Imagery Sources and Clay Sculpture of Adolescents

by

David Cunningham

B.F.A., The University Victoria, 1974 B.Ed, The University of British Columbia, 1990

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Abstract

An experiment was set up in a public secondary school to study the effect of different imagery sources on the claywork of grade eleven and twelve students. A pilot study was conducted with subjects grouped according to the use of three imagery sources: a written description, a photograph and a live model. For the final study subjects were divided into two groups based on two of these imagery sources: the written description and the live model.

Each of the thirty-eight subjects was required to produce a human figure of clay using either a written description (one class of 20 students), or a live model (one class of 18 students). The subjects' work was subjected to evaluation by three judges and a statistical analysis. Three dimensions were evaluated; form, position, and differentiation. The Multivariate Analysis of Variance revealed a significant difference between the two study groups, particularly with regard to differentiation. A qualitative examination of the subjects' work was also carried out to complement the statistical analysis.

This study demonstrated that sculpting tasks based on differing imagery sources probably involve different cognitive processes. Consequently, a variety of such tasks was recommended for inclusion in the

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secondary art curriculum, as a means of enhancing students' abilities in the domain of clay sculpture.

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Chapter I

Introduction

Studio art activities, as taught in secondary school classrooms, fall into two broad categories: two-dimensional work and three-dimensional work. Art teachers wishing to incorporate three-dimensional work into their curriculum often do so by using clay as the medium. Other sculptural media such as soapstone, papier-mâché and wire do exist and are available to art teachers, but most take too long to construct a finished product or are too difficult to work. For example, stone and wood are difficult to control as is papier-mâché. Other media, such as wire, string or rattan, are limited by their nature to small-sized works or crafts.

Clay is a medium familiar to most children, as they become introduced to modeling in a plastic medium through play with "baker's clay" (flour and salt dough). Also, clay is relatively easy to work with the hands alone. No special tools are required but, if needed, tools can be improvised by using pencils, rulers, nails and other common objects. Its plasticity allows for correction of errors without much difficulty and it offers an unending repertoire of possibilities. Clay, when fired, is very durable and, although delicate, can be used for practical objects such as cups, teapots, and ashtrays as well as for sculpture. Students taught the appropriate skills can produce

large sculpture as well as small. The flexibility of clay in this regard is outstanding. Although clay is somewhat messy to store and work with and its firing requires large and expensive equipment, it is the three-dimensional medium most often seen in school art rooms when sculpture is a part of the curriculum.

My own interest in sculpture developed at an early age. I can recall sitting at the kitchen table with my mother on a cold, snowy, Winnipeg afternoon when I was about six years old, making colourful plasticene butterflies to be placed on a dried winter twig as a centrepiece decoration for the dinner table. Later, as my interests broadened, I remember making jungle scenes complete with trees, vines, snakes and other wild animals, all modelled out of plasticene. Eventually, I decided on a career as an artist. Although clay was overshadowed by new materials like wood, stone and metal, my interest in clay was revived, when, much later, I began to teach art professionally in the public school system.

As a secondary school art teacher, I noticed that a visual comparison of the sculptural work and the sketch book drawings of grade twelve students showed the sketch books to contain work that seemed much livelier and more detailed than most sculpture. Much of the clay work of these students seemed flat and lacking in volume. The representations of human figures

included few details and often vital parts of the human anatomy were omitted. In comparison, the drawings of these same students appeared advanced with unusual viewpoints being used as well as the more conventional full-front and profile views. Foreshortening and shadowing were often used and details such as fingernails, eyelashes and clothing were included. Most students who drew in this way had a particular imagery source that they felt comfortable with. Some, particularly those who commonly drew from comics and cartoons seemed to prefer to work from their imagination. A number of students liked to draw from books. The female students enjoyed drawing from fashion magazines whereas the male students worked from comic books. A small number of these students appeared to prefer to work from life.

When a drawing project was introduced most of the students in this group would ask whether they could use a particular book or magazine source, or use a fellow student as a model to help them develop their imagery. I noticed that when these same students worked in clay they seldom sought imagery sources. Instead, they most often seemed to work from their imaginations. This raised the question: Having presented these students with imagery sources such as they used in their drawings, would

different imagery sources cause differences in the product of students' clay work?

Although previous studies have addressed the clay production of children, they have dealt with younger children and used solely the imagination as an imagery source (e.g. Golomb 1992). Imagery sources such as magazine pictures, photographs, live models and other realia seem rarely to be employed. A number of these studies involved the subjects in producing a human figure. A human figure is a difficult image to represent, but a familiar one to all children. The use of imagery sources by teachers and students appears to be common practice in the classroom when drawing or painting is being taught and often these imagery sources are of human beings. It is surprising that exploration of this area in terms of using such imagery sources in claywork is not more common.

I have noticed that in my classes students become more enthusiastic and motivated when their claywork succeeds and meets their expectations. Art students at the secondary level seem very interested in producing work that is realistic or, in other words, that looks like what is intended to represent. Any strategy that aids in making the process of producing clay sculpture successful, would be useful to teachers and students working in

this area. Studies in this area might ultimately help to strengthen the presence of sculpture in the school curriculum.

Therefore the purpose of this study is to determine whether or not different imagery sources used by grade eleven and twelve students result in differences in the clay figures they produce. It is further hoped that this study may provide recommendations with regard to the inclusion of clay sculpting activities in the secondary art curriculum.

Chapter II

Review of the Literature

Students' use of imagery in their art has been explored frequently in the literature of art education. The images conventionally employed by the subjects in these studies are those drawn from their : a) "mental image" (imagination or memory); b) images presented as a two-dimensional representation (photographs, drawings, schematics); and c) images in three dimensions (actual subjects in real life). In the classroom, these three areas are employed continuously. For example, the instructor may request that students a) "sketch from a poem", b) "grid and draw" a portrait face from a magazine, or c) produce a still life painting from "realia" such as flowers or fruit.

A number of studies in art education have explored the relationship between what is seen or remembered and the ensuing product. Perhaps the most interesting relationship which emerges from these studies is that of the "mental image" and its effect on the art produced. Arnheim (1969) and Golomb (1992) typify this interest and focus on the child's development of appropriate strategies to represent a figure.

This cognitive approach to how art is produced is a continuing basis for teaching in many classrooms where teachers look for ways to

successfully employ imagery to both stimulate and train students in the production of art. Are all imagery areas equal in this respect? Will the appearance of the art produced by students working with different imagery be the same or different? Which imagery area seems to be associated with the most successful product?

Art and Representation

The cognitive view maintains that art production is a process of creating pictorial equivalents (Arnheim, 1954, 1969). It is a function of what is seen, how it is seen and remembered, how this image is held in the mind and the process of filtering this information through a particular mind to translate it into a finished product that relies on its own graphic logic. Developmental psychology is frequently employed to explain this process. While much of the research in this area has been concerned with the development of pictorial imagery on a two-dimensional surface, Arnheim (1954) outlines the "development of spatial conception in sculpture" (p.168) the concept of three-dimensional spatial organization. He begins by citing the "primordial ball" of clay as the archetypal form for beginning clayworkers, basing this assumption on such Paleolithic sculpture as the "Venus of Willendorf." Arnheim states that the next development is the

representation of direction by means of stick-like clay forms. A combining of sticks leads to figure work, first an arrangement in one plane and later adding the third dimension (p.171). Terracotta figures produced in Cyprus and Mycenae (second millennium) are cited as examples. Flattening the rolls to form slabs and then increasing the volume of the slabs to give the third dimension logically follows. This is logical but not easy. The understanding of how the different views of the figure (side, front, back) relate to the whole is one of the most difficult aspects of sculpture, and one that does not seem to be restricted to any particular developmental stage: Children and adults alike can have difficulty in correlating these singular aspects into a sculpture; this doesn't appear to be age related. Golomb (1993) states: "We found...much more evidence that the young artist struggles with problems older children must also confront" (p.11) and "cognitive maturity by itself does not automatically lead to competence in a specific domain" (p.12).

A central theme in Arnheim's writing is that a sculpture or a piece of art is a translated representation of what the artist "sees," not a copy of the actual object seen. This representation is not dependent on actual visual contact with the object being depicted. Arnheim (1969) says :"The mind, reaching far beyond the stimuli received by the eyes directly and

momentarily, operates with the vast range of imagery available through memory and organizes a total lifetime's experience into a system of visual concepts"(p.294). The search for representational equivalencies is a function of "cognitive orientation" and this process is not aided by direct copying. Arnheim states:

Exact reproductions are useful for practical purposes but are made more reliably by machines, and the skill of estimating measurable quantities correctly is insignificant and better entrusted to instruments. The human brain is not suited for mechanical reproduction. It has developed in biological evolution as a means of cognitive orientation and therefore is geared exclusively to the performance of kinds of action and the creation and recognition of kinds of things. (p.298)

People are individuals and differ not only in physical construction but also in outlook and interest. This fact creates a huge diversity in the impressions of an object retained in the minds of different people and consequently, those incorporated into a work of art. Arnheim (1969) further writes that:

art not only exploits the variety of appearances, it also affirms the validity of individual outlook and thereby admits a further dimension of variety. Since the shapes of art do not primarily bear witness to the objective nature of the things for which they stand, they can reflect individual interpretation and invention. (p.300)

Arnheim highlights three important concepts significant to my study. First, the idea of the "mental image," that is the organization of visual impressions (memory, eidetic images, imagination) into a system of "visual concepts." Second, and strongly affected by the concept of mental imagery, is the idea of copying as opposed to the search for a representational form. The third is the mind's mediation between what is observed and how it is represented.

Mental Imagery

Arnheim's studies in the area of mental image were largely conjectural, drawing heavily on examples from the history of art. However, Golomb (1976) approaches the question of representation from a practical point of view, having subjects actually produce art (mostly clay figures). For the purpose of this study Golomb's adherence to Arnheim's belief concerning representation in children's art can be summed up as follows: "The representational adequacy of a figure need not correlate with the number of known or remembered attributes". (1983, p.97). In describing Arnheim's theory of representation, Golomb(1976) writes:

This theory defines the process of artistic representation as a search for equivalence of form in a given medium, . . . and the child as well as the adult artist is faced with the task of inventing forms of equivalence suitable to the particular medium in which he is working. (p.26, author's emphasis)

Many of Golomb's studies have subjects working from their memory, reflecting her interest in mental imagery (Golomb, 1972, 1973, 1993). Her

(1972) study supports Arnheim's developmental views in that:

The first representational models are global formations, and their differentiation seems more a function of the child's discovery of representational forms than a matter of increasing accuracy of his concepts. Representational development does not proceed via piecemeal replication of the object, and seems more in line with Arnheim's postulate that it starts with global forms which differentiate as the child invents more adequate representational means. Altogether, development showed an orderly progression in terms of the increasing differentiation. (p.390)

Golomb, in her 1993 study, was concerned with the types of figures produced at different age levels, including adults. Her findings suggest that "From the middle childhood years on, differences in performance of children and adults tended not to be significant" (p.10). These findings raise two questions which helped, in part, to generate a direction for this thesis. First, would external models make a difference to the subjects' artwork when compared to their work from memory or "mental images"? Second, what is a mental image?

Mental imagery itself is a much debated area of cognitive psychology. Nadaner (1985) maintains that "there does not exist a consensus among psychologists as to the cognitive status of the mental image"(p.86). Nor is

there any agreement as to the importance of mental imagery to art production. Arnheim (1969) states that art is "a fundamental means of orientation, born from man's need to understand himself and the world in which he lives" (p. 294). He also suggests that mental image plays a central role in the process in which thought itself is generated and, therefore, of central importance to generated concrete images. As mental imagery bears heavily on one of the tasks involved in this study, a brief discussion in order to arrive at a definition seems appropriate.

Shepard (1978) establishes the existence of "mental imagery" by citing examples of its historical record in science and the arts. He suggests that there is no lack of examples, and he cites notables who specifically refer to the impact of mental images in their work, such as Einstein, Tesla and Coleridge. Shepard describes mental imagery as a process of structuring in the mind which is closer in its nature to a perceptual image than a "concrete picture" or "surface impression" (p.130). He states that past studies of mental imagery confirm that it varies from individual to individual and that it is more useful in some tasks than others. "The results do not, however, tell us much about the nature of a mental image itself or about its relation to a perceptual image" (p.131). Important to this thesis is the idea that mental images are what Shepard terms an analogical (as opposed to logical) process

in the mind, "a process in which the intermediate internal states have a oneto-one correspondence to appropriate intermediate states in the external world"(p.135). This is not to say that the correspondence will be a copy. The visual image (correspondence) of a concrete picture is not exact and "Clearly, the closer parallel is between a mental image and a perceptual image rather than a mental image and a concrete picture"(p.130). I would suggest that the parallel is very close and results in "information exchanges" between both mental and visual systems.

