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The Curricular and Instructional Implication for the Tacit Knowledge Exhibited While Creating a Forensic Craniofacial Reconstruction

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THE CURRICULAR AND INSTRUCTIONAL IMPLICATIONS FOR THE

TACIT KNOWLEDGE EXHIBITED WHILE CREATING A FORENSIC

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by

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ABSTRACT

In our teaching careers, K-12 classroom teachers come to know that the

way a given student connects the dots to comprehend a concept, lesson, or subject

is not always (and most likely never is) in a straight linear fashion. The

connections between the dots are defined as the student's personalized

understanding (tacit knowledge/knowing) of concepts, lessons, and/or subjects.

The student most likely did not perceive, process, and/or retain the concept,

lesson, or subject in the manner it was taught to her or him. Teachers asking a

student to explain how he or she arrived at an answer or knew the answer to a

problem was **right,** are often told, *"It just came to me," "I know it's right, but I

just cannot explain it,"* or *"I just know!"* These students do not fit the norms of

schooling; this affects how they are seen and how they see themselves. They

know there is a disconnection between what they know tacitly, and how they are

expected to explain what they know to prove that they know it. Theoretically this

phenomenon is not accounted for in the literatures of Epistemology or Curriculum

and Instruction. The purpose of the study is to identify the essence of the tacit

knowledge information processing problem-negotiating process used by forensic

artists, to interpretively shed light on its implications as a curricular and

instructional model to help students who otherwise would be put unnecessarily at

risk because of their tacit knowledge information processing problem-negotiating process.

In this qualitative interpretive exploratory study I use forensic craniofacial reconstruction as the lens through which I investigated the exhibits of tacit knowledge for its implication for curriculum and instruction. The study recruited volunteer members of ProjectEDAN as the study's participants. The research methodology combined *Interview as Research* and *Interpretative Biographies* that served as case studies of my participants. The collected data served as part of the inductive evidence along with the three foundational premises from the theories of Polanyi, Denzin, and Miller & Page as the bases for a Grounded Theory of Multistability to account for implications of tacit knowledge information processing problem-negotiating processes in curriculum and instruction.

The major findings from the data highlight the participants' philosophical foundation beliefs, the autotelic experiences in conjunction with their preferred method of working, their major epiphany (if any), and their reflections. The participants behaved as they perceive relative to the above categories as agents moving toward their equilibrium in the Complex Adaptive System of the facial reconstruction information processing problem-negotiation process. This is the milieu from where tacit knowledge emerges. The significance of the findings indicates the paths for further investigation into tacit knowledge information processing problem negotiation by entertaining a Multistability Theory of Curriculum and Instruction based of the ideology of "Do No Harm."

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CHAPTER ONE

Introduction

> We can know more than we can tell
>
> *Michael Polanyi*

At some time in our teaching careers, those of us who have been K-12 classroom teachers come to know this: The way any given student connects the dots to comprehend a concept, lesson, or subject is not always (and most likely never is) in a straight linear fashion. I am defining the connections between the dots to be the student's personalized comprehension (tacit knowledge/knowing) of concepts, lessons, and/or subjects. The student most likely did not perceive, process, and/or retain (personalize) the concept, lesson, or subject in the manner it was taught to her or him.

Similarly, teachers' insights into making meaningful improvements to their curriculum (lesson plans) and instruction are not always based on their observations from within their content area—or even from within the domain of education for that matter. For example, the basic concept of the binary number system could be taught by physically having students use the knits and purls of knitting to make binary codes. That said, aside from learning by rote to acquire a fundament level of understanding or to attain a skill like learning the

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multiplication table, any in-depth comprehension of concepts, lessons, or subject requires students to make metaphorical connections and on occasion interdisciplinary dispersed dots. Dewey said, "Any experience is mis-educative that has the effect of arresting or distorting the growth of further experience" (Dewey, 1938 p. 25). This implies at minimum an open-minded inclination toward curriculum, teaching, and learning experiences relative to how students are allowed to display their comprehension of how they connected their dots.

The following is a story of an interpretive investigation into the basic nature of the tacit knowledge problem negotiating process and its implication for a curricular and instructional intention. This story begins with a phone call during my seventh block of the day art class. The next-door teacher let me know I had a phone message from the coroner's office and to return the call as soon as I could. Having worked for the coroner a number of years as their forensic artist, I assumed there was a John/Jane Doe to be identified. When I called, the receptionist immediately connected me to the chief deputy coroner's office, who apologized for the short notice and asked if I could stop by the office to make a drawing of a John Doe for airing on the six o'clock news that evening.

It was obvious that time was crucial because Triena, the chief deputy coroner, met me at the door. As we walked toward the examining room, she briefed me on the case. Normally, I would have to retrieve the skull from the autopsy room and the investigation(s) reports folder—which contain information that could possibly assist in re-creating the face of the person, such as the

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available physical anthropological, dental, and death scene report data—from her office. This time, everything was already laid out for me in the examining room. Based on my limited knowledge of physical anthropology, I could see this skull had the heavy brow ridge, large mastoid process, and the more rectangular shaped eye sockets typical of a male skull. While I was working back and forth from the skull to the drawing, I began to feel another presence in the room, and in my peripheral vision I noticed that the chief deputy coroner had come in. Silently, she watched me for a while and then left. When I completed my work, Triena commented that while she was watching me work she noticed I was simultaneously functioning as an artist in terms of the drawing, to a more limited extent as a physical anthropologist in terms of confirming and acknowledging the sex, race, and age. I was also functioning to the same limited extent, according to her, as a dentist in terms of how the presence or absence of teeth would influence John Doe's facial features, and as a detective in terms of looking for ante-mortem (before death) clues on the skull that might shed light on what the person looked like in life. She was perplexed about how I was doing all of these varied cognitive functions at the same time.

Other people are the greatest source of alternative views to challenge our current views and hence to serve as the source of puzzlement that stimulates new learning (von Glaserfeld, 1989). I was unaware of the interdisciplinary nature of my thought processes or what the phenomenon of this problem-negotiating process looked like. Was it simply a taken-for-granted operating procedure I was

engaged in while doing a forensic facial reconstruction? Why had I never examined the levels of complexity involved in the execution of the facial reconstruction task?

> [T]he ascription of the tacit knowledge state to people is a theoretical move meant to explain behavior or cognitive operations . . . What makes ascription of tacit knowledge distinctive is the asymmetry between the richness of the ascribed content state and the relative poverty of the subjective experience corresponding to that state. . . [T]he person to whom we ascribe tacit knowledge has little or no conscious experience of what it is we claim is the causing his or her activity. (Dictionary of Philosophy of Mind-tacit knowledge). Retrieved March 5, 2005, from http://www.arissci.wustl.edu/~philos/MindDict/tacitknowledge.html

What Is Tacit Knowing/Knowledge ?

The word *tacit* in the Random House Webster's Unabridged Dictionary, 1999, comes from the Latin word *tacitus*, "silent," past participle of *tacēre*, "to be silent."

Tacit knowledge (personal knowledge as defined by Polanyi, 1958 and Polanyi, 1966) is based on the premise that "We can know more than we can tell." Other writers have referred to it as the "cognitive unconscious" (Reber, 1993), "knowing-how" (Ryle, 1949), "knowing -in-action" (Schon, 1988), and "the adaptive unconscious" (Wilson, 2002). Tacit knowledge is generally defined as knowledge we routinely use, or taken-for-granted knowledge that we cannot explicitly describe.

As I began to reflect on my forensic experience from a more explicit perspective of being a craniofacial reconstructionist and an art teacher, a number of general questions came to mind. First, as an art teacher, what was it about the

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nature of the problem-negotiation required by the forensic craniofacial reconstruction task that caused me to be unable to verbally explain what I had done? Do some students—regardless of the subject matter—use a problem-negotiation process that they are unable to explain? Second, was it, as the chief deputy coroner observed, my apparent melding of the interdisciplinary parts of the problem-negotiating process that prevents facial reconstruction from being explained in a linear and explicit way? Do some students also unconsciously meld interdisciplinary parts of their problem-negotiating process in ways that prevent them from being able to explain how they arrive at a solution? Third, is the type of problem-negotiating required for forensic craniofacial reconstruction well-structured, ill-structured, or both? Is it also the case that the most appropriate type of problem-negotiating for a student to perform optimally is well-structured, ill-structured, or both? Fourth, would an interdisciplinary information-processing approach to problem-negotiating—if it could be made at least more implicit progressing toward explicit—be viable in terms of curriculum and instruction in the classroom? Fifth, can an interdisciplinary information-processing approach to problem-negotiation be taught, especially on the secondary (7-12 grade) level? Sixth, given that I was not mindful of what I had done after a forensic craniofacial reconstruction, is it possible I could have explained—more explicitly—what I was doing had I been prompted with questions (e.g., the Socratic Method) while I was still functioning within the experience?

Based on the above reflective questions a qualitative research approach in general, like the Interviewing as a Qualitative research method—in particular the in-depth phenomenological interview format as advocated by Siedman (1998), melded with the Interpretative Biography as promoted by Denzin (1989b)—was appropriate. To study this tacit knowledge information processing problem-negotiating process in the most efficient way required a research method that would, as Creswell (1998, p. 15) states, provide "[A] 'complex, holistic picture'…a complex narrative that takes the reader into the multiple dimensions of [this]…experience and displays it in all of its complexity."

Like two sides of the same coin, both Interviewing as Qualitative research and Interpretive Biography are based on similar and at times overlapping assumptions. Seidman (1998, p. 3) states, "At the heart of interviewing research is an interest in other individuals' stories because they are of worth." Further, "The interpretive biographical method…involves the studied use and collection of personal-life stories, accounts, and narratives which describe turning point moments in individuals' lives" (Denzin, 1989a, chapter 2; 1989b, chapter 8).

I used the above melded methods to study three forensic craniofacial reconstructionists, one of whom is myself, to collect data on our tacit knowledge information processing problem-negotiation experiences. In terms of interpreting data from this study, I contend that the data—when viewed from the perspective of a Complex Adaptive Social System—will yield insights for curriculum and instruction.

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Facial Reconstruction

Historically, forensic craniofacial reconstruction is a more sophisticated extension of a practice which began with the Neolithic Levant (Eastern Mediterranean) peoples of Jericho, Jordan (c. 7500-5500 BCE). As part of the burial rites, on the "skull [missing the mandible] on which the face had been built up over the bone in plaster with shells set into the eye-sockets to simulate eyes" in order, apparently, to preserve a portrait of their ancestor's face (Prag and Neave, 1997, pp. 12-19). Moving on from that beginning, Greek artists in the fourth century BCE produced plaster casts from the faces of the deceased to create death masks. Few documented attempts exist on the reconstruction of the faces of deceased persons from the fourth century BCE until the late nineteenth century. The first documented art–science collaborative efforts were made in re-creating the likenesses of famous persons like the playwright Schiller, the Renaissance painter Raphael, and the composer Johann Sebastian Bach.

Contextually, forensic craniofacial reconstruction can be attributed to both physical anthropology and archaeology, which are both sub-categories of anthropology (Albert, 2005). Anthropology is "the study of human beings" in the broadest sense. When the facial reconstructive process is referred to as forensic craniofacial reconstruction or forensic art, it is found classified under osteology (the branch of anatomy dealing with the human skeleton), which is under forensic anthropology. Both, in turn, are under sub-headings in physical anthropology. "Forensic art is any art that aids in the identification, apprehension, or conviction

of criminal offenders, or that aids in the location of victims or identification of unknown deceased persons" (Taylor, 2001, p. 3).

When the reconstructive process is called facial reconstruction, it is considered archaeological and hence used to portray the faces of ancient/historical personages (Gerasimov, 1971, pp. 62-129). Forensic craniofacial reconstruction and/or facial reconstruction is part art and part science, a process in which a reasonable likeness of the face of an unidentified deceased person can be reconstructed from the remains of their skull (Gatliff & Snow, 1979; Pickering & Bachman, 1997; Wilkinson, 2004).

To identify the nature of the problem posed by the forensic craniofacial reconstruction task depends on the term one uses to understand the reconstruction process. There are six commonly used terms to conceptualize the process, and four reconstruction techniques used to produce the identifiable likeness. In the literature, the process of forensic craniofacial reconstruction is also referred to as facial approximation, facial reconstitution, facial restoration, facial reproduction, and facial reconstruction (Farrar, 1977; Gatliff, 1984; Iscan & Helmer, 1993; Rhine, 1990; Suzuki, 1973; and Tyrell, Evison, Chamberlain & Green, 1997). The concept of facial approximation implies that regardless of what materials, technique, or method used to re-create the face of a John/Jane Doe, only an approximate likeness and not an exact portrait of the person is expected. A facial reconstitution concept focuses on the application of a given medium (e.g., graphite on paper, modeling clay on a copy of the skull, or computer imaging) or

technique (drawing, sculpting, or computer aided) or procedure (Gerasimov's

Russian method, the Gatliff American method, or the Neave, also called the

Manchester method—a combination of the Russian and American methods) in

order to recover the face of the unidentified person in its original ante-mortem

appearance. This is similar to the concept of a facial restoration, which contrasts

with a facial approximation (which does not anticipate a totally positive

comparison to ante-mortem photograph(s) of the deceased). Facial reproduction

and facial reconstruction conceptually imply that they are post-mortem imitations,

resemblances, or replications of the John/Jane Doe's original ante-mortem face.

For the sake of simplicity and consistency, from this point forward I use the

letters (FCR) for forensic craniofacial reconstruction (CR), for craniofacial

reconstruction, or (FR) for facial reconstruction(s) when referring to this

identification method.

Pre-Research Observations

Without regard for the accuracy implied by a given facial reconstruction

method, I focused on the types of problem-negotiation accompanying the FCR

task. This being said, the nature of the problem of FCR can be conceptualized as

(1) a mathematical algorithm problem, (2) a puzzle problem, (3) a mystery

problem.

As mathematical algorithm problem, the FCR process functions

quantitatively (Tyrell et al., 1997). Subscribers to this approach tend to be

forensic anthropologists and advocates of computer-aided facial reconstructions. The mathematical algorithm approach is inflexible, efficiently end-product focused, objectively detached, and single-solution oriented (Quatrehomme, Cotin, Subsol, Delingette, Garidel, Grevin, & Fifrich, 1997).

The FCR puzzle-problem subscribers include people who have no real experience with FR but have either an intellectual or amusement curiosity about the process, people who have a particular technical expertise (e.g., 2-D graphic and/or 3-D simulation computer skills) that can be easily applied by law enforcement agencies, and people in related fields (e.g., paleoanthropology) that use FR as a search methodology in service to their own scientific investigative ends.

Conceptualized as a mystery problem, CR is used as a tool to give visual form to the paleoanthropological, archaeological, anthropological, and/or socio-historical curiosity about the appearance of the faces of hominids (e.g., Lucy), peoples, and personages from the past.

Whether we believe the FCR problem to be a puzzle, a mathematical algorithm, or a mystery, the problem-negotiating process spans a range of usages from the commercial, to the technical, to the paleoanthropological/socio-historical. For example, commercially, toy companies offer pseudo-scientific FR puzzle kits, like the CSI: Forensic Facial Reconstruction kit (case numbers 1 & 2 called, respectively, Brown and Blue eyes) or the PegSculpture Neanderthal and Julius Caesar kits. The technical problem-negotiating of the FCR process is

represented by people like Dr. Robert Crockett of the Milwaukee School of

Engineering, who provided technical computer-aided assistance using CT scans

and rapid prototype technology to manufacture a 3-D replica of the skull of a

murder victim as a piece of the puzzle toward solving a crime. Examples of the

paleoanthropological/socio-historical usage are represented by the scientific CR

of the face of a 160,000-year-old Ethiopian fossil believed to be one of the first

Homo sapiens, as reported in the journal *Nature*, (Hopkins pp.747-752, White

pp.742-747) 2003, and most recently the facial representation of Tutankhamen in

National Geographic, (Williams pp.2-22) 2005. Whether the beliefs about FR are

simple or complex, problem negotiating is the common link among the above

conceptualizations concerning the nature of FCR.

There is literature that supports the FCR process, as observed above and as

reported by the chief deputy coroner, as a melding of interdisciplinary parts in a

problem-negotiating process. Dr. David Whittaker, Professor of Forensic

Dentistry, University of Wales College of Medicine, states in the foreword

(Wilkinson, 2004, p. ix) to Dr. Carol Wilkinson's book *Forensic Facial*

Reconstruction:

> It is relatively recently that disciplines as apparently diverse as sculpture,
> psychology, anatomy, dentistry, criminology, and forensic science have
> collaborated in an attempt to 'identify the unidentifiable'… The problems
> of facial reconstruction are formidable… [T]o be successful a 'dedicated
> period of study' is essential. This is not the field for the dabbling amateur.

> The implication of Dr. Whittaker's statement is that at least a tacit

collaborative knowledge of the diverse disciplines, as observed above by the chief

deputy coroner, is required to even attempt the formidable problem-negotiating

needed to successfully engage in the forensic craniofacial reconstruction field.

There is no single comprehensive text reference source for all of the diverse

disciplines that an amateur can consult that would teach him or her how to try

their hand at the facial reconstruction process.

Also, in John Prag's and Richard Neave's book *Making Faces* the authors

(Prag & Neave,1997, p. 11) assert:

> Nevertheless it is fundamental that we have approached our subject [facial
> reconstruction] as a medical artist and an archaeologist and museum
> curator, and in the last resort we have each relied upon and adhered to the
> teaching rigors imposed by our own disciplines. (p. 11)

Prag and Neave's assertion is that regardless the art or science discipline

you would approach the forensic facial reconstruction process from,

at the very least it requires you to have a strong fundamental competence in your

given discipline.

As to whether the FCR problem-negotiating process is well-structured or

ill-structured, in the literature on problem solving (Brabeck & Wood, 1990;

Jonassen, 1997; Shin, Jonassen & McGee, 2003), these researchers make the

distinction between well-structured and ill-structured problems (Jonassen, 2000,

p. 64):

> The most commonly encountered problem, especially in schools and
> universities, are well-structured problems. Typically found at the end of
> textbook chapters, these well-structured ***'application problems'*** [bold
> italics mine] require the application of a finite number of concepts, rules,
> and principles being studied to a constrained problem situation… Ill-

structured problems are the kinds of problems that are encountered in everyday practice, so they are typically emergent dilemmas. Because they are not constrained by the content domains being studied in the classroom, their solutions are not predictable or convergent.

On a continuum from extremely well-structured to extremely ill-structured problem-negotiation, the progression appears to be from mathematical algorithm, to puzzle, to mystery, respectively. Comparatively, both the mathematical algorithm and the puzzle nature of FCR problem negotiating contrast with the mystery nature of the FCR process in the following assumptive ways:

a)   Both the mathematical algorithm and the puzzle problem-negotiation approach assume that a decreasing number of degrees of freedom will lead to the reasonable likeness solution. In other words, *the application* of each specific mathematical measurement or puzzle piece being put into its exact place will bring the ultimate solution one step closer to completion.

b)   Both approaches assume that the essential nature of the problem-negotiations process is for the most part quantitative.

c)   Both approaches assume that the inclusion of artistic sensibilities to the problem process is not necessary and probably even counter-productive to the solution of creating a reasonable likeness of the John/Jane Doe.

Those who assume an ill-structured nature in the problem-negotiating process as well as a mystery problem to FCR do not subscribe to the above assumptions. Would an interdisciplinary information processing approach to problem negotiating be useful as an instructional strategy in the classroom? The literature

on interdisciplinary information processing relative to teaching and learning environments at the K-12 level does not appear to include such an approach.

Can interdisciplinary information processing be taught? There is literature that explores this question at the post-secondary level; examples include programs at the University of Pennsylvania's Center for Bioethics, Swarthmore College's program for Interpretation Theory, and the NEXA program at San Francisco State University (Nikitina, 2005).

The literature on the revealing of, retrieval, capturing, or attempts to explicate tacit knowledge is dominated by the advocates of knowledge management (Nonaka, 1991; Davenport & Prusak, 1998). For example, according to the Chi Summit Report, Transforming the Pharmaceutical Industry – The Industrialization of Research and New Market Realities, knowledge management is:

> The ability to navigate through and analyze large amounts of data, and to ensure a flow of knowledge to the right people at the right time, is emerging as a major competitive advantage. This is especially critical as companies seek to exploit emerging technologies, coordinate research and activities across large organizational and geographic distances, and manage cost and projects effectively. Knowledge management systems are designed to capture much of the tacit capacities of an organization, including skills and experience of its employees.

Strict interpreters of Polanyi's definition of tacit knowledge accept the fact that tacit knowledge cannot be articulated but can be communicated, "provided we are given adequate means for expressing ourselves…we can do so only by relying on the [observer's] intelligent co-operation for catching the meaning of the demonstration" (Polanyi, 1966, p. 5). This raises the question: What were the

adequate means in the given context by which I communicated the functioning of my tacit knowledge?

Polanyi goes on to say, "we can do so [i.e., communicate our tacit knowledge] only by relying on the observer's [e.g., Triena's observations that mentioned above] intelligent co-operation for catching the meaning of the demonstration" (Polanyi, 1966, p. 5). Moreover, according to Schon (1983, p. 49) "our knowing is in our action."

Purpose of the Study

The purpose of this study is threefold:

1. To identify and make as implicit as possible—moving whenever possible on a continuum toward *explicit*—the tacit thought and/or problem-negotiating process that forensic artists use.

2. To interpret how to look for, identify, and understand the individual/adequate means a student may need to communicate her/his tacit knowledge problem-negotiating process when solving the problem at hand.

3. To shed light on the tacit problem-negotiating phenomenon experienced by forensic craniofacial reconstructionists for its applicability as a curriculum and instructional model to help students who otherwise are put at unnecessary risk because of their own tacit problem-negotiating thought processes.

Being able to do this will assist students in recognizing their ability to confront the ill-structured problems they and we will encounter in the 21st century.

The Research Questions

1) What does the phenomenon of the tacit knowledge and information processing/problem-negotiating experience that is presumed to occur during a forensic craniofacial reconstruction look like?

2) How can the tacit knowledge involved in the information processing/problem-negotiating procedure that occurs during a forensic

craniofacial reconstruction be communicated in a manner that more

closely approaches explicit knowledge?

3)   What are the implications of tacit knowledge information

processing/problem-negotiating experiences for serving as a curricular and

instructional model to help students communicate their tacit knowledge in

an implicit knowledge manner that approaches the explicit?

The nature of my research questions (Creswell, 1998, p. 17) indicates

one of the compelling reasons for selecting a qualitative research method. The

other seven reasons are stated in the methods chapter.

The literature I reviewed to answer my first research question deals with,

respectively, implicit learning and tacit knowledge and how implicit *is* implicit

learning.

Statement of the Problem

Experienced K-12 classroom teachers have, at one time or another, asked a student to explain how they arrived at an answer or knew the answer to a problem was **right,** only to be told, *"I don't know how I got it but I know it is right," "It just came to me," "I know it's right, but I just cannot explain it,"* or *"I just know!"* These students often have an awareness of themselves as not fitting the norms of schooling. Whether they perceive that feeling as intellectual, emotional, or psychological, it affects how they see themselves relative to the world in and beyond formal schooling. They tacitly feel and explicitly know there is a disconnection between what they are excepted to know, how they know it, and how they are expected to communicate it in school versus a personal, commonsense, and/or demonstrative feedback of "what they know, they know" (Acevedo-Barron, 2004; Blank & Harwell, 1997; Caine, R. & Caine, G., 1991; Grandin, 1996; Newmann, et al., 1995; Weinbaum & Rogers, 1995; Willis, 1977).

One possible historical view, in American schooling, for this disconnection can be illustrated using the Hegelian dialectic with (1) the Jeffersonian Ideal of a universal education as the *thesis*, (2) the social, political, and economic interventions into public education by the late 19th/early 20th century industrialist for the purpose of fulfilling their needs for a minimally educated workforce as the *antithesis,* and (3) with the adoption of Frederick Winslow Taylor's *Principles of Scientific Management* and various other types of educational reform (e.g., The reaction to the launch of Sputnik 1957, A Nation at

Risk: The Imperative For Educational Reform, 1983, The Child Left Behind,

2000) as the *synthesis.* Then, when we conceptualize the synthesis of educational

reforms as reconciliation between the philosophical Jeffersonian Ideal and

schooling as a tool for competitive socio-political, economic development, the

Jeffersonian Ideal is sacrificed on the altar of efficiency and we end up with:

> Teacher reducing content to rituals of lists apologizing for assignments; students quietly engaging in minimal efforts for a course credit, doing the least to get by in school; defensive teaching, and its transformation of cultural content into 'school knowledge' – it all brings us back to the Gryphon of Alice's wonderland: 'That's the reason they are called lessons, because they lessen from day to day.' (McNeil, 1999, p. 209)

The disconnection between learning in school and the world outside of

school has the following components:

1)   The norms of comprehension for the course content of schooling is

predominantly biased toward the explicit single right answer to well-

structured linear questions, which in itself is a form of social control.

For example, McNeil observes:

> Many of the smartest, best-educated…teachers [feel] that 'really to teach' would be going against expectations at their school, not fulfilling them. The Ideals they [express] for what their students should learn from their course [bear] little resemblance to the simplistic 'facts' dispensed in lectures and worksheets. The ideals [imply] open-ended, long term learning, begun by broad-ranging, depth-seeking inquiry and discussion. Yet the content [presents what is] often limited to brief, 'right' answers, easily transmitted, easily answered, easily graded. (McNeil, 1999, p. 157)

In other words, the overt or covert discouragement of divergent

perspectives of problem-negotiation that lead to alternative solutions inhibits

growth and puts some otherwise intelligent students needlessly at academic risk.

To illustrate what this means, consider how we think about and understand the meaning of length:

> To find the length of an object, we have to perform certain physical operations. The concept of length is therefore fixed when the operations by which length is measured are fixed; that is, the concept of length involves as much and nothing more than the set of operations by which length is determined. (Bridgeman, 1928, p. 3)

This means as long as we cannot, will not, or do not consider alternative possibilities toward how we conceive of doing a given task, our concept of how we can confront a given task is permanently fixed.

2)   There is a minimal involvement with authentic hands-on ways of knowing or understanding a concept, except in classes that include a studio/laboratory requirement. In a studio/laboratory class it is the experimental, experiential, trial and error nature of the process/procedure that is most important. For example, students in a statistics class could be taught (by the sense of touch) the concept of what a normal distribution bell curve is by trying (hands-on) to center a ball of clay on a spinning potters wheel. As the clay conforms to your hand positions it becomes more and more centered relative to the spinning of the wheel and the concept of a normal distribution emerges. This process would help students to understand that a normal distribution is more than just an intellectual concept, but can be understood by other means. The student can literally feel the normal 68 percent of the mass/population of the clay with their hands.

3)   The missed teachable moments when analogous themes and concepts arise
      across diverse content areas present the optimal opportunities for the
      transfers of understanding/knowledge to be made. For example, the
      concept of entropy in physics is the tendency of an energy system to run
      down. If we transfer this abstract understanding to the tools used to carve
      stone (in the respective order of the point, the claw, and the flat chisels), a
      kind of entropy occurs. The point chisel is used to rough out the basic
      form of a carving. The point chisel becomes less and less useful as we
      approach the situation where refinement of the rough surface becomes
      self-evident, and the claw chisel must be used to further refine the surface
      of the stone. Likewise, the claw follows the same entropic path as the
      point chisel, to where the flat chisel is required to make an even more
      refined surface on the stone.

4)   Ill-structured problems are naturally resistant to step-by-step algorithmic
      problem solving means, and cannot adequately be negotiated using them.
      "When solving an ill-structured problem, the solver will usually interpret
      the problem in terms of [her]/his own perception of the major causes of
      factors contributing to the problem, including constrains of the problem.
      This *personal interpretation* [bold italics mine] constitutes the
      representation of the problem" (Rahikainen, 2002, p. 24). Likewise, Goel
      (1992) argues that "[I]ll-structured, open-ended problems, like the

preliminary phases of design problems, need 'ill-structured' diagrammatic representations."

As educators we need to be constantly aware of the manifestations of our students' ways of knowing, to be open to accept and encourage all of the ways students attempt to convey their particular types of problem-negotiating experiences, especially tacit ways. The relevance of our awareness, acceptance, and encouragement will help students believe that they can wrestle with the ill-structured problems that will inevitably be part of whatever field they may choose to pursue. The present school operational structure fails to value diverse and divergent problem-negotiating strategies of students. To truly ensure that no child is left behind, we need to honor how our students' individual problem-negotiating processes work—not how well they conform to the limited, accepted norms of knowledge representation.

To reiterate, the problem of the disconnection between school knowledge and the practical application of knowledge occurs for the following reasons:

a)   the predominance and social control of the "single right answer" to well-structured linear questions.

b)   the minimal involvement with authentic hand-on ways of knowing or understanding abstract concepts.

c)   the missed teachable moments to bring to the attention of students when analogous themes or concepts arise across diverse content areas.

d)   the failure within the school operational structure to accept, value, and

honor diverse and divergent problem-negotiating strategies.

Why Study Tacit Knowledge in Forensic Craniofacial Reconstruction

> *We can communicate, after all, our knowledge*
> *of physiognomy, provided we are given*
> *adequate means for expressing ourselves.*
> Michael Polanyi

The world of forensic craniofacial reconstruction (FCR) is fascinating to the general public as well as to the forensic artists themselves; the only difference is in degree. The public's fascination is higher because the concept, process, and the results appear to be near impossible. Technically, it is a Medico-legal-visual art enterprise. It is a world that draws attention to the interrelationships of various areas and levels of expertise not normally associated which allows the forensic artist to re-create the best possible likeness of a particular John/Jane Doe. The information the forensic artist requires demands the cooperative participation and coordination of the law enforcement jurisdiction (where the remains were found), death scene and/or morgue photographer, the coroner investigator, the physical/forensic anthropologist, the forensic odontologist, and the x-ray technician, to name a few. Neither the reconstruction nor the coordinated efforts of the participants will make any difference at all, if the news media is not properly enlisted and employed.

Related to its possible implications for curriculum and instruction, there are four important reasons for studying the tacit knowledge employed while creating a forensic craniofacial reconstruction:

1)   Research on the phenomenon of tacit knowledge as it functions in the context of forensic craniofacial reconstruction and its possible relationship to curriculum and instruction is absent from the literature.

2)   The combined art/science nature of the forensic craniofacial reconstruction problem-negotiating process is a timely topic in the news media and tends to generate in students and adults alike an interest in the problem-solving and investigations.

3)   It is a hands-on, authentic way of knowing that requires a visual-tactile-spatial cognitive information processing approach to accomplish the goal of re-creating the best possible likeness of the John/Jane Doe.

4)   The study of forensic craniofacial reconstruction as a mode for understanding problem-negotiating growth experiences has intrinsic rewards:

     a)   It enforces our tacit knowledge about detail characteristics.

     b)   It is a form of the optimal experience or "Flow" (Csikszetmihaly, 1990).

     c)   It gives an insight into the kind of problem-negotiating that cannot be articulated.

     d)   It provides a sense of intellectual risk-taking; the adventure of "seeking the known from the unknown" (Williams, 2004, p. 4).

The Significance of the Study

> Let's get it clear in mind that schooling is not education
> – you can easily compensate for lacking a schooling [sic],
> but there is no way to make for the damage that occurs
> without an education. Without that you are smaller than
> you would have been.
> *John Taylor Gatto*

This study is significant for the following four reasons:

1)   The concept and practice of problem-solving in public schooling in America is and has been predominantly limited to well-structured [alphanumeric] models (Streib, 1992). This well-structured predominance constrains the potential benefits of tacit knowledge as a relevant operating strategy for students in school, turning it into the new Taylorism of scientific [knowledge] management of the 21st century by attempting to make tacit knowledge be explicit knowledge (Hilderth & Kimble, 2002).

2)   Exploring implications for the tacit knowledge in FCR as a model of problem-negotiating growth experiences is absent from the literature on curriculum and instruction.

3)   This study will direct pre-service teachers in their field placements as well as in-service teachers (pre-tenured) toward a better insight into those students who perceive the disconnection between schooling and practical applications knowledge.

4)   Given the predominance of well-structured alphanumeric problem-solving models in schooling combined with the perceptions of those students who perceive the disconnection between schooling and practical applications

knowledge, there is the strong potential for otherwise intelligent students

being put at needless academic risk because of their preference for diverse

modes of problem-negotiation.

> Although several studies have shown that at-risk students score at the average level on measures of cognitive ability indicating that they do have the ability to succeed in school, they score lower than their non at-risk peers on achievement tests and earn lower grade point averages. (Barrington & Hendricks, 1989)

There is ample literature on the profile characteristics of at-risk students

(Binkley & Hooper 1989; Fine, 1987; Lopez, 1990; Rumberger, 1987). In at-risk

students the tendency toward nonlinear forms of knowing must either be strong

enough to help them co-exist and survive for 12 years in the schooling

environment or their way of knowing must become a synthesis of nonlinear and

linear problem-negotiating. In other words, these students go through a cognitive

process of domestication (Acevedo-Barron, 2004). While some at-risk students,

like Acevedo-Barron's "Mermaids," survive the process of domestication

(schooling), many do not. For example, by their active resistance to the

domestication process of schooling, "The Lads" in (Willis, 1977) ensured they

would socially reproduce themselves as members of the working class.

National Center for Educational Statistics (NCES) projects the following statistics:

> Total public and private elementary and secondary school enrollment reached a record 55 million in fall 2005, representing a 14 percent increase since fall 1992. Between 2005, the last year of actual data, and 2017, a further increase of 10 percent is expected, with increase projected in both public and private schools. Increases in public school enrollment are expected in the Midwest, South and West and a decrease is expected in the Northeast.
> U.S. Department of Education, Center for Education Statistics (2008). Institute of Education Sciences, National.[Projections of Education Statistics to 2017. (NCES, 2008-078)]. Retrieved November 9, 2008, from http://nces.ed.gov/programs/projections/projections2017/sec1a.asp

Thus we can expect an average yearly increase of 225,000 students in our nation's schools from various racial, ethnic, and cultural backgrounds with an unknown number of students having an embedded inclination toward nonlinear tacit forms of knowing and problem-negotiating similar to the type that would be encountered in the FCR problem-negotiating process. This has problematic implications for social justice issues, in particular Multicultural Education as well as Social and Cognitive Development Models (Adams, Bell & Griffin, 1997, pp. 32 & 39), not to mention meeting the requirements of the No Child Left Behind Act of 2001. The NCES reports the percentages of school districts with public alternative schools and/or programs for at-risk students, by selected district characteristics: 2000-01.

The Role of the Researcher

> There is no science without fancy and no art without facts.
> *Vladimir Nabokov*

In this study, I investigated the tacit problem-negotiating processes used by forensic craniofacial reconstructionists as a possible curricular and instructional model for identifying the tacit toward implicit practices and behaviors when a given individual is engaged in a tacit knowledge problem-negotiating growth experience. I contend that tacit knowledge problem-negotiating processes that lead to appropriate solutions to a given problem—while seen as unusual relative to the prevailing paradigm of explicated problem-solving—do not make it irrelevant or invalid.

> [T]he dichotomy between theoretical and practical knowledge is unhelpful. Rather, one needs to be able to reconcile theoretical and direct personal…knowing of phenomena and practice, by seeing the connection between them. Also each may be derivable from the other – that is, theory may be derived from analysis of practice and new ways of approaching practice may be derived from theory…The learning goal then becomes one of making such meaning making framework explicit, appraising them for their utility and building links among them, so the repertoire of ways of … knowing, available for new situations, is largely interlinked and meaningful. (Stevenson, 2003, p. 247)

I am drawn to and approach this study from two perspectives of knowledge and understanding: as an educator and a forensic craniofacial reconstructionist (forensic artist). As an educator, I have 27 years of experiential observation of my students' tacit problem-negotiating processes relative to the authentic task of creating art works. As a forensic artist, I have been involved for 18 years with the real-world, ill-structured problem of reconstructing the best

possible likenesses of the unidentified individuals (John/Jane Doe) from the remains of their skull.

The pedagogy of teaching art involves assisting students to interweave the strands of their continual struggle with tacit internal knowledge and their implicit toward explicit tangible representation. This interweaving must be negotiated and translated into a meaningful visual form in at least three ways of understanding:

1)   Understanding how – the act of making artwork.

2)   Understanding what – focusing on the particular while being aware of the whole (the Gestalt).

3)   Understanding why – developing and exercising aesthetic sensibility toward their own work and the work of others: Eisner (1998) "Aesthetic mode of knowing."

As a forensic artist I realize that to re-create the best possible likeness of the face John/Jane Doe wore in life, I had to find the mutually supporting interrelationship between physical anthropology and the fine arts of drawing and sculpture. My realization of this mutually supporting interrelationship operated on a subconscious (tacit) level until an outside observer who briefly but actually watched me work on a reconstruction brought it my attention. Therefore, my experiences as an art educator and a forensic artist give me an adequate background to conduct this investigation.

The Organization of the Study

In chapter two I review the literature on forensic craniofacial reconstruction, tacit knowledge and curriculum and instruction to situate my study within these larger bodies of the literature, in particular interpreting how forensic craniofacial reconstruction relates to tacit knowledge and curriculum and instruction.

For the methodology, in chapter three, I guide the reader through the selection of Interviewing as a Research Method coupled with the Interpretive Biography Method, for a description of the participants, and a detailed presentation of the research plan for the data collection procedure and a brief explanation of how the data was interpreted.

In chapter four I present a Multistability Theory for Curriculum and Instruction. In chapters five, six, and seven I present my data from the background questionnaire, the audio and video recorded life history and working facial reconstruction interviews. In chapter eight, I relate the Multistability Theory for Curriculum and Instruction to the data collected and analyzed from chapters five, six, and seven.

In chapter nine, I give a brief summary of the study interpretation as it relates to research questions one and two conclude by first showing how tacit knowledge relates to forensic craniofacial reconstruction and how they both relate to complex adaptive systems in general and complex adaptive social systems in particular in terms of their implications for curriculum and instruction.

CHAPTER TWO

Review of the Literature

In this chapter I expand on the introductory survey to the literature on forensic facial reconstruction in chapter one and review the literature on tacit knowledge and curriculum and instruction, explaining their interrelationship in terms of answering my research questions one and two. The literature on forensic facial reconstruction will focus on the physical working process in terms of separating aspects of implicit knowledge from tacit knowledge. The literature on tacit knowledge will focus more in detail on how to recognize its appearance, and how it is communicated. The literature review relative to curriculum and instruction focuses on the attempts to implement tacit knowledge.

The literature sources for this study come from books, peer reviewed journal articles, dissertation abstracts, and conference papers from the diverse content areas of forensic craniofacial reconstruction (also referred to as forensic art), tacit knowledge (also called practical knowledge when it is associated with curriculum). This eclectic array of the literature review sources is necessary because a straightforward review did not present itself. This investigation requires the review of this diverse content of literature because it facilitates more explicit answers to the research questions of the fundamentally interpretive nature of this study.

Creswell (2003, p.45) suggests, "For a qualitative study the literature review might explore aspects of the central phenomenon being addressed and divide it into topical areas." Following this suggestion, and because I am a visual thinker, I visually conceptualized the outline for the literature review as three separate large circle topic areas, with smaller subtopic circle areas within them. These large circle topic areas are respectively the Forensic Craniofacial Reconstruction circles (Figures 1.0, 1.1, 1.2, and 1.3), Epistemology circle (Figure 1.4) as it relates to differences among tacit, implicit, and explicit ways of knowing, and the Curriculum and Instruction circle (Figure 1.5). These circles will eventually be superimposed on each other to form an in-depth conceptual Venn diagram that will assist in answering this study's research questions.
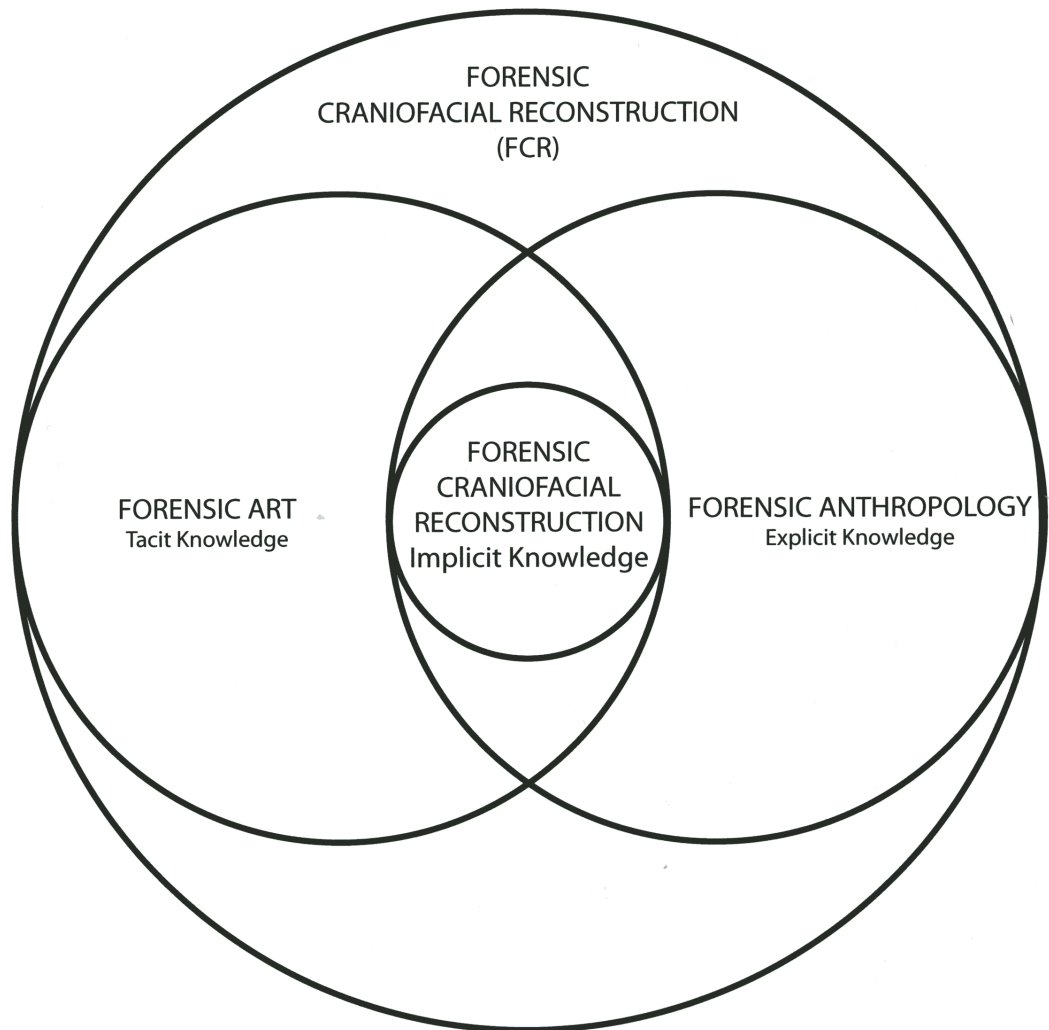
Figure 1.0. – Shows the art/science relationship within the FCR process.

Figure 1.0 is an illustration of the big conceptual picture of what the FCR process looks like as generally acknowledged in the literature. What the FCR literature is silent on is *the epistemological knowledge relationships* within the process, probably because of issues related to the Daubert standard for scientific evidence. The epistemological knowledge relationships within the FCR process are symbiotic in nature, and take place in between the conceptual borders of tacit-

implicit and implicit-explicit. For example, picture in your mind an image of yourself displayed in only precise written descriptions and exact mathematical measurements. Would a close friend recognize that exclusively explicit alphanumeric portrait as you? Likewise, if there were a portrait bust of you being sculpted by someone who had no concept at all of the human head, neck, or upper body anatomy, would anyone see your likeness in the completely tacit work? In terms of comprehending the FCR process the epistemological knowledge relationships are too fundamental to the process to be discounted.

The background literature review for forensic craniofacial reconstruction (FCR) is also represented by the first large circle, showing the major literature in the field since 1971 (Wilkinson, 2004, p. 2). These works, presented in this study in chronological order, are *The Face Finder* (Gerasimov, 1971), *The Human Skeleton in Forensic Medicine* (Krogman, 1973), *Forensic Analysis of the Skull* (Iscan &Helmer, 1993), *Making Faces* (Prag & Neave, 1997), *In the Eye of the Beholder* (Bruce & Young, 1998), *Craniofacial Identification in Forensic Medicine* (Clement & Ranson, 1998), *Forensic Art and Illustration* (Taylor, 2001), and *Forensic Facial Reconstruction* (Wilkinson, 2004). Although *Forensic Analysis of the Skull, In the Eye of the Beholder,* and *Craniofacial Identification in Forensic Medicine* are mentioned, they proved upon review to be outside of the scope of this study.

The above literature falls into a normal distribution between the two primary orientations toward FCR Forensic Anthropology and Forensic Art. In my

visual outline these views are presented by two overlapping circles within the

circumference of the main FCR circle, with the works that synthesize the

art/science nature of FCR occupying the overlapping area between them. These

two overlapping circles also represent, respectively, the tacit knowledge within

the forensic art component and the explicit knowledge of the forensic

anthropology component of the FCR process. The overlapped area in between the

forensic art/tacit and the forensic anthropological/explicit circles is where implicit

knowledge resides (Figure 1.1).

FORENSIC
CRANIOFACIAL RECONSTRUCTION
(FCR)

Face Finder
(Grasimov, 1971)

Making Faces
(Prag & Neave, 1997)

Forensic Facial
Reconstruction
(Wilkinson, 2004

Forensic art and Illustration
(Taylor, 2001)

The Human Skeleton in
Forensic Medicine
(Krogman & Iscan, 1983)
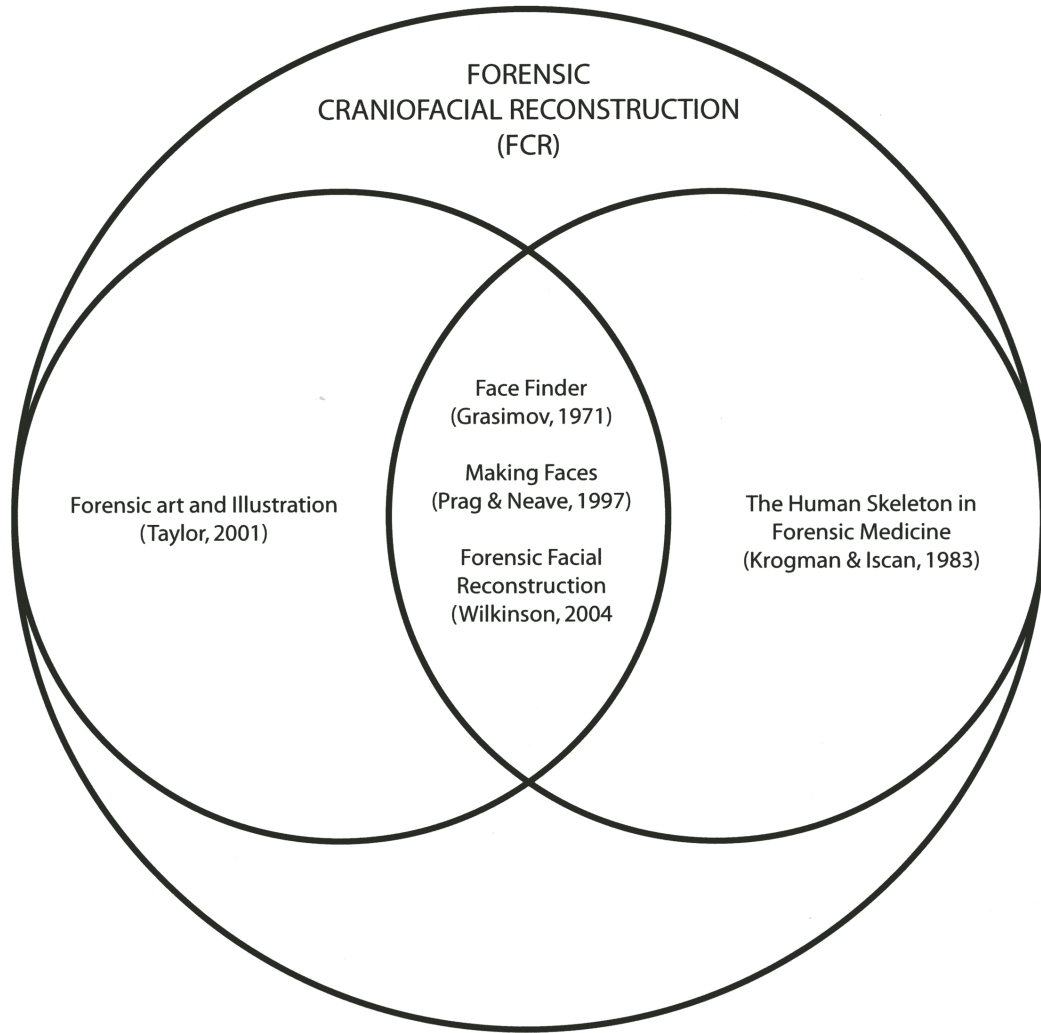
Figure 1.1 – The forensic craniofacial reconstruction literature for this study.

Within the forensic arts circle of Figure 1.2 are two smaller circles representing, respectively, the visual art techniques of three-dimensional sculpture and two-dimensional freehand drawing. The overlapping area in between the arts of sculpture and drawing is their synthesis, called bas-relief. An example of how to describe a bas-relief is to look at the profile sculpted-drawing of President Roosevelt on a dime.
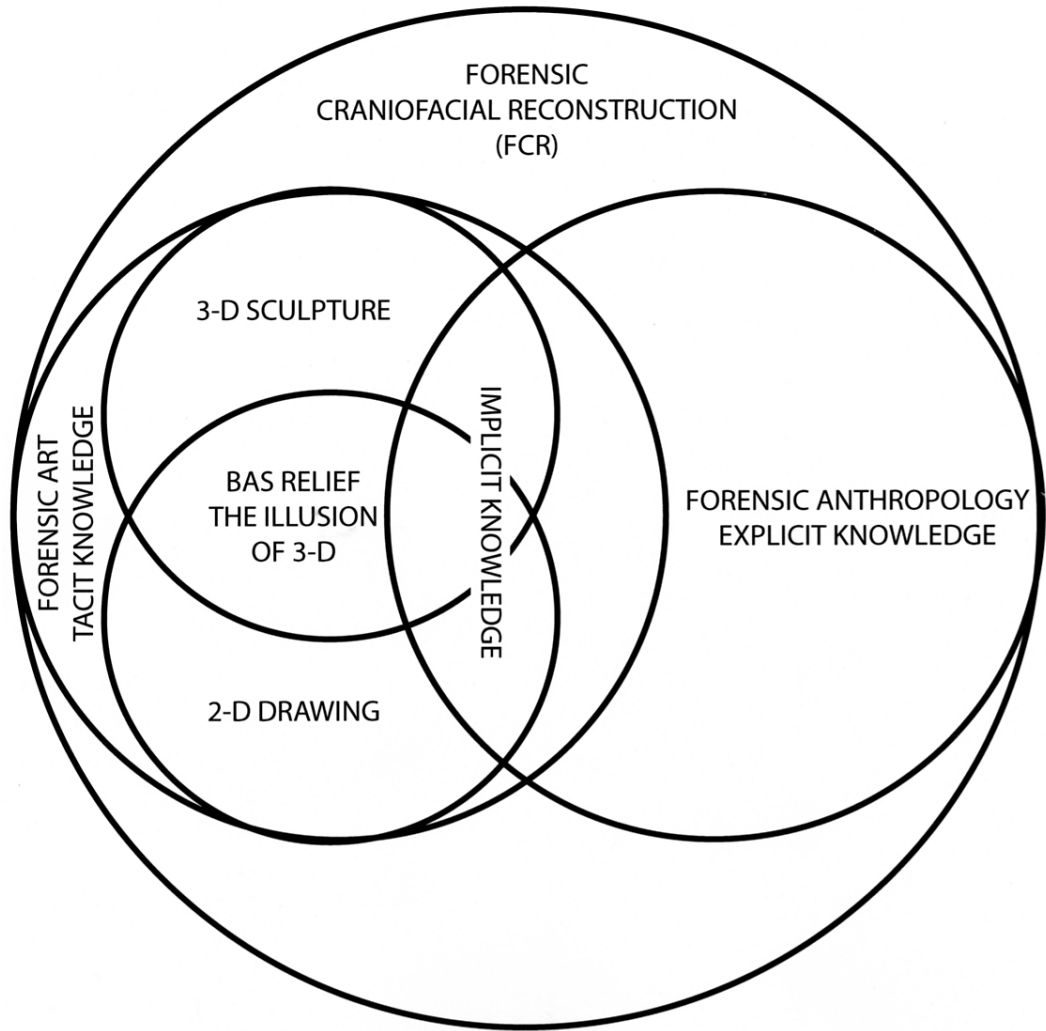
Figure 1.2 – Shows the 2-D to the 3-D relationship within forensic art.

Inside of the 3-D sculpture circle in Figure.1.3 exist two smaller circles which represent the three sculpting methods in the forensic art of FCR. They are the Russian method, which is the most tacit approach within the implicit process

of FCR; the American method is the most explicit; and as a synthesis between them the Neave method is the most implicit. What I mean is the Russian method requires the forensic artist to have the most in-depth taken for granted knowledge of human head and neck anatomy. The American method, used by persons with no previous experience in either art or anatomy, requires no knowledge of head and neck anatomy—only a strict compliance with the physically derived thickness of the soft tissue depth marker. The Neave method (Figure. 1.3) uses 3-D sculpture methods that are synthesis of the Russian and American methods.

