Simplicity and and Realism in Origami

In this study I want to look at the development of Origami and the way in which the search for simplicity on the one hand. and a desire to achieve a greater degree of realism on the other, have influenced the evolution of our modern Origami. I am not here considering Origami where the aim is to create toys or games, fascinating as this branch of paper folding is. My focus in this research has been on the finished model, not on the uses to which it can be put. I have also excluded the very special branch of geometric folding.
Although I mention the use of foil I have taken the view that paper is now the most important medium in Origami, particularly because the use of dampened paper and soft folds are of such benefit in realistic folding.

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Defining Simplicity

The Oxford Dictionary defines simplicity as :-

1   The quality or condition of being easy to understand or do

2   The quality or condition of being plain or uncomplicated in form or design

These definitions seem to me to be an excellent starting point for the investigation of simplicity in Origami and it's impact on the development of our art.
Eric Kenneway often reminded us that Origami is more about doing, that is to say the folding itself , than admiring the result. This point of view was certainly held by Lilian Oppenheimer and she constantly encouraged people to share their ideas and their folds with each other.The emphasis on sharing and hence teaching, has played an important part in the development of modern Origami.

The views on Simplicity of some of the key people in the development of Origami may be relevant here.

Mrs.Yoshizawa has been kind enough to acquaint me with the views of Akira Yoshizawa.(Ref. 1)

"He always thought it best to use the minimum number of folding lines for expressing the characteristics and beauty of objects. With his simple way of folding he succeeded in creating models as he wanted to, not only abstractly, but representationally and realistically. Generally, the sophisticated style of Origami leads to having many complicated folding lines. Yoshizawa was against this idea. To avoid redundancy, he thought it important to use materials appropriately and effectively to create models. Yoshizawa's policy was to create models with simple folding lines that everybody could follow".

David Brill writes in his preference to his book 'Brilliant Origami (Ref 2)'
"I believe my Origami work provides a bridge between the styles seen in the

West; analytical, highly detailed and engineered; and the eastern approach, minimal and artistic. Thanks to the lessons learnt from my painting teacher, Alan Thompson, I have tried to emphasise the form of the whole, rather than home in on details.”

Robert Harbin in his superb book, 'Paper Magic' (Ref3),wrote that experts insist on certain simple rules

> “1. the paper model must be achieved by folding only, without the aid of scissors or glue
>
> 2 the shape of a model should be easily recognizable without the addition of colours or special markings.”

Many years ago I visited the great American master, Neil Elias and I was fascinated when he told me that he wished he could produce simple models, but found that every time he started he felt impelled to create the most realistic result he could. Thus his wish was really to be as simple as possible but he found very difficult to achieve.

Kunihiko Kasahara in his book 'Origami Made Easy' (Ref 4) makes the following observation.

> “In good Origami, the folding process itself is as important as the finished work. If the folding has been laborious, excessively complicated, and wasteful, all these faults will manifest themselves in Origami which is stiff, unattractive and messy”.

Origami Cutting and Decoration

The idea of cutting and decorating Origami paper ,is of course, not new. In Japan specially decorated papers were printed for specific models and cutting was acceptable

Michio Uchiyama published several books in which he followed a style of Origami, which he called Kirikomi , using bases where the paper was slashed or cut into deeply, before folding. He argued that this method divided the

paper into sections which could be separately folded, in fact, he contended it saved paper .

Robert Harbin's book 'Paper Magic', (Ref 3) published in 1956 extols the idea of not using decoration or cutting but strangely has examples of both. A rabbit is shown as decorated with eyes and the sitting rabbit by Rolf Harris uses extensive cutting and decoration.

Sam Randlett's book , 'The Art of Origami' (Ref 5) published in 1961 containers several models in which we are invited to use a paper punch (or otherwise) to make the eyes, for example in the snapping wolf. For the blue whale we are required to cut one of the projections into fine strips radiating outwards to suggest the whales blowhole in action.
Randlett's book also gives examples of preprinted Japanese papers for specific models such as a carp and a postmen. (from the John Andreas collection)

Examples of the use of a pre-printed papers for specific models are to be found on the internet, and I give recent samples.

Certainly now, enthusiasts and most Origami creators, do not use cutting or decoration. I have attending Origami conventions in many countries over the past 40 years and I only recollect one occasion in which we were asked to make a cut in a model. This called for the passing round of scissors for those who wished to work this way and I don't remember many people were happy doing this! It was a good example of how folding simply using ones fingers and paper was so much more attractive than the idea of having to use tools.

The square and fingers as a basis of simplicity

The influence of the so-called traditional or classical models is a very strong one. They are nearly all folded from a square and require no decoration or cutting at all. Nearly all of them result in three D. models, but I will look at this later. Certainly many have been known in Europe for two hundred or more years, as they probably have been in Japan.

The influence of traditional folds is itself an encouragement towards simplicity. A square of paper and one's fingers are all that are needed. The square lends itself readily to such bases as the bird base which has given rise to many memorable models. The crane, the frog, the water bomb, the flapping bird, the tray, and the Junk, are all examples of traditional models that exploit the square .
The square has also many other desirable properties, particularly in sharing folding with other people and in teaching and in the richness it offers creators.
The bases used for the classical models all involve fourfold symmetry. In my publication titled, 'Snow' which you can access on my website (Ref 6) . I show that the bird base, for example, can be generated from three or four simple folds followed by a rotations to 90,180 and 360 degrees In fact all of the traditional bases have such simple generators and exploit four fold symmetry.

With the square having so many desirable properties it is no wonder that it is at the heart of all traditional Origami. The square with its four corners lends itself naturally to bases with fourfold symmetry. In addition the square has a very interesting property in that it is probably the easiest regular shape of all to cut from any piece of paper. With one fold we can create a straight line, with a second we can create a right angle and this leads us into the ready establishment of the square. I don't believe any other shape or of paper has such a simple construction possible from odd pieces of paper as the square.

It is not surprising therefore that the influence of the so-called classical or traditional forms is very marked and encourages simplicity. The traditional models all have fourfold symmetry with no cutting or decorations and nearly all of them result in 3D models.

How enthusiasts are influenced towards simplicity

Those who are keen on Origami will, of course, read many books on Origami they may well have seen Origami on TV, or attended conventions and been taught my experts. Origami certainly in the early days of its growth in Europe and the USA had a strong tradition of sharing. Being taught a fold in a group necessarily required the ready accessibility of paper suitable for folding. The simplest shape, readily available, was a square. if the model required special paper for example a 3 x 1 rectangle then this would have had to be got ready before-hand. Thus, in a group, folding the square became an accepted part of Origami.

