

CHAPTER 6

Contour drawing or CLAM

Introductory

Tracing around a shape, whether on the surface of a mirror (as done by Brunelleschi), on a tracing glass (as done by Leonardo de Vinci) or on tracing paper, involves following a line with the point of a drawing instrument, progressing a bit at a time and responding to every twist and turn separately as it comes. The result will be an accurate copy. In contrast, if we are asked to follow around the outline of an object with our eyes, while at the same time drawing it on a separate piece of paper, “as if making a tracing”, there will be numerous inaccuracies. This chapter explains why this method has been widely used as a teaching tool and in doing so shows that it has both pros and cons.

Definitions

The literal meaning of “contour drawing” is “drawing a line around the contours of an object or shape”. However it is widely used by drawing-class teachers in a more specialised way. For them it means “drawing a line around the contours of a shape, while continuously looking at the model”. This way of doing things was formalised as a teaching method by Kimon Nicolaïdes¹ in the 1930s and gained great popularity in the USA before spreading to other countries. However, there are many earlier drawings, like the one by Rodin reproduced in *Figure 1*, that show that the method was first practised in an informal way long before this.

In this book, the unfortunate ambiguity between the two meanings will be avoided by using the acronym *CLAM*, which stands for *continuously looking at the model* while drawing.



Figure 1: Drawing by August Rodin

If we look carefully at Rodin’s drawing, we will see that, in the absence of having precise rules to follow, he has looked or glanced at the model from time to time. He must have done so because various lines have strayed far from where they should be, and have been redrawn in a more appropriate position. It is an example of what Betty Edwards describes as “modified contour drawing”.² However, the actual lines drawn are typical products of the *CLAM* method, whether modified or not and the result is an image of remarkable vitality. If we wish to find out why, we can turn our attention to the lines describing either the nearer leg or the nearer hand. Anyone who knows about human anatomy will see that, although the curvatures are hugely exaggerated, every distortion reflects awareness of an anatomical feature. Also notice that, despite these distortions, the general proportions of the limbs and the figure as a whole are impressively accurate.

If we focus on the easy to see corrections that Rodin has made and if we im-

¹ Kimon Nicolaïdes, 1941, *The Natural Way to Draw*, Houghton Mifflin, Boston.

² Betty Edwards, 1979, *Drawing on the Right Side of the Brain*, Tarcher, Los Angeles.

agine the drawing continuing on the basis of any of the uncorrected ones, we will easily come to the conclusion that the resulting figure would have exhibited some extremely peculiar features. For example, the thigh of the forward extending leg would have been absurdly thin. This and other analogous peculiarities would have ensured a knock-on effect for all lines subsequently drawn. Evidently, if Rodin had kept rigorously to *CLAM*, the whole would have looked seriously awry. Nevertheless, no matter how odd looking the result, the contour line would still have given a great deal of detailed anatomical information. Indeed, it would have given the same amount as the actual, *modified-CLAM* drawing that he produced. Each change in the direction of the line would still signify the interlocking of some combination of muscles, tendons, subcutaneous fat and/or skeletal features.

Anyone attempting the *CLAM* drawing method described in the next section should find comfort and encouragement in Rodin's performance, for the same main features, both positive and negative will appear in their own productions. Even if they see the result as distasterously all over the place (as in *Figure 4*), their drawings will almost certainly contain a great deal of potentially useful information. What might well be missing is the pervasive evidence of Rodin's deep knowledge of anatomy that he had built up over a lifetime of working with human models. Reasons why the accumulation of analogous structural knowledge is essential to good drawing practice are to be found in *Chapter 8* and *PART 3*.

The basics of making a *CLAM* drawing

Figure 2 shows a photograph of a young woman (see next chapter, for why a live model might have been better). The instructions for making a *CLAM* drawing of her should be along the lines of:

- Place the photograph on a vertical drawing board at an easy viewing distance in front of another vertical drawing board, upon which you have fixed some paper that is suitable for drawing on.
- Without taking your eyes off the photograph and only lifting the drawing instrument from the paper when it cannot be avoided, imagine you are using the tip of your pencil to make a tracing of the outer contours of the young woman's body and limbs. Take great care to follow every curve, however subtle, and every change of direction, however minute, as your eyes arrive at them. At all stages, take your time. Nicolaïdes places much emphasis on the importance of moving slowly and deliberately. But there are disadvantages to being too slow and with practice the whole process

can be speeded up considerably.