FORENSIC ART
3-D SCULPTURE
TACIT KNOWLEDGE

THE METHODS

RUSSIAN METHOD   NEAVE METHOD   AMERICAN METHOD
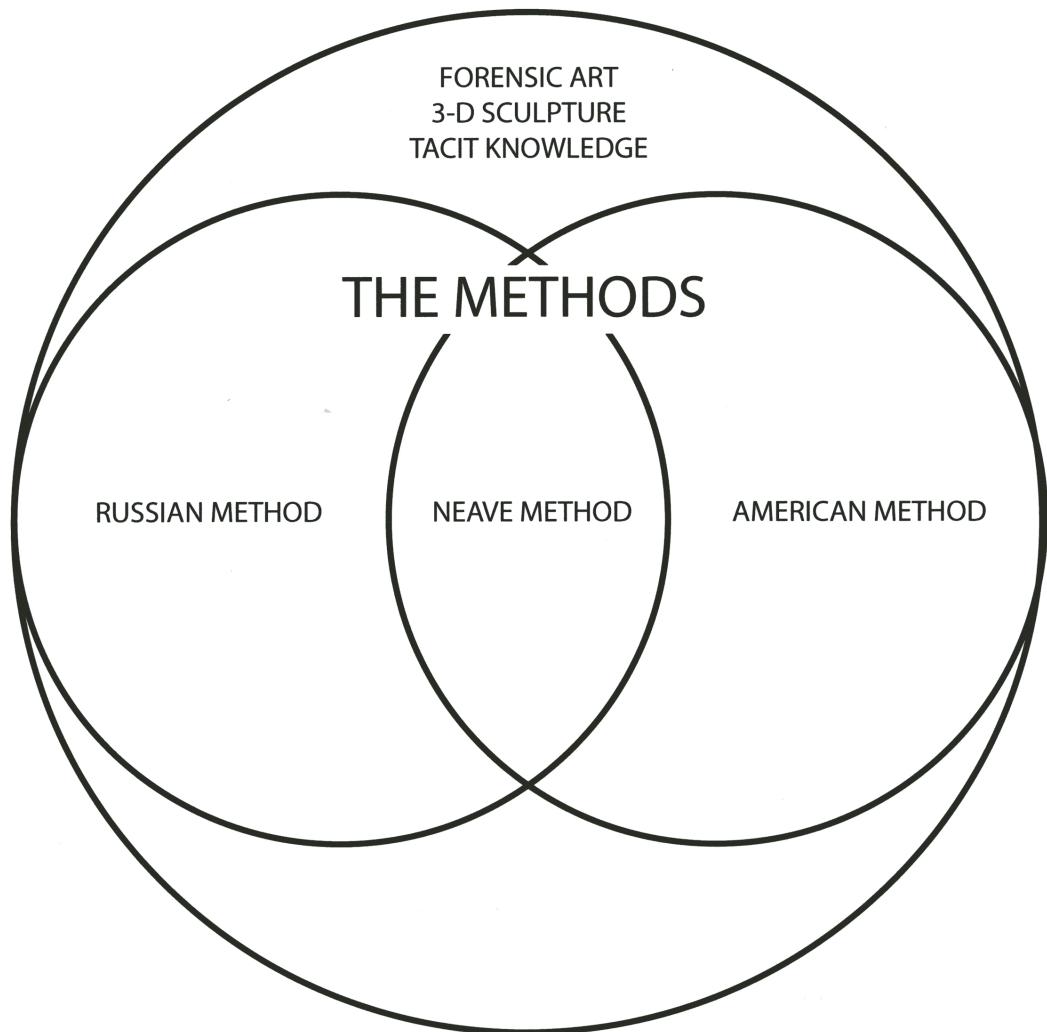
Figure 1 3 – The Forensic Craniofacial Reconstruction process has two methodological procedures: two-dimensional (i.e., drawings and/or computer assisted images) and three-dimensional (sculpted forms). Figure 1.3 shows the three individual sculptural methods and how they relate to one another.

The area where the four circles converge represents the tacit-implicit, the implicit, and the implicit-explicit art/science knowledge required to create a forensic craniofacial reconstruction.

The background literature, representing Epistemology in a general circle, is subdivided into two overlapping circles representing Tacit Knowledge (TK) and Explicit Knowledge (EK), with tacit-implicit (TI), Implicit Knowledge (IK), and implicit-explicit (IE) representing their synthesis (Figure 1.4).

EPISTEMOLOGY

TACIT KNOWLEDGE (TK)   (TI)   IMPLICIT KNOWLEDGE (IK)   (IE)   EXPLICIT KNOWLEDGE (EK)
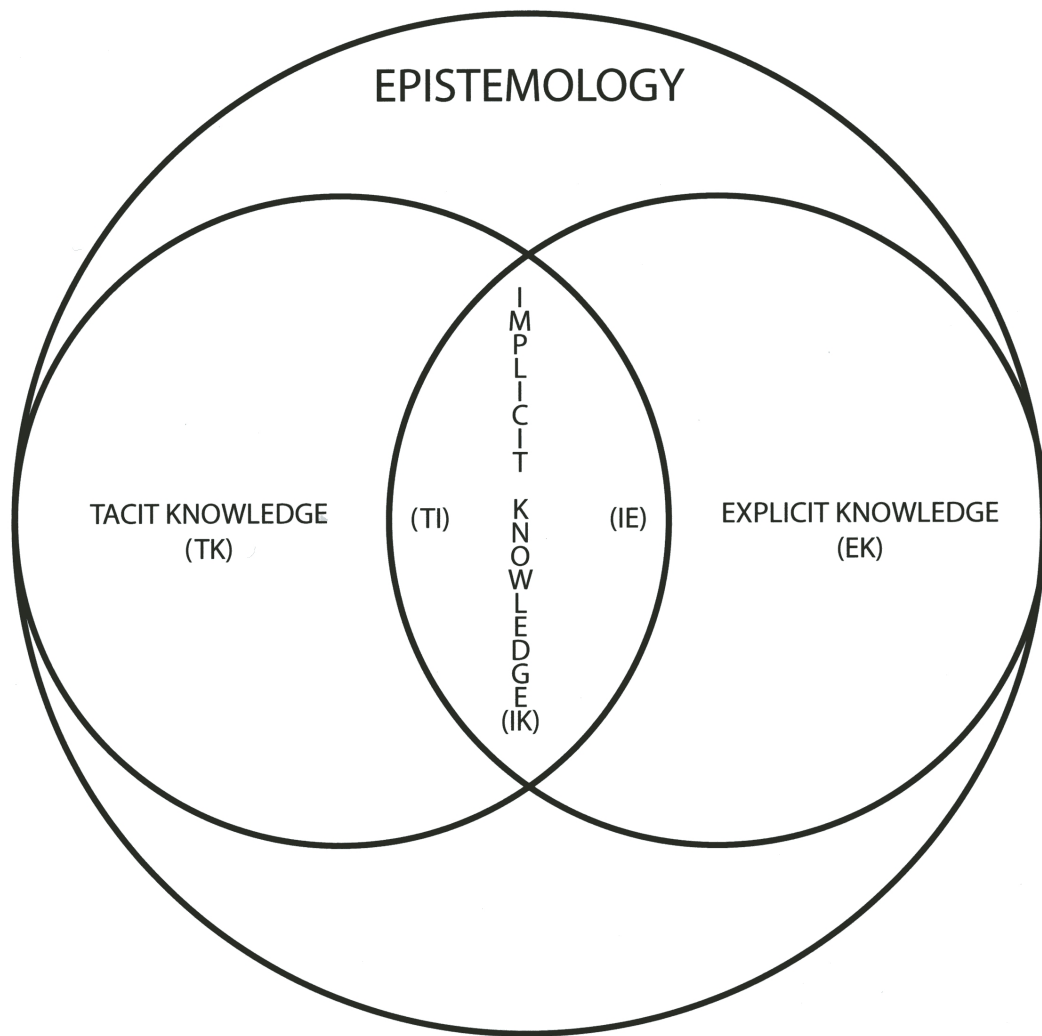
Figure 1.4 A visual display of the Forms of Knowledge/ the Ways of Knowing

Within the circle, representing curriculum in general, I have limited the background curriculum literature to the two smaller overlapping circles of the constructivist stance and the positivist stance. The synthesis of the overlap

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between these two positions sought out literature that supported an

interdisciplinary, situated/problem-based learning.

CURRICULUM

CONSTRUCTIVIST
STANCE

INTERDISCIPLINARY

SITUATED

PROBLEM-BASED

LEARNING

POSITIVIST
STANCE
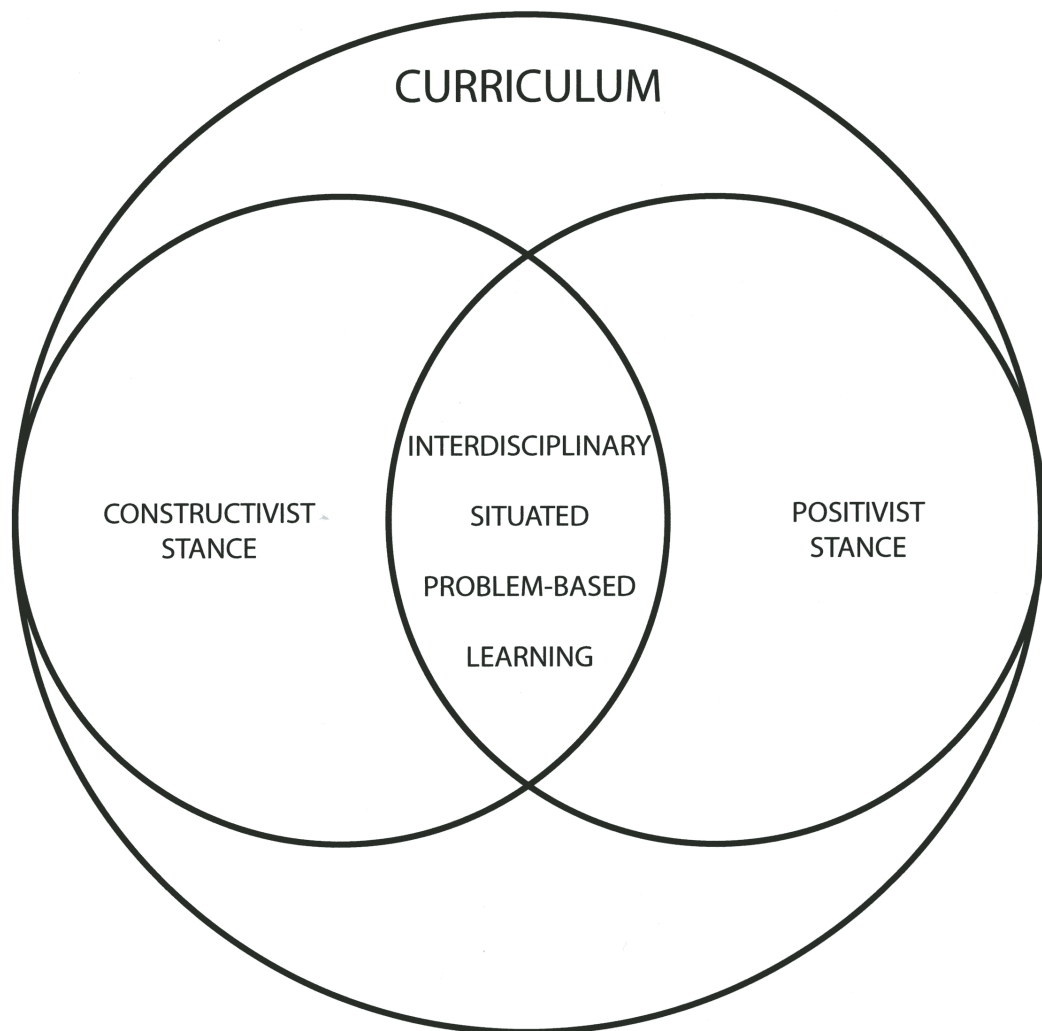
Figure 1.5 Illustrate the broad philosophical assumptions about curriculum and how they would interpretative map onto the forms of knowledge/ways of knowing in Figure 1.4 above.

The central phenomenon of the curricular implications for the tacit knowledge

employed while creating a forensic craniofacial reconstruction is revealed as the

various larger circles with their smaller circles mapped onto each other (see

Figures 1.0, 1.1, and 1.2). Inside the forensic craniofacial reconstruction (FCR)

circle are the two smaller circles of

1) Two-dimensional forensic craniofacial reconstructions, freehand drawings.

2) Three-dimensional reconstructions, clay modeled sculptures. Although
   computer-aided reconstructions, drawings, and virtual sculptures would in
   fact be the third technique within the (FCR) circle, it is not being
   considered because tacit knowledge is not algorithmic and therefore
   computer-aided reconstructions are outside of the scope of this study.

   Embedded within the three-dimensional techniques are three

reconstruction methodologies; the first is the Russian method *as thesis*

(Gerasimov, 1971), second the American method *as antithesis* (Gatliff, 1984;

Gatliff, & Snow, 1979), and the third combines the Russian and American

methods, *as synthesis* (Neave, 1980). Inside the two-dimensional techniques are

two approaches: the composite drawing (witness report) facial reconstruction of

crime suspects or victims and the Taylor method of two-dimensional forensic

facial reconstruction drawings from the skull (Taylor, 2001).

   In the second circle, epistemology, the background literature focuses on

representing the following limits of knowledge: tacit (as thesis), implicit (as

synthesis), and explicit as (antithesis knowledge). I realize that in the current

dominant educational practices in America, the positions of tacit and explicit

knowledge are reversed. Polanyi (1958, 1966), in his books *Personal Knowledge*

and *The Tacit Dimension*, defines tacit knowledge as "we know more than we can tell."

In the third circle, curriculum, the background literature focuses on the concepts and origins of problem-based learning. The literature cites McMaster University in Hamilton, Ontario, Canada as the place where Problem-Based Learning (PBL) was introduced (Neufeld, V.R., Woodward, C.A., & MacLeod, 1989; and Spaulding, 1991). The purpose of PBL is "an instructional strategy in which students confront contextualized, ill-structured problems and strive to find meaningful solutions" (Rhem, J., 1998, p. 1).

Forensic Craniofacial Reconstruction: Freehand Drawings

This literature will help toward answering my research questions: (1) What does the phenomenon of tacit knowledge information processing/problem-negotiating experience presumed to occur during a forensic craniofacial reconstruction look like? (2) How can the tacit knowledge involved in the information processing/problem-negotiating procedure that occurs during a forensic craniofacial reconstruction be made more implicit?

As mentioned above, the first circle represents the FCR background literature, of which Iscan & Helmer (1993, section 5, chaps. 14-17) is a representative primary source. This edited work covers all of the subdivisions of the facial reconstructive techniques outlined in the first circle, in addition to the technique of skull-photo superimposition. The skull-photo superimposition

identification technique is used when there is an alleged recent ante-mortem

photograph of the victim to compare to the skull of the unidentified person. By

aligning both the photo of the same proportional size as the skull in the Frankfort

Horizontal Plane, based on the unique characteristics of each individual's skull,

there should be a perfect match when the two images are superimposed one over

the other. "The Frankfort Horizontal Plane is an anthropological standard position

that closely approximates the natural position of the head in life" (Taylor, 2001, p.

425). Specifically, the Frankfort Horizontal Plane is "the line between the lower

orbital margin and the external auditory meatus (lower edge of [the] eye-socket to

[the] ear hole) parallel with the ground" (Prag & Neave, 1997, p. 25).

Although Iscan & Helmer's contributors on the facial reconstruction

process provided factual information about the two- and three-dimensional

manual FCR techniques of drawing and sculpture (especially Robert M. George in

chapter 14), they do not shed any light on acquiring a deeper understanding of the

role tacit knowledge plays in the reconstruction process.

The audience for this book is the international professional forensic

anthropologists community, who is interested in facial reconstructions from an

explicit informational, quantitative knowledge perspective. As a synthesis

between the art (drawing/sculpture) on the left and the science (physical/forensic

anthropology) on the right components of the FCR process, this work is to the

right of center. Because of this orientation, the contributors' reasoning is

clinically objective and factual. There is no "forensic art language" used (Taylor,

p. 517). The editors' purpose with this book was to quantitatively, factually, and objectively explain the art/science nature of the FCR process from a scientist's perspective. This is an excellent reference book, as it extensively covers the topic; the writing is highly technical. Any concerns for the essence of the tacit thought process and/or problem-negotiating, information processing, or ways of knowing were not a consideration for the authors or the editors.

Another work that is a representative primary source of the background literature of FCR processes is *Bones: A Forensic Detective's Casebook* by Dr. Douglas Ubelaker & Henry Scammell. The intent of the book is to present a generally readable, non-technical set of narrative case study accounts of the entire forensic investigation enterprise from the discovery of the remains, to the investigation of the crime scene, to the identification of the victim. In chapter 14, pp. 167-190, the focus is on the identification of unknown victims. The authors acknowledge two main FCR techniques: two-dimensional freehand drawings and three-dimensional sculptures (only the American method is shown). They also make the reader aware that both of these techniques can at times be computer-assisted. Computer-assisted art provides a faster process for creating the likeness and establishing biometric reliability. Specifically looking at the freehand drawing technique, the authors mention that forensic drawings can be made directly from the skull, photographs of the skull, and even x-rays. The authors point out some of the strengths and weaknesses in both the forensic sculpting and drawing techniques in terms of their individual capabilities and limitations. For example,

drawings (freehand and computer-assisted) have an advantage over sculpture in the following ways: (1) the minimal equipment and short turn-around time required to create the reconstruction/likeness, (2) the artistic skill level required to produce a reconstructive drawing is much more widely distributed, ranging from "Identikits" used by police departments, who may have little or no artistic training, to a highly skilled portrait artist, and (3) forensic drawings on average tend to look slightly more lifelike than the average three-dimensional reconstruction. A forensic sculpture's advantage over two-dimensional works is that when used in the media, it can be displayed in a front, profile, and/or three-quarter view position. The book covers a range of needs and interests for those with a CSI fascination and those who are actively working in some investigative capacity, such as deputy coroners and law enforcement personnel. Ubelaker & Scammell's work is another very good reference text on FCR techniques, but it is silent on the general problem-negotiating processes used by the forensic artist and especially on the employment of tacit knowledge.

Ferllini's 2002 book, *Silent Witness*, presents an extensive range of forensic anthropological cases from around the world, from the 1800s to 2001; her coverage devoted to facial reconstruction in general is minimal, at best. She discusses in eight pages all of facial reconstruction, which includes the Identikit, the combination Russo-American three-dimensional, computer-assisted three-dimensional and two-dimensional drawings, and superimposition reconstruction techniques. She describes in three sentences "handmade sketches" (drawings).

Ferllini is silent on the tacit and implicit knowledge involved in the thought/information process, problem-negotiation, ways of knowing or critical thought growth experiences used while creating an FCR. Her audience would be anyone with a historic interest in how forensic anthropology is used to solve crimes.

Literature that focuses on the facial reconstruction process includes Karen Taylor's *Forensic Art and Illustration* (2001) and Caroline Wilkinson's *Forensic Facial Reconstruction* (2004). Taylor's book is, as she states in her preface, a comprehensive text aimed at forensic artists in particular and anyone wanting to learn more about forensic art. As the title indicates, illustrations or two-dimensional forensic work is the featured art medium; however, she does acknowledge superimposition and the 3-D techniques. An entire chapter is devoted to the American method. She also cites from Anderson (1983), who refers to the American method as the "Tissue depth method" as opposed to the Russian or "Anatomical method."

Taylor (2001, p. 6) asserts that one way forensic art, as a blend of art and science, manifests itself is through the artist having a limited knowledge of cognitive psychology. She does not, however, elaborate on this assertion in terms of the tacit and implicit knowledge involved in the thought/information process, problem-negotiation, ways of knowing, or critical thought growth experiences that the facial reconstructionist uses while creating an FCR.

Forensic Facial Reconstruction by Dr. Caroline Wilkinson is the three-dimensional complementary counterpart to Taylor's work. In terms of my research questions, not only does Wilkinson not speak about the essence of the tacit-implicit knowledge (TIK) involved in the facial reconstruction process, she references two-dimensional reconstruction drawing(s) through Taylor's work, who I mentioned earlier as merely acknowledging an unelaborated cognitive psychological connection to two-dimensional facial reconstructions.

The two books compare and contrast in the following ways. (1) Taylor and Wilkinson both saw the need for a comprehensive text on forensic art/facial reconstruction based on the fact that it is a multidisciplinary collaborative enterprise that no one can do alone. That is to say, Taylor's comprehensive overview of two-dimensional composite and reconstructive drawings and their peripheral scientific supports, along with Wilkinson's comprehensive overview of the Manchester three-dimensional facial reconstruction method and its peripheral scientific supports, helps the practitioners with their respective methodologies to see their work in context within and across the varied methods of facial reconstruction. (2) The two works differ on the advocated superiority of their respective methods for creating facial reconstructions, while acknowledging the positive contributions of the other's methodology. Wilkinson advocates for the three-dimensional Manchester method also known as the combination, Neave and/or anatomical methods as being a qualitatively better approach to facial reconstruction than the American method. (3) Both works stress that careful

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attention needs to be paid to the importance of the subtleties of the face; both works are detailed and thoroughly researched.

Pickering & Bachman (1997) contend that facial reconstructions in general and three-dimensional in particular—outside of their uses in museum work for giving faces to ancient people, and despite some success in assisting in identification of unknown persons—do not meet the standards of scientific rigor to provide evidence in court. It appears that concern for the thought process (whether tacit-implicit or explicit knowledge) of forensic craniofacial reconstruction is of little or no importance.

Tacit-Implicit Knowledge and Problem-Negotiating

The second circle represents the background literature on epistemology. Epistemology is a branch of philosophy that is concerned with the nature of its two fundamental perspectives of knowledge Rationalism (a priori) and Empiricism (a posteriori). For this study I reviewed the literature on tacit and explicit knowledge conceptualizing them as (thesis) and (antithesis), respectively. This would make implicit knowledge (synthesis) an algorithmic-heuristic form of knowing and problem-negotiating. But this is not correct, because I failed to take into account what Triena, the Chief Deputy Coroner said while watching me work: that I was simultaneously functioning as *an artist* in terms of drawing, and to a more limited extent as *a physical anthropologist* in terms of confirming and acknowledging the race, sex, and age; as *a dentist* in terms of how the presence or

absence of teeth would influence John Doe's facial features, and also as *a detective* in terms of looking for ante-mortem (before death) clues on the skull that might shed light on what the person looked like in life. She was perplexed about how I was doing all of these varied cognitive functions at the same time. I was unaware of the complexity of this process or what the phenomenon of this problem-solving process looked like. Because I was engaged in *a personal tacit cognitive process*, I had never reflected explicitly (verbally, in writing, in images, or in a haptical fashion) on the levels of complexity involved in the execution of the facial reconstruction process. Schon (1988, p. 31) calls this type of implied knowledge "reflection-on-action," which means, "the task is already complete, and so improvements to that episode cannot be made." But, external observations of the FCR in progress and then engaging in a reflective dialogue with the observer will allow reflection-on-action to be taken into account in order to improve future task engagements.

In other words, I failed to account for the reflection-on-action of the tacit cognitive process that is a part of the information processing/problem-negotiating experience. The way I made my apparent interdisciplinary tacit cognitive process implicit-explicit was through the act of the art of free-hand drawing.

Arnhiem (1969), in his book *Visual Thinking*, makes a theoretical case for the close association between perception and cognition by challenging the assumption that visual perception and cognition are separate functions of information gathering and processing, respectively. He asserts the apparent

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separation between perception and thought is a function of language's inability to adequately explain what we know visually. "The principal virtue of the visual medium is that of representing shapes in two-dimensional and three-dimensional space, as compared with the one-dimensional sequence of verbal language" (Arnhiem, 1969, p. 232). He distinguishes between what he refers to as "intuitive and intellectual cognition," which from how he describes them, sound respectively like tacit-implicit and explicit knowledge.

In Tversky's (1999) *What Does Drawing Reveal About Thinking*, the author gives a well-researched psychological interpretation of a designer's behaviors while he/she is engaged in the act of drawing (which Tversky also calls sketching) as a design tool relates to their thought process. This gives an observer an idea of what the act of drawing looks like.

In terms of how Tversky's research informs my study, I agree with the following: (1) The thought processes she claims are involved when one is engaged in making drawings for *designs* [emphasis mine]. (2) The segmentation of the spatial arrangement of elements of drawing (lines) can be done in endless ways like the elements of language (sounds). (3) She does (1999, p.4) identify an attribute of drawing for design (see Goodman, 1968), [as a] digital, categorical, bordering on symbolic.

Where I have reservations is that she uses both of the terms *sketching* and *drawing* and does not make a qualitative distinction between them, implying that they are one and the same. They are not. In fact, she does not acknowledge the

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differences along the graphic continuum between sketching and drawing. She states, "One view of the role of sketching in design is an iterative, cyclical, dialectic view where sketches serve to instantiate design ideas as well as to simulate new ones," or what Schon (1988, p. 31) refers to as "reflection-in-action.". Reflection-in-action means "the person apprehends a difficulty in the execution of a task, and through relatively immediate reflection and adjustment is able to make modifications that will improve the concurrent performance of the task." Reflection-in-action is a better description of the act of and art of drawing more so than the act of sketching, which is similar to note-taking.

Epistemology to Curriculum

The third curriculum circle, the background literature, focuses on the synthesis between the constructivist and positivist epistemological curricular paradigms, which I conceptualized in two ways: first, in general, as a form of the Curriculum Shadow (Uhrmacher, 1997, pp. 317-329) and second as an example of an Interdisciplinary Situated/Problem-Based Learning Curriculum (Ananta, 2004).

The general review of the literature in curriculum will include the following works: Tyler's *Basic Principles of Curriculum and Instruction*, Dewey's *Experience and Education*, Bruner's *Process of Education*, Eisner's *Cognition and Curriculum Reconsidered*, Hirsch's *Cultural Literacy*, Noddings's *The Challenge to Care in Schools*, and Duckworth's *The Having of Wonderful*

Ideas. I discussed these theorist viewpoints using a round table seating arrangement, in a hypothetical conversation as a point of departure.

Starting with Dewey, on his right and left hand sides, respectively, I would seat Eisner and Hirsch because of their opposing views to Dewey's ideas on early education. To Eisner's and Hirsch's immediate left and right hand sides I would seat, respectively, Tyler and Duckworth, because Tyler would ally himself with Hirsch relative to the study of contemporary life outside of school and Duckworth would bring a Piagetian view to the conversation. To the right of Duckworth and the left of Tyler I would place Noddings and Bruner, because of their concern for the young learner.

Opening the conversation, I can see how each one of your books addressed the complexity and multi-dimensional problem of curriculum and instruction in important theoretical ways. But, as an art teacher in particular I am concerned with the present reality of "No Child Left Behind," which emphasizes the passing of standardized tests in the verbal and mathematical forms of knowledge representation to the exclusion of all others. In other words, how must we as educators prevent our teaching from becoming a Deweyan "mis-educative" experience for students, to allow for—as Eisner advocates—students to use "multiple forms of [knowledge] representation," to as Burner emphasizes, the use of a "spiral curriculum," and base instruction on the "readiness of the learner to receive nonspecific transfer," to create Noddings-like "centers of care," to encourage and reward students for the "having of wonderful ideas" as Duckworth

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points out, and to try to promote, as Hirsch insists, "cultural literacy" within a rapidly diversifying ethnic student demographic. More specifically, relative to my study, how can the above curriculum theories—singly or in combination—serve those students, in the face of NCLB, whose primary problem-negotiating mode relies on inexplicable tacit knowledge?

Curricula and/or theories of curriculum are based on the given curricularist's epistemological stance, which in turn informs their philosophy of education and theories of learning; ultimately, their particular ideology beliefs determine their understanding, development, and implementation of curriculum. Epistemology is a branch of philosophy that deals with the nature of two fundamental perspectives of knowledge: Rationalism (a priori) and Empiricism (a posteriori). Advocates of Rationalism maintain that knowledge of the world can be acquired through reason alone, whereas Empiricists believe that we gain knowledge through our experiences with and in the world. From these two paradigms of knowledge acquisition curricularists derive their philosophies of education. Larry J. Shaw of San Diego State University identifies five of the major philosophies of education; they are Essentialism (Back to Basics), Progressivism (Child Centered), Perennialism (Paideia Program), Existentialism (Self Determination), and Behaviorism (Stimulus Response).

The noted advocates of these various philosophies are respectively E.D. Hirsch, John Dewey, Mortimer Alder, A. S. Neill, and John Watson.

Curriculum Ideologies

In the literature, Eisner (1994) identifies six curriculum ideologies; they are Religious Orthodoxy, Rational Humanism, Progressivism, Critical Theory, Reconceptualism, and Cognitive Pluralism. Uhrmacher (1992) also cites the same ideologies as Eisner with the following exceptions: exclusion of Religious Orthodoxy, substitution of Developmentalism for Progressivism, and inclusion of Multiculturalism.

Religious Orthodoxy will not be considered here because it is outside of the educational institutional scope of this study. The Reconceptualist and the Multicultural Ideologies are also not being considered, because I view them to be ideologically similar to Critical Theory in kind but less extreme in degree relative to Critical Theory's more politically left stance.

I discussed the implications for my study relative to the following curriculum ideologies: Rational Humanism, Progressivism, Critical Theory, and Cognitive Pluralism. I chose these ideologies for the following reasons: First, the current NCLB policy appears to be a corrupted form of Rational Humanism. In the sense that NCLB mandates but does not succeed in providing a better educational experiences for all students, it does ensure that all students are required to take mandated standardized assessments of their academic achievement. The national penchant for evidence regarding educational attainment through measured performance does not sit comfortably with an orientation to education that celebrates reason, rationality, and extended

explanation. "Exegesis is difficult when the optical scanner must be used to score responses. In short, our assessment technology imposes its own practical values and limitations on the content and methods of schooling." (Eisner, 1994, p. 65)

Second, Rational Humanism contrasts with Progressivism in terms of curriculum content and teaching method. The Rational Humanist curriculum content advocates a curriculum based on the best of western culture (in terms of socio-political ideals, literature, art, mathematics, science, and history) taught in a seminar format; because the student's interests are irrelevant there are no electives except for the choice of a foreign language. In terms of teaching method, the Progressive Ideology asserts "the child was to be seen as a social and emotional creature, not only as an academic or intellectual one" (Eisner, 1994, p. 71). The implications for this fundamental belief provides for a curriculum content and teaching method that is holistic in nature. Rational Humanism also contrasts most sharply with Critical Theory on political grounds, in that Rational Humanist at its best is a form of social control and at its worst is an apologist for the hegemony of the Western status quo.

Third, a Cognitive Pluralist and Rational Humanist would tend to view each other with disbelief, the Cognitive Pluralist thinking to himself, *How can you* [Rational Humanist] *expect a student to find "socially important ways of solving problems"* (Eisner, 1994, p. 81) *with their heads buried in one kind of intelligence sand?* and the Rational Humanist thinking, *How can you* [Cognitive Pluralist] *expect a student "to make rational and defensible judgments about the goodness*

of things" (Eisner, 1994, p. 65) *with everyone wandering down their own multiple*

intelligence(s) paths?

By not recognizing and accommodating a student's need to try to

communicate his/her tacit knowledge in subjects that are logically sequential in

teaching method, Critical Theory puts students unnecessarily at-risk by not giving

them the means to at least make implicit their tacit knowledge. Eisner (1994,p.

74) quotes Bourdieu (1977): "[T]he school is essentially an institution whose

mission is cultural reproduction. When a society is believed to be inherently

unfair, cultural reproduction through schooling is thought to be on virtue."

An Interdisciplinary Situated/Problem-Based Learning Curriculum

The literature on Cognitive and Situated Learning will contribute toward

answering my third research question: *What are the implications of tacit*

knowledge information processing/problem-negotiating experiences for serving

as a curricular and instructional model to help students communicate their tacit

knowledge in an implicit knowledge manner that approaches the explicit?

To answer this question, I first made clear what the essence of the tacit

knowledge information processing/problem negotiating experience is. Second, I

identified what the tacit knowledge information processing/problem-negotiating

experience looks like while a student is functioning within the tacit dimension.

Third, I showed how it applies to interdisciplinary situated/problem-based

learning in general and curriculum in particular.

What is Tacit Knowledge Information Processing/Problem Negotiation?

The tacit knowledge information processing/problem-negotiation experience is more discernable by describing how it does *not* manifest itself. It does not appear to be immediately verbally intelligible, nor algorithmically or logically sequential. Evidence of its operational presence must be inferred from its appearance in a physically demonstrable form. This information processing/problem-negotiation can, for example, be expressed as what would appear to be either a cryptic metaphor (if verbally expressed at all), or physical hand gestures and/or drawings of varying degrees of clarity.

The information processing/problem negotiating does not appear to be constrained by the acknowledged boundaries between diverse disciplines. The apparent non-algorithmic or illogical information processing/problem-negotiation nature of tacit knowledge increases the search parameters for possible solutions to a given problem, making irrelevant the boundaries between diverse disciplines.

Tacit knowledge information processing/problem negotiating does not show itself to be explicitly understood, even by its user. The user's exclusive focus on the information processing/problem-negotiating task at hand, along with the increased search parameters for solutions, creates what Csikszentmihalyi (1991, pp. 71-90) refers to as the "Conditions of Flow":

> Concentration is so intense that there is no attention left over to think about anything irrelevant, or to worry about problems. Self-consciousness disappears, and the sense of time becomes distorted. An activity that produces such experiences is so gratifying that people are willing to do it for its own sake, with little concern for what they will get out of it, even

when it is difficult, or dangerous (p. 71).

What Tacit Knowledge Information Processing/Problem Negotiating Looks Like?

Using three teachers I work with (from the departments of English, Math, and Social Studies) as a "sounding board" along with the data I collect from my participants, I identified what the tacit knowledge information processing/problem negotiating experience looks like while a student is functioning within the tacit dimension.

I reviewed the literature from the following topic areas: forensic craniofacial reconstruction (also referred to as forensic art), tacit knowledge (called practical knowledge when it is associated with curriculum). The literature sources for this review come from the relevant books, peer reviewed journal articles, dissertation abstracts, and conference papers from the above-mentioned topic areas.

The primary concerns in facial reconstruction used for forensic purposes are the accuracy and reliability of the given technique or method (Gerasimov, 1971; Prag & Neave, 1997; Gatliff (in Taylor), 2001; Wilkinson, 2004). When using Gerasimov's reconstruction method the issue of accuracy and reliability centers on a given reconstructionist's experiential knowledge of the anatomical and anthropological clues of the bone-to-soft tissue relationship over time. This level of anatomical and anthropological experiential knowledge is in sharp contrast to the uses of Gatliff's reconstruction method, which requires little if any knowledge or understanding of anatomy and/or anthropology. However, the issue

of accuracy and reliability for the Gatliff and other reconstruction methods used for forensic purposes in the United States is a scientific-legal one. In other words, the reconstruction must meet the *Daubert Standard* for the admissibility of scientific evidence in a court of law.

The Daubert Standard

The Daubert standard is a legal precedent set in the 1993 Supreme Court case of <u>Daubert v. Merrill Dow Pharmaceuticals</u> [509 U.S. 579 (1993)] regarding the admissibility of expert witnesses' testimony during legal proceedings. In Daubert, the Supreme Court ordered federal trial judges to be the "gatekeepers" of scientific evidence. Trial judges must now evaluate proffered expert witnesses to determine whether their testimony is both "relevant" and "reliable": a two-pronged test of admissibility. The relevancy of a testimony refers to whether or not the expert's evidence "fits" the facts of the case. In order for the testimony to be considered reliable, the expert must have derived his conclusions using the scientific method.

Although the following was not meant to be used as a checklist, the Supreme Court offered these observations as to what constitutes scientific evidence:

> Empirical testing—the theory or technique must be falsifiable, refutable, and testable.

Subjected to peer review and publication.

Known or potential error rate and the existence and maintenance of standards concerning its operation.

Whether the theory and technique is generally accepted by a relevant scientific community.

Although the Supreme Court cautioned that the Daubert list should not be regarded as a definitive checklist, many judges are now excluding scientific evidence when they determine it is lacking on a single Daubert point instead of assessing the totality of such evidence.

Forensic Craniofacial Reconstruction (FCR)

The first part of the review will focus on the world of FCR. The literature (Gerasimov, 1971; Prag & Neave, 1997; Vanezis, M. & Vanezis, P., 2000; Taylor, 2001; Wilkinson, 2004) is in agreement that the first scholarly science/art collaborative study of craniofacial reconstructions in 1895 is credited to the Swiss-born German anatomist Wilhelm His (1831-1904).

CR did not become FCR until Gerasimov's reconstruction of the face of a twelve- to thirteen-year-old boy who had been murdered not far form Leningrad in 1939. This boy was positively identified, from a photograph of the reconstruction, by his father—who, at the time, was not aware that his son was deceased. The difference between a craniofacial reconstruction and forensic craniofacial reconstruction is the application of the CR technique to the identification of unidentified deceased persons.

In terms of three-dimensional FCR the main point of contention within the field itself is which of the three reconstruction techniques (the Gatliff/American, the Neave/Manchester, or the Gerasimov Russian) will be considered the universal scientific standard. This has ramifications for FCR use in criminal cases in terms of its reliability as it relates to the Daubert Standard—the legal precedent set in the Supreme Court case of Daubert v. Merrill Dow [509 U.S. 579 (1993)].

A major contributing factor for this situation is there is not, at this time, a professional peer reviewed journal for the forensic art component of the FRC process.

Tacit Knowledge

The literature on tacit knowledge is extensive; for this study I narrowed the review to tacit knowledge relative to its curricular implications. That is to say, how tacit knowledge relates to the basic principles of curriculum and instruction in general and how it relates to a phenomenological perspective of curriculum in particular. I worked from the Tyler Rationale of the basic principles of curriculum and instruction as it pertains to "Studies of the learners themselves" and observing how a student communicates what they tacitly know. Tacit knowledge/knowing as it generally defined in the literature is procedural knowledge we routinely use but which cannot be explicitly accounted for.

CHAPTER THREE

Methodology

In this chapter, the following item is discussed: the reasons for a using a qualitative research method in general as the data collection component—the use of the combined qualitative methods of Interviewing as a Research Method (Seidman, 1998) along with Interpretative Biography (Denzin, 1989b) in particular and why this combination is appropriate. A description of my participants and how they were chosen, and the details of the research plan of the data collection procedure is included. The data for this study is interpreted through the lens of complex adaptive systems, identifying the operational process of a complex adaptive system as the procedure for interpreting what the tacit knowledge problem negotiating process looks like.

Qualitative Research Method

Creswell (1998,pp.17-18) outlines eight compelling reasons for undertaking a qualitative study. The first reason he states is indicated by and can be seen in the wording of my research questions, on page 18 in the Introduction of this study, based on the "what is going on nature" of my research questions which begin with the words "what" and "how." The second reason (Creswell p.17): "the

topic needs to be *explored. . .* theories are not available to explain the behavior of participants or their population of study, and theories need to be developed.".

There seems to be a theoretical silence on the interpretation of a given population's exhibition of tacit knowledge in problem-negotiating situations. The third compelling reason to "use a qualitative study [is]. . . the need to present a *detailed view* of the topic." Interview as a Research Method combined with Interpretative Biography will provide a detailed view of what tacit knowledge looks like and how it can be made more implicit approaching explicit. From their respective points of view, I obtain the participant's "subjective understanding" of their behavior as opposed to how it was only observed (Schulz, 1967, chap. 3 in Seidman, 1998, p. 3) and how the participant's "subjective understanding" relates to their "*epiphanies,* or moments of revelation in a persons life" (Denzin, 1989b, p. 33). A representative example of the above mentioned *detailed view* of the topic can be found in the Introduction to this study on page 3, relative to the chief deputy coroner's observation and interpretation of my working on the facial reconstruction as being multi-disciplinary in performance and my "subjective understanding" of what I was doing as being essentially unremarkable and ordinary behavior. An example of an epiphany in the lives of my participants comes from the data showing when they individually first became aware of forensic craniofacial reconstruction and realized they had the prerequisite ability required and a desire to do forensic facial reconstructions. The fourth compelling reason for choosing a qualitative approach for this study was the necessity of

having "to study [my participants] in their *natural setting*" (Creswell, p.17).

Given that my participants live in different parts of the Untied States, this

compelling reason was inevitable. The fifth reason is having an "interest in

writing in a literary style; the writer brings himself . . . into the study. . ." which as

stated on pages 2-3 of the Introduction to this study, I brought myself into by

telling the story of my own tacit knowledge experiences relative to forensic

craniofacial reconstruction. Sixth, "employ a qualitative study because of

sufficient time and resources to spend on extensive data collection in the field and

detailed data [interpretation] of *text* information" (Creswell, p.18). During the

time of my primary data collection in the field (interstate travel) my teaching job

afforded me sufficient time (accumulated personal leave days) and resources to

travel and to engage transcribers to type up the raw data for interpretation.

Seventh, "select a qualitative approach because *audiences are receptive* to

qualitative research" (Creswell, p. 18). Both my co-advisers and my committee

and the Morgridge College of Education are receptive to qualitative doctoral

dissertation. Eighth, "employ a qualitative approach to emphasize the researcher's

role as an *active learner* who can tell the story from the participant's view rather

than as an *'expert'* who passes judgment on participants" (Creswell, p. 18). I

consider myself to be an *active learner* in the study because observing my

participants' working behaviors and interviewing them allowed me to

comprehend their individual "subjective understanding"—their explanation of

their behavioral tacit knowledge about which they are the only experts.

Interviewing as a Research Method and Interpretive Biography

In chapter one of this study, I began by telling my own story about my exhibition of tacit knowledge while creating a forensic craniofacial reconstruction. In my story I illustrated for the reader just how unremarkable, ordinary, taken for granted, and invisible the reliance on one's own tacit knowledge is for its user. From my "subjective understanding" (Seidman, 1998, p.3) until the chief deputy coroner brought it to my attention, what I was doing was what any forensic artist working at the same task would naturally do. It was like breathing—not one of those things we spend much time thinking about. By telling my own story, I made myself present in this study. "Thus, this [study] is situated in the life experiences of the [researcher] as well as the individual[s] being studied" (Creswell, 1998, p. 232).

The purpose and the problem of this study are, respectively, to shed light on the tacit information processing problem-negotiating process (as experienced by forensic craniofacial reconstructionists) for its potential utility as a curricular and instructional model, and to recognize and to help support students who may be in danger of being unnecessarily put at-risk academically because their tacit problem negotiating thought processes do not fit the explicit norm-referenced evaluation standards. Given the nature my research questions, what does the phenomenon of tacit knowledge information processing/problem-negotiating look like; how can the essential knowledge involved be made more implicit; what are the implications for tacit knowledge as a curricular model to help students

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communicate at least implicitly their own tacit thought experiences? The rationale

for using the combined methods of Interviewing as a Research Method—and

Interpretive Biography in particular—is based respectively on the following

assumptions of each research approach.

The primary assumption relative to Interviewing as a Research Method is

the researcher must have "an interest in understanding the experience of other

people and the meaning they make of that experience" (Seidman, 1998, p. 3). The

basic secondary assumptions are "[I]t is never possible to understand another

[person] perfectly. . . [W]e can strive to comprehend [other people] by

understanding their actions. . . [T]he observer . . . [has] to gain access to the

[another person's] 'subjective understanding' . . . what meaning [they themselves

make of their experience] . . . (Seidman, p.3). "[T]he meaning people make of

their experience affects the way they carry out that experience. . . Interview

allows us to put [another person's] behavior in context and provides access to

understanding their action" (Seidman, p. 4). In other words, to obtain a better

understanding of what we thought we saw in another person's performance of a

task (i.e., a student's implicit explanation of how s/he tacitly comprehends what

was taught), then an interview process will give that person according to Polanyi

(1967, p.5) the "adequate means for expressing [them]selves" as to what their

performance, action, behaviors personally meant to them.

There are nine basic assumptions of the Interpretive Biography research

method; they are "(1) the existence of others, (2) the influence and importance of

gender and class, (3) family beginnings, (4) stating points, (5) known and

knowing authors and observers, (6) objective life markers, (7) real people with

real lives, (8) turning-point experiences, [and] (9) truthful statements

distinguished from fictions" (Denzin, 1989b, p. 17). The biographical research

method is appropriate because my investigation closely paralleled (Denzin,

1989b) procedural steps for using this method, as reported in Creswell, 1998, pp.

50-51: "[I] gathered contextual biographical [data] using interviewing in addition

to a pre-interview questionnaire (e.g., [my participants] recount[ed] a set of *life

experiences* in the form of stories or narratives)" (Creswell, 1998, p. 50). The

above assumptions serve as my data collection framework.

Although the pre-interview questionnaire component of my data collection

procedure is not a traditional part of either the Interviewing as Qualitative

Research or Interpretative Biography research method, I used it because it

provided an inexpensive way of collecting background information about my

participant prior to a face-to-face interview. This was important for two reasons.

First, the in-person interviews required the major expense of airfare to the

participant's location, a motel stay and car rental because my participants live in

different parts of the United States. Second, in consideration for adhering to and

respecting the structure of the three 90-minute interview process (Seidman, 1998,

p. 13) the pre-interview questionnaire background information on each individual

participant helped to facilitate entry into interview one, which focuses on the

participant's life history. It influenced the types and direction of the questions I

asked and the depth of the participant's response because we had a common starting point from which to begin the interview. Also, the pre-interview questionnaire helped to corroborate the face-to-face interview data. This was my data collection procedure.

My research study was originally designed to use three to six self-selected participants from the total ProjectEDAN group population of 19 members. I succeeded in recruiting and collecting data from three participants, one of whom later chose to withdraw from the study. My committee permitted me to use myself as a participant given that I am also a member of ProjectEDAN.

Our stories, theirs and mine, "[were] organized around themes [our subjective understandings] that indicate pivotal events (or *epiphanies*) in [our lives]" (Creswell, 1998, p. 51). For example, childhood experiences that in hindsight contributed (albeit unconsciously) to doing facial reconstructions, vocational career paths, first becoming aware of forensic craniofacial reconstruction, seeking facial reconstruction (forensic art) training, and coming to understand the realities of the forensic art field. "[I explored] the meaning of these *stories*, relying on the [participants] to provide explanations and to search for multiple meanings" (Creswell, 1998, p. 51). "[I] look[ed] for larger structures to explain the meanings, such as *historical context* [that provided cross] interpretations for our life experiences" (Creswell, 1998, p. 51).

The biographical method was a good fit for the following reasons: First, the educational enterprise is in and of itself an ill-structured field of inquiry and a

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complex adaptive social system (CASS) over and above its relationship to any given student's tacit knowledge exhibition. This makes its subjective nature impossible to quantitatively predict. The fundamental characteristics of ill-structured problems have been well documented in the literature. Because of the subjective nature of the educational enterprise, students will be ill-served (i.e., by unnecessarily putting them at-risk academically) when the complex adaptiveness of their tacit knowledge processes are exclusively subjected to the means and standard deviations of the mean in norm referenced testing.

Although the following quote refers to critical thinking, I believe it works as well for tacit knowledge:

> Perplexing obstacles confront researchers in the design of an appropriate measure for both [tacit knowledge] and the transfer of [tacit knowledge] strategies beyond the original context. Our concern was that general observations methods—multiple choice instruments, logs, questionnaires and observation forms—would neither capture the elusive phenomenon of [tacit knowledge], nor yield data that would measure its growth or transfer. Rather, we concluded that accurately and sensitively measuring the transfer of [tacit knowledge] had distinct and inherent requirements. (Housen, 2001, p. 201)

Second, to make communicable, in myriad ways, the experience of the thought processes and/or problem-negotiating exhibited by forensic artists during a forensic craniofacial reconstruction, a rich description is needed of the experience that is the information processing/problem-negotiating exhibition, from tacit to implicit toward explicit.

The curricular implications for investigating the experience of the tacit information processing/problem-negotiating exhibitions that occurs while creating a forensic craniofacial reconstruction can shed new light on how teachers provide creative alternative means for their students to make as implicit toward as explicit as they can, their tacit knowledge about the subject at hand.

In order to progress in our understanding of a student's implicit exhibition of their tacit knowledge, we as educators need to be continually mindful of the diverse problem-negotiating processes actually used by individuals and groups from various social, cultural, ethnic backgrounds whose thinking processes are not predominantly alphanumeric in nature. In other words, "You cannot dig a hole in a different place by digging the same hole deeper" (de Bono, 2004, p. 13).

For this investigation I used the Interview as a Research method, which works well with the Interpretive Biographical method, to examine the tacit knowledge problem-negotiating thought processes of forensic craniofacial reconstructionists. More specifically I used—even though it is phenomenological in nature—the three-interview series in-depth interviewing process in Seidman (1991, pp. 9-21). Interview One: Focused Life History looks at three experiential stages in the participant's life: their past family or childhood experiences, school (K-12 to 16) experiences, and work experiences. Interview Two: The Details of Experience seeks to find the participant's "subjective understanding," in this case the facial reconstruction process while they are engaged in the process. Interview

Three: Reflection on the Meaning describes the import forensic facial reconstruction has for the participant at this point in time.

The data for this study were collected beginning Saturday, November 25, 2006 and Monday, October 8, 2007. During that time I collected data, by way of a pre-interview questionnaire as well as by audio and video recording my participants following as closely as possible the in-depth phenomenological interview process as described in Seidman (1998, pp. 11-21). I had initially recruited and interviewed three members from the total population of 19 ProjectEDAN members. One of these participants later chose to exercise their right, in accordance with their signed Institution Review Board (IRB) agreement, to withdraw from the study at any time without question. The data for this study was then collected, with my dissertation committee's approval, using the two remaining participants plus myself because I also qualify as a ProjectEDAN member. For the sake of consistency with my other participants in the presentation of the data, I refer to myself by the pseudonym Tao Darma Man (TDM).

The questionnaire provided the following background information: when and how they individually became interested in doing forensic craniofacial reconstruction; their formal and informal educational training in forensic facial reconstruction work; their year of certification, their years of involvement in the forensic facial reconstruction field; the length of time they have been involved with ProjectEDAN; their preferred facial reconstruction method—either two-

dimensional (drawing) or three-dimensional (sculpting) and why; their preferred three-dimensional facial reconstruction method (the American, Russian, or the Manchester) and why; and finally, their conceptual approach to their forensic work as primarily an artist, a physical anthropologist, or a combination of the two. Also, the audio and video data recordings provided a degree of authenticity to the participant's responses.

ProjectEDAN Participants

The ProjectEDAN (Everyone Deserves a Name) group was founded in July of 2001 by Todd Matthews in conjunction with and co-sponsored by The Doe Network. The Doe Network is the International Center for Unidentified and Missing Persons, covering the United States, Canada, Australia, and Europe. I have been a member of Project EDAN since September of 2004. ProjectEDAN is one of two projects that support the Mission of the Doe Network, based on the Network's assertion "There is no time limit to solving a mystery." It is our mission to give the nameless back their names and return the missing to their families. We hope to accomplish this mission in three ways: by giving the cases exposure on our website, by having our volunteers search for clues on these cases as well as making possible matches between missing and unidentified persons, and lastly through attempting to get media exposure for these cases that need and deserve it (http://www.doenetwork.us, retrieved February 19, 2006).

The Doe Network's other project is "[A] joint effort with [the] National Crime Information Center (NCIC) consisting of off-line searches for unidentified victims in cases we have selected to send them. Some cases have already been solved; others are on the verge of being closed" (http://www.doenetwork.us, retrieved February 19, 2006).

The Project EDAN group membership was chosen as the study population for two reasons. The first is because the members are all recognized as forensic artists who donate their time and expertise to create reconstructions and age progressions of missing and unidentified persons for domestic and international law enforcement agencies that do not have access to or funding for a qualified forensic artist of their own. The second reason is all the members of ProjectEDAN have been fundamentally trained in the 3-D American forensic craniofacial reconstruction method by its co-developer Betty Pat Gatliff and/or in Karen Taylor's 2-D facial reconstruction technique, which uses the same soft tissue depth marker foundation as the 3-D Gatliff method.

The members of ProjectEDAN are either members of the law enforcement community or are associated with law enforcement or a death investigation agency (e.g., a coroner's office) in a freelance capacity. As of May 2006, the ProjectEDAN coordinator has confirmed 19 active members: 10 female and 9 male members of EDAN throughout the United States (Colorado, Florida, Kentucky, Michigan, Missouri, New Jersey, South Carolina, and Washington State) and Canada.

The participants for this research study were drawn from a self-selected

pool of volunteers from the membership of the Project EDAN group. The self-

selection process was based on those members who had signed and returned the

University of Denver Institutional Review Board's the Informed Consent Form

for the protection of human subjects indicating that their participation is purely

voluntary and that they had read and understood their right as participants in this

research study.

Research Plan

I recruited three self-selected participants from the membership of

ProjectEDAN, one of whom is myself. The members were recruited by e-mail

through the group's website. First, I asked the coordinator for ProjectEDAN to

introduce me to the other members as a fellow member and a doctoral student

who was requesting their voluntary inclusion into a pool from which they could

be randomly drawn to participate in my research study. Second, I directly

contacted the entire membership by e-mail with a personal Letter of Introduction

to Participate (see Appendix A), giving more explanation about the study in order

to generate further interest and an Informed Consent Form (see Appendix B)

which gave details about how the study would be conducted and their rights as a

participant in the study under the "Institutional Review Board (IRB) for the

Protection of Human Subjects." Those individual members who signed and

returned the Informed Consent Form comprised the pool from which the potential

participants could be drawn. This recruitment process allowed me to enlist three participants.

