PROPOSED EXERCISES FOR MEMORY AND EMOTION IN ACTING PEDAGOGY:
A SHARED NARRATIVE WITH SCIENCE

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ABSTRACT

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Theater history records centuries of intersections between the scientific understanding of human behaviors and the skills needed by actors to create representational drama. This study reviews a shared historical narrative between science and acting with selected examples from medical traditions and acting traditions. Advancements in twenty-first century neuroscience have changed our understandings of basic principles governing the body and behaviors which pushes theater artists and educators to reconsider how we teach acting. This dissertation proposes acting exercises derived from neuroscientific behavior models which focus on performance memory and emotion expression. A serious study of acting requires a strong understanding of embodied knowledge, knowledge gained from experience. In order to guide acting students through the acting techniques, the study focuses on defining terms and basic scientific concepts and then applying the science through classroom exercises. These proposed exercises, Memory Accumulation and Emotion Scales, are designed for first-year theater undergraduates as part of any standard beginning acting class. The Memory Accumulation exercises introduce memory techniques of encoding and decoding, the concept of chunking (accumulating bits of information into larger performance sequences), and the concept of binding (associating different types of memory into a unified performance memory). The Emotion Scales exercises introduce basic emotions and the progression of building compound and complex emotions with the technique of accessing qualia, controlling intensity, and releasing emotions safely. Ultimately, using scientific models as teaching models, the proposed exercises presented in this dissertation define and identify basic memory systems and basic emotions conceptually (through scientific models) and experientially (through acting exercises).
Dedicated to Dr. Raymond Francis Rooney
Thank you Dad. Rest in peace.
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CHAPTER I. INTRODUCTION

Current advancements in the field of neuroscience have changed understandings of basic principles governing the body and behaviors. These new findings provide an opportunity for theater educators to reconsider how we teach acting. This dissertation proposes acting exercises derived from neuroscientific behavior models which focus on performance memory and emotion expression. These proposed exercises, Memory Accumulation and Emotion Scales, are designed for first-year theater undergraduates as part of any standard beginning acting class. In order to guide acting students through the complexity of human behaviors in acting techniques, the study focuses on defining terms and basic scientific concepts and then applying the science through classroom exercises. The Memory Accumulation exercises introduce memory techniques of encoding and decoding through the rehearsal progression by focusing on the concept of chunking (accumulating bits of information into larger performance sequences) and the concept of binding (associating different types of memory into a unified performance memory). The Emotion Scales exercises introduce basic emotions and the progression of building compound and complex emotions with the technique of accessing qualia, controlling intensity, and releasing emotions safely. The study also reviews a shared historical narrative between science and acting with selected examples from medical traditions and acting traditions. Historically, medically based conceptions of the body inform how actors approach their work and the process of creating representational behaviors. Ultimately, using scientific models as teaching models, the proposed exercises presented in this dissertation define and identify basic memory systems and basic emotions
conceptually (through scientific cognitive models) and experientially (through acting exercises). The outcome is not to prove through laboratory experimentation the efficacy of the exercises, rather it is to propose a series of pedagogical exercises and approaches to access and understand memory and emotion within the actors craft, exercises grounded in cognitive science.

Background and personal narrative

When surveying the internet for college theater programs for future employment, I found a wide scope of course descriptions for beginning acting courses. Often the online descriptions will state the aim of the course as basic training, fundamental principles, or basic skills. Often basic skills are vocal, movement, character, responsiveness, relaxation, imagination, realism, theater games, or scene work. Acting education and training is not consistent in content, approach, or philosophy even at a basic level. Each program must define and determine the training of their acting curriculum. This is the result of an ever evolving and changing system of techniques, especially the Stanislavski-Method techniques, and continued complexity in the market place of theater and the entertainment industry.

I began my acting training twenty-eight years ago in a college theater program where the basic skills of realism and theater games were the basis of training. I continued my training at Tisch School of the Arts, New York University, and in many professional classes in New York City where I studied soap opera acting, commercial acting, and professional comedy improvisation. My skills as a director, actress, choreographer, and dancer have led me to different genres of performance including musical theater and
ancient Greek drama. I also worked and trained in Los Angeles where I studied Meisner Technique for many years. I have accumulated many varieties of acting techniques and training from coast to coast for decades.

One notable omission from my lifetime of training (and guiding my research) is that memory is assumed. My training and education never included discussions or exercises on the process of memorization. At best, my former teachers and directors addressed the problem of memory as the actors’ problem. It is embedded in the common adage of the theater “go memorize your lines and then we can start to work.” Over my lifetime, I have discovered memorization is the work. The artistry, performances choices, and creative process begin when actors start to memorize. My experience tells me actors should not assume memory. My aim in this dissertation is to research specific memory functions of the human brain as discovered by modern science and propose acting exercises which embody and explicate those principles in order to propose pedagogical approaches designed to put these findings into action.

I also understand the perpetual attention to emotion in acting training. Historically, much of this has evolved from Diderot’s paradox and through the one hundred year history of Stanislavski-Method emotional memory exercise. A critical analysis of emotional memory theory suggests emotional memory exercises are similar to episodic memories retrieved in the process of Post Traumatic Stress Disorder therapy. The therapeutic aspect of emotional recall highlights a continual need to reconsider and evaluate pedagogical approaches toward emotion exercises in acting class. Because of the attention to “emotional memory” many actors and directors convolute “emotion” and “memory” as being the same. Memory Accumulation exercises propose memory as a
basic skill and examine how sensory, motor/bodily, spatial, emotion, and higher cognitive memory schemas bind in a unified performance memory. From this perspective, emotion can be viewed as an important part of building performance memory and functioning within a memory schema. The proposed emotion exercises address the basic skill of accessing qualia, controlling intensity, and releasing emotion arousal so actors learn healthy and safe habits in their acting training. With strong emotion techniques, actors can incorporate emotion expression in their unified performance memory safely and effectively.

By studying neuroscience of memory and emotion I am able to systematically analyze my own technique and training as a performer by using different types of memory to bridge gaps and solve memory problems. As a director, I am able to bring a better understanding of the creative processes to my students and actors. Similar to psychologists, neurologists, and naturalist scientists; actors study human behavior with curiosity and acuity. Similar to actors; psychologists, neurologists, and naturalist scientists study human behavior as components and processes. By studying historical examples from art and medical science, I am able to revive a fascinating shared history of understanding the body and embodied knowledge.

*Statement of key research questions and need*

This study pursues basic questions of how to teach performance skills and proposes a new pedagogical model. A fundamental question acting teachers should ask is how do acting exercises teach acting? What is being learned? What training is important for young actors to help them achieve their goals and successes? I aim to improve my
own skills as an acting teacher. Why should I choose to teach acting based on ideas from modern neurology? By studying advances in brain science, acting teachers may obtain a better understanding of human behavior which informs the creative and pedagogical process. In my experience of directing and teaching, I find neuroscientific explanations do not frighten my actors; rather with a common sense and clear explanation, actors appreciate the information and improve their own creative process. The study also asks what terms benefit actors the most and what are workable translations of neurological ideas. This dissertation will propose a limited range of terminology coincidental with neuroscience explanations of cognitive functions. Theories and stories offer a semantic understanding of acting, but learning performance technique is a practical experience, habitual and embodied.

Proposing new exercises addresses the need to continually improve pedagogical approaches toward the educational processes of acting. Based on the research of Angela Katherine Baker, the need for ethical practices has been given. Baker argues four major problems encountered by some actors in generating emotion in performance are “emotional hijacking,” “emotional hangover,” “emotional blockage,” and “incomplete, faded, inconsistent, and mixed emotional memories” (52-68). Her research lists anecdotal and professional examples of emotional trauma and abuse in acting performance; such as “Donald” unknowingly cutting an acting partner with a knife (Burgoyne 163), Charlton Heston physically losing control of himself on stage (Bates 13-14), and acting students becoming violent with Lee Strasberg in class (Hull 88). Baker contends “Emotion control is important while generating emotion for acting performance” and “Techniques which
allow actors to generate emotion should be dependable, consistent, and accessible at any moment the actor chooses” (3).

The need for memory exercises emerges form the absence of focused exercises in many professional and college programs. The predominate practice of memorizing lines before class or rehearsal indicates memory is an assumed skill. Although most actors develop personal strategies in memorizing the work, it is often learned through trial and error or simple folk theories of memory.

*Embodied framework - basic skills, techniques, and training*

Acting is largely an apprentice art form, information handed down in the repeated practice of the craft. “The observational model of approach, where process rather than product is placed under the spotlight, is reflected in (Richard) Boleslavsky’s practice at his Laboratory Theater and in (Lee) Strasberg’s at the Actor Studio, where the open rehearsal – or the scene critique – was the dominant method of teaching” (Pinches 90).

With the integration of psychological ideas and scientific methods, dramatists in the twentieth century searched for different approaches toward creating performance. Actors and directors began to dissect behaviors seeking basic elements, units, bits, and process in order to reconstruct action on stage. The elements discovered are basic skills and acting techniques.

*Basic skills* are ontological, physical or psychological abilities commonly used in performance. Examples of basic skills include vocal, physical, mental, emotional expression, sometimes characterization and psychological realism. Vocal skills include clarity of diction, control of volume, range and variation of pitch, tone and rhythmic
patterns, qualities of sound and accents. Physical skills include posture (historical postures and character postures), flexibility, gestures, body awareness of stage angles, stage combat, and dance. Emotion skills are an actor’s ability to willfully express authentic emotional states. Mental skills include focus (eye focus), concentration (ability to hold character or sustain fictional scenarios), character motivation, objectives, or intention (Stanislavski/Method and variations). Mental skills include subtext, inner speech, and listening. My basic skill set will also include memorization techniques.

For the purpose of this dissertation, acting technique is defined as a person’s ability to control and combine basic skills in performance. For example, vocal techniques are the actor’s ability to combine volume and pitch in their voice. Movement techniques combine flexibility and strength. Techniques build and compound, eventually, becoming the actor’s ability to combine vocal techniques with movement techniques. Techniques are also the actors’ habits when approaching their rehearsal process. Technique enables actors to make artistic choices, solve problems, and adapt performances for different mediums or genres. The two techniques this dissertation examines are memory techniques using the basic skills of chunking and binding performance information and emotion techniques of accessing qualia, controlling intensity, and releasing basic, compound, and complex emotions.

Training is when basic skills and techniques become habits or implicit. The purpose of educating actors is to provide experiences which create embodied performance habits. Strong models and strong training gives students a lifetime of potential creativity. This dissertation proposes acting exercises which train actors in basic
skills and techniques of memory and emotion so their abilities to perform and their strategies for solving creative problems become implicit.

Many contemporary acting classes include warm-up exercises for voice and body and theater games or improvisations. Most acting classes eventually progress into scene study using theater, film, or television scripts. The anecdotal method for acting exercises is “from the page to the stage.” The method of acting is to transform verbal instructions into embodied action. Embodied action becomes embodied knowledge and will “teach” actors the basic skills, techniques, and training. Embodied knowledge and repetition eventually form actors’ performance habits. Habits are behavior models; the basic skills, techniques, and training of actors’ education.

**Scientific framework - theories, hypothesizes, and models**

Methodologies and methods determine criteria for establishing information and knowledge. The scientific method establishes information by repeatable and testable experimentation and observation, the judicial method establishes information by a preponderance of evidence beyond reasonable doubt as determined by a jury of peers, the subjective method establishes information through the lens of identity and personal experience, and the artistic method establishes knowledge through creative experiences. Society uses these methodologies as well as their hybrid forms and variations.

Scientific theories are established ideas based on years, decades, even centuries of data. Data supports different aspects of a scientific theory and theories adapt with new data. Scientific hypothesis are testable ideas derived from scientific data and, whether true or false, can contribute to the establishment of scientific theory. Scientific models
serve as tools to reconsider and reorganize data in the process of developing hypothesis and theory. They are by definition plastic and exploratory. They can simplify complex systems by using verifiable components to illustrate the construction of larger matrixes. Science has many models. Anatomy is a model. From anatomical models science derives psychological models. Anatomy of the body and anatomy of the brain are guideposts towards understanding behaviors. Modern neuroscience locates memory and emotion anatomically in the brain and constructs psychological behavior models reflecting various aspects and processes.

Although scientific methodology is based on verifiable and repeatable experimentation and observation, this study does not claim scientific laboratory assessment for the efficacy of the acting exercises. But this is not to say the proposed exercises could not be linked to future studies or scientific experimentation. Adapting the exercises in a scientific study may focus on other issues of emotion research and not an evaluation of the pedagogical efficacy. The proposed exercises may offer scientists a template or behavioral model to design experiments. I believe assessment of the proposed exercises should be within standard pedagogical practices such as classroom discussions, final course evaluations, and personal applications.

Interdisciplinary approach

In this study, my interdisciplinary exchange with science is at the level of models. My approach is to engage in creative experimentation to bring scientific models from the page to the stage. There are models in the field of theater. A play is a model. Playwrights record a model of society and human behavior. Re-staging a play is a creative and
experimental endeavor which remolds the art into the current cultural milieu. A set is a model. Scene design re-models architecture and visual icons into creative and experimental environments. Acting is a behavioral model. Rehearsal constructs the performance memory model and repetition remolds the schema during the run of a show. Drawing on my personal training as an actor, my career as an acting teacher, and postmodern dance choreographer; I am crucially aware of the use of improvisation scenarios and the pedagogical skills required in guiding acting students through an exercise. Designing acting exercises or improvisation theater games or dance composition exercises are necessary directorial/pedagogical tasks and, for the purpose of this dissertation, are pedagogical models.

In *Writing Up Qualitative Research* Harry F. Wolcott notes the distinction between method and methodology. He states, “Methodology refers to underlying principles of inquiry” and method refers to tools or “specific techniques” (93). The methods or tools for the study consist of surveying scientific models derived from anatomy and experimentation, and selecting specific representational models. I adapt the scientific models into performance models which I use to teach basic principles. Finally, I bring the performance models into the classroom space to guide the acting exercises which embodies information through experience.

The methodology or guiding principle is to establish an interdisciplinary dialogue between neuroscience and theater studies as a moral and ethical exchange. To that end, I propose Dwight Conquergood’s theory of dialogical relationships. In “Performance as a Moral Act: Ethical Dimensions of the Ethnography of Performance” he states, “This performative stance struggles to bring together different voices, world views, value
systems, and beliefs so that they can have a conversation with one another” (9). Figure 1.1 is the model Conquergood’s proposed to illustrate his theory.

![Figure 1.1 Conquergood’s Moral Map, “Performance as a Moral Act: Ethical Dimensions of the Ethnography of Performance” (5)](image)

Referencing Conquergood’s Moral Map, I have experienced many skeptics copping-out on my efforts to study neuroscience and have been accused of being a superficial enthusiast in my academic scientific pursuit. I have fought to keep the highest ethical stance and the most respectful dialogical conversation in the research and presentation of this dissertation. I aim the dissertation’s moral interdisciplinary exchange at the level of modeling because models are creative and conversational. I organize the study through
the shared narrative because of a common interest for acting and medicine in human behaviors and the body.

Organization of study

This dissertation contextualizes the traditions of acting with a shared historical narrative of understandings of the body through medical science. The study of the body is a focus of humanity. From the performative practice of physician-priest of the Neolithic river valley civilizations to the performance of MRI’s in the twenty-first century, medical science informs the perception of the performing body. More than any other practices, dissection and experimentation changed the fundamental knowledge of the body and changed medicine. Dissection revealed anatomy; anatomy demystified the internal body; anatomy of the brain demystified the mechanisms of memory and emotion. The concept of mind/body, its biological nature and expressiveness, informs approaches to the actor’s creative process.

The next chapter tracks the shared narrative, selecting important junctions in both science and art. The evaluative theme of “authentic” or “natural” or the “verisimilitude” of emotion in actors’ performance appears throughout theater history, certainly beginning with the scientific gaze of the Greeks. The ancient Greeks are credited with emergence of medicinal arts and the memory arts. The memory arts were techniques of oratory through Roman civilization and techniques of visual arts in the Middle Ages. The emergence of associationism, the technology of the printing press, and the new culture of science all but buried the memory arts of antiquity and the Middle Ages. In part, this study is a story of
how memory was forgotten in the art of acting -- and emotion and the passions were privileged.

As the Reformation dissected the traditional Catholic church of Rome, the science of emotion and memory was embedded in the more important question of the soul. As new science redefined the relation between God and the world, new medical science redefined the relation between the body and soul. The shift affected the definition of religious power, which in turn affected the definition of political power, which in turn played out on the stages of Early Modern England. The revolution in medicine in the sixteenth-century and the emergence of the scientific method brought its own cultural dissection. The conflicting cultural norms and beliefs between the College of Physicians and the Company of Barber-Surgeons and alchemists were openly debated in both medicinal arts and theatrical arts. Shakespeare’s plays are a spectrum of complex characters in emotional scenes, recognizably modern and sophisticated. The sparse Shakespearian record leaves theater scholars speculating more than theorizing about Shakespearian actors’ technique. Insight to the psychological complexity of Shakespearian characters can be found in Avicenna’s *The Cannon of Medicine* (1025), the dominate medical text for five centuries. Its explanation of the body and psyche at least illustrated the medical model of the complex psychology found in Shakespearian characters. The scientific rumblings of the sixteen and seventieth-century not only played as dramatic narratives in the boldly secular theater, but affected how actors and dramatists thought of the actors’ body in the work. The stage was set for humors versus the mechanization of nerves and muscles as the practice of dissecting the body medically and artistically continued.
In the nineteenth and twentieth centuries, the actors’ body was more and more scrutinized and behavior was more and more categorized and systemized. New schools of acting, such as Delsarte and Stanislavski, actively pursued a systematic approach rather than imitative methods. American students and dramatists of Stanislavski’s system evolved and developed the mid-twentieth century Method acting techniques and late-twentieth century post-modern Method variations. Mid-twentieth century Method is the five major branches of the Stanislavski system: Lee Strasberg, Stella Adler, Robert Lewis, Stanford Meisner, and Uta Hagen. Their techniques are canonized in their schools and texts. From these branches, generations of teachers and actors adapted the technique and continue to explore the actor’s problem of emotional realism. Alternatives to traditional Method training and post-modern Method hybrids have emerged in experimental and avant-garde theater. Contemporary techniques such as Rhonda Blairs’ Image Streams, Susana Bloch’s Alba Emotions, and Richard Schechner’s Rasaboxes exemplify new neuro-scientific approaches to acting and are similar to my approach in developing the proposed acting exercise, Memory Accumulation and Emotion Scales.

The purpose of the historical perspective is to ascertain the tradition of studying and analyzing acting and the examination of selected core issues defining the performing body medically and scientifically. The following co-chapters of memory science and memory exercises, and emotion science and emotion exercises, continue the shared narrative.

Chapter three discusses basic models and principles from the neuroscientific study of human memory which support the proposed memory exercise. Human memory is a matrix composed of memory *systems*. Over the past hundred years, scientists have
documented thousands of case studies and experiments identifying aspects of memory systems. The range of existing research indicates the vast complexity of the brain and the nuanced variations of brain function. Scientific research in the area of memory referenced in the chapter is from the work of L. R. Squire, Endel Tulving, and Vern Bingman. The aim is to extract useful terms from the field of neuroscience and reconstitute them into the lexicon of actors. Terms included encoding and decoding; long term and short term; explicit and implicit; semantic, episodic, and procedural; binding and chunking; and the five general categories of memory for actors: sensory, motor/bodily, spatial, emotion, and higher cognition.

Chapter four describes the proposed memory exercises. Science opens the door to the potential to explore the skill of memorizing performance. Memory Accumulation exercises and diagramming introduces basic principles and definitions of memory models and describes how to embody the principles in practice. Different types of memory bind as they consolidate and reconsolidate in behavior and action. When modeling their performance memory, actors create unique maps of memory patterns based on an individuals’ experience in the rehearsal process. The classroom exercises design a “memory problem” for the actors, the inability to coordinate newly learned abstract movement while recalling (retrieving) a long term memory. The exercises accumulate experience for the student by offering a means to solve the problem by chunking specific types of memory and then binding and creating associations between the different modes. Diagramming illustrates the process of problem solving in the larger challenge of creating a complex performance sequence.
Chapter five discusses neuroscientific principles from emotion science which support the proposed emotion exercise. Modern neuroscience offers different models to understand human emotions, starting from identifying basic anatomical models to illustrating abstract models which representing categories and relationships. Scientific research in the area of emotion referenced in the chapter is from the work of Robert Plutchik, Jaak Panksepp, Paul Ekman, and Carroll Izard. Andrew Ortony and Terence Turner address the consistencies and inconsistencies in creating basic emotion taxonomies and models. Useful terms from the field of neuroscience include basic and complex emotions, qualia and intensity, and appraisals.

Chapter six describes the proposed emotion exercise. Emotion Scale exercises and diagramming introduce basic principles and definitions of emotion models and propose how to bring the principles to practice. The classroom exercises design an emotional progression for the actors by one, clarifying and identifying basic emotion qualia; two, using the basic emotions to create compound and complex techniques; and three, diagramming emotion in the context of environmental and cognitive appraisals. The exercises explore eight basic emotions through modes of intensity, physicality, volume, transitions, and control; eventually, applying emotion expression in given circumstances.

Chapter seven presents a summary and findings and discusses future research possibilities. The dissertation includes an appendix which archives a glossary of terms used throughout the study and in the proposed acting exercises.

Scope and limitations
The interdisciplinary scope has potential contributions for both artistic practice and scientific questions and models. On the scientific side of C. P. Snow’s classic division between the sciences and the humanities is neuroaesthetics. Neuroaesthetics, proposed by Semir Zeki, Professor of Neurobiology at University of London, is the neurological study of artistic perception. In *Inner Vision* Zeki wrote, “I believe artists are, in a sense, neurologists who unknowingly study the brain with techniques unique to them” (10). To study the visual cortex Zeki, uses fMRI’s while showing patients samples of art and by monitoring individuals cells, he maps cortical areas responding to motion, color and shapes. Kinetic art activates V5, the motion center of the brain; V4 responds to color, etc. Zeki concludes artists discovered these areas of the brain through their own creative exploration of art and perception.

On the other side of interdisciplinary scope are theater artists and scholars researching cognitive studies in theater and performance. At the forefront of the effort are Bruce McConachie, F. Elizabeth Hart, and Rhonda Blair. These scholars and many others are bridging Snow’s gap by re-examining critical and theoretical paradigms in theater and performance with cognitive approaches. In the article “Falsifiable Theories for Theatre and Performance Studies,” McConachie discusses the frequent omission of scientific paradigms in the discipline of constructing performance theory and argues “contemporary scientists, especially in the fields of cognitive psychology, neuroscience, 

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1 McConachie tracks the hegemony on scholarship through references and citations, but specifically he points to the second edition of *Critical Theory and Performance* edited by Janelle Reinelt and Joseph Roach. By indexing their entries, he compiled a partial list of Master Theorists: Bourdieu, Baudrillard, Brecht, Derrida, Feral, Foucault, Freud, Gramsci, Habermas, Jameson, Lacan, Marx, Saussure and Williams. Hailed by cognitive theater scholars as foundational, McConachie’s article challenged tenets of poststructuralism, its assumptions, assertions, and methodologies.
evolution, and linguistics, have a lot to say about the realities of perception, memory, empathy, emotions, and culture - all necessary concerns of theatre and performance scholars” (555). When Zeki states “I believe artists are, in a sense, neurologists who unknowingly study the brain with techniques unique to them,” I ask what the actor brings to the table in this conversation of neuroaesthetics and cognitive studies in theater. How, like visual artists, are performing artists “neurologists who unknowingly study the brain with the techniques unique to them?” -- the techniques of the performing arts. I find the collaboration and interdisciplinary study between neuroscience and the performing arts is not only possible, but in the ever-expanding world of neuro-humanities, it is foreseeable. Beyond neuro-musicology and neuroscience’s examination of visual arts is the question of representational artistic behavior, where the material of the art is the work product of the central nervous system. Both neuroscientists and theater scholars in cognitive studies see across C. P. Snow’s classic expanse as they aim for the crossroads of culture and cognition.

This study will limit the theoretical scope of cognitive studies and neuroaesthetics to specific questions of how neurological contributions can improve acting pedagogy for beginning college students. I will further limit the study to two areas of acting training, emotion expression and memory systems. Memory and emotion are important areas of research in neuro-psychology and are studied in biochemical, anatomical, and functional levels. I will limit the neurological field to specific precepts and axioms that pertain directly to the process of understanding basic memory and emotion and how they may affect the proposed acting techniques.
Contributions and new knowledge

The connections between acting and science existed throughout theater history including contemporary techniques. New knowledge is gained by tracking acting theories against medical history and examining marginally studied areas such as the memory arts of antiquity, Avicenna psychology, and John’s Locke’s embodied knowledge. Modern neuroscience offers new knowledge of human behavior and basic brain function which informs many known ideas about acting and action. By surveying modern neurological knowledge of emotion and memory and developing safe and effective exercises, the study will contribute to the pedagogy and tradition of acting training. I aim to make my acting exercises safe and effective by giving students the intellectual tools which explain behavior, so they in turn can solve their acting problems, whether they face a memory block or an emotional block. New knowledge is also gained by translating neurological ideas into the practical lexicon of actors.

Summary

Theater history records centuries of intersections between the scientific understanding of human behaviors and the skills needed to create representations of human behaviors on stage. Modern culture faces the exponential advancement of science, especially in the area of brain science. This fact pushes theater artists and educators to reconsider how we teach acting. Current advances in neuroscience clarify fundamental terms necessary when creating artistic behavior. Modern science provides principles of our basic biology and nature which offer insights to the processes of behavior. Through the creative and representational language of models, I aim to develop two acting
exercises for students: Memory Accumulation and Emotion Scales. Memory Accumulation addresses the largely absent skill of memory. Emotion Scales offers a new approach towards emotion expression. Acting and teaching are creative arts and ever evolving aspect of an experimental performing culture. Both art forms continue to evolve and adapt for a new generation of actors.

The serious study of acting requires dedication to embodied knowledge and embodied learning through experience. The history of embodied knowledge through Empiricism, although a less studied cannon compared to postmodern philosophies, is based in the study of the brain and the associated epistemology. I believe a disciplined examination of embodied knowledge through the cannon of medical history is required because it is rarely referenced in theater scholarship and crucial to this study. To accomplish that challenge, I track the shared narrative between the medicinal body and the performing body.
CHAPTER II. SHARED NARRATIVES OF THE BODY: ACTING TRADITIONS AND MEDICAL SCIENCE

The shared practice of analyzing the body and mind allows a shared history between medicine and acting. The science of memory and emotion is historically embedded in the philosophical debate of soul-body which evolved through the centuries into the mind-body debate. The initial dissection between the spiritual soul or the cognitive mind and the material body endures. The division continues to fracture the method of inquiry, resulting in the long, persistent battle between science and religion. Buried in the historical definition-diagnosis of mind-body is anatomical model for memory and emotion: memory is in the back of the mind and emotions flow through the heart. The history of medicine records the evolution of understanding the biology of the body, which in turn became the understanding of the biology of psychology and behavior. As medicine evolved, so did theories of acting. Chapter two reviews selected historical medical narratives which set the stage and define the performing body, and selected historical and contemporary models of acting techniques in the pursuit of embodied knowledge.

Neolithic-medicine and the early performative

The history of medicine, specifically brain surgery, extends back to Neolithic humans. Evidence of trepanations is found in skulls from Neolithic sites in Europe, India, and Peru. It is widely hypothesized early humans drilled holes into the skull “in order to liberate evil spirits who might be causing headaches or epilepsy” (Ackerknecht 8-9).
Most ancient human civilizations explain and treat disease, illness, and psychological behavior from religious models. For this reason, many paleoanthropologists reverse engineer the precept of Neolithic-medicine as an early religious practice and as a form of early social performance.