Figure 2 : A photograph of a young woman

Figures 3 and 4 are both copies of *Figure 2*. The former is a *tracing* and the latter is a *CLAM* rendering, done according to the above instructions. If we compare the two, we can easily see that:

- Despite some minimal shakiness in manual control and difficulties in dealing with the complexities of hair, the tracing is essentially *accurate*.
- The *CLAM* drawing has got into a *real muddle*.

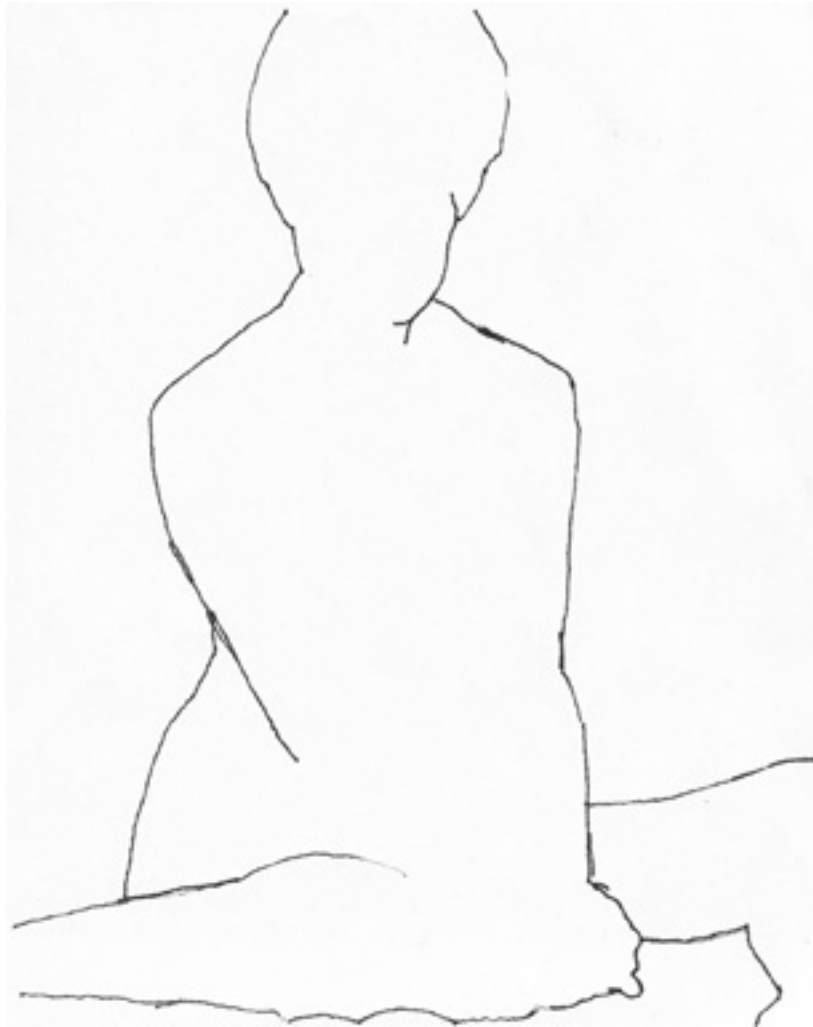


Figure 3 : Tracing of the photo of the young woman

Both are typical outcomes. However, sometimes a *CLAM* drawing is much less fractured, as the examples illustrated in Nicolaïdes and Betty Edwards show. But, they can also be much worse, however hard the artist is trying hard to follow the “*as if tracing*” instructions.



Figure 4 : *CLAM* drawing of the photo of the young woman

The reason why two ways of drawing contours come up with such different results is that the procedures involved are fundamentally different. The fact that tracing consists of following a line, bit by bit, with the point of the pen, makes it a *tracking task*, for which human eye/brain systems are particularly well equipped. However, because of its incremental nature, it requires absolutely *no knowledge of the shape being traced*. As a process, it is as *mechanical* and *mindless* as the ones adopted by the Renaissance artists and their successors when they used the

various different artists' aids that involved tracing.³ In contrast, the inaccuracies that characterise the *CLAM* copies show that there must be something radically different about the way they have been produced, despite the instruction to draw "as if tracing".