Upon receiving the signed IRB Informed Consent from my presumed participants I emailed each one sending them a Background Questionnaire to gather some preliminary pre-interview information about them as a potential starting point when we actually met. Also, in that same email I began working out arrangements with each presumed participant for a date and time at their convenience to conduct the in-person interviews. The following arrangements were made; the first interview was scheduled for and conducted between Saturday the 11th and Sunday the 12th of November 2006 (this was the interview of the participant who later withdrew from the study), the second interview was arranged for and carried out between Saturday the 25th and Sunday the 26th of November 2006; the third interview was arranged for and completed between Thursday the 28th and Friday the 29th of December 2006. The interview using myself as a participant was conducted on Friday the 5th of October, Monday the 8th of October, and Tuesday the 6th of November 2007.

In an email on Friday the 18th of January 2008, from the participant whose interview was conducted between Saturday the 11th and Sunday the 12th of November 2006 in response to the express mailed copies of the video recordings and transcripts from that interview which requested the participant's feedback and verification of the accuracy of the interview data, the participant instead decided to withdraw from the study. With my co-advisor's approval I used myself as one

of the participants in this study, for two reasons. First, I am a member of the population from which the participants were recruited; second, the study investigates routinely used, taken for granted tacit knowledge. I was interviewed using the pseudonym Tao Darma Man, on the following dates Friday the 5th of October, Monday the 8th of October, and Tuesday the 6th of November 2007, by my apprentice, an experienced sculptress who has done doll faces but has not yet done a facial reconstruction from a human skull.

The recruitment of participants worked out to be 10 percent of the female population and 22.2 percent of the male population, or 15.7 percent of the entire ProjectEDAN population.

The research interview plan followed, as close as the interview circumstances allowed, the three separate 90-minute structure for the in-depth phenomenological interviewing as described in Seidman (1998, pp. 9-21) combined with the Interpretative Biography (Denzin, 1989b). The in-depth phenomenological interview includes the first 90-minute interview session, designed to probe the participant's "Focused Life History," which "put[s] the participant's experience in context by asking him or her to tell as much as possible about him or herself in light of the topic to the present time" (Seidman, 1998, p. 11). The second interview allows participants to reconstruct the details of their experience within the context in which it occurs—in this case, while actually carrying out a forensic craniofacial reconstruction. The third interview encourages the participants to reflect on the meaning their experience holds for them.

Interpretive Biography fits well with the above three 90-minute sessions of the in-depth phenomenological interview process because it helps the participant put into a contextual chronological order, as much as possible, their epiphanies (the relived, the minor, and the cumulative) that progressed toward and regressed from their major epiphany, which I interpret to be the moment when the participants became aware of forensic facial reconstruction and tacitly knew they possessed the fundamental skills to do it. I visualize the continuum of the participant's epiphanies to be a normal distribution bell curve. The Major epiphany is the mean and the Cumulative, Minor, and Re-lived Epiphanies, respectively, represent the standard deviation on both sides of the mean. The standard deviations on the right hand side of the mean represent those epiphanies that progress toward the Major Epiphany and the deviations on the left hand side represent those epiphanies that regress from the mean. Moreover, I visualize each one of the three Interviewing as Qualitative Research sessions (Focused Life History, Details of Experience, and Reflection on the Meaning) as its own normally distributed bell curve having the same epiphany structure that supports the overall interview.

By means of the individual's email address, I sent a pre-contact questionnaire to my participants. It was designed to gather general information about the given participant's background, such as childhood to adult life experiences that may have contributed to them coming into forensic facial reconstruction and their working conceptualized approach toward doing the facial

reconstruction process as an art, a science, or a combination of the two. It inquires

into what past life experiences may have influenced why they hold that particular

conceptualization toward forensic facial reconstruction. The questionnaire items

loosely parallel the more detailed questioning for emerging information from both

Interviewing as Qualitative Research and Interpretive Biography.

  The Questionnaire items are: When and/or how did you become interested

in doing forensic craniofacial reconstruction? This question asks about the context

in which the major epiphany occurred. The next four questions sought to probe

the context of the participant's experiences leading up to and away from their

major epiphany. What has been your educational training (formal and informal) in

forensic art in general and forensic craniofacial reconstruction in particular? What

is your level of certification? How many years of experience do you have at doing

forensic craniofacial reconstructions? How long have you been involved with

ProjectEDAN? These next questions sought to give me some pre-interview

information about how my participants conceptualize and approach the facial

reconstruction problem. Which do you prefer doing: 2-D or 3-D reconstructions?

Why? Which 3-D reconstruction method do you prefer to use: the American, the

Russian, or Manchester method? Why? Do you approach your work as a forensic

craniofacial reconstructionist primarily as an artist [using the soft tissue depth

method], physical anthropologist [using the facial anatomy method], or a

combination of the two? These last five questions also gave me hints as to what to

look for during interview two (the details of experience) when they are actually working on a facial reconstruction.

Although I would have made a focused effort to obtain the most representative sample of participants from the small population I had to work with in terms of geographical location, level and type of educational background, and gender, the self-selection process dictated who my member-informants were. I made individual arrangements with each participating member-informant as to the place, day, and time that would be most convenient for them, to allow me to conduct an uninterrupted interview while they were doing a craniofacial reconstruction.

After I received their signed Informed Consent Form acknowledging their interest in participating along with their pre-interview questionnaire, I made individual travel arrangements to meet and interview each of my participants in their working environment. I brought the following equipment with me in order to collect the data:

- A Sanyo digital movie camera (model C40)
- 2GB SanDisk cards
- a tabletop tripod
- an Olympus digital voice recorder (model WS-100) with extra
- batteries, two rewritable, 4 X, 4.7 GB, DVD-RW Disks
- a Toshiba satellite notebook computer (model P100/P105 series)
- Plaster copy of a skull from one of my identified forensic cases.

Also, depending on what tools and supplies a given participant had on hand, I brought a modeling stand on which to mount the plaster copy of the skull I had the participants do the facial reconstruction on, four pounds of oil based clay, and

pre-cut soft tissue depth markers. The skull I brought with me to the interviews was the same plaster copy to provide a level of consistency. I did not, however, use the same skull for my own interview, because I knew what John Doe looked like. I worked instead on the facial reconstruction of my current unidentified Jane Doe case.

During this face-to-face working interview, I conducted several different data collection tasks at the same time:

1) I video-taped the participant's actual physical working behaviors while they were doing the three-dimensional craniofacial reconstruction.

2) I audio-taped the informant's verbal (thinking-aloud) responses to my probing prompts (e.g., What are you thinking right now? Why did you do what you just did? What do you think/believe to be the significance of what you just did/are doing? What relevance does it have to the outcome of this reconstruction?)

3) I conducted, as close as the interview circumstances allowed, a debriefing interview to capture the informant's reflections relative to their experience of being interviewed about their craniofacial reconstruction working procedures. For example: Did the interview process cause you to alter your working procedure in any way? Did the interview process cause you to become aware of tacit knowledge about your working procedure(s) that you were previously unaware of? Do you think your participation in this

research will affect your thinking and working procedures on future craniofacial reconstruction cases? If so, how?

Data Collection, Organization and Grounded Interpretation

The data I collected from my participants were in the forms of pre-interview questionnaires, audio taped and videotaped images and their transcriptions. The data are interpreted through the three respective theoretical perspectives of Polanyi's Tacit Knowing, in his book *The Tacit Dimension* (1966 pp. 3-25), Denzin's Epiphanies (Major, Cumulative, Minor, and Re-lived) in his monograph "Interpretative Biography" (1989b, p. 71), and Miller and Page's Models of Complex Adaptive Social Systems, in their book *Complex Adaptive Systems* (2007, pp. 91-113). The interpretation of the data through these three theoretical perspectives is aimed toward generating a curricular and instructional theory about the learner's "subjective understanding" (Schultz 1967, chapter three) as it relates to answering this study's research questions. In other words, to generate a theory about my participant's tacit knowledge information processing/problem negotiation, grounded in the data collected from the pre-interview questionnaires, audio taped and videotaped images and transcriptions emerged from a given participant's life stories.

The open coding of the data are from the pre-interview background questionnaire; interviewing as qualitative research and interpretive biography will provide interpretative answers to my research questions one and two. The

research questions are, respectively, to determine what the phenomenon of the tacit knowledge information processing/problem-negotiating experience presumed to occur during a forensic craniofacial reconstruction looks like; how the essence of that tacit knowledge can be communicated in a more implicit knowledge manner approaching an explicit knowledge manner.

Using the interpretative guidelines for the progressive-regressive approaches of interpretive biography suggested in Denzin (1989b, p. 67), "which begins with a key event in the [participants'] lives and then works forward and backward from that event." The four forms of the epiphany, originally identified in Denzin's book *Interpretative Interactionism* 1989a, Charter 7 and quoted in Denzin's monograph "Interpretative Biography" (1989b,71) are: (1) the ***major event***, which touches every fabric of a person's life [the major epiphany] or what I call **a personally affirmed moment of total, though inexplicable certainty** about what the participant knows. (2) The ***cumulative*** or ***representative event***, which signifies eruptions or reactions to experiences which have been going on for a long period of time [the cumulative epiphany] or what I call **a personal moments of experiential certainty that are only partially explicable**. (3) The ***minor epiphany***, which symbolically represents a major, problematic moment in a relationship or a person's life [the illuminative epiphany] or what I call **personal moments of situational certainty that are only partially explicable**. (4) Those episodes whose meanings are given in the ***reliving*** of the experience [the re-lived

epiphany] or what I call **personal moments of reflective and totally explicable certainty**.

To help the reader envision the progressive-regressive approach, I need the reader to visualize the major, the cumulative, the minor, and the re-lived epiphanies arrayed as a normal distribution bell curve. In this distribution the major epiphany is the center mean line that divides the bell curve in two. The cumulative, minor, and re-lived epiphanies are represented respectively by the first (plus/minus) standard deviations from the mean, the second (plus/minus) standard deviations, and the third (plus/minus) standard deviations. The plus and minus sides of the normal distribution relative to a given participant's experiences represent the progressive (+) and regressive (-) realizations around their major epiphany.

I highlighted in bold text, to call the reader's attention to, the data representing a given participant's Major Epiphany [ME] experience, which I need the reader to understand as being analogous to the participant's tacit knowledge. Because as Denzin (1989b) points out "These are existential acts" (p. 70).

The Major Epiphany should also be seen as similar to Tacit Knowledge because the participant takes for granted their comprehension even though they are not able to tell exactly when or how their understanding occurred. These data will be represented **in bold text and labeled [ME]**. Plain text will be used to show the data from a participant's Cumulative Epiphanies [CE] experiences. The abbreviations "pro" and "reg" stand for the participant's progressive [proCE] and

regressive [regCE] cumulative epiphanies. CE experiences are to be associated with the participant's Implicit Knowledge in that Cumulative Epiphanies, whether progressive or regressive, can be intentionally communicated to others by way of a given participant's nonverbal actions such as pointing, gesturing, and/or touching etc., as opposed to the self communicating nonverbal actions of a Major Epiphany. ***Italicized bold text*** will be used to indicate the participant's ***progressive and regressive Minor Epiphanies [proME] and [regME],*** data experiences and are implicitly communicated through a combination of physical actions accompanied most likely by metaphorical explanations. For example, someone performs the demonstrative physical action of slowly pulling away from each other the pinched-together tips of the thumb and index finger of both hands while saying something is like a rubber band referring to its elasticity. Italicized plain text proceeded by [*pro Re-lE*] or [*reg Re-lE*] throughout the following chapters will indicate the progressive and regressive *Re-lived Epiphanies.* The fact that they are re-lived means they can be expressed in a more explicit manner than either the cumulative and/or minor epiphanies. This will assist in the interpretation of the data in chapter eight. I also inserted interpretive comments to make sure the reader can make the connections between the sometimes convoluted speech and thought patterns of my participants. Also, there will be times in a participant's narrative where I either inserted and /or use pseudonyms for the names of places and/or locations that would assist a reader in determining the identity of the participant, thereby violating my IRB commitment to protect

the anonymity of my participants. Also, I edited out any verbal pauses (*er*s, *uh*s, *um*s, *you know*s, repeats etc.) that do not contribute to the readability of the narrative while preserving as much of the participant's verbatim voice as possible.

In the following chapters five, six, and seven, I presented the individual data profiles of my participants, in their own words by way of the pre-interview questionnaires, the stories of their life histories, the details of the experience of working on a facial reconstruction, and their reflections on the meaning their experiences had for them. When necessary for explanation, I interjected my interpretive explanatory comments to establish the relevance of the participant's statements to the given epiphany at hand.

The point of these profiles is to present a three-dimensional portrait of my participants as their facial reconstruction experiences contribute to answering my research questions. In other words to help the reader to see my participants as Denzin (1989b) assumes as part of the Interpretive Biography process that this is dealing with "real people with real lives" (p. 17). These profiles are presented in the order in which they were collected. To assist the reader in terms of seeing each participant clearly I presented them individually in separate chapters. Also to assist the reader in terms of my interpretation of the data I inserted the above mentioned major, cumulative, minor, and re-lived coding labels to my pre-interview background questionnaire, and the combined face-to-face interview/interpretative biography data collections. I then related the above

mentioned epiphanies to their corresponding forms of knowledge in terms of tacit, implicit, and explicit.

The data for this study is interpreted using a lens of complex adaptive systems. Complex adaptive systems (CAS) are defined by Miller & Page (2007) as "systems composed of interacting, thoughtful . . . agents" (p. 3). Or put another way, in Wendell Jones's definition in his *Complex Adaptive Systems: Beyond Intractability.* Eds. Guy Burgess and Heidi Burgess. Conflict Research Consortium, University of Colorado, Boulder. Posted: October 2003 http://www.beyondintractability.org/essay/complex adaptive systems/):

> [Complex] adaptive systems are constituted of agents that are connected to their neighbors and have a degree of freedom in responding to changes, but must respond within simple rules. This system structure produces system responses that are not determined and can be highly nonlinear.

> The example Jones gives to illustrate his definition:

> One of the simplest adaptive systems is a flock of birds…the graceful and coordinated movements… Yet there is no bird-in-chief directing the action. There is no script distributed to each bird prescribing the action of the flock… individual birds have a degree of decision-making capacity, but all flight decisions must follow the simple rules:
> Avoid hitting neighbors or obstacles, align flight to match the neighbors, and fly an average distance from the neighbors.

For the sake of interpretive argument, the problem-negotiating process that occurs during a forensic craniofacial reconstruction is analogous in function to a complex adaptive system in general and complex adaptive social system in particular when the notion of the problem-negotiating process is considered for its implications for curriculum and instruction. In the case of this study the agents are

art and science within the forensic craniofacial reconstruction process. The simple rules appear to be: Neither the art nor the science alone can exclusively determine the outcome of the reasonable likeness of a facial reconstruction; therefore a symbiotic relationship between art and science must be maintained. The art/science working relationship functions in a constantly oscillating Gestalt (figure/ground) tacit manner. For example, if we consider the well known Rubin's "multistable" of the two opposing faces and vase image as a visual explanation of how the oscillation in the art/science relationship functions during the actual forensic craniofacial reconstruction process. The moments of back and forth transfer between the two images of the faces and the vase is analogous to the shift from the art to the science in the facial reconstruction problem negotiating process and is only tacitly known.

CHAPTER FOUR

A Grounded Multistability Theory for Curriculum and Instruction

The emergence of a theory is usually based on a perceived and/or empirical presence of a phenomenon for which current prevailing theories cannot account or have ignored. I contend that the often heard phenomenon of a student saying "I know the answer is right I just don't how I got it or how to explain it, but I know it is right" is a situation that requires a theory to account for the qualitative communication and at least the conceptual implications in terms of Curriculum and Instruction. This is important because, I assert, there exists an ignored aspect of a frequently encountered though explicitly inexplicable way of knowing which is experienced by everyone in many learning situations throughout our lives.

In the literature on Educational Ideologies that undoubtedly have a bearing on curriculum and instruction I have not found an explanatory theory that speaks to the recognition of or the implications for Tacit Knowledge in curriculum and instruction. It is my contention that a Multistability Theory of Curriculum and Instruction can serve the above purposes.

The phenomenon of a Multistable is originally a visual perception situation of the oscillation back and forth between two or more visually stable

states within the same image. The classic example of this is the Necker Cube. A linear isometric drawing of a cube presents to any given observer its front, back, and all four sides view simultaneously but because all observers of this cube need to naturally establish a Gestalt figure ground relationship between the front and back faces of this cube, only *either* the front *or* the back can be seen at any given time. This particular front or back perception shifts from one to the other because it contains two ambiguities of "T" in its construction.

The "Ts" in a linear drawing are helpful because they give the observer a spatial orientation as to which parts of the drawing are visually in front of or behind other parts. The general functional rule is that the horizontal line at the top of the T is always in front of the vertical line of the bottom of the T. The two "Ts" of the Necker Cube are located at the points where the overlapping squares of the front and back touch each other. At those two points an ambiguity is created because the orientations of the tops of the "T" are in two different positions: 90 degrees of rotation from each other showing both the front and back at the same time. We as observers temporary stabilize this situation by subconsciously choosing one or the other of the orientations before it shifts again.

By a Multistable Theory I mean an explanation that can account for those moments when we experience an inexplicable though absolute certainty about something we have come to know. This has the same intellectual characteristics as a visual multistable in that the individual having the experience simultaneously knows what he or she sees but appears explicably to not know what they see. In

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other words, a theory is required to account for the disconnection between what we internally know and our inability to explain alphanumerically to confirm what we know. These flashes of understanding have been called Tacit Knowledge or Epiphanies and need to be theoretically accounted for, for the academic sake of those students who tend to exhibit evidence of functioning in this manner.

This Curricular and Instructional Multistability Theory is, I contend, conceptually grounded in the data collected from the three Interpretative Biographies (Denzin, 1989b) from my volunteer ProjectEDAN participants (one of which was me). The combined theories derive from Polanyi's Theory of Tacit Knowledge (The Tacit Dimension, 1967), which is based on the premise that "We know more than we can tell," Denzin's Theory of Epiphanies (Interpretative Biography, 1989b), in which an epiphany is defined as "a moment of revelation in a life," and Miller & Page's Theory of Complex Adaptive Systems (CAS) in (Complex Adaptive Systems: An Introduction to Computational Models of Social Life, 2007) the premise of which is the study of

> . . . the in between [stasis and utter chaos . . . control and anarchy] the usual extreme we use in modeling. . . The world tends not to be completely frozen or random, but rather it exists in between these two states. We want to know when and why productive systems emerge and how they can persist. (p.7)

In other words, this is an exploration into how and why the conscious and subconscious negotiations between and among totally self interested agents within a mutually shared environment tend to strive toward a state of cooperative equilibrium. Miller and Page (pp. 93-101) conceptualize their premise relative to

Complex Adaptive Social Systems (CASS) in terms of the Eightfold Way, which

is based on the Noble Eightfold Path (NEP) from Buddhism. These paths are

labeled the Right View, Intention, Speech, Action, Livelihood, Effort, Cognition,

and Concentration. Excerpts from Miller and Page's metaphorical mapping of a

CASS onto the agents of the NEP are as follows

The Right View as Information and connections

> [E]ncompasses the information that an agent receives from the
> world. Such information can influence agents in both direct and
> indirect ways. Directly, incoming information will cause an agent
> to immediately react to what was received by taking some action.
> Indirectly, information is often 'memorized' via some change in an
> agent's internal state, and such changes may set the stage for action
> that will only become realized far in the future…(Miller & Page,
> 2007, p. 94). . . "The timing of the information flow can be
> important – what agents know and when they know it can make a
> big difference to the outcome of a social process . . ." (Miller &
> Page, 2007, p. 95)

The Right Intention as Goals

> [F]ocuses on the goals of the agents…By manipulating an agent's
> intentions, we can obviously put in place strong forces on the
> model's behavior…the most interesting results come about when
> the outcome of a model is, at some level, at odds with the induced
> motivations of the agents -- to use Schelling's terms, when the
> micromotives and the marcobehaviors fail to align …. (Miller &
> Page, 2007, p. 95)
> ". . . it is far more interesting to see cooperative behavior emerge
> when the agents are self-interested than when the agents are
> presumed to be altruistic. . ." (Miller & Page, 2007, p. 96)

The Right Speech as the Communication among (and between) the agents

> [A]ccounts for the information that agents send to others.
> Agents can send information to other agents by taking observable
> action or, more explicitly, by using some communication channel.
> Models can differ in terms of the kind of information that is

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allowed to flow among the other agents, and the quality of the information. (Miller & Page, 2007, p. 96)

The Right Action as the Interaction

> [E]mbodies all of the interactions that occur among the agents. Each agent receives and processes information and, by its action (or even inaction), generates information that influence the other agents and the system itself …interactions depend on the 'space' within which the agents are contained. This space could be defined by physical realities, like having the agents arrayed around the perimeter of a circle or more abstract entities such as 'friendship.' Whatever the form of the space, it can mediate agent interactions by constraining the flow of information and action, such as when we only allow agents to interact within some well defined neighborhood. (Miller & Page, 2007, p. 96)

> Space is often endogenous in a system; for example, agents may prefer to interact with 'friends' and over time the interaction possibilities may change as previous interactions alter the space of friends. . . In some models, agents are assumed to gather input, process it, and act simultaneously. In these models, some external synchronization device must coordinate the behavior of the agents …Social systems also embrace institutions that coordinate behavior, such as …national election days …Agents can also activate asynchronously. Under asynchronous activation, each agnt awakes at a different time, process whatever information is currently available, and then by its action alters the informational ether that will face the other agents when they are activated. Asynchronous activation requires that the agents be placed in some activation order. One way to order agents for activation is randomly (either with or without replacement); alternatively, agents could be ordered by some exogenous or endogenous characteristic. (Miller & Page, 2007, p. 97)

The Right Liveihood as the Benefits

> [C]oncerns the payoffs that accrue to the agents. Payoff can arise via the pure 'physics' of the model, where actions aggregate to change the world in such a way that the resulting provide some benefit to, or impose some cost on, the individual agents ….(Miller & Page, 2007, p. 97)

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[A]gents also have the ability to change the physics of the world by co-creating new opportunities for payoffs – for example, when they make a zero sum bet on some outcome …By assuming that agents have the goal of improving their payoff, modelers can impose a lot of structure on the behavioral possibilities of the agents. We may also want to use payoffs as a way of drive adaptation by letting agents reproduce based on their performance. Payoffs can also be used to determine the activation order for agent updating. (Miller & Page, 2007, p. 98)

The Right Effort as the Strategies and Actions

"[E]mbraces agent strategies and actions …Strategies can take many forms, from simple-fixed heuristics to elaborate optimization routines that change over time …these types of categories are not always well-defined. For example, the fixed rule being employed by an agent to guide strategic behavior may be the result of an elaborate and optimization procedure.
There are many reasons why people may exhibit less behavioral plasticity, …, than is commonly assumed by rational choice theorist. First as long as a rule satisfies, agents may not see the need to change. Second, people may lack the ability to infer causal relationships between actions and outcomes. Causal inference become increasingly more difficult the more complex the environment or the less exposure an individual has to the particular decision scenario. Finally, if events transpire quickly, such as in a standing ovation or a riot, there is just not sufficient time to contemplate an optimal strategy and agents may follow existing, or make up new, behavioral rules ….(Miller & Page, 2007, p. 98)

This suggests an imperfect correlation between the intelligence and strategic sophistication of an agent and the observable level of computation employed by that agent. It also implies that we may need to enter a messy domain if an accurate representation of agent behavior is needed to model the successfully. (Miller & Page, 2007, p. 100)

The Right Mindfulness as Cognition

[I]s the level of cognition employed by an agent: how smart should agents be? …More likely than not, the sophistication of the agent is context dependent, and in some situations attempts at optimization predominate, while in others simple heuristics are employed …The important question is not whether agents are

boundedly rational …, but rather when and how does this make a difference. The mindfulness of social agents differentiate them from physical agents. Social agents often have mental models that they use to inform their behavior. Moreover, unlike physical agents, there is a plasticity in social agents who can change how behave if outcomes are not to their liking.

Ultimately, there appear to be no context-free answer to the question of how smart should we make our agents. Complex social systems models do – and should – vary in the level of sophistication embedded in the agents. (Miller & Page, 2007, p. 100)

The Right Concentration as Model focus and heterogeneity

[I]t requires the model to be just sufficient to capture the phenomenon of interest. Models always have contexts, and what works well in one context may fail in another. If we want to understand the essence of cooperation, then perhaps we ignore network topologies …Another element of concentration is the amount of heterogeneity in the model. Within a given system there can be substantial heterogeneity across agents …The advent of agent-based methods allows the investigation of populations of truly heterogeneous agents. One method is to have an 'ecology' of agent types, each relaying on a different behavioral governing mechanisms. Alternatively, one can use homogeneous agents but allow differences in histories, information, or underlying characteristics to cause behavioral differences among the agents. Model of complex systems phenomena should be simple, …This often seems to get confused and twisted in various ways, …the point of modeling is –whatever the target – is to simplify an otherwise overly complex world …when the resulting behavior is complex, the underlying model should be simple. (Miller & Page, 2007, p. 101)

In Figure 4.0, I offer the reader a three-dimensional visual illustration of

what a Complex Adaptive System based on the equilibriums between and among

the agents of Belief (Thesis, Synthesis, Antithesis) and the agents of Knowing

(Tacit, Implicit, and Explicit) looks like. In this illustration I need the reader to

see a transparent bubble as the Complex Adaptive System with a transparent cube

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inside of it that displays the Agents within the system. On the inside of the cube

are two lines; one creates a horizontal circular path around the inside at its

midpoint and touches the front, both sides, and the back. The other line makes a

vertical circular path around the inside of its center and touches the front, the top,

back and bottom of the cube.

COMPLEX ADAPTIVE SYSTEM

ANTITHESIS
EXPLICIT
TACIT
EXPLICIT
SYNTHESIS IMPLICIT
IMPLICIT
TACIT
THESIS
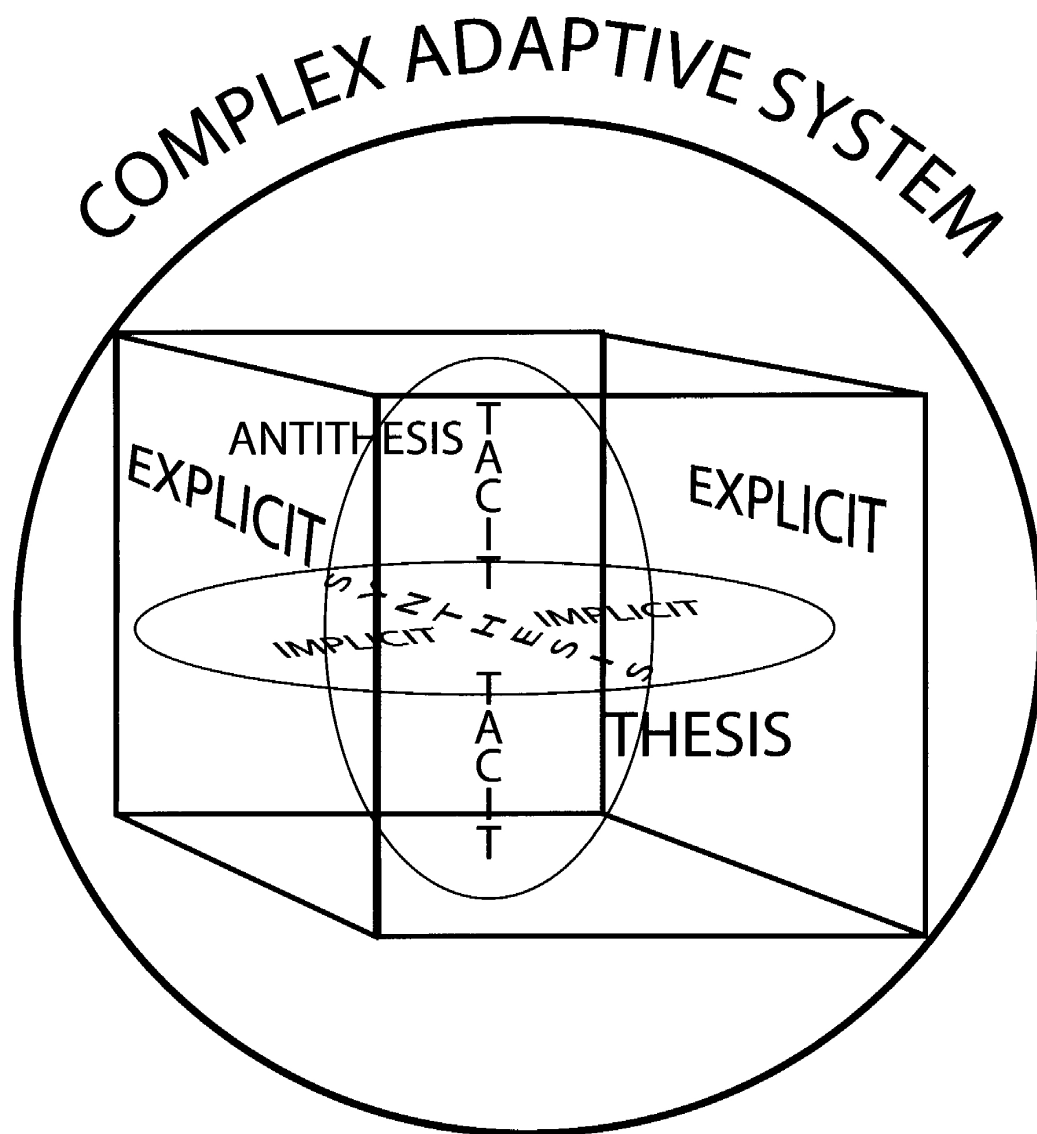
Figure 4.0

The Belief Agents are arrayed from the front to the back of the cube with

Thesis on the front, Antithesis on the back, and Synthesis lay on the horizontal

circle along a center line from front to back. The Knowing Agents are displayed

from the left to the right side of the cube, with Explicit Knowing positioned on both the left and right sides. Implicit Knowing shares the horizontal circle with Synthesis but is conceptually laid out from left to right and perpendicular to it. Tacit Knowing is presented along a line from the top to the bottom of the vertical circle that intersects the horizontal circle where Synthesis and Implicit Knowing meet. The CAS strives toward the Right View (Wisdom, in terms of information and connections) through the negotiated equilibrium of its Agents.

The collected research data, from my participants, serve as the inductive grounding for this theory and are covered in more detail in chapter eight, when I pull together the interrelationship between the three foundational theories and my collected research data. The interrelatedness of these foundational theories will then later be comparatively mapped onto Curriculum and Instruction by way of Tyler's Principles of Curriculum and Instruction (1949).

The key to comprehending this Multistable Theory is to seriously entertain the analogous connection between and among the above premises of its foundational theories, relative to the Tyler Rationale. That is to say, to take into account that Tacit Knowledge, a Major Epiphany, the Right View, and "a comprehensive philosophy of education necessary to guide in making judgements [toward the Educational Purpose of a Curriculum]" (Tyler, 1949, p. 4) are different terms that describe the same *life experience produced instances of personally acknowledged certainty that occur through the subconsciously reflected upon negotiation of differences*. This is visually conceptualized as a

Multistable Perception, which is a linear drawing of a single object that oscillates between two visually stable states (i.e., the above mentioned Rubin's drawing p. 81). Multistabled with the quote from the Hippocratic Oath "for the benefit of my [students], . . . [I will] ***abstain from what ever is deleterious and mischievous***" (Collier & Son, 1910), which has often been paraphrased as "Never Do Harm" or "Do No Harm," which I am further paraphrasing as "Never mis-educate" (Dewey,1938, p. 25) and/or "Never de-skill" (Apple, 1982). This consideration will help the reader see the similarities between and among the other subsequent Ways of Knowing, and Right Agents, that ripple out concentrically from the above central premises relative to their alignment with the standard deviations of the Epiphanies and the Principles of Curriculum.

That being said (see Figure 4.1, p. 101), within the first concentric ripple, out from Polanyi's central notion of Tacit knowledge, and Miller & Page's central concept of the Right View (Wisdom), that are conceptually aligned to the respective Means of Denzin's idea of the Major Epiphany, and Tyler's Educational Purpose of a given curriculum, we will find respectively a Tacit leaning Implicit Knowledge for Polanyi, the Right Effort (Mental Development) Agent for Miller & Page, aligned with Cumulative Epiphanies (in the first standard deviation) for Denzin, and Curriculum (in the first standard deviation) for Tyler.
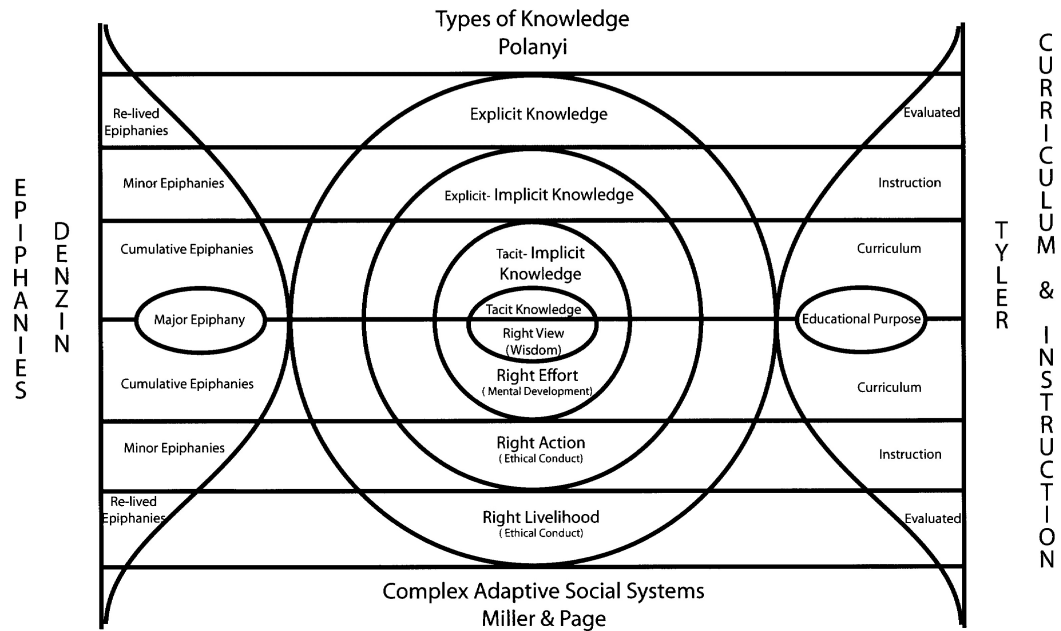
Figure 4.1

A closer examination reveals that they all have in common what I interpret to be *a fundamental compulsion toward potential communication*. By this I mean, Tacit leaning Implicit Knowledge (T\IK), which I interpreted as a meandering border area between Tacit and Implicit Knowledge. This is considered to be knowledge that, in general, can only be partially communicated in the form of words and numbers that has been further diminished by its tacit inclination, yet not totally extinguished by it (see Figure 4.2, p. 102).

EXPLICIT KNOWLEDGE

IMPLICIT KNOWLEDGE

TACIT KNOWLEDGE

IMPLICIT KNOWLEDGE

EXPLICIT KNOWLEDGE
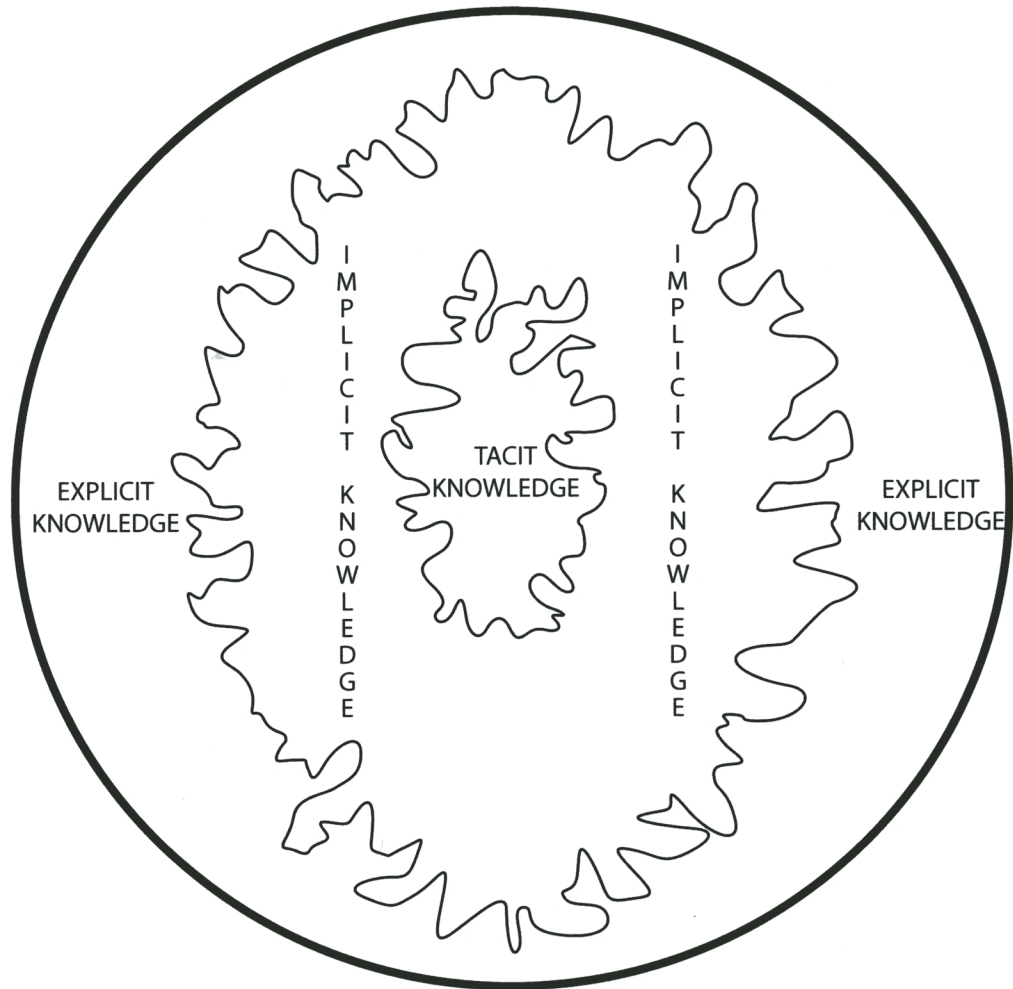
Figure 4.2 A visual interpretation of how the Complex Adaptive thought process appears to works.

A Cumulative Epiphany as defined by Denzin (1989b, p. 71, in Denzin, 1989a, chapter 7) is an event "which signifies eruptions or reactions to experiences which have been going on for a long time." A Cumulative Epiphany as a communicative display of Tacit inclined Implicit Knowledge is interpreted as evidence of an eruption or reaction to the long experience of trying to explicate the Tacit leanings of that Implicit Knowledge more implicitly at least, if not more

explicitly. By this I mean, both Tacit leaning Implicit Knowledge and Cumulative Epiphanies are experientially life based. The difference between them is that the first is a subconsciously experienced inexplicable certainty combined with a partially explicable certainty; the second is a momentary eruptive realization of an experiential certainty.

The Right Effort (Mental Development) from Complex Adaptive Social Systems also suggests evidence of having this same compulsive communicative potential in that putting forth the Right Effort can mean venturing "outside of the box" to conceive of, comprehend and negotiate a solution to a given problem by means other than those within the limited range of words and/or numbers. The Right Effort compares with Tacit leaning Implicit Knowledge and Cumulative Epiphany in that all are experientially produced but contrast in the sense that they are inwardly focused experiences compared to the outwardly focused Right Effort.

Tacit leaning Implicit Knowledge, Cumulative Epiphanies, and the Right Effort all align with Curriculum writing, because that act is a compelling communicative reaction designed to address neglected experience(s) that have existed for a length of time. For example, when the Russians launched Sputnik1 in 1957 that event compelled the re-evaluation of Math and Science Curricula in the United States to address the realized neglected emphasis in these subject areas that was then perceived to have existed for an unacceptable length of time.

Within the second concentric ripple, out from the congruent central concepts of Polanyi's Tacit Knowledge, Miller & Page's conceptualized Right View, aligned with Denzin's Major Epiphany, and Tyler's Educational Purpose, we find Explicit leaning Implicit Knowledge (E\IK). Like the separation between Tacit and Implicit Knowledge (see Figure 4.2, page 102), I interpret Explicit leaning Implicit Knowledge as having a meandering border between Implicit and Explicit Knowledge on the continuum from Tacit to Explicit Knowledge, and the Right Action (Ethnic Conduct) Agent for Miller & Page, aligned with the Minor Epiphanies for Denzin, and Instruction for Tyler in the second standard deviation in their normal distributed bell curves.

The commonality between the second concentric ripple of Explicit leaning Implicit Knowledge (E\IK) and the Right Action with the second standard deviations of the Minor Epiphanies and Instruction is the affective acknowledgement and obligatory adherence to agreed upon sets of behaviors, beliefs, and/or principles. Minor Epiphanies and Instruction are both examples of the ethical application of Explicit leaning Implicit Knowledge (E\IK). An example would be when we take the responsibility to make the cleanest possible instructional separation between what we know to be essentially the implicit from what is definitively determined to be explicit. A specific instance would be to separate the implicit leading "All" nature of the primary premise of a syllogism from the mechanically determined, explicitly stated, though mistaken, conclusion.

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In terms of a Minor Epiphany an application of ethical behavior that "symbolically presents a major problematic moment in a person's life" (Denzin, 1989b, p.71, in Denzin, 1989a, chapter 7) would be when a whistleblower exposes wrongdoing within her/his organization for public display.

To engage in the Right Action also presumes either a personal or organizationally established code of conduct and/or behavior to which one is held accountable. So, the philosophical beliefs of the individual or the organization one belongs to determine what ethical behavior does or does not look like. Then it would follow, if the prevailing philosophical foundational belief of an individual or organization is altruistic, then any selfish act is unethical. If the personal or group philosophic foundational belief is based on greed then any hint of altruism would in fact be unethical.

Next I looked at now the affective acknowledgement and obligatory adherence to an agreed upon set of behavior, beliefs, and/or principles applies to Tyler's meaning of Instruction when he talks about Continuity, Sequence, and Integration (Tyler, 1949, pp. 84-85). In that continuity is an obligatory adherence to instruction because it is a simultaneous check for understanding of previous instruction, it also helps to identify changes in the learner's behavior. An example of this is when a student is learning to add columns of different sets of similar numbers. Sequence is an affective acknowledgement of a qualitative difference between the vertical steps of continuity or when the above mentioned student goes from adding different columns of the same numbers to learning to use and apply

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the multiplication time table. Integration in terms of Instruction is another

affective acknowledgement that functions analytically. An example is when a

student begins to see, understand, and apply the learned content from one subject

to all other subject areas. This is called a transfer of knowledge to understand the

connections between and among diverse subject areas:

> in developing skill in handling quantitative problems in arithmetic, it is also important to consider the ways in which these skills can be effectively utilized in social studies, in science, in shop and other fields so that they are not developed simply as isolated behaviors to be used in a single course but are increasingly part of the total capacities of the student to use in the varied situations of his daily life. (Tyler 1949, p. 85)

In the third concentric ripple, out from the central concepts of Polanyi, and

Miller & Page, aligned with Denzin and Tyler's we have respectively Explicit

Knowledge and the Right Livelihood (Ethnic Conduct) Agent aligned with Re-

lived Epiphanies, and Evaluated curriculum and instruction, in the third standard

deviation, for Denzin and Tyler.

Explicit Knowledge represents all codified written knowledge and/or a

combination of written/mathematical knowledge. The Right Livelihood refers to

the benefit accrued to individual agents within the Complex Adaptive System

during negotiation to equilibrium. The Complex Adaptive Social System is the

interactive relationship between the Learner and the Educational Purpose of the

Curriculum. The Agents in this social system are the Learners and the Educational

Purpose (meaning the Intended Curriculum, Eisner (1998, p .172), its Instruction,

and how it is Evaluated).

Re-lived Epiphanies are the understood meaning of a particular episode in one's life by re-living that experience (Denzin, 1989b, p. 71). What ties Explicit Knowledge, the Right Livelihood, Re-lived Epiphanies, and Evaluated Curriculum and Instruction together is the explicit recall and representation, in words and/or numbers, of the most beneficial outcome for any given Agent within the System. What this describes, but not necessarily in this respective order, is the conventional way Curriculum and Instruction has been understood, theorized about, developed, represented, and assessed. In other words, it is the Antithesis of a Multistable Theory for the Curricular and Instructional Implications of Tacit Knowledge.

I contend that A Multistable Theory for the Curricular and Instructional Implications of Tacit Knowledge is based on the philosophy to, "Never Do Harm"—especially in terms of mis-educating and de-skilling. It is based on this philosophy these three ways (see Figure 4.3).

TACIT KNOWLEDGE

DO NO HARM

MAJOR EPIPHANY

EDUCATIONAL PURPOSE

RIGHT VIEW (WISDOM)
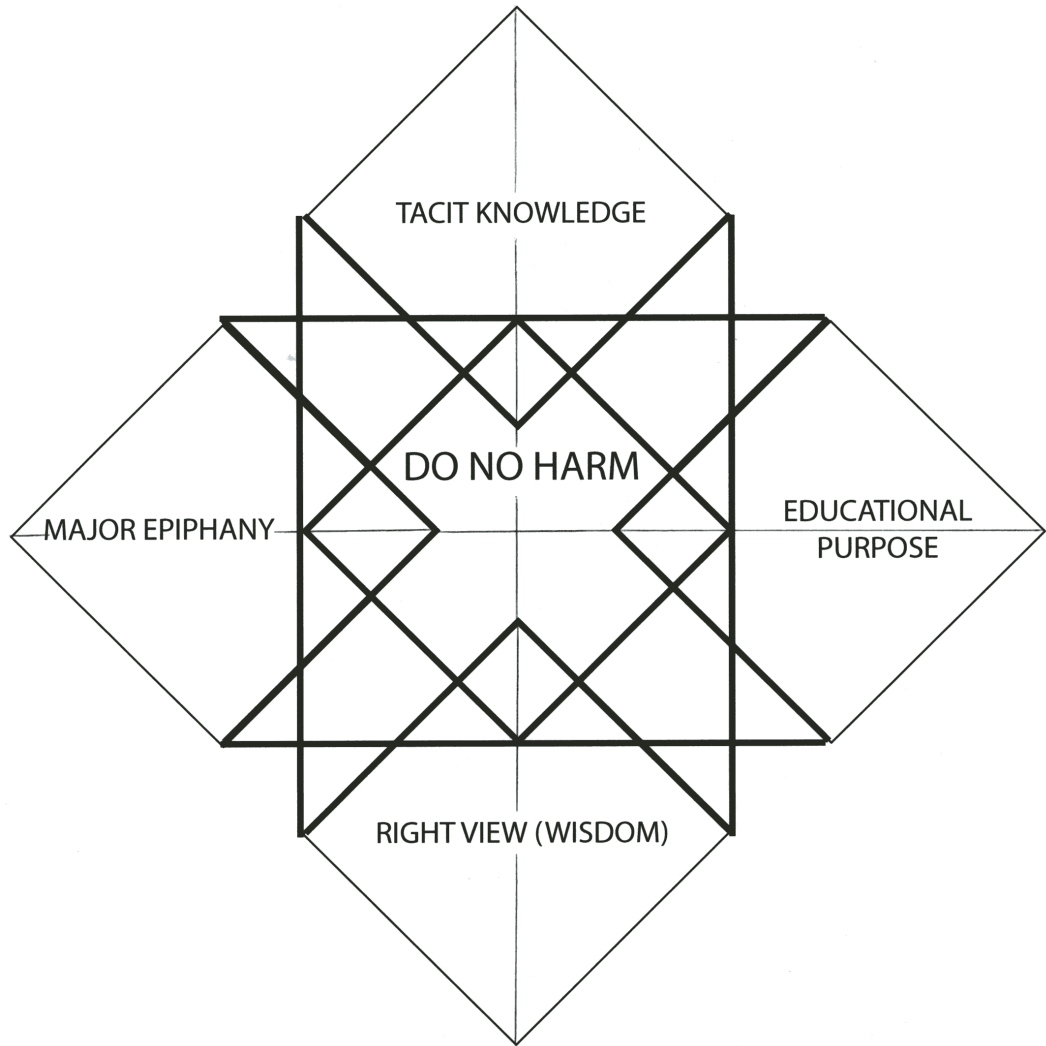
Figure 4.3 A Multistable Theory for the Curricular and Instructional Implications of Tacit Knowledge.

First, by promoting teaching and learning environments that will naturally bring out a given student's (what I interpret to be) *fundamental compulsion toward potential communication.* In other words, to bring about a learning space were a student is comfortable communicating in his or her way with anyone about what she or he knows about the subject at hand and how she or he knows it. Second, guided by the "Never Do Harm" philosophy to cooperatively grow *the*

caring acknowledgement and obligatory adherence to agreed upon sets of behaviors, beliefs and principles, simply to behave ethically. Third, to be sensitively aware of the point where assessments based on *explicit recall and representation, in words and/or number,* becomes harmful to *the most beneficial outcome for any given* student *within the* educational environment. This means to promote, look for, create, and implement alternative forms of assessment.

CHAPTER FIVE

Yoda's Mom

The data from Yoda's Mom is the first of three Interpretative Biographies that will serve as inductive evidence to support the conceptual exploration into a Grounded Mutistable Theoretical Model for Curriculum and Instruction based on the Tacit Knowledge Exhibit while Creating a Forensic Craniofacial Reconstruction.

The data were collected in the forms of a pre-interview Questionnaire, three face-to-face audio/video taped and recorded interviews along with direct observations. The Questionnaire was good at revealing broadly recalled facial reconstruction data relative to her interest and involvement in forensic art. Interview One: Focused Life History is best suited for acquiring the participant's most relevant detailed inductive evidence of Re-lived, Minor, and Cumulative epiphanies data that led up to their Major Epiphany. Interview Two highlights the details of the facial reconstruction experience, along with its direct observations best highlighting the essential inductive data from the participant as it actually occurred in real time. The third Interview seeks out the participant's reflections on the meaning the facial reconstruction experience or as Seidman (1998) put it:

> "making meaning requires that the participants look at how the factors in their lives interacted to bring them to their present situation It also requires

that they look at their present experience in detail and within the context in which it occurs (p. 12)."

The Questionnaire

To refresh the reader's memory I paraphase the Questionnaire items from page 80 of this study. When and/or how did you become interested in doing forensic craniofacial reconstruction? What has been your educational training in art and forensic craniofacial reconstruction in particular? What is your level of certification? How many years of experience do you have at doing forensic craniofacial reconstructions? How long have you been with ProjectEDAN? Do you prefer doing 2-D or 3-D reconstructions? Why? Do you prefer to use the American, the Russian, or Manchester method? Why? Do you see working as a forensic craniofacial reconstructionist primarily as an artist, physical anthropologist, or a combination of the two?

Her Epiphanies from the Questionnaire

To remind the reader what the Epiphanies are from Denzin's monograph "Interpretative Biography" (1989b, p. 71): A Major Epiphany is a personal life changing event, Cumulative Epiphanies are reactions to experiences which have been going on for a long period of time, Minor Epiphanies are representations of major problematic moments in a relationship or a person's life and Re-lived Epiphanies are those episodes whose meanings are given in the reliving of the

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experience. The reader can reference the interpretative labeling/open coding for these data (on pages 85 and 86 of this study).

The background questionnaire information indicates that YM's Major Epiphany relative to forensic craniofacial reconstruction occurred for her in the late 1960s. It was a life changing revelation. In other words, it was the moment when she became aware of the forensic craniofacial reconstruction process and her overwhelming desire to become involved doing facial reconstructions.

> In her voice, "**I saw a news clip about two people who, together, reconstructed a clay face on a skull that was later identified. It was a short news bite, but enough to turn my head [ME]** and lead me on a long search for knowledge of this skill [regCE]."

The reader must keep in mind that, respectively, the progressive Cumulative Epiphanies, [proCE], as well as the regressive Cumulative Epiphanies, [regCE] that lead up to and away from YM's Major Epiphany of becoming aware of forensic facial reconstruction are derived from multiple pre and post experiences in her life and this questionnaire item only highlights only one of those experiences (the news clip); other life experiences will be revealed during the face-to-face interview. I conceptualize progressive and regressive Cumulative Epiphanies respectively to be all learning experiences leading toward a better personal understanding of one's Major Epiphany and all methods and techniques for making the Major Epiphany tangible are regressive Cumulative Epiphanies. Yoda's Mom mentioned the long informal search for explicit information about the forensic facial reconstruction skill as she saw it at that time, segued into my

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next questionnaire item regarding her educational training (formal and informal)

in art in general and forensic craniofacial reconstruction in particular. YM talked

about her Cumulative Epiphanies, both progressive and regressive, that lead

toward and away from her tacit central Major Epiphany through her informal

search experiences and her formal educational training in the world of facial

reconstruction.

> I started looking for the data and techniques they were using, guided by the memory of those two people and the work they did. I did not know until 20 years later that the two people were Betty Pat Gatliff and Dr. Clyde Snow. I found some raw data on facial tissue depths in an obscure book in the early 70s while I was working as a teacher. There was just enough information that I was able to buy a skull replica . . . and attempt my first facial reconstruction. I continued my search for new information and each time I found some data, I would do another reconstruction [regCE]. . . .

> During the late 70s and 80s, I continued teaching and my education and raising a family, all enough to keep me occupied . . . but facial reconstruction was never far from my mind. I was able to continue facial reconstructions with limited techniques and data…but I always lacked the precise information charts I needed"[reg CE].

I am interpreting YM's above comments to be regressive Cumulative

Epiphanies for the following reason. Although her interest and determination to

become involved in doing forensic facial reconstructions was strong, she felt that

she lacked the formal educational training to be confident that she had turned the

corner toward being able to really master the facial reconstruction process. This

lack of confidence appears to be based on the unavailability of explicit step by

step text books or formal forensic craniofacial reconstruction instruction.