John L. Austin’s *How To Do Things With Words* argued language was a “performative” when by *saying* something, the utterance *does* something. For example, “I *name* the ship,” or “I *bet,*” or the wedding utterance “I *do.*” In Neolithic-medicine the incantation of chants or spells was based in the belief which by *saying* hymns, prayers, or magical utterances, it will *do* something for the patient. The physician-priest was a Neolithic performer and common figure to early civilization.

The oldest ruins of civilizations are found in four river valleys: the Tigris-Euphrates in Iraq, the Indus River in India, the Yellow River in China, and the Nile River in Egypt. Each of these ancient cultures developed medicinal philosophies and practices. The most well-known physician-priest was Imhotep of ancient Egypt. Each of these civilizations produced medicinal texts describing diagnosis, treatment, surgeries, laws, and performed medical rituals: Ebers, Smith, and Kahun papyri of Egypt, *Ayurveda* of India, *Nei Ching* of China, and various tablets of Mesopotamia. “Drug lore, herbal medicine, and magical practices are essentially universal aspects of traditional and ancient medical systems” (Magner 53). Concurrently each civilization also produced performed religious and social rituals which are often argued as nascent forms of theater (Brockett and Hildy).

The most pronounced shared history of medicine and theater was the Indus River Valley civilization. Hindus’ sacred texts were a collection called the Veda. Many
hypothesized the Veda texts were oral histories and reached back millennia BC into ancient cities of the Indus Valley such as Harappa and Mohnejo Daro. India’s ancient text of medicine was Ayurveda or The Science of Life and contained “medical lore, anatomy, wounds, diseases, healers, demons, drugs, charms, and spells” (Magner 39).

Similar to the medicinal tradition, ancient Hindu theater was interwoven with religious ritual. The extant textual artifact of Indian theater and dramaturgy is the Nāṭyaśāstra. Described as the fifth Veda, its age is also untraceable. A record of an oral history of the Nāṭyaśāstra is purported to exist 500 BC to 300 AD. The text translated by Adya Rangacharya was from the seventh or eighth century AD. In his translation, Rangacharya credited Abhinavagupta, an eleventh century writer and commentator and Dr. Manomohan Ghosh who translated the veda in the 1960s. Interpretations and translations were marred with misconceptions and embellishments, but Rangacharya defended the continual study of the Nāṭyaśāstra, stating it was “a picture of our people’s speech and manners” and a description of “the essential elements of stage craft, thousands of years ago” (xxi). In the Nāṭyaśāstra specific emotions (called rasa/bhava) were listed: love, humor, compassion, horror, courage, fear, repulsion, and wonder. They were described in detail including psychological triggers and physical gestures and characteristics. The eight emotions from antiquity are remarkably consistent with many modern categories in neuroscience research. In chapter six, I discuss a modern neuro-scientific experiment using the basic emotions of the Nāṭyaśāstra which supports the ancient “picture of people’s speech and manners” has continual recognition. Observation and recognition are elemental for the practice of medicine and performance, in ancient Greece they become transformative.
Shamanistic, religious, and empirical approaches to healing are, as we have seen, universal aspects of the history of medicine. Where Greek medicine appears to be unique is in the development of a body of medical theory associated with natural philosophy, that is, strong secular tradition of free inquiry, or what now would be called science. Unlike previous civilizations, the Greeks were not primarily organized around agriculture and a strong central government or priesthood. . . . The earliest Greek natural philosophers were profoundly interested in the natural world and the search for explanations of how and why the world and human beings came to be formed and organized as they were. (Magner 65)

*Medical theories in antiquity*

The medicinal arts of antiquity established their own nascent scientific method. They pursued knowledge by observations, diagnosis, and treatment based on the belief of material cause and effect in the biology of the body. In the *Hippocratic Corpus*, the Greeks challenged spiritual explanation of sickness. The chapter “On Sacred Diseases” stated, “It is thus with regard to the disease called Sacred: it appears to me to be nowise more divine nor more sacred than other diseases, but has a natural cause from the originates like other affections” (Hippocrates). The disease was described as violent, convulsion, grinding of the teeth, foaming at the mouth, and kicking of the feet. These characteristics lead towards a modern diagnosis of epilepsy. In Greece, physician-priests
became physicians-philosophers and were willing to challenge religious precepts in medicine and develop a more systematic approach to the understanding the body.

The study of sickness, disease, and the functions of the body were limited because the Greeks and Romans were repulsed by autopsy and dissection of cadavers. Alcmaeon, Plato, Aristotle, and Hippocrates derived much of their medicinal knowledge of the body from dissecting animals and an occasional stillborn baby. To study internal medicine the Greeks and Romans had to travel to Alexandria. The Egyptians, skilled in the art of mummification and free from the cultural taboo, accumulated detailed records of internal organs, the nervous system, and the anatomy of the brain. More than any other practice, dissection and experimentation changed the fundamental knowledge of the body and medicine.

In the second century AD, the Roman physician Galen mastered all the medicinal arts available in antiquity. After studying in Turkey and Alexandria, he returned to Rome and became the personal physician of emperors and gladiators. Treating gladiators allowed Galen to gaze inside the body without dissection or autopsy. But even with anatomical knowledge, Galen did little to change the basic percepts about the body as initially explained by the Greeks. Galen understood the body as three interconnected systems: the liver system, the heart system, and the brain system. The liver transformed digested food fluids from the stomach and intestines into blood and became the vegetable soul. From the liver, blood flowed to the heart where it was purified by air in the lungs and became the vital spirits. The vital spirits flowed to the head where they were purified again and became capable of thought, sensation, and movement which Galen called the animal soul. Anatomy governed functionality: the liver was responsible for desires,
appetites, and pleasures, the heart was responsible for emotions, and the brain was responsible for rational and the seat of memory. Galen perfected Greek medical science by focusing on balancing the four humors (clear phlegm, yellow bile, red blood, and black bile) as they move the passions through the ventricles of the heart and brain. Galen’s medical accomplishments and practice established the foundation for understanding the body for nearly a millennium (Zimmer 10-18). Medicine placed emotions in the heart and memory in the brain.

The Greek medicinal practice of naturalistic observation and hypothesis shifted from the medical body to the performing body. In the next section texts discussing acting indicate the scientific gaze also observed and critiqued naturalistic acting on stage and the performance of authentic emotions.

**Performing emotion in antiquity**

Although the origins of Western theater track to the emergence of ancient Greek drama, no actor’s treatise from the era is extant. Basic principles and evaluative criteria appeared in writings of audience members, philosophers, and professional orators comparing the art forms. Various fragments and passages discussed the verisimilitude of authentic emotion expression. The archetypal and renowned account was found in the ancient text *Attic Nights* by Aulus Gellius (circa 123-169 AD). During long winter nights in the country of Attica, the Athenian lawyer assembled a haphazard collection of writing and arguments to “jot down whatever took my fancy . . . as an aid to my memory, like a kind of literary storehouse” (1. xxvii). In “A noteworthy story about the actor Polus,” he wrote:
There was in the land Greece an actor of wide reputation, who excelled all others in his clear delivery and graceful action. They say that his name was Polus, and he often acted the tragedies of famous poets with intelligence and dignity. This Polus lost by death a son whom he dearly loved. After he felt that he had indulged his grief sufficiently, he returned to the practice of his profession.

At that time he was to act the Electra of Sophocles at Athens, and it was his part to carry an urn which was supposed to contain the ashes of Orestes. The plot of the play requires that Electra, who is represented as carrying her brother’s remains, should lament and bewail the fate that she believed had overtaken him. Accordingly Polus, clad in the mourning garb of Electra, took from the tomb the ashes and urn of his son, embraced them as if they were those of Orestes, and filled the whole place, not with the appearance and imitation of sorrow, but with genuine grief and unfeigned lamentations. Therefore, while it seemed that a play was being acted, it was in fact real grief that was enacted. (35-37)

Leofranc Holford-Strevens’ article “Polus and his Urn: A Case Study in the Theory of Acting c. 300 B.C. – c. A.D. 2000” tracked the limited historical and artistic references of the Polus legend through antiquity, the Middle Ages, and modernity. Holford-Strevens argued Gellius’ account earned Polus the reputation of the first Method actor in theater history or at least “proto-Stanislavski.”

Polus and his audience were not the first in their alleged interest in authentic emotion in performance. In Poetics, Aristotle (384-322 BC) described the verisimilitude
of actors’ emotions on an audience, “... by natural sympathy, actors are most persuasive and affecting who are under the influence of actual passion. We share the agitation of those who appear to be truly agitated – the anger of those who appear to be truly angry” (Twining 98). “Actual passion” or “truly angry” indicated aptitude to observe authentic emotional expression in actors. In Chapter XXII Aristotle wrote of another basic principle of emotion, intensity:

For what concerns the sentiments, we refer to the principles laid down in the books of Rhetoric; ... The sentiments include whatever is the object of speech; as, for instance, to prove, to confute, to move the passions—pity, terror, anger, and the like; to amplify, or to diminish. (Twining 103)

Reviewing a second translation of the passage revealed other possible interpretations. A translation by S. H. Butcher used the word “thought” instead of “sentiments.” He wrote,

Concerning Thought, we may assume what is said in the Rhetoric, ... Under thought is included every effect which has been produced by speech, the subdivisions being—proof and refutation; the excitation of the feelings, such as pity, fear, anger, and the like; the suggestion of importance or its opposite. (93)

Butcher used the word “fear” compared to “terror” and described “suggestion of its importance or its opposite” rather than “to amplify or to diminish.” I believe both translations indicate intensity, a greater intensity was more “important” and its “opposite” would be diminished intensity. Both infer a basic principle of emotion science: emotions have oppositional arousal states and emotions increase and decrease in intensity. It can
only be assumed actors themselves had similar conversations and the same gaze of naturalistic observation, known in Greek medicine, observed the stage.

Marcus Tullius Cicero (106-43 BC) described ancient Greek actors’ “emotional dexterity” as a type of “Scale” (although he did not recommend it to students of oratory):

Yet by my recommendation, no student in eloquence will be a slave to his voice like the Greeks and tragedians, who pass whole years in sedentary declamation, and daily, before they venture upon delivery, raise their voice by degrees as they stand, and, when they have finished pleading, sit down again, and lower and recover it, as it were, through scale from the highest to the deepest tone. (Cicero 77-78)

Although Cicero’s passage took a critical tone when describing Greek tragedians’ vocal scaling range and performance techniques, he saw a close relationship between the art of the orator and the art of the actor. Cole claimed “Cicero . . . belonged to a long line of famous orators who learned effective public delivery by studying actors” (21). In his treaties, he further described emotion “Scaling” and the observation of consistent physical characteristics common in psycho-physical emotion expression:

For every emotion of the mind has from nature its own peculiar look, tone, and gesture; and the whole frame of a man, and his whole countenance,

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2 In a passage from Symposiacs (III, v.1) Plutarch (circa 46-120 CE) discussed the value of emotion verisimilitude in actors. “And therefore, because he that is really affected with grief or anger presents with nothing but the common bare passion, but in the imitation some dexterity and persuasiveness appears, we are naturally inclined to be the disturber at the former, whilst the latter delights us” (qtd. in Cole 13). The passage indicated “dexterity and persuasiveness” were perceptible skills and techniques of ancient actors and valued by audiences.
and the variation of his voice sound like strings in a musical instrument, just as they are moved by the affection of the mind. For every touch, sharp, flat, quick, slow, loud, gentle; and yet, among all these, each sorts, as the rough, the smooth, the contracted, the broad, the protracted, and in modulation; for there is none of these, or those that resemble them, which may not be influenced by art and management; and they are presented to the orator, as colors to the painter, to produce variety. (qtd in Cole 24)

Cicero continued to describe specific emotions and their physical recognition characteristics. His primer list of basic emotions and pithy descriptions were similar to the descriptions found in modern neuroscience and in the veda dramaturgical text Nātryāstra. Cicero’s analysis, which focused toward vocal qualities, was as follows:

**Cicero’s descriptions of vocal emotion**

<table>
<thead>
<tr>
<th>Emotion:</th>
<th>Cicero’s Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger</td>
<td>“acute, vehement, and with frequent breaks”</td>
</tr>
<tr>
<td>Lamentation and Bewailing</td>
<td>“flexible, full, interrupted, in a voice of sorrow”</td>
</tr>
<tr>
<td>Fear</td>
<td>“despondent, hesitant, abject”</td>
</tr>
<tr>
<td>Violence</td>
<td>“strained, vehement, impetuous forced excitement”</td>
</tr>
<tr>
<td>Pleasure</td>
<td>“unconstrained, mild, tender, cheerful, languid”</td>
</tr>
<tr>
<td>Trouble</td>
<td>“gravity without lamentation”</td>
</tr>
<tr>
<td>Oppressed</td>
<td>“one heavy uniformed sound”</td>
</tr>
</tbody>
</table>

Figure 2.1 Cicero’s descriptions of vocal emotion (qtd in Cole 24)
Cicero’s descriptions indicate he used the gaze of naturalistic observation common to the practice of Greek medicine. The practice of observation dissected acting techniques of antiquity and identified basic emotions and their characteristics similar to modern science.

Performing memory in antiquity

Cicero credited the Greeks with the invention of mnemonics, the art and practice of memory. Discussions of memory techniques were found within instructional manuals on public speaking. The extant texts recording the memory arts include Cicero’s *De oratore*, Quintilian’s *Institutio oratoria*, and the anonymous *Ad C. Herennium*. Memory arts defined two types: natural memory “is that which is embedded in our minds, born simultaneously with thought,” and artificial memory “is that memory which is strengthened . . . by training and a system of discipline” (*Ad Herennium*, III.xvi, 207). The concern of memory arts was to improve artificial memory for orators. The three texts discussed the origin myth of mnemonics, basic principles, techniques, and examples of the art.

In *De Oratore*, Cicero recalled the lyric poet Simonides (c. 556-488 BC) in the mythological origin story of the memory arts.

Simonides was at Crannon in Thessaly, at an entertainment given by Scopas, a man of rank and fortune, and had recited a poem which he had composed in his praise, in which, for the sake of embellishment, after the manner of the poets, there were many particulars introduced concerning
Castor and Pollux, Scopas told Simonides, with extraordinary meanness, that he would pay him half the sum which he had agreed to give for the poem, and that he might ask the remainder, if he thought proper, from his Tyndaridea, to whom he had given an equal share of praise. A short time after, they say that a message was brought in to Simonides, to desire him to go out, as two youths were waiting at the gate who earnestly wished him to come forth to them; when he arose, went forth, and found nobody. In the mean time the apartment in which Scopas was feasting fell down, and he himself, and his company, were overwhelmed and buried in remains, but could not possible distinguish one from another, so much crushed were the bodies, Simonides is said, from his recollection of the place in which each had sat, to have given satisfactory directions for their interment. Admonished by this occurrence, he is reported to have discovered that it is chiefly order that gives distinctiveness to memory. (LXXXVI, 186)

Simonides had to re-member the dismembered body parts in order to identify the deceased. His traumatic experience, via the meddling of the deities Castor and Pollex, the boys requesting his audience triggered the realization of *method of loci* (method of places) and *method of imagines* (method of images). The technique of mnemonic was first, to construct a sequence of places and second, to place “things” (ideas, images, or symbols) in the spaces. *Ad Herennium* explained the same technique:

> The artificial memory includes background and images. By backgrounds, I mean such scenes as are naturally or artificially set off on a small scale,
. . . for example, a house, an intercolumnar space, a recess, an arch, or the like. An image is as it were, a figure, mark or portrait of the object we wish to remember; . . . I likewise think it obligatory to have these backgrounds in a series, so that we may never by confusion in their order be prevented from following the images. (III. xvi-xvii, 209)

In *The Art of Memory* Frances A. Yates speculated the performance aspect of the technique, “We have to think of the ancient orator as moving in imagination through his memory building *whilts* he is making his speech, drawing from the memorized places the images he has placed on them” (3). She furthered explained, “One of the most curious and surprising passages in the treaties, namely the psychological reasons which the author gives for the choice of mnemonic images” (9). Yates extensively quoted the *Ad Herennium* explanation of emotion and the art of memory:

> Now nature herself teaches us what we should do. When we see in every day life things that are petty, ordinary, and banal, we generally fail to remember them, because the mind is not being stirred by anything novel or marvelous. But if we see or hear something exceptional base, dishonorable, unusual, great, unbelievable, or ridiculous, that we are likely to remember for a long time. . . . Nor could this be so for any other reason than that ordinary things easily slip from the memory while the striking and the novel stay longer in the mind. . . .

> We ought, then, to set up images of a kind that can adhere longest in memory. And we shall do so if we establish similitude as striking as possible; if we set up images that are not many or vague but active
(imagines agents); if assign them exceptional beauty or singular ugliness; if we
ornate some of them, as with crowns or purple cloaks, so that the
similitude may be more distinct to us; or if we somehow disfigure them, as
by introducing one stained with blood or soiled with mud or smeared with
red paint, so that its form is more striking, or by assigning certain comic
effects to our images, for that too, will ensure our remembering them more
readily. The things we easily remember when they are real we like wise
remember without difficulty when they are figments. But this will be
essential – again and again to run over rapidly in the mind all the original
places in order to refresh the images. (Yates 9-10, Ad Herennium, III.xxii)

Yates concluded with a basic modern scientific principle of emotions affect on memory,
“Our author has clearly got hold of the idea of helping memory by arousing emotional
affects through these striking and unusual images” (10). Modern neuroscience will point
to the anatomy of the brain for explanation: an important emotion organ, the amygdala, is
connected to the central memory organ, the hippocampus, suggesting emotion is an active
agent in the process of memory formation. Simonides’ myth described basic
characteristics of episodic memory (memories of when, where, and what). In
contemporary brain science, episodic memory is memory of an event or scene.

Not only scientific principles emerged in the treaties and stories of ancient
memory arts, modern acting principles also surface. Cicero furthered his discussion on
the techniques of memory as sense memory, “those things that are the most strongly fixed
in our minds, which are communicated to them, and imprinted upon them, by the senses,
that of all the senses that of seeing is the most acute” (187). He emphasized the
imagination, “the mental eye” and explains the process of visualization as “By these imaginary forms and objects, as by all those who come under our corporeal vision, our memory is admonished and excited; but some place must be imagined, as no bodily shape can be conceived without a place for it” (188). Cicero’s descriptions resembled sense memory techniques and visual imagination common to most Method approaches. He concluded memory can be studied, “Though, therefore, a memory can not be entirely formed by this practice, if there is none given by nature; yet certainly, if there is latent natural faculty, it may be called forth” (189). With the creations of a cognitive mise en scene using the memory techniques method of loci (background), method of imagines (image), and imagines agents (active emotions); artificial memory of antiquity can easily become liminal with the modern conception of dramatic imagination. Artificial memory and authentic emotion emerge with a paradoxical but interdependent relationship.

The classical art of memory . . . belonged to rhetoric as a technique by which the orator could improve his memory. . . . And it was as a part of the art of rhetoric that the art of memory traveled down through the European tradition in which it was never forgotten, or not forgotten until comparatively modern times. (Yates 2)

Memory in the Middle Ages

When seeking to understand mind and memory in the Middle Ages, it helps to understand how the Middle Ages saw the mind. In An Illustrated History of Brain Function Edwin Clarke and Kenneth Dewhurst compiled a fascinating collection of
illustrations and diagrams of the brain by medieval medical professionals. These various taxonomies symbolized the Medieval Cell Doctrine. Figure 2.2 and 2.3 are examples of diagrams illustrating the anatomy of the Cell Doctrine as it was believed to be embodied in the brain. “The Cell Doctrine asserts faculties of the mind were contained within the ventricular systems of the brain” (10). The first cell received sensations from the senses and the body was labeled *sensus communis* or common sense. The second cell was often called *fantasia* which was the faculty of representation, or image formation from sensory and bodily sensation. The third cell was *imaginative* (or *ymaginative*) which connected images formation to active imagination or rational imagination. The fourth cell was the seat of reasoning and often labeled as *aestimativa* (judgment), *cognitive* (thought), or *ratio* (reason). *Memorativa* (memory) was located in the posterior of the brain and last cell.

![Diagram of the Medieval Cell Doctrine](image)

Figure 2.2  Diagram of the Medieval Cell Doctrine (Carruthers and Ziolkowski 122-23, Clarke and Dewhurst 29)
Although Medieval brain illustrations were crude and rudimentary compared to the taxonomies of modern science, these specific diagrams indicated two modern principles from neuroscience – location and sequencing. The illustrations in Figure 2.2 and 2.3 suggested specific areas of the brain perform specific brain functions. The diagrams also indicated Medieval physician-philosophers understood the human psyche as combination of these distinct cognitive functions. The lines connecting the areas represent
relationships and possibly functional sequencing beginning with sensory impute and transduction, to cognitive perception, to cognitive abstraction and appraisal, to memory formation. Notably, Avicenna and other Medieval physicians-philosophers did not place the seat of emotion in the brain. The anatomical-functional divide between heart-emotion and brain-memory continued in Medieval cultural.

Unsurprisingly, oratory and memory arts shifted to the growing culture of the Christian church. “The main educational milieu in the early Middle Ages was the monastic school, which stressed memorization and close rumination on texts as a devotional practice and as a means of spiritual improvement” (Carruthers and Ziolkowski 21). Applying the memory arts to Medieval Christian culture produced a unique collection of texts, woodcarvings, drawings, and even architectural designs. “One of the curious things about the Middle Ages is that they were original and creative without knowing it” (Russell 429). In *The Medieval Craft of Memory: An Anthology of Texts and Pictures*, editors Mary Carruthers and Jan M. Ziolkowski complied fascinating examples of Medieval creativity such as Alan of Lille’s drawing “On the Six Wings of the Seraph,” a mnemonic diagram guiding confession, “The Guidonian Hand,” a memory system to train musical scales, and the blockbook *Ars memorandi (A Method for Recollecting the Gospels)*.

A close study of the *Ars Memorandi* revealed a unique cultural choreography in the memory art and cognitive schema. The book was a small collection of woodcarvings and writings produced anonymously at a monastery in Germany around 1470. The book contained fifteen diagrams of a body, standing face front with arms stretched to the side. Each body was etched with six small images. The images symbolized each chapter of the
four Gospels, John, Mathew, Mark, and Luke. Corresponding to each image were brief sentences describing the content of each chapter. The woodcarvings and accompanying text functioned as a prompter book, cueing the clergy or monks to remember the stories of the gospel by associating prominent themes and plot points with the images. The images layered on top of the body are provocative and certainly agents to initiate an emotional response and encode the memory. The following figure is one example.

Figure 2.4  “First Image of Luke,” (Carruthers and Ziolkowski 281)
If one reenacts the memory schema, the mind’s eye moves in the sign of the cross, so in order to remember the sequence of gospel stories one is cognitively blessing oneself. This example clearly demonstrates Medieval artisans not only understood and practiced the techniques of method of places, methods of things, and active emotional agents, but developed unique choreographic methods of their own. They were aware of how memory flowed in consciousness. The memory arts from antiquity to the Middle Ages used four basic precepts: background, image, movement, and emotional potency.

Even though the tradition of Greek and Roman theater effectively disappeared and the large amphitheaters deteriorated into ruins, one of the most famous architectural efforts in the memory arts was Giulio Camillo’s Memory Theater. Referencing a 1550 manuscript titled *L’Idea del Theatro dell’eccellen M. Guilio Camillo*, Yates reconstructed a “plan” of the theater which illustrated the *method of loci* (spatial architecture) and the *method of imagines* (images) in their relative arrangement. Although Camillo never wrote the accompanying text to explain the memory training model, an eyewitness, Viglius Zuichemus gave his account of the theater. The purpose of the Memory Theater of Camillo was to enable the spectator to know any subject of philosophical or metaphysical importance in the universe. It is no wonder then, why the king of France was so interested in the theater and sponsored its construction. The theater was made of wood and the spectator was in fact forced to be an actor on stage, gazing into the audience. The audience area was a series of gangplanks beginning in the front row and elevating into a series of seven levels of gateways or doorways which were covered with images. Under each image was a drawer filled with text and documents. The drawer was a file of texts (a citation archive) which supported the symbolic image. The images compounded their
association and meaning as they progressed up one of the seven pillars or gangplank sections. Ergo, the theater experience of standing on stage was an intellectual endeavor to merge the drawer (inner detailed knowledge) with the images (topic, category, or subject), in order to achieve all knowledge. Camillo’s Memory Theater was an elaborate construction of method of loci and method of imagines, a theatrical encyclopedia of all knowledge, but was never meant for dramatic performances or for training actors.

Memory in the Middle Ages was symbolized in containers and contained in symbols: the containers of the Memorativa Cell of the brain, memory books of monks, and memory theaters for Kings. Especially following the demise of the Roman legal system and Senate, the memory arts of the Middle Ages shifted from being an oratory art to a visual art. The specialized oratory art of professionals in antiquity was usurped into a visually based culture infusing meaning into paintings, books, and architectural designs. Visual arts assisted congregations who spoke a regional language understand a Latin Christian service. Memory shifted away from the tradition of performance -- emotion did not.

Emotion in the Middle Ages

Hippocratic-Galenic-Avicennic model of the body anatomically divided memory in the brain from emotion in the heart. Medieval philosophers, physicians, and clergy would also place the “soul” in the heart. “As a result, the Christian heart became not only the seat of the passions, but also the site of moral conscience, an organ with powers of perception beyond the senses. It is no coincidence that Jesus is often pictured with an open heart but never an open brain” (Zimmer 16-17). The influence of pumping passions
through the body was called pneumatism: spirits and emotions affect actors’ body, the emotions flows into the physical space by the breathe, and then the spirits or emotions transfers through the air into the spectators (Roach 27). Thus, actors shifting the balance of humors in their own body during performance, may not only cause themselves harm, but may also harm members of the audience. The expression “angry enough to make your blood boil” was a literal Hippocratic-Galenic-Avicennic description of the relation between emotion and the humors, which affect both actors and audience. When an emotion, such as “anger,” was one of the Seven Deadly Sins, then one understands the danger authentic emotion in performance may cause the congregation. Galen’s vital spirits flowing through the heart and breathe were dangerous and contagious, thus becoming problematic for philosophers, priests, and performers in the Middle Ages. The concern underlined a preference towards allegorical representation and away from authentic emotion in liturgical dramas and Christian performances in the Middle Ages.

Similar to ancient Greeks and Romans, the science of emotion in the medieval era was nonexistent except in the form of naturalistic observation. The closest concept to a list of basic emotions found in the Middle Ages was the “Seven Deadly Sins” and their counterpart the “Four Virtues.” The original composition of the deadly sins list was credited to Evagrius Ponticus (c. 375 AD), a monk who allegedly was seeking to understand the cause of evil actions by isolating evil thoughts. The seven deadly sins or vices were not sins in themselves, but a state of un-grace which affect actions and choices leading to sinfully behaviors. The Virtues (Prudence, Justice, Fortitude, and Temperance) functioned in the same way, a list of basic personality characteristics and emotions which affect behaviors for good rather than evil. In 590 AD Pope Gregory I revised the list into
seven still used as a theme in modern popular culture. They are commonly called anger, gluttony, greed, lust, jealousy, pride, and sloth. The Virtues were adapted to counter the Vices, one to one, and they are patience versus anger, temperance versus gluttony, charity versus greed, chastity versus lust, kindness versus jealousy, humility versus pride, and diligence versus sloth. By the eleventh century medical sciences threw some support towards the theological-performance theory of the seven deadly sins. In Avicenna’s *The Cannon of Medicine (1025)*, some emotions the Islamic physician-philosopher discussed and diagnosed were joy, delight, sorrow, fear, and anger. Translator, O. Cameron Gruner explained these basic emotions were identified in the context of diagnosing pulse and breathe (145). Avicenna also discussed the role of imagination and emotions, specifically anger, “The persistence of an imagination which is disposed toward taking vengeance for a thing is related to persistence of anger” (546). Medieval medicine and medieval theology diagnosed emotions as a faculty of the body and the character of the soul.

