-solving process i.e. the development of the oval shapes.

ACCEPTANCE

As mentioned already, the urge to do something "worthwhile" caused a ready acceptance of the problem.
ANALYSIS

Analysing the problem would have meant, to recognise the fact that none of the shapes or shape-producing processes employed until then was thought to be satisfactory i.e. squares, triangles, circles and also figurative shapes weren’t what was required and sawing was not perceived as a way to produce an acceptable shape.

At this stage, I would have encountered a block. I can recognise it now because if there wasn’t one, I would have proceeded to saw out an oval, as I do now. Having included sawing in my analysis of what I thought did not work would have produced this block. This block was only circumvented once I rolled a shape that had been cut out. Until then, I had not considered rolling as a way of producing a shape.

DEFINITION

This would have been the stage where I had defined my problem as

"I am looking for a 'nice' shape and a way to produce it".

Note the use of 'nice'. In fact, in my mind I was probably thinking the equivalent of 'amazing!' or 'astounding!' or 'meaningful'.

See page 107 for a discussion of the word 'nice'.
IDEATION

Here I would have encountered the block mentioned under ANALYSIS (dissection). This would have resulted in me going back to analysis, to dissecting what I thought constituted the problem. All this time, the problem would have been incubating in my mind, preparing it for the recognition of the 'nice' shape, as it came out of the roller. That feeling of "A-HA!" or "EUREKA!" (41) would have been the ILLUMINATION.

At this point the problem-solving process became blurred with the creative process.

EVALUATION

Recognising the shape instantaneously as being "right", I would then have evaluated it further and that would have led me to the realisation that the texture was undesirable. This would then have led to the next problem i.e. the texture.

ACCEPTANCE would have been automatic in view of the momentum gained so ANALYSIS would have followed immediately. I would have recognised the fact that the texture was the problem, or rather, that the way the light was reflecting off the metal was not satisfactory.
DEFINITION would have led me to the realisation that the texture needed to be altered.

IDEATION would have resulted in a few suggestions. Etch the surface, stamp a pattern with punches, sand it, polish it, etc.

SELECTION would have eliminated all these methods as too time consuming. So I would have had to resort to REDEFINITION (introducing divergent thinking i.e. creativity).

"Instead of altering an existing texture, why not prevent such a texture from occurring?!"

This would have unblocked the path that then led to the connection with the advice that I'd read, of sandwiching the metal in paper before rolling. This would have been IDEATION and SELECTION in one. IMPLEMENTATION would have constituted the actual rolling and EVALUATION the satisfaction resulting from the surprisingly effective solution.

"What if (I cut the paper)?" would then have started the next creative phase of producing the various patterns as seen on p.105.

This was a brief analysis of what I can remember from that stage. My work progressed along similar lines until the present day. Play (exploration) becoming more important as a means of producing starting points to proceed from eg.
electroforming, wax manipulation, ceramic manipulation, stamping, watercolour, drawing with my left hand, lateral thinking exercises i.e. asking myself deliberately ‘what else could this be?’, ‘How else could I do it?’ etc.

Note the mixing of creativity and problem-solving and the way the process backtracks and circles.

I hope that this analysis demonstrated the fact that the design process does not proceed at an orderly pace from one phase to the next.

A few questions were put in parenthesis deliberately. Many more questions actually arise during the design process (as can be seen in the journal). This was done to draw attention to the fact that these actions were responses to questions. I feel that decisions are made in response to questions and that these decisions then lead to actions.
9. JOURNAL

INTRODUCTION

This is a journal kept of work done during November 1991. I tried to keep a record of everything that I thought might be relevant to an explanation of the design process as I experience it.

The language is sometimes rather cryptic. This is because I tried to keep pace with my thoughts. Quite a few of the diagrams were scanned directly from the original sketches done in the heat of the moment. In cases where the original sketch was too "sketchy" a new one would then be done, on computer, to facilitate the explanation.

This journal was written like a diary. Sometimes while I was busy designing, other times at the end of the day. It is not meant to be a technical explanation of what happened. The focus is rather on recognising aspects of the creative problem-solving process. Some of these aspects being 1. skills  2. blocks and 3. phases.

1. Conceptual/intellectual skills

I am not trying to prescribe which skills should play a role. The intention is to illustrate that one does utilize specific mental skills when designing. It is important to realize that these skills can be developed.
2. Blocks

Anything that impedes progress in a desired way (see 4.3.1.) could be considered to be a block. So it then becomes as important to know what one is trying to do as it is to recognise what is preventing progress i.e. a block.