What then is the difference between these two seemingly similar tasks? The answer to this question is indicated by eye-movement studies. These show that, when tracing, our eyes remain steadily fixed on the tip of the drawing instrument and the immediately following part of the line to be traced. In contrast, when we try to follow contours at a distance, as is required for making *CLAM* drawings, our eyes cannot do likewise. Rather they move about all over the place, alternating rapid jumps (known as saccades) and slower glides (see *Figure 11* in *The Glossary*).⁴

The eye/brain's way of working when engaged in *CLAM* is to:

- Section off and compare stretches of contour in terms of their relative length and relative orientation.
- Make generalisations relating to curvature-profiles.

The outcomes of the curvature-profile generalisations can either be eye/brain generated simplifications or informed guesses based on previous knowledge of the part of the object being drawn. In either case, it is a matter of "drawing what you know" rather than "drawing what you see" and, accordingly, the result is an example of "intellectual realism". By whatever name it goes, this will be a departure from literal accuracy. As a general rule, the larger the stretches of contour sectioned off, the greater will be the dependence on information stored in memory and, accordingly, the greater the room for inaccuracy.

Appearances can be deceptive

As *Figure 4* suggests *CLAM* drawings can sometimes look pretty bizarre. But even at their worst there is likely to be much in them to learn from. At the other extreme, they can also astonish in positive ways. Some might even be compared to the drawing by Rodin in *Figure 1* with respect to their:

- Recording of detail.
- Freedom of line making.

³ See *Chapter 2*

⁴ For more on this "What Scientists can learn from Artists", *Chapters 17*.

- Coherence as a whole (although they are unlikely to match the master's sense of underlying structure, which, as suggested earlier, reflects many years of experience of working with the human body).

But these are the exception. More normally *CLAM* drawings fall short in all three respects and the people who produced them can find themselves cringing inwardly from a perception of their incompetence. However, they would be mistaken to feel that way. Nor should they be discouraged for, as promised earlier, no matter how bad their *CLAM* efforts may seem, they are almost certain to be brim full of useful information. Indeed, very likely there will be just as much as can be found in any of the less fractured efforts that some other students may have produced.

It is sometimes hard work for a teacher to convince students that what they regard as being evidently shameful outcomes may contain as much useful information as ones they would perceive to be being admirable. A tactic I have used to reassure doubters is to refer them to Rodin's drawing (*Figure 1*) and point out, in much the same way as I did earlier, how much less impressive it would have been had if the artist had not allowed himself several corrective glances at his emerging drawing. Without their help, the final result would have been chock full of errors possibly quite as great or even greater than those that the student is finding so embarrassing.

Above all, it is important for people making *CLAM* drawings of a life model not to be discouraged if some of the limbs they have drawn turn out to be either ridiculously thin or absurdly fat. Nor should they be discouraged if lines in their *CLAM* drawing cross over one other when there should have been space between them. Such confusions are normal. It is also inevitable that, once something goes wrong, the consequences on further line output will be *cumulative*. With respect to accuracy, matters can only go from bad to worse. But accuracy is not the aim. The aspects of *CLAM* that should interest us are its ability to help us to:

- Discover aspects of appearance that we would otherwise have overlooked.
- Provide experience of using the *feel-system*.

Spectacular progress for beginners

However, even from the point of view of literal accuracy, the use of *CLAM*

can be good news. Nicolaïdes and no doubt countless other drawing teachers (including Betty Edwards and myself) have found that, if beginner adults are at the stage of producing the far from accurate, somewhat childlike drawings, that have been classified as “*naive adult*”, the use of *CLAM* can pave the way for almost immediate and spectacular progress in their “*normal drawings*” (ones in which they are free to use as much looking back and forth as they wish). A good teacher needs to know how to encourage this desirable outcome, which is what I set myself to do in my early years as a teacher of figure drawing. Below I describe the method that I adopted. It was a first step in the direction of the drawing lesson described in *PART 3*.