Rey (1981) agrees that mental images are a bona-fide phenomenon (if somewhat difficult to observe and study) and tries to ascribe a correspondence between visual image processing and mental image processing. Two important properties associated with visual images are colour and light (p.118). Light enables spatial properties of objects to be observable; that is, length, width, depth, proportion, composition and orientation of parts. The visual image that depicts something, that Rey terms an "X-depicting 'image' is a particular kind of representation" (p.119). This representation does not necessarily need to be complete.

An X-depicting image . . . seems to be a representation in which not only it, but also some of its visual properties, play representational roles: not only does the X-depicting image represent an X but some of its visual properties represent some properties of an X.(p.119)

The image and the particular (that which is being represented) correspond in terms of some of their visual characteristics and it is this correspondence which is "needed to distinguish imagistic from nonimagistic representation" (p.119). This is in line with Arnheim's and Shepard's thinking. Imagistic representation implies that at least one visual property of a representation must correspond to the actual object being represented, in order to be considered X-depicting. A non-imagistic image might be Xdenoting or X-describing, for example a written description.

Rey is less precise in describing how this model of visual imagery might apply to mental imagery. He mentions the "picture in the head" theory and the link between the "mental image" to a particular "configuration in our brains" (p.121). What is important in this thesis is the possible relationship between the way the eye and the brain access information (p.122). Brain systems may be similar to visual systems that allow us to connect the imagistic representation to the depicted object by using at least one compositionally exploited property. What is interesting, if this is so, is how much "interference" or "chatter" occurs between the two systems, visual and mental? Does the mental image interfere with the visual image in any way and vice-versa ?

The relationship or link between visual and mental systems is carefully explored by Marr (1976). In his work, the image and the brain's representation of it, called the primal sketch, are seen as distinct (p.516). The primal sketch is characterized as a mediator between what is seen and what is represented. This implies communication between the perception of the image (visual system) and the primal image (mental system). The brain 'computes' the visual image into a description (the "primal sketch") which can be manipulated to produce a representation. The image itself, however, is not manipulated in this way. Marr suggests:

The vision problem begins with a large grey-level intensity array, and culminates in a description that depends on that array, and on the purpose for which it is being viewed. The question of interest is what has to go in between. (p.484)

Sterelny (1984) further explores the link between imagery and perception and refines their commonalities into two groups. First Sterelny postulates: "In an image, if the size and shape of an object is represented, its orientation is; so too in perception" (p.570). That is, the form of an object, both perceived or imagined is tied to the position of that object. Second, "perception is at least partly an automatic and autonomous process.

In some of the same ways, imagery equally seems to be automatic and autonomous" (p.570).

Therefore, a conscious thought process is not required for the processing of much of what we perceive or imagine. This makes sense, as otherwise the process of recognition (or representation) would occur too slowly to be of much use.

Copying

Block (1983) examines representation versus copying in terms of the mental imagery process:

Pictorialists can and should allow that drawing is a task that requires the child to make use of his conceptual machinery, and is not a matter of "copying" an internal object. . . what the child draws has as much to do with how he solves a certain problem (the problem of drawing), especially what concepts he brings to bear as it has to do with his internal representation. (p.652)

Copying is well-documented in the literature, mostly in the area of drawing. There has been much debate on whether copying is an appropriate instructional method for art educators to use in a classroom. Practically, however, the truth is that what in art education literature is often labelled as "copying", is a frequently used stratagem (Kindler, 1992, 1994). Like working from mental imagery, copying can be seen as something more than a point-by-point congruence to an image (Duncum, 1987; Kindler, 1992). Duncum(1987) states:

There is frequently a confusion between copying as an attempt to make a fairly exact imitation of an original, as ordinarily defined, and copying as something rather less than an exact copy . . . those untroubled by copying often use the term in such a way as to involve variance, and sometimes considerable variance, from the original. They understood copying to involve interpretation. (p.203)

Later in the same article, discussing the arguments in favour of copying, he says; "It is also suggested that copying may be most beneficial where it involves variance from the original" (p.208). Duncum maintains in this article that copying from a picture is not necessarily duplication but rather influence. In this way perception of the two-dimensional image can be seen in a very similar way to mental imagery, in that a one-to-one congruence is abandoned in favour of correspondence and representation. Smith (1985) echoes this view:

Not all copying involves exact replication. In fine art there is a long history of artists using the work of predecessors as a reference or jumping-off place. Students in fine art are encouraged to copy the masters; in this activity the student tries to recreate the process of the master to gain the knowledge, but does not necessarily attempt a replica. (p. 147)

Citing comic books as a favoured copying medium, Smith makes the point that copying is a route which satisfies a child's desire to make "adult art forms". The comic is "...an example of adult art accessible to children, thematically understandable and simple enough graphically to provide a model possible to copy" (p.150). When asked to copy images, Smith's subjects didn't copy the lines of the comic exactly, as in the anatomical drawing of a superhero for example. In the process they "created awkward lumpy figures . . . so remote from those of commercial comics, one is led to speculate that perhaps the children's' intention was to indicate content, not to copy imagery" (p.152).

Kindler (1992) argues that young children's copying behaviour is "neither random nor mindless" (p.14). Duncum's (1984) article describing how children who later became well-known artists learned to draw, is also illuminating. Three of the imagery areas by which these people (Grosz, Crane, Picasso and others) learned to draw are (1) From studying pictures, (2) Verbal instruction, and (3) Directly from life (p.99). Robertson (1987) lists six strategies used by the subject of the study, Bruce, in learning to draw. These are (1) Picture study; (2) Memory drawing and borrowing; (3) Observational drawing; (4) Invention of feeling-image correlates; (5) Doodling; and (6) Mixing and mis-matching. All of the above are self-

explanatory with the exception of number four. The term "feeling-image correlates" in this article refers to the haptic sense, using one's own body as a reference not necessarily by direct observation but by assuming the position of the model and feeling what it is like:

Bruce insists that every drawing has to have a feeling to it while he is drawing. "It's not just being able to draw, you have to act like the character to feel it"... He positioned his hand, fingers tensed, glanced briefly at it, then drew ... I asked if he was drawing by the look or the feel of it, and he said mostly the feel of it. (p.42)

Robertson found that this type of action taken in drawing from the body was also used in Bruce's drawing from other artists' work. Bruce was disdainful of direct copying:

Though he studied these models (picture study) closely, Bruce disliked copying. His definition of copying was drawing with the picture before him. . . . He preferred to draw from memory (of the picture study) because he could "make changes, be original, even though you can learn about shading and stuff by copying". (p.44)

The strategies used by Bruce are at one end of a continuum which stretches from close adherence to the given imagery (copying) to variance from the given imagery (borrowing). The borrowing strategies are of particular interest. They reflect the process of mental imagery working together with perception where copying is not so much the desired end as the mind's search for "equivalent forms", "correspondence", or "representation".

Smith (1985) also explores the value of copying models, citing comic strips as examples: "Some contemporary proponents of copying cite its [comic strip] value as a means of learning the graphic conventions of representation" (p.147). Smith notes that children invent themes within a form (in this case, comic strips) and depart from the appearance of models to suit their own needs. Smith concludes that there is a wide range of possible variations in children's representations within the framework of a single model: "However, we need much more information about which models the children choose and why, about what children take (and do not take) from the models, and about how they modify the models." (p.148). Some answers to these questions are provided in Kindler's (1994) article, where she presents a case of a six year old child who spontaneously selected formal elements of Haida art as a result of his extensive exposure to these art forms.

Perceptual Cues versus Graphic Conventions

Wilson and Wilson (1977) are also proponents of the "acquisition of artistic conventions- this imitative process" (p.5) and in at least one particular study "sought to learn how images are developed, modified and adapted" (p.5).

Some cognitive researchers believe that making art is a product of acquiring graphic conventions (Gombrich, 1972; Wilson & Wilson, 1977). Arnheim's "revolution" on the other hand, was to argue that making art is neither what is known nor what is seen, but it is a construction of pictorial equivalencies. Golomb (1992) states, "At the heart of representation, as Arnheim has argued, is the urge to create equivalencies of form in a particular medium, forms that correspond structurally or dynamically but not literally to the object" (p.3). A middle view is suggested in the work of Pariser (1984), who explores graphic conventions and the perceptual basis of pictorial representation. Pariser defines two terms; "graphic conventions" which "refer to the graphic formulae which have evolved in various cultures for the purpose of representation" (p.144) and perceptual cues, "the stimuli received by the eye when looking at an object" (p.145). Arnheim's and Golomb's work refers to perceptual cues, whereas Gombrich and Wilson and Wilson talk about graphic convention. Pariser's own view is that both of these processes are simultaneously at work in the production of art. He cites Freeman (1972), who developed a middle of the road system between conventionalism and perceptualism:

It is the art of interpretation which lies at the heart of the representational process, says Freeman. The critical point in making a graphic representation is reached when the maker consciously decides which set of cues, perceptual or conventional, he will emphasize. (p.146)

In the study Pariser conducted he had his subjects (elementary level students) work from a reproduction of Durer's Rhinoceros (2D) and also a series of drawings from life (3D). His subjects used both perceptual and conceptual strategies to accomplish the tasks, each student using these strategies in various proportions.

Willats (1977) raises several points about "observational drawing" which directly relate to my study (pp.367, 377-M/1). Firstly, he equates detail and differentiation with the development of representational ability and suggests that older children use more detail and differentiation in their work:

One familiar aspect of this change is the greater detail which older children put into their pictures. For younger children any roughly circular shape serves to represent a head, with perhaps the addition of circles or dots for eyes, and a line for the mouth. In the drawings of older children not only are the drawing elements more numerous and more carefully differentiated, but extra detail serves to represent more finely discriminated features in the scene. (p.367)

Secondly, Willats looked at occlusion (overlap) as a measure of cognitive development. The use of overlap was found to be age-related, older children accepting the fact that part of the object was hidden:

It is often said that young children draw what they know about a scene and older children draw what they know of it. This can account quite well for the depiction of overlap. Young children know that boxes, tables, etc. have continuous boundaries and so tend to draw them as bounded by continuous lines. This prevents the representation of occlusion by overlap which necessarily introduces discontinuity. (p.377)

This well illustrates the push and pull between perception and convention. Thirdly, Willats indirectly suggests that it is possible to alter one's approach, either perceptual or conceptual, to the process of making art, by citing the example of modern China and Japan:

Oblique projection was used as the basis of painting in China and Japan for many hundreds of years and we can only suppose that their artists were perfectly satisfied with it. It was the experience of seeing western painting (using classic perspective) which finally induced eastern painters to change to perspective, not their experience of the real world, which they had in front of them all the time, just as we have. (p.380)

Smith (1983) gave her subjects a choice of drawing tasks to see if they would choose to draw from direct observation of, in this case, a live iguana. The study found that students "included greater detail, overlapping, unconventional orientations, and complexly contoured shapes" (p.25) when drawing from observation. Volume, however, was not indicated. Would this tendency toward detail in observational work be apparent when the student was working with a volumetric material, like clay? Smith's students were young (8-10 years old) and the lack of volume in the drawings may be due to the fact that representation of volume "requires conceiving of the means for creating a visual illusion, rather than as a means for creating an equivalent based upon concrete correspondences" (p.25). "Visual illusion" mentioned here could be equated to Arnheim's "representational equivalencies" mentioned earlier.

Freeman, Eiser and Sayers (1977) did a study on how children (5-10 years) expressed depth on a two-dimensional surface. While not directly concerned with the volumetric concerns of this thesis, the findings that strategies like separation, verticality, enclosure, and occlusion develop to allow more complete and satisfying solutions to the problem of expressing depth on a two-dimensional surface are interesting. Perhaps such strategies also exist in claywork. Freeman agrees that there is no one route to mastery of any art form: "To return to the introduction, it is characteristic of 3-D drawings that there is no correct unambiguous solution to the problem. Instead there are a variety of answers, some of which are mutually exclusive" (p.313).

Conventional theorists point to copying other's work rather than perceptual imagery as the basis for representation (Wilson and Wilson, 1977). Pariser (1984) proposes a middle ground between conventional and perceptual theories. He suggests that all images possess both perceptual

and graphic information and that this information is on a continuum. Some images have many graphic cues and few perceptual ones (like blueprints, or shorthand) in which formal, abstract elements are perceptually quite unlike the image; and other images (television and photographs) have much perceptual information. The maker of a representation is seen as deciding which sets of information, perceptual or graphic, will be emphasized (p.146).

In his study, Pariser (1984) set two tasks: a) drawing as perception (blind contour) and; b) a drawing "as the assimilation of graphic conventions" (p.177). This last was a copying exercise. Pariser found that his subjects were able "to make renderings of objects and views of objects, for which one may lack the cultural formulae" (p.154) thus working both perceptual and conventional cues into their drawings. When faced with the copying task, the subjects' use of graphic conventions as well as the perceptual cues found in the image worked together, at least one subject transforming the representation into a completely different object (rhinoceros to the story of rhinoceros). In both tasks a variety of strategies were employed in representing the image.