If one's definition of the problem is vague then it (the definition) could change slightly each time that one encountered a block. In this way one would be more aware of the lack of progress than the block itself. This phenomenon could be recognised by the amount and type of questions asked. The nature of the questions could allow for redefinition, which would facilitate creativity taking place.

3. Phases of the creative and problem-solving process

As mentioned before, the phases of the creative problem-solving process do not follow each other in a controlled and predictable way. This is borne out by scrutiny of the journal, particularly if one follows the development of the bird bead (7.11, 9.11, 13.11, 15.11, 16.11, 18.11, 25.11, 27.11, 30.11, 2.12, ....), the oval brooch (1986, 1.11, 5.11, 6.11, 7.11, 8.11, 9.11, 12.11, 16.11, 18.11, 19.11, 22.11, 24.11, 3.12, 4.12) and the earring attachment (30.10, preparation/incubation, 26.11, 30.11).
Writing about my oval brooch/earring shapes and how to finish, (resolve) them.

My first thoughts were to make each frame by hand, using nice thin fine silver for the outside frame.
But soldering is a possible pitfall, so I thought of doing it all in one piece i.e. making wire that is like this in section.

Remembering a die, that I got from an Indian jeweller, for making patterned bangle wire, I decided to make my own. Not having any experience of milling (which, I think, would have been the right method to employ), I decided to use etching. The die etched nicely but because it wasn’t hardened (I hadn’t used toolsteel) it got squashed flat in the press.

So I decided to look for another method of attachment [i.e. the oval shape would need attachments to make it wearable]. The oval shape could also be used for earrings .... It didn’t have to be a brooch .... It could look like a feather-sort-of-a-thing.

Part of the problem is that the attachment must be mass producible and that it must be stuck to enamel, titanium and
silver .... so it can’t be soldered on and should therefore be attached mechanically.

So I thought of riveting the attachment onto the oval but to cast the rivet as part of the attachment. The oval will have approximately two holes drilled in the right places ... so it will work like this.

I thought of making a shape like the shaft of a feather.
When I had the (brass) wire in my hand to start manufacturing, it seemed that forging could be a promising technique. I had been doing it with my third year students so this shape was still fresh in my mind.

![Forging Diagram]

Did some shapes ... they were so-so.

So I resorted back to a standard (plain problem-solving) solution of making a frame for casting ....

[It could be that insufficient analysis and definition prevented a creative solution from occurring.]

Paging through a book I saw a brooch shaped like a wasp using tiger’s eye beads for its body.

[ Busy with more preparation and incubation.]

Thought of doing a bee (the colours match) utilising a tiger’s eye bead for the body. [Analogy]
Because of availability of casting centre, [A new workshop being established that will undertake mass production] I thought of making castable units that could be strung onto a bead to make a pendant/charm that looks like a bee or another type of insect.

Kim’s birthday looming ... had made silver hoop earrings (one from me, one from Christopher – one of my sons) ... needed an extra present (from my other son) ... had bought beads from Jane (student sitting next to me) ... decided to make a flying insect to hang on one of the hoops. [All the phases from acceptance to selection]

A model was handmade as a prototype. [Implementation] Starting a model lets one discover the sub-problems ... had to reposition wings ... no legs? ... how to attach the bead to the body to the wings? [subproblem] ... opted, as a start, for curling end of wire up to form eyes/head (not satisfactory) [evaluation]...
Two days later ... wondering how to incorporate beading wire
[ The wire that strings it all together.] into body better [creative
discontent] ... How to integrate functions? (how not to just
stick on a jumpring? [ redefinition ] ) ...  

Why not use beading wire as jumpring? [ circumventing a block ]

How to hide the end of the wire? [ subproblem ] ... Eyes?
Leg(s)? More than one end?! Fold double for two ends.

[ Deliberate analysis (dissection) of the problem. Note that two days have
lapsed since deciding what to make.]  

WHAT FOLLOWS IS A DELIBERATE EFFORT AT DESIGNING.  

03.11.91 PROBLEM  

 Problemp statements that have led to my current design stream). 
To design ethnic jewellery that is mass producible.
SUB-PROBLEM (for research)

What do I mean by ethnic?