A group of this kind also led to an acceptance of just using one's hands and paper. So cutting and decoration took a back seat.

There were two other pressures on those taking part became subject to,when folding in a group.

First of all the teacher was most likely to favour a simple approach to Origami, seeking to achieve the effects desired by simple folding and would tend to choose models which could be readily taught using square paper. Secondly the newcomer would be welcomed by the group and readily helped as necessary. Thus there was considerable emphasis on what we now tend to call peer pressure. The participant would readily absorb that Origami was an art or craft practised in the way they had experienced in the group.

Those teaching Origami , particularly to beginners or children, also find it important to achieve the simplest possible folding sequence that their audience can manage. Thus the teaching of Origami does tend to act as a pressure towards simplicity, not only in the choice of models and the shape of paper needed but also in finding the easiest folding sequence.

The teachers, whether through books or teaching in conventions nearly all

shared a belief in the achieving of a desired result by the simplest possible means. In the UK, Bob Harbin was enormously influential through TV and his books. In my experience, including being taught by him on many occasions, he only used folding and in <u>Paper Magic (Ref 3)</u> he spells out the way experts did not employ cutting or decoration.

In the USA Lilian Oppenheimer and Alice Gray and many others in her circle also sought simplicity. Neal Elias, and Fred Rhom preferred in the main to avoid cutting. in Japan the great master Yoshiwawa only used hands and paper to achieve his wonderful models.

In New York, John Montroll is recognised as a major creator but he only uses square paper , no cutting or decoration, and no use of special papers. (John also works on Dollar Bill folding but that is rather a special branch of Origami)

When enthusiasts study paper folding from books they still find little or no encouragement to employ cutting or decoration. Interestingly even the very advanced books have about 70% of their models are folded from a square.

Thus people seeking to learn more about folding and perhaps, to become enthusiasts themselves, are led towards simplicity.

Pureland and Minimal Folding

In addition to the aspects already mentioned which have the effect of simplification of the means of folding, we need to recognize another strand, the desire of some folders to seek for the utmost simplicity in the creation and folding of models.

It is extremely difficult to create a great simple model perhaps it is even more difficult to define what is meant by a simple model !

Clearly the folding steps should be simple and the locations of the folds easy to find and perhaps, the results, surprising but identifiable and satisfying.

Some forty years ago Mick Guy and I decided a book was needed which started with simple models and gradually introduced advanced models.

I started work on the simplest section and decided the way to go was by using square paper, with only one fold to be manipulated at a time and to trying to make every fold location as easy to find as possible.

I became intrigued with trying to discover how restrictive these conditions could be on the possible range of models. I published my results in a BOS

booklet (Ref 7) and used the term 'Pureland' for the particular approach. I intended 'pure' to indicate my idea that I was talking about the simplest and purest form of folding. I had already heard of the Buddhist sect of 'Pureland' which means 'Western Paradise', I thought this was apt. Later the term Pureland came in general use to mean valley and mountain folds only, with well-defined landmarks, i.e. the fold locations. In my view this is not a sufficient definition , I still prefer the idea of only one fold being involved at a time. It is an interesting point that since publishing my ideas on what I called 'Pureland Origami', I notice that Google now has over 17,000 references to it,so I think the concept has attracted some interest.

Minimalism started as a challenge by Paul Jackson in a BOS magazine for August1981(Ref 8) and it attracted a lot of interest. Obviously there were problems in defining minimalism, but broadly it meant achieving a recognizable and often intriguing model, using the smallest possible number of folds.
Naturally I became interested because 'Pureland' and minimalism seemed made for each other.

There is a two fold model which many of us consider to be a masterpiece of simplicity and minimalism. It is the Santa Claus, by Paula Versnick (Ref 9).
John Cunliffe wrote to me saying something to the effect that he was thankful to have lived long enough to see this wonderful fold. A sentiment I thoroughly agreed with. Of course the recognition of this model depends on
its colours, red and white and perhaps its labelling and time of the year.

One of my own contributions to minimalism was my two sided 'Janus' (Ref10), but there are many other fascinating models.
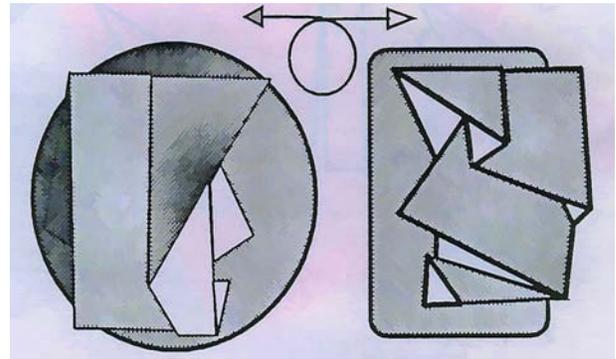
Recently Jean-Jerome Casalonga has published 'Minimal Origami' (Ref 11),with many charming and challenging models. He pre-defines the steps he will count as acceptable in minimalist folding. This is an interesting attempt to bring in some rules, I would challenge however the inclusion of sinks or reverse folds as steps. These seem to me to require not just one fold but many folds, a long way in my view from minimalism..

One of the strange things that can arise from a set of rules or concepts is the wish to see what happens when you break one or more of the constraints. In my 'Paper Play' booklet, (Ref 12) , I presented the idea of 'no- fold' Origami. This is perhaps not as crazy as it first sounds. It called my attention to the way we perceive reality and how we can readily associate shapes with the movement of animals or other objects. (note; see also Casalonga's book, (Ref. 11)

There are many folders who have created some very good simple models amongst them I would mention Nick Robinson, Paul Jackson, Mark Kirschenbaum, Aida Urratia . Having donated my large Origami library to the BOS, I no longer have access to the books and documents that I need to identify many great models and creators, I can only use the ones I can recall or find, and hope I may be forgiven for my sins of omission

Pureland and Minimalism did, however, introduce two revolutions into the the thinking about the simplicity of traditional folding. One was the idea that a model began with the very first fold rather than using a base with fourfold symmetry as a starting point, such as the birdbase, the other was the idea of seeking to express the very essence of the animal or object as simply as possible .

Attributes of Simplicity and their potential impact on Realism.

Realism in Origami can be seen in two ways.

> 1 Realistic folding that attempts to be as close to the way objects appear as possible, we attempt to fold what is in a sense a scale model of the object or animal .

> 2. Folding in which we try to realise in the Origami model the essence or the key features of the object or animal, so we are expressing our empathy and understanding of the creature.