Representation in Clay

Drawing strategies have been well scrutinized in art education literature. The clay production of children has, however, been less explored. Clay is a more difficult medium to work in and study, given its inherent properties. Information about clay, three-dimensional medium, is a more difficult medium for both the subject and for the researcher. Unless well-trained the subject often finds that the technical difficulties of working clay (drying, cracking, weight, joining) add to the problems already present in making a clay representation. In the case of clay representation, the fact that the subject has to "solve a certain problem" refers not only to how the figure will be constructed, but how the inherent structural limitations of clay (weight, sagging, drying, breaking, support, etc.) will be overcome. Golomb (1993) is one of the researchers who recognizes this difficulty particular to claywork and specifically refers to it:

Unlike drawing development . . . three-dimensional representation in clay has been largely neglected. The reasons for this neglect are not difficult to discern; it is a technically difficult and somewhat messy medium to work with, and clay figures handled by inexperienced children tend to fall apart. (p.3)

Clay is not as commonly taught as drawing skills and this lack of familiarity with the medium is both intimidating and frustrating to anyone trying to make the clay representations.

Human figures seem to be a special focus for those attempting studies concerned with claywork. Brown (1975) conducted a developmental study of children aged 3-11 years, using the human figure as a model. The subjects were asked to work from their "mental image" of a person, the instruction given was not descriptive and did not supply many clues to a particular human figure. The details of the clay sculpture of figures made were found to be developmentally behind those details present in the children's drawings of the human figure. Brown states; "The data show that the details in the children's figure drawings increase significantly in number much more often than the details in children's clay figures" (p.52). Another interesting point brought out by this study is that these younger children worked mostly additively, adding pieces to the main bulk of the clay to form arms, legs and other details. It would be interesting to investigate whether or not this remains true for older children as well.

Two problems with representation in clay are isolated by Grossman (1980) from the writing of Golomb, Brown, and Arnheim, among others:

The most salient observation expressed by each of these authors was that, at least up to about 6 or 7 years of age, children's development in a three-dimensional plastic medium such as clay is less advanced than their drawing because they lack experience and are constrained by the technical demands of working in playdough or clay. (p.51)

These two problems, lack of experience and technical demands, are not alleviated unless there is opportunity for practice with the medium. Consequently, there are grade twelve level students whose ability in clay is no greater (if as great) as five to eleven year old children. Kindler (1993) has, however, noted that children's performance on art-related tasks is often a function of the specific context in which the works are produced. Peer interaction, as well as an active involvement and teaching by adults, enables children to specifically improve their performance on tasks that can be accomplished only with a limited success in laboratory settings.

In this study Grossman stresses modeling repeatedly. This is the preferred method children use to work with clay, and gaining experience and confidence with this process is central to being successful with threedimensional clay art. The modeling process is not necessarily taught in our schools in a systematic and helpful way. Not many instructors themselves have the confidence to model and to feel comfortable teaching the techniques to others. Grossman lists basic clay modeling skills or techniques as: "1. Flattening; 2. Rolling; 3. Folding; 4. Joining; 5.
Incising; 6. Stamping; 7. Making balls (spheres); 8. Cylinders (made from coils)" (p.52).

For the purpose of my study the first five of these and number seven are to be considered true modeling techniques. Stamping is seen as a decorative technique, not as a manipulation. Cylinders are made from coils, covered under number two. Coiling is an alternative to modeling, like pinch technique or slab technique.

In his study, Grossman (1980) used the human figure as a model, even though the subjects were of preschool age. Grossman notes that instruction in the above-listed modeling techniques resulted in gains in "Formed Elements, Structure, and Details of the Modelled Human Figure" (p.57). Grossman also believes that the medium creates a large part of the difficulty in making clay representations of the human figure (p.57).

In Brewer's (1991) study of instructional approaches to clay production, two strategies are discussed. First, the child centred approach, in which the student's product "is to be influenced by the activation of prior personal knowledge" (p.198). The second approach is the discipline-based approach where the product "is to be influenced by the study of exemplary works of art" (p.198). Referring back to the issues surrounding mental imagery, this sounds very much like the perceptual-conceptual debate in a

different guise. Be that as it may, the study provides a practical example of what to expect from child-centred and discipline-based approaches.

Interestingly, the result of the study indicated significant differences between the products (ceramic vessels and human figures) of the two groups (one using the child-centred approach and the other discipline-based). The discipline-based group was shown slides of ceramics and exemplars of human sculpture <u>before</u> the task but without an imagery source to view <u>during</u> the test. The child-centred group were not given slides to view and through the test relied on imagination and memory to complete the task. Technical instruction was given to both groups before testing and Brewer highlights this as potentially important. Brewer concludes that "the discipline-based treatment group...more often used vertical stance and a formal base in their modeled human figures" (p.205).

Another study by Brewer (1992) brings up some interesting points with regard to the dimension of position. Brewer states:

Colbert (1991) asked Kindergarten students to draw and model a human seated figure. These students were better able to model a seated figure in clay than to draw it. Whereas Brown (1975-1984) and Golomb (1976) compare children's clay and drawn representations for inclusion of detail and use of proportion, Colbert (1991) compared children's abilities to depict body movements and positions through clay modeling and drawing. (p.19) What can be expected then is that even though form and detail may be rudimentary in claywork, the position of the product is likely to be excellent.

Golomb (1969) points out the effect of the medium on children's representations. Golomb maintains, "The difference between verbal, graphic, plastic and puzzle representation suggests that each medium has its own laws and demands of articulation" (p.154). The tendency for the subjects' drawings "to be superior to the sculpture" (p.129) is noted, and three basic constructs used by the subjects are described, a "sculpting model", a "graphic model" in which clay rolls indicate the outline of the figure, and a "compromise model" in which the form of the sculpture is solid, as in the "sculpting model", but flattened (p.129). In my study it is expected that the "graphic" and "compromise" models would appear infrequently and that the subjects would more frequently use the "sculpting" model, described in Golomb's study as "creating a figure by the addition of rounded and solid parts, or by modeling one piece of dough. Parts are rolled and rounded, shape is formed by pulling, pinching, and by making indentations in the dough (p.129).

The subjects in Golomb's study tended to construct their representations horizontally, even if they were seen by the subjects as

upright. "Snowman" figures were built upright. The medium has an influencing effect here, as it is very difficult to achieve a standing human figure in clay. Golomb (1972) notes that the subjects of this study achieved a "global" upright figure at an early age (p.386). It is later, when more differentiated figures are attempted that uprightness becomes difficult to achieve. The term "vertical uprightness" is described as an "erect standing column" (p.391) and is characterized as representing "an invention appropriate to the three-dimensional medium" (p.391) as opposed to drawing strategies carrying over into modeling tasks. Thus, a prone figure representation, while being seen by the subject as "vertical", would not be considered "vertically upright".

The difference the medium makes is further explored in Golomb's 1976 paper, where drawings and sculptures of human figures by three to seven year olds are compared and contrasted. Different parts of the body (torso for instance) were often depicted in sculpture, but less frequently in drawing. Senior students' (grade twelve level) problems with figure representation in clay may not be problems at all, rather their attempts to invent processes suitable to the medium.

Golomb (1993) reiterates that three-dimensional representation in clay "has been largely neglected" and mentions the difficulties of claywork as described earlier.

Particularly interesting in Golomb's (1993) study is the inclusion of eighteen college students. Again mentioning the problems of achieving "vertical uprightness," Golomb states that the position of the figure produced "the intention to create an upright standing figure" (p.6) showed no age effects, rather the "upright intention decreased with age" (p.7), this particularly in the human figure tasks. The adults (college students) showed an increase in the percentage of upright figures produced. Position seems to be a fairly stable effect across the age groups, whereas the extent of differentiation is shown to increase with age. Thus, it might be expected that senior students would have a greater ability with differentiation than younger children and that more differentiation would be exhibited in the sculptures of senior students.

The results of the study by Golomb (1993) indicate that:

From the middle childhood years on, differences in performance of children and adults tended not to be significant. With few exceptions (the art students of the adult sample) the sculptures of the adults bear a strong resemblance to those of our younger subjects, ages nine through thirteen. (p.10)

There should be a difference in the products of senior art students (especially in differentiation and less so in position) and art-naive students, whose product could possibly resemble those of younger students. Golomb (1993) points out a number of demands that clay asks of a clayworker. Clay is "a medium that puts a premium on balance, uprightness, and modeling the multiple sides of an object, all of which require great skill and practice" (p.12). These demands are to be examined in this thesis.

Chapter III

Research Design and Methodology

This chapter is divided into three sections: (1) research questions; (2) method, sub-divided into (a) organization of the study, (b) subjects, (c) data collection procedures, and (d) data analysis and presentation; and (3) design limitations, sub-divided into (a)theme, (b) sample size, (c) population demographics, (d) age level of subjects, and (e) dimensions.

Research Questions

The objective of this study was to explore the effect of different imagery sources on the clay production of grade twelve students. In particular, the following questions have been asked:

Is there a difference between clay productions of grade twelve students

created in response to:

a) a task involving sculpting a human figure based on a written description of the model?

b) a task involving sculpting a human figure based on observation of a live model?

c) a task involving sculpting a human figure based on a study of a photograph of a model? (This condition was part of the pilot study only)

Method

Organization of the Study

A proposal was submitted to examine the strategies used by grade twelve students to represent a human figure in clay using three imagery sources: a written description, a photograph, and a live model. Initially, the intention was to observe grade seven through grade twelve students in the study. However, due to concerns regarding the availability of potential subjects, as well as the time and scope limitations of this thesis, the sample group was narrowed to grade twelve students only.

Approval for the study was granted by the U.B.C. Behavioural Science Screening Committee For Research and other Studies Involving Human Subjects. I then approached the Sentinel Secondary School administration and the West Vancouver School District with a request that they approve the study taking place with the randomly selected sample of the senior student body on the Sentinel School premises. Permission was granted and consent forms were sent to the entire graduating class for their and their parents' consent to participate, to secure subjects for the pilot project.⁻ Given the limited number of students wishing to participate at this point, all those who expressed an interest were included in the study.

A pilot study was completed in the Spring of 1995 and, after a careful analysis of its results, a decision was made to eliminate one of the experimental conditions involving the sculpting of a human figure based on a study of a photograph of a model. The pilot study allowed for the finetuning of instructions and procedures of data analysis. The last phase of the experiment consisted of intact class groupings of grade 12 students (none of whom participated in the pilot study) to perform the two remaining sculpting tasks. At this time, students were working in a shared space during actual class time and the activity was integrated into the regular curriculum.

Subjects

<u>Pilot study.</u> The twenty-three students who had responded and agreed to participate in the pilot study were randomly divided into three experimental conditions. Seven students were assigned to use the written description of the model as the imagery source, seven worked from the live model and nine worked from the photograph of the model. The subjects were not put into any particular group at the start because the demands on grade twelve students are heavy and it became necessary to involve the students in the experiment according to their timetable and availability. Another problem was ensuring that the live model (the school youth

worker) and the students working from the live model would be able to be in the same place, at the same time, with enough time to work at the task. This meant it became necessary to use lunchtime, spare periods, and before and after school sessions.

More female than male students participated in the pilot study and the make-up of groups by male and female was as follows: Group one (written description) consisted of three males and four females, group two (photograph) had two males and seven females and group three (live model) had two males and five females. There was a broad range of ability, talent and experience among the subjects.

Actual study. Subjects in the actual study were students attending intact classes at Sentinel School in the Fall of 1995. Both classes were senior students (Grade 11/12) and had been in my art classes (visual arts 3D 11/12, Visual Arts 3D 11/12 C) for eight months in the previous school year. Many were students who had taken art throughout their secondary school careers; others had no art experience whatsoever.

The first class (Condition One) was given the written description as their imagery source. There were twenty subjects in Condition One, eleven female and nine male. The second class, working from the live model (Condition Two), consisted of eighteen subjects, twelve female and six

male. Three of the subjects participated in both the written description

group and the live model group and one student only had participated in the

pilot study. This was due to the fact that intact classes were involved in the

actual study.

Procedure for the Pilot Study

A room in the school was set up with a work-table, two chairs and a

stand for the model to be used in one of the experimental conditions. Each

participant was provided with:

1. A square block of clay (sized 5x5x5 cm).

- 2. Three tools:
- a) a loop tool;b) a needle tool;
- c) and a wood modeling tool (the tools were kept the same throughout the study).
- 3. Imagery source either:
- a) a live model;
- b) a photograph of the live model; or
 c) a written description of the live model (the model was a female and for the purpose of the experiment she was seated on a table).
- 4. Videotaping equipment (a video camera and tripod) was also set up in the room.