From here (RSA) eg. Ndebele, natural shapes (leaves, shells, insects, wire cars
i.e. INDIGENOUS [becoming IN(DI)GENIUS]

Sub-problem

How to make the insects?

Sub-sub-problem

What are the available materials?

Titanium, beads, ceramics, wax ....

[The above analysis felt too deliberate. It did not contribute immediately i.e. it did not give added impetus to the design process (see the bit about improving one’s tennis by hitting against a wall). p.159 ]

MAKING BEE [More analysis]

How to attach bead to body? Legs? how to make the body? The wings? What other beads besides tiger’s eye? Colour could determine the type of insect to be made eg. black - wasp ... PEARL!?
Approximately one hour later - 20.00

Looking at (analysing) a squashed fly (?)

[ chance ]

I realised that the bead could be either the thorax or the abdomen [Analogous thinking]
and that the wings could fit between the two (abdomen and thorax).

Balance might be a problem so the fly could then be suspended from the head.

Looks a bit lopsided ...
Why not have wings on two sides or four sides or all round?!

[ redefinition of the problem, made possible by question. ]

Reminds me of JADE (a previous piece made from niobium). Why not use niobium wings (!) Looks a bit like a trout fishing fly [!!!]

[I recognised an area of investigation from 5 years ago.] How to produce wings all round?

Lots of single or double ones or a few 4 x 4 ...
04.11.91  10.45
Just saw the Diamonds’ supplement to the COSMO and all the bees and insects that have been simulated!!?

05.11.91
Working on my "standard" brooch frame.

This is what the "standard" brooch looks like in section.

[I feel that the making of things is just as important as the visualizing of them. It is terribly easy to feel as if one is doing a lot of work when one is visualizing i.e. working in one’s head. So I sometimes tend to make "anything" just to get out of my head.]
06.11.91
Ditto. Made die for stamping inner shapes.

[The intention is to cast (mass produce) a frame that is a specific size, then to press a shape that fits into this frame. This "shape" will be either enamelled copper, embossed silver, titanium or niobium. The frame has to be cast before I can make the die for pressing as shrinkage occurs during casting.]

07.11.91
Frame not quite satisfactory. The seat is too deep.
[evaluation]

Realised that I could have soldered frame straight onto base.

Previous train of thought established by Leszek’s drawing of how he would do it! [train of thought = BLOCK! see photocopy no....? for Leszek’s drawing.]
But then how to ensure flow of wax!? [ subproblem ]
Lines in middle to act as sprue. What should they look like?

Jane did this:

![Diagram of a baseplate with lines in the middle](image)

Couldn’t think what to do!! [too caught up in process, not able to become objective, not analysing deliberately]
Maybe a grid? [Analogy.] So one can choose one’s own pattern afterwards?

[This turned out to be a non-problem as the frame cast without having to make additional sprues]

Thought of making a round frame!

07.11.91
But used one paper ten times!! The diagram below is a representation of the pattern used. See p.101.

![Diagram](image)

[A block had been "bust" Adams (1976). I used to think that as soon as a piece of paper starting breaking up I would have to start using a new piece. This time I was too lazy to walk back to my desk to fetch a new piece so I thought "What if I used it again?". Note the use of "What if...?".]

- Series of related plaques! Progression!

[Conceptual link between a number of plaques.]

Did some wax beads for possible export to the U.S.A, birds etc..... [CHANCE ... mention of possible opportunity by colleague]

[Start of the bird beads on p.131.]
08.11.91

Looked for broomstick die to stamp some wax beads.

[A die made for primitive mass production on the farm. See sandcasting p.56]

Came across dragonfly pattern used approximately four years ago.

Admired it for a while.
In the bus on the way to work, I realised [illumination] that I could use a dragonfly or any other realistic shape cut out for the inside of my cast frames to look nice and ensure wax flow.

09.11.91
Finished new frame and made beads for U.S.A. similar to clay bird beads made approximately four years ago. Discovered through play a new way of stringing the birds.

11.11.91
Thinking about ‘standard’ solution - previous solution - BOATS. [see p.66]
How to set on boat?

Centre one pulls tight. Maybe like oxygen pipes on microflame [analogous thinking]. What profiles to use? What is available? Square! How to make round? Round?! Grind, etch!! Etch pattern on square bar ... solder onto coloured titanium (?!).

[Analysing (dissection) of previous solutions.]
12.11.91
Dissatisfaction with standard solution growing.

[Need for novelty? creative discontent?]