In modern Origami the attempts to build a model or as close to the reality as possible certainly seems to have achieved dominance, although many folders still prefer to express the essence or show their empathy with the animal in question, rather than trying to achieve realistic modelling..

Simplicity in Origami should also to be sought in the folding sequence used. This is perhaps a outcome of teaching Origami, on occasions to inexperienced people or children.

The desire for simplicity in Origami has also led to the idea that we should only use paper and our hands, and thus to not demand the cutting of paper or the decoration in any way at all. As a consequence of these aspirations simplicity points to a recognition and respect for paper as a beautiful material in its own right and this appreciation should be evident in the completed model .

Minimalism and Pureland both place an emphasis on a model starting from the very first fold, they do not therefore require the use of a traditional base as a starting point.

Principles of Simplicity

It now seems possible to identify some of the principles to be observed in simple Origami.

1. Fold location should be by one point only as far as possible, preferably on the boundary of the model. It is best to avoid dual locations and locations within the paper.

2. If possible the model should not be changed into 3-D until the last few steps

3. Simplification by the use of bases is an advantage in that it gives starting points for many models. The most powerful bases for classical models uses fourfold symmetry

4. Avoiding unnecessary folds

5. Avoiding multiple manipulations, the ideal is to make a one fold at a time and certainly no more than three in any one move, that is to say a reverse fold.

6 Prefering a sequence of simple steps, rather than a complex manipulation.

7. A sequence of folds should aim for a sequential rhythm.

8. In the folding sequence re-orientation of the paper should be avoided as far as possible.

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Realism and 3D

I have already noted that most of the traditional models I am familiar with are 3D. Creators seeking for the utmost realism will try to achieve 3D.
Neal Elias used foil for most of his models which will readily hold its shape avoiding the opening up of multi layers due to the natural 'springiness' of paper, but I think it is difficult in foil to achieve the beauty of curved paper.

I think it was Yoshizawa who pioneered the use of dampening the paper and developed special techniques for its use. I am not clear why the dampening of paper leads on drying to a rigid model with curves and a 3D shape . One explanation I have been given is that damping softens the size in the paper which then re-sets on drying ,

I have done some research into a different approach in which the folds themselves cause 3D curves to be introduced. I have tried to interest creators in this method since it avoids the use of any external agencies such as damping the paper (simplicity again).
There are very serious problems to be solved with the use of curves caused by folding alone, the main one is the need for locking the curvature.
Philip Shen and , of course, Yoshizawa exploited the technique of induced curves.

Another approach which has led to fascinating abstract shapes, is where the fold is itself curved.This is an example by Dr.David Huffman.The curves are selected so the whole model locks to-gether.

I am not aware of animal models being wholly created from curved folds although it is possible to use it as an adjunct to normal straight line folding.

I have found a way to create a curved fold by using a successions of straight folds but it is far from easy to see how to use it in practice.

Defining Realism

Oxford dictionary defines realism as the quality or fact of representing a person or thing in a way that is accurate and true. A second definition is given as an artistic or literary movement or style, characterised by the representation of the people or things as they actually are.

From the point of Origami it does seem to be that we need to consider two different approaches to realism.
First of all a realistic approach in which we try to form a miniature of the real object. In other words a dog that looks like a real dog except on a miniature scale. Secondly we may look at realism as the way of representing the essential elements of a particular object.
In the second approach we are not seeking to represent in a miniature way the actual object but rather to represent the characteristics which we can easily and quickly recognize. If we take the traditional flapping bird as an example in its basic form it is scarcely much like a bird, but when we start the flapping motion then it is immediately recognizable because we are now showing the essential characteristics or the underlying reality of the object itself.

Understanding Realism

To understand the place of realism in Origami we must now face up to the problem of what does realism actually mean, and how far can Origami achieve it. Turning again to the Oxford dictionary, one of that definitions it gives of realism is:-

' The quality of fact of representing a person or thing in a way that is accurate or true to life. '

The crux of this plausible definition is, 'accurate or true to life'. So if I choose to represent the realism of say a swan what can we mean when we say, true to life? A Swan can fly or swim or walk, it can eat or make sounds. If I am to represent the swan in a way that is true to life then surely I need to

represent these aspects. If I accept that Origami is the art or craft of folding paper with just fingers, and then how well can I make a model which is true to these aspects The answer is surely that I can't.

So what we are seeking to do in Origami is to somehow represent a distillation of realism. I am limited by the very means that I choose to use, i.e. folded paper. The model I create a cannot move of its own volition, it cannot swim, walk, or fly. It cannot make sounds and it cannot eat. So our realism in Origami is in some way representing a very limited spectrum of the true to life concept of realism.

It is obvious that our Origami modelling of, say, a Swan is concerned only with its appearance. I am putting to one side for the moment the way a model can be manipulated to suggest motion for example by wing flapping

It is clear that our attempts to achieve the realism of a swan, for example, are concentrating on how well Origami can represent the visible form..

But a swan has feathers, and its beak and eyes are different colours to its body which is a continuous complex shape with limited openings.
How well can we be accurate or true to life in our Origami model to all of these aspects , the answer again is that in Origami we can't. For example, with feathers I suppose we might by some incredibly intricate pre-folding of the surfaces of the paper suggest them in a way which is accurate and true to life. Personally I doubt this very much!

The complete closure of a swan's body might be represented in an Origami model, but again I doubt that it is feasible. So with our chosen median of expression, that is paper and fingers, no glue, no cutting, no decoration, we are severely constrained in the way we can be true to life.

I would like now to examine the ways in Origami that we can be true to the life of an animal. Consider a horse , well in Origami we can be true to life in representing the appendages, the four legs, the head, the ears the tail and the general shape of the body. So what it comes down to is how well we can represent in an Origami model what will be seen as true to life in the real animal?.

But every time we ask whether, say the legs of an Origami horse, are really an accurate representation of life we must surely answer, of course not! So surely what we are really trying to achieve is a representation that a viewer can immediately identify as for example a leg or eye of a horse.

In an Origami model the outlines of body and appendages are of critical importance in representing reality. In my paper (Ref 13) I discuss the power of the outline in what we see and in it's representation. However, with the use of 3D in Origami. the outline is given depth which certainly adds to the representation of reality.
Origami typically consists of straight lines, a consequence of folding (I am ignoring here, use of curved folding). But a form of curvature can result when creases, are not fully flattened Yoshizawa introduced his idea of soft folding, where the paper is not sharply creased but softly curved around the shape.

The Search for Realism in Origami and the Influence of Simplicity .