My lesson would start with the students being encouraged to make a “*normal drawing*”. In other words, ones done in their usual manner. It was only if matters did not go to their satisfaction that I might suggest other approaches. *CLAM* was a favourite amongst these. My purpose was always to encourage *new ways of looking* that could be used to improve performance for “*normal drawings*”. At that time in my career, there was no question in my mind of using the method for its own sake.

The advantage of starting with the normal drawings is that they can be used as “*benchmarks*” with which the *CLAM* drawings could be compared.

A problem and a potential to be kept in mind

Over time, students working with *CLAM* and observations coming from my personal explorations of the the potential of “*modified-CLAM*” (*Figure 5* provides an example) have provided me with many insights. Two of the many lessons that emerged were to have a great influence on the contents of this book. These should be kept in mind when assessing the value of *CLAM*. One concerns an *intrinsic problem* and the other an *exciting potential*.

- The intrinsic problem is that *CLAM*, as described above, provides very little of the feedback that is required if learning is to take place, and without learning there will be no improvements in accuracy.
- The exciting potential comes from the fact that even the worst examples of drawing made using *CLAM* demonstrate the formidable capacity of the “*feel system*” for transforming visually acquired information into coherent line-output instructions. What is astonishing is not that the completed *CLAM* drawings are often all over the place, but that taken separately the

relativities of length, orientation and curvatures seldom stray far from accuracy. It is only the cumulative effect of relatively small errors that so often leads to chaos.

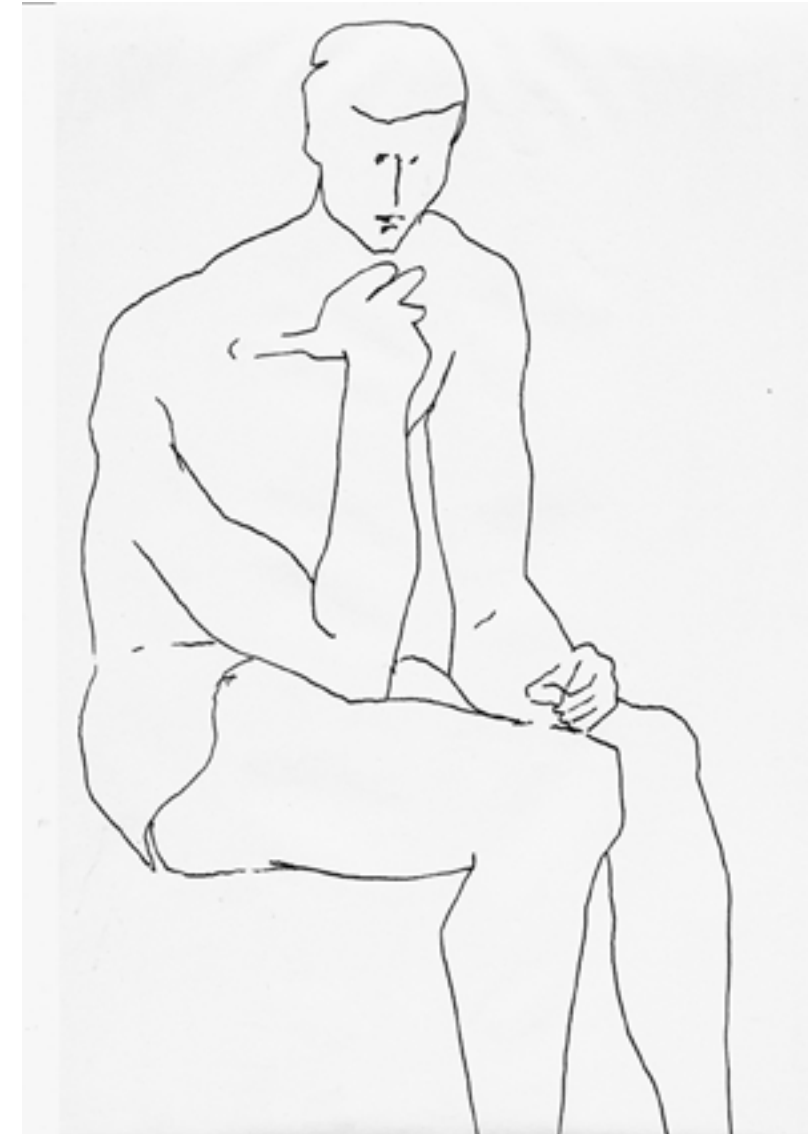


Figure 5 : *Myself seated: Ink on paper, 1966.*

COMPARING NORMAL DRAWING WITH *CLAM*

But this is leaping ahead. Let us slow down and take time to delve deeper into the characteristics of *CLAM* and do so by comparing it with normal drawing.