13.11.91
Working on birds, making moulds to reproduce, making beads x 2
STICKPIN! as in undergraduate project (third year Bodypiece).

[ Threads being tied together, see p.51 ]

14.11.91
Deliberate thought :- CROSS BIRDS WITH BOATS (and then?) Also
: relating to fashion brooch (p.61) and first thoughts on setting
with claws and not a frame. (See p.30a)

What about a shape that is put into a frame, given a twist, and
then it is secured. [ visualizing ]
Must (?) be a circle with pins (arms). [ "must" produces blocks ]

[Practising (developing) visualizing skills. Beneficial even if it does not result in a product. Part of preparation.]

14.11.91
On seeing bent dragonfly shape from top of rubber - What about casting it as an earring? eg. Remember history of dragonfly....i.e. from Japanese textile - Wire

15.11.91
Finished off birds STICKPIN! and round brooch frames [see 7.11]

Producing a result (product) allows for evaluation to take place and for the design process to continue ]
16.11.91

Want to vulcanise new oval frame (thinner) so it might need something like a butterfly in the centre. Maybe what is put in the centre could become another piece?! [redefinition] While designing I refer back to fish, crocodile and - skeleton (I was going to say internal structure, but SKELETON feels better, like it could lead places ...!) [Analogy] Single skeleton eg.

Walking past neighbour pulling off pawpaw leaves - why not use a leaf inside wax model to ensure flow of metal? [non-problem!]
16.11.91

Working on 'standard' brooch. There must be a faster (less to go wrong, less finishing of, less fussing) [creative discontent?] way of setting things.

Regarding the word "things"... [Instead of being specific at this stage I thought it better to be general now and specific later. Diverge first then converge!]

Back to

underneath and setting by pulling the curves closer.
Pulling? Pliers, winding, screwing (like rail onto bakkie)
[Analogy with problem solved elsewhere.]

To use thread, use two separate elements.

Problem where to put the catch?!

Made sort of a model. Not satisfactory re looks. Maybe?!!
What about using the birds that I’ve just cast?

Use them like beads in beadsetting?

and push them over ... or use just one ... as final claw or as beak (BEAKSETTING!!)

Later-on using birds - started juxtaposing some with each other and related shapes to form earrings (!)
While wondering about the birds, I see some titanium strip in my skin ... think about BOATS ... how to manipulate strip into acceptable shape i.e. curve for BOAT - forging on one side will curve it and give edge with possibilities of inserting into tapered hole, like a tooth.

Reminds me of crocodile. What about doing tail in titanium and teeth in silver? [see 23.11.91]
Vulcanised a new frame

and it works very nicely so it seems that all the doubts and new ideas were not necessary.

While waiting for investment to set, I played with some titanium, forging it curved and then anodizing, then grinding edge (it seemed rough), anodizing again ...(!!)
[ exploring ]

17.11.91
While lying in bed (thinking early morning thoughts), I remembered (realised?) that I could cast onto the titanium. One problem was how to put a catch on the back of the "croc" without it showing on the front.
I realised (crossed i.e. mated, thoughts) that I could ‘inlay’ the casting.

On the way back from the beach, I saw a "tor" (fruit beetle) yellow and black = brass and titanium [Analogy.] Went to studio: did titanium ‘crocs’, forged them, got carried away and forged a bangle. Then experimented with colouring titanium that had silver cast onto it (casted approximately two years ago). Did inlay casting to solder catches onto. Frames did not cast well - metal not hot enough (I think).

[ exploration ]

18.11.91
Saw ‘geometric’ decoration on a Victorian house being restored. Aware of difference between my ‘style’ and eg. Victorian (on bus). Reflecting on frame ... why is it the way it is?!

18.11.91
Cast onto titanium - holes in titanium not big enough - undercut too small.
Recasting frames - (maybe I should solder the catches on!)

Started thinking of bird necklace ... CATCH!? -

Walking home, thinking about casting onto titanium that didn't really work, thought of riveting them, - resulted in inlaying then soldering on. [visualising]

19.11.91
When I started thinking about soldering catches onto thin shape

I decided to angle the catches upwards to improve the lie of the brooch.
This morning (thinking), ... why not solder catch on edge (like William Harper)? Why not bottom edge (like hands). [Analogy]

Casting worked! So I could now saw my die for pressing the shapes to fit the frame ... pressed the copper plates I’d done before (7.11.91)

20.11.91
I still have not finished a single piece (except one bird). Very interesting!!! [see 2.12]

20.11.91
Did some lacewing/dragonfly (see development of design overleaf) roll on prints (one paper - ten prints).
[ see p.126 ]

21.11.91
I feel like I’m not designing (just playing) at the moment [diverging?]. There is not a very specific goal I am aiming at - maybe I need to consolidate i.e. write down what is in my head...