The search for realism when using a square and four- fold symmetry poses many problems.This is well illustrated by the Boston Terrier in a Sam Randletts book The Art of Origami.(Ref5)

Using a bird base with four projections we have one for the head, two for the front legs and thus there is only one left for a rear leg and none for the tail.
The model is also flat, whereas surely you need to suggest, 3 D. in the pursuit of realism. Also the model has problems in that it has many layers of paper in some places and such massing of paper tend to open up.

The instructions for the model also require you to slit the projections over the head to form two ears.

For those seeking realism in the sense of creating a miniature of a dog the

result following the instructions in this book are clearly not acceptable. We need to create four legs, one head, two ears, and one tail a total of eight points or projections with differing lengths according to what is required

In my publication 'Snow' , (Ref 6), I point out that most animal folds such as the horse or dog or bird require a bi-lateral symmetry not a four-fold. So how have folders seeking realism tackled the problems which arise if they stick to square paper and the traditional four-fold symmetry?

Yoshizawa often used two squares of paper and with a four fold symmetry on each he used two of the projections for locking the model together thus winding up six points or projections available .

Many folders including Neal Elias Ligia Montoya, Akira Yoshizawa, and others began to make use of rectangular paper in which the dimensions were chosen for the particular model they were folding. John Montroll however continued to use square paper for his Origami and this meant that he gave up the use of four fold symmetry as given by the traditional basis and created his own bases with bi-lateral symmetry needed for the models he had in mind.

The use of rectangular paper (i.e. non square) means that a four fold symmetry is not possible, but this is exactly the reason for using rectangular paper it is eminently suitable for bi-lateral symmetry . In addition the rectangle makes it possible to avoid some of the awkward massing of layers which a square sometimes seems to demand.

But, of course, it is still feasible to use a square by imposing a bi-lateral symmetry it becomes suitable for animal folds.
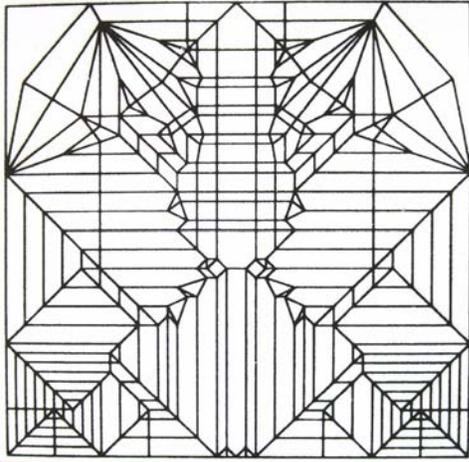
This astonishing fold pattern for the wasp is about the most complex I have ever seen from a square. If you divide the square in half you will find that one way it is symmetric but the other way it is not.

This model also illustrates the realism which can be achieved by complex folding. I am sorry to say I have no idea who is the creator of this wonderful model I think it is Japanese in origin I photographed it at the BOS 40th celebration convention.

The creation of a model by the design of the fold structure has received much attention in Japan and the USA. Robert Lang produced some remarkable computer software which, given the projections and the relations between them, produces a plan for the basic fold structure.

In the search for realism many folders have felt the need to have longer and narrower projections for animal folds, particularly for legs. One solution has been to use triangles, mainly equilateral (Although Yoshizawa has used many others) naturally the triangle does not offer a four fold symmetry or even a bi-lateral symmetry This means that the creator must necessarily create or select a base or fold structure within the triangle to achieve the bi-lateral symmetry necessary for animal folds.

__Origami Profiles__

By using a profile diagram it becomes easier to examine the differences between simplicity and realism in Origami. To establish the elements for the profile mapping I will use two models .

The simple model is the "Hello Fox" by Mitsu Okuda , which I first learnt from the blind Origami master Sabura Kase, it is called the "Hello Fox" because the animal suddenly appears as the very last move, an enchanting Origami sequence.

To help in the identification of the elements profiles I will use Eric J Joisel's Tortoise as this is a very good example of advanced realism
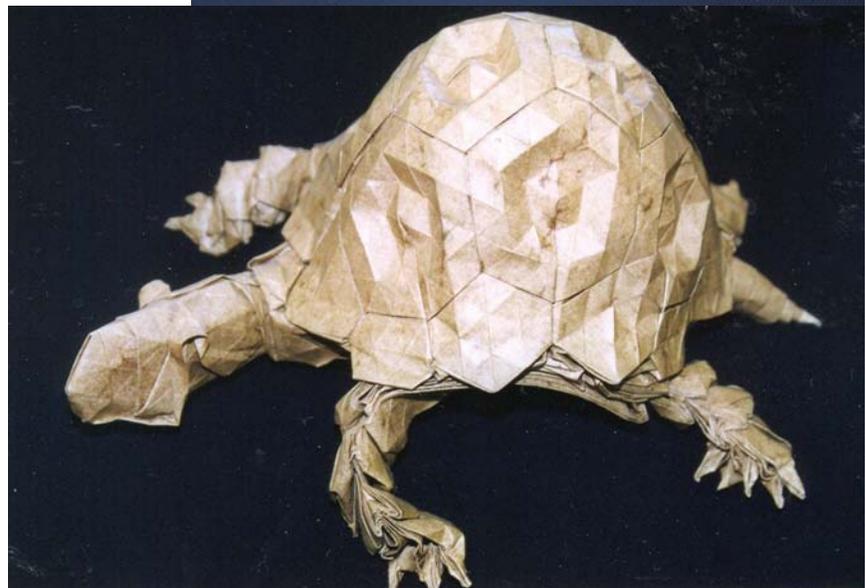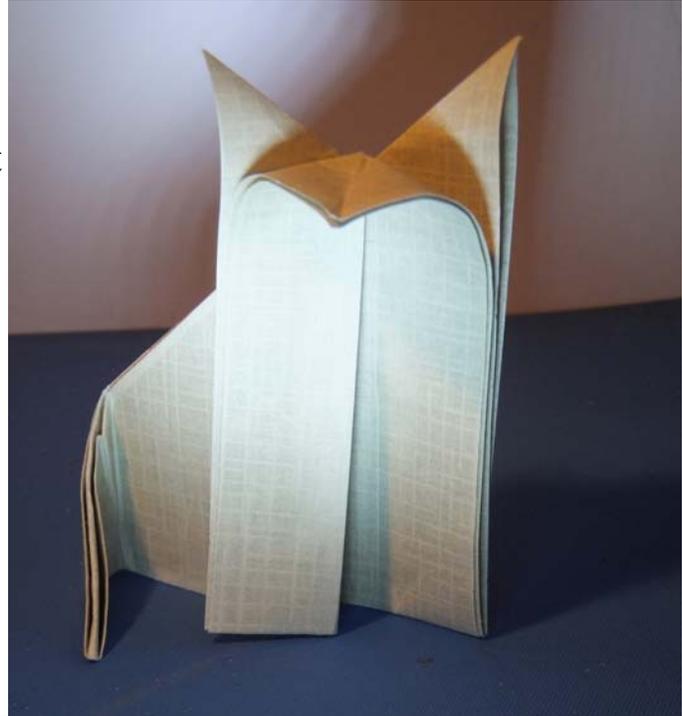
Profile Elements

Before giving these examples of the use of profiles I will briefly sum up the meanings I have attributed to the elements and general features of the basic profile.