David Bevington wrote in *Medieval Drama* “Moral personifications . . . were essential to the allegorical method of presentation” (791). The allegorical representation indicates an ontological aspect of the emotion/passion whether vice or virtue as an understood aspect of personality or, even more important to Medieval Christianity, an aspect of the soul. The belief in the seven deadly sins affected performance in the Middle Ages. The authenticity of the vices and virtues (many of which are similar to passions and emotions) created casting issues in liturgical dramas. Only good or virtuous actors would be cast in the role of Christ, God, or other pure saint. Sinful actors may play lesser roles or evil representations.
The following passage by Honorius of Autun in *De Tragoediis* (circa 1100) compared the verisimilitude of actors’ behaviors in the theater to the verisimilitude of priests’ performance, their gestures and voices, representing the gestures and voice of Christ:

> It is known that those who recited tragedies in the theaters represented to the people, by their gestures the actions of conflicting forces. Even so, our tragedian (the celebrant) represents to the Christian people in the theater of the church, by his gestures, the struggle of Christ, and impressed upon them the victory of his redemption. . . . By the extension of his hands he delineates the stretching out of Christ on the cross. By the singing of the preface he expresses the cry of Christ hanging on the cross. (Bevington 9)

Bevington acknowledged, “The liturgy itself long employed dramatic techniques such as dialogues, movement from one symbolic location to another, and the use of props.” (21). Bevington’s collection of liturgical tropes, dramas, and plays demonstrated the scope of Medieval drama both in and out of the church. *Regularis Concordia* (An Agreement Containing Rules for Guidance) recorded various tropes and processional ceremonies including a Good Friday ceremonial called *Adoratio Crucis* (Adoration of the Cross). In this brief liturgical script only deacons and priests, the very virtuosos of the church, were cast into the role of Christ’s lines so not to risk polluting the representation of Christ. Subdeacons and the congregation could recite lines of lesser roles or the masses. This system of type casting based on understanding of vices and virtues likely continued into the outdoor morality play and cycle plays. The allegorical characters of morality plays indicated by their casting that citizenry of the Middle Ages clearly recognized essential
qualities and characteristics of human nature and in their theatrical representations. Whether or not they called them basic emotions, they certainly saw them being acted.

*English Renaissance medicine, Islamic medicine, and Shakespeare*

William Kerwin’s *Beyond the Body* examined medical narratives in English Renaissance drama. Kerwin argued the fracturing medical practices in the Middle Ages between the Galenic tradition of humoral treatments and a renegade force of avant-garde medical practitioners (the barber-surgeons and alchemist) became a reoccurring theme for Renaissance dramatists. Kerwin charted the bizarre professional partnership between barbers and surgeons which formed the Barber-Surgeon Company in 1540 and officially separated surgeons from the College of Physicians legally, sociologically, and epistemologically. Using empirical observations the new Barber-Surgeon began to diagnosis from experience and dissection, not traditional studies; thus expanding medical knowledge and understanding of the body. The College of Physicians represented the thousand-year tradition of Greco-Roman medicine, although it is more accurately described as Greco-Roman-Islamic.

The conflict between traditional physicians’ practice and the development of alchemists or “drug sellers” was tracked in the plot of William Shakespeare’s (1564-1616) *Romeo and Juliet* (1594) and Ben Jonson’s (1572-1637) *The Alchemist* (1610). Kerwin contended “Shakespeare and Jonson each use depictions of drug providers to represent the struggles between tradition and modernity” (60). Bringing new meaning to Shakespeare’s line “A plague o’ both your houses” Kerwin reframed the metaphor, highlighting a medicinal drug conflict and the competition of suppliers. He argued:
The power of *Romeo and Juliet* medical politics appears most clearly when one looks at the play’s structure: it uses two drug practitioners, Friar Laurence and the Mantaun apothecary, in schematic contrast to each other, as one emerges from his garden to promote the play’s powerfully aspiring romance, and the other emerges from his shop to sell the drug that will promote the play’s tragic ending. (33)

Kerwin dissected a diminished subtext in *Romeo and Juliet*, the conflict between traditional and progressive medical therapies. Contrastingly, Jonson’s *The Alchemist*, sided with tradition and mocked alchemists as the fraudulent and greedy downfall of English society. If, as Kerwin claimed, medical narratives are social narratives and apparent cultural conflicts occurred on and off the stage, then flashes of Islamic psychology were also apparent in Shakespeare’s plays.

The nascent psychology of Islamic medicine posited complex subtext and inner emotions could be hidden, but still perceived. The Islamic era of medicine occurred after the Islamic Empire conquered Arabia, North Africa, and Spain. In the ninth and tenth centuries, the Islamic physicians Rhazes, Avicenna, and Albucasis not only translated the great medicinal texts of Greece and Rome, but expanded the basic philosophy of humors and the body. Similar to their Greek and Roman counterparts, the Islamic faith did not allow dissection. But Avicenna initiated the dissection of human psyche as a part of medicine. Avicenna text, *The Cannon of Medicine* (1025), was the primary medical encyclopedia of the day and remained the standard text book for medical schools in European universities for five centuries.
Elegant expositions of the philosophical principles of medicine and the relationship between mind and body are woven into Avicenna’s case histories. For example, his use of the pulse as a “lie-detector” demonstrated how physiological phenomena betray our hidden thoughts. In treating love sickness,” Avicenna unobtrusively kept his finger on the patient’s wrists and detected the irregularity of that corresponded to mention of the lover’s name. (Magner 143)

Avicenna’s psychology successfully diagnosed and treated the mentally disturbed and other commonly dramatized ailments such as love sickness, sleep walking, and emotional trauma. More interesting, Avicenna’s psychological model explained inner complexity of faculties and subtext while he argued for the ontological existence of the soul. He used the three-level Galenic model of the body; Vegetable soul, Animal soul, and Human soul and the five-level Cell Doctrine to identify different levels of human psyche. The following model represents the complexity of Avicenna’s psychology.
Figure 2.5  “Avicenna’s model of psychology and ‘Soul is Unity’” (Gruner 142)
The complex model illustrates the human psyche by stacking various faculties of the body and brain on top of one another and drawing connections and relationships between them. The interdependent faculties and sequencing of perception and cognition created a critical problem for Avicenna -- unification. Avicenna addressed the problem of “unification of experience” with the statement “I perceive and I am angry.”

F. Rahman wrote *Avicenna’s Psychology* for his Ph.D. at Oxford University, UK, in 1949. He translated and analyzed Avicenna’s *Kitāb Al-Najāt*, Book II, Chapter VI text which included the argument “Soul is Unity.” Rahman summarized Avicenna’s argument: “When we say ‘I perceive and I become angry,’ what is the subject of these experiences, expressed in the word ‘I’? It can not be any one organ of the body, nor two organs of the body, nor yet the whole body as such. The sentence must then mean that the faculty to which perception referred its contents became angry. The unifying principle of experience is then the soul itself” (110). Avicenna’s full argument was:

“Then most probably truth is that when we say “I perceive and I am angry” we say something in us perceived and something in us became angry . . . what becomes angry is the very thing to which the perceptive faculty transmits the content of its perception. Its being in this status, even though it be the body, is not due to being body alone; it is then due to its being in possession of a faculty by which it is capable if combining both these things. This faculty not being a physical one must be soul itself. Thus the substratum in which both these qualities inhere is not the whole of our body, not any two organs of our body, nor yet a single organ in so far as it is a physical organ; so the conclusion is that the combining
substratum is soul itself or body inasmuch as it posses soul, the combining substratum even in the latter case really being the soul, which itself is the principle of all these faculties. . . . the organ to which this principle is attached to is the heart. This theory of Aristotle is opposed to that of the Divine Plato. (Chapter XV, 66)

Modern neuroscience calls the unification problem, the binding problem of perception and experience. “I perceive and I am angry” is unmistakably similar to Rene Descartes’ (1596-1650) “I think, therefore I am.” Descartes’ citation in his essay Discourse on the Method of Rightly Conducting the Reason and Seeking Truth in the Science (1637) seems to credit Avicenna: “For since I began to count my own opinions as nought, because I desire to place all under examination, I was convinced that I could not do better than follow those held by people on whose judgment reliance could be placed. And although such persons may possibly exist amongst the Persians and Chinese as well as amongst ourselves . . .” (16). On stage, Avicenna’s psychology may be recognized as a complex and multi-dimensional character.

Shakespeare’s work was an evolution from the allegorical portrays of medieval drama because of the recognizable modern psychology of his characters. When the soul is doing something different than the faculties, it is called subtext. In Shakespeare: The Invention of the Human Harold Bloom argued Shakespeare’s work not only modeled personalities, but showed how the characters became themselves. He wrote:

A more conservative way of stating this would seem to me a weak misreading of Shakespeare: it might contend that Shakespeare’s originality was in the representation of cognition, personality, character. But there is
an overflowing element in the plays, an excess beyond representation, that is closer to the metaphor we call “creation.” The dominate Shakespearean characters -- Falstaff, Hamlet, Rosalind, Iago, Lear, Macbeth, Cleopatra among them -- are extraordinary instances not only of how meaning gets started, rather than repeated, but also of how new modes of consciousness come into being. (xviii)

Shakespeare’s characters had perceptible layers of psychological behavior, inscribed in the scripts and assumedly dramatized by the actors. Although Shakespeare was listed as an actor in various plays such as *Hamlet* and *As You Like It*, Shakespeare left no acting philosophy. The most quoted Shakespearian passage for actors on their craft is Hamlet’s speech to the players:

HAMLET: Speak the speech, I pray you, as I pronounc’d it to you, trippingly on the tongue, but if you mouth it, as many of your players do, I had as live the town-crier spoke my lines. Nor do not saw the air too much with your hand, thus but use all gently, for in the very torrent, tempest, and, as I may say, whirlwind of your passion, you must acquire and beget a temperance that may give it smoothness. O, it offends me to the soul to hear a robustious periwigpated fellow tear a passion to tatters, to very rags, to spleet the ears of the groundlings, who for the most part are capable of nothing but inexplicable dumb shows and noise. (3.2)

Through this passage, Shakespeare argued for authentic passions in players but clearly indicated a conscious effort for players to perform theatrical emotions “smoothly.” In an earlier scene with the Queen, he analyzed his own performativity of mourning:
HAMLET: Seems, madam? Nay, it is, I know not “seems,”
’Tis not alone my inky cloak, good mother,
Nor customary suits of solemn black,
Nor windy suspiration of forc’d breath,
No, nor the fruitful river in the eye,
Nor the dejected havior of the visage,
Together with all forms, moods, shapes of grief,
That can denote me truly. These indeed seem,
For they are actions that a man might play;
But I have that within which passes show,
These but the trappings and the suits of woe. (1.2)

Reading the two passages through the model of Avicenna’s psychology easily constructs Hamlet’s subtext: Avicenna’s model “I perceive and I become angry,” becomes Hamlet’s “I perceive and I become sad (or angry).” Perceptions are transmitted and cause emotions. In Hamlet’s case, it may be the wrong emotion; therefore, he must remodel his emotions for specific people’s perceptions. This is possible because in the first passage, the players can “perform” authentic passions well. The description of gasping for breathe (forc’d breath), crying (river on the eye), and facial expressions (behavior of the visage) are physical characteristics of a faculty which is capable of combining things. The “I” in Avicenna’s “I perceive and I become angry,” is the same “I” found in Hamlet’s “But I have that within which passes show.” Both “I’s” are ontological, self-conscious spiritual egos of self, able to perceive emotion, understand it and control it. Thus, Hamlet chooses an emotional expression which revealed new modes of consciousness. Essential, the “I”
of Hamlet’s ego was beyond the body and its faculties. Hamlet’s psyche or soul includes hidden thoughts, true passions, intension, sensations, reasoning, memory, and imagination. Character subtext and psychological complexity marked Shakespeare’s dramatic genius as a playwright.

The shared medical narrative on the Elizabethan stage was a social conflict of the medical modernist, the barber-surgeons and the alchemists against College of Physicians and the Greco-Roman-Islamic medical tradition. But in the minds’ of Shakespearian characters, the conflict was still between the perceptive body and ontological soul which was modeled by Avicenna’s psychology for nearly five centuries. The science of psychology will continue to be the science of acting -- well into the twenty-first century.

**Scientific Revolution, Locke and Hill**

Advances in science were a long and lumbering evolution through generations and centuries, lifetimes never saw a difference. The change to the scientific method hit critical mass with Corpernicus (1473-1543), Kepler (1571-1630), Galileo (1564-1642), and Newton (1642-1727) and their advances in astronomy, dynamics and physics. The scientific revolution hit medicine with the work of Andreas Versalius (1514-1564), William Harvey (1578-1657), and Thomas Willis (1621-1675), founder of neurology. Vesalius, physician, anatomist, and lecturer at University of Padua argued to “return to the true book of the human body” (Magner 155) and publicly criticized the Galenic body of knowledge by proving over two hundred organs diagrams in Galen’s work came from animals, cows, goats, pigs, and apes and were significantly different than human organs. Harvey’s experiments drained blood out of farm animals and weighing the remains which
proved blood “not just another humor, but a primary substance of the body” (Zimmer 67). Harvey discovered the circulation of the blood and how veins carried blood to and from the heart in a loop. Harvey’s colleagues and students, known as the Oxford Circle, continued the pursuit to understand the body through experiment. One member and physician who advanced and changed the understanding of the brain was Thomas Willis. In *Soul Made Flesh* science writer, Carl Zimmer reconstructed the life, work, and scientific accomplishments of Willis. Willis’ life work accumulated in the text *The Anatomy of the Brain and Nerves*, illustrated by Christopher Wren. Zimmer concluded:

More than any other individual, Thomas Willis ushered in the Neurocentric Age. He did for the brain and nerves what William Harvey had done for the heart and blood: made them a subject of modern scientific study. His mixture of anatomy, experiment, and medical observation has set the agenda of neuroscience into the twenty-first century.

In redefining the brain, Willis redefined the soul as well. It was banished from the liver and the heart, restricted now to the brain and nerves, where invisible corpuscles produced emotions, memory, and perceptions. (240)

According to Zimmer, Willis’ student, John Locke (1632-1704) “bears the lion share of responsibility for why few people today know about Thomas Willis” (240). Locke was a physician; he studied neurology at Oxford under Willis and practiced with Thomas Sydenham. Once Willis released emotions from the torso, Locke and the next generation of philosophers placed emotions in the brain and in the realm of human affairs.
Locke’s education also benefited from the rise of Arabic studies at Cambridge in 1632 and Oxford in 1634 when both universities appointed Arabic professorships and required Arabic for degrees. In *The ‘Arabick’ Interest of the Natural Philosophers in Seventeenth-Century England* various authors describe the era, but George A. Russell specifically studied the influence of Avicenna’s concept of *tabula rasa* on Locke. *Tabula rasa* is the concept of the blank slate. Avicenna wrote a philosophical novel on *tabula rasa* which inspired the more popular twelfth century novel, *The Self Taught Philosopher* by Ibn Tufayl (d. 1185). In 1671 Edward Pococke, son of Dr. Edward Pococke the first Laudian Professor of Arabic at Oxford, translated the novel into Latin. Popularity of the novel spread across Europe. It was reviewed by the Royal Society where Locke was named a Fellow in 1668. Russell argued Locke’s was not only aware of the novel, but it may have the catalyst for Locke’s philosophical turn towards “the nature of the mind and its emergence out of experience without innate ideas” (224). If Avicenna and Locke knew of the genome and DNA and embodied realism of George Lakoff and Mark Johnson, they may have revised their nurture versus nature debate. Locke’s *An Essay Concerning Human Understanding* ushered in the Empiricists’ movement which scientifically analyzed perceptible mental functions including sensory perception, ideas, and memory. “It was this empiricist view that led to the emergence of psychology as a separate discipline apart from philosophy, which had long monopolized the study if the human mind” (Kandel, *Principles* 411). Locke pivotal work argued the theory of embodied knowledge, the precept that ideas were derived from experience and emotions as well as memory, existed in the brain.
Locke’s discussions of embodied knowledge and close analysis of cognition may have been influenced by his neurological education and medical training. In Chapter XI of *Essay* Locke wrote, “First, we can not have ideas of Sensations but by the Inlet of the Senses” (106). Locke’s passage described the first cell of Avicenna’s Cell Doctrine and the modern neurological process called transduction. The process occurs when specifically orientated reflex cells react to physical energy in the environment and create neural patterns of representation. Transduction is the cellular reaction when external perceptions and experience becomes embodied knowledge. “Secondly, Because we find that an Idea from actual Sensation, and another from Memory, are very distinct perceptions” (106-07). Locke’s continued his discussion with an example of Sensory memory exercise similar to the techniques of mid-twentieth century Method artists. He argued responding to memory differs from responding to sensory experience. “Thirdly, Because Pleasure or Pain, which accompanies actual Sensation, accompanies not the returning of those Ideas without the external objects” (107). Locke indicated the separation between the memory of basic emotions “Pleasure” and “Pain” and the experience of emotions, thus creating distinct dimensions of cognition.

Dramatic theorist Aaron Hill (1686-1750), lesser-known English playwright, left a detailed treatise which listed basic emotions. In “An Essay on the Art of Acting” (1746) he identified “ten dramatic passions” and argued a four step sequence to act a passion. The sequence Hill suggested was:
Aaron Hill’s sequence of emotional expression in acting

Cognitive imagination →

muscular sensation (face and body) →

emotional trigger (animal spirits) →

vocal and movement expression

The actors must one, imagine a strong visual or mental image; two, the idea impresses a form on muscles of the face and body; three, the muscles trigger the passions; and lastly “by impelling or retarding animal spirits transmit sensations to the voice and gesture” (365, Aa3). Hill’s philosophy of acting locates emotion in the brain and the body. He suggested a hybrid between the bodily orientation of passions (still associated with animal spirits) and the progressive medical ideas of the emotion as a mode of the mind. Hill’s list of basic emotions is remarkably similar to Locke’s list of Modes of Thinking. The following chart (Figure 2.5) compares Locke’s list of emotions with the list of the passions proposed by Hill.
In *Essay Concerning Human Understanding*, physician-philosopher John Locke modeled the systematic categorization of ideas. In *An Essay on the Art of Acting*, dramatist Aaron Hill modeled his first dramatic principle which was “To act a passion” (Aa2). Scientific Empiricism and dramatic theory are comparatively similar.

<table>
<thead>
<tr>
<th>Locke’s Ten Modes of Thinking</th>
<th>Hill’s Ten Actors’ Passions</th>
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<tbody>
<tr>
<td>Love</td>
<td>Love</td>
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<tr>
<td>Hate</td>
<td>Hatred</td>
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<tr>
<td>Joy</td>
<td>Joy</td>
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<tr>
<td>Fear</td>
<td>Fear</td>
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<tr>
<td>Anger</td>
<td>Anger</td>
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<td>Grief</td>
<td>Sorrow</td>
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<td>Envy</td>
<td>Jealousy</td>
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<tr>
<td>Despair</td>
<td>Pity</td>
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<td>Hope</td>
<td>Wonder</td>
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<tr>
<td>Desire</td>
<td>Scorn</td>
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Modes are derived from the ideas: *Pain* and *Pleasure*
Joseph Roach’s seminal work *The Player’s Passion: Studies in the Science of Acting* follows the cannon between acting and science from the seventeenth to the twentieth century. In the Preface Roach introduced the central problem:

> The nature of the body, its structure, its inner and outer dynamics, and its relationship, to the larger, world that it inhabits have been the subject of diverse speculation and debate. At the center of this on going controversy stands the question of emotion. . . . As Williams James put it in the title of a celebrated essay, “What is an Emotion?” In the history of science, substantially different answers have been proposed to James’s question as theories have changed to fit new psycho-physiological discoveries. The following . . . explores the revolutionary influences that these changes have exerted on theatrical theory from the Galenic physiology of the passions in the seventeenth century to the condition reflex of the twentieth.

As Roach analyzed the historical relation between acting and science, it is notable he did not investigate memory. This is a testament of the forgotten memory arts, associationism, and techniques of memory were not regarded important for theoretical discussions. The center piece of the book was a chapter on Diderot (1713-1784), author of the *Encyclopédie* and his pivotal essay “The Paradox of Acting” where he discussed the “uneven acting of actors who play from the heart” (Diderot 198). In *A Dream of Passion* Lee Strasburg aptly explained,
Diderot’s basic proposition in The Paradox of Acting began with the problem, if an actor experienced real feeling in the first performance, he would be worn out and cold as marble by the third. This was not a theoretical assumption; it is precisely the problem that has faced all actors since time immemorial. (34)

To solve the problem Diderot proposed:

On the other hand, the actor who plays from reflection, from the study of human nature, from constant imitation of some ideal model, from imagination, from memory, will be one and the same at all performances, will be always at his best mark; . . . His passions has a definite course – it has bursts, and it has reactions; it has a beginning, a middle, and an end.

(Diderot 198)

Diderot’s passage described performance as a model which remains consistent so that emotion can flow through “a definite course.” Diderot suggested emotions should be fresh and spontaneous whereas memory was an ideal or model. Similar to the anatomical divide of emotion in the heart and memory in the brain, the theoretical divide cemented the repetition problem for an actor was a problem solved by studying emotion and not a problem concerning memory.

Roach focused on the nature of passions and how they related to the body. He wrote, “The rhetorical theory on which seventeenth century discussions of acting were based rested not on a foundation of dramaturgy, but on an understanding of how the passions operate on the human body” (30). Many of the text he discussed such as John Bulwer’s Chirologia: or the Natural Language of the Hand and Chrionomia: or the Art
of Manual Rhetoric contained categories of emotion and their physical expression. Roach contended,

Treatises on the passions cataloguing their inner causes and outer characteristic, became numerous enough to constitute a more literary-scientific genre in which it seemed that ever more careful descriptions of outward expressions would somehow explain the inward nature of the phenomena. (31-32)

One artist Roach did not include in his text was Francois Delsarte. Delsarte (1811-1871) was son to a renowned physician. The most predominate texts describing the techniques were Delsarte System of Expression by Geneviene Stebbins and Delsarte System of Oratory (1893) an anthology of texts by L’Abbe Delaumosne, Angelique Arnaud, and Marie Geraldy. Delsarte’s system attempted to connect the inward nature with outward expression by choreographing bodily form through a formula. “Here is the formula: the sensitive, mental and moral state of man are rendered by the eccentric, concentric, or normal form of the imagination . . . there is a second law, each form becomes a triple by borrowing a form of the two others” (Delaumosne 4). Following the formula Delsarte system constructed a chart of nine boxes (3 X 3) which “sums up all the essential forms which can effect an organism” (Delaumosne 7).
<table>
<thead>
<tr>
<th>GENUS</th>
<th>SPECIES</th>
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<tbody>
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<td></td>
<td>1</td>
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<tr>
<td>II. Conc.</td>
<td>1-II</td>
</tr>
<tr>
<td>III. Norm.</td>
<td>1-III</td>
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<tr>
<td>I. Ecc.</td>
<td>1-I</td>
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Figure 2.8  Delsarte basic chart (Delaumosne 5)

Figure 2.9  Delsarte chart for the head (Stebbins 223)
With the chart, a body part (legs, chest, head, facial expressions) could be designed into a system of nine different Concentro-Normo-Excentro expressions. Thus the body became a venue for the true, the good, and the beautiful. Stebbins explained, “This is the age of formulation. What Comte has done for exact science, Buckley and Mill for history, Spencer for culture, and Ruskin for painting, Delsarte has tried to do for action, for expression” (75). For Delsarte his proclaimed purpose had more divine reach. In Delsarte’s address before the Philotechnic Society of Paris he explained:

But whence comes this vivifying fecundity of art? Whence comes the sovereign and irresistible dominion which it exercises over all hearts? From its celestial origin. Yes, gentlemen from its celestial origin. Art is divine in its principles, divine in its essence, divine in its action, divine in its end. . . . Now the Good, the True, and the Beautiful can be found only in God. Thus, art is divine in the sense that it emanates from his divine perfections; in the sense that it constitutes for us even the idea of those perfections and above all, in the sense that it tends to realize in us, about us, and beyond is this triple perfections that it draws from God. (Stebbinns 30)

The texts in *Delsarte System of Oratory* from 1893 spoke of God and soul, attempting to embody Christian spirituality with the system. Even though Stebbins included Delsarte’s address, Stebbins’ text (first published in 1902) had a more secular tone describing Delsarte’s system. She stated, “Delsartians find the great value of the Delsarte system; for it has furnished a complete system of esthetics, which is an embodiment of the laws of grace” (414). It is possible Roach did not include Delsarte because the system was based
in many religious precepts rather than scientific. Delsarte dissected the performing body with a religious scalpel; it seemed he was seeking the soul through art and the body.

The history of medicine followed physicians-priests to physician-philosophers to neurologist-empiricist-dramatist (Willis-Locke-Hill). As modern science began to expand the field medicine and modern culture expanded the philosophy of art, the previously shared narrative became more disembodied, more alienated strangers instead of collaborators. Dramatists began an independent tradition from scientific terms. Stanislavski at one point championed actors and directors to develop their own lexicon and jargon (Pintches 2). As they began collected their own tradition of philosophy and texts, dramatists proposed new definitions of the performing body and embodied knowledge of emotion and memory. Especially in the twentieth century, the cannon of acting through the body and embodied knowledge began to diversify into a matrix of theories of art.

*Stanislavski, Strasberg and emotional memory*

Roach ended *The Player’s Passion* with the “Russian Revolution,” specifically, Constantine S. Stanislavski (1863-1938). Most modern actors would trace some aspect of the technique for “realistic acting” to Stanislavski. His work at Moscow Art Theater evolved into “The System,” a collection of acting exercises and training practices recorded in his many texts: *My Life in Art* (1924), *An Actor Prepares* (1936), and *Building a Character* (1950). In *The Player’s Passion* Joseph Roach summarized, “The Stanislavski System is a means of manipulating levels of consciousness to achieve certain specific effects on the body, especially the illusion of spontaneity” (206). Jonathan
Pitches detailed text, *Science and the Stanislavski Tradition of Acting* followed scientific influences on the system. Newtonism, Taylorism, and Fordism referred to as “scientific management” inspired Stanislavski “to discover the physiological and psychological laws of behaviors and to systematize the performance process so that (performers) . . . can regularly create the necessary conditions for truthful acting” (32). Similar to Henry Ford’s assembly line, Stanislavski broke down dramatic action into units or bits and then blended them together in a through-line of action. A second influence from science was the work of Ivan Pavlov and reflexology. Pavlov’s ideas created psychological triggers which were integrated into the breakdown of units or bits and caused chain reaction of reflexive behaviors into the flow of action which create natural and authentic emotion and behavior. In Stanislavski’s technique, “The System,” and the American version, “The Method,” was an exercise called “emotional memory.” Stanislavski described emotional memory as “That type of memory, which makes you relive the sensation you once felt . . . Just as your visual memory can reconstruct an inner image of some forgotten thing, place or person, your emotion memory can bring back feelings you have already experienced” (158). Emotional memory techniques became a basic skill of The System.