[Here I became anxious at the lack of a product. Later on realizing that it was analysis/preparation/incubation, I relaxed. Note mixing of creative and problem-solving process.]

No direct benefits after having done it. [see bit about improving tennis p.158]
Carried on rolling pattern onto aluminium sheet. Aluminium implies anodizing (to me).

It would make lot of sense to dome the rectangle then to anodise it and only then to cut out the domed oval, i.e. one would have space for riveting the plaque to the cathode for anodising.

Layout of patterned/dommed pieces seems to have implications for presentation. [chance]

22.11.91
Decided to finish the frames (mindless(?) work!?)

23.11.91
Looked at work in studio at home.

Saw that A G A T E ("Halstone" p.71) connected with my framed brooches I am doing
and that

connects with agate stripes on A G A T E.

Saw fashion brooch which is also mass produced for setting.

Getting out of the car at Tech (on my way to the workshop), I wondered why I was now considering a new shape and not sticking to the old one.

A lot of visualising occurred which resulted in quite a few interesting ideas. For a description of what happened refer to the next page, which is a photocopy from the journal.
23.11.91
Kyk na goed in studio.
Krokodille!
Aluminium! (Anodized) (?!!)
Instead of casting onto Aluminium (you can’t anyway), one could clamp onto it! eg.
[Development on 16.11 - gradual illumination.]

Solder catch onto Ag. Anodize Aluminium (black)
Catch could be for brooch or jumprings for earring.
On seeing glass, I felt a stir of interest (!?) Could it be

145
related to the crocodiles?

Also noticed sandcast dragonfly die ...  

24.11.91
I tried riveting onto the titanium pieces and it worked beautifully. Now just to work out the proper sequence for riveting, colouring and soldering onto titanium. Did some experimental pieces but they are too beautiful (to me) to experiment on. I'm scared that soldering onto coloured titanium removes the colour.

Half an hour later. ... Soldering onto coloured titanium does alter the existing colour!!!

It seems also that one only has one chance to colour titanium. Subsequent colourings are not as predictable as the first one.

Maybe I should solder the catches onto a plate that I then rivet onto the brooch? eg. [ ideation ]
24.11.91
Set one of the domed (stamped in sandcast mould of lacewings) (the back to front one) pieces. Too flat (too even).....

["Too" implies that evaluation is taking place. This leads to a new problem statement. The next sentence shows definition/ideation/selection in one. Please note that acceptance is automatic.]

Maybe I should texture the plate before stamping.

24.11.91
Finishing cast frames.

Used dragonfly die to produce centerpiece for oval frame.

While waiting for tumble polisher (polishing frames), I started working on my titanium crocodiles that I’d tried casting onto. (See 16-17.11.91)
25.11.91
Seeing a blue/green fly, my mind turned to titanium - catches.
To ensure that the rivet holds, file groove at bottom.

(TESt!)

Because of my looming deadline, I am starting to think more and more about the written aspect, so I should possibly wind up my practical work now.
Finish - birds ... cast more - design catch.
Titanium brooches.
.... set .... niobium.

26.11.91
Looking at my collection of work and deciding what and how to finish. Lots of oval shapes that need an earring fitting that can be rivetted on (cut my nails ... went to replace nailclippers ... saw a medal in the jewellery box (Kim’s grandfather’s) ...
saw connection
studied it ... went to make tea ... thought about alternate ways of doing curls (on medal) ... - forging! Remember previous encounter with same problem. [1.11 & before ]

THINGS TO DO

Do more "skulpdoppies" (see p.60)
[This is earlier work that was resolved(finished) at that stage but that now, after more work has been done and new skills and information have been acquired, can be developed further. (Has it become unresolved?).]

Do first rolled oval shape earrings again (as on photocopy P.111).
Glass etching.
Jade i.e. flower-sort-of-shapes made from anodised niobium.
N.B.! In studio - came across all my previous rolled papers i.e. papers used for rolling textures - Alhambra pattern [see below]. Very interesting! [chance - brought on by being busy]

Realised that successful solution to problem of earring attachment (see previous page) will result in many pieces.