1   The profile diagram consists of lines radiating from the centre to the circumference of a circle

2   The lines show elements which I have found necessary to discriminate between simple and realistic models in Origami. To help in using the profile as a discriminator , the element lines all have the same angle to each other, i.e. are equally spaced around the circle.

3.   The centre of the profile diagram shows the minimum value for that element.

4.   The circle boundary shows the maximum value, or the most extreme case of the element

5.   A point is placed on an element line to reflect the value attributed to a particular model

6.   By connecting points with straight lines a profile shape can now be filled in thus giving it visual presentation of the profile .

7.   A point halfway between the centre and boundary indicates a balance.

8   If an element is missing in a model this could be shown by omitting a plotting for that element. When the profile is shaded then it will be clearly incomplete. Such a case might arise, for an example, if the model being identified is somewhat abstract.

With the Fox and the tortoise what are the elements which stand out as

needed in a profile mapping? Of course there must be much subjective judgement in seeking the elements, but I hope that most will be self evident and acceptable.

1. ***Respect for Paper***

Paper Respect

Appendage etc. Deliniation

Fold Difficulty

Pose Posture

Appeal Immediancy

Recognition Speed

The Fox reveals the beauty of the material from which is has been made, for surely paper is one of the most magical means we can employ. The folding seems to arise from the paper itself it does not force or tor- ture the material to get its result. One can easily see and appreciate that the Fox has arisen from folds in a sheet of paper, so it is both paper and a Fox at the same time.
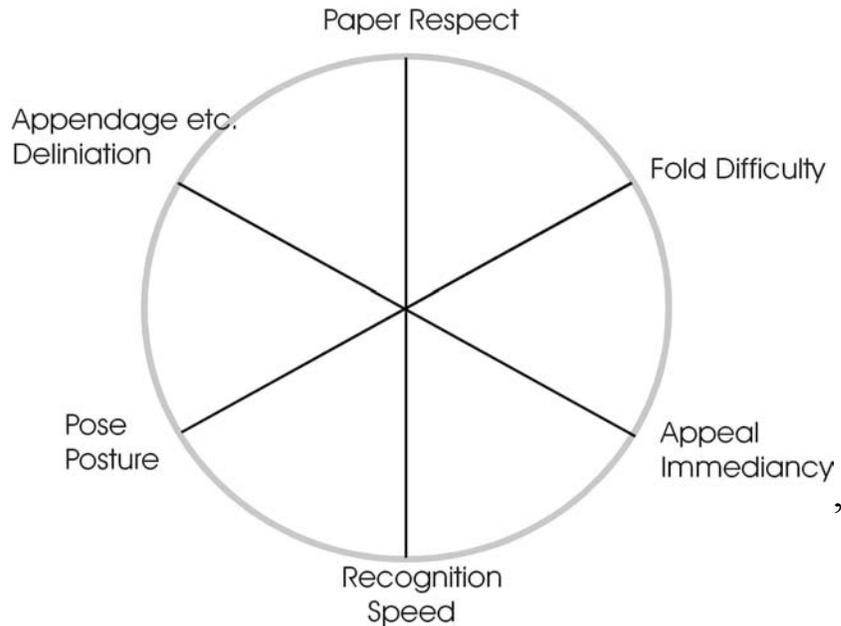
To emphasis this point, on a recent holiday I saw a Walnut table top in which the shapes and patterns in the wood were finely revealed. Later, in a church, I saw an intricately curved screen, the work was a very complex and beautiful, but the wood just seemed a convenient material to exploit. I have noticed the same kind of comparison occurs in Origami. In the 'Hello Fox', the paper forms natural curved shapes, it is essentially true to the very medium itself. It does not exploit it, the shapes, folds, and curves belong to the paper itself.   In the Tortoise such is the scale of details, that for me, the beauty of paper is hidden.

Respect for Paper might also be labelled as a the love of paper . The beauty of paper is revealed in the way it brings life and vitality to model.

Is at its best the delicate curves possible in paper can be achieved by using a damp process which when it dries, sets in the curves. Curves can also be introduced by locking them into the paper in such a way that the paper is held in the desired shape. (I have research this method at some length and christened it **Curio**, from the title, **Cur**ve **I**nduced **O**rigami .

Paper also offers the opportunity for soft folding, (introduced I believe, like so many other ideas by Yoshizawa) instead of a sharp crease the fold appears somewhat curved.

The profile element, 'Respect for Paper', is at a maximum when the model uses techniques which reveal the beauty of paper particular its curvature. As the profile score approaches the boundary of the profiles this is the case where the model appears to be at one with the paper and indeed,seems to emerge from it.
At the other end of the profile line (the minimum) a different regime appears. The paper is now simply a medium to be forced into the desired shapes required for the appendages etc Frequently, multi-layers of paper are crudely displayed, in limbs for example, because the folder wishes to show fingers or toes at the extremity. Often in viewing the final result it is not even clear that paper has been used at all. In some cases one has to wonder why paper is being tortured in this way. Surely some other medium would be more suitable. ? Certainly where simplicity appears the opportunity is there reveal the beauty of paper. There is something more appealing and dramatic in well judged simple folding than in the strong search for reality which can lead to over elaboration.

2.The Difficulty of Folding

With the Fox there are are only a few Valley or Mountain folds . But the resulting figure is essentially simple and compelling .The minimum value for this profile element usually implies that the model is easy to teach as well as to fold and diagram, which is certainly true for the Fox. The maximum value indicates such a level of folding complexity and originality that it seems unlikely that anyone other than the creator could achieve the result . This means that it is unlikely that it can be taught or diagramed to achieve the creators result. I suspect this may well be true of the tortoise.

At first glance the difficulty of folding a model would appear to be directly related to how many appendages are to be delineated and hence how many steps will be required . Obviously there is a relationship, but it is not necessarily the number of steps involved to complete the model,but rather of

the nature of the steps which determine the difficulty of folding the model.