Normal drawing

Typically, the kind of outline drawings from observation that beginners produce when drawing normally are significantly effected both by the contents of long term memory and by the influence of the constancies of size, shape and orientation. The drawings may well have required hours to produce and their authors will no doubt claim great efforts in the direction of accuracy. They may also assure me, saying, “*I am simply drawing what I see*”. But if that is what they believe that they are doing, they are deceiving themselves. The phenomenon of seeing is never “*simple*”, nor is the process of converting the visually acquired information it produces into instructions to muscle systems for guiding accurate line production.

The beginners, being innocent of these facts, may well not notice much wrong with their judgments of relative lengths, orientations and curvatures, not, at least, when they review them separately. Certainly I am quite frequently challenged when I suggest that there might be an error. However, ill-founded local satisfaction does not prevent disappointment with the completed product. While defending the details, the beginners may nevertheless find themselves deeply ashamed of the final result, which can be far indeed from the resemblance to which they aspired.⁵

Nor is this just a problem for beginners. Errors made by experienced artists are less spectacular but, long experience tells me that they are likely to be numerous. No matter how competent an artist might seem to others, careful analysis will only too often reveal many inaccuracies.

Characteristics of errors found in normal drawing

If we ask whether there are regular patterns or tendencies to the errors made in normal drawings from observation, the answer is “*Yes*”. Although these may slip by unnoticed in the drawings of experienced artists, the tendencies are universal. Thus, several error-types occur regularly in drawings of the human figure.

⁵ Though, for those who are open to finding pleasure in naïve adult drawings, they can on occasion be seen as being full of character and individuality.

These include:

- *Size relativities will be awry*, with a strong tendency for the eyes and mouth to be too big for the face, for the head to be too big for the body and the legs to be too small for it.
- All the parts of the head and body that are turned slightly away from the artist will be depicted *as if seen from a more front-on viewing position*.
- Lines representing straightish edges that are neither vertical or horizontal are likely to be made either *more vertical* or *more horizontal*. Thus, for example, a slightly tilting head will often be drawn as upright with horizontal eyes and mouth.
- A tendency in the direction of drawing *archetypal postures* (for example front-on or side-on view), particularly for heads, arms and legs (this can conflict with the drift towards the vertical or horizontal).
- Asymmetries between the two sides of the body will be drawn as more symmetrical. For example, when one shoulder appears as being shorter and less sloping than the other, the difference will be reduced or even eliminated.
- *Complex curves tend to be ironed out*, sometimes with beginners, to the degree that invariably complex outlines of body parts and clothes are characterised as simple curves or even as straight lines.
- A tendency for body parts that should be truncated as a result of being viewed in recession (as is the left side thigh of the model in *Figure 2*), to be perceived as being longer than in measured reality.

The list could go on, but it is long enough for the purposes in hand. Its contents already provide a basis for appreciating the seeming miracles that can occur on the first occasion that someone, whose normal drawings exhibit an accumulation of the above listed distortions, adopts the *CLAM* method.

The miracle of *CLAM*

If a first effort at *CLAM* drawing is compared with a normal drawing of the same subject matter (henceforward referred to as the “*benchmark drawing*”), the differences are likely to be profound, even for relatively advanced artists. Despite superficial waywardness, it is likely that the *CLAM* drawing will be more faithful to reality in a number of respects. For example:

- The negative influence of size constancy on the benchmark drawings will be significantly reduced.
- The orientation of eyes, mouths, heads, shoulders and limbs will correspond more nearly to those of the pose than in the benchmark drawings.
- Asymmetries in the model's pose will be better preserved or, at least, made clear.
- There will be many more changes in line-direction such that curves will be more complex and correspond more closely to the degree of complexity found in the contours of the actual model.
- The tendency towards archetypal postures will almost always disappear.
- The visual shortening of body parts due to recession will be better preserved, as will be the relativities between the perceived lengths of the different body parts.