26.11.91
Comparing solution of earring attachment to pinching between forefinger and thumb [Analogy] - pinch wax onto earring

i.e.
roll sausage

then fold

and pinch onto a piece of sheetmetal that is the desired thickness

Drill hole for rivet, solder jumper on top (to ensure correct
Having rivet go through might be a problem ... Why does it have to go through?! [circumventing block] See earlier thoughts

and (also inlay rivet for titanium?)

make the hole tight for rivet, so it just gets hammered in like a nail! [Analogy]

Spent whole day making earring attachment (see p.102).
27.11.91
Did enough birds to do half a necklace - DO MORE!!! I must not forget to design the catch.

28.11.91
Vulcanised earring fitting. Starting to slack off on PRAC to think about THEORY. (Why?!) Deadline shifted etc.

Some people wanted to buy some rings ... made me look at them again. (carved "ethnic" rings that I'd been working on before p.68)

28.11.91
Compressed braided ring to see what it would look like. I prefer the proportions.

29.11.91
Waiting for bus. Looking at smaller ring (28.11) - What about hammering it flatter and wider so that I can dome it? Seems like a contradiction to make it smaller and then bigger BUT! It allows me to make the same ring wider.

[ ideation - delaying judgment allows the idea to develop ]

Decided not to sell bird beads to U.S.A. so I need to make some others to replace them ... What about shrinking the ring until it is a bead?!
How many different ways are there of shrinking?! Explore.

[Ideation]

Cut into smaller pieces and then bend around.
Cut and curl
Twist
Fold
Links for chain. i.e. jump rings

Looking at my thought process, I realise that a little spark of interest triggers an intense bout of speculation i.e. redefinition, analysis, ideation and other types of divergent thinking. Approximately two - five minutes and then nothing!

[It is at points like these that an understanding of the design process contributes to its progress. The process having come to a halt does not perturb me. I realise the need for intense analysis/preparation to be followed by incubation.]

30.11.91

Cast attachments for earrings. (It seems satisfactory, for now)

[evaluation] (see p.102)

Cast more bird beads.

Stamped some more oval shapes for brooches.

Cutting them out, I realised that the off-cuts could be utilised, for presentation - probably with glass.

[Redefining "off-cuts" contributes to addressing a problem (thread) from long ago (1984)]
Cast a signet ring that I had carved as a private job, made a vulcanised rubber mould of it.

02.12.91
I find it very difficult to do old work. "Old" means repetition of something done before - repeating a recipe. It is safe ... but not compelling. [not novel!]

Today, I coloured some niobium that has been prepared over the last approximately three weeks. There is such a mass of new factors and colours to work with.

This niobium had been blackened by annealing, so I exposed it by sanding and engraving as opposed to etching (which is how I used to do it before).

[Redefinition of etching (i.e removing metal and not necessarily using chemicals.)]

I also find it very difficult to continue with a piece to the end i.e. to finish it. It is as if I do not need to complete it because I know what it is going to look like. So the closer I get to finishing a piece, the smaller the compulsion to finish it. eg. my oval frames. I can do approximately ten to twenty brooches a day and I have enough ideas for "decorating" them but I've only completed about two. [This could be considered a pitfall of creativity, the pursuing of novelty at the expense of consolidating a train of thought.] On the other hand, maybe I can find a way of "doing
it by not doing it" (myself) i.e. get other people to complete the process.
(see co-operative jewellery p.68)

[At this point I realised that I was in a rut... blocked!]

As for the birds... I still only have a half necklace.

Someone bought one of my rings today, so I had a new look at them and I can feel a surge of interest. [see 28.11]

I also have not completed a single earring even though I’ve finished the attachment. (I know what it is going to look like!)[ not novel! ]

One thing though is that I do not have my spiral die for stamping a twist into my ovals. [see p. 96]
[ block? ]

03.12.91
Doing a niobium test strip to see the colours that are possible to achieve. Bought some lace so that I can do a niobium oval brooch for my mother-in-law’s Christmas present. The lace is for a roll-on texture.

What a kaleidoscope of colours!!
So easy to make gaudy things!
04.12.91

Lots of colouring of titanium and niobium!!

Resist - etch. Grind - colour.

- RESTRICT palette!