Thus a model requiring ten steps may be very simple to fold if each fold is a mountain or valley fold and easily located. But if the steps include many complex folds such a sink and which must be performed in a strict sequence and are difficult to locate, then the folding would have to be considered as difficult.

The most difficult models with are likely to include:

1 Many complex steps such as sinks and folds within the boundary of the model

2 Difficulty in locating the folds

3 The size of the paper actually being manipulated, if this is very small then the folds will be difficult to handle.

4. Models which have to be folded while holding the model in a 3D. shape

5 Multi layers of paper which have to be manipulated to yield thin legs or other slim projections.

6 Curved folds

7 A large number of sequentially dependent folds .

In the most extreme case of difficulty the location of fold and it is nature becomes a matter of artistic judgement. Often such folds are uniquely curved. Thus a model of this kind is a virtual work of art and unique to the creator.

3 *The immediacy of the impact of the appeal*

The very simplicity of this model takes is straight to it's recognition, this is a

Fox! There is a magic here, the media, and the method are all revealed and yet the result is a Fox.

The immediacy of impact of a model is at a maximum at the circumference of the profile circle, the closer the line goes towards the centre the more it will indicate difficulties in responding to the impact.

Obviously this profile element may well be associated with the subject of the model and the pose as well as it's ease of recognition. I suspect that the more complex the model the less the immediacy of impact and of possibly the identification.

As an illustration of this effect this is an example from a fire escape warning sign. The figure is extremely simple but with the pose is sufficient to yield a high immediacy of impact and recognition.

At its best a final model, will be so folded and dis played is that it grabs ones interest and attention; in t his way the model has a vitality which readily attracts interest. At a lower level the model might be so drab, sad, and lacking vitality that it attracts little interest. Often such models are over elaborate.

4 *Recognition*

We should not need a label or an explanation to tell us what animal is being portrayed. In a great model it is an immediate realisation. Obviously this aspect is strongly related to way the pose or posture of result is shown.

A low value is likely where the pose, the proportions, and the appendages and patterns are at odds with the subject.

At a maximum value it is immediately obvious what subject is.

At a minimum the viewer may need guidance, by means of a title or by the way the model is displayed, to be quite sure we can identify what we are seeing.

5 *Pose or posture*

The final model should reveal our understanding of the animal by its pose. Naturally paper lends itself readily to the adjustment of the outline for

example, of a fold or a slight angle change, etc. But what we are seeking is the enhancement of our recognition thus displaying our deep understanding of the animal itself. A low value is likely where the pose, the proportions, and the appendages and patterns are at odds with the subject.

By reacting to the way a model is displayed (it's pose or posture) we may feel a strong empathy with the subject. Bringing the image to a life in this way will be found at the maximum value of the project line.   At the lowest score the model will seem wooden and devoid of life.

6 *Detailed delineation of the appendages of the animal and the surface and form*

The tortoise by Eric Joisel is a remarkable model in its attempt to achieve a realism particularly, by the use of detailed appendages, surfaces and form The Hello Fox has clearly fairly simple minimal delineation of the appendages and of the surfaces, this is indicated in the profile by plotting near the centre. The tortoise is remarkable in the surface pattern and the way the legs, claws, head and tail (appendages), are delineated This obviously would mean a profile plotting close to the maximum i.e. the circumference of the circle

A comparison of the Tortoise with the Hello Fox, does bring another aspect of realism. In general, the more realistic the model the more it will appear realistic from different viewpoints. A very simple model, like the Fox, usually only makes sense one or two viewpoints.

At a maximum this element discloses a determined effort to show every possible detail. The effect may well be to deny the model impact, quick appeal and recognition. At a minimum the project line indicates a careful presentation of only those details necessary for recognition.

Contra elements

These are elements which hinder the appreciation of the final model. For example where a multi layers of paper show which are of no relevance to the portrayal of realism or where the relative proportions of legs etc are not realistic represented, or where crease lines occur which do not accord with the subject.
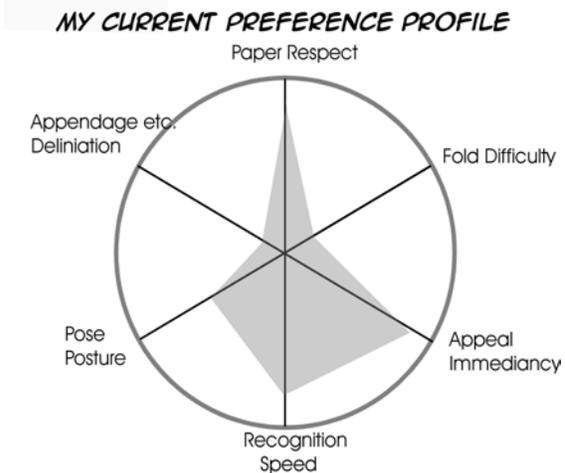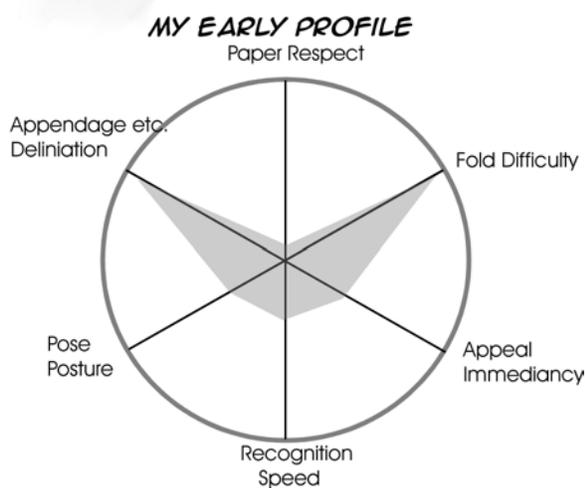
Profile mapping