The subjects were tested individually in the Spring of 1995 (between

January and June). Prior to the beginning of the task each subject was

familiarized with the equipment and materials. Subjects were reassured that

the study was not a test of art skill and it was not necessary for them to be

expert artists in order to be successful. Instructions for the task were as

follows: "I would like you to make a human figure with the clay that is provided - the whole figure and not just the head. Make the best human figure you can. To help you I've brought in a . . .

written description of a figure;
 a photograph of a person; and
 a live model

... for you to use as a reference. You are not required to 'copy' the reference material. Do you have any questions before you start?" (for the written description see Appendix A2). Subjects were allowed to work as long as they needed and, on average, they did so for one hour. All completed work was labelled and photographed before it became subject to scoring.

Procedure for the Actual Study

After looking at the results of the pilot study, it was decided that, for the actual study, subjects would be asked to complete the task in a classroom situation using the written description and the live model instructions only. This decision was made for two reasons. First, there seemed to be more difference between the two conditions retained for the actual study than between either one of them and the sculpting based on a photograph condition. Furthermore, an attempt has been made to have

subjects perform their tasks in more naturalistic (classroom) circumstances, rather than in an artificial 'laboratory-like' setting.

The subjects were given the same instructions, materials, tools and imagery (with the exception of the photograph) as in the pilot study. They were limited to an hour to complete the task, which seemed a reasonable period based on the pilot study data. However, the actual amount of time spent by each student varied enormously within that hour. The model used for the live model group was one of the female students in the class who best matched the written description.

Scoring Scheme

<u>Pilot study.</u> The amount of clay and tools available to subjects were identical to the pilot study. The completed work was documented and photographed before the judges proceeded with their scoring. A number of aspects were considered in comparing the produced sculptures. These were: 1) order of building; 2) most often used building technique; 3) total time used to construct sculpture; 4) time on task; 5) size of sculpture; 6) verbal behaviour; 7) referring to self as model; 8) form; 9) position; and 10) differentiation.

The order of building was determined through observation and field notes, and video data which recorded the sequence of sculpting the figure.

The most often used building technique was determined by calculating instances when a subject explored a specific modeling technique (e.g. pinching). Total time used to construct the sculpture was calculated from the moment the subject was given his or her instructions to the completion of the task (as reported by the subject).

The amount of time on task was determined by watching the subject's eyes during the study to determine how often they glanced at the "model" and for how long. This was checked by reviewing the videotapes of the sessions and noting eye movement and checking it against the field notes.

Each sculpture was measured to determine its height and spatial expansion (distance between the two furthest points).

Verbal behaviour and referring to self as model were noted by the experimenter and recorded as a part of the video data to provide more insights into the sculpting process.

In addition, all sculptures were rated on bi-polar scales constructed by the researcher to describe works produced by students along three dimensions which emerged from the review of literature: form, position and differentiation. These scales were developed based on analysis of the literature exploring children's clay production (e.g. Golomb, 1974, 1992). The individual criteria were further defined to explain each of the

dimensions. Form had six criteria: (1) the figure was made "in the round"; (2) limbs are part of a "growing form"; (3) there is a sense of "living" form; (4) proportion is attempted; (5) male/female differences are indicated; (6) the form is reminiscent of the model. Position had five criteria: (1) the figure is arranged in more than one plane; (2) the position is humanly possible; (3) the figure "catches its balance"; (4) "vertical uprightness" is achieved; (5) the position corresponds to the model's position. Differentiation had five criteria: (1) all features of the head are present; (2) all parts of the body are present; (3) clothing is attempted; (4) anatomy is attempted; and (5) details correspond to model's details.

Each criterion was to be judged on a five point bi-polar scale. A judge would give a score of five if he or she believed that the evaluated sculpture had fully achieved the criterion described by the scale. No points were awarded where the judge believed that the sculpture had not met the scale criterion. With three judges (experienced secondary art teachers) performing their scoring independently, each dimension listed would therefore have a possible highest score of fifteen points on each of its criteria, the sum of the three judge's evaluations.

After the judges had completed their scoring task, their scores were aggregated for each individual subject on each of the criteria for each of the

three dimensions, within each of the conditions. Next, the scores on each criterion for all of the subjects in a given condition were aggregated and averaged over the three judges. These became total average scores on each of the criteria in each of the three dimensions, within each of the conditions. A total average dimension score for each experimental condition was then determined by aggregating the average total criteria scores for all the dimension scales and dividing it by the number of criteria.

<u>Actual Study.</u> In the actual study only the final product (sculptures) were assessed. The procedure and instrumentation for scoring were identical as in the pilot study.

Documentation

After the sessions were finished the resulting sculptures were photographed as quickly as possible and the work judged using the same evaluation forms and criteria as for the first group of subjects, again using three judges. The sculptures were then fired to cone 04 in an effort to make them more durable. The work was then re-photographed after the firing. A statistical analysis (MANOVA) was performed on the scored information and the information recorded.

Design Limitations

The limitations of the study can be placed under the following titles: (1) theme, (2) sample size, (3) population demographics, (4) age level of subjects, (5) dimensions. These limitations to the study were largely imposed of necessity and do not greatly affect the outcomes described. <u>Theme</u>

The study is involved with one main theme or task, that of sculpting a human figure. The rationale behind using the human figure was that it would be familiar to all the participant subjects. Also, many of the studies in the literature make use of the human figure as a theme and it was thought that this would give continuity and points of reference to this study. It could be of interest to repeat this study using a theme such as animals or inanimate objects, in order to find whether or not this produced different results to those reported in this study.

Sample Size

The sample size in the study was determined by the size of the senior visual art 3D classes at Sentinel Secondary school. At the time of the study, the numbers in each class were approximately 20 students.

Population Demographics

Sentinel Secondary School is located in West Vancouver, one of the wealthiest areas of the City. Hence, the subjects involved in this study are largely from upper middle class families and, as such, may not represent a cross section of the student population in the city of Vancouver. An extension to the study engaging students from other parts of the city would increase the generalizability of the study.

Age Level of Subjects

The age level of the sample population was narrowed to the senior population at Sentinel Secondary School. Initially, the study was to involve students from grade seven to grade twelve. However, it was determined that including these other grade levels would generate an unwieldy amount of data for a study of this nature. A further study including other grades would provide insight into the developmental aspects of secondary school claywork.

Dimensions

Finally, the dimensions of the study were form, position and differentiation. It was considered that these dimensions were important aspects of claywork and that it was possible to judge them accurately.

These dimensions are also consistent with aspects of claywork explored in the literature. Other aspects which could form the basis for another study are movement, rhythm, symmetry, balance and finish. These aspects would be somewhat more difficult to judge, but are also important parts of sculpture and claywork.

Chapter IV

Results of Pilot Study

In this chapter the results of the pilot study will be presented. The pilot study consisted of observing and recording the production of clay human figures by three groups of secondary school students. Each group had a different imagery source: (a) a written description; (b) a photograph of a model; and (c) a live model. The chapter will describe the order of building the figure, the most often used building technique, the time used to complete the task, size of the sculptures, verbal behaviour, referring to self as model, as well as judges' ratings on the dimensions of form, position and differentiation. A discussion of results, comparing and contrasting the performance of the three groups of students, will be given.

Order of Building

Two general stages of production were observed in this study. First, an "initial stage", which I have defined as the rapid achievement of form in the sculpture. Second, an "in process" stage, which I have defined as the detailing and differentiating of the initially produced form.

In general, the larger parts of the body tended to be worked on first to establish the form. Detailing could be done to any part without a set pattern being observed. It is also important to note that the "in-process" stage did

not characterize the work of all the subjects, some of whom tended to include detail in the process of initial forming. Table 4.1 describes the sequence of figure construction by subjects in the three experimental groups.

Table 4.1

Sequence of figure construction by subjects in the three experimental groups in the initial stage

Element of the figure	Experimental Condition									
	Model			Photograph			Written description			
	Made 1st	Made 2nd	Made 3rd	Made 1st	Made 2nd	Made 3rd	Made 1st	Made 2nd	Made 3rd	
Head	1	0	0	2	3	2	4	1	1	
Torso	2	2	2	5	2	0	2	1	2	
Arms	0	3	2	1	1	4	1	2	0	
Legs	3	1	2	1	3	3	0	3	3	

As Table 4.1 indicates, subjects in the written description and photography conditions tended to work on the sculpture starting with the upper part of the body. Also, these subjects seemed to be interested in including any appendages (arms and legs), only after the core of the figure was established. Subjects in the live model condition, however, were evenly split in terms of the sequence of construction, with some of them building the figure beginning with the legs.

Naturally, with the limited number of cases, it would be unwise to draw confident conclusions; it is possible, however, to speculate that the requirements of the task have an influence on the sequence of clay construction in its initial phase.

Table 4.2 indicates the sequence of construction during the "inprocess" phase, concerned mostly with fine differentiation and detail, as opposed to the initial forming. As mentioned earlier this phase was not common to all the subjects.

Table 4.2

Sequence of figure construction l	by subjects in the three experimental
groups in the "in-process" phase	

Element of the figure	Experimental Condition									
	Model			Photograph			Written description			
	Made 1st	Made 2nd	Made 3rd	Made 1st	Made 2nd	Made 3rd	Made 1st	Made 2nd	Made 3rd	
Head	0	0	1	0	0	0	[.] 1	0	1	
Torso	0	0	0	1	0	2	1	0	1	
Arms	0	1	0	2	1	0	1	0	0	
Legs	1	0	0	0	2	1	0	2	0	

As Table 4.2 suggests, only one subject in the live model group engaged in the "in-process" phase. This is congruent with the fact that figures produced by subjects in this experimental condition were generally less differentiated and detailed than the work produced by the students working on the other tasks. With the limited number of cases noted, it is, however, impossible to make confident generalizations based on this data.

Most Often Used Building Technique

The method of building the figures was predominantly subtractive. Most of the subjects, however, used a combination of additive and subtractive techniques to accomplish the figure. Modeling techniques were used extensively, with only a few subjects using other techniques (coil and slab). Detailing seemed to bring into play all of the modeling techniques, more so than sculpting in the initial stage.

The rough form and the detailing were worked on using additive techniques and subtractive techniques. Both pulling and cutting, and rarely other methods, such as coil, were also used. In making the rough form a difference in the work based on expertise was noted.

Subjects with stronger art backgrounds and experience tended to use the subtractive method of modeling, forming the limbs, torso and head from a single ball of clay. Less experienced subjects used the additive method more extensively (5 of the subjects used the additive process and 3 the subtractive). Only one subject chose to work outside the modeling technique and made the figure from coils of clay. This figure (H) was largely unsuccessful. The weight of the clay made it collapse and squashed the legs early in the building process. The subject chose to rename the

sculpture, calling it a "baby". It was not completed, unlike most of the other figures. Interestingly, subject H had extensive experience in throwing pots on the wheel but little in hand building. This may suggest that experience with one clay building technique may not easily transfer, or cannot be meaningfully translated into other modeling tasks. It is also possible that the experience with handling hollow objects on the wheel (rather than bulky structures) promoted this subject to proceed with the coil method of construction.

Total Time Used to Construct the Sculpture

Some students finished in as little as 25 minutes, others taking up to 100 minutes. The average times for the three experimental conditions, though, were very similar. The written description group required an average of 65 minutes per student, the photograph group took an average of 56 minutes per student, and the live model group took an average of 54 minutes per student. Based on expertise, the averages of the expert, middle ability and beginner groups were, 56 minutes, 65 minutes and 51 minutes, respectively. The male students in the study took an average of 67 minutes to complete their sculptures and females took an average of 54 minutes to complete theirs. All these averages come close to the anticipated one hour work-time.

Total Time on Task

As with total time to construct the sculpture, total time on task varied widely with each individual student, some glancing at the model as little as once or twice, some as many as 50 to 60 times. The amount of time spent looking at the model on each occasion also varied, with six seconds being the lowest recorded time and 182 seconds the longest.

Table 4.3

Subject references to the imagery source by imagery source and level of expertise

Variable	Average number of times imagery source was referred to	Average total number of seconds imagery source was explored		
Written description	5	77 3		
Photograph	18.4	28.1		
Live model	59	94.6		
Expert	43.3	73.7		
Middle	24.5	63.4		
Beginner	16.6	55.4		

As Table 4.3 indicates, subjects using the live model referred to the imagery source more frequently and for substantially longer periods of time than subjects using the other imagery sources. Subjects making their sculptures based on a photograph spent the least amount of time consulting

the imagery source, while subjects in the written description group referred to the imagery source least frequently. The written description group, however, was closer to the live model group than to the photography group in the amount of time spent consulting the imagery source. This may indicate the presence of different cognitive processes involved in the three tasks. This study indicates that sculpting from a live model encourages frequent consultation and thorough examination of the imagery source; written description leads to few but focused and extended efforts to extract relevant information; while the photography condition prompts very limited use of the model.