Although YM's Major Epiphany, or what I interpret to be, *her personally*

affirmed moment of total, though inexplicable, certainty (page 84) **a personally**

affirmed moment of total, though inexplicable certainty about her tacit

capability to do facial reconstructions, there was also the feeling that there was

some missing explicit knowledge.

> "It took me what seemed forever to find out that Betty Pat Gatliff had
> started teaching classes in facial reconstruction in the early 80s . . .
>
> From Betty Pat's classes, I learned the techniques that put everything I had
> previously done in a new perspective and enabled me to finally correct my
> mistakes. It gave me a change to acquire the data that I had had such a
> hard time finding for so many years.
>
> It gave me a new sense of respect for the people who do this work and a
> great desire to continue on" *[proRe-lE]*.

The above Re-lived Epiphany was the start of the explicit formal track of

YM's facial reconstruction training. Her formal education included the follows

classes, and workshop: Basic and Advanced 3-D Facial Reconstruction, in

Norman, Oklahoma, with Betty Pat Gatliff; Composite Art for Law Enforcement,

Atlanta, Georgia; Composite Art Workshop II, Secret Service Training Facility,

Beltsville, Maryland; Comprehensive Composite Art, Scottsdale, Arizona; 2-D

Facial Reconstruction, in Scottsdale, Arizona, with Karen Taylor and Composite

Art Workshop, 6 weeks online with Betty Pat Gatliff et.al. Formal workshops

included: Facial Reconstruction Using Digital Imaging; Studio Workshop for 2-D

Facial Reconstruction and Age Progression.

At present YM does not have a formal level of forensic art certification,

but in terms of experience she has 30-plus years of combined informal and formal

forensic education—the last six years of which has been full time involvement

both doing facial reconstructions and teaching 2-D and 3-D forensic arts methods.

She has been a member of Project EDAN for, according to her estimate, about 4-

plus years.

Of the two facial reconstruction methods, YM prefers to do the 3-D clay

reconstructions as opposed to the 2-D drawings because she finds a level of tacit

tranquility in the process because of the Autotelic Experience it affords.

> The term "autotelic" derives from two Greek words, auto meaning self,
> and telos meaning goal. It refers to a self-contained activity, one that is
> done not with the expectation of some future benefit, but simply because
> the doing itself is the reward (Csikszentmihalyi, 1991, p. 67)

> I prefer the 3-D if I have a choice. . . .you can usually take more time to
> complete a reconstruction when working with clay. While the 2-D take
> less time, the time spent doing a 3-D clay reconstruction is rather *soothing*
> [reg CE]

I see this as a regressive Cumulative Epiphany because it was for her a

reaction to her working knowledge with the two facial reconstruction methods

over a period of time leading to what I interpretively call **a moment of**

experiential certainty that is only partially explicable for her preference. My

interpretation as to why YM experiences a sense of "*soothing*" while working on

a 3-D clay facial reconstruction is because in the act of making a drawing, the

artist is working with two dimensions and only the illusion of the third. Whereas

when the artist is working three-dimensionally every manipulation of the medium

must contribute to the reality of the emerging image in all three dimensions

simultaneously to be convincing. Dewey (1934) put it this way,

"The experience itself has a satisfying emotional quality because it possesses

internal integration and fulfillment reached through ordered and organized

movement" (p. 38). This would be *soothing* for an artist.

Of the above mentioned 3-D methods the Russian, the Neave and the

American, (see Figure 1.3, page 40 of this study) YM prefers the Neave method.

> I really prefer the Neave . . . [method] primarily because it seems to blend
> the best of the Russian and the American methods together to produce a
> reconstruction which seems to be a better quality than either method
> separately *[regME]*.

> …when I have a deadline, I use the American Method, which I call 'down
> and dirty,' meaning it is the fastest, and least complicated method and you
> can complete a reconstruction in less than 12 hours if pushed.
> *[regME]*.

These last two comments are both regressive Minor Epiphanies because

the uses of her preferred 3-D facial reconstruction method is influenced by the

major problematic issues of providing the best quality reconstruction in the face

of the time constraint of meeting a deadline. This is a ***moment of situational***

certainty that is only partially explicable in terms of producing the best

reasonable likeness of the John or Jane Doe.

> This [the American] is the method I teach my students. The Russian
> method is too complicated and the results dubious unless you are a trained
> anthropologist or anatomist [proCE].

> I only use this [the Neave] method when I have time to devote to the
> reconstruction. I do offer this method to my students since I have an
> instructor with a PhD in Anatomy to oversee the initial lay-ins of the
> muscles *[pro ME]*.

YM's last comments represent respectively progress Cumulative and

Minor Epiphanies for these reasons. Gerasimov, the developer of the Russian

Method, in his book *The Face Finder* gives a page 10 explanation of the "The Essentials of [his] Method" in chapter three. The reader needs to first be aware that this book was translated from Russian to German into English. The overall presumption this chapter makes of its reader is that s/he has an extensive background in the science and terminology of physical anthropology notwithstanding sufficient sculpting ability. That said, this chapter could not be read, understand, and used as a "how to instructional text" by someone merely interested in trying their hand at doing a facial reconstruction. Even for the experienced forensic facial reconstructionist, Gerasimov's Russian Method is more than challenging. I am interpreting this to be a progressive Cumulative Epiphany because of its ***experiential certainty*** derived from searching for and finding over time her method of choice.

In the questionnaire, I wanted to know what YM's conceptual approach is toward her work as a forensic craniofacial reconstructionist. Is it primarily as an artist, physical anthropologist, or a combination of the two? The assumptions for a particular conceptual approach toward doing forensic craniofacial reconstructions fall into one of two orientations which is driven by the reconstructionist's client's need to adhere to the above mentioned Daubert Standard (see pages 61 and 63 of this study).

A more artistic approach to creating a forensic craniofacial reconstruction is focused on producing a reasonable likeness, that can border on being a caricature if the artist's knowledge of facial anatomy is poor, as opposed to the

more scientific American soft tissue depth method encouraged by the Daubert

Standard. The reconstructionist that subscribes primarily to the tissue depth

approach is ultimately more concerned with adhering the Daubert Standard than

even obtaining the best reasonable likeness of the John or Jane Doe, which can

tend to look like the head of a mannequin given the reconstructionist's knowledge

of facial anatomy.

The combined anatomical and tissue depth approach is concerned with

producing the best reasonable like of the John or Jane Doe, based on the

symbiotic relationship between the art (sculpture) and the scientific data from a

physical anthropologist about the skull in order, to help generate investigative

leads for either law enforcement agencies or coroner offices—and not to stand-up

in a courtroom as evidence.

> I try to approach my work as a forensic craniofacial reconstructionist
> primarily as a combination of artist and physical anthropologist . . . While
> researching a better way to present this information, I did some
> reconstructions from [my state's] University… anthropology lab for Dr.
> W. That led me to studying physical anthropology from the University [in
> another state] I presented a proposal to [my state's] University's
> anthropology division a couple of years ago. They would allow me to
> receive a master's degree in Physical Anthropology with the degree being
> in Forensic Art. I intend to take them up on that in the next year or so.
> [reg CE].

Implicit and Explicit Knowledge from the Questionnaire

Working from the concept of Implicit Knowledge as the combined natures

of Cumulative and Minor Epiphanies, which are respectively moments "which

signifies eruptions or reactions to experiences which have been going on for a

long time" and situations "which symbolically presents a major problematic moments in a . . . person's life"(Denzin, 1989b, p.71), the items in my questionnaire were better for obtaining YM's Re-lived Epiphanies conceptualized as explicit knowledge and ill-suited to capture implicit knowledge. Cumulative and Minor Epiphanies, on which I assert Implicit knowledge to be based, are respectively as (Denzin, 1989b, p. 71) states, either eruptive/reactive dynamic or problematic in nature.

Evidence of YM's explicit knowledge manifests itself from the Questionnaire when she responds to the items about why she prefers the 3-D Neaves facial reconstructions Method over the Russian or the American Methods by saying:

> *When I have a deadline, I use the American Method, which I call 'down and dirty,' meaning it is the fastest, and least complicated method and you can complete a reconstruction in less than 12 hours if pushed. . . The Russian Method is too complicated and the results dubious unless you are a trained anthropologist or anatomist. I really prefer the Neave . . . primarily because it seems to blend the best of the Russian and the American methods together to produce a reconstruction which seems to be a better quality than either method separately.*[reg Re-lE].

Ways of Knowing: Tacit, Implicit, and Explicit

In this section I show the respective analogous relationship between Yoda's Mom's Major Epiphany with her Tacit Knowledge, next her Cumulative and Minor Epiphanies with her Implicit Knowledge, and lastly her Re-lived Epiphanies with her Explicit Knowledge.

Before I can proceed with these analogous relationships the reader needs to understand the distinction I make between tacit and implicit knowledge. Tacit knowledge is impossible to understandably communicate to another person in either verbal or written language, or mathematical terms. This means the conventional forms of explicit communication or combinations of these communicable forms cannot help a learner/student understand, internalize, or perform the behaviors they observed in the person that took the behaviors in his/her performance for granted. One example would be if you, as an expert tightrope walker, gave someone explicit verbal, written, and mathematical instructions on how they must maintain their balance while walking along a tightrope and then expecting them to walk the rope like you would from your explicit instructions alone. Another example would be the difficulty we sometimes experience trying to get a computer software program that we are unfamiliar with to work correctly from the information in the instruction manual. A personal example of mine is that I have always been able, as far back as I can remember, to rotate an object in my mind, yet after 30 years of being an art teacher I was never able to write a lesson plan that could instruct my students how to perform this simple task.

The communication of one's tacit knowledge to other people appears to be transmitted through the intentional or unintentional demonstration of our taken for granted behaviors that can only be received through the attentive observations and

a focused level of intellect of the observer. This is what Polanyi (1967) was referring to when he said:

> "it can be argued . . .that the possibility of teaching these appearances by practical exercises proves that we can tell our knowledge of them. . . we can do so *only by relying on the pupil's intelligent co-operation for catching the meaning of the demonstration"*(p. 5) [italic emphasis mine].

The communication of implicit knowledge is fundamentally different from tacit knowledge because it can be transmitted by conventional as well as unconventional means in the form of a ***momentary experiential certainty*** that another person may have at some previous time perceived, understood, or internalized on a level that can make the unfamiliar seem intellectually familiar. By ***a momentary experiential certainty*** in this case I mean a verbal, written, mathematical and/or demonstrative presentation that falls within or at least borders on another person's sensory and/or intellectual frame of reference.

Take, for instant the perennial "What I did over My Summer Vacation" essay re-conceptualized as "What My Summer Vacation looked, sounded, smelled, tasted, felt (tactile) like when I or we did such and such." Because we all have experienced the sights, sounds, smells, tastes, and textures of summer. Another example would be the metaphorical familiarity of learning to steer a car using a wheel based on our previous understood and internalized like experience of steering a bicycle with a bar.

YM's Major Epiphany is analogous to Tacit Knowledge in the sense that it was the intentional demonstration, of the taken for grant behaviors of Betty Pat Gatliff and Dr. Clyde Snow from the news bite, that YM actively received

through her observations and the level of her intellectual focus on what those

people were doing which was "enough to turn [her] head." In other words, this is

what Denzin (1989b, p. 71) refers to as an "the major event, which touches every

fabric of a person's life and what I called (on page 84 of this study) *a personally*

affirmed moment of total, though inexplicable, certainty. Once again the reader

must keep in mind that the progressive Re-lived, [proRe-lE], Minor, [proME] and

Cumulative Epiphanies, [proCE], as well as the regressive Cumulative, [regCE],

Minor,[regME] and Re-lived Epiphanies [regRe-lE] that lead up to and away from

YM's Major Epiphany.

   Her Major Epiphany of becoming aware of forensic facial reconstruction

as being the same as her tacit knowledge is derived from many previous

experiences in her life of which the questionnaire highlights only one of those

experiences (the news clip).Others life experiences will be revealed during the

face-to-face Interviewing as Research method and Interpretive Biography.

   The implicit knowledge revealed in YM's Questionnaire is analogous to

both Cumulative and Minor Epiphanies in that certain *momentary experiential*

certainties of hers became engaged. For example, when her formal education of

the respective Bachelor of Science degree with a certification in Studio Arts, and

the credits for a Bachelor of Fine Arts degree engaged with the 2-D and 3-D art

skills required to do forensic facial reconstructions, a previously unknown or

considered field for studio and fine arts application. I am interpreting that

engagement to be what advocates like Gardner (1983) and Eisner (1994) mean by

Cognitive Pluralism. Cognitive Pluralism can be thought of as a pragmatic use of an individual's accumulated knowledge in intellectually appropriate situations.

The Interview Setting Yoda's Mom

The three series of interviews with Yoda's Mom were conducted between Saturday the 25th and Sunday the 26th of November 2006, in YM's visual arts studio, in the town of Tinybrook (pseudonym), USA. Tinybrook has an estimated, as of July 2006, population of 15,580, a land area of 9.52 square miles; a water area of 0.17 square miles; and a population density of 1,091.27 people per square mile (Census 2000). YM's studio is located in the southwest quadrant of the town. The area is in bordered on the east by the main north/south street of Tinybrook; on the west by an interstate highway; on the north by the main east/west street of Tinybrook and on the south by one of the state's major rivers. The studio is in an area with nine other flat roofed one- and two-story buildings forming a kind of business park. The building next door to the studio serves as a church. YM's studio is on the south side of the street, its front entrance facing north; across from a combination antiques, collectables, and furniture shop.

Our first scheduled meeting was at 11:30 AM. I thought I had arrived early and was waiting for a while out in front of the studio when she came to the door and waved me in. She was wearing a short sleeved red knit top, black pants, and comfortable walking shoes. The best visual description of YM is a kindly grandmother figure in her early 60s. She is a large woman about 5' 5'' feet tall.

She wears rimless glasses and has a short but full, in volume, head of light brown hair worn in a pageboy style streaked here and there with strands of gray. There is a wise, gentle, and welcoming air about her. You feel that you will be nurtured (educated) by her. You can tell by the explanatory way she speaks that she is a former teacher.

Upon entering the studio you will be in a small vestibule; the door-less opening into the studio is straight ahead. The studio itself was divided into three, possibly four, rooms forming an upside down "T." Two of the rooms were obviously working/class rooms that formed a reversed from right to left L-shape. The first of the rooms, the vertical part of the reversed L, that you entered from the vestibule was set up in a lecture/conference meeting format with a long table surrounded by chairs. This room is where the 2-D work is done. There were paintings on the white painted walls of this room done by YM herself, in either oil or acrylic, of various outdoor subject matters along with a portrait of her husband. To the right is a small lounge area with a sofa and coffee table, just big enough for three to four people to use comfortably which was probably a break area for her students. The other part of the studio, to the left, looked like a 3-D working sculpture area; there was no artwork on the white walls, just work stations and chairs. The possible fourth room appeared to be some kind of living quarters; it looked private so I did not go in.

Interview One: Yoda's Mom's Life History in Her Voice

Interview One was conducted in the 2-D classroom area of her studio; she talked openly and freely about her life history and how it related to her moral/humanitarian perspective toward forensic facial reconstruction. I need the reader to keep in mind that the interpretive labels (Re-lived, Minor, and or Cumulative Epiphanies) that I assign to Yoda's Mom's statements are mine alone but I acknowledge that others might interpret them differently.

For the three interviews, for each of my participants, all of my questions directed toward them will be in single indented, double spaced italic text and all of my inserted interpretations and explanations will be in single indented, double spaced plain text. The voices of my participants will be in single indented blocked plain text.

> As far as my early experiences, and it really does tie into facial reconstruction, was adopted . . . my brother and I were adopted . . . I was 8 and he was 5 . . . My parents [adoptive parents] had a strong sense of right and wrong and they instilled that into me. . . [T]hey gave me a very moral background . . . education became the first and foremost thing. . . that was the first and only job we had growing up *[proRe-lE]*.

> [T]hey…had 8th grade educations…But . . . they were always the kind who fed the hungry *[proRe-lE]*.

> When there were strikes at the steel company people were out of work for a year and they had no income and they were hungry…They'd [my parents] plough up the fields and they would plant beans and corn and people would come and just take it you know whatever they needed…

> So I actually experienced first-hand some sacrifices they made, you know, for…betterment of humanity…to me that was very important growing up . . . they always asked that we do the right thing so . . . I did champion a lot of children growing up because that was to me the most important thing,

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you know, service. Even today it is . . . what I can do beyond myself, for other people. . .that was how I grew up. . . *[proRe-lE]*.

The above Re-lived progressive Epiphanies indicate that Yoda's Mom's moral upbringing along with the importance of being of service to people in lesser circumstances had an influence on the affective foundation for her life. It would also be safe to say by extension it also had an influence on her outlook on the forensic facial reconstruction work she would do in the future. To probe a little more to find the foundation of her instilled strong sense of right and wrong and moral background, I asked about her religious affiliation. Yoda's Mom stated that she is a Methodist and talked about the odyssey of attending several different churches from childhood to adulthood.

> My mother was a Baptist and my father was Methodist . . . I spent my childhood going to the Baptist church [on Sundays] . . .on Wednesdays I would go with my cousins to the Church of Christ . . .it wasn't until I was I got to college [I] went to the Unitarian, the Presbyterian, and the Episcopalian . . . To me God existed everywhere, so it wasn't a matter of going to church to worship God, it was a matter of just being fascinated by the different rituals that . . .people went through in their beliefs.…

> I'm a Christian, I believe in God yes but not in a totally organized way [proCE].

> I just had one outstanding belief and that was uh in God and beyond that it was just you know it was very open-minded, I didn't care who or how they worshipped . . . *[proRe-lE]* . . .

Yoda's Mom's Christian belief is matter of fact and clear.

> I'd never make a good psychologist because I couldn't…there's some things you just can't explain uh why people behave the way they do.

> But…like I said, it'll eventually all come back to, you know, facial reconstruction because growing up knowing right from wrong and having that become a part of my personality as I said once before justice prevailed

if . . . it was either right or it's wrong and there were some shades in between but if something was bad, it was bad, if it was good, it was good. Sometimes there's no leeway one way or the other, you know, some things are just plain bad. Some things are just plain good. So that is what I grew up with. Uh giving quarter to some people because of their um religious beliefs or even their thought processes um…by the time I hit college and even in high school, some of the kids I couldn't understand but then now I know where they were coming from…from some of their activities, their behaviors.*[proRe-lE].*
But it always fascinated me to study people [proCE].

As the Re-lived and Cumulative Epiphanies above passages implies

Yoda's Mom relies on her belief in God as the basis for her sense of right and

wrong coupled with a fascination with people, in general, in terms of their beliefs,

motivations, and behaviors to make an honest attempt to understand people better.

I wanted to know whether she considered this an anthropological

fascination or a psychological fascination

Well it's actually both…because . . . in high school there was this boy on the football team . . .
I swear. He was directly descended from the Neanderthals. . . anthropologically . . . not behaviorally . . . he was not stupid behavioral. I mean, he was not stupid . . .he wasn't the smartest apple in the barrel but he was average . . .

…But anthropologically, yeah. I always watched people. Their body, their faces, their eye cause I was fascinated by human features…the eye on this girl…muscles on that guy, the squatness of one person versus the tallness of another and Roger, bless his heart, was exactly built like a Neanderthal down to the face *[proRe-lE]*.

The fascination with people . . . even when I…drew [i.e., relative to art], what is that stupid little test they do for The Art Instruction Schools?*[proRe-lE]*.

I passed it and…went through that little process for a year I think…

Even then I was interested in art and fortunately I had a friend who also enjoyed art so we did art together that way. Cause we didn't have art classes in [high] school ever. *[proRe-lE]*.

The Art Instruction Schools/Famous Artist School to which Yoda's Mom is referring still exist it is now called Art Instruction, Inc. The School's "Draw Me" advertised test was ubiquitous in the late 1950s-early 1960s, and could be found in popular magazines and even on some match book covers. The test was that you copied and mailed in a drawing of the head of a cartoon figure or human in profile to demonstrate your prerequisite drawing skill to be admitted into the for-profit mail order Art Instruction Schools.

An example of Yoda's Mom's psychological fascination with people's behavior is shown in the next passage.

Just how…they [people] thought to do what they did was just beyond me…[It] was a time when you didn't talk about pregnancy, girls didn't get pregnant…and if they did, they went away and came back, you know, went on vacation with Aunt so-and-so…I' m dating myself. But you know in the 60s, early 60s…that was the way it was done.*[proRe-lE]*.

In her next few statements we can begin to see how, even unconsciously, the connection between the importance in her upbringing for the "betterment of humanity" with her strong sense of right and wrong combined in the service of justice in terms of choosing her professional working career in education. Yoda's Mom naturally appears to always be directed by her internal humanitarian gyroscope toward helping others in need help.

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Well, like I said, when I went to [my state's] Women University to register…I didn't know what I wanted to do so I just opened up the book right there at the Registrar's . . . to Special Education.[proRe-lE].

She [the Registrar] said 'What do you want to do?…I said 'That good enough?'

I didn't have a choice with elementary because it was a double major. So anyway, that's what I did. . .[E]ven before I graduated when I did my student teaching, uh they hired me as soon as I finished school because I finished on that odd semester…I finished in December so I went to work for them immediately. I was already married then cause I [got] married my last semester of school . . . [W]e bought a house outside a little town that had nothing but a gas station…[S]o it took me an hour and a half to get to school; an hour and a half to get home, which I didn't mind back then cause it was kind of cool…

I had a mixed bag of children, autistic, a blind child, Down's Syndrome children, quite a few of these. . . were a little bit more than learning disabled. They were kind of like a Catch-22 where they were just termed learning disabled even though there was something else functionally wrong that was never diagnosed.*[proRe-lE].*

This is prior to the enactment of Public Law 94-142 (Education of

All handicapped Children Act) passed by Congress in 1975.

This law provided that handicapped children and adults age 3-21 Be educated in the "least restrictive environment" to the maximum extent appropriate, meaning that they are educated with other children who are not handicapped and that special classes, separate schools or other removal of children form their regular educational environment occurs only when the severity of the handicap is such that education in regular classes cannot be achieved.

Before a child can be placed in a special education program, an extensive evaluation procedure is required by PL 94-142. These criteria must be determined before a child can be placed: whether a child has a physical or mental disability that substantially limits learning.

the possible cause of a child's disability strengths and weaknesses of a child in physical, emotional, social, vocational and intellectual area.

the educational diagnosis category that best describes a child's disability.

the special services instructional techniques and other interventions that the child needs.

the appropriate instructional placement for the child reasonable prediction of the child's academic, social and vocational potential.

(retrieved online http://www.nd.edu/~rbarge/www7/pl94-142.html Wednesday 16 July 2008).

Despite the absence of the now mandated PL 94-142 diagnostics mandates

Yoda's Mom's moral core beliefs caused her to carry out her teaching

responsibilities as if PL 94-142 was already the norm. Her expectation for

situations to be justice also caused her to be "mother bear protective" of her easily

physically preyed upon, mentally challenged students.

> So anyway, I enjoyed that class. That was fun because they were developmentally uh they were just trainable. You could teach them their names and might teach them to, you know, to do some money and just basic skills of life that they have to have, not to function on their own, because I didn't have any high level children. But they required not a lot of attention, but a lot of protection at the school [bus] stop…to make their way around the school. Because where I worked was a special education center, which was set away from the other school here, but these children came over to…catch the bus here and they were normal children but um, you know how kids are. They don't, kids just don't tolerate differences and so…my kids needed as did all these other children in different age ranges and categories that this school handled, really had to champion our children to keep them from being picked on and whatever. So we actually did a lot of physical intimidation with junior high and high school kids. You know, 'You touch my child and…you're dead.' And literally those words. And you really had to, I say physically touch these uh young men who were the worst for hurting our children. But it only took one time to physically go up and pound on this kid's chest as he went back and back and you're emphasizing in words 'Don't you ever touch my kids again. If you do'…and I mean all the way down the path and all these kids are watching,…I will kill you.' Not bad words like that but I will hurt you. And it only took that one time for all of these others, you know, to behave…[W]e cut down on a lot of the damage to our children because they'd come back with bruises and all sorts of physical hurt . . .it took us to physically handle the older kids to stop the hurting and intimidation of

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ours. Anyway, again, it's that justice serving justice situation that pops up in almost everything I do. But, not that I'm proud of that. Uh, you know, that's just the way I'm. And that explains most of why I do what I do. .[*proRe-lE*].

As this next quote will show the intellectual extension of the physical

protection of her students was through her continuing education into who her

students were psychologically and how best to teach them.

> "…When I took abnormal psychology and my thesis was oddly Normal and Abnormal Behavior of Mentally Handicapped People.

> Because there's no research done on it**.[proME].**

> What was normal for them was not perceived as normal by the [general] population. So I had to find what was normal for them and what became abnormal based on a true judging society…So again, that had to go back to what to justify what behavior was normal**. [pro ME].**

> So I took some . . . abnormal psychology and I had to take all of the intelligence testing workshops…to be certified and to give intelligence tests. So again, just the matter of serving the 100 people that I had to test was amazing in their ability to think and to do. And, of course, this is all mental…and that of course reinforced my fascination with how people act and what they do…

> When I graduated, I was working and I don't even remember what it was.

> It was something on the news. . . all I can remember is seeing these two people working together in this lab and they were reconstructing a face on a skull *[proRe-lE]*

> And it was like. . . There are things that happen in your life that just, you know, there it was. That was what I had been searching for and you just knew it whatever it happen to be. . . I thought 'That, not only is that fascinating but that's what I want to do. That's what I want to be. I want to be whatever they're doing **[ME].**

Although the actually path is circuitous, my interpretation is based on a

close examination of Yoda's Mom's progressive Re-lived, Minor, and

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Cumulative Epiphanies showing an increasingly finer understanding, based on her belief in God and her embedded sense of right and wrong, as to who is most in need of justice. Her childhood experiences pointed toward feeding the hungry as being those most in need. Her professional work experience suggested that mentally handicapped children were in the greatest need for justice. But it was in her Major Epiphany of "seeing these two people (Betty Pat Gatliff and Dr. Clyde Snow) working together in [a] lab . . . reconstructing a face on a skull" when she tacitly came to understand that unidentified deceased persons were truly the most vulnerable and in need of justice, given that they no longer have a voice, a recognizable face, nor publicly recognized socio-political advocacy groups dedicated to the recovery of their lost personhood, like there are respective advocates and laws for feeding the hungry and the humane treatment of the mentally handicapped. It seems inevitable that YM would eventually become involved with forensic craniofacial reconstruction, given her belief in God, her foundation sense of right and wrong, her anthropological/psychological fascination with people, and her unwavering need to secure justice for the most vulnerable individuals with which she becomes involved.

    To this point in Yoda's Mom's life history we have seen the progressive Re-lived, Minor and Cumulative Epiphanies that lead up to the Major Epiphany **[ME]** or ***the moment of her total, though inexplicable, certainty*** *or that **she tacitly*** was certain that she wanted and had to pursue the art and science of forensic craniofacial reconstruction.

This next part will show the regressive Re-lived, Minor, and Cumulative

Epiphanies that lead away from Yoda's Mom's realization of her Major

Epiphany. In other words, once she had her Major Epiphany the regressive

epiphanies explain her long journey to educate herself, both informally and

formally, about the process and techniques of forensic craniofacial reconstruction

of which she was then only tacitly aware.

> So it took me a long long time cause I didn't have the slightest idea of
> what. . . [they were doing] was called. It was '69 and I was 22 just
> before graduation. . .
> But all I can remember seeing is just these two people working in this lab
> and I didn't know who they were. . . back then we didn't have computers
> so we didn't have anything but uh newspaper archives and of
> course…working in the master's program, I still had access to the
> university library.
> So, looking . . .,and looking, trying to find something to describe what
> they were doing, what the process was, anything about it. And there was
> absolutely nothing. It was just bare blank *[regME].*

The above is a regressive Minor Epiphany *[regME]* for YM in that she was

aware of the existence of the phenomenon (forensic facial reconstruction) that

she could not name, performed by two people she did not know, using

unfamiliar techniques she could not describe and the problematic situation of

not being able to find explicit information about it even in a university's

library.

The next five statements by Yoda's Mom fall into the regressive

Cumulative Epiphany [regCE] category because they represent reactions to

informal self-taught learning experiences which have been going on for a long

time.

I found a few references to something obscure. Well, now I know what it was, but then I didn't know . . . after I found that first bit of information, it was like…OK. So I went and got a skull from a ceramics shop because I did a lot of ceramic stuff…So I reconstructed a face based on whatever limited information I had. To be honest, . . . it didn't have anything to do with charts. It didn't have anything to do with anything but anyway [regCE].

So I did that…it was like sculpting…I had taken . . . sculpting . . .through a realistic (i.e., works with the human figure as subject matter)…world famous sculptor . . . I took that in college [regCE].

And [because] I thought "I want to do this [forensic craniofacial reconstruction] . . ." even though I taught I was in [the] library, I mean every library I could find, to access something that would have to do with whatever they [B. P. Gatliff and Dr. C. Snow] were doing cause I still didn't know what it was [regCE].

And…so each time I found a little information about putting a face on a skull, which of course, was not called reconstruction then, I would get another [skull]…I went from ceramic skulls to finding, you know, better ceramic skulls that looked normal and human and getting them every time I saw something like that [regCE].

I maintained a working studio since getting out of college . . . wherever I was and I did art. But this [forensic craniofacial reconstruction] was something else…it was alien to me at the time cause I didn't know who these people [B. P. Gatliff and Dr. C. Snow] were. I did not know exactly what they were doing and no one could tell me what they were doing. Nobody knew anything about anything [reg CE].

Although YM had implicit knowledge about facial reconstruction, in

general, by way of her figurative sculpture educational training (which is half the

battle in a forensic facial reconstruction), being able to incorporate the explicit

knowledge of physical anthropology with the art made the whole process, to use

her wording, seem "alien" to her. The alienation that Yoda's Mom felt highlights

the implicit fact that the forensic craniofacial reconstruction process is a synthesis

between the art (2-D or 3-D) and science (physical anthropology) and the best

results (reasonable likeness of the John/Jane Doe) cannot be achieved by either art

or science alone.

> So it took a [while]…but every time I got a piece of information I would do another skull. So even though [my ProjectEDAN profile] says it [has] been 30 some-odd years it hasn't been like I've been working at this, because it's not a job. I still don't even know what I'm doing…I'm just getting better at it, but I didn't know what it was called. I didn't know who these people were.

> I am interpreting this next part of YM's regressive Cumulative Epiphanies

to be the turning point where her informal (self-taught implicit knowledge)

learning phase of the facial reconstruction process starts to become a more formal

(instructed explicit knowledge) phase.

> And it took me a long, long time until the 80s to discover that it was Betty Pat and Dr. Clyde Snow. And that what they had done was to develop the American Method of facial reconstruction . . . and luckily, in the 80s, there were computers [laugh]. . .

> Apple computers…Apples were used in schools. I was the computer teacher. I wrote a grant which gave us access to the highest. . . the Apple IIe. . . I taught basic HTML and we wrote graphics programs . . . not that I was great at any of it but, it doesn't take me long to learn anything…and I didn't have any choice. I was the gifted teacher and had to teach that sort of stuff, so I had to learn everything about it [reg CE].

> . . . So when I finally found out who they [Gatliff and Dr. Snow] were, I was able to, I got the process down. But I could not find the charts. And that took me a long time to find the Rhine Chart(s) . . . I don't know how they were hidden from me for so long but they were just not accessible to me. . . I knew there were tissue depths but somehow these didn't ever…pull up (on the computer) [reg CE].

The Rhine Chart(s) refers to the compiled collection by Rhine and

Campbell 1980; Rhine, Moore, and Weston 1982 on the average facial soft tissue

measurements by race and body type (emaciated, normal, or obese). Although the

Rhine Charts are most used, they are only one of several statistical guidelines for

forensic facial reconstructionists working three-dimensionally, to determine the

length to which their soft tissue depth markers should cut based on the sex, ethnic

affiliation, body build, and sometimes age of the John/Jane Doe.

In the following regressive Re-lived Epiphanies Yoda's Mom reflects in

detail on the pedagogical aspects of 3-D portion of her formal forensic

craniofacial reconstruction education in general (see page 85 of this study).

> And then I discovered Betty Pat was teaching classes.
> I do not remember how I found out that this lady, who I'd seen many years
> before, was actually teaching, of course, this was in the early 80s. I think
> she only started teaching in the early 80s. And I was determined to go to
> her classes. . . [reg CE].

In this section she experiences a regressive Minor Epiphany relative to

her expectations of finally receiving formal instruction from the person who

initially sparked her Major Epiphany about becoming involved in forensic

craniofacial reconstructions. It is understandable that someone like YM, who has

gone through a teacher education program and had actual classroom teaching

experience, would have preferred the more andragogical approach of being taught

as an adult as opposed to the pedagogical approach used for children.

As the above pages 113 to 114 of the study indicate, Yoda's Mom has

exhibited what (Knowles, 1980) regard as the basic assumptions about the

andragogic adult learners, which are: (1) [Her] self-concept moves from dependency to independency or self-directedness. For example, from the moment of Major Epiphany she has regressed toward becoming a forensic craniofacial reconstructionist by her own self-educative means in the face of difficult to find explicit data. (2) [She] accumulated a reservoir of experiences that was used as a basis on which to build learning. Like how she used her various experiences with using the library to do research, associating her previous sculpture training as having working similarities that facilitate facial reconstruction. (3) [Her] readiness to learn becomes increasingly associated with the developmental tasks of social roles. YM's Major Epiphany, prior to attending Betty Pat's class and her years of self-taught informal education, defined both her desire to obtain the social role of being a forensic craniofacial reconstructionist and her readiness to learn the formal developmental tasks associated with the role. (4) [Her] time and curricular perspectives change from postponed to immediacy of application and from subject-centeredness to performance-centeredness. This could be seen when YM states, "I do not remember how I found out that this lady, who I'd seen many years before, was actually teaching . . .and I was determined to go to her classes."

> So. . . I did attend Betty Pat's classes. And while I got to be very good friends with her, frankly the only thing I got out of that class was the [Rhine Charts]. And the only reason I stayed for the second week was because I had paid for it*[reg Re-lE]*.

> . . . She is not a teacher. She knows the [American Method] process…she knows it so well that there's no change. And she hasn't changed it since she started teaching it . And that's really wrong. I don't know what else to say about that **[reg ME].**

I just saw so many flaws in her methods of teaching. . . you pay your money, you go in, you do it this way, . . . you're going to do it exactly the same, you just follow right along. Everybody's came out looking the same.
How can that be? We all have the same skull in, the first class that was fine. Yeah there should be similarities, but there still should be differences. . . even then I knew that *[reg Re-lE]*.

You [meaning me, as the Investigator and as an Art Teacher] took her class so you understand exactly what I'm saying.

What YM is saying, and my experience was similar to hers, that Betty Pat Gatliff's introductory facial reconstruction class is designed for students with (1) no art making background (especially in sculpture), (2) student who have not been teachers themselves, and (3) students who are not really serious about becoming forensic craniofacial reconstructionists.

The second class was the advanced class in which you did have [16] different skulls . . . Everybody had a different skull because [there were] only. . . 16 skull! And they all looked the same! I.[thought], ***'Something's not right here in Georgia!*** [An expression of amazement].*'*

So all I did was stand back and start thinking, analyzing, first of all her [pedantic teaching] methods and, second of all [not] what should have be taught, but the lack of what was there. . . not that she knew her [the American facial reconstruction] method. She had been doing it so long. I mean, twice a year with doing the same skull. . . it's when I saw her do it the second time and it turned out to be. . . exactly [like] the first one, I thought 'OK, you know, there definitely is something that should be changed *[regME].*

I am interpreting Yoda's Mom's disappointment with her first formal facial reconstruction instruction to be the combined effect of two compounding reasons. The first being that Betty Pat Gatliff was not a *teacher* and had not considered her students' needs, in particular that she did not take into account where a given student might be along the pedagogic/andragogic instructional

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continuum as it relates to forensic craniofacial reconstruction. In other words, she

did not use a differentiated delivery of her curriculum in order to better serve her

students' needs. According to Tyler, a student's need is "when the information

about the learner is compared with some desirable standard, some conception of

acceptable norms, so that the difference between the present condition of the

learner and the acceptable norm can be identified. This difference or gap is what

is generally referred to as a need" (Tyler, 1949, p. 6). In Yoda's Mom's case this

was more a matter of the absence of a differentiated delivery of the curriculum

content than the potential growth from the curricular objectives.

   The second reason, compounded with the first, concerns from her point of

view the apparent lack of demonstrable change in behavioral growth from the

beginning class instruction to the nonexistent differentiated instruction in the

advanced class, which produced essentially the same resulting likenesses from

different skulls. This is problematic in that anthropologically no two human

skulls, to include identical twins, are exactly alike. Therefore, it is understandable

why YM felt that there was something lacking in Gatliff's instruction. She also

made the following [reg CE] observations:

> Inherently [facial reconstruction] is a flawed system to begin with because
> it's based on just a tiny number of individuals to begin with for its
> [statistically explicit anthropological soft tissue marker data
> measurements].

> In Manhein at the Face Lab and Caroline Wilkerson at Manchester use
> lasers to do a larger sampling. And there were only…a couple of
> millimeters of difference in things [soft tissue depth measurements], so
> Rhine really holds true. But, your statistical data when…you only got 45
> samples and you're basing a whole process on 45 samples that's not

enough to…quantify anything…So inherently it's a flawed basis on what we're doing facial reconstructions to begin with.

However, it doesn't really matter essentially because when you do the facial reconstruction, I was finding this out as I was going through Betty Pat's class, but…also going through Karen's 2-D class, which uses the same statistical basis and the same process that [is still flawed].

I was excited to take these classes because all of a sudden I realized that there was a lot more to forensic art than this sculpting business. There was a whole world out there…Carrie Parks was giving a class…for composites and she uses the grid system, a 4 by 6 [inch] grid. Like it's new. I mean, you know, the Renaissance people were using…grids, but hers are a 4 by 6 because it comes out even…

[I]t's wrong because it's flawed too because in a 4 by 6, a human skull is from 7 to 8 inches tall, not 6 inches…[S]o you know, some of the things that [Carrie Parks] is teaching are inherently wrong but it fits within her little world and it's very easy to do. You know a grid…So I took [Carrie's] class…I learned what I call 'Down and Dirty.' [The flawed but] Very fast [method of composite drawing]. Just like the American Method. If I'm in a hurry and don't have a lot of time…I use her method.

Interview Two: Yoda's Mom's Facial Reconstruction Process

Interview One has given the reader an insight into how YM's Epiphanies (Re-lived, Minor, and Cumulative) have influenced her comprehension of the Facial Reconstruction Process in terms of recollected significant experiential live moment (i.e., the subcategories of Epiphanies) that progressed up to and regressed away from the participant's Major Epiphany.

In this Interview, I present the reader with the Ways of Knowing Yoda's Mom is interpretively engaged in at the given moment. The types can either be Explicit, Implicit (which subdivides into Tacit leaning Implicit, or Explicit leaning Implicit), or Tacit. I need the reader to understand that Explicit and Tacit

problem negotiation are both respectively and simultaneously science and art oriented.

The negotiated interactions between and among the different Epiphanies and the various Ways of Knowing serve as the Agents that will provide an insight into the Complex Adaptive System of the Forensic Craniofacial Reconstruction process in general; a glimpse at the details of Yoda's Mom's facial reconstruction process in particular.

Interview Two was conducted in the 3-D classroom area of her studio previously described as a working sculpture area; there was no artwork on the white walls, just work stations and chairs. This room has windows along the length of its northern side which provides an even consist nature light during the day.

At this point, it is important for the reader to understand and keep in mind that they will not witness the entire three-dimensional facial reconstruction working process from beginning to end. The entire process using the American Method, which is the fastest of the three methods, could literally take from 12 to 18 hours to complete depending on the experience and sculpting skill of the reconstructionist. The allotted time for Interview Two was 90 minutes (Siedman, 1998, p. 13). So at best, given that time frame, I would only by able to present to the reader 13% of the entire process which would leave the reader with an alphanumeric description of an image that would not facially be recognizable as even humanoid.

That said, I present a brief outline of the five most representative steps of the beginning facial reconstruction process. First, the forensic artist, in the absence of a postmortem report from a physical anthropologist on the ante-mortem condition of John/Jane Doe, would begin by making non-scientific physical anthropologically based observations and/or measurements to determine the sex, ethnic affiliation, and age of the skull. In an actual forensic craniofacial reconstruction case the physical anthropological information about the John/Jane Doe, in terms of the sex, ethnic affiliation, age and body build at the time of death would have been provided in a written report.

Second, the measuring of the width of the nasal aperture and the length of the external nasal spine to respectively confirm the John/Jane Doe's ethnic affiliation and to determine the forward most projection of the nose. Third, the participant begins positioning, placement, and alignment of the eyes into their respective orbits. Fourth, the measuring, cutting, and attachment of the soft tissue depth markers onto the cast plaster skull I provided for this study. The soft tissue depth markers represent the thickness of the flesh from the bones of the face to the outer surface of the skin. The various lengths of the 21 markers are based anthropologically on the above mentioned Rhine Charts; the John/Jane Doe's body builds that are interpreted to be emaciated, average, or obese. Fifth, the participant begins the initial application of the clay relative to the soft tissue depth markers.

I need the reader to understand that although my individual participants' beginning working routine will accomplish the same goals mentioned above, they will not exactly follow the steps as I have just outlined above; they will all eventually go through these initial steps at some time during the beginning of the facial reconstruction process. In other words the reader needs take into account that because my participants are not beginners but experienced forensic artists they have developed idiosyncrasies in their working procedures and terminologies.

I now guide the reader through the facial reconstruction process as it was experienced by YM. The reader must keep in mind that my descriptions of YM's exhibited physical behaviors (with or without verbal comments on her part) will be my evidence for the interpretations I give for the Type of Knowledge (Tacit, Implicit, or Explicit) she is using to negotiate the problem at hand. For example, a silent physical flow of effortless behaviors while performing any given reconstruction task is an indication of a high level of tacit knowledge at work. In the personal engagement of anyone's tacit knowledge the behaviors are internalized and taken for granted by its performer such that it never approaches conscious awareness in verbal form. An example of the exact opposite of what I just said would be if someone provided a running verbal and/or mathematical commentary on how you are able to walk from point A to point B in your own home. Whereas mime-like physical behaviors (e.g., gestures that suggest words, like pointing) without an actual verbal comment are indicative of Implicit manifestation of a Tacit Knowledge problem negotiating process. On the other

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hand the same mime-like gestures with verbal comments (whether intelligible or not) are more closely associated with Explicit Knowledge in terms of dealing with a given problem. Although the above mentioned mime-like physical behavioral/gestures can be associated with either Tacit Knowledge or Explicit Knowledge, based on the respective absence or presence of verbal commentary they are to be considered by the reader general displays of Implicit Knowledge. Obviously, any explanation, negotiation, and/or resolution of a given problem that is primarily accomplished by using the symbolic means of spoken words, text, and/or numbers are indicative of an Explicit Knowledge thought process and problem negotiation.

Focusing on the area of Implicit Knowledge revealed in a Tacit-Explicit Knowledge Venn diagram (see Figure 4.2, page 102), I want the reader to re-visualize, respectively, a meandering border between Tacit and Implicit Knowledge (Tacit leaning Implicit Knowledge, T\IK) as well as the border between Implicit and Explicit Knowledge (Explicit leaning Implicit Knowledge, E\IK). The following interpretative labels (from pages 85 and 86) will be used to distinguish the different Ways of Knowing my participants are using at the time they are negotiating a given facial reconstruction problem. These labels will be bold text **[TK]** to represent Tacit Knowledge and are analogous to a Major Epiphany, Implicit Knowledge, which I am interpreting as being both Cumulative and Minor Epiphanies and label respectively by the plain text label [T\IK] when there is at least a physical gesture used to articulate a tacitly comprehended

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Implicit solution; I am using italicized bold text *[E\IK]* to represent at least a metaphorical communications of explicit knowledge. In other words, there is a communicative continuum across Implicit Ways of Knowing from Tacit leaning Implicit Knowledge [T\IK] to Explicit leaning Implicit Knowledge *[E\IK]*. The plain italicized text label *[EK]* will be used for examples of Explicit Knowledge.

My reasoning as to why Cumulative and Minor Epiphanies can both be analogous to Implicit Knowledge is because of the functional relationship *between*, "[the] . . . eruptions or reactions to experiences which have been going on for a long time" and "[the symbolic presentations of] major problematic moment in a . . . person's life" (Denzin, 1989b, p. 71) that moves like a mobius strip conveyer belt around **a Cumulative/Minor Epiphany Path** with one Epiphany turning into the other and back again. This is what I have previously called *a momentary experiential certainty* (see page 84 of this study). For example, Implicit Knowledge that is driven by a Cumulative Epiphany eruption/reaction would be when a person spontaneously stands up against a persistent pattern of injustice. An example of Implicit Knowledge in the form of a Minor Epiphany as a problematic moment in a person's life is when that individual takes a moral stand, from which s/he will not benefit, in the face of the popular momentum. The difference as to whether one's comprehension is considered Tacit-Implicit or Implicit-Explicit knowledge depends on how well one is able to communicate explicitly their Implicit form of momentary experiential certainty.

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For Interview Two we have moved from the 2-D studio where Interview One took place into the 3-D studio. The interview begins with the plaster skull I provided for this study, mounted on YM's sculpting stand while she quietly appeared to just be staring at it. She was in fact making some preliminary physical anthropologically based visual determination as to the sex of the skull. In other words, she was making those non-scientific observations previously mentioned earlier in this study.

YM observes verbally,

There are certain things, obviously, that tell me he is most likely to be male. He has an extremely well developed mastoid (indicated by touching the area), his nuchal bone (also indicated by touching the are) back here is indicative of a male because it is much bigger than a female*…[E\IK].*

[E]ven though you can't see it (touching her own jaw to illustrate) a female has a very rounded little jaw. His is very sharp back here (touching the back edge of the mandible) on the skull to indicate where she is talking about [T\IK].

The orbital bones up here are rounded (touching the upper under side of the eye socket); in females they are very sharp, you actually cut yourself on them practically [T\IK].

Across the superior part of his eyebrows there is a bone [running her finger across the part of the skull just above both eye sockets, showing the heavier brow ridge] that all males have. He has a zygomatic process [the extension of the cheek bone that runs along both sides of the skull] that goes past and just above his external auditory meatus which is the opening for ear, which again is an indicator of a male. I think he's male *[E\IK].*

My interpretations of YM's comments above are as experiential certainties based on comparative observations between male and female skulls and not on explicit scientific measurements, making these determinations implicit in nature.

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Traditionally the skull is the single most studied bone in physical anthropology. . .Equally traditional, the sexing of skulls has been based on an anatomical (osteological) basis, so that descriptive features (traits) have ruled, rather than dimensions (size, proportions) (Krogman, 1973, p. 114).

YM's first reconstructive observations about the skull were scientific in nature, in that she was looking for physical anthropological evidence and using statistical based measurement to confirm the skull's sex, ethnic affiliation, and age at the time of death. During this process YM makes implicit comments about the physical anthropological evidence she found and at times accompanied her comment by touching the skull to tactilely confirm her verbal comments.

In an actual forensic craniofacial reconstruction case, before a forensic artist would even consider starting a reconstruction, s/he would expect to be given a written report from a physical anthropologist, although all investigative reports pertaining to the John/Jane Doe that can be legally made available to the forensic artist are helpful. These reports give explicit anthropological information about the sex, ethnic affiliation, and age of the skull.

We strongly suggest that artist do not attempt the [facial reconstruction] process without the proper input from science professionals. Similarly, we believe that scientist without artistic talents greatly reduce the odds of obtaining effective results when they attempt reconstructions without an artist's assistance (Taylor, 2001, p. 341).

Next, she measures the width of the nasal aperture as anthropological evidence for the ethnic affiliation of the skull. I am interpreting the next six somewhat hard to follow self-talk verbalizations on YM's part as an attempt to make at least more implicit, her tacit knowledge problem-negotiation thought

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process, which she was unable to clearly articulate. Talking aloud, to the skull or

at times to herself during this process, she said:

> Let's see now wide [meaning the nasal aperture]…Ok, he's like 30…31, 31 millimeters. [Talking to the skull she asks] Are you 31millimeters [T\IK].

Krogman, 1973, p. 190; Wilkinson, 2004, p. 130 both confirm that measuring the

width of the nasal aperture at its widest part is an explicit anthropological way to

determine ethnic affiliation. Caucasians statistically have nasal apertures that are

narrower at their widest parts as compared to Blacks, Asian and Native

Americans.

> And spinal [referring to the external nasal spine, of which three times its length is used to estimate the forward projection of the nose out from the face]…all right I'm gonna go with 8 [millimeters]."I'm not gonna go with 9 [millimeters] that I might have gone with. So it's an 8. Um…so….if we have …it's an eight …uh…I don't…he has this long, I'd say Caucasian…this the spine, spinal bone up here, uh is, uh nasal bone is, is , is long. If he were, uh, African-derived this [the nasal spine] would be, uh no, a little shorter. It would be, the whole face would be flatter if he were, Asian, and of course the projection of the mouth area if he were African-derived so I'm, I'm gonna say, if I had to guess…estimate, I don't guess…uh, he would be a Caucasian male [T\IK].
>
> His nose [speaking to herself] is not gonna be that long, it's just gonna be just, just nothing for him for him a normal projection. We'll see. Although, [speaking to the skull] you have a wide, wide aperture. So we'll see what it is? What'd I say? Eight [millimeters]?
> Let's just see [counting looking at the ruler] 10, 20, 24. Say right about there. That's about right actually. I have not too bad notes.
>
> And the reason I do that is because even though if he's a Caucasian male, he'll have uh, he'll have a nasal uh, uh the whatever it is, marker that will be 10 millimeters, but that would have to fit back into his nasal and we don't have room for, I don't even think I have room for a 10.

Well just about on the tip there. So that plus the 24, 10, 20, 24 if we get it all the way back, that would be just like about his little nose tip of it would probably curve around. So we'll, we'll see.

But that's an awful wide aperture. We'll see.

His features, he just does not have uh Asian features, he just does not have, uh the projection here that tells me that he is not African derived. So it's [meaning the skull] Caucasian. We'll see [she says laughing].

Age wise…he's not old enough for these uh, sutures [meaning the immovable joints of the skull] to have filled in." [That is to say, the older one gets the more their cranial sutures fuse together]. Uh…mmm, it's…and they don't start usually doing that until the age of 60, so I would say anywhere from maybe 35 to 55 maybe a 20 year span [T\IK].

Based on both her respective physical anthropologically influenced nonscientific observations and measurements YM determined that the skull belonged to a Caucasian male who was 55 years of age according to the skull's sutures at the time of his death. Because John Doe has been previously identified I was able to confirm the accuracy of YM's observations. As she mentioned above her observations were to be considered estimates and that:

That's something [what she means is for a more accurate determination of age] you're gonna have to. . . have a forensic. . . you know. . . a physical anthropologist or a medical examiner would already have given me those notes . . . this is just random estimations of what I'm looking at here *[E/IK].*

Given that YM was not very articulate about what she obviously knows and understands about taking measurements to determine the ethnic affiliation and the projection of the nose, this argues in favor of that particular knowledge being maintained tacitly. As the following verbatim statements by YM will show, her knowledge of the pre-reconstruction procedures she is engaged in, determining

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the placement of the eyes in their orbits, are held in her mind tacitly, not explicitly. This is made evident by the absence of a consistently smooth articulation of what she knows. YM begins talking about the placement of John Doe's eyes.

> Uh I can you know, you could see his eyes are going to slant down droop rather than be straight across. You see where someone with casts tell where the attachments are going to be, but he has a nice one here where the muscles attach and he, I won't say have a big droop but he might have a small one [T\IK].

> First of all, you just, just by looking at him [meaning the skull], his eyes, his eyeball have to fit within a certain orbit. Uh, and there are nerves coming there, so he I would say kind of at a, an angle like this. I could be totally wrong but that's the way we're gonna go cuz [talking to the skull now] you kinda look like a person who may have a uh [T\IK].

Then in the next sentence she started talking about the lips and the difficulty in determining what they will look like because of the difference in tooth length between his few maintaining natural teeth in the mandible and his upper plate denture. She talks on for seven more sentences about the measurement she got and the potential size of his lips based on those measurements. Then back to the eyes again she says:

> I prefer to put in eyes and the one thing I do instead of going ahead with markers (meaning the soft tissue depth markers) is to get my eyes out of the way because I already know where they go. . . I know that the eyeball touches three sides of our orbit. Not in the middle . . . it's more toward the [outer]edge than it is perfectly in the middle, which is what most you're taught to do, to strive for anyway.[T\IK].

> . . . Physiologically, or anthropologically it's it's it sets where it meets actually these orbital rims, that's, and even if you're in fine arts' you'll tell uh the students will see that that's what forms this, this eye shadow in the inner corner of the eye *[EK]*.

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As she is physically placing the right prosthetic eye into its orbit, she

speaks first coherently and then simultaneously and incoherently to me, but

mostly to herself, and skull and then back again coherently to me.

> . . . .you have to find the widest part of the eye [orbit] and yes that is
> where your eyeball is going to go [T\IK].

> Come on now . . . and it's not really going to be . . . do the other side. It's
> going to project . . . something like this . . . it's going to come out and
> meet my . . . let me put it a little more behind . . .now, come on now
> behave . . .here we go . . . yup. that's so much better . . .and I 'm going to .
> . .right there . . . not too far out . . . it's going to come to where it meets . . .
> just click on that, because it is on a . . . muscle all the way around . . . a
> little bit [T\IK].

> I don't really care what I use as a tool as it's working, it works. Ok. Let's
> anchor them [meaning the eyes] in a minute. Let's see if we can straighten
> you back up again. And first and foremost is that [speaking to the skull]
> are you looking at me ? If not looking at me, you will in a minute. Here
> we go [measuring]. It's a little bit off. There you go. Ok [T\IK].