The profiles are an attempt to identify the main elements which characterises

Origami Simplicity and Realism. Thus they are a way of illustrating the differences between Simplicity and Realism in paper folding.
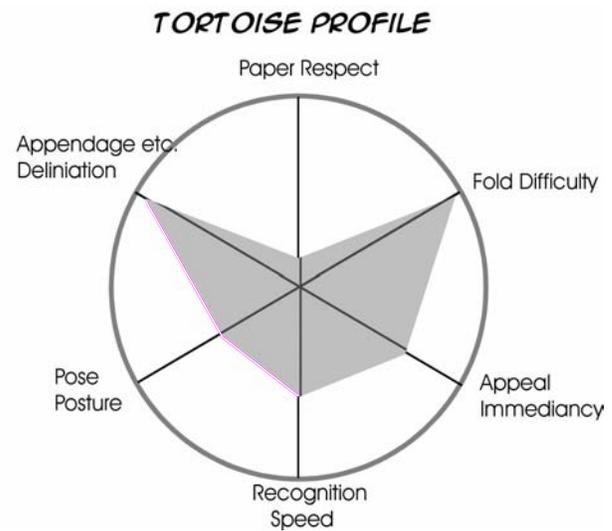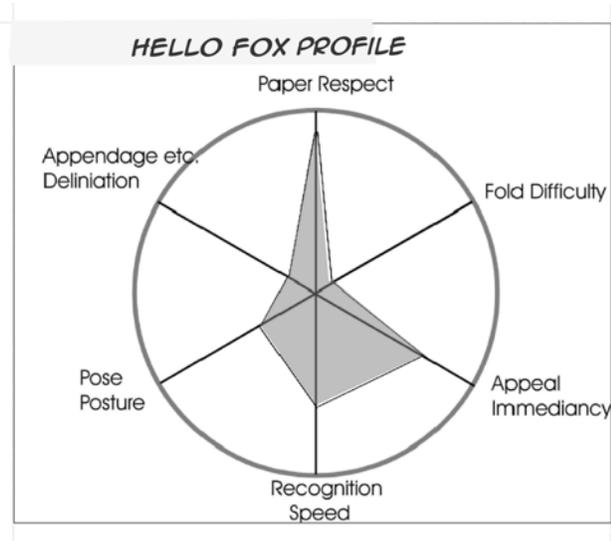
I have used mapping to show the way a simple shaded linkage of the elements strengths lead to identifying markedly different patterns. As an illustration, compare the above shape of the profile pattern for 'Hello Fox' with that of the Tortoise.

The profile map can also be used to study one's own preferences.
 As a demonstration I give a profile mapping for my early days in Origami.

Compare this with my profile map for my current view .
 I have moved from a strong preference for the complex realistic school to my present position of seeking simplicity.
Obviously one can evaluate models using the profile mapping and selecting

those which closest to your current preferences.

HEGEL(Ref 14)

The philosopher Hegel put forward the idea of dialectical scheme that swung from thesis to antithesis and then back again to a higher richer synthesis. Hegel saw this process has applying to a vast range human activities.

I was intrigued by these ideas to seek out how the methods and techniques from simple Origami might influence and illuminate the pursuit of realism.

Thus I have spent some time identifying the ideas of simple Origami including Minimalism and Pureland to see how they could yield a new synthesis within realism. For example, by identifying what really matters in expressing an empathy with a particular animal in the simplest possible way.

Two Origami Masters I have studied in some detail both seek the synthesis of simplicity and realism as a vital matter. I have already mentioned David Brills's account (Ref2) how he studied animals to achieve an understanding and an empathy which he then express simply in his folding. I now wish to turn my attention to probably the most important Origami master of all time Akira Yoshizawa and study how he achieved his remarkable synthesis of simplicity and realism.

Yoshizawa models

In order to study the synthesis which Yoshizawa has achieved him bringing ideas from simplicity to realism, I will look at a number of his models which best illustrate his mastery of our art.

The fox

The alert Fox is a masterpiece. It shows a remarkable sensitivity to paper as a material. The pose of the model is dramatic, revealing an empathy with the animal which is breathtaking. The animal seems almost in motion, it is alert and waiting to pounce. Yet all of this has been accomplished in the simplest possible way. There is no attempt to elaborate; in its simplicity lies its power.

Old Japanese Dance

I find this model utterly charming. How simple it is, and yet showing Yoshizawa's love and respect for paper. The pose of the dancer is so well obtained that the figure almost appears to be moving.
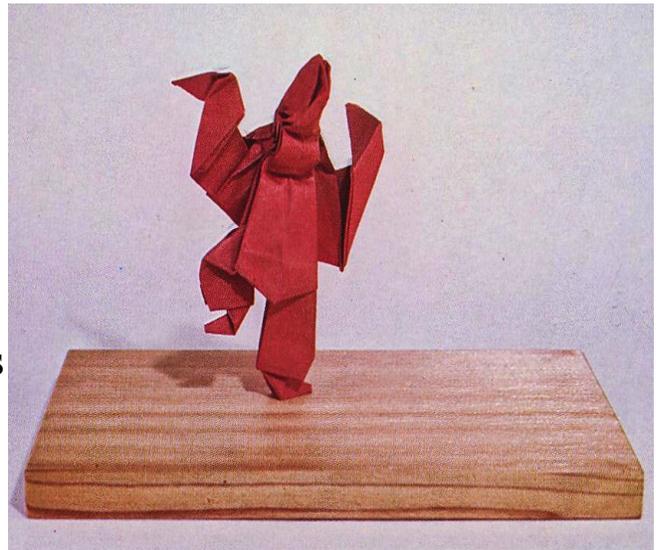
I think at this point it is worth considering how such things as an empathy with the subject and the love of paper as a material can manifest themselves in the final model. Empathy for the subject is revealed through the pose, speed of recognition, and the immediacy of appeal.

Often all we have is a model folded by the creator, or possibly by someone able to understand and express the creators intention. So it is through aspects of the model itself that we glimpse the author.

Monkeys

Here we have a tableau of two figures, an adult and a young monkey. The pose of each is compelling and both seem to have paused for a second before some action is taken. The face of the adult seemed somehow to express concern for the young one