Given the fact that in the actual study several subjects were performing the task at once, it was impractical to collect and record data related to all the aspects of the process of clay building, as was the case in the pilot study. Consequently, the analysis of data for the actual study was composed only of the assessment of the final product. Again three judges were employed to rank sculptures in terms of their form, position and differentiation characteristics. The same scales as in the pilot study were used for each of these three dimensions.

The expert clayworkers spent more time and number of times viewing the model than the middle experience group, followed by the beginners.

Even though the experienced group was adept in extracting information and should have been able to do it more quickly than the other groups, more time was spent by them looking at the models. It seems that the more experienced students had a better understanding of the value of consultation of the imagery source and perhaps were more skilled at meaningful scanning techniques.

<u>Size</u>

All the subjects started with a square block of clay, a cube measuring approximately 5X5X5 cm. Some subjects used only a small portion of this block, while some requested twice as much clay and this was made available to them. Surprisingly, the sculptures turned out to be much the same size. Measured between the furthest points on the sculpture (spatial expansion), the largest distance was 29.3 centimeters and the smallest was 10.5 centimeters. However, most of the sculptures ranged between 17 and 20 centimeters. The average distances for subjects, in terms of their spatial expansion, grouped by imagery source, expertise and gender, are given in Table 4.4 below.

Table 4.4

Average distance between furthest points on sculpture (spatial expansion) by imagery source, level of expertise, and gender of subjects

Variable	Average distance between furthest points (cms)	
Written description Photograph group Live model group	17.6 19.1 18.3	
Expert Middle Beginner	19.2 19.2 17.0	
Female Male	18.4 18.5	

As Table 4.4 indicates, these measurements remained highly uniform across the groups, with no significant differences emerging as a result of the experimental condition, level of expertise, or gender.

Verbal Behaviour

The verbal behaviour of the subjects fell into the following broad categories: 1) a subject asked a question when in difficulty and requested feedback; 2) a subject talked to themselves both when in difficulty and to explain a process, for example, "now I'm adding the feet"; and 3) a subject engaged in task-unrelated talk (for example, vacations, school matters, etc.). Only three of the subjects (C, J and T) did not spontaneously engage in verbal behaviour. The researcher made it a point to ask them questions from time to time. These subjects would answer direct questions, but had to stop working when they did so. A number of students would answer questions put directly to them but would not initiate conversation. The students who chose to converse on their own, usually kept a running commentary on their progress, especially when they ran into difficulties. Many of these would express disclaimers about their progress "usually I can do arms- I just can't do them today"(subject Q) or veiled requests for feedback "Hmm, how am I going to do this?"(subject K). Subjects exhibited tremendous variation in their verbal responses to the work, closely paralleling their personality profiles.

Referring to Self as Model

One of the exciting facets of the study was the subjects' use of their own body as a referent or model for their work. Robertson (1987) refers to Bruce, one of her subjects, as using the haptic sense of body position to aid his drawings. Subject D in this study used a needle tool to check the nose/chin/forehead angle on his own face. Subject N checked the position of the hands by positioning her own hands and arms in a manner similar to that of the model, felt her neck to find out how the collarbone worked and put her body into the position she wanted her clay piece to be in. Subject Q

used her hips as the model, the figure followed the student's seated position (i.e. with crossed legs) even though the model (imagery) used was somewhat differently positioned. Subject S used his own body to measure the position of the hand " I just want to see how far the hand comes", and subject T and W got their bodies into the position they wanted their sculptures to have. Subject T checked the position of the figure by imitating its position. During this he did not look at his body but stared at the clay while assuming the position. These observations suggest that the haptic sense, which is a little-researched area of sculpture, may need further investigation in relation to its significance to the teaching of claywork. <u>Form, Position and Differentiation</u>

Some subjects specifically referred to the "mental imagery" they were using and this seems to have influenced the form, position and differentiation of their sculptures. Subject E referred to her "Western Civilization" course (art history) when asked to describe her clay figure. She maintained that it was patterned after a "Renaissance woman" that she remembered from the course. Interestingly, this figure was one of the few standing figures produced. Subject H patterned her clay figure after "kids I baby-sat when I was eleven - they had the chicken pox - running around the house naked." Subject S, who had also used his own body as a referent,

stated: "This person is supposed to have baggy pants - supposed to look like my brother - the way my brother is - like picturing him - rapper guy."

All the subjects referred to specific mental images. This was evident in the work of Subject S, who was able to add a detailed design on the sweatshirt of the figure even though he neglected the facial features and left the head smooth. Subject E included such detail as the bodice lacing and the pleats in her sculpture, even though these were not attributes of the actual model. Detailing of the form occurred at almost every and any stage of the modeling. For example, some subjects chose to make the head, detail it, then join it to the torso later. This often created problems with the clay drying and making joining difficult or the entire head being destroyed by subsequent operations. Often when joining the head to the torso, the features so carefully and lovingly put on would be effaced by the pressure needed for joining. Other students created the form first, then added the details. This variety of working strategies made it difficult to determine an "order of building."

Form, position and differentiation were assessed by three expert judges (secondary art teachers) on a series of bipolar scales. Table 4.5 presents the average scores from the judges' ratings, obtained by subjects in the three experimental conditions within the three dimensions.

Table 4.5

Average scores obtained by subjects in the three experimental conditions within the dimensions of form, position, and differentiation

Dimension		Experimental Condition				
	Model	Photograph	Written description			
Form	9.00	9.92	9.14			
Position	7.94	10.51	10.49			
Differentiation	5.62	5.33	7.94			
Overall average score on the three dimensions	7.52	8.58	9.19			

Table 4.5, indicates that the written description resulted in the production of figures which most closely resembled the actual model (with a total average score of 9.19). Figures sculpted from the live model received the lowest scores overall, as well as on each of the studied dimensions. The greatest differences between the live model and written description conditions were found along the position and differentiation dimensions. The photograph group tended to perform similarly to the written description group on the position dimension, while achievement on

the criteria related to differentiation closely approximated the performance of subjects in the live model group. On the dimension of form, subjects in the three experimental groups obtained very similar scores, indicating that the requirements of the task were not instrumental in determining the outcome of the activity.

Chapter V

Results of Actual Study

Description of the Produced Sculptures

All subjects participating in the study were willing and able to complete the task. Following is a brief subject by subject description of each person's work. These descriptive accounts are grouped by experimental condition, with the work of the written description condition being presented first.

Both tasks were given to the classes on the same day. The time allotted for the test was fifty minutes inclusive of instruction time. Actual time on task was probably closer to forty-five minutes.

Condition One - Written Description

<u>Subject One</u> (see Figure 1, Appendix E)

This subject finished in twenty-five minutes and did not include many details. She completed her sculpture in a shorter time than any other subject in Condition One. The sculpture appears roughly finished but despite this, the subject has indicated eyes, mouth, nose, fingers and a slash line for the sleeve cuffs. The hair on the sculpture is exceptionally well done and it is likely that the focus of the work was upon this. This piece was completed by a student who had problems attending class and who seemed to value art but made little effort to spend time doing it. Her attitude seems to be reflected in this sculpture.

Subject Two (see Figure 2, Appendix E)

This is a well-differentiated sculpture. The form is worked to a considerable extent and time has been put into details such as buttons and pockets. Subject two took forty-five minutes to complete her sculpture and it appears that she followed the written description quite closely. She deviated slightly by sculpting her figure with the hands resting on top of the thighs rather than beside them. Perhaps because of this, her figure seems to be slightly overbalanced backwards.

Subject Three (see Figure 3, Appendix E)

This student is well known to the writer and it is felt that her lack of confidence in her artistic abilities is reflected in her rendition of the clay
figure and that her work is perhaps not representative of the other students participating in this study.

Subject Four (see Figure 4, Appendix E)

Subject four took fifty minutes to complete his work and did a good job of positioning his clay figure. Details such as shoes, fingers and overlapping cuffs have been indicated. He has sculpted certain anomalies in the chest area. Subject four did a brisk job of working his clay sculpture without too much attempt at finishing.

Subject Five (see Figure 5, Appendix E)

The differentiation on this clay figure is good with cuffs, sleeves and pants cut in different planes, not just pressed in as a line. Buttons are indicated on the clay figure's shirt and all of its body parts have been included. Subject five has kept the position of his clay figure very close to that in the description and the form is definitely modelled to represent a female figure. Subject five is a student known for his long and careful projects and he was clearly satisfied with his work on this clay figure after fifty minutes.

Subject Six (see Figure 6, Appendix E)

Subject Six worked for fifty-five minutes on her clay figure. Her sculpture appears roughly worked and the form can be identified as vaguely

feminine. Details including buttons and facial features are present on the sculpture and it is made in the same position as the model in the description provided.

<u>Subject Seven</u> (see Figure 7, Appendix E)

Subject Seven took the full sixty minutes to complete his clay figure. This sculpture was one of the only sculptures to be done on a separate block on which the clay figure is seated. Although the detailing is not as clear in this sculpture as in others, nose, fingers, toes, hair and clothing are indicated. Congruency to the written description is found in the position of the clay figure, but in little else.

<u>Subject Eight</u> (see Figure 8, Appendix E)

Subject Eight spent the entire sixty minutes on her sculpture. This sculpture is congruent with the written description in terms of position, form and details. An interest in detail is evident in the way that the shoe laces are carefully detailed on her clay figure, as well as the pant leg creases which are indicated by incised lines rather than the clay being brought to a sharp edge. The form is somewhat squared, especially the legs and feet; the head appears to have been made by a ball while the torso was organically modelled and quite subtle around the breasts. Subject Eight's modeling of

the jacket appears more skillful than that of the pants which seems to indicate that this was the area that she focused most time and care upon. <u>Subject Nine</u> (see Figure 9, Appendix E)

Subject Nine took sixty minutes to complete her work. Although the position of the sculpture is congruent with the written description, her use of detail and form are quite different. She modelled her figure with a hat and holding a book, neither of which are included in the written description. It is also not clear whether she intends her figure to be seen as male or female. The finish on this sculpture seems a critical part of this student's efforts; the surface is very regular and carefully smoothed.

Subject Ten (see Figure 10, Appendix E)

Subject Ten took sixty minutes to complete her clay figure. It is congruent in position, form and details to the written description. Details such as buttons, collar, hair and features have been carefully sculpted, especially so the hair. The sculpture's proportions are accurately modelled as well as having an excellently finished surface.

Subject Eleven (see Figure 11, Appendix E)

Subject Eleven took sixty minutes to finish his clay sculpture. The clay figure modelled by Subject Eleven roughly followed the written description. He has substituted a long skirt for the slacks worn by the

model in the written description and a blouse for the jacket. The form of the sculpture can be identified as roughly female, although this is mainly indicated by the long skirt. Although Subject Eleven allows his figure to strongly lean back, his figure does follow the position of the written description quite closely.

Subject Twelve (see Figure 12, Appendix E)

Subject Twelve took sixty minutes to complete her clay figure. Her clay sculpture appears to be lively and expressive and the whimsical expression on its face gives it a lifelike quality. Subject Twelve has not adhered exactly to the written description of the model in her sculpture, but has left its form quite rudimentary by not including legs and making no attempt to define gender. She has kept the position of her sculpture congruent with that of the description and it has a visually satisfying balance. Close attention is shown to detailing with the model's clothing and facial features carefully modelled, while in contrast the cuffs and the edges of the clothing are tentatively handled.

<u>Subject Thirteen</u> (see Figure 13, Appendix E)

Subject Thirteen took sixty minutes to complete her work and the product appears rough and tentative. This rather unfinished sculpture is not typical of the students working from the written description. In contrast to

its lack of finishing this sculpture quite closely follows the form given by the written description and female attributes are indicated even though details are non-existent.

<u>Subject Fourteen</u> (see Figure 14, Appendix E)

Subject Fourteen took seventy-five minutes to complete his clay figure. His sculpture appears to closely follow the written description of the model, with the exception of bare feet instead of the shoes that had been described. All else is well done from a representational standpoint. Subject Fourteen handles form well in his sculpture, with rounded limbs and all parts contributing to a growing form. The position and details of his sculpture also closely follow the written description.

Subject Fifteen (see Figure 15, Appendix E)

Subject Fifteen took seventy-five minutes to complete her clay figure. The sculpture is, in several ways, not congruent with the written description of the model in that it is completely missing arms and head and is modelled without clothes. Despite these differences her sculpture appears to be seated in the same position as that of the model in the written description. Although there is little detail apparent such as clothing, the modeling of the breasts and navel, as well as the flowing organic form, make it an interesting piece of work.

Subject sixteen (see Figure 16, Appendix E)

Subject Sixteen took eighty minutes to complete his clay figure. His sculpture is richly detailed in terms of clothing, with even the holes in the buttons represented. In addition, fingers on the hands and shoelaces show his focus on detail. In contrast to this, no attempt has been made to include facial features Finally his sculpture also shows congruency of position to the model in the written description.