Stanislavski’s company, The Moscow Art Theater, toured America in 1922-23. Their audience included what would soon be some of the most important figures in American Theater, specifically Lee Strasberg. In *A Dream of Passion* Strasberg remembered,

What completely bowled me over was not the acting of any of the great actors of the Moscow Art Theatre . . . but the simple fact that the acting on the stage was of equal reality and believability regardless of the stature of
the actor or the size of the part that he played. . . . Obviously truth and reality was achieved by some singular process or procedure of which we in the American theatre had little knowledge. It seemed clear to me that what we were seeing was not just great acting, but something that embodied an approach to acting that might supply the answer to the problems that I had become aware of. (37-38)

The tour led to the forming of the American Laboratory Theater lead by two members of the Moscow Art Theatre, Maria Ouspenskaya and Richard Boleslavsky. Strasberg was intrigued enough to audition for the American Laboratory Theater. Strasberg kept detailed notes on his experience which are archived in the Lee Strasberg collection. He recalled Boleslavsky divided affective memory into two sub-categories, analytic memory “recalls how something should be done” and memory of real feeling “helps the actor accomplish it on stage” (69). Pinches noted Boleslavsky was influenced by the science of Theodule Ribot, *The psychology of the emotions* (1911) whose theory of affective memory argued sensory perceptions can construct memories (Locke’s empiricism) and the residue is fixed in an organism (embodied) and they may provoked back into consciousness (Pitches 100-01). In *Acting: The First Six Lessons* Boleslavsky explained, “We have a special memory for feelings, which works unconsciously by itself and for itself. . . . The French psychologist Theodule Ribot was the first to speak of it, over twenty years ago. He calls it ‘affective memory or memory of affects.’ (It works) through all the manifestations of life and our sensitivity toward them” (36-37).

In *A Dream of Passion* Strasberg described Boleskavsky’s exercises which could be a primer of acting exercises in twentieth century acting curriculum. Strasberg
described a sequence of exercises: imaginary object, imaginary situation, animal exercise, and foreign personalities. Strasberg wrote, “Our exercises . . . were confined to the area of analytic memory. They were designed to train the actor’s imagination. It was later in my own work with the problems of the actor that exercises dealing with ‘emotional memory’ were developed” (75). Strasberg began forming his work with The Group Theater, founded by Harold Clurman, Cheryl Crawford, and Strasberg. The company mission was to produce new theater and support actors in developing as artists. June 1931 in a Connecticut retreat, Strasberg began experimenting with a company of twenty-eight actors to develop a unified method of technique (Clurman 41).

Strasberg divided memory into three categories: mental memory, physical memory, and affective memory which he further divided into sense memory and emotional memory. He explained the purpose: “Affective memory is the basic material for reliving on stage, and therefore for the creation of a real experience on the stage. What an actor repeats in performance after performance is not just the words and movements he practiced in rehearsal, but the memory of emotion. He reaches emotion through the memory of thought and emotion” (113). During the first summer retreat of the Group Theater in 1931, Strasberg began his exercise experiments: imagination exercises, reformulating Stanislavski’s “creative if,” improvisations, sense memory, emotional memory. In The Fervent Years Harold Clurman remembered, “much nonsense was written and spoken, . . . the fact is that this procedure [emotion exercise] was used by us for the first four years of our work, and it unquestionably produced results – of all kinds” (43–44). From the beginning, members of The Group Theater criticized the
emotional memory exercises which developed into the divisions of acting technique in twentieth century.

One of the best textual descriptions of emotional memory exercise was found in Lorie Hull’s work *Strasberg’s Method: As Taught by Lorie Hull*. Unfortunately, it was too lengthy to quote. I appreciate one of the first descriptions which is pithier. Clurman’s layman explanation was:

Affective memory” may be defined as the “emotion of memory,” which, historically speaking, is the root discovery that led Stanislavski to the elaboration of his system. In this “exercises” the actor was asked to recall the details of an event from his own past. The recollection of these details would stir the actors with some of the feeling involved in the original experience, thus producing “mood.” These “exercises” were used to set the mechanism of the actor’s emotion rolling, so to speak. When the actor was in the grip of this mood – although that is not what we called it, nor was the purpose of the exercises to capture it directly – the actor was better prepared to do the scene calling for the particular mood that the exercise has evoked. (44)

In New York, 1957, Robert Lewis’s lectured on Method techniques which resulted in his first book, *Method - or Madness?* Lewis explained his pedagogical approach and criticism of emotional memory. “I myself, in my work with actors over the years, have found emotion is not necessarily the biggest problem. . . . there is still a lot of ‘working for emotion.’ . . . but what it is about is not always clear. It often seems to be mere self-indulgence, more like *emotionalism* than emotion, a kind of self-induced feeling which is
more closely related to pathology than to art” (56-58). Strasberg fought against his technique being labeled as emotionalism. In *A Dream of Passion* he argued,

> In the emotional-memory exercises, the actor is asked to recreate an experience from the past that affect him strongly . . . he does not tell me the story. He does not worry about feelings or emotions, only sensory objects –what he sees, hears touches, tastes, smells, and what he is experiencing kinetically. . . . some acting teachers misuse this exercise, They want to know stories. I don’t want to know . . . what the actress experienced was the full re-creation of the intense emotional experience. In being able to create it and express it, the actress develops the ability to control the expression of her emotions on stage. (149-51)

Strasberg’s scientific influence was Canadian brain surgeon, Dr. Wilder Penfield who in 1933 discovered emotional flashbacks in his patients during surgery (113-14). He also engaged in a lengthy discussion of William James and the “revivability of emotions” as a bodily feeling as well as a cognitive memory. Strasberg clearly felt his acting exercises were a shared narrative with the science of the James-Lange Theory of Emotion (183-88).

Many actors know of Strasberg’s emotional memory exercise and know to avoid it, but lack serious analysis of what it is, what it does, what are its aims, and why it often fails. The medical ideas behind the emotional memory exercises are recovering repressed memories by decoding details of an episodic memory and then studying the emotional element of the memory. The shared narrative between medicine and acting for the emotional memory exercise is similar to the psychological procedure of Post Traumatic Stress Disorder therapy.
During the process of post-traumatic stress therapy patients are asked to recall the traumatic event in order to engage in psychological therapeutic process. Actors will eagerly do the same in order to explore authentic emotional expression. The point of therapy when a patient recalls the event and related emotions is for the therapist to mute the emotion and pain and distance the memory from the present moment. Therapy is an effort of talking a patient through re-consolidation of traumatic memory so they are no longer traumatized and dysfunctional. Strasberg’s exercise does the exact opposite. He stated, “Recreating or reliving an intense emotional experience at will was at the core of our work” (114). Strasberg’s aim was to train actors to bring up complex and intense emotions at will and be able to infuse the dramatic action with real feelings and believable behaviors. As Angela Baker presented in her research, the result was often an out of control actor, inappropriate incongruent emotional performances, and destructive personal behaviors. Acting became, oddly and dangerously, disembodied from its medicinal roots.

Not only was Strasberg central to the split in Method, he also sacked the issue of memory. In *A Dream of Passion* he dismissed the issue of memory as nothing to do with the work of actors. He wrote:

Either you remember the lines, or you don’t, you know what the scene is and you can go on with it. Your partner will remember the lines. That’s the least of it. That is pure memory. That has nothing to do with acting. It has nothing to do with acting talent, it has nothing to do with what the actor does. Any human being has problems with memory, so that’s not an acting problem. (102)
I find his attitude dismissing the importance of memory and excluding memory from the actor’s work is commonplace and still practiced in many acting schools of thought.

The schism in American acting pedagogy and training centered on emotion memory and emotionalism, not memory. The issue of emotional memory fractured mid-twentieth century acting techniques into different branches of Method.

_Mid-twentieth century Method and post-modern Method_

Arguably the most important legacy of The Group Theater was pedagogical. From the funnel of America’s theater experiment dispersed some of the most successful acting teachers in American history: Lee Strasberg, Stella Adler, Robert Lewis, Sanford Meisner, Uta Hagen. All have died leaving an archive of books and texts, acting schools and conservatories which establish their interpretation of Method exercises. Strasberg (1901-1982) became the Artistic Director of Actors Studio in 1951 and Actors Studio West in 1969. Presently, The Lee Strasberg Theater and Film Institutes in New York City and Los Angeles continue his legacy. Stella Adler (1901-1992), founded the Stella Adler Conservatory in New York City in 1949 and the Stella Adler Conservatory in Los Angeles. Her book _The Art of Acting_ was published posthumously in 2000. In 1943 she studied with Stanislavski for a brief period of time and returned with “The Stanislavski Chart.” A copy of the chart can be found in Robert Lewis’ _Method - or Madness?_ Using Adler’s chart Lewis wrote some of the best descriptions of the Stanislavski System and some of the most well founded critiques. Robert Lewis (1909-1997) also authored _Advice to the Players_ (1980) and _Slings and Arrow: Theater In My Life_ (1984) and was the Head of the Acting and Directing Departments at The Yale School of Drama in the 1970s.

All of the artists’ books and schools codify the history of mid-twentieth-century Method.

Adler’s chart is one of few models of the Stanislavski System. Although it is complex and difficult to read, the chart does illustrate relations between various basic skills and techniques. The base is “work on one’s self,” the second tier refers to “action,” the third tier refers to emotion divided as the internal feeling and the external process of expression, and the fourth tier represents levels of consciousness and control. The “pipe organs” represent various basic skills and techniques and are loosely grouped into more implicit techniques and more explicit techniques. The top of the chart represents an integrated performance between the actor and the part. The upper right-hand corner is the origin of the phrase “given circumstances.”
Figure 2.10 Stella Adler’s chart of The Stanislavski System (Lewis Method 34)
Once the mid-twentieth century Method schools established themselves, they trained thousands of actors, directors, and future teachers in the basic and adaptive principles and exercises of their version of Method and their interpretation of the Stanislavski System. Each school has an impressive list of alumni of stars and professional actors and local, regional, and international artists. The schools continue to educate thousands of theater and film students as well as many who become teachers and acting coaches. The population explosion of trained acting students via the established Method schools creates a generation of post-modern Method practitioners.

Post-modern Method is a democratic, competitive, and evolving process. Similar to many explosions in the information age, post-modern Method changes and adapts with each replication. Individual artists and teachers pick-and-choose from the buffet of Method techniques, constructing their own version of a system. As Adler said in *The Art of Acting*, “The Method is something you will find through me. I am one of the two million people who have been inspired by it. But my particular contribution will be to make you independent of The Method. You will then have the strength to reformulate it and go your way” (14). Theater artists continually work as creative artists by exploring and investigating different artistic processes of the craft by adapting traditional exercise, and inventing new exercises from basic principles. Many artists and teachers use a hybrid approach because no single technique, system, or method answers all artistic challenges or problems. The result is thousands of individualized approaches to acting and acting training. Many of these find a home in college and university theater departments.

*Cognitive Studies in theater and contemporary techniques*
The shared narrative between medicine and theater continues with Cognitive Studies. Bruce McConachie, and R. Elizabeth Hart, edited *Performance and Cognition: Theatre Studies and the Cognitive Turn*, a collection of essays and a primary resource for cognitive studies in theater scholarship. The contributors wrote on different interdisciplinary issues and intersections: “Performance theory and cognition,” “Drama and cognition,” “Acting and cognition,” and “The spectator and cognition.” McConachie argued for theater scholars to incorporate scientific theories and protocols (such as the concept of falsifiability) into theater scholarship and practice. Hart, a Shakespearean and literary theorist, argued toward an embodied understanding of meaning and language. She reconsidered the terms “phenomenology” and “semiotics” as traditionally defined by Saussurean legacy as being disembodied. Hart acutely pointed to the paradox of “embodied theory” imbedded in disembodied discourse. Similar to McConachie, she credited neuroscience as the basis for re-examination of central epistemological concepts such as the physical orientation of meaning in language. They established common ground by sharing primary resources to focus their range of arguments, specifically George Lakoff and Mark Johnson’s work *Philosophy in the Flesh* (1999).

*Philosophy in the Flesh* was a detailed text describing re-embodied knowledge from the neurology of perception (a twentieth century variation of Locke). Lakoff and Johnson explained how basic perceptions become cognitive models and tracked their uses in higher and abstract thought. The authors, Lakoff, a linguist, and Johnson, a philosopher, called their argument *embodied realism*. They wrote, “Embodied Realism, rejecting the Cartesian separation, is, rather, a realism grounded in our capacity to function successful in our physical environments. It is therefore an evolution-based
realism. Evolution has provided us with adapted bodied and brains that allow us to accommodate to, and even transform, our surrounding” (95). Embodied realism connects neural modeling of spatial and motor information into language and meaning schemas which are used in the domains of subjective experience. For example, when one says “I grasp the idea,” the concept of “grasping” originates from the motor system of when a hand grabs something. The motor system creates a neural model which then informs higher thought and a linguistic representation.

In *The Actor, Image, and Action: Acting and Cognitive Neuroscience* Rhonda Blair addressed the actor problem of “imaginatively creating and being consistently connected to the role” by looking at “how developments in cognitive neuroscience, which studies the intersection of biology and cognition, might be used in a ‘new generation’ approach to help the actor, in Stanislavski’s words ‘reach an unconscious creativeness through conscious technique’ (Stanislavski 1936: 50)” (xii). She cited the historical relationship between acting and science referencing Roach’s study from the seventeen to twentieth centuries. In her chapter “A new way of thinking about acting,” she reconsidered key ideas in acting and discussed them in their equivalent neurological terms: “character” translated to “self,” “given circumstances” to “environment,” “action” to “behavior,” “focus” to “attention.” She included “applications,” a chapter featuring several detailed explanations of “image streams” which was her approach to visualization of performance. She wrote, “Two basic applications could be in how we might emphasize episodic, rather than rely on semantic memory, and in how we reinforce neural patters and responses that break free of culturally and habituated framings of the ‘problem’ of the character” (81). By echoing rhetorical phrases such as “image schemas” from Lakoff
and Johnson’s neurological discussions, Blair applied science to theoretical discussion
and to practice in the rehearsal process. Blair and other cognitive studies scholars/artists
aim to create an interdisciplinary model for the theater community to approach the
complex interface of neuroscience and theater arts.

Neuropsychologist, Susana Bloch developed Alba Emoting, a technique based on
the physiology of emotional expression. Bloch capitalized on three effector patterns:
facial (Ekman), postures or bodily expressions (Wallbott), and respiratory patterns
(Rainville et al.). The controllable effector patterns stimulate the basic emotions. For
Bloch they are anger, love/tender, love/erotic, fear, joy, and sadness. The technique is
based on precepts that all emotion derives from basic emotions, bodily reaction to each
basic emotion is specific and universal, and reproducing bodily reactions subject to
bodily control stimulates emotion biochemically (Rix 59-63). Once actors acquire the
ability to use effector patterns to evoke the basic emotions, Bloch teaches actors to
control the level of emotion and to evoke mixed or blended emotions (Chabora 234-38).
Bloch’s example of effector patterns is a successful example of shared history between
medical principles and artistic process.

Richard Schechner is a pivotal scholar/artist and instrumental in establishing the
Performance Studies department at New York University’s Tisch School of the Arts
where I studied Asian Theater and “Rasaethetics” with him. To develop Rasaethetics
Schechner pulled from historical traditions other than Stanislavski and used the ancient
Hindu dramaturgical text Nātryāstra. Schechner’s “Rasaboxes,” developed the eight
basic emotions as theorized from Nātryāstra into physical action and emotion
expressions of movement and voice.
Schechner used the traditional idea of rasa in acting techniques by conceptualizing rasa as “flavor” and “taste.” He aims to highlight taste/smell senses over the tradition of seeing/hearing, breaking away from etymology of “theatre” as a place for seeing (27). Reflecting the role of food in traditional Hindu performances and sometimes contemporary Performance Art, Schechner proposed a shared narrative between contemporary acting technique and the ancient text Nātryāśṭra. Schechner also differentiated cultural representation from theoretical inspiration, “On the surface this work is not very Asian, but at an underlying theoretical level, it is extremely rasic” (47).

How do rasaboxes work? The key to their design is the spatialization of emotions. What makes our use of rasa “Western” is that rather than codifying the expression of emotions through particular gestures and facial expressions that are always performed in the same way (as in classical Indian dance), we use space to delineate each rasa, and allow the individual performer to find her own expression of the emotion/s contained within. (Minnick 40)

The Rasabox exercise centered on a grid of nine squares (similar to Delsarte model) taped on the floor and large enough for actors to enter and exit.

![Rasabox](image_url)

Figure 2.11 Richard Schechner’s Rasabox (36)
The eight squares, surrounded by a neutral or empty center square, are labeled with the eight basic emotion or rasas: sringara (love), hasya (laughter), karuna (sadness), raudra (anger), vira (vigor), bhayanaka (fear), bibhasta (disgust), adbhuta (surprise). The technique trains actors to jump into the box and into the expression of the rasa with the immediacy of an athlete jumping into a game. The exercises begin with physical body postures depicting the rasa and eventually grow into vocal and movement sequences.

Schechner considered modern neuroscience when developing his techniques. He extrapolated the neurological concepts presented in the book *The Second Brain* (1998) by Michael D. Gershon, MD. Gershon described the enteric nervous system (ENS). A remnant of evolution, our digestive system has an accompanying neurological system. Millions of neurons dictate the digestion of food and control many organs in the “gut.” Schechner used the ENS to theorize on “gut” responses in acting and the concept of rasa favor as performance experience. I believe Schechner makes erroneous assumptions and egregious connections between artistic cognition and the gut. Schechner wrote “Thus I am making a much larger claim -- and sending out a more general invitation. I am inviting an investigation into theatricality as orality, digestion, and excretion rather than, or in addition to, theatricality as something only or mostly for the eyes and ears” (47). His artistic model was a suggestion and invitation to think differently about essential precepts of performance; his neurological model was flawed.³ In fact, the connection between

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³ Gershon stated, “In fact, the enteric nervous system is a vibrant, modern data-processing center that enables us to accomplish some important and unpleasant tasks with no mental effort. When the gut rises to the level of conscious perception, in the form of, for example, heartburn, cramps, diarrhea, or constipation, no one is enthused. We want our bowel to do its thing, efficiently and outside our consciousness. Few things are more distressing than an inefficient gut with a feeling” (xiv).
performance emotion and ENC is a poetic metaphor without scientific principles supporting the artistic claim.

Summary

The shared narrative between medicine and acting intersects in the mutual study of the body, the psyche, and modes of expressive behaviors. The unique cannon followed the physician-priest, to the physician-philosopher, to the neurologist-empiricist-dramatists, to neuro-philosophy and cognitive scholars. The divide between science and art was fractured further by the specialization of modern practices and theories in both medicine and theater. The shared narrative is also the story of embodied knowledge: the knowledge from experience (empiricism), the knowledge of embodied realism (Lakoff–Johnson), and the embodied framework of actors’ basic skills, techniques, and training. Embedded in the shared historical narratives are the issue of emotion and memory, both concerns for actors. The memory arts were vibrate creative techniques from antiquity through the Middle Ages, but diminished with the printing press and shifting modes of oratory. Diderot’s problem for the actors was diagnosed as a paradox of emotional authenticity and not a concern of memory. This diagnostic choice echoed through the ages in the study of emotion in acting pedagogy. The divisive philosophical argument between Strasberg and other mid-twentieth century Method instructors fueled the fire and continued to focus American acting technique on emotion. The issue of memory was largely forgotten or assumed.

Emotion, in contrast, was repeatedly studied in acting through the gaze of science. Emotions are played through the heart -- before it was a metaphor, it was medicine. The
contagious affect of emotions on Medieval audiences was based on the medicinal principle of humors and pneumatism and the anatomical models of emotions generated through the heart. The complex psychological models of emotions performed in Shakespeare’s works were illustrated in Avicenna’s models of the brain and the soul. The advances of the scientific revolutions changed medicine through Harvey’s experiments on the circulation of blood and Willis’ experiments on the brain and nervous system. Roach analyzed dramatists as they searched for a parallel mechanized system in the artistic process and began to theorize new causalities for behaviors. In the twentieth century, the separation of science and the humanities, C. P. Snow’s divide, allowed acting techniques to become increasingly disembodied from the science of the body or misaligned with scientific principles. Stanislavski’s system and American Method intensified the study of emotion referencing the emotional science of Ribot and James. Contemporary artists seeking embodied pedagogy in both theory and practice propose embodied realism and new techniques of emotional expression.
CHAPTER III. MEMORY SCIENCE

To continue the shared narrative between the medical understanding of the body and the performing body, this chapter discusses the scientific principles supporting the Performance Memory Model. Neuroscience strives to concatenate how neural representation gives rise to individual consciousness. The Medieval Cell Doctrine of Avicenna is replaced by the Neuron Doctrine of Cajal, and eventually, the Network Doctrine of the future as posited by Jaak Panksepp (lecture). One of the most important areas of connecting biology of the brain to the experience of the mind is memory. Memory and learning occurs because of the brain’s biological processes. When we learn, neurons grow. When neurons are destroyed; then memory is lost, identity disappears, and eventually, life ceases.

This chapter surveys selected applicable models and terms of memory science. Anatomy is a primary model used in scientific studies. Abstract models will be utilized to represent memory categories and functions. Discussion include basic anatomical models (neuron and networks), basic abstract models (episodic, semantic, and procedural), five categories of memory for actors (sensory, motor/bodily, spatial, emotion, and higher cognition), and chunking and binding processes. General introduction terms necessary for the lexicon of acting pedagogy concerning memory include encoding and decoding, long term and short term, and implicit and explicit.

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4 I took Master’s level Neurobiology with Dr. Vern Bingman at Bowling Green State University. Basic neurology is required for most psychology majors. The content and scientific density of my understanding of the neuron and other neurological process, (including terms associated with memory) is largely from class lectures, advising, and my own personal research. Various textbooks provide similar basic information.
Encoding and decoding. Memory has two distinct processes: encoding, the making of memory, and decoding, the retrieval of memory. Actors should understand both processes of encoding and decoding. The rehearsal process is both the creation of performance memory (encoding) and the challenge of memory retrieval (decoding).

Long and short term memory. Long and short term memories differ by the time span of retrieval from time of encoding. Short term memory occurs when information is recalled immediately. Human beings have an average of seven units in their short term memory (Miller). Short term memory is regulated in the hippocampus. Long term memory is encoded in the cerebral cortex (consolidated) and is retrieved after it disappears from consciousness at least once. It can be altered during retrieval (re-consolidation).

Explicit and implicit memory. Explicit and implicit memories differ in attention and awareness towards information of action and thought. Explicit means the individual is aware and attentive of activity; implicit means the individual is unaware or shifts attention in consciousness. When actors and directors break down a scene they articulate explicit behaviors or motivations into the performance memory. Conscious learning of behaviors is explicit. Actors learn explicit action, such as lines, music, movement, and emotion expression in the rehearsal process. The various actions bind and become increasingly implicit. Motor memory is processed through the motor systems, cerebellum and Supplementary Motor Area (SMA). For example, when the SMA turns off or fewer neuron activate, then movement feels learned or “in the body” and categorized as implicit. Implicit memory feels sub-conscious or instinctual.
Anatomy of neurons

The brain’s most basic component is neurons. Santiago Ramon y Cajal (1852–1934) formulated the neuron doctrine, laying the foundation for the modern study of the brain. The neuron doctrine explains that “individual neurons are the fundamental signaling elements of the nervous system” (Kandel, In Search 443). Cajal’s discoveries depended largely on a staining technique developed by his rival and co-winner of the 1906 Nobel Prize, Camillo Golgi (1843-1926). Golgi erroneously believed brain tissue was a continuous web which intermingled and communicated. Using Golgi staining technique, Cajal was able to isolate individual neurons to study its properties. Cajal’s neuron doctrine established that neurons are the basic building block of the brain, neurons communicate with each other at the synapse, connections between neurons have a specific purpose, and signaling flows in one direction (Kandel, In Search 66-67).

Neurons have distinct processes in the formation of human memory. Specifically, when we learn and memorize, our neurons change their neurochemical properties which code electrical impulses. Neurons can grow new synapses changing the anatomy of the cell which happens in long term memory. Repeated experience, as in the case of actors’ rehearsal processes, changes the physiology of the brain. When I work with actors, I use the following metaphor to explain memory at the level of the neuron. Short term memory is similar to leaves turning to face the sunlight. Long term memory happens when the tree grows a branch to keep them there. The simple metaphor is meant to illustrate that the cell can grow an extra branch (terminal and synapse) which strengthens connections between cells for long term memory.
Eric Kandel’s life long research is paramount to the continued understanding of human memory in the twentieth century. The 2000 Nobel Prize committee summarized his contribution at the awards ceremony: “Eric Kandel’s work has shown us how these transmitters, through second transmitters and protein phosphorylation, create short – and long term memory, forming the very basis for our ability to exist and interact meaningfully in our world” (In Search 401). In his autobiographical scientific book, In Search of Memory (2006), Kandel gives a detailed description of his extensive study of *Aplysia*, a California marine snail. *Aplysia* has one of the largest neuron cells found in the animal kingdom which is easily visible for study. After decades of repeated experimentation Kandel discovered behavioral reflexes can be learned (by repeated production of second messenger neurotransmitters) trapping memory at the cellular level. Kandel pushed the research further by asking how does short term memory lead to long term memory. He discovered, “We learned that memory derives from changes in the synapse in a neural circuit: short-term memory from functional changes and long-term memory from structural changes” (221).

A neuron is a micro chemistry shop. The cell nucleus forms organelles sacks (Golgi apparatus) which are transported along the cell’s axon to the pre-synaptic terminal. The organelles are created through a complex chemical process using DNA in the cell nucleus and RNA to synthesis proteins. The sacks are filled with neurotransmitters to be released at the pre-synaptic terminal through a fusion pore causing a release of chemicals into the synaptic cleft. The neurotransmitters travel to the neuron-next-door (post-synaptic terminal) triggering another sequence of bio-chemical reactions. These sequences are modulated (inhibitory or excitatory) by an army of second
transmitters. As Kandel discovered, the second transmitters play an important role in cell
differentiation and gene expression. Through second messaging, neurotransmitters
activate specific metabotropic channels releasing G-protein to interact with kinase
proteins (the protein phosphorylation process). This complex manufacturing of chemicals
and proteins in the cell changes the functional composition of the cell, which in turn, can
alter synaptic activation for milliseconds, minutes, hours, or a lifetime. Because neurons
develop specific physiological characteristics which respond to specific neurochemical
transmitters which code electrical impulses neurons “remember.” Because the
neurochemical process can also lead to gene expression, neurons grow and adapt their
structure which leads to long term memory and behavioral habits. Consolidation is when
long-term memory becomes firmly established and re-consolidation is when long-term
memories alter during retrieval processes. 5

All of this happens to create energy, and in the case of the neuron, it is the action
potential. One of the consequences of the chemical composition of the cell is to create an
electrical charge. Similar to opposite charges in a battery, chemical molecules in the cell
are positively and negatively charged -- creating the potential for electrical polarization.
The membrane of the cell is speckled with ion channels, literally, gates which allow
positively and negatively charged molecules [potassium (K+), sodium (Na+) chloride
(Cl-), calcium (Ca++)] to pass in or out of the cell. When critical masses of these
molecules change their positions, then neurons undergo a sequence of electrical impulses

McGowan tells how Karim Nader’s experiments using a protein-synthesis inhibitor
affected a rat’s ability to remember. Reactivating memory destabilizes it and allows it to
alter. He challenged Eric Kandel’s theory of memory formation and introduce the theory
of memory reconsolidation.
called action potentials. Action potentials run along the axon of the cell at different rhythms. The rate of firing (how many action potentials) communicates an overall pattern into a network of neurons.

Clinical evidence to support the importance of the neuron in memory is found in the study of Alzheimer’s disease. Alzheimer’s disease attacks and kills individual neurons. Two aspects of the neuron biochemistry are affected by Alzheimer’s disease, the beta-amyloid and the tau protein. The beta-amyloid protein’s formation misfolds causing the development of plaque outside the neuron. The tau protein found inside the neuron is damaged and forms tangles which break the microtubules in the axon, essential breaking the neuron’s basic internal structure. The result is Alzheimer’s destroys individual neurons and their synapses causing atrophy of the brain and severely affecting memory and behavior. Because the disease destroys individual neurons, and there are a hundred billion neurons in the brain, it can have a slow progression.