In summary, however confusing a *CLAM* copy may appear to be, it is likely to be a considerable improvement on the benchmark drawing in some or, very possibly, in all the above listed ways.

COMPARISON AND MISTAKES

Comparison

As is repeatedly emphasised in this book, *comparison* is the most important tactic available to those who want to develop their observational skills. Before progressing to an explanation of how it can be used in the context of *CLAM* drawings, it is worth making a short detour to elaborate on reasons why.

As explained earlier, all conscious looking behaviour is *knowledge-driven*. However, our attention can be attracted by a sudden sound, a flash of light or an unexpected movement.⁶ In an analogous way, it is attracted by *differences between similar things*. An experiment investigating factors that influence the drawings of young children can be used to illustrate this.⁷ Despite its simplicity, it illustrates a phenomenon that has a fundamental role in *all analytic looking*

⁶ Or, indeed, by a stationary element within a moving one, as Lindsay Wilson, one of my colleagues at the University of Stirling demonstrated experimentally. See "*Fresh Perspectives on Creativity*", Chapter 4

⁷ Alyson Davis, 1983, *Contextual sensitivity in young children's drawings*. Educational Psychology, Vol. 35

whatever the age or stage of the development of the person concerned.

So what was the experiment? First, the young children were shown a mug with its handle out of sight and asked to make a drawing of it. Typically for people of their age, the invisible handle was represented in their drawings. The children had included it on the basis of what they *know* about mugs in general rather than what more careful visual analysis might have revealed.⁸

Next, the children were shown two identical mugs. The handle of one of these was obscured as before, while that of the other was plainly visible. When the children were asked to make a drawing of the two mugs together, all correctly drew one mug with and the other mug without its handle. No special instructions were required to produce this transformation. The comparison between the two mugs had automatically called attention to the main item of difference between them.

If, instead of adding a second mug, the one with the handle obscured had, first, been rotated until it came into view and then been made to disappear again, I feel little doubt that its appearance would have drawn attention to its presence and its subsequent disappearance would have drawn attention to its *absence*.⁹ For this reason, it would not have appeared in their drawings.

In summary both *comparison* and *movement* draw attention to differences between similar things, whether these be alternative views of the same object or of the object and a drawing of it.

But, why should we want to attend to differences? Because the unpredictability of both their location and their characteristics, means that it is inevitable that they enable us to look at aspects of appearances that we would otherwise have overlooked. In other words they *help us to see in new ways*.

This insight can be applied to comparisons between a model and the unintentional inaccuracies in a drawing of it that we call "*mistakes*". The fact that same/difference judgements invariably draw attention to previously overlooked aspects of appearances, means that making and finding them can be used a method of not only for escaping from the straightjacket of our habits of looking but also for extending our awareness.

⁸ In other words, it was a so called *intellectually realistic* drawing.

⁹ As shown by experiments by Lindsay Wilson in which I participated. See "*What Scientists can Learn from Artist*", Chapter 4

MAKING USE OF CLAM

Three way comparisons

In the light of these general considerations, let us see how *comparisons* can be used as a learning tool in the situation, described above, in which they are being made between the *model herself*, the *benchmark drawing* and the *CLAM rendering*, all of which should have features in common.

First let us turn our attention to the learning opportunities provided by comparing the *CLAM* drawing with the benchmark drawing. Even though following the contour of the model without looking at the emerging drawing can reveal spectacular improvements of the kind detailed above, the outcomes are always likely to be inaccurate in a number of ways (For example, in those that are exemplified in the Rodin drawing reproduced in *Figure 1*). However, if the instructions have been conscientiously followed, the erroneous contours will correspond in discernible ways to each and every one of the features that they are intended to represent, which is far from being always the case with benchmark drawings.

Looking at the situation from another perspective, comparisons between the model herself and the *CLAM* copies will always reveal a very large number of unpredictable differences between the two, thereby drawing attention to an equally large number of features that would otherwise go unnoticed. Even trying to explain the reasons for the largest errors can help in this process.