I interpret this coherent/incoherent talk to be an inductive example of ***a***

fundamental compulsion toward potential communication or Tacit leaning

Implicit Knowledge (i.e., the meandering border area between Tacit and Implicit

Knowledge (see page 101 of this study).

The following data collected from Yoda's Mom is relevant to the further

understanding of how ubiquitous the art/science relationship is to the initial

forensic craniofacial reconstruction process as it aligns with the Grounded Theory

in this study for the following three reasons: First, although the lengths of the soft

tissue depth markers and the precisely named points where they are to be attached

to the skull are explicitly, anthropologically, and scientifically determined, the

actual locating of a give spot of physical attachment for the markers can only seem be located by a combined qualitative visual-touch process. Especially in the case of finding the attachment location of soft tissue depth marker number one. This combined visual-touch process is a Tacit leaning Implicit way of knowing that can be described as a Cumulative Epiphany. Second, notwithstanding that no two human skulls are alike, when there is an anomaly with a skull (e.g., dentures, tooth and/or bone loss, etc.) the solution has to be multistablized in the art and the science of the facial reconstruction process. Third, the art/science relationship in Forensic Craniofacial Reconstruction when seen in terms of being a two agent complex adaptive system with the simple rule of creating the best possible reasonable likeness of John/Jane Doe involves the Right Effort being made whether it is artistically or scientifically.

YM now goes on to positioning and attaching the soft tissue depth markers. Although YM attached most of the markers on the entire skull, in terms of the actual reconstruction she was only able to complete the upper half of the mask portion of the face minus the nose. Using a set of ethnic and body build appropriate, pre-cut soft tissue depth markers that were commercially packaged by one of her former students, she comments:

> The measurements [the lengths of the individual markers] (a slight pause, and showing a resigned facial expression with an accompanying hand wave gesture) are more or less correct [EK]. . . So I am going to place [marker] number one and [it] goes where the skull starts to turn backward [T\IK].

And how do you determine that?

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Well, for me, by visualization. You just, you know, have to turn it [the skull either left or right] to see where the curve starts, and because we have a sloping [forehead] here, uh, it's just, its right on these, where these two prominences [the Frontal Eminences] are [T\IK].

I can see . . . you're doing that by touch, but how do you know exactly

where that point is from touching it?

Because you can feel [tactily] that curve start to go back [T\IK] **even, if you closed your eyes you could still feel it [TK]**.

So, if I can ask, without putting words in your mouth, are you doing it

heuristically as opposed to algorithmically

Exactly! It is essentially right across . . . from these two [Frontal Eminences] in this approximate area and I can't say it's exactly uh, you know four millimeters up or down, It could be off, you know, by a little bit [T\IK].

 . . It cannot be exact, I don't care if you go by these [meaning the Rhine] charts or the Manhiem's charts or Caroline Wilkerson's charts, . . . these are approximations [T\IK].

We know where they [the markers] go but if we get to the [exact] millimeter, we can't determine that [TK]. We just have to make the best attempt that you can . . . you always try to get as close to where they [the charts] tell you it is [T\IK].

I'm going to [place marker number one] right between these two prominent features [the Frontal Eminences] because that is where [the] number 11 makers [are]going to go. Number one is going to go on what I'm saying is his hairline [the Supraglabella] *[E\IK]*.

I'm gonna . . . follow [an imaginary] line straight down the middle [of the skull]. . . almost between the eyes on the [the Glabella] which is between the Supraorbital brow ridge. It is where [marker] number two is going to go.[Marker] number four goes right on the end of the nasal bone *[E\IK]*.

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Because John Doe wore an upper set of dentures, it caused YM to debate with herself, verbally, where to attach marker number five, given that its placement will affect the projection of the nose as well as the attachment of markers six and seven, on the upper and lower gumlines, which determine the mouth and depth of the lips. There are no explicit instructions or direction as to how a forensic artist should handle situations like this that sometimes arise, making this a Tacit leaning Implicit Knowledge problem negotiating situation.

> Um, number five, this is the one that goes under [the] nasal spine. It should be halfway between where the teeth are and here at the end of it [the gumline]. . . [where] it actually goes . . . but since he [has dentures] there we have to make some adjustments. That I don't like . . . [T\IK].

> Uh, cuz that's actually where it [number five] goes. . . so I'm gonna have to compromise and figure out something to do, so I'm gonna put it halfway. I have no other choice but to put it [there] because what it can't do is interfere with where we're gonna put the projection [of the nose based on the length of the nasal spine] I clay. Um . . . it's not ideal but it's going to have to do **[E\IK]**.

> That runs into a problem with number six . . . so we'll skip six and seven. Uh and then we have number eight, which goes, there [the chin-lip fold] in that middle little groove.

> What am I putting on here? I'm missing [number] nine. Oh well, I'll just put ten on there because I have it here.[Marker 9 was momentarily overlooked, found and attached].

As the reader can see, the data above are relevant because it aligns with Tacit leaning Implicit Knowledge, Cumulative Epiphanies and the Right Effort, which provides inductive evidence for the Grounded Theory in this study.

Next Yoda's Mom begins the application of clay to the skull with the soft tissue depth markers serving, respectively, as guides for the thickness of the clay

to be applied at a given point on the skull and as an algorithmic application

procedure by following the numbers. YM commented as she worked and for

clarity her nonverbal physical actions will be presented in brackets [i.e., YM's

actions] and her Silent Pauses will be identified by parentheses with three periods

between them (. . .). She states:

> I have my measurements, I have my markers on [as she sight measures
> with a strip of clay laid on the forehead of the skull between markers 1 &
> 2] and I'm simply going to (. . .) start to (. . .) [she puts the strip in
> place] do the clay.

> I'm not going to be really [she, sight measures the piece between markers
> 2 and 3] careful about it. It's a matter of placement [she, cuts that section
> of clay for the space between markers 2 & 3 and tries to put it in place but
> the piece does not fit].

> [she adjusts the size] I cut a notch because I don't really want to put a lot
> of stress on the skull. [she, tightens the mounting screw at the base of the
> skull, (. . .) she sight measures and cuts the piece for the space between
> markers 3 & 4, places it, it doesn't fit, cuts a notch and attaches the clay].

> [she sight measures and cuts clay for the space between markers 1 and 11]
> I don't think it's important what someone does here, whether I go from 1
> to 2, 2 to 3, 3 to 4 all the way through 10 or whether I backup and just fit
> (and attach the clay) from marker (. . .) to marker (. . .), (. . .), (. . .).
> It generally works its way (. . .) to even out in the end.

> If I can ask, without putting words in your mouth, you are doing it

heuristically as opposed to algorithmically.

> Exactly.

> It is really not, . . . a question of whether (. . .) It looks pretty. And were I
> doing it [this reconstruction] for a book, or in your case it is a camera
> going, you're not interested in it being pretty, you're more interested in
> how it's done.

This procedure of cutting and fitting sections of clay between all of the numbered soft tissue depth markers is basically how this part of the process is done. As Yoda's Mom commented, that part of the Facial Reconstruction process is equivalent to a housekeeping task at the least and like preparing the foundation for a structure above it.

Interview Three: Yoda's Mom's Reflections

According to Seidman (1998), the purpose of Interview Three is to:

> address the intellectual and emotional connections between the
> participants' work and life. . . [requiring] the participants [to] look at how
> the factors of their lives interacted to bring them to their present situation
> (p. 12).

Because of the failure on my part to "maintain the delicate balance of providing enough openness for the participant to tell their stories and enough focus to allow the interview structure to work [relative to Interview Three]" (Seidman, 1998, p.12), my error was in providing too open of an opportunity for this participant, in particular, to tell her story given the 90 minutes per interview time constraint. Although some details of the intellectual and emotional meaning Yoda's Mom made of her work may have been lost, a portion of these data can be gleaned from Interviews One and Two. By an examination of the Ways of Knowing YM engaged in, her Epiphanies, and the negotiation between and among the Complex Adaptive Systems Agents of the Right (Action, and Livelihood) I can regain a part of the Interview Three Reflections data.

First intellectually, the particular Ways of Knowing she was engaged in were either Implicit (which can be either Tacit leaning or Explicit leaning) or Explicit. An example, in Interview One, of the intellectual meaning she made of her work and life experiences as a forensic artist was when she talked about ***her physical fascination with people*** and her determination that Roger the high school football player looked anthropologically like a Neanderthal (page 127). This was an Explicit leaning Implicit type of knowledge. Her determination was probably based on explicit images, anthropological artifact and/or text descriptions of what Neanderthals most likely looked like, from which Yoda's Mom intellectually concluded that Roger's physical appearance was remarkably similar. Another example was her continuing educational inquiry into ***her psychological fascination with people*** represented by her thesis research into the Normal and Abnormal Behavior of Mentally Handicapped People (page 131) as an instance of an Explicit Type of Knowledge because the research data was explicitly codified as text. Still another example was the intellectual search for her missing piece of the facial reconstruction process puzzle, which was the Rhine Chart (page 136). I interpreted that to be a Tacit leaning Implicit type of knowledge because the Rhine Chart represents a scientifically determined list of soft tissue depth marker lengths and their placements that must be applied to the skull using ***a multistable art/science sensibility***. In other words, *intellectually, **although data are scientifically derived, it does not necessarily follow that these data should, must, or can be scientifically applied in practice.*** An analogous

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example of that would be if technological upgrades in education, for instance access to the latest computers, was only made available to mathematics and sciences classes.

Second, the Epiphanies she had that contributed to the emotional meanings she made of her experiences were Cumulative, Minor, or Relived. For example, when she talked about coming to *the realization that Betty Pat Gatliff was not a teacher* and that *there were flaws in her teaching method* (pages 137-138). This was a Minor regressive Epiphany for Yoda's Mom because it was "a major problematic moment in the [student/teacher] relationship" (Denzin, 1989b, p. 71) she was having with Betty Pat at that time. Another example would be when Yoda's Mom stated *"it's the justice serving justice situation that pops up in almost everything I do. . . you know, that's just the way I'm. And that explains most of why I do what I do"* (page 131). I interpret this to be a Relived progressive Epiphany in that "Its meaning is given in the re-living of the experience" (Denzin, 1989b, p. 71).

Third, the Complex Adaptive Systems Agents (the Right Livelihood, the Right Action, and the Right Effort) are associated with my participant's intellectual and emotional reflective meaning about their work as a forensic artists for two reasons. One, because of their respective connections to the Epiphanies (Re-lived and Minor) and (Explicit and Explicit leaning) Ways of Knowing; two, because of their functional interactive nature within the complex system they share, which is to negotiate the best possible benefits to itself as agent within that

system. This is an unemotional pragmatic process. An example of the Right Livelihood is that after Yoda's Mom had her Major Epiphany she understood that to find out "Who those two people in the news clip were, What they were doing and What the process of what they were doing" was called for, an intellectual pursuit of the Explicit Knowledge would be necessary for her to achieve her three wants "That's what *I want to do*, That's what *I want to be*, *I want to be whatever they're doing*" (see page 131 of this study).

To work toward the Right Livelihood she had to ethically negotiate the appropriate equilibrium of benefits to the following agents (her teaching, her family, and the unyielding pursuit of her life changing Epiphany) within the Complex System of her life. This segues into the Right Action agent that captures the intellectual/emotional reflective meaning for this participant because of its connection to Explicit leaning Implicit Knowledge; its natural drive toward Ethical behavior. An example of this is when YM realized to ethically continue to teach her Special Education Students she needed to better understand Abnormal Psychology. Therefore her thesis was the Normal and Abnormal Behavior of Mentally Handicapped People, because there was no research done on it. "What was normal for them was not perceived as normal by the [general] population. So, [she] had to find what was normal for them and what became abnormal based on a true judging society . . . to justify what behavior was normal for her students" (see page 131 of this study). The above is simultaneously emotional and ethical.

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The Right Effort agent reveals the more emotional reflections of this participant because it is associated with Cumulative Epiphanies and Tacit leaning Implicit Knowledge; its nature to seek the appropriate mental development especially when that required my participant to make choices she did not like, which is emotional. For example, when YM continued to stay through the Advanced Facial Reconstruction class after she realized that Betty Pat Gatliff did not prove to be the teacher she had expected. In other words, a teacher that understands the necessity for differentiated instruction, which was confirmed by the counter-intuitive results that all of the reconstructions looked like in Advanced Facial Reconstruction class where there 16 different skulls were represented (see page138 of this study).

In Interview Two, intellectually, the Ways of Knowing Yoda's Mom engaged in was primarily Implicit Knowledge subcategorized into Tacit leaning and Explicit leaning Implicit Knowledge. An example of the intellectual meaning YM made of her Facial Reconstruction experience was when she talked about her anthropological observations relative to identifying male characteristics on the skull in terms of the "well developed mastoid process, the noticeably large nuchal bone on the back of the skull, and the prominent brow ridge (page 146). Another example is when Yoda's Mom talked about the physiological or anthropological bases for how the eye sets in its orbit touching the three sides toward the outer edge and not in the middle (page 150). I interpret both of the above examples to be Explicit leaning forms of Implicit Knowledge because although the

characteristics of the male attribute and the positioning of the eyes in their orbit are explicitly based on codified statistical normality, they do not hold true, in that no two human skull are exactly alike and margins of error have to be physically accounted for in a Facial Reconstruction.

Cumulative and Minor Epiphanies account for the more emotional meaning YM made about her Facial Reconstruction experience. I need the reader to understand that I am defining emotional to mean any decision or judgement that is not totally based on objective reasoning. Cumulative and Minor Epiphanies have what I previously mentioned (page 145) a functional relationship that moves like a mobius strip conveyer belt with one Epiphany turning into the other and back again. An example is when she describes how to find the best possible position for soft tissue depth marker number one as a heuristic process which relies more on the sense of touch than on explicit scientific measurements, but this act does not make the explicit measurements irrelevant (page 153). Another example is when she commented that "we know where they [the soft tissue depth markers] go [algorithmically] but if we get [them] to the exact millimeter, we can't determine that" (page 153). In other words, this is an algor-heuristic process.

This is what I gleaned from the data of Interview Two when I looked for the meaning Yoda's Mom made of her intellectual and emotional reflections about her work as a forensic artist by way of the Complex Adaptive Systems Agents of the Right Livelihood and the Right Action.

Analysis of Interview One

From this first of a series of three interviews with Yoda's Mom the following data was obtained. She had 12 progressive Re-lived Epiphanies leading up to her Major Epiphany (see page 131). Yoda's Mom's experienced 5 Minor Epiphanies (1 progressive and 4 regressive) and 12 Cumulative Epiphanies, the 3 progressive and 9 regressive (see Table 1).The Sub-Categories of a Major Epiphany (Re-lived, Minor, and Cumulative) are both progressive and regressive relative to it.

Table 1

Re-lived	Minor		Cumulative	
progressive	progressive	regressive	progressive	regressive
Moral Upbringing and the importance of Education; Parent feed the hungry; Sacrifice for the betterment of Humanity important growing up; Championing of Children; Service beyond oneself. (p.125)				
One outstanding belief in God (p.126).			I'm a Christian, I believe in God, but in organized way; Justice Prevails; Fascinates me to study people (p.126).	
Registrar, Special Education a Catch 22 for special education students (p.129)				

Championing Special Education Students (p.130); Justice serving justice (p.131).	ResearchThesis: The Normal and Abnormal Behaviors of Mentally Handicapped People (p.131).		
progressive	progressive	regressive	regressive
		The search for [FRC] data was just bare blank (p.133).	The search for FCR data obscure references, Had taken [human figure] sculpture classes in college, Every library I could find, to access something that would have to do with whatever they [Betty Pat and Dr. Snow] were doing, Self taught with ceramic skulls, Nobody knew anything about anything (p.134).
		She is not a teacher (p.137). I saw many flaws in her methods of teaching , The advanced class had 16 different skulls [for reconstruction] And the results were, they all looked the same. Something's not right here in Georgia (p.138).	Finding the Rhine Chart, Discovered the Betty Pat was teaching FCR classes (p.136).

Major Epiphany: There are things that happen in your life that just, you know, there it was. That was what I had been searching for and you just knew it whatever it happen to be [in her case Forensic Art]. I thought that not only is that fascinating but that's what I want to do. That's what I want to be. I want to be whatever they're doing (p.131)

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From Table 1 Yoda's Mom's life history, the following patterns and recurring themes emerge. Within her progressive Re-lived Epiphanies, the reader can see two sides of her personality the Affective (moral, religious) side and her Intellectual (pragmatic, justice prevails, physical and psychological fascination with people) side.

Yoda's Mom's Minor (progressive and regressive) Epiphanies showed how serious she is about the educational process from preparing to teach others. On the one hand what she knew to be her obligation to her students as a teacher in terms of further educating herself relative to the true expected normal and abnormal behaviors they would exhibit; on the other hand, her frustrated unmet expectations as a student of Betty Pat's and her ingrained sense of justice she felt that would have compelled any teacher to do for his/her students.

The regressive Cumulative Epiphanies reconfirms for the reader her intellectual sides by showing the reader just how determined she was over a 20 year time period to become a forensic artist.

Analysis of Interview Two

From this second of a series of three interviews with Yoda's Mom the following data was obtained. She had 8 episodes of Implicit Knowledge broken down by its sub-categories of which were 6 Tacit leaning and 2 were Explicit leaning. She also exhibited two episodes of Tacit Knowledge (see Table 2).

The Sub-Categories of the Ways of Knowing

Table 2

Explicit (Re-lived)	Implicit (Tacit leaning & Explicit leaning)	Tacit (Major)
	. . . Most likely to be male because of the well developed mastoid and large nuchal bone, brow ridge and the zygomatic process that goes pass the external audio meatus [E\IK] (p. 146).	
	Touching to illustrate the sharp back edge of the mandible; the rounded upper under side of the orbital rim of the eye [T\IK] (p.146).	
	Measuring the Nasal Aperture [T\IK] (p. 148).	
	Measuring the External Nasal Spine [T\IK]; Age wise he's not old enough for these [carnio] sutures to have filled in . . . and they don't start . . . doing that until the age of 60, so I would say [he's] anywhere from maybe 35 to 55 years old [T\IK] (p.149).	
	I prefer to put in the eyes [now] because I already know where they go . . . the eyeball touches three sides of our orbit. . . more toward the [outer] edge than perfectly in the middle.[T\IK] (p.150); Physiologically or anthropologically [the eyeball] sets where it actually meets the	

	three orbital rims [T\IK] (p.150); . . . .You have to find the widest part of the eye [orbit] . . .that is where the eyeball is going to go [T\IK]; . . .first and foremost . . .are you [speaking to the skull] looking at me?[T\IK] If not you will be in a minute [measuring]. It's a little bit off. There you go. Ok. [T\IK] (p.151).	
	. . . I am going to place [marker] number one and [it] goes where the skull starts to turn backward (152). By visualization, you turn [the skull either left are right] to see where the curve starts, because we have a sloping [forehead] here. . . you can feel where that curve starts to go back [T\IK] (p. 153).	Even, if you closed your eye s you could still feel it [TK]; We know where [the markers] go but if we get it to the [exact] millimeter, we can't determine that [TK] (p.153).

Table 2 (continued)

From Table 2, Yoda's Mom's Facial Reconstruction process, the following patterns and recurring themes emerge. The Ways of Knowing used by Yoda's Mom while engaged in the facial reconstruction process were either Implicit or Tacit with the lion's share going toward Implicit in general and Tacit leaning Implicit in particular. By implicit I mean her explanations lacked the clean precision of an explicit explanation. Phrases that voice an uncertainty, no matter how slight, like "mostly likely to be" or "anywhere from maybe 35 to 55."

The Tacit ways of knowing exhibits the multistable characteristic of having two stable states of being that oscillate back and forth. For instance, when she talked about finding the placement for tissue depth marker number one, in that it can be made visually stable by viewing the skull laterally from the left or right

or it could be made stable through your sense of touch. But it becomes a multistable when both are used at the same time. By this I mean, if you identified the point for tissue depth marker number one by finding it by touch and while your finger was still in place you turned the skull laterally left or right to visual identify and confirm the location and if you make even the slightest adjustment of your finger or eyes. I contend that a multistable condition has been created in that you could no longer say for certain that you know the markers location by sight or touch.

The Tacit leaning Implicit Knowledge manifested itself in terms of what can be called physical anthropological circumstantial evidence, meaning that as Yoda's Mom observed that the size of the mastoid, nuchal, and the brow ridge bones combined with the sharp back edge of the mandible, rounded upper eye orbital rims, and narrow nasal aperture collectively suggested a Caucasian male.

Analysis of Interview Three

As I mentioned above (see page 144) relative to Yoda's Mom I had failed to maintain the balance between providing openness for her to tell her story and the 90 minute time constraint for each given interview. Though some data of the intellectual and emotional meaning she made of her work as a Forensic artist may have been lost, I believe a portion of these data can be gleaned from Interviews One and Two. By an examination of the Ways of Knowing Yoda's Mom engaged in, her Epiphanies, and the negotiation between and among the Complex Adaptive

Systems Agents of the Right (Action, and Livelihood) I can regain a part of the

Interview Three data.

Interview Three: Reflections Data.

Table 3

Intellectual Meaning		Emotional Meaning	
Ways of Knowing (Interview One)		Epiphanies (Interview One)	
Implicit (Tacit leaning/Explicit leaning)	Explicit	Re-lived (Progressive)	Minor (Regressive)
Her physical fascination with people. Roger the high school football player looked anthropologically like a Neanderthal [E\IK] (p. 127).	Her psychological fascination with people. In her research thesis into the Normal and Abnormal Behavior of Mentally Handicapped People (p. 131).	". . . it's the justice serving justice situation that pops up in almost everything I do . . . that's just the way I'm. And that explains most of why I do what I do.	Her realization that Betty Pat Gatliff was not a teacher. I saw many flaws in her methods of teaching (p. 138).

As I asserted (on page 158) the Complex Adaptive System agents of the

Right Livelihood, Action, and Effort are all associated with Yoda's Mom's

intellectual and emotional reflective meaning of her work as a Forensic artist for

the following reasons. (1) Because of their respective connections to the Re-lived

and Minor Epiphanies and with the Ways of Knowing (Explicit and Explicit

leaning implicit); (2) because of their unemotional interactive pragmatic process

of negotiating the best possible benefits for themselves and by extension or

unintentionally to all of the other agents within their shared system.

Interview Three Data

Table 4

Intellectual and Emotional Meanings		
Complex Adaptive Systems Agents		
The Right Livelihood	The Right Action	The Right Effort
In order to obtain what she wanted after her Major Epiphany Yoda's Mom intellectually understood she had t find out "Who those two people in the news clip were, What they were doing, and What the process of what they were doing " was called, intellectual pursuit of the explicit knowledge would be necessary.	Yoda's Mom understands the ethical connection between the intellectual/emotional task you say, you are performing and the actual performance. Like teaching Special Education Students on an emotional level and really understand the difference between their normal and abnormal behaviors on an intellectual level.	To seek the appropriate intellectual frame of mind in the face of emotionally having to make choices between and among options you do not like. Like when Yoda's Mom stayed in the Advance Facial Reconstruction class despite the many flaws she saw in Betty Pat's teaching methods.

The Complex Adaptive System Agents in Table 3 represent only three of the eight Social System agents that Miller and Page (2007, p. 93) use to illustrate for the reader what the Noble Eightfold Path (NEP) conceptually looks like. Although it is not explicitly stated, I would contend that Yoda's Mom's ingrained sense of justice embodies compatible agents. As the three agents from Table 3 implied there is an underlying pragmatic-compassionate-ethical-integrity complex adaptive force at work here.

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CHAPTER SIX

Renaissance Man

The data from Renaissance Man is the second of three case studies that

provide further inductive evidence to support the conceptual exploration into a

Grounded Mutistable Theoretical Model for Curriculum and Instruction from the

perspective of the Tacit Knowledge Exhibit while Creating a Forensic

Craniofacial Reconstruction.

Although, Renaissance Man did volunteer to participant in this study, he

did not talk as freely about his life history as Yoda's Mom did. He was

less forthcoming compared to Yoda's Mom and even Tao Darma Man in the

following chapter about himself on a personal level.

Renaissance Man's (RM) data were collected in the forms of Artifacts

(i.e., his Curriculum Vitae, a article about him in his hometown newspaper, and

ProjectEDAN data) in lieu of the Questionnaire that he did not return, the face-to-

face interviews and direct observations. I was able to find sufficient Epiphany

related answers to the Questionnaire items, gleaned from the Artifacts about RM

combined with his responses in Interview One.

The Questionnaire Items

I summarize the Questionnaire items from page 80 of this study. When

and/or how did you become interested in doing forensic craniofacial

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reconstruction, what has been your training in art in general and forensic

craniofacial reconstruction in particular, What is your certification? How long

have you been doing forensic craniofacial reconstructions, How long have you

participated in ProjectEDAN, Do you prefer doing: 2-D or 3-D reconstructions,

Why, Which 3-D reconstruction method do you use: the American, the Russian,

or Manchester method, Why?, Do you approach your work as a Forensic

Craniofacial Reconstructionist primarily as an artist, physical anthropologist, or a

combination of the two? The last five questions suggested possible questions to

ask in Interview Two (the details of experience) when he was actually working on

a facial reconstruction.

His Epiphanies from Artifacts in lieu of the Questionnaire Items

To reiterate for the reader what the Epiphanies mean I quote (Denzin, 1989b).

> (1) the ***major event***, which touches every fabric of a person's life [the
> major epiphany]; (2) the ***cumulative*** or ***representative event***, which
> signifies eruptions or reactions to experiences which have been going on
> for a long period of time [the cumulative epiphany]; (3) the ***minor***
> ***epiphany***, which symbolically represents a major, problematic moment in
> a relationship or a person's life [the illuminative epiphany]; and (4) those
> episodes whose meanings are given in the ***reliving*** of the experience [the
> re-lived epiphany] (p. 71).

The data organization occurs in terms of the interpretive labeling for the

Epiphanies (see pages 85 and 86 of this study). This labeling will assist in the

interpretive organization of the data in chapter eight. The combination of Artifacts

and Interview One data revealed that Renaissance Man [RM] first became aware

of and interested in forensic art, as it relates to forensic craniofacial

reconstruction, in the year 1999.

> I was watching a TV show one night, one of those crimestopper shows
>
> [The New Detectives] that showed this lady in Texas was able to take a
>
> skull and uh do what we now know as Two-Dimensional Reconstruction.
>
> She could take the skull, photograph it, and was able to draw a likeness
>
> and solve the case and her name was Karen Taylor. You probably know
>
> [of] her…from Texas she worked . . . their version of the state police
>
> down there . . . And when I saw her do that night on TV.I said, '**Well, my**
>
> **God, I can do that [ME]!**
>
> I've been drawing portraits for 40 years [pro CE]**.**
>
> And here I'm sitting on my butt not doing anything. Why not offer my
> services? So…next day on the phone I'm calling up the local law
> enforcement people and uh…they'd never even heard the term forensic
> artist…I had to explain to them what it was [reg ME].
>
> Well, yeah we might be interested. You need to come down to the
> department and show us what you can do.
>
> So…we actually sat down and I drew out a composite off of the way this
> lady described this person to me, and it came pretty close . . . I didn't
> know anything about the relationship she had with him. It turned out to be
> her brother and uh in the photograph she showed me after I did the
> drawing was uncannily uh similar and it really excited me. I said 'Boy,
> you know, I could…really do this [reg CE].

RM realized there was a Tacit leaning Implicit relationship between doing

portraits for 40 years and his ability to do Composite drawings. But he implicitly

sensed there was a fundamental explicit difference, on a cognitive level, between

doing a Composite drawing, with which he experienced immediate success, and

the 2-D Facial Reconstruction drawing he witnessed Karen Taylor do on TV that

night. This prompted him to think:

> . . . Where do I go to get formal training. **Well there was no such thing in a university or a college** *[regME]*.

In response to the questionnaire item about educational training, either

formal or informal, in forensic art in general and forensic craniofacial

reconstruction in particular, the artifact of RM's 2000 Forensics Training

Curriculum Vitae provided the following regressive Re-lived Epiphanies data.

> …you had to go to a specialist like Karen Taylor. And uh people like Betty Pat, she and Karen worked together…Betty Pat does the clay and Karen does the drawings . . . [reg Re-lE].

> my very first…exposure to [forensic art] was before I got to Scottsdale that year…In February I found this lady named Lois Gibson in Houston…I sent her some photographs of some art work and she just got all really excited about that fact that I could do portraits and she thought it would be great so she really hosted me for like two days at the Houston Police Department. She has an office up on the 18th floor and they treat her like a queen. She's the first one to ever get on the police department as a full-time artist on the payroll. So I learned a lot from her just from that informal exposure for two days [reg Re-lE].

> . . . my first formal course was to take Karen's workshop [in Scottsdale] for two weeks which was in May of 2000. And it was a week of just basic forensic art. Her second week was…where you take the skull and pretty much photograph the skull after it has had [the Rhine Chart guided] tissue depth markers placed on it, and then you take this kind of paper, . . . Vellum, and make your drawing…with [a] graphite [pencil]. . . [reg Re-lE].

> [Informally] Then in March the next month I went to the Los Angeles Sheriff's Department and a gal by the name of Sandie Enslow showed me her work. I was there for about a half day…[reg Re-lE].

. . . [T]he very next month [in June, after Scottsdale] I went to Cleveland where Betty Pat taught her clay reconstruction. So I was there for two weeks [reg Re-lE].

[In] July, [I went to the] FBI Headquarters where they had cranio-facial IACI is the name of the group…International Association of Cranio-Facial Identification. They had a workshop on everything in forensics: blood-spatter, footprints, tool marks…fingerprints [reg Re-lE].

August, I went to Northern Idaho where Carrie and Stuart Parks have a school. They have a certification program. The next month in September I went to…where Lois [Gibson] taught a formal week at the Criminal Justice Center, at the University of Houston [reg Re-lE].

In October, I then went to…Wisconsin, where Rick and Carrie Parks taught advanced [compositeness] incorporating color composites, cognitive interviewing, signs of deception and memory]. And also in October of that year I went to Oakland County Sheriff's Department and met for a couple of days with a gal by the name of Barbara Martin. She'd been there like 35 years [reg Re-lE].

So that was my initial immersion into forensics, the artistic side of forensic full-time. In 2003, then, I got away from all that schooling for a while. 2003, I think it was April, [I went to the] U.S. Secret Service for a week [reg Re-lE].

Although Renaissance Man did not directly respond in writing to

Questionnaire items 4-7, it can be reasonably inferred from other parts of the

interview process (i.e., ProjectEDAN and other artifacts) what his answers most

likely would have been. The next Questionnaire item to RM would have been,

How many years of experience do you have at doing forensic craniofacial

reconstructions? According to the ProjectEDAN and other artifacts RM has been

involved with that forensic artist group since it was started on July 20, 2001. In

the three years since the end of his formal forensic art training until December 28,

2006, the start of my interviews with Renaissance Man for this study, he has worked on at least 32 national and international Doenetwork/ProjectEDAN two-dimensional drawing cases. His last domestic case, as of this writing, was in September of 2004.

The inferred response to the questionnaire item six concerning RM's preference for 2-D or 3-D reconstructions: It is apparent given that the lion's share or 8 out of 9 of his formal and informal trainings have been in the two-dimensional (composite and 2-D facial reconstruction drawing) experiences as opposed to only one formal three-dimensional clay sculpture facial reconstruction exposure. Why RM has this preference will become clearer in Interview One where he recalls a progressive Minor Epiphany from his childhood. I also argue that the same progressive Minor Epiphany account for why he did not appear to be completely comfortable with the 3-D sculpting facial reconstruction process during his Interview Two for this study.

The inferred answer to item seven from the questionnaire, "Which 3-D reconstruction method do you prefer and why," might appear to be irrelevant in Renaissance Man's case but on closer examination he does have a Tacit-Implicit preference. By this I mean, first as Interview One shows, RM's love for the physical act of drawing, which he referred to as "doodling," is Tacit in origin. Second, the only formal 3-D facial reconstruction training and experience he has had, has been with the American Method. Although RM is probably aware of the Russian and the Neave's 3-D facial reconstruction methods, there is no evidence

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that he has had either formal or informal training with either of them. Third, Karen Taylor's 2-D facial reconstruction method is based on Gatliff's 3-D American method (Taylor, 2001, p. 369). Therefore, by extension, on a Tacit-Implicit level Renaissance Man does have a 3-D facial reconstruction reference, the American method.

In terms of Questionnaire item eight, I could not glean from the artifacts any inferential evidence that RM indicated a particular conceptual approach toward how he does a forensic craniofacial reconstruction. That said, I need to remind the reader that in order for the facial reconstruction process to successfully produce the best reasonable likeness of the John/Jane Doe a symbiotic relationship must exist between the art (2-D or 3-D) and the science (physical anthropology). Although on the face of it Renaissance Man projects a strong 2-D art orientation toward the facial reconstruction process, I would argue that his forty years of doing portraits combined with his Bachelors degree in Biology exerts a taken for granted Tacit Knowledge of physical anthropology, as it does to the anatomy of the human face, needed in the art/science relationship of forensic craniofacial reconstruction.

Implicit and Explicit Knowledge from the Artifacts in lieu of the Questionnaire Items

I am arguing from the concept of Implicit Knowledge as a multistable interrelationship between Cumulative and Minor Epiphanies (which are respectively moments "which signif[y] eruptions or reactions to experiences which have been going on for a long time" and situations "which symbolically presents a major problematic moments in a . . . person's life" (Denzin, 1989b, p.71), the multistable distinction between the two being how consciously or subconsciously aware the individual having the given Epiphany is relative to the length of time the experience(s) that triggered the eruption /reaction). In other words, Cumulative Epiphanies can appear to be a Minor Epiphany if the experiences being reacted to were subtle enough not to be perceived on a conscious level. The items in my Questionnaire, however, were better for obtaining Renaissance Man's Explicit Knowledge conceptualized as Re-lived Epiphanies and ill-suited to capture the Implicit Knowledge. An example of the above mentioned subcategories of Implicit Knowledge inferred from the artifacts was when RM's Minor Epiphany became a Cumulative Epiphany. By this I mean, at the instant he realized that his 40 years of subconscious portrait drawing skills were implicitly transferable to his reaction to solving two-dimensional forensic art problems. This is what I call moving from a moment of *explicable certainty* (see page 85) to a moment of *experiential certainty* (see page 84). The Cumulative and Minor Epiphanies, on which I assert Implicit Knowledge to be based, are one and

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the same, simultaneously, multistably eruptive/reactive dynamic or problematic (i.e., types of certainty).

Evidence of RM's Explicit Knowledge shows itself in the inferred responses to the Questionnaire items gleaned from the artifacts. In particular the items about his formal training in forensic art in general; the composites, age progressions, and 2-D forensic craniofacial reconstructions specifically. When RM talks about his post Major Epiphany forensic artist training he relates in specific detail with whom and where his training took place.

Ways of Knowing: Tacit, Implicit, and Explicit

In this section I again need to remind the reader of the respective analogous relationship between first Renaissance Man's Major Epiphany with his Tacit Knowledge, next his Cumulative and Minor Epiphanies with his Implicit Knowledge, and lastly his Re-lived Epiphanies with his Explicit Knowledge as I did with Yoda's Mom on page 119 in chapter five of this study.

In order to proceed with the analogous relationships the reader needs to remember the communicative distinction I made between tacit and implicit knowledge. Tacit knowledge is impossible to explicitly communicate to another person in either verbal or written language, or mathematical terms. This means the conventional forms of explicit communication or combinations of these communicable forms cannot help a learner/student understand, internalize, or

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perform the behaviors they observed in the person that took the behaviors in his/her performance for granted.

As previously mentioned, the communication of one's tacit knowledge to other people appears to be transmitted through the intentional or unintentional demonstration of our taken for granted behaviors that can only be received through the attentive observations and a focused level of intellectual involvement of the observer. This is what Polanyi (1967) was referring to when he said:

> "it can be argued . . .that the possibility of teaching these appearances by practical exercises proves that we can tell our knowledge of them. . . we can do so *only by relying on the pupil's intelligent co-operation for catching the meaning of the demonstration"* [italic emphasis mine] (p. 5).

I need the reader to remember that the communication of Implicit knowledge is fundamentally different from Tacit knowledge because it can be transmitted by conventional as well as unconventional means in the form of what I called ***a momentary experiential certainty*** (see examples on page 84 of this study).

RM's Major Epiphany is analogous to Tacit Knowledge in the sense that it was the intentional demonstration of the taken for granted behaviors of Karen Taylor from "The New Detectives" TV program from which RM actively received—through his observations and the level of his intellectual focus—what Taylor was doing which triggered his statement of recognition "I can do that." This is what Denzin (1989b, p. 71) refers to as an "the major event, which touches every fabric of a person's life and what I called (on page 91 of this study) ***a personally affirmed moment of total, though inexplicable, certainty.*** Once again the reader must keep in mind the progressive Re-lived, [proRe-lE], Minor,

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[proME], and Cumulative Epiphanies, [proCE], as well as the regressive

Cumulative, [regCE], Minor,[regME], and Re-lived Epiphanies [regRe-lE] that lead

up to and away from RM's Major Epiphany.

His Major Epiphany of becoming aware of forensic facial reconstruction

as being the same as his tacit knowledge is derived from many previous

experiences in his life, of which the gleaned inferences from the Questionnaire

highlighted only one such experience (The New Detectives TV show). Other life

experiences will be revealed during the face-to-face Interviews.

The implicit knowledge revealed in RM's Questionnaire is analogous to

both Cumulative and Minor Epiphanies in that certain ***momentary experiential***

certainties of his became engaged. The formal education of his Bachelor of

Science in Biology engaged with his informal art education of doing portraits for

40 years proved to be required skills to do forensic facial reconstructions—a

previously unknown field for their combined application. I am interpreting that

engagement to be what advocates like Gardner (1983) and Eisner (1994) mean by

Cognitive Pluralism. Cognitive Pluralism can be thought of as a pragmatic use of

an individual's accumulated knowledge in intellectually appropriate situations.

The Interview Setting Renaissance Man

The series of interviews with RM were conducted between Thursday the

28th and Friday the 29th of December 2006, in RM's Recording/Art studio, which

is in the city of Renaissanceville (pseudonym), USA. The two day weather

forecast for both days was, mostly cloudy, highs in the low 50's and lows in the mid 30's and low 40's respectively. Renaissanceville has [an estimated, as of the 1st of July 2006] population of 15,580, a land area of 9.52 square miles; a water area of 0.17 square miles; and a population density of 1,091.27 people per square mile (Census 2000).

RM's home and recording/art studio is located in the north of Renaissanceville in a wooded area bordered on the north by a interstate highway. The studio is bordered on the south by a major US river; it is bordered on the east and west respectively by a spur off the northern boundary interstate and one of Renaissanceville State's major rivers. The studio itself is part of the house where RM and his wife live. The main entrance to the house faces west with the living area to your left and the studio straight ahead. The studio is divided into the recording section which takes up the lion's share of the space and the 2-D art section. This arrangement is based on the fact that RM primarily makes his living making audio music recordings supplemented by fine art paintings which are for the most part portraits. The forensic work is done out of a sense of having the skills and wanting to provide the needed services of Facial Reconstruction, Composite, and Age Progression drawings to law enforcement agencies. The 2-D portion of the studio is on the southern third of the room and has windows along the south wall providing a consistent natural light for the 2-D work he does in that part of the combined studio. In the 2-D studio space looking back toward the windows are two eight foot long tables with an office chair between and a

drawing/painting easel to the right of the chair. The table immediately in front of

the chair is 2-D work space and the table behind the chair has a row of books and

supplies in a large plastic tote box.

Interview One: Renaissance Man's Life History in His Voice

Our first scheduled interview was at 10:00 am. I set up my video

camera/audio recorder in the narrow no man's land space that divides RM's

recording studio business from the 2-D art studio working section. This

arrangement is based on the fact that RM primarily makes his living doing audio

music recordings and voice-overs supplemented by fine art paintings which are

for the most part portraits.

Renaissance Man is a older gentleman in his late 60s; he describes

himself as "a silver-haired teddy bear." He is a big heavy set man about 6 foot 1

or 2 with a full clean shaven face topped off by a head of white hair. He was

wearing a light blue windowpane plaid shirt and black khaki pants. In his

presence one feels there is a focused determination about him probably due in part

to his radio announcer's voice. "A voice that has served him well for a 36 year

radio career, as a rock 'n' roll DJ for 18 years at one station, 14 year at another,

and continually involved in voice-over and commercial production work as his

main business" (Renaissanceville (pseudonym) Courier & Press, 2004).

Although he did participant in the study, he did not talk as freely about his

life history; compared to Yoda's Mom he was less forthcoming about himself on

a personal level. Once again, I need the reader to keep in mind that the

interpretative labels (Re-lived. Minor, and Cumulative Epiphanies) that I assigned

to RM's statements are mine alone with the acknowledgement that others might

interpret his statements differently.

When, I asked, can you say more about how you got into it, meaning the

events and influences in his life history that led him into doing forensic art, RM

wanted to know if I meant into forensics or into art in general.

Well, either or …both. . . they're kind of intertwined.

Well basically, yeah …when I originally started talking about the uh the
fact that …my dad said teachers would be impressed with the fact that my
stick <u>figures</u>, which are no different from anybody else's stick figures at
age 4 or 5, I was throwing shadows with them. Or if I had a stick figure
standing next to water, I was showing a reflection in the water *[pro Re-lE]*.

Given that the act of representational drawing is a spatial reasoning

attribute, the fact that at 4 or 5 years old RM was using shadows and reflections

off the surface of water to draw attention to the physical space around his stick

figures means that he had acquired a tacit knowledge approaching an implicit

knowledge, on some level, about at least stick people in an environmental space.

But this is impossible to know for sure without interviewing the young RM about

how he came to made the drawings of stick figures casting shadows and making

reflection on water.

Kids, my age they don't do that. They're just happy to …draw something
to make Mommy and Daddy think it's a person *[pro Re-lE]*.

And uh …so, I never really paid much attention to that but I just knew that
I could …I would love doodling. . . sketching and drawing just came
naturally to me . . . **[pre ME]**.

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The above statements are classic responses to essentially "how do you know" questions, made by someone who retains in a tacit manner their implicitly acquired understanding about something that is occurring or has occurred in their environment.

> Uh …all through high school I was a cartoonist. I did more studying of uh …cartooning characters than I did what I was suppose to be paying attention to. . . Uh so I was a cartoonist for uh a radio station here in town that put out uh a weekly magazine and I drew I drew caricatures of the radio station personnel. Made a dollar a piece off these when I was about 14 years old so …I knew I could do it but I never wanted to pursue it as a career because I knew artist generally starved to death and I just um had no interest in pursuing it as a formal thing. So uh…I never had a formal art course. *[pro Re-lE]*.

The above recalled progressive Re-lived Epiphany is an indication of a combined informal and implicit learning process that must have been at work during the early artistic developmental years for RM.

> The only thing I can really remember in the 4th grade was soap carving. Take a bar of Ivory soap and carve out an animal's head and uh…I didn't make the teacher happy with the way I did it, and so she flunked me. So I flunked my only art course I ever had…***[pro ME].***

The following explanation is relevant for these reasons: to give what Denzin (1989b, p. 83) calls a "thick descriptive explanation" for the psychological and cognitive developmental context from which to understand my second Research Question in terms of the Ways of Knowing employed, the types of Epiphanies that are had, and the Agents that exist within the Complex Adaptive System of what would be in the explication a given person's Tacit Knowledge.

Carving or subtractive sculpting, regardless of the medium (soap notwithstanding), is not an appropriate first time three-dimensional experience for 4th grade students. Even if the teacher were a curriculum endorsed art teacher, which I doubt given the time when Renaissance Man was in 4th grade, to teach carving is to say the least a challenge. It is challenging because it presumes, to name just a few the following things: (1) that most student can envision and understand what the object they want carved looks like inside the outer limit of the bar of soap, (2) that most students know and understand the physical limits of the soap and the limits of the carving tool to produce the results they have envisioned, (3) that most students have the dexterity and patience to carry out or especially to be able to modify their carving if a part of it is accidentally cut away or broken off.

Given RM's natural tendency to express himself through the act of drawing, it would be logical on his part to treat the soap carving challenge in the manner in which he was the most comfortable, successful, and knew best. For this explanation I use the terms *sculpting* and *carving* interchangeably. That being said, the most natural transition from the act of 2-D drawing to the act of 3-D sculpting is through the three progressive stages of bas-relief, low relief, and high relief. All three of these forms of relief are technically considered to be sculpture, but for the sake of explanation I need the reader to see these as transitional stages from the two-dimensional to the three-dimensional. For example, imagine three 8 ½" x 11" slabs of clay that are all 5 inches thick. On the first slab you use a

compass to draw a four inch in diameter circle into the soft surface of the clay; this is an example of a bas-relief.

On the second slab you repeat the process of drawing the circle on the surface of the clay, but this time you carve away the background area around the circle back two inches while simultaneously carving a smooth hemispherical dome using the edge of the circumference of the circle as a guide, so that it gives the appearance of a ball that has emerged to one half of its volume from its background; this is an example of low relief.

On the third slab of clay you repeat the compass circle drawing; this time you carve away the background area around the circle back three inches while simultaneously carving a smooth ball form that appears to have emerged to three quarters of its volume from the background. This would represent a high relief. Therefore, a carved ball that is completely free from its background or sculpture in the round is what most people who are not sculptors consider to be a sculpture. So, if Renaissance Man's teacher was expecting a soap carving in the round from him and he produced a high relief soap carving, which he most likely did regardless to how detailed, it would have been considered unfinished and a failure. This is the childhood experience that I referred to earlier that I interpreted as having a continuing effect on how RM interacts with 3-D methods of expression (see page 184 of this study).

Although at the time of my interview Renaissance Man is an adult and working with an additive sculpting method as opposed to the subtractive, the

unsuccessful experience as a 4th grader still seems to haunt in him because he recalls it as what I interpret to be a negative progressive Minor Epiphany. To remind the reader a Minor Epiphany symbolically presents a major problematic moment in a relationship or a person's life. It is progressive because the recollection of this epiphany preceded RM's Major Epiphany of becoming aware of and tacitly knowing he wanted to get involved in doing forensic craniofacial reconstructions.

The above explanation sought to establish a "thick descriptive explanation" for a psychological and cognitive developmental context from which to conceptualize my second Research Question in terms of the Ways of Knowing employed, the types of Epiphanies that are had, and the Agents that exist within the Complex Adaptive System of effort to explicate an individual's Tacit Knowledge.

> Uh in 1957. . . I joined the Reserves as a junior in high school and uh, two day after graduating from high school I was in basic training in Fort USA (pseudonym).
>
> But my weekends at Fort USA would be spent, [doing portraits]."You got a girlfriend, you want a picture of ?" They'd hand me their wallet-size photo of their girl and the next day on a piece of typewriter paper with a 2B pencil, I had a sketch of their girlfriend. And they gladly paid me a dollar for it *[pro Re-lE]*.
>
> So, uh I was really proud of that because that was really my . . . moving into the big time of commercial art because one weekend I made about 40 bucks cuz I was able to whip em out pretty quick. And I made more in a weekend than most people made as a private all month long, in the Army, so …I made back in those days about 70 dollars a month [pro CE].

The above progressive Re-lived, Minor, and Cumulative Epiphanies from this interview focus on the aspects of RM's life history that lead up to his Major Epiphany and serve to fill in the data gaps that were not accounted for by the Artifacts instead of the Questionnaire.

Interview Two: Renaissance Man's Facial Reconstruction Process

Interview One gave the reader an insight into Renaissance Man's Epiphanies (Re-lived, Minor, and Cumulative) that had an influence on his comprehension of the Facial Reconstruction Process in terms of recalling the significant experiential lived moments that progressed up to and regressed away from his Major Epiphany.

In Interview Two, I present the Ways of Knowing RM is interpretively engaged in at the given moment. That is to say the Explicit, Implicit, Tacit leaning Implicit, Explicit leaning Implicit or Tacit he appears to be using. I need the reader to understand that Explicit and Tacit problem negotiation are simultaneously science and art oriented. The negotiations between the Epiphanies and the Ways of Knowing are the Agents that will provide an insight into the Complex Adaptive System of the Forensic Craniofacial Reconstruction process of Renaissance Man's in particular.

The interview was conducted in the 2-D area of his duo purpose recording/art studio. This room has windows in the wall of the southern side which provides an even consist nature light during the day. Like Interview Two

with Yoda's Mom, I need to remind the reader to understand and keep in mind that they will not witness the entire three-dimensional facial reconstruction working process from beginning to end (see page 141). Also, like the second interview with Yoda's Mom, the reader needs to keep in mind that my descriptions of RM's exhibited physical behaviors (with or without verbal comments) will be evidence for interpreting the Type of Knowledge (Tacit, Implicit, or Explicit) he is using to negotiate the current problem. A nonverbal physical flow of effortless behaviors will indicate Tacit Knowledge engagement, in that Tacit Knowledge driven behaviors are internalized and never approach conscious awareness in verbal form.

Mime-like physical behaviors (e.g., gestures that suggest words, like pointing) without an actual verbal comment are an Implicit manifestation of a Tacit Knowledge problem negotiating process. The same mime-like gestures with verbal comments are more associated with Explicit Knowledge in terms of dealing with a given problem because the knowledge display is partially encoded in words and/or word-like sounds. As I have mentioned (see page 143) these mime-like physical behavioral/gestures are to be considered examples of Implicit Knowledge (either Tacit leaning or Explicit leaning forms of it).

The negotiation and/or resolution of a facial reconstruction problem that is accomplished using verbal comment(s), text, and/or numbers are Explicit Knowledge forms of thought processing and problem negotiation.

Revisiting Figure 4.2, page 102, in the area of Implicit Knowledge I want

the reader to recall the meandering border between Tacit and Implicit Knowledge

(Tacit leaning Implicit Knowledge ,T\IK) and the border between Implicit and

Explicit Knowledge (Explicit leaning Implicit Knowledge, E\IK). The following

labels will be used to differentiate the Ways of Knowing Renaissance Man is

using to negotiate a given facial reconstruction problem. These labels are bold

text **[TK]** for Tacit Knowledge which is analogous to a Major Epiphany. Implicit

Knowledge is interpreted to be associated with both Cumulative and Minor

Epiphanies and labeled respectively by plain text for Tacit leaning Implicit

Knowledge[T\IK] when there is a physical gesture used to communicate a tacitly

comprehended Implicit solution, and italicized bold text *[E\IK]* to represent

metaphorical communications of explicit knowledge. There is a communicative

continuum across Implicit Ways of Knowing from Tacit leaning Implicit

Knowledge [T\IK] to Explicit leaning Implicit Knowledge *[E\IK]*. The plain

italicized text is for examples of Explicit Knowledge *[EK]*.

My reasoning as to why Cumulative and Minor Epiphanies can both be

analogous to Implicit Knowledge is because of the functional relationship

between, "[the] . . . eruptions or reactions to experiences which have been going

on for a long time" and ". . . [the symbolic presentations of] major problematic

moment in a . . . person's life" (Denzin, 1989b, p.71) that moves interpretively

like a mobius strip conveyer belt around **a Cumulative/Minor Epiphany Path**

with one Epiphany turning into the other and back again. This is what I have

previously called ***a momentary experiential certainty*** (see page 84 of this study).

For example, Implicit Knowledge that is driven by a Cumulative Epiphany

eruption/reaction would be when a person spontaneously stands up against a

persistent pattern of injustice. An example of Implicit Knowledge in the form of a

Minor Epiphany as a problematic moment in a person's life is when that

individual takes a moral stand, from which s/he will not benefit, in the face of the

popular momentum. The difference as to whether ones comprehension is

considered Tacit-Implicit or Implicit-Explicit knowledge depends on how well

experiential certainty is verbally articulated.

On Friday the 29th of December 2006, during Interview Two before

Renaissance Man actually started working the skull I provided for facial

reconstruction, he comments

> …It's been …since the year 2000 [six years prior to this interview] since I
> have done this [a 3-D clay facial reconstruction]. So we're going to see
> …how much I remember *[EK]*.

From RM's statement it can be inferred, relative to Questionnaire item

number four, that the years of experience in doing three-dimensional clay facial

reconstructions specifically would be none. Renaissance Man's preference is for

the Taylor 2-D facial reconstruction method, which is based on the 3-D American

facial reconstruction Method.

The American Method in turn takes its origin respectively from the 1943

drawing by John Adams depicting the facial features on the right hand half of the

skull of a 65 year old Negro male (Krogman 1973, p. 264) and the 1946 Krogman

and Mary Jane McCue attempt at a 3-D facial reconstruction on the skull of a 40 year old American Negro male (Krogman, p. 265). Both the drawings, which used 15 locations for the soft tissue depth markers in the form of small blocks of clay (Krogman, 1973, p.272), and the 3-D were based on the 1898 Kollman and Buchly derived average tissue thickness of 45 moderately well nourished white males to establish. This is what I have determined is the bulk of Renaissance Man's facial reconstruction experience.

I began the interview by saying: So as you work I'm just going to prompt you every once and a while to ask what you're thinking or if you want to just think aloud as you're working that fine too. [Clearing his throat, he asks].

Ah, what do you know about the about the case?

He is a male, obviously. Well, I shouldn't say obviously but. . .

> [Simultaneously pointing with and making a back and forth rounding gesture, with the middle fingers of both hands, over the area of the brow ridge of the skull, he says].Obvious from this *[E\IK]*.

He's in his mid to late 50s.

> [Touching the right inside edge of the mandible, he asks]
> Do you go by the fact that he has no wisdom teeth? [an *E\IK* heuristic method to determine the age of a skull].

I was looking at the cranial sutures primarily.