Why can the brain learn and memorize while we are still alive? Because the brain has plasticity and experience changes neurons. The bio-chemical properties of neurons can change and the axon terminals (anatomical structures of neurons) can grow or wither. Neurons have a distinctive anatomy. Neurons are the nuts and bolts of human memory. Without them, no cognition would occur. The rate of their biological chemical and physiological consolidation processes may affect the timing and speed of actors’ learning through the rehearsal process. The phenomenon of human memory as we experience it is identified by neurological networks. After the neuron, the next level of understanding how the brain remembers is its complex organization of networks.
Anatomy of networks. During a 2009 lecture at Bowling Green State University, Professor emeritus Jaak Panksepp commented that twentieth century neuroscience evolved from the neuron doctrine and what twenty-first century neuroscience needs is the network doctrine. Memory at the level of the neuron doctrine is the common chemical composition, the repeating rhythm of the action potentials, and expanding branches of terminals and number of synapse. Memory at the level of network doctrine is a critical mass of active and connected neurons that represent components of experience (sensory or cognitive). These networks bind together creating categories of psychological experience or behavioral systems. Various behavioral and perceptual systems synchronize becoming consciousness, but still remain recognizable and identifiable. Memory systems and types are also recognizable and identifiable and must be assessable in the work of actors. Examples of memory systems I propose for the pedagogy of acting are sensory, motor/bodily, spatial, emotion, and higher cognition.

The brain has major anatomical divisions frequently identified as the medulla, pons, midbrain, cerebellum, diencephalon, and cerebral hemispheres. The four main areas of the cerebral cortex are the occipital, parietal, temporal, and frontal lobes. In 1909 Korbinian Brodman began mapping the microscopic areas of the brain. Currently there are about one hundred Brodmann’s areas recognized. Areas have specific or multiple functions in information processing including sensory perception, spatial, movement, language, music, or higher cognition. The various areas of the brain are networked to other parts of the brain by identifiable pathways which construct a functional system. Each functional system has distinct properties and informational processing. Major divisions of systems are frequently identified as sensory perception, motor movement,
emotional arousal and homeostasis, and higher cognitive processes which include the questions of motivation, identity, memory, and consciousness.

By identifying the diversity of cognitive systems and networks, modern neurologists face the unity problem of experience, similar to Avicenna and the Cell Doctrine of the Medieval era. In *In Search of Memory* Kandel discusses the status in the field of consciousness studies. He writes, “the new science of mind had to settle on a working definition of consciousness as . . . an awareness of self, an awareness of being aware” (376). He identifies two issues facing scientists studying consciousness: one, the question of unity, the fact the various functional systems of the brain bind together as a unified whole creating a coherent experience; and two, the question of subjectivity, the unique and personal sensations of experience. Similarly, being conscious of performance memory puts these two issues in actors’ rehearsal process. Unity of the performance memory implies the binding process must integrate implicit and explicit information connecting separate areas and systems of the brain. Subjectivity implies each individual actor has unique and personal experiences in the rehearsal process and original expressive behaviors in their subsequent artistic performance.

From the anatomy of the brain and networks scientists construct many abstract models which represent the various memory systems. The following two figures are examples of abstract models proposed in neuroscience to organize various types of memory and their relations.
A taxonomy for memory L. R. Squire proposed in “Mechanisms of Memory” (505):

![Memory Model](image)

**Figure 3.1 Memory Model from “Mechanisms of Memory” (Squire 505)**

From *Fundamentals of Human Neuropsychology*: Table 16.1 Terms describing two kinds of memory” (364)

<table>
<thead>
<tr>
<th>Explicit (conscious)</th>
<th>Implicit (unconscious)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fact</td>
<td>Skill</td>
</tr>
<tr>
<td>Declarative</td>
<td>Procedural</td>
</tr>
<tr>
<td>Memory</td>
<td>Habit</td>
</tr>
<tr>
<td>Knowing that</td>
<td>Knowing how</td>
</tr>
<tr>
<td>Locale</td>
<td>Taxon</td>
</tr>
<tr>
<td>Cognitive mediation</td>
<td>Semantic</td>
</tr>
<tr>
<td>Conscious recollection</td>
<td>Skills</td>
</tr>
<tr>
<td>Elaboration</td>
<td>Integration</td>
</tr>
<tr>
<td>Memory with a record</td>
<td>Memory without a record</td>
</tr>
<tr>
<td>Autobiographical</td>
<td>Perceptual</td>
</tr>
<tr>
<td>Representational</td>
<td>Dispositional</td>
</tr>
<tr>
<td>Episodic</td>
<td>Semantic</td>
</tr>
<tr>
<td>Working</td>
<td>Reference</td>
</tr>
</tbody>
</table>

**Figure 3.2 Memory Model from Fundamentals of Human Neuropsychology (364)**

Squire’s model represents categories and relations of memory spatially and the second model lists a range of terminology and loosely categorizes memory types. In the
following sections I will describe selected types of memory and how they associate to the work of actors. In the next chapter, I adapt the models for the proposed acting exercise.

**Episodic, semantic, and procedural**

Similar to encoding and decoding, memory categories of episodic, semantic, and procedural describe basic aspects of the actor’s rehearsal process. Episodic memory is a memory of an event in one’s life. Endel Tulving, professor emeritus at University of Toronto, is a leading scientist in research and development of episodic memory. Tulving defines episodic memory as:

> Episodic memory . . . makes possible mental time travel through subjective time, from the present to the past, thus allowing one to re-experience, through subjective time, from the present to the past, thus allowing one to re-experience, through autonoetic awareness, one’s own previous experiences. Its operations require, but go beyond, the semantic memory system. Retrieving information from episodic memory (remembering or conscious recollection) is contingent on the establishment of a special mental set, dubbed episodic “retrieval mode.” Episodic memory is subserved by a widely disturbed network of cortical and subcortical brain regions that overlaps with but also extends beyond the networks subserving other memory systems. The essence of episodic memory lies in the conjunction of three concepts -- self, autonoetic awareness, and subjectively sensed time. (5)
Tulving’s landmark case study is a patient known to science as K.C. In 1981 K.C. suffered severe brain damage from a motorcycle accident. Many of his mental capabilities remained intact; he could read, write, play the organ, chess, and card games and had normal abilities to concentrate, think, and communicate. However, he did suffer from deep amnesia, specifically K.C. lost episodic memory. He could not remember any autobiographical or personally experienced events, although he retained semantic knowledge. For hypothetical example, if K.C. was asked “What happened to President Kennedy?” he would likely be able to report “He was assassinated,” but if asked where he was when he learned about it, he would not remember.

Tulving and other scientists have continued to pursue the specific cortical location and mechanistic processes associated with episodic memories. The hippocampus is central in the formation of memory. The neocortex creates perceptual moments. Only a small subset qualifies for memory. The hippocampus, anatomically convenient to the emotion systems, affectively marks moments as salient with emotional arousal. The cortex needs to be informed or given opportunity to change a perceptual pattern into a permanent neural pattern or memory. Without a functioning hippocampus, actors would never be able to accumulate information to build a performance memory. Further research and experimentation using functional neuroimaging of PET and fMRI indicates activation of the frontal lobes during the encoding and decoding of episodic memories. Tulving’s experiments show the left prefrontal cortex is more involved in encoding and the right prefrontal cortex is more active in decoding (17).

Building episodic memories is the epicenter of the actors’ rehearsal process. Tulving defines episodic memories as memories about happenings in a specific place and
time or about “what,” “where,” and “when.” I propose episodic memory of fictional events, the dramatic scenes which become the building blocks of a play or performance, require a larger analysis model. In *Group Performance of Literature* Beverly Whitaker Long, Lee Hudson, and Phillis Reinstra Jeffery summarize a model for performance called the Dramatic Analysis. The Dramatic Analysis identifies aspects of a dramatic episodic event through seven questions. Similar to Tulving, the authors list “what,” “where,” and “when,” but they also ask “who,” “to whom,” “how,” and “why.” “Who” and “to whom” are important in an actors’ episodic memory because actors are working within the personality schemas of fictional characters. “How” and “why” are important because fictional characters create unique mannerisms and hold fictional motivations and objectives. Episodic memory is important in rehearsal process because it functions as a phase when different types of semantic performance information bind together creating a unified performance memory.

*Semantic.* Semantic memory is recall of facts independent of an experiential context. Semantic refers to a conceptual knowledge base including objects, people, places, and facts about them. Semantic memory can be general semantic or autobiographical semantic. General semantic memory is information about the world or universe. An example is George Washington was the first president. Autobiographical semantic memory is information about self, specifically, qualities which characterize an individual and not an event (Hart and Kraut).

Important for actors, autobiographical semantic memory is also the fictional autobiographical information about character. Semantic memory is the ability to recognize specific features and characteristics and categorize them. For example, I have a
simple acting exercise which embodies semantic memory. I offer a list of physical characteristics such as shuffling gate, shaking hands, stooped shoulders. Using the mental semantic category of motor behavior, actors embody the characteristics and discover an illusion of an “older” character. The physical characterization becomes motor/bodily sense memory. Fictional semantic memories construct a personality model.

Semantic memory relates to directorial information an actor receives during the rehearsal process. Actors learn a play or performance through verbal instructions, the text of a play, blocking instructions, and discussions of character and their emotional behavior. The rehearsal process is a process of embodying semantic information about the performance into repeatable episodic memory of the event.

_Procedural._ Procedural memories are defined as implicit motor skills such as riding a bike, driving a car, or getting dressed in the morning. Procedural memories are encoded in the motor cortex and processed through the motor systems of the brain, often including a part of the brain called the putamen. The putamen is located in the basal ganglia (Goldberg 3), the lobe of the brain as the hippocampus, but anatomically separate.

Repeatable experimentation with animal testing supports that types of implicit memory are processed in unique memory pathways that are independent from common amnesia (Kolb and Whishaw 365-64). Clinical studies of patients with hippocampal damage reveal that motor learning and skills may be processed with different areas of the brain. The study of memory and the functional importance of the hippocampus began because of the case study of a patient known to science as H.M. H.M. suffered severely debilitating epilepsy from an accidental head injury. In 1953 his doctors were able to
locate the origin point H.M.’s epileptic seizures and frequent blackouts. He was offered surgery to remove the area although the doctors did not know at that time what side effects may occur. H.M. elected to have the surgery which cured his epilepsy by destroying bilateral areas of the hippocampus, amygdala, and part of the temporal lobe. After surgery the side effects became apparent, H.M. could not form any new memories. H.M. remembered his history and identity before the surgery, but he could not accumulate new information about the world or himself after the surgery. H.M., who learned to make cigarette lighters, still has implicit procedural memories and could learn motor tasks, indicating the hippocampus is not associated with the acquisition of procedural memories (Bingman). In the next chapter the acting exercise aims to differentiate semantic motor memory (abstract movement) from procedural motor movement (mime sequence).

Performances incorporate procedural memories of individual actors. For example, when blocking includes motor skills such as walking or sitting or when actors are asked to drink tea or tie their shoe as “a bit.” Procedural memories on stage are often perceived as realistic or natural because they are not being consciously controlled by the actor. Actors work toward rehearsing aspects of their performance to a level where the physical actions are implicit and the performance experience “feels” procedural. Procedural memories are implicit and subsequently feel “automatic–pilot.”

In the next chapter the Performance Memory Model will break down the semantic, episodic, and procedural memory model into specific time span components and types of memories for the actors’ rehearsal process. The Performance Memory Model also proposes categories of memory types. The following section tracks the
anatomical model of various types of memory in order to propose the abstract model for actors.

*Five memory categories: sensory, motor/bodily, spatial, emotion, higher cognition*

*Sensory.* The five senses, visual, audio, tactile, gustatory, and olfactory, are processes in five different systems which are located in five different topographical areas of the brain. Sensory input is primary information for actors learning about the environment of the play. Sensory information may form priming memory. Priming memory is “recall of words or objects is improved by prior exposure to the words or objects . . . even though the subject has no conscious memory of having seen the word before” (Kandel, *Principles* 1230). Priming memory for actors is unconscious sensory information about the rehearsal room or the cueing process which triggers conscious information of blocking and lines.

The olfactory system is an ancient system which encodes and decodes information by specific odorant neurons in the olfactory bulb. Information is transmitted directly to the cortex or through the thalamus to several areas in neocortex. Taste is also a chemical sense with specific neurons orientated to sweet, bitter, salty, and sour. Specific coded information travels from the taste buds to the brain stem, the thalamus and then binds together in the gustatory cortex.

Tactile encodes and decodes information by sensors in the periphery. Properties are processed by populations of receptors oriented to respond to texture, shape, size, temperature, and mass. The diverse information travels in parallel pathways arriving at the somatosensory cortex where the specific characteristics bind into a unified perception.
Somatosensory cortex is located in the parietal cortex and functions as an association area. It integrates touch, temperature, pain, muscle and skeleton inputs with other sensory information such as sight. When relayed to the motor areas of the frontal lobe, it can help guide movement and evaluate the body in space.

The visual system is first a special oriented reflex system, responding to physical energy in the environment. The visual system first deconstructs physical energy into neurological impulses and then reconstructs the impulses into perception. The deconstruction process, transduction, occurs when photoreceptors, rods and cones in the retina translate wave properties of light (the electromagnetic energy of blue, green, red, light, dark, and movement) into biological information. The axons of the retinal ganglion cells stream together and become the optical nerve. The right and left pathways cross. The optic nerve has two distinct pathways, the M and P pathways, which project through various organs and terminate in the six layers of the visual cortex where the process of reconstruction begins. The occipital lobe, or visual cortex, has different areas of specializations. It is a defined hierarchy V1 through V5 and other areas. For example, V5 is specially oriented to process movement.

Reconstruction is called serial processing. Serial processing builds up information or feeding forward which moves towards prefrontal cortex creating a conscious experience of sight. The visual system also feeds back or processes information in a top-down trajectory which is called psychological rules. Once a critical mass of recognition units activate, then psychological rules become a factor unifying visual information into a holistic experience of sight and sometimes creating optical illusions.
The auditory system works in a similar process as other sensory systems. Sound energy is captured by the external ear, middle ear, and inner ear. Transduction of frequency, tone, volume, and directional sensitivity occurs in the inner ear in the cochlea. Cochlea is lined with approximately sixteen thousand hair cells which gate ion channels by mechanical force. Once ion channels gate and open, then an action potential triggers neural signals. Neural signals travel to the auditory cortex where it is processed into complex experience including language and music.

Sensory information is important to actors for two major reasons: one, actors are trained to use their senses to perceive and react to their fictional environment or given circumstances, and two, actors are trained to use sense memory exercises. Sensory information may affect the actors’ rehearsal process because sensory perceptions bind to the unified performance memory and may become implicit components priming the retrieval of the memory. When actors change rehearsal spaces or move into the theater, they will often “drop lines” and miss cues. Hypothetically, this may be partially caused by disrupted sensory memory which cues and binds performance memory.

Actors using “sense memory” exercises attempt to isolate specific qualities and characteristic of sensory reception and perception. Actors strive to “substitute” or “transfer” neurological perceptions without the transduction process of environmental stimuli. The goal of sensory transfer is to support realistic behaviors in performance and trigger spontaneous responses.

Motor/bodily. Motor output is the brain signaling to the Peripheral Nervous System (PNS), activating nerves and causing muscular movement. Bodily senses are somatosensory information or the status of the body relayed back to the brain. (Further
discussion of the multiple nervous systems and scientific principles related to emotion is in chapter six.)

The mechanics of motor output and bodily senses are distinctive brain activity which is why muscular movement “feels” inexplicably different than thought or higher cognition. Motor output and somatosensory information is processed through various regions of the brain: basal ganglia, thalamus, cerebellum, brainstem, spinal cord, premotor cortex, supplementary motor cortex (SMA), and primary motor cortex. The motor systems of the brain and CNS have unique neurons such as purkinje which are individually so complex they resemble sea fan coral. Motor neurons and the motor system’s unique anatomy have evolved to process the Herculean task of locomoting a skeleton with body mass through space.

The brain topographically organizes the body in a region called the motor cortex and the somatosensory cortex. The motor cortex is located at the posterior of the frontal lobe and the somatosenory cortex is located on the other side of the central sulcus at the anterior of the parietal lobe. The cortex extends like a double headband across the two hemispheres and controls the opposite side of the body. Figures 3.1 and 3.2 illustrate the homunculus, a representation of the “body in the brain” which means the location and the amount of cortical area designated to control specific parts of the body. When stroke patients lose muscular control on one side of their body, it is because one side of their brain is damaged. The body is in the brain and all muscle memory is cognitive.
Figure 3.3  Body in the brain – somatosensory homunculus (Baars and Gage 137)

Figure 3.4  Body in the brain – motor homunculus (Baars and Gage 137)
The biological reversal of losing the brain is losing the body. V. J. Ramachandren has studied the phenomenon of phantom limb syndrome and has published many accounts of his discoveries. In the essay “A Pain in the Brain,” he explains how amputee patients often experience sensations or pain in their lost limb. This is because the brain’s motor and somatosensory cortex are still functioning and seeking activity. Various therapies help patients by tricking the brain. The mirror exercise is where patients place their remaining hand in a box with a mirror that reflects the second missing hand. Visual sensory input of the second hand moving relieves the pain of the phantom limb and indicates that visual sensory perception binds with motor and somatosensory perceptions.

Performance behavior is perceptible motor output an audience can observe and/or experience empathically. Motor memory is remembering what the body, including voice and face, is doing and inversely “feeling.” In the praxis of acting, motor memory is referred to as “muscle memory.” A revised understanding for actors is that muscle memory does not locate in the peripheral nervous systems or in the muscles, it exists in the brain. Motor memory has various subdivisions for actors. Extraordinary tasks such as choreographies, staged stunts, vocals, and musical expressions are conscious or explicit. Ordinary skills such as walking, gesturing, or performing daily tasks are unconscious or implicit. The extraordinary skills require a conscious effort to execute or learn and progress from semantic information about how the body moves, to episodic integration into the scene, to final procedural execution of the performance when the specifics of the motor memory is largely implicit. Motor memory binds to spatial memory because it is “how” actors move through the performance space.
Spatial memory is the brain’s ability to perceive spatial dimensions and relationships, and remember mapping and pathways. Spatial processing primarily occurs in the parietal lobe and the hippocampus, but is critically dependent on bodily senses and visual input of the environment. At Bowling Green State University Dr. Vern Bingman’s research and experiments with pigeons suggest spatial contemplation and memory has unique and specific oriented neurons. The hippocampus has place cells which only fire when a specific position in the environment is recognized. Route path cells are a compass sense mechanism and fire only when there is direction toward the goal location. Mutual firing between place and route cells is the brain’s mechanism to navigate and map places. Bingman contends the navigation of space is the contextual cue for episodic memory and crucial for the formation of memory.

Spatial memory is also processed in the parietal lobe. Clinical evidence to support this is the study of Balint’s syndrome. Patients with Balint syndrome can not see multiple objects in a scene. They can only recognize individual objects one at a time and can not describe relationships between objects. Balint, treated a stroke patient who was unable to grasp objects, estimate distances, or process the content of the visual field. Balint discovered damage to the parietal lobe causes visual-spatial deficit (Kolb and Winshaw 451-52).

An ordinary example of spatial memory is remembering where specific food is located in the grocery store. In the work of actors spatial memory could be summed up with the typical directorial instruction “remember your blocking.” Spatial memory is important to actors because it integrates many of the basic systems of memory when actors create a scene or episodic event. Many actors confess to me that they can not
memorize their lines until they get their blocking. I find this logical when considering the role spatial memory has with episodic memory. The parietal lobe integrates visual information and bodily sensory information creating spatial orientation. The parietal lobe is hard wired to the hippocampus making a strong connection between spatial orientation and the central area of the brain which processes short term memory into long term memory. The parietal lobe constructs the actor’s canvas on which they build their performance memory. This also echoes the memory arts of antiquity where artificial memory forms on method of loci or spatial memory.

Spatial memory is important to actors because they can develop and use “spatial memory exercise” similar to sensory memory exercise. By associating images of the eventual performance space during the rehearsal process, actors are less vulnerable to memory disruption when relocating the work.

**Emotion.** Emotion systems are similar to sensory systems because they have distinct anatomy and processes and are integrated into larger cognitive schemas and memory patterns. A fuller discussion of emotion systems and memory is the content of chapters five and six.

**Higher cognition.** Higher cognition is the content, process, and awareness of mental activity and the status of the Central Nervous System (CNS). The frontal lobe is associated with many mental functions which are categorized as higher cognition. Some of these functions are motivations, drives, evaluation, decisions, attention, focus, and theory of mind. Higher cognition also refers to mental activity located in other areas of the brain or topographically referred to as global. Global refers to “whole brain assessable” which indicates multiple areas, networks, and sequencing are simultaneously
active and give rise to thought, memory, or imagination (Rooney). Higher cognition includes mental activity such as imaging and inner speech. Neurological schemas define self, the aspects of identity, and behavioral filters such as likes, dislikes, values, and beliefs as higher cognition. For actors higher cognition includes the task of “creating a character,” defined for the purposes of this discussion as a fictional personality schema that processes dramatic behavior.

Frontal lobe association with higher cognition entered popular culture with the 1848 case study of Phineas Gage. Malcolm Macmillan’s *An Odd Kind of Fame* records a full historical and scientific narrative of Gage’s case. It contains most primary sources of the case including facsimiles of Harlow’s published paper, “Passage of an Iron Bar through the Head.” Gage, a railroad worker in Vermont, had a horrifying accident on the job site. An accidental explosion propelled a pointed iron bar (3 feet, 7 inches long, 1 and 1/4 inches wide) directly into his head. The bar entered through the left eye area and exited through the top of his skull, destroying a large section of Gage’s frontal lobe. He regained consciousness shortly after the accident and was able to speak and walk. He suffered no physical, memory, or sensory disability, but he lost the ability to evaluate, make a decision, focus, and control his behavior. Gage lost his identity. He had been known as “a capable foreman” and an honest working man. Harlow described him as “fitful, irreverent, and indulging at times in the grossest profanity, manifesting but little deference for his fellows, impatient of restraint or advice when it conflicts with his desires . . . After the accident his co-workers said he was ‘no longer Gage’” (qtd. in Macmillan 414-15). Gage was a watershed case study indicating the frontal lobe is the neurological seat of personality which affects many aspects of higher cognition.
For actors higher cognition refers to many traditional acting techniques developed in the twentieth century via emerging psychotherapy and the integration of training psychological triggers to direct actors. Higher cognition means actors memorize thoughts or other mental functions such as motivation and objectives. Many acting techniques contend by activating higher cognition, then spontaneous new behaviors will trigger in the performance. It has many terms and associated mental functions in the work of actors (especially from the Stanislavski-Method techniques) such as motivation, objective, super-objective, character history, “magical if,” imaginative circumstances, and subtext. Higher cognition includes fictional personality schemas and theory of mind or what actors call “getting into character.”

**Chunking and binding**

*Chunking.* Chunking is the process of consolidating short sequences of information. When information is “chunked,” it is known as a singular bound idea rather than individual elements. Many scientific experiments test the span and retention of working memory and individual capacity for learning. One of the first experiments was conducted by George A. Miller who published “The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information” in 1956. Frank Dempster’s experiments indicate individuals have span differences and children increase their span through development. Individual differences for adults may span between four and eleven units of working memory. Popular culture understands chunking because the average memory chunk is seven digits or units of information, thus, telephone numbers and license plates have seven digits. Performers understand chunking in the rehearsal
process. For example, a sequence may begin off stage, enter by jumping and sliding and then freeze in a pose resembling a statue. Each element of the sequence must be learned semantically. The actor or dancer must chunk the information together and label the sequence as “the entrance.” Eventually, “the entrance” sequence will be chunked with other movement or action sequences which accumulate into a scene or extended performance.

*Binding.* Binding combines different types of information into a unified experience (Kandel, *In Search* 382). For actors, binding occurs through the rehearsal process, when performers combine lines, action, blocking, emotion arousal, and motivations into unified performance behavior. How do components of basic mental systems and/or the systems themselves bind together to create holistic experience of sight or a unified experience of consciousness or a unified performance memory? Neuroscientists offer a number of working hypotheses: neuro-chemical, neuro-modeling, or 40-Hertz oscillation synchronization. Any one hypothesis, or a combination of all, may offer the key to understanding the mystery of binding and unified performance memory.

Neuro-chemical coding may contribute in binding and coding performance memory. Neuro-chemical properties strengthen the connection of the synapse between cells creating memory networks. Scientists know of approximately sixty neurotransmitters and neuro-peptides. The nine small molecule neurotransmitters (acetylcholine, dopamine, norepinephrine, epinephrine, serotonin, histamine, GABA, glycine, and glutamate) do most of the work. The other chemicals called peptides, are composed of a chain of amino acids. Transmitters have no singular function and have
multiple relations to cognition and behaviors. Neurotransmitters and neuro-peptides can coexist in a single neuron, creating the potential for multiple functions (Kolb and Wishaw 86-90). Although no direct experimental data exists of encoding performance memory sequences with transmitters, data does exist that neurochemicals are fundamental in creating memory.

In the 1940s at MIT, Warren McCulloch and Walter Pitts pioneered the mathematical representation of complex neuronal activity. Neural modeling guides how single neurons connect into networks and build into cognitive architectures. Neural modeling hypothesizes how specific functioning cells funnel disperse neuron activation into a bottleneck cell (Baars and Gage 454-59). For example, complex and simple neurons in the visual system bind together stimuli into the perception of a bar of light in a specific orientation, creating a segment in the perception of a line. Binding three bits of visual data into one is a fundamental step in binding. Neuronal networks take disperse visual input and processes it into a holistic visual experience.

For actors disperse aspects of performance memory may bind by specific functioning neurons and encoded neuron networks which consolidate sensory, motor, spatial, emotional and cognitive inputs and cue memory. The obvious example is the process of calling “line” during rehearsal. Multiple types of memory bind together creating the unified performance memory, but as changes are implemented in the creative process of rehearsal (new blocking, different interpretations, new emotions) actors “lose” the lines. The line is still encoded, but the cue is lost because of the reconsolidation process of changing performance information. On the level of network and behavior, the disperse types of performance information (sensory perception, movement, spatial
blocking, emotion, or thoughts) participate in creating a threshold which triggers the next cue. The trigger is the summation of representing inhibitory or excitatory effect on the neuronal system, which activates the next synaptic sequence of behavior (the line). If the trigger changes, the cue changes.

In *The Astonishing Hypothesis* Francis Crick offers an explanation of the mysteries of consciousness and the binding problem. His argument derives from experimental data of a cat’s visual cortex which suggests “some neurons in the visual cortex fire in a somewhat rhythmical manner when they become active due to a suitable stimulus in the visual field” (244). The rhythms, called a 40-Hertz oscillation, synchronize neurons on a beat of approximately forty repetitions per second. The 40-Hertz oscillation create a local field potential which brings various aspects of visual perception together by firing at the same time and in the same tempo. Crick hypothesized from the data the rhythmic energy of the brain may bind different neuronal systems together giving rise to mental focus, awareness, attention, or possibly consciousness (243-45).

The micro-rhythms of the brain are impossible to perceive. But for actors who choose to approach their craft as an art, the perspective of artists is to see across many boundaries (including the biological) and understand the mechanism of the craft behind the obvious perceptions. The rhythm and energy of performance is essential to encode into the performance memory. Rhythm, speed, and energy bring live performance into a salient experience for the audience and mark the execution of the actor’s performance. In the common lexicon of actors a “low energy performance” equals a bad performance. For actors, it is a metaphorical but an important idea of embodied performance -- the macro-
rhythms of experience may be biologically connected to some of the micro-processes of the brain.