Meanwhile the *CLAM* drawings have also been praised for what teachers are likely to see as two other advantages over benchmark drawings. Thus:

1. The line-production is very likely to be more fluent. Since beginner students often assume this kind of fluency to be beyond their capacities, their *CLAM* copies are likely to provide them with new hope.
2. *CLAM* errors often take the form of *exaggerations and distortions* of the kind found in the Rodin (*Figure 1*). Far from lessening the positive impact of the image produced, these departures from literal realism can imbue it with more force. Van Gogh was a pioneer in seeking ways of giving drawings extra meaning through *exaggeration*. Rodin and many of his successors have found that using *CLAM* represents a way of achieving this goal.

CLAM and the feel-system

Since the rule of not looking at the emerging drawing means that there is no visual feedback from the emerging drawing, everything has to be done by *feel*. Indeed, *CLAM* can be described as a way of “*drawing with the feel-system*”. That this is the case will become apparent when we come to the drawing lesson presented in *PART 3*.

We are so accustomed to using the feel-system in everyday life¹⁰ that we may fail to appreciate its amazing powers. Likewise, it is only too easy to take for granted that it can guide a drawing instrument along complex pathways (including subtle curvatures and sudden changes of direction), simply on the basis of information residing in the patterns of light entering the eyes.

We may also overlook the degree to which *CLAM* drawing demonstrate our sense of two dimensional spatial layout. This is perhaps best illustrated by the significant proportion of beginners who, even after the entire tour of the figure, succeed in finishing surprisingly near to where they started.¹¹ Also impressive is their sense for the relativities of length and orientation between succeeding features. Inconsistency in measures of relativities would bring chaos to the final product that are far greater than anything that actually seems to occur.

While *CLAM* certainly has its limitations, the fact that we are able do it, even without training, is one of the miracles of evolution. At the very least the feel-system provides all of us (even the most seemingly incompetent beginners) with:

- The possibility of an often unsuspected degree of *control over line production*.
- An impressive capacity for sensing *relativities* of length and orientation.
- A feeling for *spatial layout*.

Limitations of the method

The many advantages of using the *CLAM* approach are balanced by serious limitations. The most disappointing aspect of the method is that its shortcomings stubbornly refuse to go away. After the first exciting efforts, it is likely that there will be little or no sense of progress with respect to accuracy. Nor is it difficult

¹⁰ For picking up and putting down, for guiding household tools or for using sporting equipment.

¹¹ I have also noticed that, where there was a shortfall or an overshoot, this reflects a tendency that is characteristic for the person concerned.

to discover the main reason for this potentially discouraging outcome, which lies in the fact *CLAM* fails to provide the feedback necessary for the training of the *feel-system*.¹² This shortcoming is due to a combination of:

- The rule that forbids looking at the emerging drawing.
- The fragility of both short-term *visual-memory* and *working-memory*.

When engaged in making a *CLAM* drawing, the eye/brain sections off a sequence of segments of contours. It focuses separately on each one, makes a generalisation of it and uses this when creating:

- The *line-output instructions* needed for drawing the segment of contour in question
- The *analytic-looking instructions* that guide it to the next segment of contour.

In the process it uses two kinds of memory *short-term visual memory* and *working-memory*, both of which are obliterated by subsequent activity. Accordingly, the slate is cleaned of all information in both types of memory, leaving none available to be used as visual feedback. This matters because, without feedback, learning cannot take place and, without learning, skills cannot be developed.

This catastrophic loss of information is not such a serious matter for the development of visual analytic skills. These can be honed with the help of the completed *CLAM* drawing, by making comparisons between it and the model, in the ways suggested above. However, although there will always be possible to use *CLAM* drawings in these ways, their usefulness is likely to be short term. The reason is that the very success of the method causes it to become redundant. Due to making use of it, the beginners no longer look with the eyes of beginners. They now find themselves noticing numerous features that they were previously overlooking and, consequently, making huge improvements in the accuracy of their normal drawings. From now on, the two-way comparisons between these and the model will provide them with feedback that is likely to be quite as useful as that created by the *CLAM* method. In as far as this is the case, there will be little point in turning to *CLAM* as a means of achieving accuracy.