Domestic Fowl (tableau)
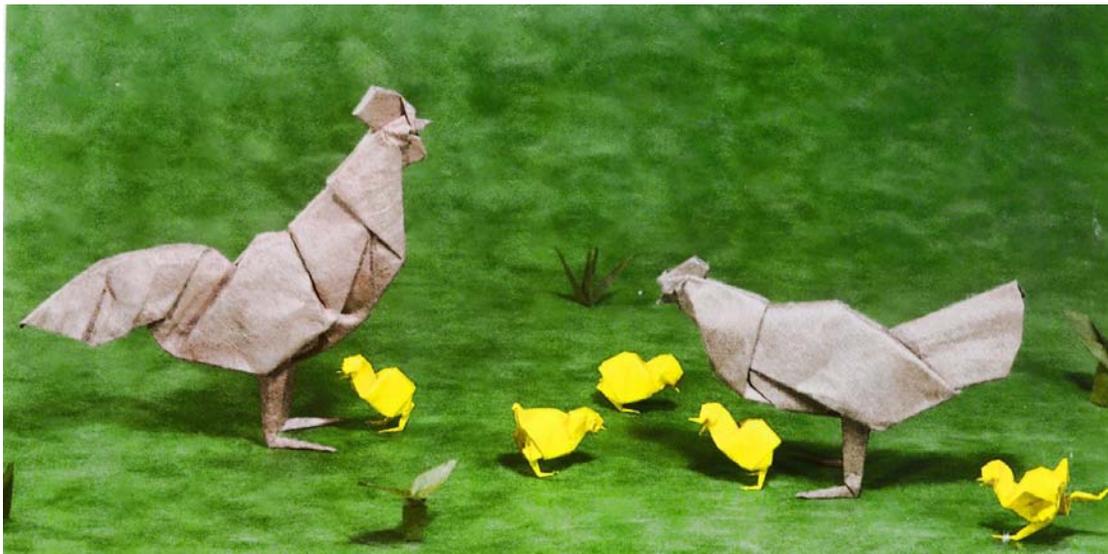
This tableau uses 3 models, a Rooster, Hen, and Chicks. Although each model separately shows considerable empathy the whole tableau re-enforces the way simple Origami has been used to great effect. Each chick has a life of its own, but enhances the other figures . The Rooster and Hen show immense regard for the subtlety of paper and a deep appreciation of the intrinsic life of the animals.
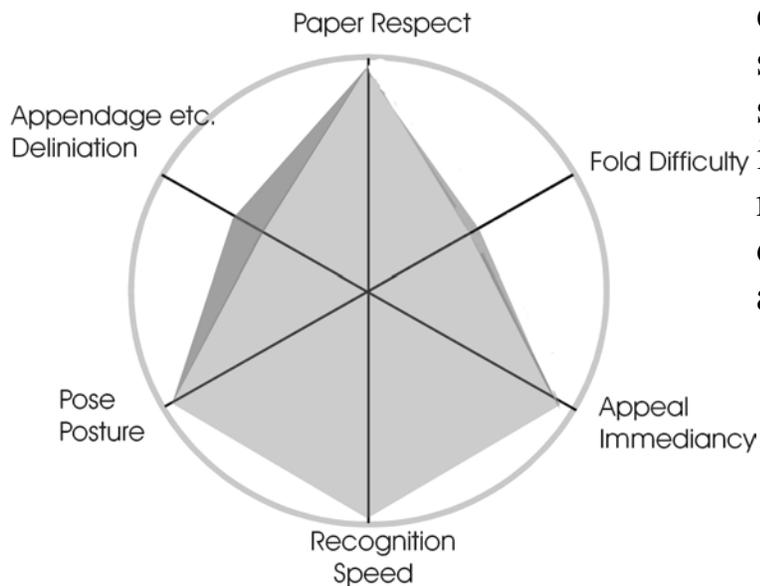
Swans
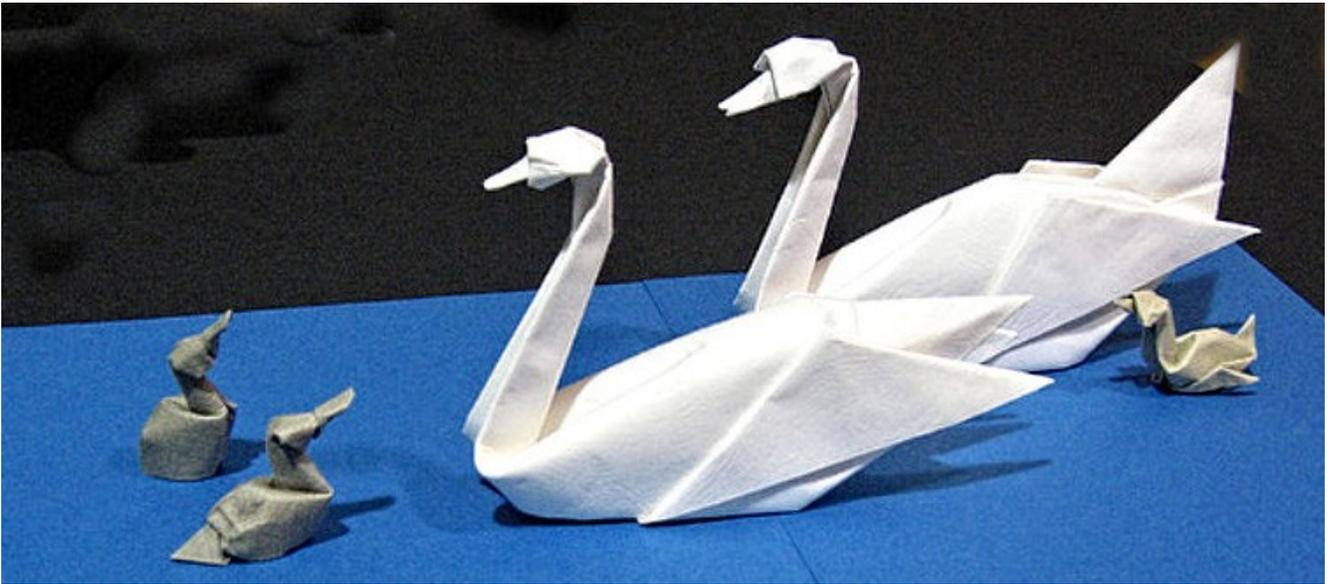
Looking at this tableau who can doubt the genius of Yoshizawa. The swans and cygnets are so alive that one is apt to overlook the empathy, creativity and artistry that created them. This is a sublime example of the synthesis of simplicity and realism achieved by a master.

Rather than give the profiles for each picture I have combined them into a single profile . I did , of course, select Yoshizawa's models which best illustrated his mastery of a synthesis of simplicity and realism.

YOSHIZAWA PROFILE

Paper Respect

Appendage etc.
Deliniation

Fold Difficulty

Pose
Posture

Appeal
Immediancy

Recognition
Speed

 Naturally, therefore, profile elements such as empathy, respect for paper and simplicity shine through the work I have illustrated. In Yoshizawa's models we can see a maturity of   the synthesis of simplicity and realism.

Note:- The additional shading reflects slight differences in the profiles for particular models. Some models have more appendages appearing but because of Yoshizawa great skill in designing the folding sequences, this does not lead to a similar crease in the fold difficulty.

There is, of course, a strong relationship between Appendages and Deliniation and Fold Difficulty. In general the more detailed the model then the more complex the folding is likely to be. However there are many cases when this relationship does not hold good. Eric Kenneway (ref15), "Faces of the Famous", have very simple delineation of the features, but the folding is surprisingly complex to achieve this result.   How easy a model is to fold depends on the skill of the designer of the sequence rather than the number of delineations or appendages required.

This then is my tribute to a great master of Origami.

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