Summary

Neurons and neuronal networks are the biological muscle which pursues knowledge. Neuroscience studies these muscles through a process of identifying the phenomenon, finding the location, and understanding the mechanism. The phenomenon of memory is mediated through the mechanics of the neurons, located in networks and processing areas of the brain, and experienced in many different modes and types. Studying brain science gives actors a critical set of tools to study the mechanisms of human behavior.

Memory as a basic skill is absent in the training of actors. In order to make-up ground, I propose a list of terms to introduce basic memory principles and processes with the goal that they become as common as other psychological words such as “motivation” and “objective.” Integrating terms and basic ideas into the proposed acting exercises is achieved by the rhetorical application as well as the embodied experience.
CHAPTER IV. PERFORMANCE MEMORY MODELS AND EXERCISES

Memory has become oddly disembodied from acting. This chapter defines the Performance Memory Model and proposes an acting exercise as an example of how to bring basic scientific principles to practice. The purpose of this acting exercise is to learn by experience and specifically, demonstrate how memory functions in the work of the actor. I use terminology defined and discussed in the previous chapter to apply the science to the creative processes and to contribute new knowledge to the lexicon of actor training.

Why is it important to study memory?

Actors memorize performance. Memorization skills are often assumed in acting training. Acting requirements mentioned in chapter one on internet course description demonstrate a consistent omission of any discussion on memorization. Actors must encode and decode performance memory. Encoding is important because actors can be fired if they can not memorize the work and perform on schedule. Decoding memory is important because actors suffer from “over-decoding” in long runs and repeated performances. With the advent of the mega-musical in the last part of the twentieth century, Broadway actors become endurance artists. With the popularity of theater comedy games and reality television, many contemporary actors construct performance on the basis of improvisation, rather than memorization of scripts and directorial action. Improvisation performances are constructed by predetermined rules or given scenarios which guide the performers’ participation without the need to create performances
schemas which must be memorized and repeated. Traditional live theater, television, and film work still require actors to memorize and perform on schedule.

Acting exercises teach performance habits and strategies. Habits and strategies may be called skills, techniques, training, or principles in the pedagogy of higher education. The rehearsal process, a creative process constructing a performance memory, is an intense period of time when actors learn the content of performance, including blocking, lines, behaviors, actions, emotional and psychological mind set of characters, and technical needs of the production. Coordinating multiple memory systems into the focused action of the performance is the assumed result of the rehearsal process. Understanding human memory, developing good habits when rehearsing memory, and knowing how to deal with memory blocks are all important to the education of young actors. Understanding human memory as performances repeat and age is important to the education of actors and to the longevity and success in their future careers. The aim of the Performance Memory Model is to introduce the scope of memory for actors and introduce the lexicon of memory to the pedagogy of acting. The purpose of the exercises is to demonstrate a specific example of how to embody an aspect of the model into an educational experience in class.

*What is a Performance Memory Model?*

The Performance Memory Model is a chart representing basic modes of memory and memory progressions common in the rehearsal process. The Performance Memory Model depends on various axioms and precepts from scientific models and is adapted from the two models presented in the previous chapter. Memory changes through time
and repetition. Memory is processed in different modes or types. Different modes of memory bind together and form complex memory patterns.

The chart reflects the complexity of the rehearsal process when learning performance memory in two ways, memory schemas of time and memory types. The chart’s X-axis represents time and the process of “breaking-down” a scene or play. It represents encoding and decoding in the rehearsal process and then the progression of semantic to episodic to procedural. The chart illustrates shorter lengths of memories to longer lengths of memories: moment-to-moment, chunking, phrases/arcs, scenes, epic (all scenes), show (on and off stage), and finally, a long run memory. Means to discovering different memory types occur when actors work in the process of “moment-to-moment.” Retarding the behavior and action down to almost freeze frame slowness, directors and actors dissect and analyze the layers of the performance and the specifics of memory.

The Y-axis represents the break-down of different memory categories or types. For the purposes of teaching actors memorization skills, I propose five general categories of memory types: sensory, motor/bodily, spatial, emotion, and higher cognition. The five general categories have many subcategories and possibilities. The list of subcategories is neither absolute nor complete, but rather an open question for discoveries of pertinent types for specific performance challenges. I allow actors to invent a subcategory if they discover a memory through-line which anchors their performance. Full analysis of all subcategories is not within the scope of this dissertation.
PERFORMANCE MEMORY MODEL

ENCODING .......................... DECODING

SEMANTIC .......................... EPISODIC .......................... PROCEDURAL

Moment To Moment-------Chunks--------Phrase/Arc-----Scenes------Epic------Show----Long Run

LENGTHS OF TIME

• Humans first encode (consolidate or form) and then decode (retrieve or recall) information as memory.

• Building and rehearsing Performance Memory progresses from Semantic (direction or facts about the performance) to Episodic (memory of the scene in time and place) to Procedural (motor skill and increasing implicit).

• Memory terms to identify sequencing and cueing of information in increasing time spans.

Figure 4.1 Performance Memory Model: X-Axis - Length of time (Rooney © 2010)
PERFORMANCE MEMORY MODEL

X-AXIS – LENGTHS OF TIME

Memory Types - Y-AXIS

Sensory
- Visual
- Auditory
- Tactile
- Olfactory
- Gustatory

Motor/Bodily
- Implicit Types:
  - Nervousness
  - Bodily functions
  - Facial
  - Gestures
  - Basic movement actions
- Explicit Types:
  - Verbal
  - Choreography
  - Gestures
  - Actions

Spatial
- Blocking
- Relations to others
- Relations to audience

Emotion
- Basic
- Compound
- Complex

Higher Cognition
- Lines, words and meaning
- Motivations and objectives
- Fiction memories and recall
- Inner speech and subtext
- Listening
- Time

Figure 4.2 Performance Memory Model: Y-Axis – Types (Rooney © 2010)
For the purpose of this dissertation, I will propose an example of an acting exercise by accumulating behaviors. The Accumulation exercise explores selected memory types, chunking, and demonstrates how they bind together. I will introduce diagramming a memory model to illustrate the embodied process. Performance Memory Model is a tool to help students diagnosis their creative and memory processes. It is also a pedagogical tool to help design new exercises for specific issues and challenges facing student actors.

Memory exercises - Accumulation

Objectives: Accumulation one and two isolate different types of basic memories and identify memory types in experience: motor and verbal, motor explicit and motor implicit, long term retrieval and short term retrieval. Accumulation three and four introduce techniques to fix the memory challenges by working with the principles of chunking and binding. Chunking is a memory technique of combining performance information through time. Binding is a memory technique when actors compound basic memory types allowing some to submerge in the performance memory (become implicit). Complex performance memories are constructed with both techniques and are discussed as diagramming models. Final discussions introduce the concept of how Method techniques work with memory techniques to keep performance spontaneous, realistic, or fresh.

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6 I studied choreographer Trisha Brown’s work “Accumulation” which explored the duality of accumulating movement sequences and telling stories (Banes 82).
**Classroom space:** The classroom space should be large enough to accommodate a class of ten to twenty students. Classroom space for acting class should be largely empty and so actors can physically work in groups and individually. Classroom should have theater blocks, chairs, or furniture which is easily rearranged for different exercises.

**Class time:** Class time should be three hours and needs to be monitored because memory occurs and changes through time. Dividing the exercise into different parts or over different days will create opportunities to identify memory skills such as decoding/retrieval.

**Projected learning outcomes:** The projected learning outcomes are to explain and embody basic memory skills and understand and acquire basic problem solving techniques. Embodiment requires instructors to motivate actors into action so learning occurs through experience. Once students are able to model the various modes of memory, they can apply the process and repeat the analysis, either implicitly or explicitly, in their future artistic work. The performance memory model gives actors a tool to use cognitively, and hopefully and eventually, instinctually in future rehearsal and creative processes. It also gives them a tool to use if they are faced with a memory challenge or block. By analyzing the memory model on paper they can add other memory functions to layer the moment and encode detailed information for performance. By experiencing the memory modes in acting exercises, students can embody the information in practical and personal skill sets.

Diagramming performance memory introduces how to use Method techniques with memory techniques in order to keep performance fresh, spontaneous, and realistic. Learning outcomes would also include an expanded vocabulary list that contributes new
knowledge to the lexicon for actors. Terms include: encoding and decoding, short term and long term memory, implicit and explicit memory, chunking and binding, and five general categories of memory for actors: sensory, motor/bodily, spatial, emotion, and higher cognitive.

ACCUMULATION ONE – Abstract movement

1. Form small groups of three to four students. Each group will create a sequence of movements or simple abstract gestures. Each student should create one gesture and teach others in the group until an accumulated sequence of meaningless movements is choreographed. Avoid literal gestures such as a waving good-bye, or pointing, or the palm-up gesture meaning “stop.” Groups should accumulate a sequence of seven or eight moves. Allow three to five minutes to create a sequence.

2. Each group performs their sequence for the class.

3. Select a story topic of a long term memory, first day of kindergarten, a favorite holiday memory, or birthday. Each topic is different and unique for each performer.

4. Assign each student a letter “A,” “B,” “C,” etc. When the letter is announced, the actor will begin telling their story.

5. Each group performs their accumulated movement sequence and the identifying letter is called out approximately every thirty seconds. As the students move, one student begins to tell her story out loud. When the next letter is called, she stops and the next student begins.
6. *Discussion:* Actors should make self-observations and note how their body and muscles feel, how their voices change, and any cognitive impressions which occur during the exercise. The results of the exercise are generally chaotic and uncoordinated. Actors should complete the second accumulations and then discuss their experiences with the class.

**ACCUMULATION TWO - Mime**

1. The class repeats the process of accumulating a sequence of movement, except this time the students use mime gestures and create a sequence of getting dressed.

2. With the same groups, create a sequence of mime or miming gestures of getting dressed. Once again, each student should create one gesture and teach the others in the group until an accumulated sequence is choreographed. Groups should accumulate a sequence of seven or eight moves. Allow three to five minutes to create a sequence.

3. Each group performs their sequence for the class.

4. Select a new story topic of a long term memory. Students in a group can switch topics to keep every story different and unique for each performer.

5. Confirm each student’s letter “A,” “B,” “C,” etc. When the letter is announced, the actor begins telling their story.

6. Each group performs their accumulated sequence, repeat movement sequence if necessary, and the identifying letter are called out approximately every thirty seconds. As the students move, one student begins to tell his story out loud. When the next letter is called, he stops and the next student begins.
7. **Discussion:** Students reflect on their experiences and compare and contrast the two exercises. Discussion questions may include “What is similar about the experiences and what is different? How do the differences change the story telling? Try to use the terms implicit and explicit in the discussions. Discussions may examine the hypothesis that “getting dressed” is like “riding a bike,” procedural memories processed by the putamen which frees the hippocampus to process the story. In the first exercise, the hippocampus has to process both tasks, remembering the movement sequence and retrieving the story. It becomes overwhelmed and unable to coordinate competing cognitive schemas.

ACCUMULATION THREE – Fix the problem with chunking, binding, and association points

1. **Time:** The second part of the exercises should happen either after a break or the next class day.

2. Accumulation three builds on the first two Accumulations and asks the question, how do actors now fix the problem of the retrieving the long term memory and executing the choreographed movement? How do actors combine memory modes and construct a performance memory?

3. Each student works individually. With the accumulated abstract sequence, students divide the sequence into two or three “chunks.” Each chunk should consist of three to four of the abstract movements. Do not rearrange the sequence.

4. Students perform their movement chunks in class.
5. Select one of the previous story topics. Select specific phrases which become vocal chunks.

6. Bind vocal chunks with movement chunks. Perform the two sequences together looking for rhythmic patterns and associations. Focus on the beginning of the vocal phrase with the beginning of the movement chunk and the end of the movement chunk with some vocal equivalent. These are association points where two types of memories bind.

7. Repeat the process for the second and/or third chunks. Continue binding vocal phrases with movement chunks. Make specific choices for the association points, begin the chunk with a specific word and the end chunk with a specific word.

8. Rehearse all the association points.

9. Perform the exercise.

10. Discussion: The purpose of Accumulation three is to embody memory skills of chunking and binding as learned from neuroscience into a performance experience. Actors should make self-observations and record how their body and muscles feel, how their voices change, and any cognitive impressions that occur during the exercise. This result may appear remarkably familiar to a particular performance genre common to post modern dance in New York during the 80s. It is also similar to rehearsing musical theater choreography while saying the lyrics. I do not allow a full discussion, but ask them to take a few notes on their own experience for discussion after the next accumulation.
ACCUMULATION FOUR – Rehearse chunking, binding, and association points with mime

1. Each student works individually. Repeats the process of Accumulation Three with the mime sequences. Chunk “getting dressed” sequence into two or three movement phrases. Do not rearrange the sequence.

2. Students perform their movement chunks in class.

3. Select one of the previous story topics or continue the story from Accumulation Three. Select specific phrases which become vocal chunks.

4. Bind vocal chunks with mime chunks. Perform the two sequences together looking for rhythmic patterns and associations. Focus on beginning and ending association points where the two types of memories bind.

5. Repeat the process for the second and third chunks. Continue binding vocal phrases with mime chunks. Make specific choices for the association points, begin the chunk with a specific word and the end the chunk with a specific word.

6. Rehearse all the association points.

7. Perform the exercise. Allow the action of getting dressed to change vocal inflections and rhythmic patterns.

8. *Discussion*: The purpose of Accumulation Four is to embody memory skills of chunking and binding into a performance experience. Actors should make self-observations and record how their body and muscles feel, how their voices change, and any cognitive impressions that occur during the exercise. The result of the mime and story exercise may appear familiar to dramatic realism or other naturalistic genres. Students should discuss their own memory strategies. Ask
students to reflect how they memorize the work and what they are conscious of in the process. The purpose of post discussion is to improve student awareness of the brain’s complexity when perceiving, learning, and remembering. By using other modes and types of memories, students can learn to solve their own memory problems, memorize faster, and be prepared to use method techniques with their memory to progress their acting into fresh, spontaneous and realistic performance. I end discussions with the motto, “Chunk through time and bind through type.” The purpose of the pithy expression is have the students reflect back on the classroom experience of accumulating different types of information into chunks and increasing awareness of how to build their performance memory.

ACCUMULATION DIAGRAMMING

Diagramming forces the student to inscribe the process and experience. It scores the performance by recording or remodeling the performance behaviors into a specific chart.

1. *Time:* Accumulation diagramming may be done individually or in small groups. Students may take as long as they need to finish

2. Select one performance chunk from Accumulation Four – Mime and Story.

3. Write the words along the X-Axis of the Performance Memory Model worksheet.

4. Fill in the Y-Axis of memory types using the five general categories and any of the subcategories. Identify as many implicit and explicit memories as possible. After students complete diagramming their chunk of performance memory, they perform their chunk in the next class.
5. Select two or three of the strongest memory types and focus on them while performing the chunk. Rehearse the performance chunk with those memories being explicit and allowing others to submerge and become implicit.

6. Select one of the strong memories types and change it. Select a different motivation, or a different emotion, or a different reading, or even a different motor sequence. Perform each in the moment without rehearsing or pre-conceiving a performance result.

7. Discussion: Discussions begin by asking students what needs to be memorized and what needs to be forgotten when actors work in the Method or other variations of Stanislavski’s psychological realism? How do actors work memory with Method?

   In order to use Method techniques with memory techniques, actors need to disrupt or reconsolidate some aspect of their performance memory. The reconsolidation or change is the surprise in the performance which creates spontaneous and fresh aspects of the behavior. The surprise can also initiate the quality of realism in the tradition of the Stanislavski System and the subsequent evolution of the Method. The re-consolidation can keep freshness and creativity in long run performances.

   Discussion should ask students to describe their memory process from their past stage experience and begin to diagnosis their natural strengths as performers. Most musical theater actors do not learn the lyrics until they learn the music reflecting on the difference of how the brain learns melody versus semantic information of words. Many professional actors and student actors explain to me they can not learn
their lines until they know their blocking also reflecting on the relations between how the brain records spatial information versus the semantic information of lines. I also build my performance memory from visual-spatial orientation. Blocking is a visual-spatial memory map orienting the actor on stage. It is a primary memory for building episodic memory of the scene. Eventually, actors memorize their blocking, memory modes bind together becoming implicit through the rehearsal process and a procedural aspect of their performance memory. The following figure is an example of diagramming:
**PERFORMANCE MEMORY MODEL**

<table>
<thead>
<tr>
<th>Memory Types - Y-AXIS</th>
<th>Chunk:</th>
<th>X-AXIS – LENGTHS OF TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sensory</strong></td>
<td>I remember my first day at kindergarten</td>
<td>Moment to moment and Chunks</td>
</tr>
<tr>
<td>Visual</td>
<td>Seeing the chair and floor</td>
<td></td>
</tr>
<tr>
<td>Auditory</td>
<td>Sound of the line and inflection</td>
<td></td>
</tr>
<tr>
<td>Tactile</td>
<td>Touching chair</td>
<td></td>
</tr>
<tr>
<td>Olfactory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gustatory</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Implicit Types:</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nervousness</td>
<td>Sensations in stomach</td>
<td></td>
</tr>
<tr>
<td>Bodily functions</td>
<td>Breathing</td>
<td></td>
</tr>
<tr>
<td>Facial</td>
<td>Responding to movement of speech, emotion, thoughts</td>
<td></td>
</tr>
<tr>
<td>Gestures</td>
<td>Adjustments to action</td>
<td></td>
</tr>
<tr>
<td>Basic movement actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Explicit Types:</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td>Saying line</td>
<td></td>
</tr>
<tr>
<td>Choreography</td>
<td>Bending over to pick up imaginary shoe</td>
<td></td>
</tr>
<tr>
<td>Gestures</td>
<td>Looked at audience while bending over</td>
<td></td>
</tr>
<tr>
<td>Actions</td>
<td>Fingers and hands grasping imaginary shoe</td>
<td></td>
</tr>
<tr>
<td><strong>Spatial</strong></td>
<td>Next to chair</td>
<td></td>
</tr>
<tr>
<td>Blocking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relations to others</td>
<td>Inner circle with self</td>
<td></td>
</tr>
<tr>
<td>Relations to audience</td>
<td>Direct</td>
<td></td>
</tr>
<tr>
<td><strong>Emotion</strong></td>
<td>Fear that day / Fear of audience</td>
<td></td>
</tr>
<tr>
<td>Basic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compound</td>
<td>Desire to protect myself</td>
<td></td>
</tr>
<tr>
<td>Complex</td>
<td>Loneliness</td>
<td></td>
</tr>
<tr>
<td><strong>Cognitive</strong></td>
<td>The words and a truth statement</td>
<td></td>
</tr>
<tr>
<td>Lines, words and meaning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivations and objectives</td>
<td>Recalled vision memory Mrs. Watson and dress</td>
<td></td>
</tr>
<tr>
<td>Fiction memories and recall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inner speech and subtext</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Listening</td>
<td>To audience</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Speaking slowly</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.3  Performance Memory Model - Example of diagramming (Rooney © 2010)
Summary

Memory is assumed in many acting classes and training. Accumulation exercises and diagramming disrupts the assumption that student actors understand the complexity of human memory. Performance Memory Models are fluid, plastic charts representing the creative choices when building a performance. They are a mutable layering of basic skills including psychological and cognitive elements of actors’ work. This malleability and plasticity of the model reflects the plasticity of the human brain. Performance memory models include a vocabulary of memory schemas through time (X-Axis) and memory types (Y-Axis).

Accumulation exercise and diagramming introduces basic scientific ideas which bring the principles to practice. The classroom exercise designs a “memory problem” for the actors, the inability to coordinate newly learned abstract movement while recalling (retrieving) a long term memory. The exercises accumulate experience for the student by offering a means to solve the problem by chunking specific types of memory and then binding and creating associations between the different modes. New terminology and terms coincidental with neuroscience explanations of memory contribute new knowledge to the lexicon of actor training. These terms are: encoding and decoding, short term and long term memory, implicit and explicit, chunking and binding, and five general categories of memory for actors: sensory, motor/bodily, spatial, emotion, and higher cognitive. Different types of memory bind as they consolidate and reconsolidate in behavior and action. Reconsolidation allows performance to change and creates the quality of spontaneous, fresh, and realistic acting.
Diagramming allows the student to see the process of problem solving in the larger challenge of creating a complex performance sequence, specifically, introducing how traditional Method techniques work with and against memory techniques. When modeling their performance memory, actors create unique maps of memory patterns based on an individuals’ experience in the rehearsal process.
CHAPTER V. EMOTION SCIENCE

Even in the memory arts of antiquity, performers understood memory and emotion are interdependent. Explicitly or implicitly, emotion is central to performance memory and a basic skill in acting training. The emotional memory exercise from Stanislavski and Method techniques is controversial and largely obsolete. In order to better understand the biological foundation of emotion, this chapter surveys selected historical theories and reviews basic emotion principles from contemporary science including a debate on basic emotions. The systematic analysis and study of human and animal emotion often begins with the harbinger work of nineteenth century naturalist’s Charles Darwin. Further experimentation through the twentieth century by scientists such as Walter Cannon clarified, revised, and expanded the basic precepts of emotion. Current arguments and theories are represented by the work of Paul Ekman, Jaak Panksepp, Carrol Izard, and Robert Plutchik. This chapter surveys selected historical benchmarks in the development of scientific emotion theories, references the primary anatomical models of emotion in the Central Nervous System (CNS), references the abstract emotion models from neuroscience (Plutchik’s Circumplex Model), and proposes a definition of emotion.

Historical discussions of emotion

Charles Darwin’s *The Expression of the Emotions in Man and Animals* (1872) is the gamete model of emotion research. Darwin tracks previous influential studies in his introduction such as Sir Charles Bell’s *Anatomy and Philosophy of Expression* (1806) and Dr. Duchenne’s *Mecanisme de la Physionomie Humanine* (1862). His observational
data suggests three basic principles: I) The principle of serviceable associated Habits, II) The principle of Antithesis, and III) The principle of actions due to the constitution of the Nervous System, independently from the first of the Will, and independently to a certain extent of Habit. The first principle recognizes emotion expression as reflexes and habits. He describes many examples in the animal kingdom such as the gate of horses, the pointing behavior of setters, or the flight of birds. He further describes the reflex actions seen in humans such as coughing, sneezing, blinking, and “a start from a sudden noise” (39). The second principle states “when a directly opposite state of mind is induced, there is a strong and involuntary tendency to the performance of movements of a directly opposite nature, though these have never been of any service” (50). Darwin argues a system of behavioral opposites such as a cat or dog’s arching posture of hostility and the counter curvature of the spine in a more affectionate moment. In the third principle Darwin recognizes every bodily movement is the effect of a functioning nervous system and attempts to identify bodily expression beyond the result of will, or through habit or antithesis. His arguments and observations seem to echo an implicit memory response of the body and the Autonomic Nervous System. He discusses bodily responses such as trembling, heartbeat, skin flush, and competitive pain. He writes, “As Hippocrates long ago observed, if two pains are felt at the same time, the severer one dulls the other” (72). His primary three theories remain integrated to current emotion theory: emotions derive from evolution and are observable across species, they are biological and adaptive, and they have functional value to the organism including communication. Darwin’s basic ideas propagated not only scientific research, but speak to an important axiom for successful acting: if emotions are not recognizable, identifiable and understandable, then
actors would lose a connection and a venue of communication, empathy, and impact with their audience.

William James’ “What is an Emotion?” (1884) introduced the theory of bodily sensations as a “necessary condition” of emotional phenomenon. James benchmark essay states:

Our natural way of thinking about these standard emotions is that the mental perception of some fact excites the mental affection called the emotion, and that this latter state of mind gives rise to the bodily expression. My thesis on the contrary is that the bodily changes follow directly the PERCEPTION of the exciting fact, and that our feeling of the same changes as they occur IS the emotion. Common sense says, we lose our fortune, we are sorry and weep; we meet a bear, we are frightened and run; we are insulted by a rival, we are angry and strike. The hypothesis here to be defended says that this order of sequence is incorrect. (189-90)

In “William James and Emotion: Is a Century of Fame Worth a Century of Misunderstanding?” Phoebe C. Ellsworth argues James was often misinterpreted as “the idea that emotions are nothing but the sensation of bodily changes” rather than “a necessary condition of emotion” (222). As the nuance of James’ intention was debated for the past century, the result was the emerging theory of the peripheral nervous system feedback loop in emotional experience.

One of James’ most influential critics was Walter B. Cannon, professor of Harvard Medical School and author of Bodily Changes in Pain, Hunger, Fear and Rage (1929). In the chapter “A Critical Examination of the James-Lange Theory of Emotions”
Cannon systematically critiques the visceral theory of emotions and challenged the exclusivity of bodily feedback. By conducting experiments where he removed the sympathetic division of the autonomic nervous systems in cats, Cannon demonstrated the animals still had a range of emotional behavior. Cannon also discussed experiments by British scientist, Charles Sherrington, who cut the spinal cord and vagus nerves in dogs and observed the animals continued to show emotions including anger, joy, disgust, and fear (348-49). Cannon’s second criticism argued strong visceral responses (which he described as bodily responses such as heartbeat, sweating, pupil dilatation, and increases in blood sugar and adrenaline) have similar physiological reactions and were too uniform to distinguish different emotions. Third, Cannon argued insensitive organs in the peripheral nervous system, such as the liver and spleen, do not contribute to emotional states because they do not evoke any perceptible feelings, even in surgery of un-anaesthetized patients. Cannon then noted, not only are various responses absent, but the ones that do exist are “too slow to be a source of emotional feeling” (354). And lastly, in an experiment where students received injections of adrenalin, the students did not experience any specific recognizable emotion. Cannon concluded emotions do not follow visceral changes in all cases (356). The result was the emerging theory of top-down cognitive pathway in emotional experience counter to James-Lange.

James and Cannon’s ideas and theories framed the debate throughout the twentieth century of mind-to-body sequencing versus body-to-mind sequencing. This scientific debate also emerged in the competing approaches toward acting training, the conventional recognized techniques of “outside-in” (bodily feedback) and “inside-out”
(cognitive catalyst) as a means to create emotional life and expression on stage. Both the scientific process and the artistic process investigate sequencing.

In *Emotions and Life* (2003), Robert Plutchik illustrates the sequence problem in three viewpoints which are modeled in the following figure.

**Models of emotional sequencing**

**“Commonsense Viewpoint”** is

Perception $\rightarrow$ Emotion Feeling $\rightarrow$ Bodily Changes

**“James Viewpoint”** is

Perception $\rightarrow$ Motor Reaction $\rightarrow$ Visceral Arousal $\rightarrow$ Emotional Feeling

**“Cannon Viewpoint”** is

Perception $\rightarrow$ Hypothalamic Arousal

Branches equally to

Emotional Feeling and Bodily Changes

Figure 5.1 Model of emotion sequencing (Plutchik, *Emotions and Life* 35)

In figure 5.2 I illustrate a proposed actors’ viewpoints of sequencing emotion as an adaptation of Plutchik’s models.
Actors’ Viewpoint of sequencing

Actors start with “Motivation to Act” which is the basic willingness to commit to the rehearsal process and engage in dramatic action. The branch to “Perception and Memory” is the “inside-out” technique common to many Method techniques and traditions. The branch to “Bodily Changes” is the “outside-in” approach common to various contemporary techniques. It is the goal of both to stimulate hypothalamic arousal in order to trigger emotional feeling and re-inform bodily changes into a fresh, spontaneous, and realistic emotion expression in performance. In the next chapter Basic Emotion Scale exercises use the “outside-in” approach and Complex Emotion exercises include the “inside-out” approach. It is the goal of the proposed Emotion Scale exercises to introduce both pathways as creative possibilities for developing performance.
Anatomy of Central Nervous System

Sequencing indicates pathways in the anatomy of the brain and body. A discussion of basics of the human nervous systems may help acting students connect the artistic idea of “inside-out and outside-in pathways” to the anatomy of the brain and body. In Clinical Neuroanatomy made ridiculously simple Stephen Goldberg, M. D. writes, “The central nervous system (CNS) includes the cerebrum, cerebellum, brain stem, and spinal cord” (3). The other main division of the human nervous system is the peripheral nervous system (PNS) which runs from the spinal cord to all appendages of the body. The PNS also can be divided into distinct classifications: the somatic nervous system and the autonomic nervous system. The somatic nervous system controls skeleton muscles which is the voluntary control of motor commands from the brain and also relays sensory information from the skin. The motor neurons are part of the CNS, located in the spinal cord and brain stem and connect directly into the skeleton muscles (Kandel, Principles 962). For actors the somatic nervous system is the pathway where information about blocking, dance and gestures travel from cognitive information of motor coordination in the brain to perceptible motor output of performance. It is also the pathway which reports to the brain how motor execution is fairing. Thus, it gives feedback to the brain to evaluate the status of the body on stage and movement through the performance space.