[This is an order to myself as a result of evaluation]

Do paper texture on niobium (colours too bright).
10. NOTES

DEADLINES

These play a significant role in the design process by forcing a product (a piece of jewellery) into existence. This leads to evaluation and the resumption of the creative process.

PRACTICE

Deliberate practice does not always (seldom does) lead to a viable design ... BUT ... it is (I think) important as far as improving one’s design skills are concerned. It could be compared to improving one’s tennis by practising against a wall. It prepares one for the opportunity when one will have to draw instinctively on a learned skill to solve a problem.

SKILLS

When I design I employ specific mental skills that are readily recognised. The most obvious ones being analogous thinking and visualising. Having isolated these skills I could now set out to improve them deliberately, referring to books and manuals written on this subject.
BLOCKS

In a few instances I recognised perceptions that influenced my problem-solving and creative abilities negatively. Being able to recognise these perceptions enabled me to alter them to my benefit. This ability to recognise blocks, and alter them, can also be improved with conscious effort.

I also pointed out a few examples of "chance" occurring and touched on the possible effect it could have on my design process.

PHASES

At the beginning of the journal I recognised and pointed out some of the phases of the problem-solving process and the creative process. Later on the phases became more intermingled and more difficult to separate from each other. Quite often phases of different problems and sub problems overlapped, making it quite difficult to recognise them.

Sometimes the problem was that more than one phase was represented by one sentence. Nevertheless they were definitely discernable by examining types of questions and particular words used during the design process. An example being "realised" which, in some cases denoted illumination.
11. CONCLUSION

In the first few chapters the design process, i.e. the problem-solving process and creativity, is analysed and discussed as if it consists of readily distinguishable components arranged in a very specific sequence. These components being the phases of the process and the factors, abilities and blocks, that influence it.

In the analysis of my work, the development of the oval shape and the journal, these phases and factors are recognised, but not as readily as might be expected.

This could be ascribed to the intermingling of problems and subproblems. It seems to me that one very seldom focusses on one problem to the exclusion of all else, particularly if one is being creative. The search for novel stimuli, which I feel is a prerequisite for creativity, would automatically extend one’s perception (definition) of a problem to include factors that are new to one.

Two areas were focused on when examining the link between creativity and problem-solving. These were 1. the product and 2. the process.

The product

In both creativity and problem-solving the establishing of a product has been shown to be the central concern. The difference
in the product is that where creativity is concerned the product must be appropriate and novel, whereas for problem-solving only appropriateness is of concern.

The process

If one focuses on the aspect of novelty, regarding the product, then it is feasible to consider the difference between the two processes to be the factors that are related to the production of such novelty. Having discussed the importance of divergent thinking in the creative process, I feel that this mode of thinking, particularly in relation to redefinition, is responsible for introducing the aspect of originality, or novelty, to the problem-solving process. The addition of divergent thinking can be seen to change the problem-solving process into a creative one.

Own work

In analyzing my own work it became apparent that the problem-solving and creative processes are thoroughly intertwined, making it quite difficult to extricate one from the other. Nonetheless, aspects peculiar to both processes were isolated from within a practical environment.

Within this practical environment, more particularly the journal, the aspects that I can recognise as introducing the
quality of novelty to the problem-solving process are 1. the search for novel stimuli, which can be seen to be a less 'practical' motivation for starting the problem-solving process and 2. divergent thinking processes, being analogous thinking and redefinition.

The design process, therefore, could be seen as a process of problem-solving. Aspects such as divergency, originality, novelty, fluency and flexibility amongst others add qualities to the process which we call creative.
11. REFERENCES


7. Ibid (p.12)

8. Ibid (p.38-45)


14. As in, Olivier (1985), (p.20)


18. Best, 1985.(p.80)


27. Behrens, 1984 (p.10)


33. This concept is discussed extensively in CHANGE: principles of problem formation and resolution by P. Watzlawick, J.H. Weakland and R.Fisch. Published by W.W. Norton, New York, 1974.


35. Graham Wallas (1926), Catherine Patrick (1935,37) in Radford and Burton, 1974. (p.92)

36. Radford and Burton, 1974. (p.92)


38. Olivier, 1985, p.36

39. Ibid p.38


41. Edwards, 1982. (p.35)

42. Koberg & Bagnall, 1974. (p.17)
12. BIBLIOGRAPHY


Austin, J.H., CHASE CHANCE AND CREATIVITY The lucky art of novelty, Colombia University Press, 1977.