> They're finished *[E\IK].*

Well, except for the back of the skull . . . anything else you'd like to know?

> A wild guess, [he is] Caucasian? Just because of the [shape of the] eye sockets *[E\IK].*

Oh not wild, right on the money.

The above comments by RM in determining the sex, age, and race of the skull are Explicit leaning Implicit Knowledge *[E\IK]* Ways of Knowing.

The back and forth rounding gesture over the area of the brow ridge of the skull argues for *[E\IK]* being at work in terms of the sex of the skull. "The supraorbital ridges [brow ridges] are almost invariably much more strongly developed in male than females" (Krogman, 1973, p 116). To make a determination about the age of the skull by physically touching the mandible, while making a specific verbal reference to the missing wisdom teeth suggests *[E\IK]* was engaged, in that, "A clean, open socket usually indicates postmortem loss of a tooth, while a socket filled in with bone may mean that a tooth has been missing for a period of years" (Taylor, 2001, p. 330).

The references on the determination of the age of a skull by its cranial sutures *[E\IK]* state that "The earliest closure [occurs] at 21 years, latest at 50, with greatest frequency at 40-45 years. In aging skulls suture closure could not come closer than 15-20 years. . . Vault suture [the joint on the top center of the skull] closure began between 25-40 years, was complete between 40-60years" (Krogman, 1973, p. 77).

Explicit leaning Implicit Knowledge was also engaged in regard to ethnic affiliation based on the rule of thumb shape of the sockets/orbits in which Caucasian males have comparatively speaking a more rectangular shape to their eye socket/orbits than Caucasian females and all other ethnic groups, male and female.

This interview resumes where RM is in the process of attaching the soft tissue depth markers with the skull resting in a face position, when he says.

. . . I have positioned number one too low.

And why are you making that determination?

> Just based on my [copy of the Rhine] Chart here. Um . . . the fact that it's not really on the forehead like it should be [according to the front view of the skull on the Chart]. Looks like number one is ought to be up to the hairline [as indicated by the left side view of the skull on the same Chart] ***[E/IK].***

> Let's hope old Elmer [meaning the type of glue] does the job here. . .

I interpret the first and second sentences of the above comment to be an example of ***E\IK*** because the Rhine Chart presents two visually different locations for the attachment point of marker number one. This discrepancy is due first to the fact that the front and left side views of the skull on the Rhine Chart which show the location and the marker numbers one are not drawn to the same scale in term of size. The left side view of the skull is 14% larger than the front view. Second, the visual transition from the two-dimensional drawing to the three-dimensional reality of the skull is intellectually impossible to see. By this I mean, the thick two-dimensional lines (that represent the three-dimensional soft tissue

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markers) are positioned to show their proper relationship to the two-dimensional

drawing of the skull. So, they work. But, there is a subtle but definite plane

change at the spot where the number one tissue marker is attached. Yoda's Mom

referred to this during our exchange in her second interview when she said (on

page 136 of this study):

> . . . I am going to place [marker] number one and [it] goes where the skull starts to turn backward.

And how do you determine that?

> Well, for me, by visualization. You just, you know, have to turn it [the skull left or right] to see where the curve starts, and because we have a sloping [forehead] here . . .

I can see . . . you're doing that by touch, but how do you know exactly where that

point is from touching it?

> Because you can [physically] feel that curve start to go back **even, if you closed your eyes you could still feel it**.

> . . It cannot be exact, I don't care if you go by these [meaning the Rhine] charts or the Manhiem's charts or Caroline Wilkerson's charts, . . . these are approximations.

To verbally illustrate this, if you drew a six inch circle on a piece of paper

with a quarter inch dot in the center and told the viewer that the circle represents a

ball the curvature projecting the dot toward you and its three-dimensionality

cannot be seen, but intellectually you would understood it that way in reality

because of your tactile experience with a ball. This requires an intellectual

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transfer of the two-dimensional visual data into its suggested third dimensional

interpretative presentation.

For Yoda's Mom attaching the soft tissue depth markers has become an

exercise of Tacit leaning Implicit Knowledge based on her experience of

attaching them over time. For Renaissance Man the attachment of the tissue depth

markers is still at the Explicit Knowledge stage because of the difficulty he

experienced negotiating the anomaly with John Doe's dentures.

As the interview with Renaissance Man continues he says:

This is one of those tasks that uh . . . it can't be rushed. Unless you're
Betty Pat.

She'd probably put on the markers and have the clay laid in the first day.
Be ready to start shaping the hair or throwing a wig on it by the second
day.

RM then recalls his observations while watching Betty Pat Gatliff work on

her trademark reconstruction.

…He had a mustache and a big head of hair…she sculpted all of it , she
sculpted the hair and . . .the mustache, which I thought was fascinating.
Now that's the mark of a real artist she's a real artist …but she's also
know the science. I mean you knew where the science was controlling her
and you also knew where the art was taking her [EK].

I'm not so sure that this Elmer's glue is going to be the hero here like we
want. 4 is right there.

. . . If they [the soft tissue depth markers] those were already on there then
we would just be fast-forwarding to laying in the clay . . . which . . . I
don't think laying in the clay process is going to be any more revealing
that putting on the markers.

This is the point in the interview with Renaissance Man where I felt his

discomfort with the 3-D facial reconstruction process. He seemed to me to lose

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his focus based on his previous statement, because the application of the clay is

always, experientially, more revealing in terms of seeing the face emerge than

putting the tissue markers in place.

So this case was never solved?

Oh, yeah it was. I have the driver's license photo and the photo of the

reconstruction I did to show you, if you care to see it.

If I'm lucky enough to get all these markers on here, **one thing I do want to do is photograph it**. And then do the uh as an extra step un when I have . . . the chance cuz you're in you're in here to get the clay done.

But I, you know, later **I would do the 2-D drawing**. And I probably want to do that before I even saw the photo. Cuz I don't want to be influenced by the supposed outcome.[He was attempting to stabilized marker number five, as he was talking].

If I could get a copy of that [drawing], I'd surely send you the [driver's

license photo and a photo of the reconstruction I did] later.

This is where we should have had . . . what is that glue we're suppose to use? If I were to turn this skull up right now, half of these [markers 1-4] would fall off.

I think it's a two part epoxy.

Now, are there any particular thoughts that are going through your mind as

you put those [tissue markers] on, other than tedium?

Oh nothing related to my great insight about this person other than these markers are going to give us a picture when I get it all done. You know. . . I'm just wondering if . . .

see that one [marker number five] right there is not gonna make it.

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He [John Doe] didn't see a dentist very often [referring to his upper denture], did he?

[Laughing] Well, you know, when in doubt, we know what number five length is going to be. Lets see if we have any more luck with number six right on the upper incisors at the lip line/[gumline]. Yeah, looks like all he [number six] needed was a flat surface.

So do you need number five flattened out?

Well just the position where he [marker number five] would have sat was too ridged. It was too much of a ridge there for even a good wad of this glue to attach it.

Well we're going to have the same . . . results as number five, I'll bet you. Maybe that's the secret, I didn't bead enough on, it doesn't matter if I slop it on. Give it a health bead of it.

My thinking is before we get our hopes built up on this glue [the Elmer's] really working, we should get a tube of the right stuff.

Cuz I know this not being a wood model, this Elmer's glue, carpenter's glue, probably not going to work.

What I want to do is just let it pause at this time and then in a little bit turn the skull up and see if they fall off or not.

If the reader will recall this is the same area where Yoda's Mom ran into problems with this skull (see page 154).

Because John Doe wore an upper set of dentures, it caused Yoda's Mom to debate with herself where to attach marker number five, as Renaissance Man is doing now, given that its placement will affect the projection of the nose as well as the attachment of markers 6 and 7 on the upper and lower gum lines/lip line that determine the mouth and depth of the lips. There are no explicit instructions or direction as to how a forensic artist should handle situations like this that

sometimes arise, making this a Tacit leaning Implicit Knowledge problem-negotiating situation.

Yoda's Mom chose to resolve the problem by relying on her sculpting experience (from page 154); paraphrasing, she said:

> . . . Marker number five goes under the nasal spine. It should be halfway between where the teeth are and here at the end of the gum line/lip line, but since he has dentures there we have to make some adjustments. That I don't like.
>
> Because of where marker number five goes I'm gonna have to compromise and figure out something to do.
>
> So I'm gonna put it halfway. I have no other choice but to put it there because what it can't do is interfere with where we're gonna put the clay for the projection of the nose based on the length of the nasal spine.
>
> It's not ideal but it's going to have to do.
>
> That runs into a problem with number six . . . so we'll skip six and seven; then we have number eight, which goes, there [the chin-lip fold] in that middle little groove.

Renaissance Man, who had less 3-D facial reconstruction experience, was either not aware or unsure what compromises needed to be made and attributed the problem to be the difficulty of attaching marker number five due to not having the right glue. There were in fact three contributing reasons for this problem. First, RM's only 3-D facial reconstruction experience used one of the near physically ideal male skulls in Betty Pat's class. Second, the visual data discrepancies in the Rhine Chart as Yoda's Mom observed (on page 153), the Rhine Charts like the Manhiem and the Wilkerson Charts are only approximations. Third, the subtleties of the plane changes on a skull intensify in

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the small areas where tissue markers are to be attached, but the size and the flat

attachment plane of the tissue markers themselves do not change.

Continuing on with Renaissance Man's Interview after he obtained the

right glue he said:

> I put these tissue depth markers on here [the skull] according to . . . I look at straight lines.
>
> Straight lines this way [gesturing horizontally], straight lines that way [gesturing vertically], across the top of the eyes, across the top of the forehead, see what lines up like [tissue markers] 13, 15, 16, and 17 are eventually gonna make a band around the zygomatic arch. *[EK]*
>
> It's mostly staying linear with these markers. You can't let the chart confuse you, let the numbers confuse you. You just gotta know, make sure that numbered tissue depth markers are cut and trust that they are cut to the right the numbers specifications for this male.
>
> I'm sure it's a European white male that's been described to me.
>
> So I'm just placing things here that look to me like it would form a band that goes around.
>
> There is a suture point there [where marker number 16 attaches to the right hand side zygomatic process] And a suture point there [where marker number 16 attaches to the left hand side zygomatic process] *[EK]*.
>
> Again these don't have to be exactly, in my estimation, as the Chart indicates because they are tissue depth markers. We just know that when we're laying the clay that tissue depth ought to come close to what these markers tell us connecting the dots. ***[E\IK].***

So if I am understanding right, are you indicating that a reasonable

positioning of the soft tissue depth markers is good enough?

> As long as you can just eyeball the factors of linearity here and the linearity here and here and here then you're pretty much on target with how you're gonna lay in the clay ***[E\IK].***

Now is that the band you talk about is that strictly from forensics or from other experiences that you've had?

It's just from the training that I've been through on this as far as noticing the Chart does take on an art, almost hate to use the word, artistic but it is a mixture of art and linearity it's a very linear thing, I mean, you can see a design here *[EK]*.

Ok when you say linear do you mean that applying more to the art of reconstruction or the science of the reconstruction?

There is a lot of art in here

Okay, so you're using linear to talk about the art more so than the science?

Yeah, because on some cast skulls the suture marks won't show so you have to kinda eyeball the artist intent who drew the Chart to know where these points are in your own anatomy [T\IK].

And this one [marker number 17] here would be at the very tip [the furthest end of the zygomatic process] back here.

And not having done a bunch of these you still have to develop an instinct for where it ought to be [T\IK].

This [gluing in place tissue depth markers] is something you actually got to just sit here and hold it until it acts firm. You just wise you had a mini-clamps that would just go on every one of these things. And hold it just so.

There's more really to just letting the glue dry before you try to apply pressure. Start to take on a drying action before you add pressure to the marker so that it affixes with some strength.

Clearly, at this point in the Interview Renaissance Man's focus relative to working three-dimensionally was gone. His last few comments confirmed that he has an exclusively 2-D mindset toward Forensic Art. It is my interpretation that Renaissance Man finds the process of doing a 3-D facial reconstruction too mechanical for his taste for these reasons. First, although the incident occurred in

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the fourth grade the only form of art he told he was a failure at was carving, which

I feel still haunts him. Second, he was not as confident about his 3-D art skills as

he is about his strong 2-D skills. Third, and compounding the two for someone

who is not confident about their abilities with the 3-D medium of clay sculpting,

having a class with Betty Pat Gatliff can be overwhelming. Fourth are his

references as to how the reconstruction would be done as a 2-D drawing:

> Some people can look at a skull and just go ahead and two-dimensionally with out applying clay **They can draw the two-dimensional sketch without even having depth markers to go by.**

> There are some people who can do that. I don't believe I'm at that stage yet where I can do that.

> When this is all finished [meaning with all of the tissue depth markers on] **we will upright it and take a photograph of the skull with this [twelve inch] ruler in place so that we can have an accurate life-scale photograph** so then you can use [said with dry humor] that very scientific method of drawing the eyeball by taking a [US 25 cent piece] quarter. A quarter is exactly the size of an eyeball.

And you learned this method where?

> [From] Karen Taylor. It was the show I saw back in January of 2000. Where she kind of laughed at herself saying this is very scientific. Then she laid a quarter our and just drew a circle around the quarter, approximately where the eyeball should be and instinctively that's pretty much on.

> So its not, she didn't get any calipers out or ruler ,she just eyeballed it, to tell where the eyeballs go. So that looks pretty linear, I wish I could hold this up at the point of, I think I will try to . . . as we sneak up to a completion of adding the tissue depth markers.[holding the skull up to the camera] I still got a few to go

> What I'm trying to do here this morning is do more recall of my training of 6 years ago cuz this isn't a discipline that I do every day, or every week, or every month. I haven't done it since training. What I'm doing is

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slopping along here as I try to fill up these markers and pretty much try to even approach the moment when we can say now I want the artwork to take over and bring this guy back to life.

Okay, now this is something I'm watching you do and something that I noticed from my other informants that you referred to charts and things for the science end but I don't see charts or anything out for the art end. I mean I don't see explicit instructions for the art end.

Again that goes back to where you gotta start with the physical, you gotta start with the mechanical part of this process which doesn't require a lot of depth. You don't have to be a philosopher to follow these kinds of instructions. If you know how read from a chart, well then, probably my 12 year old grandson could do this so far what I've done.

I'm afraid to keep doing what I'm doing here and continue with what we're doing and still carry on a conversation with you because it's killing my train of thought of sticking to this project and if I didn't have to talk to you , then I could be more serious about this. But I'd rather talk to you to help you with the balance of your interview process.

In hindsight I should have gone with the flow and had Renaissance Man do the reconstruction in the manner in which he was the most comfortable. This probably would have yielded more insightful data from Renaissance Man.

Interview Three: Renaissance Man's Reflections

The purpose of Interview Three is to capture the intellectual and emotional factors in the work and life that contributed to Renaissance Man's current involvement as a forensic artist up until the 29th of December 2006. Once again I found a combination of not budgeting the interview time wisely and collecting far less data from Renaissance Man than I had expected. Interview Three did not

occur during on the second day December 29, 2006 of the interviewing time I had scheduled.

However, I was able to collect data from Renaissance Man in the form of the Artifacts in lieu of the Questionnaire, Interviews One related to his Life History and Interview Two related to his Facial Reconstruction Process along with a very brief written response to my request for his reflective intellectual and emotional perspective on being a forensic artist. As I did with Yoda's Mom, I gleaned inductive evidence of Renaissance Man's Intellectual and Emotional reflections by way of the Ways of Knowing he engaged in, his Epiphanies, and the interactions between the Complex Adaptive Systems Agents of his Right Actions and Livelihood.

Intellectually, the particular Ways of Knowing Renaissance Man engaged in were primarily Explicit Knowledge [EK], Implicit Knowledge [IK], and the subcategories of Implicit Knowledge (Explicit leaning Implicit Knowledge [E\IK]; Tacit leaning Implicit Knowledge [T\IK]).

In RM's case part of the data on the intellectual meaning he made of his work and life as a forensic artist centered on the Explicit Knowledge of his training which was to learn the craft of being a 2-D forensic artist, came from the inductive evidence of the Curriculum Vitae artifact. When he displayed his formal and informal training in 2-D Forensic Art it shows he sought training on how to interface with law enforcement agencies/organizations and to establish forensic artist credentials. This is a manifestation of Explicit Knowledge engagement in

that the training was more than likely delivered in a matter of fact way for the

purpose of future recall.

On the other hand, the intellectual meaning he made from the artifact of

the article in his hometown newspaper was captured in his statement,

> "All a forensic artist is is a tool for detectives. We don't solve crimes. But
> we help the detectives save hundreds of man hours. . ."

I interpret this to be an Explicit leaning Implicit Knowledge [E\IK] display

because it was for Renaissance Man a situational certainty that can only be

partially explained. I mean a definitive explanation of how a forensic artist's

talent as a tool for law enforcement is a case-specific situation and therefore only

partially explicable in general as a tool.

In Interview One as I mentioned earlier (on page 170), Renaissance Man

was not forthcoming about his life history other than in relationship to the act of

drawing and his love for it. As I mention (on page 183), the act of drawing is a

spatial reasoning attribute that he apparently understood on a Tacit level since the

age of 4 or 5 years old. I then find it is within reason to interpret that from the 4-

year-old to the 61-year-old Renaissance Man, the activities he pursued in his life

that had an intellectual meaning for him needed to have a 2-D visual spatial

reasoning component to it. The inductive evidence for my interpretation is based

on RM's own words and actions. For example, when he says (on page 183):

> "I never really paid much attention to [how I knew how to draw] but I just
> knew that I could…I would love doodling. . . sketching and drawing just
> came naturally to me."

Another example is

"Uh …all through high school I was a cartoonist. I did more studying of uh …cartooning characters than I did what I was supposed to be paying attention to."

This did not, however, extend to a 3-D visual/tactile spatial reasoning.

Because as he said (on page 184):

"I can . . . remember in the 4th grade was soap carving. Take a bar of Ivory soap and carve out an animal's head and uh…I didn't make the teacher happy with the way I did it, and so she flunked me. So I flunked my only art course I ever had…"

Further inductive evidence of Renaissance Man's compulsion for the intellectual spatial reasoning afforded the act of drawing manifested itself in the form of the drawings he made of fellow GI's girlfriends while he was with his Army Reserve Unit on weekends. Despite the fact that he was paid for the drawings he made, this does not, for me, completely mask what Csikszentmihalyi (1991, p. 67) refers to as the Autotelic Experience [the intrinsic reward] he receives from the act of drawing. By this I mean his need to satisfy his intellectual spatial reasoning compulsion would guarantee that he would have found a reason to draw even if he was not being paid for it.

From Interview Two, the Explicit Knowledge [EK] RM used, in terms of the intellectual meaning he made of his facial reconstruction process, was again expressed in his own words when says (on page 191):

"It's been …since the year 2000 since I have done this [a 3-D clay facial reconstruction]. So we're going to see …how much I remember.

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In other words we're going to see how much of the pre-sculpting technical preparation training he can recall and carry out, in terms of determining the sex, age, ethnic affiliation, and the attachment of the soft tissue depth markers.

The Explicit leaning Implicit Knowledge [E\IK] Renaissance Man used to make the above determination is based on what Krogman (1973, p. 114) calls the skull's anatomical (osteological) descriptive features (traits). The general impression may be verified by observation of the mandible, nasal aperture, orbits cheekbones, supraorbital ridges, glabella, forehead contour, mastoid processes, occipital region, palate and teeth, and skull base (Krogman, 1973, p. 115). The inductive evidence became visible when (on page 189), in his own actions, he gestured to confirm the heaviness of the brow ridge for sex, commented on both the missing wisdom teeth for age, and the shape of the eye sockets/orbits for ethnic affiliation.

In terms of the meaning Renaissance Man makes of the emotional factors in his work and life that contributed to his current involvement as a forensic artist, an example comes from the above mentioned hometown newspaper article in his following comment:

> The most heartbreaking [2-D reconstruction] I ever did [was] the 15 year old case of a child who might have been about 3 [years old] whose body was found in Washington State. A Seattle newspaper ran a major story titled "Baby Jane Doe." It was disappointing though, The victim had a picture the of a postage stamp; the picture of the detective runs a half-page.

Analysis of Interview One

From this first of a series of three interviews with Renaissance Man the following data was obtained. He had 5 progressive Re-lived Epiphanies leading up to his Major Epiphany (see page 160). Yoda's Mom's experienced 2 Minor Epiphanies (progressive) and 1 progressive Cumulative Epiphany (Table 5).

The Sub-Categories of a Major Epiphany (Re-lived, Minor, and Cumulative)

Table 5

Re-lived	Minor	Cumulative
Progressive	progressive	Progressive
My dad said teachers would be impressed with the fact that my stick figures, which were on different from anybody else's stick figures at age 4 or 5, I was throwing with them. Or if I had a stick figure standing next to water, I was showing a reflection in the water (p.183). Kids, my age they don't do that (p. 183). All through high school I was a cartoonist . . . at 14 years old, I was a cartoonist for a local radio station and I drew caricatures of the radio station personnel (p.184).	I never paid much attention to that but I just knew that I could . . . I would love doodling . . . sketching and drawing just came naturally to me (p.183).	
I never had a formal art course (p. 184).	The only thing I can really remember in the 4th grade was soap carving. Take a bar of Ivory soap and carve out an animal's head. I didn't make the teacher happy with the way I did it, and so she flunked me. So, I flunked my only art course I ever had (p.184).	
In 1957, I joined the [Army] Reserves, my weekends at Fort USA (pseudonym) would be		I was really proud of that because I was moving into the big time of commercial art.

spent [doing portraits]. "You got girlfriend, you want a picture of?" They'd hand me a wallet size photo of their girl and the next day I had a sketch of their girlfriend and they gladly paid me a dollar for it (p. 187).		Because one weekend I made more than most people made as a private all month long in the Army. Back in those days about 70 Dollars a month (p.187).

From Table 5, Renaissance Man's life history, the following patterns and recurring themes emerge. Within his progressive Re-lived Epiphanies, the reader can see a personality shaped by his Tacit knowledge of 2-D spatial problem negotiation and solutions of drawing that lead up to his Major Epiphany.

Analysis of Interview Two

From this second of a series of three interviews with Renaissance Man the following data was gathered. He experienced (8) occurrences of Explicit knowledge engagement; (6) of Implicit sub-categorized into (4) Explicit leaning and (2) Tacit leaning episodes (see Table 6).

The Sub-categories of the Ways of knowing

Table 6

Explicit (Re-lived)	Implicit (Tacit leaning & Explicit leaning	Tacit (Major)
It's been since the year 2000 [6 year as of this Interview] So we're going to see how much I remember (p.191).		
	Obvious from this [meaning the brow ridge of the skull]. [Age wise, touching the right inside edge of the mandible, he asks] Do you go by the fact that he has no wisdom teeth? (p. 192) *I was looking at the cranial*	

	sutures They're finished [meaning the cranial sutures are filled in]. A wild guess Caucasian? [meaning is he Caucasian] because of the [shape of the] eye sockets [E\IK] (p. 193).	
	It's [soft tissue depth marker number one] not on the forehead like the Chart [Rhine] shows in the front view [E\IK](p. 194).	
Her trademark reconstruction. "He had a mustache and a big head of hair . . . she sculpted all of it . . . which I thought was fascinating. Now that's the mark of a real artist, she's a real artist . . . but she also knows the science. I mean you knew where the science was controlling her and you also knew where the art was taking her (p. 196).		
I put these tissue depth markers on [the skull] according to . . . I look at straight lines. Straight lines this way [gesturing horizontally], straight lines that way [gesturing vertically], across the top of the eyes, across the top of the forehead, to see what lines up like [tissue markers] 13, 15, 16, and 17 are eventually gonna make a band around the zygomatic arch. There is a suture point there [where marker 16 attaches to the right hand side zygomatic process]; a suture point there [where marker number 16 attaches to the left hand side zygomatic process (p.200).)	.. . These [tissue markers] don't have to be exactly, I my estimation, as the Chart indicates because they are tissue depth markers. We just know that when we're laying the clay that tissue depth ought to come close to what these markers tell us . . . As long as you can just eyeball the factors of linearity . . . you're pretty much on target with how you're gonna lay in the clay [E\IK] (p.200).	
. . . The band you talk about is that strictly from forensics or other experiences that you've had?(p. 201).		

Table 6 (continued)

It's just from the training that I've been through on this as far as noticing the Chart does take on an art, I almost hate to use the word, artistic but it is a mixture of art and linearity it's a very linear thing, I mean, you can see a design here (p.201).	. . .Because on some cast skulls the suture marks won't show so you have to kinda eyeball the artist intent who drew the Chart to know where these points are [on] your own anatomy [T\IK] (p.201).	

These next three items concern the sex, the age, and the ethnic affiliation of the skull. Unlike Yoda's Mom, Renaissance Man wanted the sex and age information provided to him. In truth a Forensic artist should never make sex and age determinations in an actual case. But the artist should be confident enough about her or his very basic anthropological knowledge of the differences in the characteristics between a male and female skull and the appearance of the cranial sutures to at least ballpark a determination. Because Renaissance Man was apparently reluctant to speculate on the sex, age, and the ethnic affiliation of the skull, this suggested that he had done mostly drawings in his forensic work, which was confirmed by ProjectEDAN artifacts.

So to put Renaissance Man's data comments in context I need to repeat our verbal exchange from (p. 192) to his initial question:

Ah, what do you know about the about the case?

He is a male, obviously. Well, I shouldn't say obviously but. . .

[Simultaneously pointing with and making a back and forth rounding gesture, with the middle fingers of both hands, over the area of the brow ridge of the skull, he says].Obvious from this *[E\IK]*.

He's in his mid to late 50s.

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[Touching the right inside edge of the mandible, he asks]
Do you go by the fact that he has no wisdom teeth? [an *E\IK*
heuristic method to determine the age of a skull].

I was looking at the cranial sutures primarily.

They're finished *[E\IK].*

Well, except for the back of the skull . . . Anything else you'd like to know?

A wild guess, [he is] Caucasian? Just because of the [shape of the]
eye sockets *[E\IK].*

Oh not wild, right on the money.

Analysis of Interview Three

As I mentioned on (page 203) I had again failed to budget the time allocated

per interview wisely and ran out of time to conduct Interview Three on

Renaissance Man's Intellectual and Emotion reflections about his work in

Forensic art. I again have to do what I did with Yoda's Mom's third interview,

that is, to glean from my available data source the inductive evidence toward a

grounded Multistable theory for Curriculum and Instruction. So again, by

examining the Ways of Knowledge RM engaged in, his Epiphanies, and the

negotiation between and among the Complex Adaptive System agents of the

Right Action, Livelihood and Effort I can capture a portion of RM's Intellectual

and Emotional reflections.

Interview Three: Reflections Data

Intellectual Meaning		Emotional Meaning	
Ways of Knowing (gleaned from all sources)		Epiphanies (gleaned from all sources)	
Implicit (Tacit leaning /Explicit leaning)	Explicit	Re-lived (Regressive)	Minor (Regressive)
I've been drawing Portraits for 40 years [T\IK] (p.172)	Evidence of RM's Explicit Knowledge showed itself . . . When RM talked about his post Major Epiphany forensic artist training, he relates in the details of with whom and where his training took place (pp.173-174).	. . . You had to go to a specialist like Karen Taylor and people like Betty Pat (p. 173). His recollection of his observation of watching Betty Pat work on her trademark reconstruction and being fascinated (p.196).	Where do I go to get formal training? There was no such thing [as formal training in Forensic Art] in a university or a college (p.173). . . . It's been since the year 2000 since I have done [a 3-D clay facial reconstruction]. So we're going to see how much I remember.

Table 8

Intellectual and Emotional Meaning		
Complex Adaptive Systems Agents		
The Right Action	The Right Livelihood	The Right Effort
Intellectually, Renaissance Man learned from the beginning of his involvement in Forensic art that had to educate his potential users [law enforcement]. As to what exactly Forensic Art is and why it is to their advantage to have access to those services (p.172). Also, RM comments, ". . . A forensic artist is a tool for detectives. We don't solve crimes. But we help the detective save hundreds of man hours (p.205).	A zero sum result should not exist for the forensic artist, the user of her/his services, and identifying the John or Jane Doe then RM's emotion is understandable. "The most heartbreaking reconstruction I ever did was the 15 year old case of a child . . . about 3 [years old] whose body was found in Washington State. A Seattle newspaper ran a major story titled 'Baby Jane Doe.' . . . The victim had a picture the size of a postage stamp; the picture of the detective runs a half page (p.207)	An example when the Right Effort was clearly not applied was when Renaissance Man repeatedly tried to glue soft tissue depth marker number six to the area obscured by the upper plate of John Doe's dentures (the third contributing reason p.199).

CHAPTER SEVEN

Tao Darma Man

The data from Tao Darma Man is the third of three case studies that will provide additional inductive evidence to support a Grounded Multistable Theoretical Model for Curriculum and Instruction based on the Tacit Knowledge Exhibit while Creating a Forensic Craniofacial Reconstruction. These data were collected in the forms of a pre-interview Questionnaire, three face-to-face interviews, and direct observations.

As I have indicated previously, under the heading ProjectEDAN Participants on pages 74 and 76, I am a member of ProjectEDAN and a participant in this study. I am Tao Darma Man; I have chosen to write about my data in the third person to maintain reading consistency in terms of confidentiality.

The Questionnaire was designed to collect broad pre interview data that would serve as a basis for opening questions for Interview One. Interview One: Focused Life History is best suited for acquiring the participant's most relevant detailed inductive evidence of Re-lived, Minor, and Cumulative epiphanies data that led up to their Major Epiphany. The Details of the Experience of actually doing a Facial reconstruction, Interview Two along with its direct observations best highlights the essential inductive data from the participant as it actually

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occurred in real time. The third Interview seeks out the participant's reflections on the meaning Seidman (1998, p. 12).

The Questionnaire

Briefly paraphrased, the Questionnaire items from page 80 of this study are. When and/or how did you become interested in doing forensic craniofacial reconstruction? What has been your educational training in art and forensic craniofacial reconstruction in particular? What is your level of certification? How many years of experience do you have at doing forensic craniofacial reconstructions? How long have you been with ProjectEDAN? Do you prefer doing: 2-D or 3-D reconstructions? Why? Do you prefer to use: the American, the Russian, or Manchester method? Why? Do you see working as a forensic craniofacial reconstructionist primarily as an artist, physical anthropologist, or a combination of the two?

His Epiphanies: from the Questionnaire

When and/or how did you become interested in doing forensic craniofacial reconstructions?

Tao Darma Man first became aware of sculpture being used for forensic purposes, when a former classmate of his, Dirk Nelson, sent him an article by Erik Larson, from the October 8th 1987 *Wall Street Journal*, about Betty Pat Gatliff, titled "Forensic Sculpture Gives Skulls a Face, Sometimes a Name: Busts by Betty Pat Gatliff Often Help Police Identify The Missing or Murdered."

Dirk is always sending me interesting drawing and sculpture related articles from newspapers, magazines, etc. This particular article caught my attention on a number of levels, the sculptural, the facial depiction, and my love of puzzle solving. But, since I had just started teaching elementary school art at the time, and was finally making some real money after grad school, and I had no idea where to begin to find out more about this kind of sculpting, the article went into my "to considered later file."

It was not until three years later, in 1990, when an opportunity to try a Forensic Sculpture Class came around. It was offered through the TDM's City (pseudonym) Natural History Museum by Dr. Michael Charney, a well known physical anthropologist, and I thought it sure would be nice to do that if I just had the time, because, I was back in grad school pursuing a PhD and the forensic class was very expensive. I was talking to a very dear friend about the class and why I couldn't do it and she said, "If you don't take the class, it will always bother you that you didn't and if you don't spend that money on the class you will just spend it on something else." That totally enjoyable two day class put me on the 17 year path of doing Forensic Art in my home State.

When I asked, in the questionnaire: *What has been your educational training*

(formal and/ or informal) in forensic art in general and forensic craniofacial

reconstruction in particular?

My forensic craniofacial reconstruction education is rather limited. I have only had two formal classes, the one with Dr. Charney in 1990 and the other in 1992 in San Antonio, Texas with the national known, and co-creator along with the noted physical anthropologist Dr. Clyde Snow, of the American Forensic Sculpture Method, Betty Pat Gatliff.

Informally, it was primarily my intellectual curiosity that led to finding Mikhail M. Gerasimov's book *The Face Finder*, and the facial reconstruction techniques used by John Gurche.

What is your level of certification?

Because I had been doing 3-D sculptures and 2-D drawings for a number of coroner's and sheriff's offices in my state since 1990, I thought it would help establish my credibility with agency in my state who might be

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considering but had not used my services, if I became certified through a recognized organization.

In 2006 I applied for, took, and passed the examination process for The International Association for Identification to become on April 28th a (level 1 composite artist) Certified Forensic Artist (CFA).

How many years of experience do you have at doing forensic craniofacial

reconstructions?

Because the field of forensic art is not a full time profession most reconstructive or composite work be it respectively 3-D/2-D or 2-D is done as a part-time, per-case, free lance job. So, although I have been doing forensic art for the last 18 years it has been as a free lancer.

Which do you prefer doing 2-D or 3-D reconstructions? Why?

Even though my first experiences in doing art in general has been two-dimensional (drawing and painting), see myself artistically to be a sculptor. I am comfortable and competent with both forms of expression, but I prefer three-dimensional reconstructions. Why I have this preference is to paraphrase Michaelanglo "The difference between sculpture and [drawing] is like the difference between illusion and truth."

Which 3-D reconstruction method do you prefer to use: the American, the

Russian, or the Neaves? Why?

Most, if not everyone who becomes interested forensic facial reconstruction to the point of actually doing a class is taught the American Method. This method has been the standard for doing facial reconstructions, in the United States, since its development in 1967 by Gatliff and Snow.

This method could not have been taught for so long to so many beginning learners or used by so many practitioners in the field if it did not produce reasonable likenesses from the skulls of unidentified persons. But, based on my experience as an art student, teacher, and artist I found the method to be wanting in at least three ways.

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First, the *Rhines's Charts* show the positions of the soft tissue depth marker as flat black dots and/or thick lines applied to a flat two-dimensional skull. The problem is neither the soft tissue markers, which are generally cut segment of cylindrical erasers) nor the surface of the skull or a plaster copy of the skull to which the markers are glued is in fact flat. The inexperienced beginner faced with this problem will tend to glue the markers on in the most symmetrical and linear way possible on the uneven surface of the skull to match the Chart exactly. This creates a forced symmetrical distortion in the outcome of reconstruction from the very beginning, even though no human face is symmetrical.

Second, the compounding problem is what I call *the mirror effect* the tendency for beginner, in particular, to sculpt their own facial features onto the skull they working on, because their own facial features are the ones they unconsciously know the best.

Third, and farther compounding the problems of the American Method is the algorithmic reconstruction approach, that discounts or ignores the importance of a fundamental understanding of facial anatomy, tends to produce, in my opinion, mannequin-like facial features.

Neither the Russian nor the Neaves Methods are prone to the American Method problems, because only a more experienced forensic facial reconstructionist is likely to use these methods. As for the Russian Method its strength is, anatomically more accurate than the American Method because, the approach requires the reconstruction be built muscle by muscle from the surface of the skull out to the skin. The Russian Method's weakest compared to both the American Method and the Neaves Method, comes about for two reasons. First, it does not appear to take into account the anthropological information about the unidentified person's body built, probably because the Russian Method was initially not used forensically, but to give faces to the remains of prehistoric and historical figure like Ivan the Terrible. Second, given that Gerasimov, the developer of this method, himself had a strong background in anatomy; it was probably taken for granted that only those reconstructionist with a similar background would use this method.

The Neaves Method is a synthesis of the American Method and the Russian Method in that it combines the best features of both, respectively, the uses of the anthropologically determined soft tissue depths marker placement with the anatomically more accurate muscle by muscle reconstruction approach. For this reason a Neave's like method is my preferred 3-D reconstruction method.

Do you approach your work as a forensic craniofacial reconstructionist

primarily as an artist, a physical anthropologist, or a combination of the two?

> Although my strength in a facial reconstruction task is as an artist, I can only respond to this question from the understanding that neither the art nor the science alone can product a reasonable likeness of an unidentified person. It is a mutual support process were the shortcoming of one are compensated for by the powers of the other an vice versa. In the words, it is beneficial to know anatomically and anthropologically what the name of given muscle is and thing to be able convincingly draw or sculpt it. So I would say I work as an asymmetrical combination of the two.

Ways of Knowing: Tacit, Implicit, and Explicit

In this section I show, as I did with Yoda's Mom (on page 119) in chapter five and with Renaissance Man (on page 178) in chapter six, the respective analogous relationship between first Tao Darma Man's Major Epiphany with his Tacit Knowledge, second his Cumulative, and Minor Epiphanies with his Implicit Knowledge, and third his Re-lived Epiphanies with his Explicit Knowledge.

The reader needs to be reminded about the distinction I made (on page 120), between Tacit and Implicit Knowledge, in order to illustrate these analogous relationships. Tacit knowledge is impossible to adequately communicate to another person in either verbal or written language, and/or mathematical terms. This means the above mentioned conventional methods of explicit communication or combinations of these methods cannot help a learner/student understand, internalize, or repeat the actions they observed in the person that performed his/her actions in a taken for granted manner.

An example would be if you, as a professional unicyclist, gave another person explicit verbal, written and mathematical instructions on how they must maintain their balance while riding a unicycle and then expecting them to ride a unicycle like you would from your explicit instructions alone. Another example would be the difficulty we sometime experience trying to get a computer software program that we are unfamiliar with to work correctly from the information in the instruction manual. A personal example of mine is that I have always been able, as far back as I can remember, to rotate an object in my mind, yet after 30 years of being an art teacher I was never able to write a lesson plan that could instruct my students how to perform this simple task.

The communication of one's tacit knowledge to other people appears to be transmitted through the intentional or unintentional demonstration of our taken for granted activities that can only be received through the attentive observations and a focused level of intellectual involvement of the observer. This is what Polanyi (1967) was referring to when he said:

> "it can be argued . . .that the possibility of teaching these appearances by practical exercises proves that we can tell our knowledge of them. . . we can do so *only by relying on the pupil's intelligent co-operation for catching the meaning of the demonstration"* [italic emphasis mine] (p. 5).

The communication of Implicit Knowledge is fundamentally different from Tacit Knowledge because it can be transmitted by conventional as well as unconventional means in the form of **partially explicable** *moments of experiential certainty* that another person may have at some previous time experienced, understood, or internalized on a level that can make the unfamiliar

seem intellectually familiar. By ***moments of experiential certainty*** in this case I mean **partially explicable** verbally, in writing, mathematically, and/or a demonstrative presentation that falls within or at least borders on another person's sensibility and/or intellectual frame of reference. Take, for instant the perennial "What I did over My Summer Vacation" essay re-conceptualized as "What My Summer Vacation looked, sounded, smelled, tasted, felt (tactile) like when I or we did such and such." Because we all have experienced the sights, sounds, smells, tastes, and textures of summer. Another example would be the metaphorical familiarity of learning to steer a car using a wheel based on our previously understood and internalized like experience of steering a bicycle with a bar.

TDM's Major Epiphany is analogous YM's Tacit Knowledge experience in the sense that it was the intentional demonstration of the taken for granted behaviors of Betty Pat Gatliff and Dr. Clyde Snow from the news bite that YM actively received through her observations and the level of her intellectual focus on what those people were doing which was "enough to turn [her] head." In other words, this is what Denzin (1989b, p. 71) refers to as "the major event, which touches every fabric of a person's life" and what I called (on page 84 of this study) ***a personally affirmed moment of total, though inexplicable, certainty.*** Once again the reader must keep in mind that the progressive Re-lived, [proRe-lE], Minor, [proME], and Cumulative Epiphanies, [proCE], as well as the regressive Cumulative, [regCE], Minor,[regME] and Re-lived Epiphanies [regRe-lE] that lead up to and away from the Major Epiphany.

The Interview Setting Tao Darma Man

Our first meeting of three meeting was scheduled for 11:00 am, on Wednesday the 3rd of October. The series of interview with Tao Darma Man were conducted starting on Wednesday the 3rd, continuing on Friday the 5th and finishing on Monday the 8th of October, 2007, at his home and studio in the City of Tao Darma. The weather on all three days was mostly sunny, highs in the upper 50s to the mid 60s and lows in the mid 30s. Tao Darma City has [an estimated, as of the 1st of July 2006] population of 566,947…a land area of 153.3 square miles, a water area of 1.6 square miles, and a population density of 3,642 people per square mile.

Tao's home and studio are located in the northeast part of the city. The area is bordered on the North by a major interstate highway; on the South by one of the main east/west streets of the city. On the West, the area is border by downtown TD City; on the East by a north/ south spur off the above mentioned the North by a major interstate highway.

I arrived more or less on time and was greeted warmly at the door of TDM's small, single story, brick home. I was instructed to take my shoes off and was offered a pair of house slippers to wear. I refused the slippers but asked if it was okay if I just walked around in my socks, which was fine. I was asked if I would like something to drink, green tea or coffee, both of which I declined and asked for water instead, upon which I was handed a chilled bottle of water.

Tao Darma Man is in his early sixties, a small man of medium built, 5' 3''
feet tall. He wears rimless reading glasses and has a salt and pepper moustache.
TDM can best be described as a loner. He gives you the feeling that he has never
had a mentally idle moment in his life. He appears to be, as he says a friend of his
once said about him, as being a creature who strives for excellence in whatever he
does.

As you enter the house into the living room which leads straight into the
dining room area to the kitchen beyond, there was a cluttered but comfortable feel
to the space, with framed art work on the walls, sculpture pieces, masks from
Africa and Japan, and bookshelves filled with books in a variety of topics. After
you have visually scanned everything in the rooms there always seems to be an
interesting item you seemed to have missed but can't imagine how you did.
TDM was dressed casually wearing an oatmeal-colored baseball cap with the logo
for and the words Oregon Shakespeare Festival printed on the front of it, a light
blue shirt with a dark grey sweatshirt over it, tan colored khaki pants and a pair of
white terrycloth house slippers.

Interview One Tao Darma Man's Life History in His Voice

Interview One was conducted in the dining room area at a large round oak
dining table cluttered with books, a laptop computer and printer, coffee cups filled
with pens/pencils, and a bowl full of Dove dark chocolates.

OK …Tao, We'll talk about your art background and what it is that has brought

you to doing forensic reconstructions.

Ok when you say my art background, what do you mean?

Let's talk about when you were a child and what it was that made you recognize

you wanted to be an artist.

Um … I liked as a kid to make things…and it really didn't matter what it was. I mean, I didn't have a whole lot of, you know, different materials to work with. But uh the one thing that was always available was paper and pencils. It was one of the ways to make things and to possess things that I didn't have. *[proRe-lE]*.

Like um like if I wanted a lion, I could I could make a lion. If I wanted an eagle, I could make an eagle. So it was, you know, <u>the magical thing of making</u> *[proRe-lE]*. I guess. If that makes sense.

It does to me.

This last comment about "the magical thing of making" is also an example

of what Csikszentmihalyi (1991, p. 67) meant by an Autotelic Experience that

Yoda's Mom and Renaissance Man both respectively had as what YM described

as *"soothing"* (on page 115) and when RM said *"I would love doodling"* (on page

171).

What is it that led you down the path of doing that? Becoming an artist.

Well, it was one of the things I was good at. And it was one of the things that other people said I was good at, so I guess it was a positive reinforcement of feeling that I was good at something and having it confirmed by other people *[proRe-lE]*.

So when you started college what was it that you decided to major in?

Engineering (Laughs).

Um that was because. Well I mean everybody kind of goes through this thing about the starving artist. You know, how are you going to make a living as an artist? And uh since there's not a clear career path as to you know going from college to feeding yourself as an artist, everybody thinks well you know I gotta have something else to do to make a living so them maybe I can do the art on the side *[proRe-lE]*.

Well, I decided on engineering because my best friend in high school Ulyses Martin was, you know, going into engineering and I was good at math in fact we had every math class that you could possibly take at the high school until we ran out of math classes to take and uh so I was good at Algebra, Advanced Algebra, Geometry, Solid Geometry. Um at the time they didn't offer Trigonometry class *[proRe-lE]*.

That didn't happen till I got to college but I thought, well, I got math down then I can probably use some of the art because actually I went into engineering because there was no architecture school at the University of My State (UMS, pseudonym) at the time. So you had to take a certain number of engineering courses and a certain number of art courses and this was all kind of in the ether somewhere and then you went to the BigCity (pseudonym) to take the exam for your architecture license *[proRe-lE]*.

So um that's kind of an out-of-the-way, convoluted way of kind of answering your question.

So, when was it that you gave up the engineering idea?

Um, that was after I had calculus. I always thought I was pretty good at math until I got to calculus. And then it just stopped making sense to me all together.

And then um having Dr. Calculus (pseudonym) …he was the professor I had for it and uh he lived, and breathed, Calculus. It was, you know, his thing.

So he never could get into his mind that there were people that couldn't do it the way he did. And couldn't do it at his level. So you'd go to class, a big lecture class and he'd ask did anybody have any trouble with such and such problem and you'd raise your hand and ask and he'd start writing out the uh problem, equation and uh he'd get bored and say "Well, yeah Ok. This is the answer." And he'd just write the answer down. And then uh

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he'd do that with several other problems so you never got to see the whole step-by-step process from the beginning of the problem to the end of the problem cause, he got bored because it was too easy for him. So, that contributed to me flunking out of engineering and calculus and whatever *[proME].*

So the university gave me another shot and I figured well the only other thing I was good at was art. So I went over to the Art Department. And first semester there, grades started to go up again and uh you know I thought well, OK, I'm home.

This next comments fall into a special and unforeseen category of the

Major Epiphany. It is what I am interpreting as a progressive Major Epiphany [pro

ME]. What I mean by this, is the progressive Major Epiphany precedes the main

Major Epiphany in one's life but it has less influence on your life's direction

when it occurs than the main Major Epiphany, but far greater impact than a Minor

Epiphany in terms of understanding a major problematic moment in a person's

life.

It wasn't until my second semester in art when I had my first sculpture class and uh it was a carving class – woodcarving class – and I was listening to the professor, you know, lecture about, . . . carving and all, and then it hit me.

That is the same stuff that Dr. Calculus was talking about in terms of Calculus.

It was that the sculpture professor explained it in term of the visual and three-dimensional and Dr. Calculus was explaining it in terms of numbers and words.

So then everything clicked and made sense **[ME].**

Well, if Dr. Calculus had been more of a sculptor, I would have probably been an architect (laughs).

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It sounds like the technological aspects of the doing things like that really appeals to you as far as the engineering, architecture and the art.

So as you were sculpting, how is it that you became intrigued with the human form?

Good question.
Uh …well, I've always been intrigued with people. Uh I mean even as a little kid I remember just people-watching. And I probably did more of it in church than listening to the sermon (laughs). But uh I just found the way that people move and do things that they do is just really interesting [proRe-lE].

Something that comes to mind especially when I'm doing a reconstruction is that one soliloquy from Hamlet Act II, scene II comes to mind

"What a piece of work is man! How noble in reason! How infinite in faculties! In form and moving how express and admirable!…The beauty of the world-the paragon of animals!

People are just interesting. I don't know how to explain it any better than that.

I thought I was going to be a painter. I didn't know at the time, that deep down, I was a sculptor. So I took a lot of drawing especially life drawing classes [reg CE]. I thought maybe that's one way you could make a living as an artist was a portrait artist.

But then I had a professor Ed Morton for drawing in fact he was an adjunct professor. He was and had been in commercial art for years and years and one of the words of wisdom he gave me – he always spoke metaphorically – he said "It is the hunter with the most arrows in his quiver that gets the game."

And he also said "It's not that you don't have the skills or the talent to do commercial art." It's just a cut-throat world. It's constant deadlines and you would probably lose your love for art by going into commercial art as opposed to teaching.

And uh so he pretty much convinced me to go into education to teach.

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So how did you take the path to learning more about sculpting rather than

two-dimensional art illustration in commercial art in that aspect?

> Um that goes back to my childhood and um …I have to show you something. I know it's not going to show up on the camera but …

He shows me a woodcarving of a pack animal a mule or a donkey.

> This is a carving I did when I was ten years old.

Wow, for a ten year old, that's very good.

> I spent a lot of time in the library and when I wanted to know something I would generally go to the library and try to find a book on it and try to figure out how it worked from there because I realized even as a little kid I always thought in three dimensions [reg CE].
>
> So I found this book on carving you know with a pocket knife. Um the piece is not complete anymore because it had a pack saddle and things and ropes that were done with cord string. The animal itself that's part of a 2x4 that I carved that out of and it was a matter that because my family, parents, knew that I was only going to use the knife for carving they didn't have any problem with me having a pocket knife at home.
> I could work on that for hours. It is just, I would lose total track of time. So the sculpture element was always there [reg CE].

> The last three sentences indicate that he had an Autotelic Experience.

Although Tao Darma Man's woodcarving was not a graded school art project, his

experience with carving contrasts sharply with the above mentioned (on page

184) soap carving experience that Renaissance Man had.

> But you get seduced, when you going to college, with the idea of real artist are painters so you go down the painting route. Well um the drawing I think was more to my heart than the painting was. Not that I'm a shabby painter. I mean, I'm not the best but I can paint I can hold my own as a painter. But it was the drawing that was more fascinating to me that the color.

And um later on I realized for myself that the drawing and the sculpture were more closely related to what I really wanted to do than the color in painting was because the color eventually became insignificant.

So it's just stripping it down to the structure I suppose. Would that be in

line with working from a skull and building out in forensic sculpture?

Well um I didn't personally know that forensic sculpture existed at the time.

Well, yeah, I mean, when I think historically um Gerasimov was doing it long before it ever got to the United States and there was a couple other people before him that tinkered with it but they didn't use it for, you know, law enforcement purposes. They did it to see what the faces of people look like from the past not as a tool for law enforcement.

So yes there's the structure of things the um physicality of things I guess could say is something that fascinates me along with the fact that I thought in dimensions.

I could, from as far back as I can remember, I could always rotate objects in my mind [reg CE].

That's interesting. So relating that to sculpture, that must have been a great

advantage in coming at an object and trying to portray it in 3-D. Let's talk about

the techniques that led you up to working in different materials. What other

materials did you work I besides wood? Because you started out with wood

sculpting?

There was always you know clay, Years and years ago there was a plastocene clay that was out there. Not like the oil based clay now. Uh I can't even remember the brand name of it now, it was so long ago…but um I liked working with that but it didn't have the structure to it and because I wasn't aware of armatures that you couldn't just build up a clay piece. You have to build up that clay piece on some kind of a structure. I didn't understand armatures that way but I did realize that it did need some type of understructure to it. So I'd put things in the clay to help

support it but since they weren't supported by a base, they fell over it was frustrating.

Um so wood made the most sense because you didn't need the armature and besides there was some about the subtractive process that was just …it I think . . . it was Michelangelo who said that the sculpture is inside, you just have to eliminate the stuff that's not the sculpture. So it was like um a three-dimensional investigation.

Well it's obvious from this first piece that you did that you understood that the sculpture was in there somewhere because this is really good for a 10 year old to have done.

In school when you were pursuing your teaching and your actual degree in art, how did you go on from the wood carving experience? What did you do next?

Well to become certified as a teacher back in the day um you could have your specialty area, but you expected to be um competent, knowledgeable about as many different media as possible.

So um at the UMS at the time they had um what they called their craft, basic craft classes where experienced a little bit of jewelry making, a little bit of ceramics, etc. *[pro Re-lE].*

Interview Two Tao Darma Man's Facial Reconstruction Process

Interview One has given the reader an insight into how Tao Darma Man's

Epiphanies (Re-lived, Minor, and Cumulative) have influenced his

comprehension of the Facial Reconstruction Process in terms of recollected

significant experiential live moment (i.e., the subcategories of Epiphanies) that progressed up to and regressed away from the participant's Major Epiphany.

In this Interview, I present the reader with the Ways of Knowing TDM is interpretively engaged in at the given moment. The types can either be Explicit, Implicit (which subdivides into Tacit leaning Implicit, or Explicit leaning Implicit) or Tacit. I need the reader to understand that Explicit and Tacit problem negotiation are both respectively and simultaneously science and art oriented.

The negotiated interactions between and among the different Epiphanies and the various Ways of Knowing serve as the Agents that will provide an insight into the Complex Adaptive System of the Forensic Craniofacial Reconstruction process in general; a glimpse at the details of Tao Darma Man's facial reconstruction process in particular.

Interview Two was conducted in his studio area, which for Tao Darma Man means anywhere in the house with exceptions of the bedroom, the kitchen, and the bathroom. The reconstruction was done on the white wrapping paper covered round oak table in dinning room area. I wondered and asked why he would want to be doing a Forensic Facial Reconstruction on his dining room table. With a look of "why not" on his face he said, "The table is covered with everything bio-hazard free, and it is the only room that has north facing windows for a natural source of consistently even light."

At this point once again, it is not only important for the reader to understand and keep in mind that they will not witness the entire three-

dimensional facial reconstruction working process from beginning to end. And also that the artifact of male plaster skull I used for Yoda's Mom's and Renaissance Man's in their respective Second Interviews will not be the same plaster skull I used for Tao Darma Man for the following reasons. First, because I am Tao Darma Man and the male plaster skull I used for the other two participants was one of my own successfully resolved Facial Reconstruction cases. I am thoroughly familiar with the procedure for re-creating the face on this skull. Second, in order for me as a participant in this study to have the same natural responses Yoda's Mom and Renaissance Man had while reconstructing the face on the skull of, an unknown to them, I had to provide the same circumstances for myself as Tao Darma Man. Third, fortuitously I received an actual case, a Jane Doe, from one of the Coroners Offices in the state, which provided me with all of the basic information from the Physical Anthropologist report in the skulls (sex, age, ethnic affiliation).