In contrast, the autonomic nervous system is involuntary control. Autonomic nervous system mediates visceral reflexes and relays information to and from internal organs, smooth muscles, cardiac muscles, and glands. For actors, it is more tangible to understand the autonomic nervous system via its three divisions: the sympathetic,
parasympathetic, and the enteric. The sympathetic nervous system increases overall body activity in humans and animals and “governs the emergency reaction, or fight-or-flight reaction” (Kandel, *Principles* 961). The parasympathetic nervous system decreases overall body activity, slowing down heartbeat and respiration and maintaining metabolism. The sympathetic and parasympathetic systems relate to the experience of scaling up and down intensity during the Emotion Scale exercise. It also relates to the Emotion Scale “surprise/excite – sloth/exhaust.” The “excite” scale pushes the sympathetic nervous system to respond by increasing body mechanisms such as heartbeat and respiratory. The “sloth/exhaust” coaches the actors and their parasympathetic nervous system to decrease body activity and energy including heartbeat and respiratory. The third division of the autonomic nervous system is the enteric nervous system (ENS). The ENS is a rather substantial group of neurons located in the gastrointestinal tract which mediate digestive processes and related organs of digestion. It is mostly a self-contained system with a specific purpose of converting food into energy (Gershon). (It does not relay complex artistic ideas to the CNS. Richard Schechner’s theory of artistic cognition from the “gut” is metaphor and not a tangible argument scientifically.) The neurological anatomy of the body and its unique systems and pathways offer the actor a model of sequencing and layering elements of behaviors which in turn increases their awareness in the creative process of building a performance rich with human emotions.

*Anatomy of emotion in the brain*

The physiological aspect of emotion is organized as neural systems and can be modeled in taxonomies and studied in the anatomy of the brain. In *Clinical*
Neuroanatomy made ridiculously simple Goldberg continues, “The central nervous system (CNS) includes the cerebrum, cerebellum, brain stem, and spinal cord . . . plus a few scary-sounding structures situated between the brain stem and cerebrum” (3). Those “scary-sounding structures,” include the basal ganglia, a principle subcortical structure linking the cerebral cortex to the thalamus and involved in motor processing and emotion. I hesitate scaring students with the complexity of the diencephalons. A full detailed discussion of the anatomical properties of the emotion systems is worthy of many textbooks, but beyond the scope of this dissertation. I do feel a brief discussion should give actors insight to the wonders of their own complexity and capability as performers and artists.

The anatomy is the scary sounding structures which are composed of complex system of pathways mediated by a complex cocktail of neurotransmitters. As an example, I will discuss the Emotion Scale of “anger – fear” using Jaak Panksepp’s research presented in his textbook *Affective Neuroscience*, as well as quoted by Plutchik. The circuits of our “anger” responses run through specific areas of the midbrain: the amygdala, hypothalamus, periaqueductal gray (PAG). In *Affective Neuroscience* Panksepp explains, “These areas are hierarchically arranged so that higher functions are dependent on the integrity of the lower ones. The more we understand about these circuits, the more we will understand the fundamental nature of anger itself” (187). The “anger” circuits have autonomic outputs to motor outflow from the PAG and cognitive inputs into the amygdala. The circuitry becomes circular when motor bodily feedback informs higher functions and returns into the subcortical emotion structures.
Figure 5.3    Anatomical model of Rage (Panksepp, *Affective Neurology* 195)

Similar to “anger” our circuits related to “fear” response also run through the amygdala, hypothalamus, and PAG of the midbrain. The difference is that “anger” is in the medial amygdala and “fear” is in the central and lateral amygdala. “Anger” is in the perifornical hypothalamus, “fear” is in the medial hypothalamus, and both run through the dorsal PAG. Both “anger” and “fear” share the neurotransmitter glutamate (+) which is a common neurotransmitter operating in the general metabolism through many pathways. They also have a unique cocktail of other neurochemicals that modulate the emotional system. In *Affective Neuroscience* Panksepp argues:

> It makes good evolutionary sense for FEAR and RAGE circuits to be intimately related, for one of the functions of anger is to provoke fear in competitors, and one of the functions of fear is to reduce the impact of angry behaviors from threatening opponents. Although it has not been empirically demonstrated it is reasonable to suppose that at low levels of
arousal, the two systems are mutually inhibitory. At very sudden or intense levels of arousal, however, both the fear response and the rage response may be concurrently aroused. (208)

Panksepp illustrates basic emotions of anger or rage and fear in the following abstract model.

Figure 5.4  Illustrated model of basic emotion (Panksepp, *Affective Neurology* 53)
Hypothetically, an actor practicing the “anger – fear” Emotion Scale would activate some of these anatomical components. It is also a hypothesis that these components would fire with some repeated consistence which would result in learning an awareness of the qualia of “anger” and “fear” for the actors.

Abstract models of emotion from Ekman, Panksepp, and Plutchik

In *Emotions Revealed* (2003) Paul Ekman discusses decades of emotion research he began in the late 1950s. Ekman’s research is referenced in acting techniques of Richard Schechner’s Rasabox and Susana Bloch’s Alba Emotion. Ekman’s emotion research demonstrates recognition of certain basic emotions in facial expressions across many different cultures. Ekman’s model considers issues such as emotional signaling, emotional triggers, and emotional awareness from a social and psychological perspective about basic emotions “sadness and agony,” “anger,” “surprise and fear,” and “disgust and contempt.”

Panksepp defines his approach as *affective neuroscience*. He models the “mind” and “brain” relationship in a triangulation with “real behaviors.” He has revised his model of affective neuroscience by using the term “MindBrain” indicating the relation between the mind and brain as singular experience of the brain (lecture). His decades of experimentation identify neuroanatomical features and neurochemical properties of emotional systems. Panksepp proposed a model with three general levels of complexity: Category 1, Reflexive Affects, which include the startle reflex, gustatory disgust, pain, and the various homeostatic distresses (e.g. hungers) and pleasures (e.g. good tastes).
Category 2, Blue-Ribbon, Grade A Emotions, are the basic emotions that have been “conceptualized as sensory-motor emotional command circuits” located in intermediate areas of the brain linking higher limbic zones with midbrain emotion zones. Panksepp identifies these basic systems as “rage,” “fear,” “expectancy,” and “panic.” Category 3, Higher Sentiments, is emotional affective processes constituted from “intermixing the lower affects from the higher cognitive processes” (Panksepp, “Emotions as Natural Kind” 142-43). Panksepp lists “seeking,” “anger,” “fear,” “care,” sadness,” and “play” as basic emotions and “lust/sex” and “spirituality” as areas of continued study and experimentation (lecture).

Robert Plutchik proposes a different taxonomy of emotion systems called the Circumplex Model of Emotions. The model diagrams a two-dimensional circle with pie slices representing basic emotions and the lines represent potential for compounding of emotions. Plutchik uses the model to discuss secondary and tertiary dyads, the combining of primary emotions into other emotions. The center C represents “the idea of conflict which is produced by mixing opposite or near-opposite emotions” (Emotions and Life 105). In the multidimensional model Plutchik uses the vertical dimension to represents intensity. He arranges emotions based on similarity, such as “annoyance-anger-rage” or “apprehension-fear-terror.”
Figure 5.5  Plutchik’s Circumplex Model of Emotions (*Emotions and Life* 105)

Figure 5.6  Plutchik’s multidimensional Model of Emotions (*Emotions and Life* 104)
I adapted Plutchik’s model because it offers a clear set of ideas that are applicable towards the embodied process of the actors’ work. The model does not represent anatomy, but presents a visual means to understand the relation between emotions. His models offer a map (floor plan) and a vertical sculptural dimension (bodies in space). The three dimensional and spatial characteristics translate into the spatial aspect of performance and classroom exercises.

Basic emotions

Basic emotions suggest an ontological status. In the article “What’s Basic about Basic Emotions?” Andrew Ortony and Terence Turner address the consistencies and inconsistencies in creating basic emotion taxonomies and models. They argue a better explanation of the experimental data does “not depend on the notion of basic emotions” but rather “the assembly of diverse components (some of which are themselves biologically basic) into a complete emotional response” (327). In 1992 the *Physiological Review* published counter arguments from Ekman, Panksepp, and Izard defending their work on basic emotions. Ortony and Turner fire back, “The kind of basic emotions approached exemplified by Ekman and Izard draws our attention away from the many emotions that do not have a unique facial expression, emotions such as pride, admiration, and envy” (570). They argue against the category of basic emotions because there is no consistency in establishing criteria to determine basic emotions. They contend emotions are basic neurobiological nuts and bolts rather than basic systems. I believe their final argument does not negate the body of data supporting neurobiological emotion systems based on anatomy.
Criteria for establishing the status of basic emotions continued the basic themes introduced by Darwin. Emotions are characteristic of mammalian life, and have evolutionary purpose, and are continually adaptive. Thus emotions should be common through the *Homo* sapiens species as Ekman’s cross-cultural research argued. It should also have biological characteristics in the brain as the research of Panskepp argues.

One difficulty which creates inconsistencies is the choice of language and the issue of labeling. Ortony and Turner often refer to a “class of emotions” and write “There is no reason to suppose that the language of emotions bears a one-to one relation to distinct emotions” (“What’s Basic” 327). They argue, “Some theorists use the term *anger* and others the word *rage* while presumably referring to the same emotion” (315). In Table 1 “A Selection of Lists of ‘Basic’ Emotions” (316) they surveyed fourteen major researchers’ theories of what the basic emotions are. Below I summarized the basic emotions in categorical groups and how many times they appeared.

**Summary of basic emotions from Ortony and Turner**

Anger (7), rage (3), rage and terror (1), contempt (2), hate (1) - Listed 14 of 14 studies  
Fear (9), anxiety (2), distress (2), panic (1) - Listed 14 of 14 studies  
Happiness (3), joy (6), elation (1), pleasure (1) - Listed 11 of 14 studies  
Sadness (5), shame (3), sorrow (1), despair (1), grief (1), pain (1) - Listed 12 of 14  
Desire (2), love (3), tender-emotion (1), acceptance (1) - Listed 7 of 14 studies  
Disgust (6), dejection (1), subjection (1), aversion (1) - Listed 9 of 14 studies

Continues
Surprise (5), interest (3), expectancy (1), anticipation (1), wonder (1) - Listed 11 of 14
Other emotions listed: guilt (1), courage (1), hope (1).

Figure 5.7 Summary of basic emotions from Ortony and Turner

These lists have similar constancies and inconsistencies in terms used to identify basic emotions in the techniques and theories of the Nātryāstra and Aaron Hill. In the next chapter, I propose acting students reference the scientific data and select their own terminology in a self-report.

In 2000, Physiological Science reported on the experiment “Exploring Hindu Indian Emotion Expressions: Evidence for Accurate Recognition by Americans and Indians” conducted at the University of Wisconsin and Bhubaneswar, Orissa. Author, Ahalya Hejmadi videotaped forty-five emotion portrayals as described in the Nātryāstra. Hejmadi is a twenty year professional in Hindu dance and two Indian gurus validate her performance as being “true to the exact specifications” of the ancient text (184). The videotape was presented to forty-eight American and forty-seven Hindu Indian college students who were asked to identify the emotion in either a fixed-response format or a free response format. In the fixed response format the choices given the participants were: “anger,” “disgust,” “fear,” “heroism/valor,” “humor/amusement,” “love,” “peace,” “sadness,” “shame/embarrassment/shyness,” “wonder,” and “neutral/non emotion.” In the free response format participants were asked to write down any word or words they thought described the gesture shown. Results showed participants from both countries were quite accurate in correctly identifying the basic emotions of the Nātryāstra using
both formats. Hejmadi, Davidson, and Rozin’s experiment connects the scientific study of emotions with acting techniques. It also indicates that actors’ trained in dramatic techniques of basic emotions do acquire the ability for emotional expressions that are recognizable.

The study of basic emotion science continues to develop through systematic challenges and experimentation. Accurate linguistic labeling and biological criteria are fundamental to research. Arguments will continue to refine the biological givens or the neurological “rock bottom building blocks” (Panksepp lecture) of human emotions. Ortony and Turner’s survey represents a similar process I used to select basic emotions for acting exercises. My criteria are scientific repetition, opposition, and cultural awareness. I choose to identify eight basic emotion categories: “anger/fight,” “fear/flight,” “desire,” “disgust,” “happiness,” “sadness,” “surprise/excite,” “sloth/exhaust” and allow students to choose specific representative words through a self-report. In the tradition of experimental theater, I use creative experimentation of acting techniques which depend on the logic of social constructed dramatic behavior to explore and understand basic emotion.

*Compound emotions and Relation dynamics*

Ortony and Turner’s arguments point to an apparent gap between basic and non-basic emotions. They argue “Several proposals for relating basic to non-basic emotions have been made, including fusing, blending, mixing, and compounding, although it is not always clear how these methods of combination differ” (“What’s Basic” 326). They discuss Plutchik’s psychological approach and I am including their full argument:
Plutchik (1962) adopted a color metaphor for the process whereby basic emotions combine, suggesting that combinations take place in a manner similar to the way in which, for example, blue and yellow paints mix together to create a green pigment. Of particular interest in this context is his suggestions that the combination of two or more basic emotions yields a new emotion that may be phenomenally quite different from the elements from which it was derived. Plutchik has furthered suggested that the basic emotions that are close to each other on his “circle” of emotions can combine easily, indeed fuse, whereas those farther apart tend to lead to conflict when combined into a new emotion. Thus, his emotions of joy and acceptance are adjacent to each other and if mixed, fuse into the new emotion of love, whereas joy is mixed with distant emotions of fear and guilt is created, but this emotion often takes the form of an oscillation between the two conflicting basic emotions. This view is not without its problems. For example, anger and joy are adjacent, but it is not clear how they combine easily, or into what. (326)

The Compound Emotion Scales exercises engage in these scientific questions without claiming an answer. The Compound exercise is an artistic process that claims individual results may vary. Emotion Scales does not claim that any combination of basic emotions will result in the same compound emotion for every actor. Emotion Scales practice intensity as a factor that may change an actors’ interpretation of any emotion experience.

Compound emotion model is a steppingstone towards creating complex emotions. The compounding of two emotions creates an energy state I will call a Relation dynamic.
Relation dynamics are identified as competing, a Darwinian struggle of one emotion over another; combining, a blending or mixing or reacting of emotions to each other; or canceling, a neutralizing of each other’s arousal energies. Relation dynamic theorizes how emotions mix or blend. They identify the process or phase of emotions interacting with each other. Relation dynamic is more specific about how two emotions merge and offers possible results, albeit through a self-report.

Unlike scientific experimentation, methods of compounding emotions with actors in classroom studies are creative and exploratory. The results are increasingly subjective and individualized in both self-report of experience and recognizable factors for the audience. The complexity and unpredictability of the process is the artistry. In Darwinian terms, it is because the Homo sapiens’ biological complexity creates individualistic organisms in the species. In theatrical terms, it is because people are individuals and their uniqueness is the potential for artistry.

**Complex emotions and appraisals**

Carroll Izard’s “Emotion Theory and Research: Highlights, Unanswered Questions, and Emerging Issues” was thought-provoking review addressing current issues in emotion research. He called for the exponentially expansive fields of emotion research and cognitive science to “become increasingly collaborative and progress toward becoming one” (25). Izard reviewed the origin of emotions, fundamental principles, types of emotions, and proposed a definition of emotion as a phase rather than a response or consequence of neurobiological activity. Phase indicates a process or interaction with other cognitive systems and structures. He categorized emotions into two broad types,
basic emotions and emotion schemas. Basic emotions included basic positive (“interest and joy”) and basic negative (“sadness, anger, disgust, and fear”). Emotional schemas are emotion-cognition interactions which influence mind and behavior. They are in phase when appraisals, memories, thoughts, or autonomic processes combine with neurophysiological process of emotion. Izard considers the role emotion may play in phenomenal consciousness and cognitively accessible consciousness. The intensity of emotion feeling may factor into and influence attention, thereby shifting mental states.

I found Izard’s discussion of Mirror Neuron Systems (MNS) and memes reflecting a larger philosophical question of embodied knowledge and learning through experience. Mirror neurons discharge both when performing a specific action and the observation of the action (Rizzollati “Localization”). The implications have spurred related research towards studying a mirror-neuron system in humans (Rizzollati “The Mirror System”). Memes (a term proposed by Richard Dawkins in 1976) was re-defined by Izard as “behavioral (cognitive, emotional, action) units that can propagate (be readily copied) and become subject to natural selection” (2). One implication was behavior/emotion memes are propagated/selected through perception and transmitted into parallel neurological patterns via MNS. Meme theory has also received attention in culture studies by identifying units of object replication, anything from Xerox copies to historical re-enactments. Culture memes include actors’ behaviors in movies, television, theater, and other variations of media. Meme theories suggest the cultural feedback loop is an extension of the brain-periphery feedback loop influencing the coding of behavior and emotion. Izard contends, “imagination remains part emotional feeling and part cognition” (15). With imagination the scientific study of human behavior and the artistic
study of human behavior may share cognitive mechanisms. Beyond John Locke’s Empiricism of embodied knowledge, the scientific framework of memes and mirror systems may suggest how culture embodies.

Summary: Towards a definition of emotion

Plutchik’s theory on emotion was first argued in *The Emotions: Facts, Theories and a New Model* (1962) and expanded in subsequent textbooks *Emotion: A Psychoevolutionary Synthesis* (1980) and *Emotions and Life* (2003). His original six postulates are:

1) there are a small number of pure or primary emotions, 2) all other emotions are mixed, 3) primary emotions have different physiology and behavior, 4) properties of primary emotions can be inferred from various kinds of evidence, 5) primary emotions may be conceptualized in terms of pairs of polar opposites, 6) each emotion can exist in various degrees of intensity or arousal. (*Facts, Theories* 40-53)

These six postulates are a clear and direct example of providing acting students with an assessable and effect understanding of emotions.

Although defining emotions is an active and continued pursuit for science, efforts are made to summarize and define human emotion. Plutchik’s *Emotions and Life* provides detail discussions of major debates and issues in emotion research providing insight to the nuances and complexity involved. He surveyed some of the most influential definitions appearing in scientific publications in the past one hundred years. The survey demonstrated a spectrum of components and aspects of emotion experience as scientists
focus on specific research questions. He also dedicated a chapter to “theories” of
emotions, arguments supported by experimentation and observation which debate broader
questions including anatomy, biological processes, environmental triggers or integration
with other cognitive systems. Plutchik quoted Kleinginna and Kleinginna in creating a
consensus as how emotion could be defined:

Emotion is a complex set of interactions around subjective and objective
factors, mediates by neural/hormonal systems, which can also give rise to
(a) affective experience such as feelings of arousal, pleasure/displeasure;
(b) generate cognitive processes such as emotionally relevant perceptual
effects, appraisals, labeling processes; (c) activate widespread
physiological adjustments to the arousing conditions; and (d) lead to
behavior that is often, but not always, expressive, goal-directed, and
adaptive. (Kleinginna and Kleinginna 371, Plutchik 22)

Scientific analysis of emotion gives both a historical development and physiological-
psychological criteria for improving the pedagogy of acting. Towards that aim and to
summarize is the following proposed definition:

Emotion is a complex set of actions and interactions around subjective
(qualia) and objective (given circumstances) factors. Emotion can be
accessed in the creative process by willfully triggering various nervous
systems resulting in the arousal of neural/hormonal systems and a
phenomenal awareness of pathways: bodily feedback (outside-in) or
cognitive catalyst (inside-out). Emotion is integrated into cognitive
appraisals, character schemas, and fictional motivational processes and
plays an important role in memorization of performance. Emotion
influences physical and vocal expression/behaviors that can be observed
and interpreted by an audience.

The scientific study of emotions has a counterpart in the praxis of acting. Scientists
deconstruct emotional behaviors by isolating neurophysiological characteristics. Actors
construct human behaviors through the experimental rehearsal process. The scientific
deconstruction and the artistic construction of emotional experience have common issues.
Both acting technique and scientific experimental requirements have common goals
including recognizable honesty and clear categories. The concepts must be made viable
to the work of actors and be translated to an embodied experience.
CHAPTER VI. EMOTION SCALE MODELS AND EXERCISES

The Performance Memory Model is a pedagogical tool to help analyze human memory in the work of the actor. The five categories proposed in the Performance Memory Model are sensory, motor/bodily, spatial, emotion, and higher cognition; all have multiple subcategories and can bind in various ways with each other. Emotion is crucial to actors’ performance memory. In *Handbook of Emotions* (2000) Jaak Panksepp wrote, “If everyday human reports are to be believed, it appears that the brain is much more skilled in remembering the world events associated with arousal of emotional states than the intensity of the affective processes themselves” (151). This chapter is an example of how to study the category of emotion by proposing a performance emotion model and related acting exercises to embody basic principles. Terminology necessary for the exercises includes:

*Basic emotions* are modes of behaviors with ontological status. They are recognizably characteristic of mammalian life, have evolutionary purpose, are continually adaptive, and have physiological ontology in the brain and CNS.

*Qualia* are the distinctive qualities or identifiable characteristics of the felt nature of mental states or experiences; characteristics such as the pain of a toothache, the taste of chocolate, sound of violin, redness of a cherry (Levin 69, Lakoff and Johnson 103).

*Motor* is the physical output or muscular expression of emotion including facial expressions, gestures, posture, movements, and vocal qualities and help students identify their emotion qualia.
Compound emotions mean the interactions of two identifiable emotion qualia when basic emotions schemas are recognizable in the same performance.

Relation dynamics are how the experience of combining emotions progresses. Relation dynamics are my answer when a student asks me, “How do I compound two emotions?” Emotions can compete with each other, cancel each other out, or combine with each other. The dynamic is subjective and unique for every actor. It is the complexity of emotions and unique quality of the Relation dynamic which makes every actor a unique artist and their creativity of behavior original.

Complex means two or more basic emotions may be recognizable and performed in the context of environmental appraisals and/or cognitive appraisals.

Environmental appraisal means the given circumstances, historical factors, surroundings, and dramatic action which have perceptible affect on acting behaviors.

Cognitive appraisals are mental functions, motivation, objectives, subtext, or fictional memories. Cognitive appraisals are mental actions such as recognition, belief, evaluations, comparisons, decisions, wants, needs, responsibility, and attention to a situation.

Outside-in and inside-out describe two pathways which trigger emotional expression. Emotion functions through the central nervous system (CNS), the brain and spinal cord; the peripheral nervous system (PNS), nerves located throughout the body; and the Autonomic Nervous System, part of the nervous system that regulates unconscious bodily functions such as temperature and breathing. Emotion is processed in two directions -- as response and as feedback. Response is the brain signaling the nervous systems to react to stimuli. Feedback is the nervous systems signaling bodily information
to the brain. The two pathways allow actors to approach the study of emotion with two general strategies: “inside-out” or cognitive catalyst and “outside-in” or bodily feedback. “Inside-out” is the imagination and psychological component to emotional expression. “Outside-in” is the conscious activation of body and muscles and uses feedback pathways as a catalyst for emotional experience and emphasizing motor aspects of emotion. It is important for actors to understand both processes and pathways as basic skills.

Why is it important to study emotion?

Actors perform emotional expression. As demonstrated by the historical survey, emotion and emotional expression are important to the art of acting since antiquity. In the past theater practitioners recognize basic emotions (Nātryśāstra, Hill). These techniques approach emotional expression through the imitation and recognition of physical characteristics of face, eyes, gestures, and voice. Stanislavski and Method techniques approach emotional expression from psychological motivations and affective memory recall. Affective emotional memory recall practices often fail to incorporate the emotion behaviors into the specifics of the scene (Lewis, Method 58). Contemporary techniques such as those of Bloch and Schechner, often emphasize physical catalysts when creating emotional expression and address neurological aspects. The varied approaches represent continued artistic exploration and experimentation into the complexities of human emotional behaviors. Emotional expression is a fundamental component of theatrical performances, as elemental as action and mise en scene. Emotion is energy in performance which may creates empathy and catharsis.
Studying emotion expression is important because emotion is memory and often the glue binding performance memory. Emotion informs cognition and meaning as much as cognitive motivations and objectives inform emotional expression. Emotion can be either implicit or explicit in performances and can change how motor memory and vocal memory are executed. Emotion is often the “feeling” of the performance for the actor. Because emotion has unique and complex biological processes, emotion in performance can have plasticity. Emotion often guides the organic flow of execution, creating unexpected behaviors and actions. Charged emotional expression is important in keeping live performance alive. Emotion's variable dynamics can keep performances fresh in a long run. It is also important to control emotion in performances. The dynamic of emotional expression has potential to create dangerous situations in rehearsal and performance. Teaching basic habits and strategies of access, control, and release of emotion in performance is the fundamental goal of the Emotion Scale Model and exercises. Emotion expression is a basic skill in and of itself. It is also a strategy for performance memory problem solving. Acquiring healthy habits of accessing, controlling, and releasing emotions may benefit the longevity and success of actors’ careers.

*What is Emotion Scale Model?*

Emotion Scale Model depends on various principles from scientific models. These principles include: one, there are basic emotions; two, basic emotions can be blended, mixed or combined to create compound and complex emotions; and three, basic, compound, and complex emotions can be defined and adapted through cultural context
and individual appraisals. Basic emotions (derived in evolution) have distinct neuro-
physiological and neurochemical characteristics. The unique characteristics create qualia
for each individual. All emotions can be experienced in a range of intensity.

The three models may be interpreted by actors, as they clarify and identify their
emotion qualia through a self-report. The models allow me to create different acting
exercises for a semester or multiple semester courses. I can also design exercises to
address specific needs for my students.

The first Emotion Scale Model is a chart representing basic emotions which can
be adapted to represent potential compound and complex combinations of emotions. The
chart has two parallel Y-axes and eight mirroring X-axes extending in both directions
from central Y-axes lines. The two Y-axes create a central zone that represents a neutral
state. The eight X-axes represent eight basic emotions. The basic emotion oppositional
pairs are: “fight-flight,” “desire-disgust,” “happiness-sadness,” and “surprise-sloth.” The
extending lines represent the range of emotion intensity, low near the central zone,
medium in the middle, and high on the edges. The various polar axes of the model, as it is
diagrammed on paper, become the floor plan for the classroom activity.
EMOTION SCALE MODEL

BASIC EMOTIONS – OPPOSITIONAL PAIRS WITH RANGE OF INTENSITY

(anger) Fight
High    Medium    Low

Flight (fear)
Low    Medium    High

(hunger/sex/nurture) Desire
High    Medium    Low

Disgust (revolting)
Low    Medium    High

(pleasure) Happiness
High    Medium    Low

Sadness (pain)
Low    Medium    High

(excitement) Surprise
High    Medium    Low

Sloth (exhaustion)
Low    Medium    High

Figure 6.1 Emotion Scale Model – Basic emotions (Rooney © 2010)
The basic Emotion Scale Model can be adapted to reflect compound emotions, the joining of two basic emotions into a singular arousal state. Compound emotion diagramming selects two X-axes and combines them in triangle model. The Relation dynamic is represented through the space of the triangle.