In contrast, the eradication of the memory traces is fatal for the evolution of the skill of sensing spatial relations. The question is, what modifications would be most helpful? My answers to it are enshrined in *the feel-based drawing lesson*, described in *PART 3*.

¹² See *Chapter 4*, “*The sketch*” for more on the *feel-system*.

Personal expression

A final reason why teachers favour sessions using *CLAM* is the belief that it provides a way of encouraging personal expression. In the short term, the evidence may seem to support this idea, but only too often the repeated use of *CLAM* is likely to lead to frustration. True, if we produce hundreds of *CLAM* drawings, there is a good chance that a proportion of them will have qualities that may be perceived as being as expressive. Unfortunately, as the numbers accumulate, it is likely to dawn on us that the whole process has something in common with throwing dice. If so, particularly if we value the sense of being involved in creation, we can expect to find that even the happiest examples of the chance-determined outcomes give diminishing satisfaction. Once again, the reason for this is the absence of the useful feedback upon which learning depends, and, in this context as in the context of training the *feel-system*, it is only if learning is taking place, that we can hope for true progress and the sense of satisfaction that goes with it.

What is needed is a way of training the *feel-system* that:

- Improves its ability to sense relative lengths, orientations and curvatures.
- Frees it to support our explorations of the expressive value of exaggeration, distortion, abstraction and mark-making.

The feel-based drawing lesson, described in *PART 3*, is designed to meet these objectives.

Summary and conclusions

Everyone can do CLAM. The process involved has nothing mystical about it, nor has it anything particular to do with a supposedly creative right side of the brain, as implied by Betty Edwards in her 1979 book “Drawing on the right Side of the Brain”.¹³ Indeed, none of the artistic practices she suggests can be validly associated with a specifically creative side of the brain. The truth is more prosaic, for they all depend on the essentially banal process of breaking down objects into constituent parts either by means of analytic-looking strategies directed by previously acquired knowledge stored in the memory or by means of mechanical aids. Whichever is the case, all require processing activity in both sides of the brain. It is time to give up the idea that there is a privileged cerebral hemisphere

¹³ See “*What Scientists can Learn from Artists*” and “*Fresh Perspectives on Creativity*” for a more detailed account of how the brain makes use of the *information-gathering stage* in the context of enabling creativity.

that is able to achieve creativity on its own.

The CLAM method is based on procedures that are almost as mechanical and mindless as those required for tracing. Whether despite or because of this, it has transforming power. The reason is that it forces those who use it to adopt looking and line-production strategies that bypass their normal behaviour. No matter how banal the procedure, it results in people looking in a different way. Also, no matter how bizarre the outcomes may sometimes appear to be, the drawings produced by CLAM are almost certain to make available information that was previously overlooked.

CLAM can also transform the quality of line-production. Lines that were formerly hesitant and scratchy become both more assured and smoother for considerably longer stretches. With time, the new confidence can be incorporated in normal drawing practice. Furthermore, because line-output is mediated by the feel-system, CLAM has the potential of keying artists into the dynamics of ongoing feelings. The process of sensing one's way around a form in the context of its personalised connotations and associations is a step in the direction of expressive mark-making.

In summary, the potential of simultaneous looking at the model while drawing can hardly be overestimated, whether as a means for creating eye-opening feedback, or whether as a means of linking line-production with feeling.

But the strategy also has potential shortcomings, all of which revolve around the possibility of allowing its mechanical and mindless aspects to prevail. To avoid this happening, it is necessary to combine CLAM with other approaches.

One suggestion is to use comparisons between CLAM drawings and the model as an aid to correcting sections of the contours normal drawings. Another is to use "modified-CLAM", whereby a limited number of looks at the emerging drawing is allowed. A third, more thoroughgoing possibility, is explained in the course of the "feeling-based drawing lesson" described in Part 3, which suggests ways of integrating feel-system learning into normal drawing practice. The main advantage of doing so is that estimates of length, orientation and curvature can be largely transferred to the feel-system with its proven capacity, not only for highly reliable judgements but also for reflecting personal responses.