Subject Seventeen (see Figure 17, Appendix E)

Subject Seventeen took eighty-five minutes to complete his sculpture. He has modelled his clay figure with clothing and was able to indicate that this is a female form. The position is close to the description and is well balanced, with excellent detailing such as knuckles on fingers, buttons, buttonholes, and facial features.

Subject Eighteen (see Figure 18, Appendix E)

Subject Eighteen took eighty-five minutes to complete his clay figure. It is modelled in a more complex position than most students' sculptures, with legs crossed, head turned down, and hands folded in the lap. The figure is, however, unstable and will not support itself. The form is recognizable as female and is organic and flowing. Detailing is attempted;

cuffs, buttons and folds of cloth are present, but no attempt has been made to indicate facial features.

<u>Subject Nineteen</u> (see Figure 19, Appendix E)

Subject Nineteen took ninety minutes to complete her clay figure. This sculpture has a feel of movement about it and the form is very flowing and loose and is modelled to be obviously female. The sculpture's position is congruent to the model in the written description, even though it has the look of sliding off its platform. The legs are missing below the knees and the arms below the elbows, while the hair and the face have been briskly sketched in with little attempt at careful finishing.

<u>Subject Twenty</u> (see Figure 20, Appendix E)

Subject Twenty took ninety minutes to complete his clay figure. The form, position and details of his sculpture are all congruent with the description of the model. An interesting aspect of this particular piece (photo 20) is that it was completed.

This student is a slow and careful worker with an eye for detail. It was surprising that he brought the piece to completion within the given time frame. Perhaps the organization of the imagery on the page made it easier for him to extract the needed information than from the live model, or maybe the live model offered too much information, an overload. This

student also participated in Condition Two, working from a live model (photo 36), and his ability with the medium of clay is quite evident in both pieces he produced

Condition Two - Live Model

Subject Twenty-one (see Figure 21, Appendix E)

Subject Twenty-one worked quickly and seemed satisfied that his sculpture was complete after twenty-five minutes. He modelled his clay figure seated, wearing a skirt and blouse, and reading a book. He has caught the position well in this sculpture and a surprising liveliness animates the piece, even though the position is straightforward and symmetrical. Subject Twenty-one has rounded the form of his clay figure nicely and the figure is definitely intended to be female. However, detailing is only sketchily done, fingers are not indicated and nor is the mouth. Clothing is only partly indicated by a ledge meant to indicate the skirt hem. Despite this his sculpture appears modelled, for example, the hair, indicated by a lump of clay with no individual strands, is very similar to the form of the live model's hair. Overall, the sculpture appears nicely finished considering the amount of time spent on it.

Subject Twenty-two (see Figure 22, Appendix E)

Subject twenty-two worked on her clay figure for thirty minutes. Her sculpture is the only standing figure in the final study and as such, echoes the pilot study in which students working from a live model seemed more likely to deviate from the model's position than those working from a written description. Subject Twenty-two seems to have used humour by modeling her clay figure as a caricature of the live model. Perhaps this was a way of making the task of portraying an actual person less intimidating. Detailing on her clay figure is minimal except for the face. Her solution to the problem of making her figure stand up was overcome by modeling a base instead of feet and as a result, her figure stands well.

Subject Twenty-three (see Figure 23, Appendix E)

Subject Twenty-three took thirty minutes to complete her clay figure. The form of her sculpture is generalized, with head, torso and legs roughly formed and unfinished. Except for the legs, she has kept the position of her sculpture very close to that of the live model. There appears to have been little attempt at detailing on her clay figure, either in body parts or clothing. <u>Subject Twenty-four</u> (see Figure 24, Appendix E)

Subject Twenty-four managed to sculpt a convincing clay figure in the thirty-five minutes that she worked. The form of her sculpture appears to be

carefully developed and the whole is nicely rounded and organic. Although she has left out the book held by the live model, she has positioned her clay figure very similarly, so that it appears to be reading. Detailing of the body and clothing is almost entirely absent and the sculpture does not have explicit female characteristics. Her lack of detailing gives her clay figure a tentative look.

<u>Subject Twenty-five</u> (see Figure 25, Appendix E)

Subject Twenty-five took thirty-five minutes to complete her sculpture. The extreme generalization of form and position of her clay figure as well as its lack of detail indicate her struggle to accomplish this task. She has made no precise divisions on the body of her sculpture, with arms growing into the torso and legs looking like tubes bent over the platform to indicate a seated position. The sculpture does, however, show congruence to the live model in its seated position and in the way that she has modelled the hands together in a position that indicates that it could have been holding something.

Subject Twenty-six (see Figure 26, Appendix E)

Subject twenty-six worked on her sculpture for thirty-five minutes. She has taken obvious care with the form of her sculpture, but has left off the head, arms and feet. Female features are not indicated on her clay

figure, yet the sculpture has a strong feminine feel to it. Subject Twenty-six has positioned her clay figure in a pose that is very close to that of the live model, but has included almost no detailing.

<u>Subject Twenty-seven</u> (see Figure 27, Appendix E)

Subject Twenty-seven took fifty minutes to complete her clay figure. While the form of her sculpture seems close to that of the live model, it is generalized, unfinished and the pose seems stiff. She established the balance of her sculpture well and because of this the clay figure gives the appearance of being alert and birdlike. Features such as clothing and other details are suggested in only a cursory way.

Subject Twenty-eight (see Figure 28, Appendix E)

Subject Twenty-eight took fifty minutes to complete his clay figure. His sculpture is better formed than many of the sculptures in Condition Two, with a lot of detail which give it a lively appearance. This student also took part in Condition One and so had this experience to work upon, which may have influenced the outcome of his second sculpture.

<u>Subject Twenty-nine</u> (see Figure 29, Appendix E)

Subject Twenty-nine took sixty minutes to complete her rather enigmatic clay figure. Overall her sculpture is recognizable as being anthropomorphic, but not necessarily human-like. The form of her clay

figure is flattened, not rounded, and although the forms are organic and flowing, they bear only a slight resemblance to legs, arms and torso. The head of her sculpture is the most developed area but, even so, it is hard to tell if this student was trying to depict a human, or some other animal such as a bird. The legs of the sculpture grow together at the knees, one arm is missing and the other is bent over like a pretzel and the feet appear to be flattened. Subject Twenty-nine positioned her clay figure in a similar way to the live model but provided very few details besides rudimentary facial features.

Subject Thirty (see Figure 30, Appendix E)

Subject Thirty took sixty minutes to complete her well-formed and differentiated clay figure. Her sculpture is composed of well-rounded, organic forms, although the joining of these forms is rather rough with little smoothing. The positioning of her sculpture is close to that of the live model although she modelled the hands of her clay figure in a prayer- like position rather than holding a book as the live model was. Subject Thirty has included details such as fingers, facial features, feminine characteristics and clothing. <u>Subject Thirty-one</u> (see Figure 31, Appendix E)

Subject Thirty-one worked on his clay figure for sixty minutes. His sculpture appears to be nicely formed with organically rounded forms blending nicely together; however, the forearms are missing. Looking at his sculpture, it is impossible to say whether the arms of the sculpture were intended to be only that long, or that the forearms were purposely left off. The careful finishing work done on this sculpture may indicate that the arms were intentionally left at this length. The legs are placed in a crossed position even though the live model did not have her legs crossed. A number of subjects used that position, possibly indicating a reliance on a certain mental image of a seated figure rather than on what was observed. Otherwise the position of this sculpture follows that of the model. Subject Thirty-one modelled his clay figure without clothing and when asked if this was intentional he indicated that it was. He did not attempt to include facial features, fingers or toes on his clay figure, but rather his focus seems to have been on establishing a suitable, if androgynous, form and achieving a smooth exterior finish.

<u>Subject Thirty-two</u> (see Figure 32, Appendix E)

Subject Thirty-two worked on his clay figure for sixty minutes. His sculpture appears to be unfinished with the absence of lower legs and feet.

He has roughly blocked in the form of his clay figure and left the surface rough. The position of his sculpture is congruent with that of the live model and he has been able to impart a feeling that his clay figure is focusing upon a book in its hands, as was the live model. Subject Thirty-two has included few details in his sculpture with no facial features or fingers and little indication of clothing other than a roughly cut hemline and scratches to indicate hair.

Subject Thirty-three (see Figure 33, Appendix E)

Subject Thirty-three took sixty minutes to carefully craft her beautifully finished clay figure. Although she included few details in her sculpture, the form is easily recognizable as female and appears to be reading or looking at something in her lap. Like several others in this study, Subject Thirty-three crossed the legs of her clay figure even though the live model was not seated in this way. The focus of her sculpture seemed to be on a smooth finish which gives a 'worked-on' appearance to the finished piece.

Subject Thirty-four (see Figure 34, Appendix E)

Subject Thirty-four worked on her clay figure for sixty minutes. Her sculpture is well formed and although minimum effort seemed to be put into its completion, a very satisfactory effect is achieved, possibly being less

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stiff and formal than previous examples. She positioned her sculpture very closely to that of the live model. Subject Thirty-four included few details in her sculpture but was able to indicate the way the hair waves upon the shoulders of the model, the hem of the skirt and that this is meant to be a female figure.

<u>Subject Thirty-five</u> (see Figure 35, Appendix E)

Subject Thirty-five worked on her clay figure for sixty minutes. She has left her work unsmoothed and roughly established which has given it an angular, brisk look. The obvious focus of the sculpture appears to have been to create a female form. It is modelled in a seated position that varies considerably from the position assumed by the live model. The position does not appear to be a natural one, with the knees drawn up and the body tilted back at an angle without arm support. Details, except for rudimentary facial features, are entirely absent from her sculpture, the limbs only generally resemble human limbs and there seems to have been no attempt to include clothing.

Subject Thirty-six (see Figure 36, Appendix E)

Subject Thirty-six took sixty minutes to work on his clay figure. He seems to have had insufficient time to finish his sculpture and to have been 'caught up' with trying to reproduce particular details of the live model.

Even though his sculpture remained unfinished, Subject Thirty-six sculpted a very lifelike figure with a close adherence to the live model.

Subject Thirty-seven (see Figure 37, Appendix E)

Subject Thirty-seven took sixty minutes to complete her well formed and lively clay figure. She has formed her sculpture nicely with the head tilted down and turned to one side, giving it a lifelike quality. The torso of her clay figure is also twisted which gives the sculpture a sense of spiraling motion. Subject Thirty-seven included few details in her sculpture besides an indication of a shirt collar and pant leg openings, showing the intention of making her clay figure clothed. Although facial features, fingers or toes are not indicated, the finish is worked very smoothly and contributes to the sense of flowing motion possessed by the sculpture.

Subject Thirty-eight (see Figure 38, Appendix E)

Subject Thirty-eight worked quickly and briskly on his clay figure, establishing the form quickly and then building in the details later. Working for sixty minutes on his sculpture, he produced a clay figure in a relaxed natural-looking position. His method of developing the complete form first and adding details last was different from many of the other subjects, who formed and added detail to one part of their sculpture before going onto another part.

Statistical Analysis

Overall, the results of the pilot study suggested that the imagery source has an impact on both the process as well as the outcome of sculpting activity. With a rather limited sample size and lack of rigor in the sampling procedure, it was impossible, however, to apply inferential statistics to this descriptive, exploratory study. In order to further substantiate some of the study findings, it was replicated in naturalistic (classroom) conditions with a larger number of participants. The focus of the actual study was the effect of the task requirements (sculpting from a live model and a written description) on the final product (sculpture of a figure). While the insights relative to the process revealed through the pilot study were interesting, the time and site conditions made it impossible to collect extensive data related to sequence of building, time on task, verbal behaviour, and so on. Therefore, in this study, data that became the subject of analysis consisted of finished figures that were labelled, photographed and presented to three independent judges for assessment in terms of their form, position and differentiation.

Both descriptive and inferential statistics were used to analyze the obtained data. First, raw scores were tabulated for all judges on all of the scales. These data are presented in Table 5.1.

Table 5.1

Dimension	Criteria	Raw score Condition One n=20	Raw score Condition Two n=18
Form	1	227	171
- Chini	2	211	171
	3	198	155
	4	198	152
	5	177	136
	6	173	126
Total		1,184	911
Position	1	221	196
	2	229	200
	3	205	197
	4	237	218
	5	179	163
Total		1,071	974
Differentiation	1	187	113
	2	206	129
	3	211	105
	4	160	103
	5	174	112
Total		938	562

Raw scores for each criterion within the dimensions of form, position and differentiation by condition

As was the case in the pilot study, each judge was required to give a mark for each criterion within each dimension for every sculpture produced in the study. All of these scores were then aggregated to arrive at the total

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scores for each condition on each of the dimensions. As Table 5.1 indicates, Condition One rated considerably higher than Condition Two in terms of overall raw scores on all of the dimensions.