This Facial Reconstruction case was supposed to have been used to initially train my apprentice, but because of the severe damage to the skull it would have been far too difficult for a beginner to do as a first real case and more than a challenge for me. Therefore, for Tao Darma Man, I substituted a plaster copy of a female skull for his reconstruction.

As I mentioned above (on page 141), the facial reconstruction process using the American Method could take from 12 to 18 hours to complete. Because Tao uses the Neave Method of Facial Reconstruction the process would take

conservatively 24 to 36 hours. The fundamental difference between the American

Method used by the other two participants and the Neave's Method is in the

application of the clay to the skull after all of the soft tissue depth markers are in

place. For a more in depth explanation see Taylor (2001, pp. 341-345). That

application of the clay is anatomical as opposed to algorithmic. What that means

is the clay is applied relative to the tissue depth marker on the skull to replicate, as

much as possible, the muscle by muscle re-creation of the face from the muscles

closest to the bone to the ones just beneath the skin. Conceptually, it can be

thought of as a reverse dissection.

The allotted time for Interview Two was 90 minutes (Siedman, 1998, p.

13). At best, given that time frame, I would only by able to show the reader about

6.25% of the entire process which would leave the reader with a words and

numbers description of an image that would only be recognizable as a partially

completed exploratory gross dissection of the muscles in a human face.

Because the Neave Method is an anatomical procedure there is no

definitive starting point; it is the prerogative of the forensic artist to determine.

That being said, I fast forward the reader past the description of attaching the soft

tissue depth markers, which are all attached; the Temporalis muscles are already

laid in.

> The Temporalis is fan shaped, its fleshy part attaching to the temporal
> bone on the side of the cranium and its tendon passing under the
> zygomatic arch to the coronoid process of the jaw. It works with the
> masseter by pulling up the lower jaw with force against the upper one, as
> when the teeth are clenched (Gordon, 1977, p. 22).

These are the muscles on both sides of your head that you can feel if you

place your hands on the sides of your head and open and close your mouth a

couple of times.

As a reminder from (page 78) my apprentice began the Interview by

letting Tao know the video camera was going and asked:

What are you doing now?

> I'm starting the reconstruction from the muscle group closest to the bone
> and building out to the muscle groups that are the farthest out and then it'll
> be covered with skin or blended so that it appears to be skin *[EK]*.

> *As Tao was speaking, he was working on building, the Buccinator, on the*

right and then the left hand sides of the skull.

> The Buccinator is a flat muscle on the side of the cheek which blends
> rather broadly with the Orbicularis oris at the corner of the mouth
> (Gordon, 1977, p. 22).

> *I was going to ask you if you do this* [build the muscles] *symmetrically*

from one side to the other on the same muscle group?

> . . . Yeah. That way it keeps things in visual balance for me. I guess it
> really wouldn't matter but uh to start to get the feel for the structure and
> the form of the face it just . . . it really helps me to do it in a more balanced
> way *[EK]*.

> *As he was talking, he began working on building the left hand side*

Buccinator. Because my apprentice was unfamiliar with the Buccinators location

on the skull she asked:

> *This is the insertion for the Temporalis muscle? Is that what we are*

looking at here?

> I'm sorry, what?

Tao's response above at that moment indicated that he was functioning in a somewhat tacit mode in that he took it for granted that anyone who was watching what he was doing would have known that it was the Buccinator he was working on and not the insertion for the Temporalis [T\IK].

Isn't this the insertion for the Temporalis muscle? That has gone down and under the zygomatic arch?

No, . . . that would attach to the top of the . . . the . . .Well no . . . the . . . well yeah the . . . what's the name of that [trying to remember the name of the insertion point, the Coronoid Process of the Mandible, while he was pointing to and tapping on the Ramus of the mandible, with a sculpting tool] [T\IK].

Tao's mental search for the explicit name of the insertion point for the Temporalis muscle is an other example of functioning in a tacit mode.

The Ramus?

No . . . this is the Buccinator that runs from the inside of the Ramus of the lower jaw to the first pre-molar [where it blends with the orbital muscle around the mouth [Orbicularis oris] or it is suppose to represent that any way *[EK]*.

Ok.
I don't think illustrated books on facial anatomy show, except for (Gordon, 1977, p. 27) the insertion point [where the Temporalis attaches to the Coronoid process of the Ramus]. I know Gray's [Anatomy] does, but Gray's is a medical text book and not a Art text book *[EK]*.

I'll call that good for now [meaning the right hand side of the Buccinator is finished] I need to go get a . . . my Chart [a personally made photographic chart of the muscle anatomy of the human face done in clay].

So now you're building the Masseter . . . muscle?

Yes.

The Masseter is a flat muscle which runs diagonally over the side of the jaw. It covers most of the Ramus of the jaw and is attached to the lower border of it (Gordon, 1977, p. 22).

Will you always build that [the Masseter] out evenly with the zygomatic

arch?

I generally do. If it's not totally even it's got a little bit of a line but I try to build it even *[E/IK]*.

I see you've filling out the [Masseter] muscle to the height of the tissue

depth markers, but you have one marker that is much higher than the other one

within the same muscle. And I see you've left a dimple or depression there

between the two. Can you tell me why you did that?

Because un the Chart [Rhine's] is two-dimensional it shows the soft tissue depth markers in a straight vertical-horizontal fashion. But in actuality when you glue a three-dimensional form onto another three-dimensional form/surface and one or both of them is uneven or undulating, that soft tissue depth marker isn't going to lay in a perfect vertical-horizontal configuration. And if that's what the skull says is going on at that particular point with that soft tissue depth marker, you don't argue with the skull. I mean that would be me imposing my will over what's actually happening. So it might be just that little bit of subtlety in a reconstruction that helps a person be identified. And if I take it upon myself to eliminate that, I am in fact hindering an identification. So that is why I do it **[E\IK]**.

So for that reason, these markers have to be cut very precisely. Pretty

square as far as the top and the bottom go.

Oh yeah. Within reason. I mean, you know, to cut it precisely you'd almost need a laser-cutter, whatever, because I don't think human beings, as wonderful as they are, are capable of that type of, you know precision. And to in a certain way, it's not necessary to have it that precise. Because the difference between .5 millimeters and a millimeter is, from my point of view, pretty insignificant. You know, length or measurement . I'm more

concerned with how cleanly I can represent this muscle relative to the anatomy around it. Ok. I'll call that It for now on these [meaning the Masseter muscles] **[E\IK]**.

So the muscle that was in place before we started is the muscle on the side of the head. The Temporalis muscle? It's just the first one you put in. And then you put in the Buccinator. And now the Masseter.

Yes.

The muscle you are working on now is the Obicularis Ori. Why are you building it the way you are?

Well, the muscle no doubt lays a lot flatter in actuality, but since I will need to put other muscles behind it or attached to it, that attached to other places. I am building it out as if it were more three-dimensional than it actually is [T\IK].

It's a trade off between the visual and the sculptural, because it's like I said in the anatomy books it doesn't show it as a form, it shows it as two-dimensional because of the way its printed or presented in the books. For books [on anatomy] to be as accurate as they could be, they would have to be movies or videos especially, when it comes to presenting three-dimensional representations [T\IK].

One of the nice things that happened in terms of computers was when there were programs that could allow an object to be rotated which gave the viewer a better sense of the three-dimensionality of what they were looking at *[EK]*.

It was good for other people, but not necessarily for me because I have done that in my head ever since I was a little kid. I have always rotated objects but not with a grid system imposed on it. I just rotated them because I could [T\IK].

Now how do you know how for in to bring that muscle because the tissue depth markers certainty doesn't tell you that?

When you say how far to bring it out what do you mean?

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Uh, the opening [from left to right] of this muscle because we know its an

oval muscle.

Right now I'm ballparking it, to just behind the first premolar, because when most people smile that is about how wide their mouths open or spread. So that the muscle would have to pull at least to that point before it stops. In your smile it's easy to see that you have what I would call a Goldie Hawn type smile. You kind of have a rectangular shaped smile [T\IK].

Like this reconstruction?

No, this is just in terms of the construction so I can see where to place the lips later. So I'm trading off one thing for another, so I'm doing something here that maybe isn't 100% correct, so I can see how to make the next part . . . like when I do the lips how to make those correct [T\IK].

Unlike a craft, the art part of this . . . I can't do what I'm doing now without thinking ahead to something else that I'm going to do later. And if I totally ignore what's going to happen or not be mindful of what's going to happen later I'll do something now that will cause me to go back and adjust or fix that thing in the future [T\IK]. If that is making any sense.

That does make sense. It's the foundation that you're building on . . . for

the next part.

Yeah, that's probably the best way to think about it. Because I'll never bothered to put what I am thinking into [explicit] words. I never thought about the right words to use to describe it [T\IK].

Why is it that you want this surface [of the obicularis oris]smooth before

you go on to the next part. I noticed you've done that with every muscle you've

built so far.

Well it's an organic to geometric thing. Organically, the muscle probably looks nothing like this, but I need to build it geometrically so I can fit the next [muscle] in exactly where it is supposed to go or close to it. I need to know what this muscle looks like mechanically [T\IK].

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How can I put it another way . . . muscle cells from what I understand, in the human body are . . . essentially like any other cells in the body It's got two long narrow ends and . . . a bulge in the middle and muscle fibers, muscle cells and other cells look like that . . . then there is no way to organically represent that muscle without making the same form. Well, I can't make every individual muscle fiber that shape so I have to ballpark it and build it into a form I can sculpturally deal with [T\IK].

Is this making sense?

Yes.

Let me put in another way, if I were to build something and I was going to start with the atomic structure and built it atom by atom I would have to build each atom separately and then connect them together in that form, well because I can't do that I would have to represent that collection of atoms in the most efficient way. So I am representing these muscle fibers in the most efficient way to go onto the next step *[T\IK]*.

For me words are not a very good way of explaining things. If I could just show you, you would understand it. The words are a kind of necessary evil right now.

Did I answer your question?

You did.

Tao checks his personal assembled photographic reference for the

muscles of the face built in clay. To make sure he is doing it right.

I was not sure if I answered your question or if you were just totally baffled and did not know what to say next.

Do you always start with the lower half of the face, the muscles on the

lower half of the face as opposed to beginning at the forehead or beginning at the

eyes.

Yes, but I don't have a good logical reason for doing so. It's just the way I approach it.

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It's just personal preference?

As I said earlier, there is no one way to do a facial reconstruction. I do it in a way that makes logical sense to me, and it seems to work so I stick with it. Like everything that people do, they will continue to do what they are doing until it causes them enough distress to change *[E\IK]*.

When you're working on a reconstruction, how long does it take you to

complete it, from laying in the muscles to completing the reconstruction. Have

you not timed it before?

I have no idea. It was never important to me to really time it . . .I am more interested in the quality of what I'm doing than the quantity in terms of time.

Ok.

If I got it done in five minutes and it was perfect, all well and good or if I don't get it done for five days and it's perfect, all well and good. The bottom line is I want my reconstructions to be as close to a reasonable likeness of what John or Jane Doe actually looked like . . . than how fast it takes me to do it [T\IK].

It looks like you're cutting [the clay of] this muscle off at about where the

gumline would be . . . Is that accurate?

Basically yes, it just helps me to see the next step when I do the lips a little better. That is why I did not put on the soft tissue depth markers at positions six and seven . . . Because . . . those markers would have been right in the middle of what I was trying to do. When I do build the lips they approximate the height of those soft tissue depth markers without having them standing right in the middle of the road [T\IK].

Right. . . When you approach sculpting a reconstruction . . . what do you

take into consideration when you think about what expression you are going to

portray this person as having?

That's the kind of a decision you make when the [facial] features are completely worked out, because in some cases I have made the mouth

with a partial smile based on the muscles and position. But like every feature on a human face, one feature affects another, so I can't decide at this point in time whether to do a smile, not knowing, for instance, what the nose looks like. Because the smile will definitely effect the nose and it in turn would affect the eyes, which in turn affect the forehead *[E\IK]*.

So the features have to be complete before I could make a decision like that because the adjustments to make it look right become more subtle as you go and one small false tweak in a really complex area of construction, would be like a spot on a Prom Dress, you will be able to see it across a Ballroom floor *[E\IK]*.

Pardon my analogies, but I find that sometimes it's the only way I can really express what I'm thinking or trying to say. Because, the analogies help give a visual conceptualization of what I 'm trying to get across [T\IK].

The last time I spoke with the coroner this case is for I told her I would have the reconstruction done by the time she came in to town. She said, I am really eager to what she looks like. My reply was yes, me too. Because I have only a reasonable impression of what a John or Jane Doe looks like until the reconstruction is done and I have an actual life photograph of him or her to confirm my impression [T\IK]

Interview Three: Tao Darma Man's Reflections

The intent of the Third Interview is to throw light on the respective intellectual and emotional factors in the life and work that contributed to this participant becoming involved in Forensic Art (see Seidman 1998, p.12).

Over the last couple of interviews we've talked about your background in art and your interests in the human figure. This time we want to talk more about the things that have contributed to you wanting to do Facial Reconstructions and the reasoning behind the things that you've done.

Can you give me a definite question to work on?

Sure. When you approach a Forensic Facial Reconstruction, what are you thinking about when you start to do that?

> Basically, I wonder if I'm up to the task, because every skull is different with its own unique characteristics, and anomalies. And despite the fact that there is with the American Method anyway a step by step procedure on how to proceed with a reconstruction, facial reconstruction is, for me, not an algorthmic process. You have to bring an awareness of things that are going on that are outside of a step by step procedure.

Because Tao considers Forensic Craniofacial Reconstruction to be more of an analogue anatomical process, more so than an algorithmic process, it requires a mediation (or a synthesis) between the two in order to engage in creating a reasonable likeness of the given facial reconstruction problem at hand.

For comparison, the respective ways that Yoda's Mom (page 154) and Renaissance Man (page 197) handled the placement of tissue markers five, six and seven relative to John Doe's upper denture plate and how that would affect the sculpting of the projection of nose and building of the lips later. Yoda's Mom's reasoning (page 154) was:

> Um, number five, this is the one that goes under [the] nasal spine. It should be halfway between where the teeth are and here at the end of it [the gumline]. . . [where] it actually goes . . . but since he [has dentures] there we have to make some adjustments. That I don't like . . .
>
> Uh, cuz that's actually where it [number five] goes. . . so I'm gonna have to compromise and figure out something to do, so I'm gonna put it halfway. I have no other choice but to put it [there] because what it can't do is interfere with where we're gonna put the projection [of the nose based on the length of the nasal spine] I clay. Um . . . it's not ideal but it's going to have to do.

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Renaissance Man's determination (page 197) for the same problem was

the glue:

> . . . That one [marker number five] right there is not gonna make it.

> He [John Doe] didn't see a dentist very often [referring to his upper denture], did he?

> Well, you know, when in doubt, we know what number five length is going to be. Lets see if we have any more luck with number six right on the upper incisors at the lip line/[gumline]. Yeah, looks like all he [number six] needed was a flat surface.

So do you need number five flattened out?

> Well just the position where he [marker number five] would have sat was too ridged. It was too much of a ridge there for even a good wad of this glue to attach it.

> Well we're going to have the same . . . results as number five, I'll bet you. Maybe that's the secret, I didn't bead enough on, it doesn't matter if I slop it on. Give it a health bead of it.

> My thinking is before we get our hopes built up on this glue [the Elmer's] really working, we should get a tube of the right stuff.

The problem was not the glue or its application, but accepting the

Complex Adaptation to the situation in terms of performing the Right Action

within the ethical guideline of the Right Livelihood to produce the better

reasonable likeness of this John Doe's face.

> Even though I don't use the American Method, I use a modified version of the Neave's anatomical method where I reconstruct the face muscle by muscle. Despite the fact that I'm putting in the temporal or the masseter muscle for instance, yes those given muscles are respectively located in a particular anatomical locations like the sides of the Cranium and over the Ramus of the lower jaw.

But it is never the same shape, its not the same size, its different from male to female, from male to male and ethnic affiliation to ethnic affiliation. So despite the fact that you have a heuristic, a rule of thumb to go about doing the reconstruction, when it comes down to the actual performance of the task, it is unique every time.

Tao's answer above gives the reader an example of the Explicit leaning Implicit Knowledge employed in the intellectual involvement required in the Facial Reconstruction process. The intellectual involvement centers on not taking for granted that because the muscle group one may be rebuilding is familiar visually, that the rebuilding of that muscle group will not always be a one of a kind process. This suggests an Eisner-type of *Reconstruction Connoisseurship* or the art of appreciation (Eisner, 1985, p. 215) for the discernable differences in the muscle structure of the human face across ethnic affiliations, between the sexes, and within the same sex.

What is the first thing that you do when you approach a new case?

I want to made sure that the skull is as clean [Bio-hazard free] as possible and I make a mold to create a plaster copy of the skull to work on and a backup copy so I do not work, glue on tissue depth markers and apply clay directly on the John/Jane Doe's skull.

For reasons that he could not fully explain on an emotional level, in terms of a regressive Minor Epiphany, Tao said ***it doesn't feel right*** for him to do a Facial Reconstruction on the actual John/Jane Doe's skull. This response borders on being a Major Epiphany in that it tends toward ***a personally affirmed moment of total though inexplicable certainty*** (see page 84) or what could be called a

Tacit leaning Cumulative Epiphany, in that a Cumulative Epiphany "signifies

reactions to experiences which have been going on for a long time."

> I give the John/Jane Doe's skull back to the agency who hired me to do
> the reconstruction. Then I make the skull as stable as possible by
> mounting the skull with its lower jaw attached on top of heavy cardboard
> tube that serves as the under structure for the neck. The mounting tube fits
> my work stand so I can turn the skull from side to side and basically
> operates horizontally 360 degrees. I then some times speculate on what the
> person might look like. I don't really know for sure because that evolves
> as I work.

> *When you're making the mold, how is it that you do that?*

> That is primarily sculpture training from when I was a student. The actual
> making of the mold itself is not as much of a problem as Accounting for
> negative spaces between bone-forms, like the space between the
> zygomatic arch and temporal bone behind it, undercuts and the various
> unforeseen individual anomalies. Dealing with these problematic areas is
> experiential because there are no explicit instructions that tell you how to
> account for these areas.

> *So it's an intuitive process. . .?*

> It's intuitive. Or what could be thought of as just a "Practiced Hand." It's
> just the experiential craftsmanship of moldmaking, that I never needed to
> put into words.

> This above response can be interpreted as a form of Tacit leaning Implicit

Knowledge in that it signifies **moments of experiential certainty that are only**

partially explicable (see page 84).

> *It seems like there is a big difference between the two the methods, the*

American and the Neaves, in the way you approach them. One is a more technical

[meaning anatomical] approach and the other is more of a recipe book. I would

think the American method would be more of a recipe book way of Facial

Reconstruction on a skull.

Which method do you think uses your artistic background more than the

other?

Yes, the American Method is the basic one that everybody is first taught. With me being an art teacher, an artist and a sculptor, I know to really understand, the human form in general and the human head and face in particular you have to understand its anatomy. I mean understanding the deep anatomy of the bones and muscles relative to the skin surface.

The American Method doesn't go into any detail about anatomy, therefore the acquisition of an understanding of anatomy via this method is subconscious and only acquired over time by those who are committed to using it. Whereas, with the Neave's Method the acquisition of an understanding of anatomy comes by way of the visual-tactile experience of using the method which can be thought of as a simulated reverse muscle group dissection.

In other words, because you're building muscle by muscle you can see the point where a given muscle would attach to the bone of the skull and/or interweave into another muscle(s). The process is more real anatomically and less algorithmic, I guess the easiest way to say it, it's the differences between a craft where you know what the outcome will be and an art process where you constantly adjusting toward the eventual outcome.

If there is a flaw in the American Method, it would be that its users, with limited experience working three-dimensionally find it more difficult that usual to deal with the anomalies of a given skull relative to re-creating the best reasonable likeness of the John or Jane Doe.

That's an interesting way to put that, so when you're building the muscles

are you thinking constantly about where the muscles are going, how thick they

are, where they're attaching, or are you just doing it with out thinking about it?

Yes and no. an example that I can use to give some indication of what this process is like, is making a cylinder on a Potter's Wheel. Centering a mass of clay on the spinning wheel is a mechanical process. As the wheel spins you need the apply equal pressure simultaneously with both hands respectively to the side and top of the spinning mass of clay, and if your hands maintain their cooperative pressure the clay with confirm and center itself between your hands.

During the centering of the clay your focus is on the cooperative pressure and the stability of your hands.

Opening the middle of the still spinning, but now centered dome shaped mass of clay is less mechanical and more tactile. In this process you re-establish the side pressure with your hand, while you use the first three fingers of other hand together as a unit to push straight down into the center of the dome until you feel the wheel, at that time you will slowly pull your fingers toward the palm of your hand that maintained the stability of the outside of the spinning clay. You should feel the clay that is trapped between your palm and fingers, start to rise and become thinned.

During the opening process your focus was on the speed the wheel was spinning at and the respective downward and outward movement of the clay between your fingers and palm.

The raising of the walls of the cylinder is even less mechanical and far more tactile. Still using your fingers and palm you will establish a balanced inside outside pressure on the wall of a short thick cylinder. As you slightly increase the balanced pressure on the clay between your fingers and palm you will feel two respective things happen. First a slight bulge in the wall of the clay above your fingers and palm will be created by their increased balanced pressure; second and a slight upward movement of the wall of the clay. Now by slowly sliding the bulge you created with you your fingers and palm from the bottom to the top of the cylinder the following thing will happen the clay wall will become progressively thinner and taller.

During the raising of the walls focus is on maintaining the following things: the balanced pressure between your fingers and palm, the slight bulge if clay above them, and the quality of the water wet lubrication of your fingers an palm as they slide slowly from the bottom to the top of the wall.

The point is your previous foci, of the stability of your hands, the speed of

the wheel, and relative directions of movement of the clay have not been

forgotten, but have taken on a relationship that Polanyi (1967) refers to as

proximal and distal. What this means is:

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. . . In an act of tacit knowing we attend from something for attending to something else; namely, from the first term to the second term of the tacit relation. In many ways the first term of this relation will prove to be nearer to us, the second further away from us. Using the language of anatomy, we may call the first term *proximal* and the second term *distal.* It is the proximal term, then, of which we have a knowledge that we may not be able to tell (p.10).

The above quote is, I contend, the foundational concept for my Grounded Multistable Theory of Curriculum and Instruction that I go more into detail about in the next chapter.

So, it's kind of like driving a car?

Yes, kind of like driving a car or keeping our balance while riding a bicycle or all of those processes that are mechanical on the surface appearance but tacit in how it functions. Those physical processes that we do in our lives that we don't have to think about because we're aware of all of the aspects of the process we are involved in.

What in your background do you think has given you the most advantage as far as approaching Facial Reconstruction work and doing it anatomically?

Well, doing art work in general. All art forms require that you be aware of and attend to multiple facets of the process at the same time. For example, you would find it very difficult to do a drawing on apiece of paper not being aware of the composition (relative the borders of the paper), foreground, middle ground and background (relative to the spatial reasoning problem you are dealing with), the drawing tool and medium you are using and their relationship to the surface quality of the paper you are drawing on. You have to be aware of all of these things at the same time while giving your focused attention to the one you are working on. In other words, you put out the fire closest to your head and you let the rest of them burn.

That's a good way to put it. Artistically, when you want to reconstruct a face on a skull what is it that you're thinking about as you are doing it? What

knowledge are you bringing to help you reconstruct that face? I know that you're

using clay and your experience with the clay. But, how is it that your hands are

doing what's going on in your mind?

> Well, it's like I said before, you're cognizant of more than one thing at a time and you can only be fully aware of those things after you've gotten past what I am interpreting as the mean craft level of doing a facial reconstruction.

> By this I mean, when I got the opportunity to take my first Facial Reconstruction class after knowing about the existence of this form of sculpture for three years. I found it curious that my follow classmates were having what I considered to be extraordinary amount of difficulty working with the clay and clay tools during the reconstruction.
> The awkwardness that they displayed was the result of not having experientially mastered a fundamental craft level of working with clay and its tools.

> So, to answer your first question about what is it that you're thinking about as you are doing a Facial Reconstruction. I would say that you are marshaling of all of your experiential resources whether they are context specific or not to help you negotiate the facial reconstruction problem at hand. An analogy for this is you cannot plan an elaborate strategy in a Chess game at the same time you struggling to learn the rules of how the play Chess.

> There is a presumptive level, rightly or wrongly, of a experiential level of craftsmanship prior to becoming involved in doing a Facial Reconstruction task. By this I mean, having experience making recognizable images in both two and three dimensions directed toward the goal of negotiating a spatial reasoning problem.

> To answer your second question, I offer this, as mentioned above the Knowledge you would bring to the Facial Reconstruction task like our thinking is marshaled of everything we Tacitly, Implicitly, and Explicitly know and remember about the appearance of, a description of, and/or the structure of the human face that at some time or another caught our attention. An example bring, when Yoda's Mom mentioned that Roger the football player in her high school that looked like a Neanderthal (on page 127 for this study). Another example would be, when I said have you a Goldie Hawn type smile (on page 238).

In regards to your third question about, how is it that my hands are doing what's going on in your mind? I contend that once a level of craftsmanship has been attained where we have internalized how our tools and materials work in terms of what they can and cannot do based on their characteristics. So that we don't have to come to totally stop in the middle of what we're doing to determine what or how am I going to do this step other than minor adjustments to the point where our thoughts and actions are indistinguishable from one another. A common example we have all experienced is when you are writing our thought in cursive

So it's just a flow. It's like a thought flow.

It should be a flow. That's a very good way of putting it. A nice analogy that would fit this concept of flow is I am a horrible dancer but from what I understand of the art of dancing is it's a constant spatial communication between you and your partner on a very subtle level. This subtle spatial communication prevent both of you from stepping on each others feet, tripping your partner, or causing you both to topple over.

The above is analogous to the subtle give and take between and among the materials (the clay and its tools), your level of internalized craftsmanship, and the flexibility within your working (tacit, implicit, and explicit) knowledge base.

What do you think it is that artists have, what connection is it that is

different than other people when they approach doing things with their hands?

I would say that an artist approaches things in a more global fashion. By this I mean, the artists I have known tend to need to see the problem to be dealt with in its entirety from multiple perspectives.

When I say see the problem, I mean via the five senses and intellectually. They need the most complete presentation of the facts that are available. Artists are less concerned with the names of things. They don't need to know that a particular bone is called the parietal, or the frontal, or even the maxilla or the mandible. They just have to know what it looks like in any configuration that it can be shown in, they have more of a need to know how than to know that.

Can you pick apart that communication process that happens? When you

are thinking about the chin and applying the clay on to the chin of that skull.

What are you thinking about before you put that clay on is there some way of

communicating between your hands, what you're seeing and thinking.

That's difficult, it's a question that I can only answer by stabbing around it because I can't get to the heart of the question the way, I understand, you're asking it.

I don't impose my will on the reconstruction as much as I take what it's telling me and work from that. For example, let's say that the two Mentalis (the actual muscles of the chin) will be unequal in size based on the evidence of the Depressor labii muscle group that immediately surrounds them on the top and left and right sides. I would not impose my will by making the two Mentalis the same size for my aesthetic reasons. It's more of a negotiation than it is a process of merely just applying clay or me acting upon the materials.

An analogy, you're walking on a surface that's slippery. You're conscious about how much weight you put forward and where your body is. You don't sit down a calculate all of that out but you're aware and if anything should happen while you are negotiating that surface, you will modify your behavior instantaneously without thinking about it. If you don't adjust to your situation or if you're not aware at the right time, you're going to fall.

So there is a constant dialogue between your fingers and the surface of the

reconstruction.

Yeah, It's a very non-verbal dialogue. It's tactile, it's visual, it's all of those senses that you don't generally think about. It might even be audio to a certain point where on a very obscure level that if the clay doesn't sound right, if it doesn't feel right, if it's a little too warm and a little too tacky in your hand, you know right then and there it is not going to work for the situation, so you put that piece down and pick up a piece that's more firm.

It's what they call in statistics "Degrees of Freedom" in terms of a statistical analysis that at the beginning of any particular process you have lots of degrees of freedom. Ok what I mean by this is when you start a

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facial reconstruction you have big applications of clay. As you get down to the details, your degrees of freedom diminish to the point where the slightest thing you do will make the biggest difference in how that reconstruction appears.

That's what I was looking for.

Analysis of Interview One

The following data was obtained from this first of three interview with

Tao Darma Man. He experienced respectively 7 progressive Re-lived, 1

regressive Minor, and 5 regressive Cumulative Epiphanies preceding toward and

receding from his Major Epiphany (see page 214).

The Sub-Categories of a Major Epiphany (Re-lived, Minor, and Cumulative)
Table 9

Re-lived (progressive)	Minor (progressive)	Cumulative (progressive)
I liked, as a kid to make things . . . and it really didn't matter what it was. I didn't have a lot of different materials to work with but paper and pencils were always available. It was a way to possess things I didn't have. If I wanted a lion, I could make a lion. It was "the magical thing of making" (p.224).		
Even as a little kid, I remember just people watching (p.227).	Having Dr. Calculus (pseudonym) he lived and breathed calculus and teaching it appeared to bore him, it was too easy for him. It contributed my flunking out of engineering. I went over to the Art Department and felt "I'm Home" (p.226).	

People are just interesting I took a lot of drawing especially life drawing classes. I thought . . . one way you could make a living as an artist was as a portrait artist (p.227).	A professor I had for drawing who had been in commercial art for many years advised me to go into teaching instead because felt that I would my love art in the commercial world (p.227).	Well, if Dr. Calculus had been more of sculptor, I have would probably been an architect (p. 226). I thought, I was going to be a painter. I didn't know at the time, that deep down, I was a sculptor (p.227).
I realized . . . that drawing and sculpture were more closely related to what I really wanted to do than the color in painting. . . the color eventually became insignificant (p.229).		That goes back to my childhood, [showing a carving of a donkey] this is a carving I did when I was ten year old. Even as a little kid, I always thought in three dimensions. So the sculpture element was always there (p.228).
		I could, from as far back as I can remember. . . rotated object in my mind (p.229).

Major Epiphany: It wasn't until my second semester in Art when I had my first sculpture class – a woodcarving - and I was listening to the professor lecturing about carving and all and Then It Hit Me "That is the same [thing] the Dr. Calculus was talking about in terms of Calculus. It was, that the sculpture professor explained it in terms of the visual and three-dimensional and Dr. Calculus was explaining it in terms of numbers and words. So then everything clicked and made sense.

It's interesting that Tao's Major Epiphany concerned the compatibility between Calculus and Sculpture and not facial reconstruction. This is important because although his personally affirmed moment of total certainty did not cause him to return to engineering or architecture with the new found wisdom, Tao did realize tacitly that an explicit explanation of the compatibility between Calculus and Sculpture that would be accepted in both the world of Calculus and the world of Sculpture would be almost impossible to explicate explicitly. This is an intellectual Multistable. It would be like trying to provide explicit explanatory

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reasoning as to why one image or the other in a visual Multistable is the stable one.

The following pattern has emerged from Table 9. There is a convergence of Tao's compulsion toward "the magic of making," a tacit Calculus-like understanding of sculpture, and a curiosity to understand human physicality through drawing and sculpture.

Analysis of Interview Two

This second interview in the series of three with Tao Darma Man revealed the following data: 4 examples of Explicit ways of knowing, 21 examples of Implicit ways of knowing that is subdivided into 14 Tacit leaning instances of Implicit knowing, and 7 of Explicit leaning Implicit ways of knowing.

The Sub-categories of the Ways of Knowing

Table 10

Explicit (Re-lived)	Implicit (Tacit leaning & Explicit leaning)	Tacit (Major)
I'm starting the reconstruction from the muscle groups closest to the bone and building out (p.234).	Tao took it for granted that anyone [familiar with facial anatomy] watching would' have known it was the buccinator [T\IK] (p.235).	
That way it keeps things in visual balance for me (p.234)	I generally do [build the masseter out evenly with the zygomatic arch [E\IK] (p236.).	
. . . The insertion point, the Coronoid process of the Mandible, where the Temporalis attaches (p.235)	Because the Chart [Rhine's] is 2-D it shows the tissue depth markers in a straight vertical horizontal fashion.[E\IK]. . . . Because the difference between .5 mm and 1 mm . . . is pretty insignificant [T\IK] (p.236).	
. . . computer programs that could allow an object to be rotated . . . (p. 237).	I'm ballparking it, to just behind the first premolar . . .[T\IK] (p.238).	

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	I never bothered to put what I'm thinking into [explicit] words. I never thought about the right words to use to describe my thoughts [T\IK] (p. 238)	
	Organically, the [Obicularis oris] probably looks nothing like this, but I need to build it geometrically . . . I need to know what this muscle looks like mechanically [T\IK] (p.238).	
	. . . I have to ballpark it and build it into a form I can sculpturally deal with [T\IK] (p. 239).	
	. . . put another way, . . I am representing these muscle fibers in the most efficient way to go onto the next step [T\IK] (p. 239).	
	. . . There is no one way to do a facial reconstruction. I do it in a way that makes logical sense to me, and it seems to work so I stick with it [E\IK] (p. 240). The bottom line is I want my reconstructions to be as close to a reasonable likeness of what John or Jane Doe actually looked like. . . than how fast it takes me to do it [T\IK] (p. 240). . . . It just helps me to see the next step when I do the lips a little better. . . When I do build the lips they approximate the height of those soft tissue depth markers without having them standing right in the middle of the road [T\IK] (p. 240).	
	. . . Every feature on a human face affects another, so I can't decide at this point whether to do a smile, not knowing . . .what the nose looks like. Because the smile affects the nose. . . [E\IK] (p.241) . . . The features have to be approaching completion before I could make a decision . . . the adjustments to make it look right become more subtle as you go and	

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	one small false tweak in a really complex area of construction, would be like a spot on a Prom dress, you will be able to see it across a ballroom floor.[E\IK] (p.241).	
	Because I have only a reasonable impression of what a John or Jane Doe looks like until the reconstruction is done and I have an actual life photograph of him or her to confirm my reconstructed impression [T\IK] (p.241).	

Table 10 (continued)

The following pattern has emerged from Table 10. There is an anatomical approach to Tao's facial reconstruction process that relies, for the most part, on Tacit leaning Implicit ways of Knowing. This means that he worked from a series of experiential certainties that are only partially explicable interspersed with episodes of Explicit leaning Implicit ways of Knowing that reflect certainties that are totally explicable.

Analysis of Interview Three

I examine the data from Tao Darma Man's Interview Three through the respective lenses of the Ways of Knowing engaged in, Epiphanies experienced, and the negotiation of the Complex Adaptive System Agents of the Right Livelihood, Action, and Effort that Tao engaged for evidence of the Intellectual and Emotional meaning he makes of his work as a Forensic artist.

Interview Three Reflections Data

Table 11

Intellectual Meaning		Emotional Meaning	
Ways of Knowing (from interview three)		**Epiphanies** (from interview three)	
Implicit (Tacit leaning/Explicit leaning)	Explicit	Re-lived (Regressive)	Minor (Regressive)
. . . Because every skull is different with its own unique characteristics and anomalies. . . You have bring an awareness of things that are going on, that are outside of a step by step procedure [T\IK] (p. 242). Despite the fact that I'm putting in the Temporal or the Masseter muscle for instance . . .those given muscles are respectively located in a particular anatomical location like the sides of the Cranium and over the Ramus of the lower jaw. . . It is never the same shape, it's not the same size, it's different from male to female, from male to male, ethnic affiliation to ethnic affiliation. So despite the fact that you have . . . a rule of thumb to go about doing the reconstruction , when it comes down to the actual performance of the task, it is unique every time [T\IK] (p. 243).	Learning over time the names, locations of the 21 bones of the skull and the names of the muscles and their insertion points with the bones of the skull and other muscles.	. . . I do not work, glue on tissue depth markers and apply clay directly on the John/Jane Doe's skull. "It doesn't feel right" for me to do a Facial Reconstruction on the actual John/Jane Doe's skull (p.244).	An Eisner-type of Facial Reconstruction Connoisseurship or the art of appreciation for the discernable differences in the muscle structure of the human face . . . (p. 244).

As I asserted on (page158 and again on page 212) the Complex Adaptive

System agents, the Right Livelihood, Action, Effort are associated for all of my

participants' intellectual and emotional reflective meaning of their work as

Forensic artists for the following reasons. (1) Because of their respective

connections to the Re-lived and Minor Epiphanies and with the Ways of Knowing

(Explicit and Explicit leaning implicit); (2) because of their unemotional

interactive pragmatic process of negotiating the best possible benefits for

themselves and by extension or unintentionally to all of the other agents within

their shared system.

I use the example (from page 246) of making a cylinder on a Potter's

Wheel to describe visually how the following Complex Adaptive System agents

work. This is based on the assumption that any given individual agent within the

system is constantly working to improve their standing in the system, but at the

very least would seek to maintain the integrity of its most stable position if

improvement is not possible.

Interview Three Data

Table 12

Intellectual and Emotional Meaning		
Complex Adaptive Systems Agents		
The Right Livelihood	The Right Action	The Right Effort
The raising of the walls of the cylinder is even less mechanical and far more tactile . . . using your fingers and palm you will establish a balanced inside-outside pressure on the wall of a short thick cylinder. As you slightly increase the balanced pressure on the clay between your fingers and palm you will feel two respective things happen. . . a slight bulge in the wall of the clay above your fingers and palm will be created. . . ;second a slight upward movement of the wall of the clay (247).	Centering a mass of clay on a spinning wheel is a mechanical process. As the wheel spins you apply equal pressure simultaneously with both hand respectively to the side and the top of the spinning mass of clay . . . (p.246).	Opening the middle of the spinning, centered dome shaped mass of clay is less mechanical and more tactile. .

During the opening process your focus is on the speed the wheel is spinning and the respective downward and outward movement of the clay between your fingers and palm (p.247). |

Now by slowly sliding the bulge you created from the bottom to the top of the cylinder . . .the wall will become progressively thinner and taller. During the raising of the wall focus is on the following the balance pressure between your fingers and palm the bulge above them and the wetness of the lubrication on fingers and palm as they slide slowly from the bottom to the top of the wall (p.247).		

The Right Action and Effort agents are associated with the intellectual part of the cylinder making process, whereas the Right Livelihood is associated with the emotional lift of feeling the process working.

CHAPTER EIGHT

Interpretation of the Data

> Complex Adaptive Systems are composed of interactive,
> thoughtful (but perhaps not brilliant) agents.
>
> *Miller & Page*

The intent of this chapter is to pull together the relationships between the collected research data from my participants and the premises of the foundational theories that provided the inductive evidence as the bases for my interpretation for a Grounded Multistable Theory of Curriculum and Instruction.

In chapter four, I also presented the reader with a visual model for a Ground Multistability Theory for Curriculum and Instruction. This model was built on the following foundational works: Polanyi's Theory of Tacit Knowledge from (The Tacit Dimension,1967), Denzin's Theory of Epiphanies from (Interpretative Biography, 1989b) and Miller and Page's Theory of Complex Systems from (Complex Adaptive Systems: An Introduction to Computational Models of Social Life, 2007).

The major premise of Polanyi's theory is "we know more than we can tell." This theory was developed as an explanation to account for the subtleties in the outward appearance, features, or characteristics of people or objects without being able to explicitly say or measure how we know. For example, if you try to

explicitly describe alphanumerically the subtlety of Mona Lisa's smiles. Another example would be how to describe with mathematical accuracy the difference in the texture between silk and nylon to someone.

Denzin's foundational premise is "Epiphanies are interactional moments and experiences which leave marks on people's lives or a moment of revelation in a life" (p. 70). This is meant to account for those times in our lives when we have said, *it just came to me*, or *I got it*, or *Aha!* My interpretation of an Epiphany is a moment of total, though inexplicable, certainty. A Major Epiphany shares the following characteristic with Tacit ways of knowing. First, the direct access to the acquisition of your certainty cannot be accounted for; second, you know more than you can tell and that cannot be completely recalled explicitly in words and/or numbers to define what you know.

In a Complex Adaptive System Miller and Page's theoretical premise is "the world tends not to be completely frozen or random, but rather it exists in between these two states." In other words, it provides an explanation of why the conscious and subconscious negotiations between and among totally self interested agents within a mutually shared environment tend to strive toward an existence of cooperative equilibrium. For example, when a pack of predators attacks a herd of prey for food, they tend to take victims in a way that culls the herd to insure their future food supply. Another example is when a beekeeper harvest honey in the fall to make sure s/he leaves enough honey, by rule of thumb, in the hive so the bees can winter over to the next year.

What these three theoretical premises have in common is what I interpret to be a subconscious finely honed discernment for qualitative differences. In other words, what exactly is that unquantifiable bit of difference that keeps Mona Lisa's smile just barely detectable, or what is that hair's width of differences that makes a situation an epiphany or not, and what non-numerical, inarticulate calculation determines which prey to take; or is 70 pounds of honey going to be enough for this particular hive to comfortably winter over.

On page 101, Figure 4.1, I offer the reader a visual representation showing how the above foundational premises relate to each other. Epiphanies have subcategories called Cumulative, Minor, and Re-lived conceptualized as moments leading up to and away from the central Major (Aha) Epiphany like the mean in a normal distribution bell curve. The Ways of Knowing Tacit, Implicit (this has the subset of tacit leaning and explicit leaning Implicit), and Explicit are also conceptualized as bell curves. These categories and subcategories of the Ways of Knowing and the Epiphanies provide the labels I used to open code my participants' responses during their individual case study interpretative biographical interviews in chapters five, six, and seven. The data from this open coding is then axial coded in Figure 4.1 identifying Tacit Knowing and a Major Epiphany as being one and the same with each other and by extension to the central phenomenon of the Grounded Multistability Theory for Curriculum and Instruction.

The research data I collected from my participants [one of whom was me] used the following procedure based on Siedman's three interview series of his In-Depth, Phenomenological Interviewing (Siedman, 1998, pp. 9-21).

The first interview establishes the context of the participant's experience. The second allowed participants to reconstruct the details of their experience on the context in which it occurs. And the third encourages the participants to reflect on the meaning their experience holds for them (Siedman, 1998, p. 11).

I examined the above interviews through the two respective categories (toward the grounded theory) of Denzin's Major Epiphany or the turning points in my participants' lives; the second was the Ways of Knowing (interchangeable with Types of Knowledge) employed while they were engaged in doing a Facial Reconstruction, from the perspective of Polanyi's Tacit Knowledge.

The results of having used these two categories provided a description or what Stake (1995, p. 123) calls a "narrative description" of the interpretive biographical data from my participants as individuals. Second, they provided the data to answer my research questions one and two, showing the Open Coding of the inductive evidence for the grounding of my Multistable Theory.

The premises of the foundational theories I am using to support my contention for this Grounded theory come from three sources: Polanyi's Theory of Tacit Knowledge (in his book *The Tacit Dimension*, 1967), which is based on the premise that "We know more as you can tell," Denzin's Theory of Epiphanies

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(in his monograph Interpretative Biography,a) which defines *an epiphany* as " a

moment of revelation in a life," and Miller and Page's Theory of Complex

Adaptive Systems (in their book *Complex Adaptive Systems: An Introduction to*

Computational Models of Social Life, 2007) the premise of which is the study of:

> The interest in between stasis and utter chaos. The world tends not to be completely frozen or random, but rather in exists in between these two states. We want to know when and why productive systems emerge and how they can persist (p. 7).

The above premises of the three foundational theories, I assert, are

different perspectives on the same central phenomenon of Multistability. For this

reason, they share what I interpret to be a pure transparent comprehension of the

structural wholeness of Ways of Knowing, of Re-lived Revelations, and the

Complex Adaptive negotiations between our Ways of Knowing and our

Revelations. By this I mean the structural wholeness of Multistable situations,

events and occurrences are ubiquitous and it is the ingrained opaqueness of our

"either/or" comfort zone of our alphanumeric logic that inhibits our perception of

the transparency of the structural wholeness of the Multistabilities around us.

Figure 4.3 (on page 108 of this study) is a visual three-dimensional representation

of how the Multistability of the foundational theories relate to each other and to a

Multistable Ground Theory of Curriculum and Instruction based on the ideology

of "Do No Harm."

The Causal Conditions (or the subcategories of an Epiphany, which are

Cumulative, Minor, and Re-lived Epiphanies) have the respective associated

extensions of Implicit and Explicit Knowledge. I concluded that there must be

corresponding subcategories of Implicit Knowledge which I interpreted to be

Tacit leaning Implicit Knowledge and Explicit leaning Implicit Knowledge.

A preliminary analysis of the data from Interviews One, Two, and Three

for each one of my participants produced the following collected data based on

the Epiphany subcategories of Re-lived, Minor, and Cumulative (both

progressive; regressive) from the Interviews One, the Ways of Knowing

categories of Explicit, Implicit (further subdivided into Tacit leaning and Explicit

leaning Implicit Knowing), and Tacit from the Interviews Two, and the

Intellectual and Emotional meanings examined, respectively, from the three

perspectives of the Ways of Knowing, the Epiphanies, and Complex Adaptive

Systems Agents.

Collective Interviews One

Table 13

Re-lived	Minor		Cumulative	
Progressive	progressive	regression	progressive	Regressive
24	3	5	4	14

Collective Interviews Two

Table 14

Explicit	Implicit	Tacit

(Re-lived)	(Tacit leaning \ Explicit leaning)		(Major)
12	22	13	2

The Interrelationship Among the Collective Analyses from the Participants' Interviews

The categories for the collective analysis of the participants' individual interviews were chosen for the following reasons: (1) They were drawn from the collective analytical direction the three individual interviews appeared to be going for in the particular category. For example, the analysis of the participant's Life Histories from Interview One revealed foundational principles about Art for Renaissance and Tao, and Justice and Art for Yoda's Mom, that I am calling a philosophy. (2) Also from Interview One is the collective analytic direction of their Epiphanies showing the connection between the individual participant's revelation and the philosophy of their foundational principles. For Yoda's Mom probably the ultimate ways to participate are in serving justice, for Renaissance Man as a natural extension to his Art, and for Tao a different perspective on the magic of making. (3) From Interview Three the Reflection on the collective intellectual and emotional means of their work as Forensic artists is the collective sense of crossing or not crossing certain borders. For Yoda's Mom never crossing the borders of justice, for Renaissance Man it was getting others to cross the border of their own Egos to focus on the Doe, and for Tao not crossing his personal ethical border of doing a reconstruction of the actual skull of the Doe. (4)

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Also from Interview Three there appears to be a collective of the Complex

Adaptive Facial Reconstruction System that result in an Autotelic experiential

situation. (5) From Interview Two there is the collective direction for their

preferred Facial Reconstruction method. It is, predominantly, 3-D and

Anatomical.

The Collective Analysis of the Participants' Interviews

Table 15

	Yoda's Mom	Renaissance Man	Tao Darma Man
Philosophical Foundation	Moral up bringing, belief in God, ubiquitous sense of justice, a fascination with people, and a love for doing art work (p.125).	A natural ability and love for drawing (portraits especially) (p. 183).	The Magic of making things (p. 224). (Art 2 or 3-D) partial to 3-D.
Autotelic experience situations	Working on an anatomical Neave Method ("soothing") p.115.	The physical act of Drawing ("I would love doodling," p.171).	The physical act of Carving (" I would loose track of time for hours"). (p. 228)
Major Epiphany	Broadcast media TV news clip Betty Pat Gatliff and Dr, Clyde Snow, 1969. "That what I want to do" (p.131)	Broadcast media TV The New Detectives, 1999 featured Karen Taylor, ". . . My God, I can do that" (p. 172).The	In a sculpture class, 1967 after flunking out of Calculus. Realize that for him Sculpture and Calculus are the same (p. 226).
Facial Reconstruction Preference	Has done two and three-dimensional, but prefers 3-D Anatomical.	Does not do three-dimensional, prefers two-dimensional based on the American 3-D Method.	Has done two and three-dimensional, but prefers 3-D Anatomical.
Reflections	". . . It's that justice serving justice situation that pops up in almost everything I do. . . not that I'm proud of that. . . You know that's just the way I'm. And that explains most of why	"The most heart breaking [2-D reconstruction I ever did [was] the fifth year old case of a child . . .about 3 [years old]. . . A Seattle newspaper ran a major story title	" . . . I do not, glue on tissue depth markers . . . **it doesn't feel right** [emotionally] for me to do a Facial Reconstruction on the actual John /Jane Doe's skull (p.244).

	I do want I do (p.131)."	"Baby Jane Doe." I was disappointing though, the victim had a picture the size of a postage stamp; the picture of the detective runs half a page (p.207)."	

As Table 15 shows there are commonalities between and among the three participants across the categories of Philosophical foundations, Autotelic experience situations, Major epiphanies, Preferential approaches to Facial Reconstruction, Reflections. The strongest across the board commonalities were the participant's love for doing artwork, and art induced Autotelic experiences.

In terms of their Philosophical foundation the need to do and a love for art—either drawing, sculpture, or both—is a common bond. Given the art connection it is not surprising that Autotelic experience situations would occur in conjunction with their preferential Facial Reconstruction method and described in terms of being "soothing," a "love [of the drawing act] doodling," and "losing track of time for hours."

Yoda's Mom and Renaissance Man share a very similar Major Epiphany experience despite the fact that the situations were 30 years apart. Although Tao's Epiphany was very different it does strongly suggest a subconscious tacit struggling with a problem long since absent from conscious thought to emerge over a year later in what most people would consider an entirely different context to produce an Epiphany that is appropriate for both Sculpture and Calculus.

Tao and Yoda's Mom share a common Facial reconstruction work experience of having done both two and three dimensional cases but preferring to do three-dimensional anatomical cases in part probably for the Autotelic experience the process alone would bring. Renaissance Man does share this preference for the particular Autotelic feeling; he however engages in a facial reconstruction process that is obviously based on the American 3-D method. The reflections of all three of these participants appear to have a feel to them that somehow justice may not be served based on what they may do or not do. For example Yoda's Mom has for lack of a better description an internal gyrocompass that will not permit her to go off the path of justice. For Renaissance Man and Tao the unjustice can come from respectively doing our reconstruction work to the best of your ability only to have it inappropriately displayed by others or by not doing the reconstruction by the unspoken standard in the field of Facial reconstruction of rebuilding the face directly on the skull of the John or Jane Doe. The above analysis will be used to answer my research questions one and two.

The Relationship between the Participants' Interviews and The Foundational Theories Premises for a Grounded Multistability Theory for Curriculum and Instruction

The Relationship between the Participants' Interviews to Premises for a Grounded Multistability Theory

Table 16

	Ways of Knowing					Epiphanies			Complex Adaptive		
	Tac	T\IK	Imp	E\IK	Exp	Cum	Mnr	Re-l	Thes Exp	Synt Imp	Anti Exp
Philosophical Foundations					X			X	X		X
Autotelic Experience		(X	X	X)		(X	X)			X	
Major Epiphany	X									X	
Facial (2-D) Reconstr...(3-D Algo)		(X	X	X	X)			X	X		X
Pref...........(3-D Anat)	(X	X	X	X)		(X	X)			X	
Reflections (articulation)	0.0	.25	.50	.75	1.0	(.25-.75)		1.0	(see enlarged)		

	Complex Adaptive Systems Model						
	Thesis Explicit	Synthesis Implicit					Antithesis Explicit
Reflection (articulation)	1.0	.75	.25	0.0	.25	.75	1.0

Table 16 (enlarged)

The Findings from the Research Data

The finding from the data in Table 16 shows that my participants' core philosophical foundational belief(s) across the Premises of the Foundational Theories is explicitly known to her or himself and reported to others as Re-lived Epiphanies. For example, Yoda's Mom's foundational belief in justice serving

justice was reported to me through a Re-lived Epiphany (see page 131). My participants' belief(s) can, in fact, be compatible or Antithetical to other people's belief(s), noted only as a philosophical position and not as issues of validity.

Across the Premises, the Autotelic experiences for my participants are Implicitly known to her or himself, and fall within the Implicit Ways of Knowing ranging from Tacit leaning Implicit to Explicit leaning Implicit Knowing; the experience tends to be defined in metaphorical terms rather than explicit ones to describe such a completely fulfilling experience. The Autotelic experience, continuing across the Premises, is located between the Cumulative and Minor subcategory epiphanies of their Major Epiphany; as Figure 4.1 (on page 101) shows these two subcategory epiphanies align with the Tacit-Implicit and Explicit-Implicit Knowledge (used interchangeably respectively with Tacit leaning and Explicit leaning Implicit Knowledge). Continuing on, an Autotelic experience relative to the Complex Adaptive System model would lay on the Synthesis/Implicit plane (see Figure 4.0, page 98) given that it is neither a thesis, nor an antithesis and therefore not a form of Explicit Knowing.

My participants' Major Epiphanies, across the Premise, are associated respectively with Tacit Knowledge under the Ways of Knowing and at the center point where the intersecting circular planes of Synthesis/Implicit and Tacit Knowing inside the Cube of a Complex Adaptive System model converge (see Figure 4.0, page 98).

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In terms of a given participant's individual Facial Reconstruction Method preference, across the Premises, it covers most of the range of Ways of Knowing from Tacit to Explicit, but is primarily concentrated in Implicit Ways of Knowing ranging from Tacit leaning Implicit to Explicit leaning Implicit Knowing for both the facial reconstruction methods of Drawing (2-D) and Sculpting (3-D). The Sculpting can be approached either algorithmically or anatomically. On the one hand, Drawings and algorithmic Sculpting range into Explicit Ways of Knowing; on the other hand anatomical Sculpting ranges into the Tacit Ways of Knowing. Continuing across the Premises the anatomic Facial Reconstruction method is associated with Cumulative and Minor Epiphanies because they are respectively moments of experiential certainty and moments of situational certainty both of which are only partially explicable. These two subcategories of Epiphanies are mostly likely to occur when a participant confronted an anomaly during the facial reconstruction process. In terms of the relationship between the Facial Reconstruction Method preferences and the Complex Adaptive Systems model the Drawing and algorithmic Sculpting method are associated more directly with Thesis and Antithesis and the anatomical Sculpting method is associated with Synthesis/Implicit negotiation.