Inter-judge Reliability

The scales used by the judges to rate the clay figures in this study were the same as the ones used in the Pilot Study (see Chapter IV and Appendix C). This time, the judges' scores were subjected to a careful analysis to determine inter-judge reliability. Correlation coefficients were performed to examine inter-judge agreement. The correlations were executed on the three judges' agreement on the dimensions of Form, Position and Differentiation. Inter-judge agreement was also checked on the combined scores for the three dimensions of form, position and differentiation. The correlation coefficients for form, position and differentiation between the judges are given in Table 5.2 below.

Table 5.2

Dimension	Judges	Correlation coefficients	<u>p</u> Values	
Form :	One/Two	.61	.000	
	One/Three	.61	.000	
	Two/Three	.77	.000	
Position :	One/Two	.47	.003	
	One/Three	.60	.000	
	Two/Three	.85	.000	
Differentiation :	One/Two	.92	.000	
	One/Three	.88	.000	
	Two/Three	.90	.000	

Inter-judge agreement on combined scores for the dimensions of form, position and differentiation

Table 5.2 shows that a particularly strong agreement between judges was found for differentiation. This may be accounted for by the less ambiguous effects of differentiation than of form or position. These figures also indicate that statistical agreement between the three judges is significant. Therefore the statistics drawn from their evaluation of the clay figures can be reliably reported.

Differences Between the Two Study Groups

Means and standard deviations were computed for the dimensions of form, position and differentiation for each of the experimental groups, as shown in Table 5.3 below.

Table 5.3

Means and Standard Deviations for the dimensions of form, position and differentiation by condition

Dimension	Condition One		Condit	Condition Two	
	Mean	Std. Dev.	Mean	Std. Dev.	
Form	9.87	1.89	8.44	3.08	
Position	10.71	2.12	10.82	1.63	
Differentiation	9.38	3.35	6.24	3.50	

A Multivariate Analysis of Variance of the total scores for form, position and differentiation by condition was performed with the alpha level of .05 used for all inferential statistics tests. There was a significant violation of homogeneity of variance, Box's M=19.04, $\underline{P} = <.008$. However, MANOVA is robust to modest violation of normality if the variation is due to skewness rather than to outliers (Tabachnick & Fidell, 1989) as was the case with these data. The variable "form" was slightly negatively skewed and no outliers were apparent. Using Pillai's criterion, which is not highly linked to the assumption of normality of the distribution, a significant effect for condition was found, F (3,34) = 7.10, p<.001. Follow-up univariate Ftests showed this to be due to a significant effect of experimental condition on differentiation, F (1,36) = 7.95, p<.008, the live model condition producing sculptures that were significantly less differentiated than those working from a written description. The dimension of form failed to reveal statistically significant differences overall (p > .05). However, it was possible to note that subjects in the written description group produced more figures where consideration was given to different sides of the sculpture rather than a single plane. No differences between the groups were found along the dimension of position.

The other two dimensions analyzed in this study were not responsible in a significant way for the variance found among the groups. Photographs of the produced claywork provided in Appendix E confirm these results.

Chapter VI

Discussion

There are a number of differences and similarities between the work produced by the students in Condition One (written description) and those in Condition Two (live model). The first part of the discussion chapter will look at the general differences between the sculptures produced in the two conditions.

Most of the figures produced in Condition One were well finished. However, the clay figures in Condition Two were often left rough and unfinished, with finger marks and pressure indentations rarely smoothed over giving the work a brisk 'rough and ready' look. The subjects working in Condition One used more of their time to smooth and refine their clay figures, carefully removing cracks and other imperfections from the clay. The biggest difference noted between the work done by the two groups was in the dimension of differentiation. The clay figures modelled in Condition One were more congruent with the imagery source and fit better the criteria within this dimension than those modelled in Condition Two.

Some of the major differences in this regard were as follows: (1) there were significantly fewer clothed figures produced by subjects in the live model group than in the written description group; (2) subjects in the

written description group produced more complete figures than the subjects in Condition Two; (3) figures produced by the live model group showed a lack of facial features.

The written description of clothing in Condition One seemed to be a focus for students working from this type of imagery source. There are only three figures without clothing in the twenty sculptures produced by the subjects in Condition One. All others are clothed, with most having carefully followed the written description. Exceptions to this are Figure 7 and 11 (see Appendix E). In Figure 11 a loosely draped blouse and skirt are substituted for slacks and shirt. Figure eleven is clothed in a long skirt down to its ankles. A fanciful departure from the written description is also seen in Figure 9 (see Appendix E), where a hat and a short sleeved shirt have been added and the figure holds a book or paper in its hand.

The subjects in Condition One paid particular attention to detailing, with many of them even including small details such as buttons, which can be seen in Figures 2, 5, 6, 10, 11, 14, 16, 17, and 18 (see Appendix E). Figure 20 has further detail added in the form of buttonholes. Other details of the clothing produced in Condition One include pockets (Figure 2), shoelaces (Figure 8) and, in two of the sculptures (Figures 17 and 20), collars, cuffs, shoes and even wrinkles in the clothing.

The figures in Condition Two show a contrast to this detail produced in Condition One. Here, only half of the clay figures include even minimum detail to indicate clothing. Some examples of this are Figures 21, 28 and 30. Figure 21 includes only the hem of a dress, Figure 28 includes a hem, collar and cuffs, while Figure 30 includes a hem and a collar. Figure 38 is the most complete of the clay figures made by the subjects in Condition Two, and includes details such as hem, collar, cuffs and wrinkles in the fabric. Figure 37 shows a strange variation in detail, with lines that seem to indicate the clay figure has been modelled wearing a bathing suit.

Only six of the twenty sculptures based on the written description lack facial features, whereas nine of the eighteen based on the live model are lacking in this regard. Most of the figures from the written description possess nose, eyes, mouth and hair. The hair, in those figures where it is present, tends to hide the ears. This may be an attempt to avoid making the ears which many students find difficult. Fingers are present in nine of the clay figures from Condition One. Examples include Figures 1, 2 and 4, with Figures 7 and 14 also including toes. Only Figures 30 and 38, from Condition Two, include fingers. A number of sculptures from the live model group depict mitten-like hands, with only the thumb differentiated, for example, Figures 28 and 21. When the sculptures produced in the

written description group are viewed with the knowledge that only approximately an hour was used for building these figures, the amount of detailing is strikingly abundant. An interesting study might be to purposely extend the amount of time designated for completing the work, perhaps over several days.

Incomplete figures are a hallmark of Condition Two. Eight Figures, numbers 22, 23, 25, 26, 29, 31, 32, and 36 are incomplete, missing such things as hands, feet, legs, arms and head. This contrasts with only three clay figures from Condition One; Figures 13, 15, and 19 being incomplete.

Global figures, lacking differentiation into recognizable body parts, are rare, though figures 23 and 25 in the live model group are just barely out of this stage. In Figure 25, the arms are not separated from the body, though there is a head and the legs are drawn out. Figure 23 is much the same, except that the arms are separated from the body. No figures as undifferentiated as these were observed in the written description group.

Lack of differentiation is noted in the literature. For example, Golomb (1972) refers to a lack of differentiation in claywork when compared to drawing (see p.8). In highlighting this lack of differentiation, she suggests that the medium (clay) itself has an effect on this lack of detail. While Golomb's research is concerned with two to eight year olds and this study

deals with senior students (17 to 18 year olds), most of whom have taken art classes throughout their secondary school years, it seems reasonable to suppose that if the technical characteristics of clay were the only factor conducive to a lack of differentiation, sculptures produced in both Condition One and Condition Two would have been affected equally. However, the results of the prescribed analysis show that the written description group did significantly better at differentiation than the live model group. This finding would suggest that the imagery source has an effect on differentiation at least as much as the characteristics of clay as a sculpting medium.

An explanation for this effect could be provided by the way the information in both imagery sources is arranged. The information in the written description is organized into categories and is presented almost as a "how-to" manual for constructing a clay figure. It is a closed system with a definite beginning and end. Perhaps students at the secondary level are more familiar with this approach of being presented with a task, since it is a common method used in school. The live model task, however, is presented in a much more open-ended manner. The information is there, but not in a ready-organized form. Therefore, the organization and weight given to various attributes, form, position and differentiation, is determined by the

individual student. Writing a description of a person does not call for a lot of information on form and position. These can be described quite economically. However, detail takes a lot of words to describe accurately. In working from a live model, the form or position may have equal weight to the details. In fact, the details may be perceived by the subject as being relatively unimportant. On the other hand, students faced with the large amount of data relating to detail, as in the written description, may decide that detail is more important than form or position or at least as important. Given that students working from the live model were certainly capable of including detail had they thought it important, the conclusion would appear to be that the live model elicits a different response to the task in the dimension of differentiation than does the written description. This is consistent with Smith's (1983) findings.

A parallel can be made to the differences found between spontaneous drawings of young children and so-called "dictation drawings," when a child is either presented with a verbal listing of elements to be drawn, or his or her attention is selectively directed to the attributes of a model. It has been demonstrated that children who spontaneously produce only very crude and undifferentiated drawings are well able to include a great amount of detail under the dictation task (e.g. Golomb, 1993).

As the analysis of the obtained data indicated, no statistically significant difference was found on the dimension of form. In fact, there were many similarities with regard to certain parts of the figures, especially the head, which was uniformly rounded in most of the sculptures created by the subjects in both conditions. The human figure was recognizable in all of the sculptures and a majority were recognizable female figures. One startling and unexpected difference along the form dimension was the occurrence of square legs on several figures produced by subjects in Condition One. Figures 2, 6, 8, and 12 demonstrate this phenomenon. However, no square legs appeared in the work produced in Condition Two.

Arnheim (1954) refers to the historical process of clay development by citing the primordial ball, used to represent a figure, then rolls of clay to illustrate length and direction. Flattening the rolls follows, and increasing the volume of the slabs gives the third dimension to the figure. This might explain the square leg phenomenon observed in Condition One. However, this raises the question: Why did subjects in Condition Two not use this strategy? It is possible that the visual reference they had to a live model with obviously rounded legs may have influenced their strategies for achieving form. Experience suggests that art students often use a two dimensional front view and side view as a strategy when producing three

dimensional work. There is often little attempt to integrate these two dimensions into a rounded form and this results in a rather squarish look to their sculpture.

In both the pilot study and in the actual study, a number of subjects used their own limbs and body as points of reference to help generate their clay figures, adding to the given imagery source. The use of this strategy did not, however, seem to be influenced by the experimental condition.

The number of general similarities between the two conditions are much more numerous than the differences. The dimensions of form and position, as well as the techniques used by the subjects to construct their clay figure, were similar. However, there were several lumpy, amorphous figures produced by subjects in the live model condition, with the absence of such figures in the work of subjects in the written description group. Generally, the forms used by the majority of students in both conditions were rounded and organic. Other forms such as flattened, stick, or "snowmen" reported by Golomb (1969), were entirely absent. Figure 29 used a kind of graphic representation for the face. In this case, the rounded head form was cut away to a flat plane where the face would be. The features of the face were then roughly pushed in with the end of a tool, including the nose which did not project out from the flat plane of the face.

Heads, in particular, seemed to be rolled from balls of clay, this holding true for both of the experimental conditions. Some examples of where this technique had been used were Figures 5, 8, 12, 22, 23, and 27. Arnheim (1954) mentioned the primordial ball used to achieve form and this search for rounded form seemed to hold stable for both conditions in the present study. The features, such as hair and nose, were added to the ball, while eyes and mouth seemed to be carried out.

Almost all students made the form part of the whole, with very few stick-on parts, the form of the entire body flowing well together. Stick-like forms were in evidence on only two sculptures, Figures 1 and 25. All other limb forms flow nicely into the body and even the stick-like limbs were attached in a convincing fashion.

"Position" was very similar in both conditions. Almost all the clay figures were modelled seated, which closely followed the position of the live model and the written description. Position seemed to be a dimension that students strove to make congruent. Figure 3 was the only lying figure done by a subject in this study. This Figure has been made prone and it is difficult to discern whether it was intended to represent a lying or standing figure. Full vertical uprightness as described by Golomb (1993) has not been achieved in this case. However, Figure 22, produced by a subject in

Condition Two, was built standing. It is vertically upright, a difficult position to achieve while sculpting in clay.

All of the figures except 3 and 22 were seated and showed the limbs. very closely aligned with the position of the limbs in the models. Of special interest is the positioning of the arms, because the models' arms differed in position between the two conditions. In Condition One, the model was described as having her hands on the table at her side and most of the figures closely follow this description. The live model had her hands in her lap holding a book and the figures in Condition Two were uniformly built to this image. Only one student in Condition One opted to seat the figure on a clay platform, while all the other figures have the legs hanging over the edge of the table with the exception of Figure 35, which has the legs drawn up on the same plane as the bottom.