The articulated Reflection of a participant across the Premises is broken down in terms of an interpretive percentage of articulation. Articulated Ways of Knowing breaks down interpretatively as such 0% for Tacit knowing, about 25% for Tacit leaning Implicit knowing, around 50% for Implicit knowing, near 75%

for Explicit leaning knowing, and almost 100% for Explicit knowing. Moving on across the Premises Articulation of the Epiphanies is as follows in the range from Cumulative to Minor Epiphanies: respectively articulation is anywhere from 25% to 75%; Re-lived Epiphanies are very close to 100%. In terms of a Complex Adaptive Systems model the articulation ranges through the center of the Cube from left to right and front to back is respectively 100%, 75%, 25%, 0, 25%, 75%, and 100% (Figure 4.0, page 98).

How Complex Adaptive Social Systems as the Noble Eightfold Path Metaphorically Relates to the Tyler Rationale of the Basic Principles of Curriculum and Instruction

Given that an educational enterprise functions simultaneously as a socialization process of the young into the cultural norms of their given society, and as a Complex Adaptive Social System, the following is an interpretation of how a basic framework for Complex Adaptive Social Systems (i.e., the Noble Eightfold Path) relate to the basic principles of curriculum and instruction of the Tyler Rationale.

Although Miller and Page define Complex Adaptive Social Systems (CASS) as being composed of interacting, thoughtful agents, in the CASS of an educational enterprise it is composed of the following agents: people, their activities, their artifacts (i.e., the curriculum), and the environment they interact in. That being said, in the CASS of the educational enterprise, the agents are respectively the students, the teachers, the curriculum and its instruction, and the

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teaching and learning environments. The teacher also has as a part of her/his

agency the sub-agents of possible curriculum planner, and lesson plan maker for

instruction(s) in order to implement the curriculum. It should be understood from

the beginning that the metaphorical mapping of the NEP onto the Tyler Rationale

will be as Miller and Page (2007) have previously stated about their own mapping

of CASS onto the model of the NEP: "As in any metaphorical mapping,

sometimes the alignments prove tight, and other times we must resort to broad

interpretations to maintain relevance" (p. 94). In addition to the above, my

metaphorical mapping will be at times nonlinear. I approached this interpretive

metaphorical mapping from the viewpoint of the Tyler's Rationale.

     1)   **What educational purpose should the school seek to attain?**

This question aligns with the NEP agent of the **Right Intention**, which states,

"[It] focuses on the goals of the agents (the students, the teachers, the curriculum

and its instruction, and the teaching and learning environments)." In order to

determine educational purposes, Tyler's suggestions pertain to: studies of the

learners themselves, studies of contemporary life outside the school, and

obtaining the suggestions about objective from subject specialists. He also

suggests the use of [a] philosophy [of education] and the psychology of learning

in selecting objectives, of which are congruent with the NEP agent of the Right

View. **The Right View** "encompasses the information that an agent (i.e., the

curriculum planner) receives from the world" (Miller & Page, 2007). Because a

philosophy of education and the psychology of learning are types of indirect

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information that are according to the Right View are "memorized via some change in an agents [the teacher] internal state, and such changes may set the stage for action [lesson plan making and/or instructional delivery] that will only become realized [further] in the future." (p. 94).

The **Right Speech** agent of the NEP states, "[It] accounts for the information that [the teacher]-agents sent to others [the student-agents]. Agents [teachers or students] can send information to other agents [other students or the teacher] by *taking observable action* or, more explicitly, by using some communication channel …in terms of the kind of information that is allowed to flow among the other agents [students and/or teachers], and the quality of the communication" (p. 94).

I found this Right Speech agent of the NEP to be a match for, in Tyler's words, "Stating objectives in a form to be helpful in selecting learning experiences and in guiding teaching."

The Right Intention, View and Speech all imply the educational purpose to be sought and attained by the school is similar in commitment to the often mis-quoted but relevant statement "First, do no harm." Although the phrase is not written in the Hippocratic Oath it is attributed to Hippocrates in his (Epidemics, Bk. I, Sect. XI).

> Paraphrased "Declare the past, diagnose the present, foretell the future; practice these acts [when developing curricula]. As to [the educational purpose of the school] make a habit of two things – to help or at least to do on harm" Retrieved Monday 9 June 2008 from <http://www.geocities.com/everwild7/noharm.html>.

Given that the phase is generally associated with the practice of medicine I find applicable to curriculum and instruction to "declare the past."

2) How can learning experiences be selected which are likely to be useful in attaining these objectives?

In this case the agents are the students, the teacher, their lesson plans, and the teaching and learning environments. This question relates to the following NEP agents of the **Right, Effort,** the **Right Action,** and the **Right Liveihood**, which respectively say "Embraces agent strategies and actions, …[E]mbodies all of the interaction that occur among the agents" and "By assuming that [student]-agents have the goal of improving their [benefits in terms of their achievement], modelers [teachers and their lesson plans] can impose a lot of structure on the behavioral possibilities the [student]-agents." The Right View agent "encompasses the information that an agent (students in their learning environment) receives from the world," what Tyler (1949) meant when he talked about the term "learning experience." "The term…refers to the interaction between the learner and the external conditions in the environment to which [s/he] can react" (p. 63).

Relative to the general principles in selecting learning experiences, the Right Intention is the agent of concern, especially for the interactions between the students and their learning environment. The NEP Right Speech agent is only one example of the interaction between the learner and the external conditions in the learning environment. These external conditions mean "the [NEP] space within which the agents [students and teacher] are contained" (2007, p. 96). The learning

experience should allow, as Tyler says, "for a given objective to be attained, a student must have experiences that give him/ [her] an opportunity to practice the kind of behavior implied by the objective."

In order to show the learning experiences that are useful in obtaining the appropriate objectives, the **Right Liveihood** NEP agent needs to be taken into account, meaning "the payoffs [the educational experiences] that accrue to the agents [student]" (2007, p. 97). The learning experiences that, Tyler says, should accrue to the student-agents are the ones to develop skill in thinking, as well as those helpful in acquiring information, in developing social attitude, and in developing interests. The accrual of educational experiences "requires the [agent] to be just sufficient to capture the phenomenon of interest" i.e., the application of the **Right Concentration** agent**.**

3)   How can learning experiences be organized for effective instruction?

Although the nature of this question can initially be interpreted as the NEP Right Action agent, in fact, to also account for Tyler's sub-issues requires the interactions between and among the following agents: the Right Intention, the Right Concentration, the Right View, and the Right Mindfulness. The interactions relative these NEP agents are, respectively, in terms of: What is meant by organization and organizing principles, The criteria for effective organization (continuity, sequence, and integration) and the organizing structure, Elements to be organized (concepts, values, and skills), and the process of planning a unit of organization.

4)   **How can the effectiveness of learning experiences be evaluated?**

This question throws light fundamentally on the interactions between and among the NEP agents of the Right Intention, Livelihood, and Concentration. The interactions between and among the NEP agents look interpretively like this, "In social systems [like the educational enterprise], we …want the [learning experience]-agent behaviors to aggregate (i.e., "to change the world …that the resulting provides some benefit to . . .' p. 97), the individual [student]-agents in such a way that the system achieves [its] goal" (2007, p. 96).

Tyler proposes four ways to evaluate the effectiveness of learning experiences; they are (a) The need for evaluation, (b) basic notions regarding evaluation, (c) evaluation procedures, and (d) using the results of evaluation.

Respectively, the four proposals match the following NEP agents: The Right View and *the need for evaluation* in terms of "The timing of the information flow [is] important – what [student]-agents know and when they know it can make a big difference to the outcome of [an educational evaluation] social process." (2007, p. 95).

The *basic notions regarding evaluation* in terms of the Right Concentration, means that "[T]he focus of the [evaluation]-model – namely, it requires the model to be just sufficient to capture the [learning experience] phenomenon of interest" (2007, p. 101). The Right Action NEP agent is congruent with the *evaluation procedure* in that, "[It] embodies all of the interactions that occur among the agents (i.e., the students, the teachers, the

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curriculum and its instruction, and the teaching and learning environments). Each

agent receives and processes information and by its action (or even inaction),

generates [evaluative] information that influence the other agents and the

[evaluation procedure] system itself" (2007, p. 96).

The NEP agents of the Right Speech, Livelihood, and Mindfulness align

with ***using the results of evaluation*** in the following respective ways, "Right

Speech account for the information that agents (the students, the teachers, the

curriculum and its instruction, and the teaching and learning environments) send

to [one another]. Agents can send information to other agents by …using some

communication channel. [Evaluation] models can differ in terms of the kinds of

information that is allowed to flow among the other agents, and the quality of the

communication" (2007, p. 96).

"By assuming that [students]-agents have the goal of improving . . .

[evaluators] can impose a lot of structure on the behavioral possibilities of the

agents" (2007, p. 97); the Right Liveihood becomes apparent.

"The Right Mindfulness is the level of cognition employ by an agent

(student): how smart should agents be?…More likely than not, the sophistication

of the agent is context dependent, and in some situations attempts at optimization

predominate, while in others simple heuristics are employed…The important

question is not whether agents boundedly rational. . ., but rather when and how

does this make a difference…there is a plasticity in social [student and teacher]

agents who can change they behave if outcome are not to their liking…Complex

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social systems models do – and should – vary in the level of sophistication embedded in the agents" (2007, p. 100).

A Summary of the Chapter

In this chapter the reader was shown the following; first, how the complex adaptiveness of the foundational premises relate to each other as the basis for a Grounded Multistability Theory for Curriculum and Instruction in terms of what they have in common—a subconscious finely honed discernment for qualitative differences. The foundational premises also provided the labels used to Open Code my participants' responses to in chapters five, six, and seven. The Open coding data was then Axial Coded as (Figure 4.1, p.101) showing Tacit Knowing and Major Epiphanies as one and the same with each other and the central phenomenon of Multistability. I contend that tacit knowing, major epiphanies, and multistabilities share a pure transparent comprehension of the structural wholeness of ways of knowing, re-lived revelations, and the complex adaptive negotiations between them. The structural wholeness of multistable situations, events, and occurrences are everywhere, but the opaqueness of our well schooled "either/or" words and/or numbers logic inhibits our perception of the transparency of the structural wholeness of the multistabilities around us.

The interrelationship among the analyses from the participants' interviews in Table 15 reveals their shared commonalities across the categories of the participants' philosophical foundations, autotelic experiences, major epiphanies, facial reconstruction preferences, and their reflections. Data from Table 15 is used

to answer research question one. The relationship between the participant's interviews and the Foundational Theories premises for a Grounded Multistability Theory for Curriculum and Instruction is displayed in Table 16 and used to answer research question two. How Complex Adaptive Social Systems as the Noble Eightfold Path metaphorically relates to the Tyler Rationale of the Basic Principles of Curriculum and Instruction was explained and it is used to answer research question three.

CHAPTER NINE

Implications of the Study

A Brief Summary of the Study

In this Qualitative interpretive exploratory study I investigated the exhibits of Tacit Knowledge during the creation of a Forensic Craniofacial Reconstruction for its implication for Curriculum and Instruction. From chapter one, I refresh the reader's memory why I used Forensic Craniofacial Reconstruction as the vehicle of entry into this study. The reader should recall, I confronted my own inexplicable demonstration of Tacit Knowledge when the chief deputy coroner asked me how I was apparently carrying out multiple functions from several different knowledge domains. From the perception of the chief deputy coroner I was simultaneously functioning as an artist and a scientist; despite my vocation as an Art teacher, I could not explain how and/or why this problem-negotiating process was happening.

The purpose of the Study was threefold: first, to identify the essence of the tacit thought and/or problem-negotiating process used by forensic artists. Second, to interpret how to look for, identify, and understand the adequate means a student may need to communicate their tacit knowledge when solving a give problem. Third, to shed light on the tacit problem-negotiating phenomenon experienced by forensic craniofacial reconstructionists, for it implications as a curricular and

instructional model to help prevent students, who are tacitly processing

information and problem-negotiating in a similar inexplicable manner, from being

put unnecessarily at academic risk.

The Research Questions are: What does the phenomenon of the tacit

knowledge and information processing/problem-negotiating experience that is

presumed to occur during a forensic craniofacial reconstruction look like? How

can the essence of the tacit knowledge involved in the information

processing/problem-negotiating procedure that occurs during a forensic

craniofacial reconstruction be communicated in a more implicit knowledge

manner approaching an explicit knowledge manner? What are the implications for

the essence of tacit knowledge information processing/problem-negotiating

experiences to serve as a curricular and instructional model for helping students to

communicate their tacit knowledge in an implicit knowledge manner approaching

an explicit knowledge manner? (see page 17).

The Statement of the Problem in brief: there are the four components of

the disconnection between learning in school and the world outside of school.

These components are:

> 1) The predominance and social control of the "single right answer" to
> well-structured linear questions.
>
> 2) The minimal involvement with authentic hands-on ways of knowing to
> understanding abstract concepts.

3) The missed teachable moments to bring to the attention of students when analogous themes or concepts arise across diverse content areas.

4) The failure within the school operational structure to accept, value, and honor diverse and divergent problem-negotiating strategies.

There are four reasons why this Study is significant. First, the constrains placed on the potential benefits of tacit knowledge as a relevant operating strategy for students in school because of the predominance of the well-structured [alphanumeric] models of problem-solving in schooling in America. Second, exploring implications for the tacit knowledge in FCR as a model of problem-negotiating growth experiences is absent from the literature on curriculum and instruction. Third, this study will direct pre-service teachers in their field placements as well as in-service teachers (pre-tenured) toward a better insight into those students who perceive the disconnection between schooling and practical applications knowledge. Fourth, given the predominance of well-structured alphanumeric problem-solving models in schooling combined with the perceptions of those students who perceive the disconnection between schooling and practical applications knowledge, there is the strong potential for otherwise intelligent students being put at needless academic risk because of their preference for diverse modes of problem-negotiation.

Next, I guide the reader through the data analysis process using the conceptual frame work of Complex Adaptive Social Systems, explaining how it relates to curriculum and instruction and is relevant to answering research

question three and how this study will make a contribution to the literature on curriculum and instruction.

The Literature Review from chapter two situated this study respectively in the forensic craniofacial reconstruction, the tacit knowledge, and the curriculum and instructional literatures.

In chapter three the Methodology, I guided the reader through the selection and uses of Interviewing as a Research Method combined with the Interpretive Biography Method to act as case studies for this investigation, a description of the participants, a detailed presentation of the Research Plan for the Data Collection procedure, and a brief explanation of how the data was interpreted. The individual interviews were conducted in four different parts of the United States between Saturday the 11th of November 2006 and Tuesday the 6th of November 2007.

In chapter four, I explain the inductive evidence that conceptual grounds an exploratory Multistable Theoretical Model for Tacit Knowledge exhibition while creating a Forensic Craniofacial Reconstruction. The grounding is based on the premises from three different yet conceptually compatible theories from Polanyi, Denzin, and Miller & Page mapped onto the Tyler Rationale for curriculum and Instruction.

In Chapters five, six, and seven, I present the data I collected from participants in the forms of a Background Questionnaires, and the respective interviews of the Audio and Video recorded Life Histories, a brief look into the

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actual process of doing a three-dimensional Facial Reconstruction, and their

intellectual and emotional reflections on their work as Forensic artists. Following

the three individual interviews for each one of my participants I provided analyses

of their interviews broken down in terms of the subcategories of their individual

Major Epiphanies and the Ways of Knowing they were engaged in while they

were working on the facial reconstruction. Next, I did a collective analysis of the

three individual analyses of the interviews from my participants. This is broken

down into the individual philosophical foundational beliefs, autotelic experience

situations, major epiphanies, the individual participant's preferential approach to

facial reconstruction, and their reflections on how they see their work as forensic

artist.

In chapter eight I revealed, respectively, the relationship in Tables 15 and

16, between the collected data from my participants through their individual

interviews in chapters five, six, and seven and the foundational premises from the

theories of Polanyi, Denzin, and Miller& Page. In Table 15, I broke down the

collective three individual interviews for each one of my participants relative to

the commonalities that emerged from them. These commonalities are the

participant's foundational philosophical beliefs, their Autotelic experience

situations, their preferred facial reconstruction method, and their reflections. The

commonalities were then further broken down relative to the sub-categories of the

Ways of Knowing, Epiphanies, and Complex Adaptive Systems model. The

findings for this study come from Table 16.

Research Question One

What does the phenomenon of the tacit knowledge and information processing /problem-negotiating experience that is presumed to occur during a forensic craniofacial reconstruction look like?

In terms of the big idea of this question is it looks like an observer determined, context specific, silent and fluid, algorithmic or anatomical additive sculpting technique, in which the fluidity is maintained by the constant complex adaptive negotiation of the multistable relationship between the Art and Science agents of the forensic craniofacial reconstruction process as a system for recreating a reasonable likeness of a John or Jane Doe's face.

In other words, what this means is the implicit answer to this question is really determined by, from whose perspective one is looking at this information processing problem-negotiating experience. It is the Others, meaning the thoughtful observing persons other than the forensic craniofacial reconstructionist/forensic artist themselves, who identifies and determines what the tacit knowledge exhibited during a forensic craniofacial reconstruction looks like. There are five types of Others on a continuum from: (1) those who have maybe heard about facial reconstructions but have never seen it demonstrated, (2) those who have heard about facial reconstructions and are seeing it demonstrated for the first time, (3) these who make uses of facial reconstructions but have never seen it demonstrated (i.e., coroners and law enforcement), (4) figurative/portrait artist (2-D or 3-D) who have heard about facial reconstructions and wanted to

become forensic artists but have never done a facial reconstruction, and (5) scientists (physical anthropologist) who have never done a facial reconstruction. The ways the above five types of Others respectively tend to see the facial reconstruction process is: it is impossible, it is mysterious, it is a multidisciplinary tool to aid their particular identification issue, it is anatomical issue, and as a drawing or sculpture issue. In order to explain the individual perceptions of the Others the reader must keeping in mind what I said on (p. 264) about the "either/or" comfort zone of our alphanumeric logic, that inhibits our perception of the transparency of the structural wholeness of Multistable encounters.

In its purest manifestation from the perspective of the forensic artist involved in their preferred facial reconstruction process it looks like an Autotelic experience. Yoda's Mom reported her experience when she is fortunate enough to work in her preferred three-dimensional Neave's anatomical facial reconstruction method as soothing. With Renaissance Man the autotelic experience comes just from the act of drawing in general, but also from doing portraits particular of which facial reconstruction is a type of portraiture. For Tao his autotelic experience was triggered by what he calls "the magic of making" while engaged in either 2-D or 3-D anatomical facial reconstruction.

What these collective autotelic experiences make the information processing problem negotiating process look like, from the point of view of an observer of a facial reconstruction demonstration, depends on his/her familiarity with the forensic facial reconstruction process. That being said, it would tend to

look like points along a continuum from witnessing a facial reconstruction being done by an artist with serviceable skills to experiencing the causal ease of a master using her or his favorite tool. For example, it would respectively be like the points on the continuum of hearing a blues guitarist with adequate technique perform and experiencing B.B. King playing Lucille. The first is an event in that for some audience members there is a discernable auditable difference in the figure-ground relationship between the technique to the sound in the performance; the second is an experience of indescribable oneness of technique and sound that whatever figure-ground relationship that may exist is beyond everyone's ability, save for Mr. King's, to discern.

Another aspect of what the tacit knowledge information processing problem-negotiation looks like is dependant upon the compatibility between the participant's foundational philosophical belief(s) and their major epiphanies. By this I mean when the foundation philosophical belief aligns with the major epiphany it looks like something that a participant either said, it is what I want to do, or what I can do and /or what I need to do. For example, after Tao's major (calculus-sculpture) epiphany aligned with his magic of making foundational philosophical core, his information processing and problem-negotiating looked like *I can do calculus conceptualized as a sculpture*.

What the tacit knowledge information processing problem-negotiation process looks like also presupposes that the tacit knowledge we are encountering cannot be communicated in words or numbers. By this I mean, knowledge can

also be tacit because the knowledge holder for some reason either has not, or will not communicate alphanumerically what they know at least implicitly approaching an explicit manner. This means that this knowledge is tacit by design.

Because I am interpreting all information processing problem-negotiation experiences to be a complex adaptive system by nature, we need to determine the simple rule(s) that influence the negotiating behaviors of the self interested agents within the system. Given that the particular phenomenon of tacit knowledge we are dealing with in fact cannot be alphanumerically communicated, then the presumption that the appropriate complex adaptive information processing problem-negotiation that is occurring during the forensic craniofacial reconstruction looks like an Art/Science Multistability and is demonstrated either algorithmically or anatomically.

If the determination is made that the particular phenomenon of tacit knowledge has not or will not be made at least tacit leaning implicit then the issue becomes the intent of the holder of the tacit knowledge. Until that intent is revealed it is not possible to determine what the information processing /problem-negotiating experience will look like.

The point I need the reader to understand from the answer to this question is that knowledge can be tacit for a at least three reasons and it important to know how that will influence what the complex adaptive information processing/problem-negotiation procedure looks like in terms of a possible

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unknown intent of the holder of the tacit knowledge. Notwithstanding which of of the three possible types of tacit knowledge we are dealing with, what it looks like only reveals itself when the alignment of the knowledge holders, from the findings, Philosophic Foundational Principles, if they are having an Autotelic experience at the time, what epiphanies they are having if any, while employing their preferred Facial Reconstruction Method. All of this must be aligned, at the point in time when the separation between the figure and the ground, the space between the proximal and the distal, and/or the oscillating back and forth of the given Multistability are approaches zero. By this I mean there is never a point in time or space when there is no oscillation within a multistable situation, occurrence or event but the time space back and forth oscillations can be so short or so rapid as to appear to have stopped. For example, the highs and lows of a 60 cycle per second vibration occur in time and space in the manner I mentioned above and it therefore sounds like a continuous hum rather than the distinct highs and lows of the sound a delivery truck makes as it is backing up. Another example is the length of time it takes for your eyes to re-focus from one object of your attention to the next object. In this example if one wanted to take the time to physically measure the re-focus time it would have to be 186,000 miles per second divided by distance from your eyes to the object of focus and back to your eyes. But nevertheless there is always that flash of an instance in time and space when our eyes are simultaneously unfocused and focused in a multistable state.

Research Question Two

How can the essence of the tacit knowledge involved in the information processing/problem-negotiating procedure that occurs during a forensic craniofacial reconstruction be communicated in an implicit knowledge manner approaching an explicit knowledge manner?

The implicit big idea answer to this question is the way to communicate tacit knowledge in a alphanumeric manner relative to forensic craniofacial reconstruction, requires translating the silent inexpressible moment of absolute certainty or tacit knowledge into a metaphorically demonstrable algorithmic or anatomical performances that can be articulated implicitly to reveal the multistable relationship between the Art and Science in the forensic craniofacial reconstruction process.

To elaborate on this question I need the reader to entertain my assertion that the essence of our knowledge in general is manifested in our behaviors whether they are progressive, regressive, or avoidance behaviors. There are also combinations of these three main behaviors with knowledge loosely defined as volition driven occurrences but these will not be explored at this time.

I also contend that tacit knowledge is acquired and disseminated through the **subconscious complex adaptations of the multistability between meaningful sensory experiences and our responses to them, in other words our subconscious connecting of the dots in terms of coming to understand the influence of the transparent structural wholeness of diverse ways of knowing,**

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which may at times occur simultaneously. Simply, what this means is using a gestalt analogy in terms of knowledge acquisition and dissemination we tend to group concepts (like shapes) that are somewhat alike together; the only difference with this in terms of acquiring and disseminating tacit knowledge is that the passing of time and physical space are insignificant factors. For example, Yoda's Mom's connecting the forensic craniofacial reconstruction-dot with her sense of moral justice-dot from childhood or Renaissance Man's connecting his 40 years of doing portraits-dot to the 2-D facial reconstruction segment of a hour TV crimestopper show-dot or Tao's connecting of the calculus-dot with the sculpture wood carving class-dot at least a year after flunking calculus.

This question also assumes that we are dealing with the first of the three phenomena of tacit knowing, that is to say the *it can't be alphanumerically articulated implicitly* approaching explicit type as opposed to the *it has not been or will not be* types. That being the case, then only through the demonstrative clarity of an actual performance of the facial reconstruction process, being witnessed by an engaged observer, can the communication of the forensic artist's tacit knowledge begin to be imparted along a continuum of communicable understanding from tacit leaning implicit to explicit knowledge depending on the initial facial reconstruction background knowledge of the observer. In other words, using the analogy of currency exchange, conversion from one currency to another, where currency represents the experiential quality and quantity of the observer's comprehension and tactile familiarity with actually doing a facial

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reconstruction. I am approaching this currency exchange conversion analogy from the perspective that no one is bankrupt regarding the premise of facial reconstructions. That is to say there is always some level of beginning comprehension even if that means you do not understand it. What this means is if the observer's comprehension with the facial reconstruction process is high the analogous exchange conversion rate can be 1/1 comprehension to process; depending on how low the observer's comprehension is the analogous rate could be 1 divided by 0.1.

Research Question Three

What are the implications for the essence of tacit knowledge information processing/problem-negotiating to serve as a curricular and instructional model for helping students to communicate their tacit knowledge in an implicit knowledge manner approaching an explicit knowledge manner?

The implicit answer to the question of the essence of tacit knowledge information processing/problem-negotiating defined as the transparent structural wholeness of the complex adaptive negotiations of tacit knowledge (to serve as a curricular and instruction model to help students articulate their tacit knowledge) requires a Multistability Theory based on an a foundational premise to account for it. I contend that premise is Do No Harm.

It should be obvious to the reader that the answer to this question is in terms of implementation conceptually outside of what is traditionally considered a teaching learning environment for the instructional delivery of a curriculum.

If the reader has seriously entertained the meaning of the essence of tacit knowledge information processing and problem-negotiating, which sheds light on the acquisition and dissemination of this way of knowing, starting from this common point of understanding I can answer this research question. The manifestation of the essence of tacit knowledge is through observing the behaviors of someone else's autotelic facial reconstruction experience. That true tacit knowledge exists in the mind of its holder and is communicated internally (through what I contend to be image-like means) and applied personally. I am basing my contention about the internal communication of tacit knowledge as image-like on my collected data and the literature, that the first attempts to communicate tacit knowledge externally is usually demonstrative (i.e., pointing, touching etc.) and not alphanumerical in the form of words and/or numbers.

In order for information processing/problem-negotiating for tacit knowledge to serve as a curricular and instructional model, a complex adaptive system is required that strives for equilibriums between and among the self-interested agents. The issue becomes, who or what are these agents and what are their individual interests? For example, in a very simplified two agent instructional system of a teacher and a student, the simple rule (implement the curriculum through ethical instructional means) the individual interests are the

teacher's (get the most cooperation from the student toward implementing the simple rule) and the student's interest (give the least cooperation for the highest possible reward).

In order for any information processing/problem-negotiating experience, no matter whether it is explicit, implicit, or tacit based, to serve as a model for curriculum and instruction it must have a foundational philosophy, ideology, or paradigm. I propose that a foundational ideology of "Do no Harm," paraphrased as Never mis-educate and/or Never de-skill, be used. The model I am suggesting also requires a theory of tacit knowledge application to curriculum and instruction. There is no evidence that such a theory exists. Based on the data from this limited study as inductive evidence combined with the three respective foundational theories from Polanyi's Tacit Knowlegde, Denzin's Epiphanies, and Miller and Page's Complex Adaptive Systems, is the grounding for my contention for a Multistability Theory of Tacit Knowledge/Knowing as a curricular and instructional model.

The structural wholeness of Multistable situations, events, and occurrences is ubiquitous and it is the ingrained opaqueness of our "either/or" comfort zone of our alphanumeric logic that inhibits our perception of the transparency of the structural wholeness of the Multistabilities around us. Figure 4.3 (on page 108 of this study) is a visual three-dimensional representation of how the Multistabilities of the foundational theories relate to each other and to a Multistable Ground Theory of Curriculum and Instruction based on the ideology of "Do No Harm."

As I mentioned on page 99 of this study, the key to comprehending this Multistable Theory [for Curriculum and Instruction] is to seriously entertain the analogous connection between and among the three premises of its foundational theories, relative to the Tyler Rationale. That is to say, to take into account that Tacit Knowledge, a Major Epiphany, the Right View, and "a comprehensive philosophy of education" (i.e., Do no Harm) is necessary to be a guide in making judgements [toward the Educational Purpose of a Curriculum]" (Tyler, 1949, p. 4) are different terms that describe the same life experience produced instances of personally acknowledged certainty that occur through the subconsciously reflected upon negotiation of differences.

What this means, as I mentioned on page 296 of this study, is that the above mentioned premises of the three foundational theories are different perspectives on the same central phenomenon of Multistability. For this reason, they share in the transparent comprehensive structural wholeness of the Ways of Knowing, of Re-lived Revelations, and the Complex Adaptive negotiation between our Ways of Knowing and our Revelations. By this I mean the structural wholeness of Multistable situations, events, and occurrences are ubiquitous and it is the ingrained opaqueness of our "either/or" comfort zone of our alphanumeric logic that inhibits our perception of the transparency of the structural wholeness of the Multistabilities around us.

The following is a verbal illustration of what that transparent comprehensive structure wholeness looks like. It is a linear representation of a

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form where all facets (the front, back, sides, top, and the bottom) of the object, situations, events, and occurrences are perceived simultaneously and focused on individually while holding the other facet visually and conceptually constant. The appearance of this structure relative to the facial reconstruction process depends on what the observer is looking for and their actual experience(s) with the process. Generally, what this means is the observer will tend to see those things in the process that are visually, physically, and intellectually unfamiliar to them. Because the things that are visually, physically, and intellectually familiar to the observer are taken-for-granted. This is what Polanyi (see page 247) meant when he talked about attending from the proximal (that which is near/familiar to us) for attending to the distal (that which is further/unfamiliar to us).

Tyler (1949, p. 5) indicated that studying the learner themselves as a source of educational objective talked the needs that all [students] have and that the study of those needs "in a given group of [students] would involve identifying those needs that are not being properly satisfied and . . . the role the school can play. . . suggest educational objectives in the sense of indicating certain ***knowledge***, (bold italics mine), attitudes, skills . . . would help [students] to meet these needs more effectively."

Relative to the findings from the data (page 270) of this study the implications for the essence of tacit knowledge information processing/problem negotiation to serve as a curricular and instructional model for helping students to communicate their tacit knowledge in an implicit manner approaching an explicit

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manner are presented as things to watch for and to be aware of—peripherals to a given student's tacit knowledge. Manifestations of tacit knowledge tend to be identified by what is going on around it, in that tacit knowledge is so internal and taken for granted that even the person engaged in its use really cannot directly identify it.

Teachers must be aware of explicit expressions of a given student's philosophical foundations (thesis) because it will be: (1) communicated explicitly in terms of ways of knowing; probably in the form of a re-lived epiphany because it more than likely was associated with something in their life that had a significant indelible meaning to them, (2) by extension it will indicate to the teacher in sharp contrast what the student doesn't believe and the explicit reasons why (antithesis), and (3) provide some insights into the complex adaptive negotiations toward ways to compromise (synthesis).

Teaching at its highest level seeks to provide an Autotelic experience for every student in any given subject content area. Signs to watch for and be aware of with a student's Autotelic experience are: (1) the compatibility of the student's philosophical foundations beliefs with the task they are engaged in, (2) did the student have the opportunity to be engaged in her or his preferred activity, which can be either craft-like (algorithmic, well-structure) or puzzle-like (heuristic, ill-structured), and (3) don't expect explicit responses to the question, because Autotelic experiences fall into implicit ways of knowing (tacit leaning or explicit

leaning implicit knowing) and are associated with either experiential or situational moments of certainty aligned respectively with cumulative and minor epiphanies.

Major epiphanies (see Figure 4.0) when they occur were generated as a result of the complex adaptive negotiating toward the common centers along the intersect of the horizontal synthesis/implicit circle and the vertical tacit circle. They are tacit in nature and communicated demonstratively.

Another peripheral indicator of the presents of tacit knowledge information processing problem negotiation and working is the relative position along the continuum of reflective responses one can receive (see Table 16, enlarged section, p. 270). This section indicates that the closer a response approaches zero the more tacit is the knowledge and how much more complex the adaptive negotiation has become—in that the closer you approach zero the fewer degrees of freedom you have to negotiate with.

There are two big ideas from this dissertation that I want the reader to remember. The first is to be open to the concept of a Transparent Comprehensive Structural Wholeness of Ways of Knowing and second to seriously entertain a Multistability Theory of Curriculum and Instruction to account for it.

References

Acevedo-Barron, A. (2004). *The domestication of mermaids capturing the experience of k-12 pre-service teacher candidates in the teacher education program at the University of Denver*. Unpublished doctoral dissertation, University of Denver.

Adams, M., Bell, L. A., & Grifffin, P. (Eds.). (1997). *Teaching for diversity and social justice: A source book*. New York: Routledge.

Albert, A. M. (2005). *What is anthropology and forensic anthropology?* Retrieved August 6, 2005, from University of North Carolina at Wilmington Web site: http://people.uncw.edu/albertm/what.htm

Apple, M. (1982) *Education and power*. London: Routledge & Kegan Paul.

Ananta, I.G.P. (2004). *Using adaptive Web-based learning environment to develop conceptual and procedural knowledge*. Unpublished doctoral dissertation, University of Wollongong.

Anrheim, R. (1969). *Visual thinking*. Berkeley: University of California Press.

Barrington. B. L., & Hendricks, B. (1989). Differentiating characteristics of high school graduates, dropouts, and nongraduates. *Journal of Educational Research*, 82, 309-319.

Binkley, E. M., & Hooper, R. W. (1989). "Statistical profile of students who dropped out of school during school year 1987-1988," *Nashville-Davidson County Metro. Public School Research 1989*. Report 143, June, 7- 51.

Blank, W. E., & Harwell, S. H. (Eds.). (1997). Promising practices for connecting high school to the real world. The Office of Vocational and Adult Education, US Department of Education. Tampa, Florida: University of South Florida.

Bourdieu, P. (1977). *Reproduction in education's society and culture*. London: Sage Publications.

Brabeck, M. M. & Wood, P. K. (1990). Cross-sectional and longitudinal evidence for differences between well-structured and ill-structured problem-solving abilities. In *Commons*, M. L. Armon, C. Kohlberg, L. Richards, F.A., Grotzer, T.A., & Sinnott, J. D. (Eds), Adult development 2: Models and methods in the study of adolescent and adult thought (131-146) New York: Prager.

Bridgeman, P. W. (1928). *The logic of modern physics*. New York: Macmillan.

Caine, R, & Caine, G. (1991). *Making connections: Teaching and the human brain.* Alexandria, Virginia: ASCD.

Collier, P. F., & Son (1910). *Harvard Classics*, Volume 38.

Creswell, J. W (1998). *Qualitative inquiry and research design: choosing among five traditions*. Thousand Oaks, CA: Sage.

Creswell, J. (2003). *Research design: qualitative, quantitative and mixed methods approaches*. Thousand Oaks, CA: Sage.

Csikszentmihalyi, M. (1990). *Flow: The psychology of the optimal experience*. New York: Harper Perennial.

Davenport,T.& Prusak, L. (1998). *Working knowledge: How organizations manage what they know.* Cambridge, MA, Harvard Business School Press.

de Bono, E, (2004). *Lateral thinking & parallel thinking (TM)*. Retrieved November 13, 2008 from http://www.edwdebono.com/debono/lateral.htm

Denzin, N. K. (1989a). *Interpretative interactionism*. Newbury Park, CA: Sage.

Denzin, N. K. (1989b). *Interpretative biography*. Newbury Park London: Sage.

Dewey, J (1934). *Art as experience*. New York: Perigee

Dewey, J (1938). *Experience & education*. New York: Touchstone Books

Dictionary of Philosophy of Mind–tacit knowledge, Retrieved March 5, 2005, from http://www.artsci.wustl.edu/~philos/MindDict/tacitknowledge.htmlhttp://www.arisci.wustl.edu/~philos/Mind

Eisner, E. W. (1994). *The educational imagination: On the design and evaluation of school programs*. New York: Macmillan College Publishing Company.

Eisner, E. W. (1998a). *The enlightened eye: qualitative inquiry and the enhancement of educational practice*. Upper Saddle River, New Jersey: Prentice-Hall.

Eisner, E. W. (1998b). *The kind of schools we need: personal essays*. Portsmouth, NH:Heineman.

Farrar, F. (1977). From skull to visage: A forensic technique for facial restoration. *IPCH,44,* 78-80.

Ferllini, R. (2002). *Silent Witness: How forensic anthropology is used to solve the world's toughest crimes*. Buffalo: Firefly.

Fine, M, (1987). Why urban adolescents drop into and out of public high school. In *School dropout: patterns and policies.* Natriello, G. (Ed.). New York: Teachers College Press, Columbia University.

Gatliff, B. P.& Snow, C. C. (1979). From skull to visage. *Journal of Biocommunication* 6(2), 27-30.

Gatliff, B. P. (1984). Facial sculpture on the skull for identification. *American Journal of Forensic Medical Pathology*, 5, 327-332.

Gerasimov, M. M. (1971). *The face finder*. Philadelphia: Lippincott.

Goel, V. (1992). Ill-structured representations for ill-structured problems. *Proceedings of the Fourteenth Annual Conference of the Cognitive Science Society*. Hillsdale, NJ: Lawrence Erlbaum.

Goodman, N. (1968). *Languages of art: an approach to a theory of symbols*. Indianapolis: Bobbs-Merrill.

Gordon, L. (1977). *How to draw the human head:Techniques and anatomy*. New York: Viking Penguin.

Grandin, T (1996). *Thinking in pictures*. New York: Random House.

Hildreth, P. M. & Kimble, C. (2002). The duality of knowledge. *Information Research* 8(1), paper no. 142. Retrieved August 4, 2005, from http://InformationR.net/ir/8-1/paper142.html

Hopkin, M (2003) Skulls reveal dawn of mankind, *Nature 423,*747-752.

Housen, A.C. (2002). Aesthetic thought, critical thinking and transfer. *Arts and Learning Research Journal*, 18(1), 99 -133.

Iscan, M. Y. & Helmer, R. P. (Eds.). (1993*). Forensic analysis of the skull*. New York: Wiley-Liss.

Jonassen, D. H. (1997). Instructional design models for well-structured and ill-structured problem-solving learning outcomes. *Educational Technology Research and Development*, 45, 65-90.

Jonassen, D. H. (2000). Toward a meta-theory of problem solving. *Educational Technology Research and Development*, 48(4), 63-85.

Knowles, M. (1980). *The modern practice of adult education: From pedagogy to andragogy.* (2nd ed.) Englewood Cliffs: Prentice Hall/Cambridge.

Krogman, W. M. (1973). *The human skeleton in forensic medicine*. Springfield: Charles C. Thomas Publisher

Lopez, P. M. G. (1990). "Why do they leave? Social/affective vs. cognitive predictors: A developmental look at dropouts." Paper presented at the annual meeting of the American Educational Research Association April 11–16.

McNeil, L. M. (1999). *The contradictions of control: School structure and school knowledge*. New York: Routledge.

Neufeld, V. R., Woodward, C. A., & MacLeod, S. M. (1989). The McMaster M.D. program: A case study of renewal in medical education. *Journal of Medical Education* 64, 423- 432.

Newmann, F. M., Secada, W. G., & Welage, G. (1995). *A guide to authentic instruction and assessment: Vision, standards, and scoring*. Madison, WI: Center for Educational Research at the University of Wisconsin.

Nikitina, S. (2005). Pathways of interdisciplinary cognition. *Cognition and Instruction,23* (3), pp. 389-425.

Nonaka, I. (1991).The knowledge creating company. *Harvard Business Review,69,*96-104.

Prag, J. & Neave, R. (1997). *Making faces: Using forensic and archaeological evidence*. College Station: Texas A & M University Press.

Pickering, R. B. & Bachman, D. C. (1997). *The use of forensic anthropology*. Boca Raton: CRC Press, Inc.

Polanyi, M. (1958). *Personal knowledge: Toward a post-critical philosophy* Chicago: The University of Chicago Press.

Polanyi, M. (1966). *The tacit dimension*. Garden City: Doubleday & Company, Inc.

Quatrehomme, G., Cotin, S., Subsol, G., Delingette, H., Garidel, Y., Grevin, G., Fidrich, M., et al. (1997). A full three-dimensional method for facial reconstruction based on deformable models. *Journal of Forensic Sciences*, 42(4), 649- 652.

Rahikainen, R. (2002). Learning through cognitive and collaborative problem-solving processes in technological product development. Unpublished doctoral dissertation, University of Tampere, Finland.

Reber, A. (1993). *Implicit learning and tacit knowledge: An essay on the cognitive unconscious*. New York: Oxford University Press.

Rhem, J. (1998). Problem-based learning: An introduction. *The National Teaching and Learning Forum,* 8(1) 1-4.

Rhine, J.S. & Campbell, H. R. (1980). Thickness of facial tissues in the american black. *Journal of Forensic Sciences*, 25, 847- 858.

Rhine, J.S., Moore, C.E., & Weston, J.T. (Eds.) (1982) Facial reproduction: tables of facial tissue thickness of american caucasoids in forensic anthropology. Maxwell Museum Technical Series No. 1 University of New Mexico, Albuquerque.

Rhine, J.S. (1990) Coming to terms with facial reproduction. *Journal of Forensic Sciences*, 35, 960-963 *Journal of Forensic Sciences*, 25, 847- 858.

Rumberger, R. W. (1987). "High school dropouts: A review of issue and evidence." *Review of Educational Research*, Summer. 57(2) 101-121.

Ryle, G. (1949). *The concept of mind.* London: Hutchinson.

Schon, D. A. (1983). *The reflective practitioner*. New York: Basic Books.

Schon, D. (1988). *Educating the reflective practitioner*. San Francisco: Jossey-Bass.

Schultz, A. (1967). *The phenomenology of the social world* (G. Walsh & F. Lenhert, Trans.). Chicago: Northwestern University press.

Seidman, I. (1998). *Interviewing as qualitative research: A guide for researchers in education and social sciences*. New York: Teachers College Press.

Sevenson, J. (2003). The implications of learning theory for the idea of general knowledge. *Journal of Vocational Education and Training*, 55, 241-253.

Shin, N., Jonassen, D. H., & McGee, S. (2003). Predictors of well-structured and ill-structured problem solving in an astronomy simulation. *Journal of Research in Science Teaching*, 40, 6-33.

Spaulding. W. B. (1991). *Revitalizing medical education. McMaster Medical School. The early years 1965-1974*. Hamilton, B.C.: Decker Inc.

Stake, R. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.

Streib, J. T. (1992). History and analysis of critical thinking. Unpublished doctoral dissertation, University of Memphis (formerly Memphis State University.

Suzuki, T. (1973). Reconstitution of a skull. *International Crime Police Review*, 264, 76-80.

Taylor, K. T. (2001). *Forensic art and illustration*. Boca Raton: CRC Press.

Tversky, B. (1999). What does drawing reveal about thinking? In, Gero, J. & Tversky B. (Eds.). Visual and spatial reasoning in design (pp. 93-101). Sidney, Australia: Key Centre of Design Computing and Cognition, University of Sidney.

Tyler, R.W. (1949). *Basic principles of curriculum and instruction* Chicago: University of Chicago Press.

Tyrell, J., Evison, M., Chamberlain, A., & Green, M. (1997) Forensic three-dimensional facial reconstruction: Historical review and contemporary developments. *Journal of Forensic Sciences*, 42(4), 653- 661.

U.S. Department of Education (2008, September). Projections of education statistics to 2017, (Section 1. Elementary and Secondary Enrollment) Retrieved November 9, 2008, from (Institute of Education Sciences, National Center for Education Statistics, NCES, 2008-078) http://nces.ed.gov/programs/projections/projections2017/sec1a.asp

Ubelaker, D. H., & Scammell, H. (1992). *Bones: A forensic detective's casebook*. New York: HarperCollins.

Uhrmacher, P. B.(1992). *Series introduction, in social studies: A practical guide for k-12 social studies curriculum.* Millwood: KrausInternational Publications.

Uhrmacher, P.B. (1997). The shadow curriculum. *Curriculum Inquiry27* (3) 317-329.

Vanezis, M., & Vanezis, P. (2000). Carnio-facial reconstruction in forensic identification: Historical development and a review of current practice. *Med Sci Law 40* (3) pp.197-205.

Von Glaserfeld, E. (1989). Cognition, construction of knowledge, and teaching. *Synthese*, 80, 121-140.

Weinbaum, A., & Rogers, A. M. (1995). Contextual learning: A critical aspect of school-to-work transition programs. Washington, DC: National Institute for Work and Learning. (ERIC Document Reproduction Services N0 381 666).

White, T.D. (2003) Pleistocene homo sapiens from Middle Awash, Ethiopia, *Nature 423* (6941) pp.742-747.

Wilkinson, C. (2004). *Forensic facial reconstruction.* New York: Cambridge University Press.

Williams, A. D. (2004). *The jigsaw puzzle: Piecing together a history.* New York: Berkley.

Williams, A.R. (2005).King tut revealed. *National Geographic, June,* 2-22.

Willis, P. (1977). *Learning to labor: How working class kids get working class jobs.* New York: Columbia University Press.

Wilson, T.D. (2002). *Strangers to ourselves: Discovering the adaptive unconscious.* Cambridge: The Belknap Press of Harvard University Press.

Appendix A—Letter of Introduction to Participate

To: The Members of Project EDAN (Everyone Deserves a Name)

From: Daniel Marion, Jr.   August 00, 2006
       2452 Gaylord Street
       Denver, Colorado 80205
       (303) 377-6330
       email dmarion@du.edu

Dear (Individually named EDAN member),

I would like to invite you to participate in a study I am conducting as part of my doctoral dissertation research requirement. The study is called *The Curricular and Instructional Implications for the Tacit Knowledge Employed While Creating a Forensic Craniofacial Reconstruction.* This research will be supervised by my Graduate Advisors, Dr. P. Bruce Uhrmacher, in the College of Education, University of Denver, Denver, Colorado 80208, (303) 871-2483 and Graduate Co-advisor Dr. Edith W. King in the College of Education, University of Denver, Denver, Colorado 80208, (303) 871-2487.

The intention of my research is to identify, interpret, and document evidence of tacit knowledge exhibition while creating a forensic craniofacial reconstruction. Tacit Knowledge is the taken for granted procedural knowledge we use while performing common tasks, that we cannot verbally explain it, in other words "we know more than we can tell."
By analytically interpreting the data from your think-aloud, self-reported thoughts while you are working, your actual working behaviors, and your uses of reference tools and/or aids, my study will attempt to reveal the incremental, implicit phases

of how tacit knowledge is made public. Revealing the incremental implicit phases

in forensic craniofacial reconstruction can in turn have curricular implications to

interpret and identify when a given student is engaged in their own "know more

than they can tell" tacit knowledge. Given that the children who usually do not do

well in school are those that cannot verbalize their knowledge, it is my hope this

will help to ensure that no child will truly be left behind.

As a visual arts educator and a forensic artist with Project EDAN and the

Jefferson County Coroner's Office, Jefferson County, Colorado, I believe I bring

to this research a connoisseur's sensitivity toward being able to identify, interpret,

and accurately document the nuanced manifestations of your employment of tacit

knowledge. To collect this data for my dissertation, I need your permission to

conduct in-depth interviews that will be audio taped, video taped and

photographically recorded. I would greatly appreciate your consideration for and

participation in my research project.

Sincerely,

Daniel Marion, Jr.

_____   _____

Doctoral Candidate   Dr. P. Bruce Uhrmacher Graduate Advisor

                                       _____

                                       Dr. Edith W. King Graduate Co-advisor

Appendix B—Confidential Informed Consent Form

You are invited to participate in a study that will investigate *The Curricular and Instructional Implication for the Tacit Knowledge Employed while Creating a Forensic Craniofacial Reconstruction.*

In order to conduct this investigation, I studied those members of ProjectEDAN (Everyone Deserve a Name) in the United States, who have given me their voluntary informed consent to participate as a part of my doctoral dissertation research.

This study is designed to research the working behaviors (i.e., the information processing/problem negotiating) of forensic craniofacial reconstructionist, to reveal the tacit knowledge they employ while they are re-creating the likeness of a John Doe from a copy of his skull. The purpose of this research is to shed light on tacit knowledge, to identify how it manifests itself, and to interpret its possible curricular and instructional implications.

Tacit Knowledge (TK) is the basis for the statement "we know more than we can tell." In other words tacit knowledge is the taken-for-granted, procedural knowledge that we constantly use to perform a given task(s), but we do not have the words to explain how we were doing what we did. For example we can recognize the face of a friend in a crowd, but we cannot explain how we do this.

A combined Phenomenological and Cognitive Interviewing process for gathering information will be used to collect data from the participants by requiring them to "think aloud" either spontaneously or when prompted. The actual face to face interviewing time required for each participant is 4 1/2 hours divided into three 90 minute session. Also, the interview process will involve, with the consent of the participant, any one or all of the following data collection methods (audio and video taping, and photographed).

This dissertation research study will be supervised by my Graduate Advisors, Dr. P. Bruce Uhrmacher, College of Education, University of Denver, Denver Colorado 80208, (303) 871-2483, and my Co-Advisor Dr. Edith W. King, College of Education, University of Denver, Denver Colorado 80208, (303) 871-2487. The research study will be conducted by Daniel Marion, Jr., MFA.

There is a remote but reasonably foreseeable possibility for discomfort to the participants, relative to the "think aloud" requirement of the interview process. Because, you will be asked to not only try to recall, but to reflect upon, and then to best of your ability to at least implicitly verbalize your heretofore tacit (taken-for-granted) working and problem solving procedures, you may experience varying levels of discomfort. In order to minimize the possible of this discomfort,

I informed my participant before the interviewing starts that this real possibility exist and remind them of their right under this informed consent agreement, to refuse to continue to participate and the investigator will immediately terminate the interview upon your request.

The potential benefits of this research study for the individual participant are the self-awareness of and the personal insight into their own taken-for-granted (tacit knowledge) relative to becoming a more effective forensic artist; to make their accessible (either implicitly or explicitly) to the consumers of their skills in either formal or informal educational settings. There is no other compensation for participating. The benefits of doing this research are more important than the minimal discomfort possibly experienced by the participants because any increase in the general improvement in the quality of forensic art used to help identify the remains of an unknown person, will brings hope to the loved ones of a missing person by eliminating those remains as a possibility, while at the same time it will bring closure to others as to the true fate of their loved one. Also, to providing a possible lead for law enforcement in cases where the leads have gone cold.

In addition to the above, the curricular and instructional implications of paying attention and being sensitive to a given students manifestations of their tacit knowledge can possibly prevent otherwise very intelligent students and especially the gifted ethnically diverse and minority ones from being put unnecessarily at risk.

The confidentiality of all information and records (i.e., audio, video, and photographic images) identifying the participants in this research study will be maintained. All foreseeable precautions will be taken before, during and after data collection and analysis to securely store collected information in a locked file cabinet in my home, and to the best of my ability be observant to the possibilities of the disclosure of the identities of all of the participants.

Notwithstanding the above, I am required to inform you, the participant, that there are two exceptions to the promise of confidentiality. If information is revealed concerning suicide, homicide or child abuse and neglect, it is required by law that this information be reported to the proper authorities. In addition, should any information contained in this study be the subject of a court order or lawful subpoena, the University of Denver might not be able to avoid compliance with the order or subpoena.

For answers to any and all pertinent questions regarding this research study, please feel free to contact the Principle Investigator (PI) Daniel Marion, Jr. at dmarion@du.edu or (303) 377-6330. For answers to questions regarding research participant's rights, any concerns or complaints about how you were treated during the research sessions, please contact Dr. Maria Riva, Chair, Institutional

Review Board for the Protection of Human Subjects at (303) 871-2484 or Sylk Sotto, Research Compliance Manager, Office of Sponsored Programs at (303) 871- 4052 or write to either at the University of Denver, Office of Sponsored Programs, 2199 South University Blvd., Denver, CO 80208-2121.

Because participation in this study is purely voluntary, it is within the participant's rights under the rules of the Institutional Review Board for the Protection of Human Subjects to refuse to participate or discontinue to participate at any time without penalty or loss of benefits to which the subject is otherwise entitled.

I have read and understood the foregoing descriptions of the study called The Curricular and Instructional Implications for the Tacit Knowledge Employed While Creating A Forensic Craniofacial Reconstruction. I have asked for and received a satisfactory explanation of any language that I did not fully understand. I agree to participate in this study, and I understand that I may withdraw my consent at any time. I have received a copy of this consent form.

_____   _____

Signature   Date

Also, please indicate with an "X" which of the following data collection methods you will consent to:

[ ] I agree to be audio taped.   [ ] I do not agree to be audio taped.

_____   _____

Signature   Date

[ ] I agree to be photographed   [ ] I do not agree to be photographed

_____   _____

Signature   Date

[ ] I agree to be video taped.   [ ] I do not agree to be video taped.

_____   _____

Signature   Date

Appendix C—Background Questionnaire

When and/or how did you become interested in doing forensic craniofacial reconstruction?

What has been your educational training in art and forensic craniofacial reconstruction in particular?

What is your level of certification?

How many years of experience do you have at doing forensic craniofacial reconstructions?

How long have you been with Project EDAN?

Do you prefer doing 2-D or 3-D reconstructions? Why?

Do you refer to use the American, the Russian, or Manchester method ? Why?

Do you see working as a forensic craniofacial reconstructionist primarily as an artist, physical anthropologist, or a combination of the two?