Clearly, detail and differentiation made a significant difference in the production of clay figures between the two conditions. This is not meant to imply that a highly differentiated or highly detailed sculpture is superior to one that is less so. This dimension of differentiation is only one of three dimensions selected as a focus for this study, and there are many more aspects to art than these alone. Realism seems to be a focus in secondary student artwork and differentiation helps to make projects look more real.

As such, differentiation is an appropriate focus for the study. However, by itself differentiation does not determine whether a piece of art is successful or not.

Lastly, the technique used in constructing the clay sculptures was universally modeling, both additive and subtractive. Additive modeling uses separate pieces joined together to form the clay figure. The head, torso, legs and arms are made separately and then added together. Often, especially in the case of the head, details are worked into the separate pieces before joining. Subtractive modeling is done by pulling out the limbs and torso, as the continuity of the clay has not been compromised. Most students were observed to draw on both processes in their efforts to construct their figures. Details, in particular, were added on, as is the case of buttons, noses and hair.

Classic clay building techniques such as pinch techniques, coil and slab were not used, even though most of the students participating were aware of them. Only one figure in the pilot study was built using the coil technique. Modeling is therefore seen as an often used and natural way to achieve a clay figure. The general similarities between the two conditions include first, the universal use of rounded forms in body and head, second, the amount of differentiation, both in clothing and anatomy, and third, the

phenomenon of squared limbs in the written description group. The most important difference evident between the two groups was the focus on detail by the subjects in Condition One. The focus on position and form seemed to be equal between the groups with the possible exception of the squared legs previously mentioned.

Conclusions

Generally a difference in differentiation was noted between Condition One (written description) and Condition Two (live model), with the subjects in Condition One producing the most differentiated and detailed sculptures. The dimensions of form and position were very similar between the two conditions, with the exception of the squared legs produced in Condition One. Specifically, clothing details, facial features and body part differentiation accounted for most of the differences between the two conditions. The seated position of the figure and the placement of the arms, the lack of built-up bases on which to seat the figure, and correspondence to the model's position, especially the limbs, were seen as salient similarities between conditions. That the figures were mostly made as females, congruent to the models, was another point of similarity. Thus different imagery sources seem to elicit a different response to the given task demand of making a human figure in clay with the secondary level students.

Significance to Art Education

This study indicated that task demands, and specifically imagery sources, affect clay sculpture of secondary students. The pilot study and the actual study pointed to important differences in both process and final product, as a function of variation in the imagery source. This study suggests that different cognitive processes might be involved with the alternative tasks. It would, therefore, be recommended that clay instruction in school be devised in ways exploring strategies drawing on various imagery sources. While sculpting from imagination or from a model is a common practice in many art rooms, written description is not a frequent imagery source. This study demonstrated how it can be effectively employed to bring students' attention to numerous attributes of objects to be modelled and encourage greater differentiation of their sculptures. While more research involving subjects at various developmental levels and exploring other subject variables (e.g. animals, inanimate objects, etc.) would be recommended to further substantiate these study findings, use of a

variety of imagery sources in sculpting tasks (including a written description) gives promise of expanding students' sculptural abilities and repertoires.
Chapter VII

Conclusion

This study explored clay production of grade twelve students in a classroom situation, using different imagery sources. Three imagery sources were used in a pilot study and two in the major study. The pilot study consisted of grade twelve students working from a written description, a photograph and a live model. The main study consisted of grade twelve students working from a written description and a live model. Each of the students involved produced a clay figure and the aspects of form position and differentiation were looked at in each of the sculptures. The human figure was used because students were judged to be familiar with it and had probably worked previously in representing it. Grade twelve students were chosen because it was felt that little work had been done with students of this age-group.

This study was intended to find out if there was any difference in the clay sculpture produced by students working from an imagery source consisting of a written description of a human figure and students using a live model as their source of imagery. In the course of the study it was determined that in one of the dimensions evaluated, that of differentiation, a

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significant difference did occur. In the other two dimensions, those of form and position, there were no significant differences noted.

The construct in the mind, the mental image of the figure generated by the written description and brought to life in the clay sculptures of these students, contains much detail and differentiation. Very small details, such as buttons and buttonholes are included on the figures, and facial features are often also present. In contrast, the sculptures produced by the students working from the live model are less detailed and complete.

Given the lack of research into clay modeling in general, and how imagery sources affect clay production in particular, this study points out an effect which should be of interest to the teacher of sculptural claywork. The nature of the imagery source elicits certain effects in clay production which create a more complete, descriptive piece, at least when a written description is provided. This could possibly enable a classroom teacher to direct the work of students in this regard, contributing to their understanding of such principles as elaboration, differentiation, detail and complexity. A written description provides an example of how to organize the separate and diverse elements of the human figure into a framework that makes sense and can be worked from by most students, no matter what their ability level.

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It would be wrong to think of detail and differentiation as the only important criteria in the creation of "good" sculpture. Why was there so little difference in position and form between the two groups looked at in this study? Other facets such as liveliness, humour and sense of movement, balance, symmetry and harmony, all of which are often significant characteristics of "good" sculpture, could also have been compared. This research opens the door only a little wider into the understanding of the process of producing clay sculpture in the classroom.

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Glossary of Terms

ADDITIVE SCULPTURE

Sculpture that is accomplished by joining or adding pieces of material together.

COIL

A technique for establishing form in claywork wherein cylindrical "ropes" of clay are placed one on top of the other to build the form.

FORM

A three-dimensional figure which exists in real space and encloses volume.

MENTAL IMAGE

The result of the mind finding structure in a visual image and incorporating it into a schema, not necessarily like a picture or film in the mind.

MODELLING

A technique for working clay or other malleable materials wherein form is achieved by the manipulation of the material; pulling, pushing and forming it, adding material or removing it until the form is satisfactory.

PINCH

A technique for working clay in which a solid, spherical ball of clay is made hollow by pinching it with the fingers.

SCULPTURE

The process of making a three-dimensional image or representation.

SHAPE

Indicates a two-dimensional outline of an object, as when a line drawn on paper touches back on itself and encloses flat space.

SLAB

A claybuilding technique where flat plates of clay are combined to create form.

SUBTRACTIVE SCULPTURE

Sculpture achieved by removing material from an original lump to reveal the form within.

Appendix A1

Photograph of Model



Appendix A2

Written Description of Human Figure

Gender: female

Age: mid-twenties

Height: 5'8"

Anecdotal information:

The face of the figure has strong, definite features. The general build of the body is slim and rangy, also somewhat angular. The hair is shoulder length and has a pronounced wave or curl. It is parted on the right side, one curl brushing the left eye. Hands and feet are long and slim.

Position:

The figure is seated on a table with knees together and legs from the knee down over the tables edge vertically oriented with feet swinging clear of the floor. Both hands are placed on the table mid-thigh and point away from the legs. The torso is inclined forward and is supported in this position by the arms and hands. The shoulders are not turned but are square with the hips. The figure's head is held level, not tilted and is turned slightly to the left.

Clothing:

The figure wears low, black shoes, slip-ons with pointed toes. Loose fitted beige pants end just above the ankles being secured by a narrow black belt with a round buckle. A low-necked white top is tucked into the pants. Over the pants and top the figure is wearing a dark jacket which is unbuttoned and open in the front. The jacket has three buttons on the left side and three corresponding loops on the right side, one at waist level, one above and one below the first.

Appendix B

Instructions to the Subjects

Greeting:

Just something to put the student at ease. I know most of the students who will be participating and will find the right words as the need arises.

Description of the task to the participating student:

(1) Familiarize the student with the surroundings and recording equipment. At this point it may be useful to reassure the subjects that it is not necessary for them to be expert artists and that the study is not a test of their art ability.

(2) Introduce the materials; clay, clay tools and slip. The clay would be premeasured and the tools briefly commented on. I think it would be interesting to see which students would make use of them. These tools are a wooden modelling tool, a loop tool, and a needle tool.

(3) Instructions: " I would like you to make a human figure with the clay that is provided - the whole figure and not just the head. Make the best human figure you can. To help you I have brought in...

a. (group 1) a written descriptionb. (group 2) a photograph of a person*c. (group 3) a live model

for you to use as a reference. You are not required to copy the reference material. Do you have any questions before you start?

*Please note that the photograph of a person was not used as a reference source in the final study.

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Appendix C

Judges' Evaluation Instrument

EVALUATION OF FIGURES (0=not apparent, 5= most apparent)

SUBJECT:

A. FORM

1. Figure is made "in-the-round" (back is modelled, not flat) $0 \ 1 \ 2 \ 3 \ 4 \ 5$ 2. Limbs are part of a "growing" form (not stuck on, but flowing) 0 1 2 3 4 5 3. There is a sense of "living" form (grace, beauty, aesthetics) 0 1 2 3 4 5 4. Proportion is attempted. 0 1 2 3 4 5 5. Male /female differences are attempted.

0 1 2 3 4 5

6. The form is reminiscent of the model.

0 1 2 3 4 5

B. POSITION

- 1. The figure is arranged in more than one plane. 0 1 2 3 4 5
- 2. The position is a possible one for the human body. 0 1 2 3 4 5
- 3. The figure " catches its balance ".

0 1 2 3 4 5

4. "Vertical uprightness" is achieved.

0 1 2 3 4 5

5. Position of the figure corresponds to model's position.

0 1 2 3 4 5

continued over page

C. DIFFERENTIATION

- 1. The features of the head are present.
 - 0 1 2 3 4 5
- 2. All the parts of the body are present.

0 1 2 3 4 5

3. Clothing is attempted.

 $0 \ 1 \ 2 \ 3 \ 4 \ 5$

4. Anatomy is attempted.

0 1 2 3 4 5

5. Details of the figure correspond to those of the model.

0 1 2 3 4 5

Appendix D

Photographs of the Pilot Study Sculptures

The following pages contain photographs of the sculptures produced in the pilot study. Subjects are identified by the letters "A" to "W". The subjects' participation in one of the three pilot study groups; photograph, written description, or live model, is also identified and the following pages are grouped into these categories.

Pilot Study, Subject A Photograph



Pilot Study, Subject B Photograph



Pilot Study, Subject E Photograph



Pilot Study, Subject J Photograph



Pilot Study, Subject K Photograph



Pilot Study, Subject N Photograph



Pilot Study, Subject S Photograph



Pilot Study, Subject T Photograph



Pilot Study, Subject U Photograph



Pilot Study, Subject C Written Description



Pilot Study, Subject D Written Description



Pilot Study, Subject O Written Description



Pilot Study, Subject P Written Description



Pilot Study, Subject Q Written Description



Pilot Study, Subject R Written Description



Pilot Study, Subject V Written Description



Pilot Study, Subject F Live Model



Pilot Study, Subject G Live Model



Pilot Study, Subject H Live Model



Pilot Study, Subject I Live Model



Pilot Study, Subject L Live Model



Pilot Study, Subject M Live Model



Pilot Study, Subject W Live Model


Appendix E

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Photographs of the Sculptures Produced in the Actual Study

The following pages contain photographs of the sculptures produced in the actual study. Subjects are identified by the numbers 1 to 38. The subjects' participation in one of the two experimental groups; written description (Condition One), or live model (Condition Two), is also identified.

Figure 1 Condition One, Subject 1



Figure 2 Condition One, Subject 2



Figure 3 Condition One, Subject 3



Figure 4 Condition One, Subject 4



Figure 5 Condition One, Subject 5



Figure 6 Condition One, Subject 6



Figure 7 Condition One, Subject 7



Figure 8 Condition One, Subject 8



Figure 9 Condition One, Subject 9



Figure 10 Condition One, Subject 10



Figure 11 Condition One, Subject 11



Figure 12 Condition One, Subject 12



Figure 13 Condition One, Subject 13



Figure 14 Condition One, Subject 14



Figure 15 Condition One, Subject 15



Figure 16 Condition One, Subject 16



Figure 17 Condition One, Subject 17



Figure 18 Condition One, Subject 18



Figure 19 Condition One, Subject 19



Figure 20 Condition One, Subject 20



Figure 21 Condition Two, Subject 21



Figure 22 Condition Two, Subject 22



Figure 23 Condition Two, Subject 23



Figure 24 Condition Two, Subject 24



Figure 25 Condition Two, Subject 25



Figure 26 Condition Two, Subject 26



Figure 27 Condition Two, Subject 27



Figure 28 Condition Two, Subject 28



Figure 29 Condition Two, Subject 29



Figure 30 Condition Two, Subject 30



Figure 31 Condition Two, Subject 31



Figure 32 Condition Two, Subject 32



Figure 33 Condition Two, Subject 33



Figure 34 Condition Two, Subject 34



Figure 35 Condition Two, Subject 35


Figure 36 Condition Two, Subject 36



Figure 37 Condition Two, Subject 37



Figure 38 Condition Two, Subject 38