The Compound model’s triangle structure systematically analyzes the relationship between any emotion pairs, either oppositional pairs or an arbitrary pairing of any two basic emotions. There are twenty-eight possible pairing of the eight basic emotions. Each of the pairings can be performed with the three different Relation dynamics, totally eighty-four possibilities. These possibilities increase if actors use different intensities of emotions which leave the number of possibilities and interpretations exponential.

The specific language to describe compound emotions becomes increasingly subjective and reliant on self-reports. Specific compound emotions are from interpretations in my own rehearsal process. For example, I rehearsed the compound exercise and combined “anger” and “disgust” which resulted in a feeling of hopelessness. The compound exercise performed with “anger” and “disgust” competing give rise to murderous feelings. When the Relation dynamic was canceling, the result was a feeling of helplessness. A second example is my compounding rehearsal of “happiness” and “sloth/exhaust.” When I compound “happiness” and “sloth/exhaust” with a Relation dynamic of competitive, my self-report is “giddy.” When I combine “happiness” and “sloth/exhaust,” I experience an arousal state I label as “content.” When I rehearse canceling, my self-report was “serene.” I found the experience of intentionally compounding two basic emotions often chaotic. The oscillation between two strong emotions opened up many possible emotional interpretations.
Figure 6.2 Emotion Scale Model – Compound (Rooney © 2010)
Complex emotions are a shifting cluster of basic emotions embed and appraised in environmental and cognitive circumstances. Complex emotions frame combinations in a rectangular model. Basic emotions are diagramed as internal and given circumstances are represented by the frame.

Complex emotions are the most subjective to personal associations and perceptions of the given circumstances. The Complex Emotion Model is a rectangle, metaphorically a stage. The basic emotions are labeled in the interior with their relation dynamic, and the context or given circumstances described under the bottom of the rectangle. Complex Emotion Model functions as both a de-constructive model and a constructive model. The deconstructive process starts with a word commonly associated with emotion. In my own experimental rehearsal process I have constructed an unknown complex emotion by changing the basic emotion in the diagram. For example, one exercise I worked on was “loneliness.” Per the self-report experiment, “loneliness” was perceived as the basic emotion “sadness” about the given circumstances of “being alone.” Per Oxford American Dictionary I confirmed “lonely - adj. sad because one has no friends or company.” I deconstructed “loneliness” into basic emotion components (sadness) and the evaluation or appraisal of the cultural context (alone). An individual can be “happy” about the status of being alone, but the combination does not define loneliness. If “sadness” is replaced with “happiness” in the diagram, my self-report result was the word “independent” with the feeling of freedom.
Figure 6.1 Emotion Scale Model – Complex emotions (Rooney © 2010)
Emotion exercises – Scales

Objectives: The purpose of the Emotion Scale is to perform the model as an actor training exercise. Students use a self-report to clarify and identify a specific word that will represent their specific qualia. The performance objective is for students to execute a monologue along the spatial model accessing the emotional qualia from neutral, changing the emotional intensity from low to medium to high, and then returning back down the scale and releasing into neutral. Scales are basic skills. Beginning scales focus on clarity of emotional expression, identifying personal emotional qualia, controlling energy, and exploring creativity in emotional expression. Diagramming compound and complex emotions, combine basic emotions and create dynamic performance behaviors.

Classroom space: The classroom space should be large enough to accommodate a class of ten to twenty students. Classroom space for the acting class should be largely empty so actors can physically work in groups and individually. The classroom should have theater blocks, chairs, or basic furniture which is easily rearranged for different exercises.

Class time: Class time should be three hours. The exercise should be explored slowly for the first attempts. After the students get accustomed to the work, then the scales can be used as a warm-up exercise for any class. Actors’ Emotion Scales should be viewed as the equivalent of music scales. They also can be compared to athletic drills and be performed to make actors sweat.

Projected learning outcomes: By using the scientific understandings of human emotion, I aim to teach my students to model and embody the emotional life of their performances by clarifying and identifying the qualia of the basic emotions and being
able to construct complex schemas. Students can apply the process of accessing, controlling, and releasing emotions in their future artistic work. It also gives them a tool to create simple performances such as one-liners, small roles, commercials, voice-overs, extra performance, and improvisations. Future classroom exercises would include application of emotion training to these types of performances. By experiencing the Emotion Model in acting exercises, students can embody the information in practical and personal skill sets and repeat the analysis, either implicitly or explicitly.

**Pre-Class Work:** Students select a Shakespeare monologue, sonnet or a poem in iambic parameter. It should be 12 to 24 lines. Students should memorize the passage (they may use chunk and bind techniques or their own memorization processes). They should be able to recite the verses in a speed-through tempo and divide the verse into sections. I recommend to select a piece actor’s enjoy, but would never perform in a professional job. The exercise requires hundreds of repetitions.

**EMOTION EXERCISE SELF-REPORT:**

1. Using the worksheet of an empty Emotion Scale Model students write in any word or words they associate along the X-axis. Aim for approximately five to six words in each of the three intensities of low/medium/high. There is no time limit. This worksheet is called the “mob of words.” The goal is have a group of words associated with each basic emotion in each of the three intensity categories.

2. If students exhaust the improvisational process of association, use the word bank provided. Students should share words with other students in class and use any resource to collect vocabulary.
3. Students summarize each list by choosing a single word for each of the three levels of intensity for all eight basic emotions.

4. Record word choices on a second Emotion Model worksheet. This is the guide and floor plan for each student’s emotion scaling.

5. *Discussion:* Discussion should include articulation of the students’ decision making process, specifically, students should explore what made them choose the word they did. Discussion questions may include: Is the word something they use often in their daily life or is it a particular word? What was the first word that came to mind for any emotion? Do they associate a specific event in their past with any specific word? What was the most difficult emotion to identify? What emotions have the most words and why?

**SCALE ONE – Target the emotions qualia**

1. Scale One embodies the words from the self-report into a performance experience. Actors should never over energize high emotion and they must maintain safety rules in the classroom for themselves and others. Actors should make self-observations and note bodily changes and any thoughts or impressions that occur during the exercise.

2. Set up three chairs, evenly spaced in a row. Assign one chair as “low,” the middle chair as “medium,” and the last chair as “high.” The three chairs represent the X-axis spatially.

3. Select one basic emotion, for example “anger” or “happiness.” Label each chair with the vocabulary word from the self-report. For example, for the basic emotion
of “anger” the first chair representing low anger may be called “annoyed,” the second chair representing medium “anger” may be called “mad,” and third chair representing high “anger” may be called “furious.”

4. Imagine a circle around each chair. Walk into the circle and embody the emotion with a posture. Allow the breathing pattern to change. Students may sit or stand, but may not engage in unsafe action such as throwing the chair or self-indulgent violence. Once the emotion is fully embodied, exit the circle and release the muscular pattern and return to a normal breathing pattern.

5. Perform the monologue partial or complete in the emotional range represented. Repeat the process of entering the circle allowing the emotion to change the performance and exit the circle returning to neutral. Actors may perform on or around each chair.

6. Repeat for all eight basic emotions.

7. Discussion: Discussion should include a self-report of embodiment. Students should make self-observations and record how their body and muscles feel, how their voices change, and any cognitive impressions that occur during the exercise. Did students create other dramatic circumstances, character, situations or environment? It is important to keep the exercises full of creative opportunities. Free associations within the experience should be explored.

SCALE TWO – Turn the dial

1. Scale Two embodies emotional control as students learn to scale emotional intensity. Actors need to self-monitor high emotions and never over energize the
performance to the point when they may damage vocal cords or harm others in the class.

2. Repeat exercise one except perform only two to four lines at each chair. Students should continue speaking as they move from chair to chair. They should increase the emotional intensity of the performance of the monologue guided by the spatial map of the chairs. Begin and end the exercise from neutral.

3. Repeat the above exercise except start from high intensity and scale down to low emotional expression. Begin and end the exercise from neutral.

4. Repeat the exercise by combining the process of scaling up and increasing intensity with the reversal of scaling down and diminishing intensity. Increase emotional transition speed by eventually performing up and down the scale in the span of one recitation of the monologue. Always return to neutral and release muscular tension and return breathing to normal.

5. Repeat for all eight basic emotions.

6. *Discussion:* Discussion should include a self-report of experiences. Students should make self-observations and record how their body and muscles feel, how their voices change, and any cognitive impressions that occur during the exercise. Discuss differences such as explicit muscular control over vocal chords versus none over tear ducts, thus, laughing on cue is easy and crying on cue is difficult. Discussion questions may include: What is more difficult, scaling up or scaling down? What challenges did different emotions create when scaling? Did students create other dramatic circumstances, character, situations or environment? What other associations emerge during the work?
SCALE THREE – Turn the dial for vocal volume

1. Scale Three embodies control of volume and vocal qualities with emotional intensity. Other vocal skills will enter into the exercises and students should be aware of them and incorporate them into the experimentation and play of scaling. With the crescendo and decrescendo, speech will often accelerate and decelerate and change tempo. Rhythm and phrasing of speech changes. Pitch and timbre of vocals should also fluctuate.

2. Use the three scale degrees of low/medium/high to indicate volume. Low volume would be appropriate for film work. Medium/high volume would be appropriate for stage work. Never push the voice beyond a safe range. Do not screech or scream uncontrollably.

3. Repeat scaling exercise two with the basic skill of volume and vocal control. Increase and decrease volume while scaling up intensity and scaling down intensity as the monologue is performed. Always return to neutral by releasing muscular tension and returning breathing to normal.

4. Repeat the scale with low volume in all emotional intensities. Repeat with all eight basic emotions. Experiment with other vocal qualities of tempo, rhythm, pitch, and timbre.

5. Repeat the scale with medium volume in all intensities and for all eight basic emotions. Experiment with other vocal qualities of tempo, rhythm, pitch, and timbre.
6. Repeat the scale with high volume in all intensities and for all eight basic emotions. Experiment with other vocal qualities of tempo, rhythm, pitch, and timbre. Actors should be aware of their own vocal limits, use their breath, and never recklessly scale.

7. Reverse volume scaling with emotional intensity scaling. For example, use high or loud volume for low “annoyed-anger,” medium volume for medium “mad-anger,” and low volume for high “furious-anger.”

8. Repeat for all eight basic emotions.

9. Discussion: Actors should continue to make self-observations. Discussion questions may include: What is the natural tendency for vocals as they scale up and down in intensity? Do different emotions have different tendencies? What happens when the vocal choices do the reverse? Did dramatic creativity and scenarios connect the behaviors and inform the exercise?

SCALE FOUR – Turn the dial on physicality

1. Scale Four embodies a range of physical gestures and movements into basic scaling. Use the three degrees of low/medium/high to indicate the range and size of movement. Low physicality would be appropriate for film work, especially close-up shots, which focus on eyes and facial expression. High physicality would be appropriate on a large arena stage or for a broad based comedy genre. Always work in a safe manner. Students should not attempt acrobatic or extreme uncontrollably action that may put themselves or other class members in danger.
2. Repeat scaling exercise two with the basic skill of movement and physical control. Increase range and size of gestures/movement while scaling up intensity and decrease range of physicality while scaling down intensity. Always return to neutral and release muscular tension and return breathing to normal.

3. Repeat the scale with low physicality in all emotional intensities. Repeat with all eight basic emotions. Experiment with face, arms, and hand movement, body postures, shape, and overall qualities of effort, tension, and relaxation.

4. Repeat the scale with medium physicality in all intensities and for all eight basic emotions. Experiment with a range of physical expressions.

5. Repeat the scale with high physicality in all intensities and for all eight basic emotions. High physicality generally means “big.” It can also incorporate tempo and rhythm. High physicality may also mean comic or slap-stick work. Actors should be aware of their physical limits, use their breath, and never recklessly scale.

6. Reverse physical scaling with emotional intensity scaling. For example, use high or big physicality for low “annoyed-anger,” medium physicality for medium “mad-anger,” and low physicality for high “furious-anger.”

7. Repeat for all eight basic emotions.

8. Actors should continue to make self-observations. Discussion questions may include: What is the natural tendency for the body as actors scale up and down in intensity? Do different emotions have different tendencies? What happens when the physical choices do the reverse? What challenges and problems did the
exercises create? How did they solve them? Did dramatic creativity and scenarios connect the behaviors and inform the exercise?

ADVANCED SCALING

Advanced scaling exercises become more creative and improvisational in their individual experimentation. Basic guidelines may help student design and challenge themselves in increasing complex variations of scaling. Once students have separated emotional intensity from the range of vocal and physicality expression, they are free to creatively experiment in any combination of physical, vocal, and intensity scaling. Exercises in advanced scaling would be to scale through an emotional opposition pair. For example starting at high anger and performing through low anger to the neutral zone, into low fear, and ending in high fear. Advanced scaling exercises focus on increasing the speed of the scale. Advance scaling exercises can jump from different intensities. Advance scaling lead into experiments and exercises into compound and complex emotions.

DIAGRAMMING COMPOUND AND COMPLEX EMOTIONS

Diagramming is when actors use sections of the emotion model and reassemble or remodel the parts into a new model and a different emotion. It is first a written exercise and second, a performance exercise. Most emotions we embody and experience on stage or off stage are compound or complex. There is a collection of compound and complex emotions which are so common, they could be considered basic. For example “nervous, troubled, worried, anxious, paranoid” may be scaled as a compound emotion of “fear”
and “excite” with the appraisal context of attention and evaluation of given circumstances. Other examples of common compound and complex emotions are “jealousy,” “curiosity,” “apathy,” “serene,” “contentment,” “giddy,” “guilt,” and “loneliness.” Two of the most common and important complex emotions are “love” (“desire-excite-happiness” within given circumstances) and “hate” (“anger-disgust-desire” within given circumstances).

DIAGRAMMING ONE - Compound

1. Choose “anger” and “desire” and draw their X-axis line of movement toward each other. Draw a third point creating a triangle. This is the new floor plan. Place three chairs at the three points of the triangle.
2. Perform the monologue alternating each emotion with each stanza, then couplet, and then line. Focus on one of the Relation dynamics as the emotions shift. As the exercise progresses and the compound emotion becomes clearer move toward the third chair. Record the experience and select a third word to describe the emotion.
3. Experiment with other basic emotion combinations. Draw new models recording the basic emotion choices. Label two chairs in the triangle with the two selected emotions. Perform back and forth between the two chairs allowing both emotions to exist in the performance. Move to the third chair and identify the compound emotion. After each exercise or run through of the monologue remember to exit the triangle and release the emotions to neutral.
4. Actors can choose the same basic emotions and come up with very different experiences of the third compound emotion. Even the same actor repeating the
experience may come up with a different result. It is a creative process and
depends on the individual experience in the Relation dynamic.

5. Discussion: Compounding emotion and Relation dynamics may be more of a
implicit rather than explicit process. Relations dynamics are subjective and
exploratory process. Many Relation dynamics are personal and unique. Students
should observe their own embodiment and record physical characteristics, vocal
qualities, and any cognitive impressions that occur during the exercise. Discussion
questions may include: Did the exercise break expectations? What happens when
new qualia emerge? What challenges and problems did the exercises create? How
did they solve them? Did dramatic creativity and scenarios connect the behaviors
and inform the exercise?

DIAGRAMMING TWO - Complex

1. Draw a compound triangle model of “anger” and “desire” with their X-axes line
of movement and write “jealousy” as the third point. Draw a square or rectangle
around the triangle. Write “seeing lover with someone else” outside the frame.
This is the new floor plan. Place chairs as diagrammed.

2. Perform the monologue in the given circumstances. Focus on how “anger” and
“desire” relate to each other through “jealousy.” Focus on the Relation dynamics
as the emotions shift. After each exercise or run through of the monologue,
remember to exit the frame and release the emotions to neutral.
3. Experiment by adding a third basic emotion, for example “sadness” or “disgust.”
   Draw a representation of the extra emotions. Allow the third emotion to emerge in
   the exercise. Experiment with different types of “jealousy.”

4. Repeat the exercise with the word “nervous.” Create a specific dramatic context
   with the intent to evaluate circumstances of self or others. Answer the question,
   “what can I be nervous about?” Use the basic emotions “fear” and “excite.”

5. Experiment by adding a third basic emotion, for example “sadness” or
   “happiness.” Experiment with different types of “nervousness.”

6. Scale “nervousness.” Note: there is a rich collection of words that describe the
   family of intensities. “Nervous, troubled, worried, anxious, paranoid” could be
   scaled as a compound emotion of “fear” and “excite” with the context of attention
   to something.

7. Repeat the exercise with the word “curiosity.” Create a specific dramatic context
   with the intent to discover and evaluate a discovery. Use the basic emotions
   “excite” and “desire.” Add “fear” or “disgust” to “curiosity.” Scale “curiosity.”

8. Actors can choose the same basic emotions and come up with very different
   experiences of the third compound emotion. Even the same actor repeating the
   experience may come up with a different result. It is a creative process and
   depends on the individual experience in the Relation dynamic.

9. Discussion: Diagnosis of compounding and complex emotion can be an outside-in
   process or an inside-out process, especially when the actors involve a dramatic
   situation. Students should reflect on their own analytical processes: How does
   embodiment inform diagramming and how does diagramming inform
embodiment? Students should observe their own embodiment and record physical characteristics, vocal qualities, and any cognitive impressions which occur during the exercise. Discussion questions may include: Did the exercise break expectations? What happens when new qualia emerge? What challenges and problems did the exercises create? How did they solve them? Did dramatic creativity and scenarios connect the behaviors and inform the exercise?

**Summary**

Emotion is a basic skill for actors. Emotion is as basic to an actor as paint on a pallet is to a painter or notes are to a musician. Pedagogy in acting classes includes training which is the embodiment of information through exercises. Basic skills of emotion expression include acquiring healthy habits of accessing, controlling and releasing emotions; targeting qualia; controlling intensity; and understanding how basic emotional colors become a rich tapestry of human behaviors through compound and complex emotional schemas.

New terminology and terms coincidental with neuroscience explanations of emotion contributes new knowledge to the lexicon of actor training. Important terms include basic, compound, and complex emotions, inside-out and outside-in pathways, qualia and intensity, Relation dynamics, environmental and cognitive appraisals. When modeling performance emotion, actors create unique maps of dynamic patterns based on an individuals’ experience in the rehearsal process.

The classroom exercises design an emotional progression for actors, clarifying and identifying basic emotion qualia and then using the basic emotional alphabet to
create compound and complex emotion expression. The exercise accumulates experience for the student by offering a means to explore and create emotion physically and vocally, and eventually, applying emotion expression in given circumstances. Diagramming allows the student to see the creative process of emotion expression in the larger challenge of environmental and cognitive appraisals. Appraisals introduce how traditional Method techniques work with and against Emotion Scales techniques. Diagramming also models other potential performance problems in order to construct other classroom exercises.
CHAPTER VII. CONCLUSION

While performing job searches for future employment, I paid close attention to acting programs in colleges and universities. I informally surveyed online course descriptions of beginning acting classes. All theater programs offered the course. Some offered a course description beyond “Acting I” and listed learning outcomes as “basic techniques,” “basic skills,” “fundamental processes,” “fundamental principles.” Some even listed what basic skills meant: imagination, concentration, human psychology, characterization, realism, voice, and movement. After surveying multiple levels of acting training, I did not find “memory” listed as a basic skill or part of any beginning or advanced course. On the opposite end of memory’s absence in acting pedagogy was a continual focus on emotion. These two skills, memory and emotion, have a shared history and association through the emotional memory exercises of Stanislavski-Method training. The emotional memory exercise was an aesthetic variation of Post Traumatic Stress Disorder therapy. The purpose of the emotional memory exercises was to train emotional expression, not to learn memorization techniques. Although artists claimed basis in the psychological science of their time, the applied science of emotional memory in acting was troubled as Angela Katherine Baker study presented. Advances in neuroscience give theater artists a new opportunity to study emotion and memory safely and affectively.

What was most personally important about my research was what a serious study of memory could mean to my work as a director and teacher. It is common sense to understand and appreciate the actor’s work is the memory. Actors memorize two hours of human behavior on-stage and off-stage in complex and engaging patterns of life, action,
and personality; and attempt to raise it to a high art. I full heartily reject the hackneyed tradition that memory is a forgone conclusion. Memory is the work. What an actor remembers is what the actor has to perform. How an actor remembers is often cued to the emotion in the performance. Other types of memory are also creative and functional in the dramatic imagination. It is unproductive for the actors’ creative process to privilege emotional memory over other basic skills in performance memory.

Restatement of historical research issues

A serious study of acting requires a strong understanding of embodied knowledge, knowledge gained from experience and explained through the science of behavior. Psychology is traditionally the medical science of acting and the interdisciplinary exchange has a rich and fascinating historical cannon. It is poetic that the roots of the shared narrative shared the same body. The physician-priest of early civilizations performed magical utterances to heal the body and cure the soul. The physician-priest became the secular physician-philosopher in ancient Greece where the shared gaze of naturalistic observation studied the body and studied the stage. The memory arts of ancient Greece studied the mind. The memory arts identified basic memory functions, space, image, movement, and emotional agency which are parallel to precepts from brain science. Likewise, the Nātryāśāstra identified eight basic emotions similar to modern science. For the most part, ironically, the memory arts were forgotten after the Middle Ages.

The Cannon of Medicine was the pivotal text in my research. The physician-philosopher Avicenna compiled the primary medical encyclopedia from the medicinal
knowledge of the four river valley civilizations and Greco-Roman medicine. His other
writing included foundational arguments on the nature of the soul, a great deal of which
was incorporated into Christian theology. Avicenna’s psychology was based in the
anatomical model of the Cell Doctrine and the humors. He argued five brain cells
balanced five senses and identified levels of consciousness and embodied experience. His
model of the human psyche was a part of European medicine and society for five
centuries. The shared narrative of Avicenna’s psychology with acting and theater is a lost
or at least undiscovered story. Theater historians willing to study the history of medicine
along side the cannon of theater may find clues in the cast list of morality plays and the
characters of Shakespeare.

After the scientific revolution in medicine, the Medieval psychology of Avicenna
was replaced with the Early Modern psychology of John Locke. Locke was a physician.
He studied neurology under Thomas Willis at Oxford and practiced with Thomas
Sydenham. The rise of Arabic studies at Oxford introduced Locke to the Islamic
philosophy of *tabula rasa*, the blank slate which experience embodies. Locke’s eclectic
interests took him many areas of philosophy and, especially popular is his time, political
philosophy. But before his soirée into political philosophy, Locke’s neurological eye
dissected the anatomy of human knowledge. In *Essay Concerning Human Understanding*
his close analysis of cognition initiated Empiricism, nurture versus nature discourse, and
memory associationism. “It was this empiricist view that led to the emergence of
psychology as a separate discipline apart from philosophy, which had long monopolized
the study of the human mind” (Kandel, *Principles* 411). Locke, a psychologist-
philosopher, argued embodied knowledge on the blank slate and graphed memory and
emotion into the biology of the brain. His insight was not lost on a dramatist of his time as Aaron Hill’s dramatic theory in “An Essay in the Art of Acting” demonstrates. Not only did Hill have a list of emotions similar to Locke, but he sequenced emotional expression through the brain and imagination. Psychology is the science of acting and actors continue to explore science in the creative laboratory of theater.

Alternate theories of acting emerge in the wake of the scientific revolution, what Joseph Roach called a “Crisis of Sensibility.” The narrative of scientific understandings of the body proposed an increasing mechanized body controlled by nerves, passions, and ideas. Scientific precepts inspired actors and dramatists to perform their own dissection of human behavior, creating systems of gestures, categories of passions, and theories of motivations. Medical science became intermixed in artistic process and explained in texts and manifestos such as John Bulwer’s *Chirologia* and *Chironomia* and François Delsarte’s system of oratory. Many of these systems and theories focus on emotion, not memory. The shared narrative of bourgeoning psychology and new acting systems eventually crossed in the transformative system of Constantin Stanislavski.

Although Stanislavski was not the only dramatist experimenting with scientific research at the turn of the twentieth century, he is one of the most influential. Stanislavski applied many scientific ideas to the creative process from the reflexology of Ivan Pavlov the to scientific management of Henry Ford’s assembly line. His techniques ranged from psychological ideas triggering reflexive behaviors to breaking down behaviors and creating a through-line of action. His work introduced many of the fundamental pedagogical approaches found in contemporary acting including imagination, given circumstances, characterization, and emotion. Memory was not a part of the system.
Lee Strasberg stated, “I have always referred to our own work as a “method of work” because I never liked the implications of the term system” (84). Although what Strasberg was implying is not completely clear either, it seems American acting was moving towards individual artistry and away from scientific systemization. The division in acting philosophies broke from The Group Theater and formed the major schools of mid-twentieth century. Individualized interpretation of the Method increased exponentially in the latter half of the century and continues to be revised and adapted with each generation of teachers in professional schools, conservatories, and college and university acting programs. Acting pedagogy has become more culturally based than scientifically based, and C. P. Snow’s divide between humanities and science has symbolized the separate narratives. Memory was not part of Method either.

With the advent of Cognitive Studies in theater and neuroaesthetics in neuroscience, the shared narrative between medical science and the performing body continues in the twenty-first century. Germs of ideas and primordial experiments in acting are emerging, some successful and others not successful. Incorporating modern science into the tradition of acting creates opportunities for artists; it also challenges artists and scientists for a responsible and ethical dialogical of exchange.

Summary of findings

Following the historical narrative between medical science and acting lead me to the challenge modern neuroscience offers to the craft and creative processes of acting. The proposed exercises, Memory Accumulation and Emotion Scales, follow the tradition of experimenting in the theater and incorporating the science of human behavior with
acting techniques. In the twenty-first century, science of human behavior is neuroscience. The advances in neurology have expanded the understanding of the brain and cognitive processes to a new level with a new vocabulary. The proposed exercises demonstrate that the complex and scientifically dense information of neuroscience can be applied in focused and affective methods of acting pedagogy.

Theater artists have a great deal of “catching-up” to do in the area of understanding human memory. One approach is to define basic terminology from neuroscience. Basic terms can describe the actors’ process. Encoding and decoding clarify the processes forming memory and retrieving memory. These two distinct processes affect the rehearsal process and extended to performance work in a long run of a show. Long term and short term memory define basic types of memory which change in the encoding process. Explicit and implicit memory defines information in relation to cognitive attention and embodied learning. Semantic (facts), episodic (scenes), and procedural (automatic) memories define types of information and help actors understand how performance information transforms in memory. Types of memory I proposed in the Performance Memory Model are sensory, motor/bodily, spatial, emotion, and higher cognition. These basic categories of memory, studied in neuroscience, are applicable and useful to discuss actors’ work in rehearsal.

Embodied knowledge is acquired through experience and acting exercises should incorporate principles into activity. Memory Accumulation demonstrates actors can experience the memory process of chunking or accumulating information in a sequence of gestures. It further layers memory processes by asking students to recall a long term memory while performing a short term movement memory. The exercise incorporated the
principles of different movement categories (motor/bodily and higher cognition) in a performance memory. Students experience short term memory (the movement sequence) versus long term memory (the story). Memory blocks or failures are addressed by chunking and binding memory through association points. In Accumulation exercises three and four demonstrate how students can experience explicit and implicit memories through the process of studying categories of information and binding them together.

Emotion Scales embodies knowledge of emotional expression by incorporating scientific principles and individual expression in the creative process. Emotion Scales exercises strive to balance the biological commonality of emotion as studied in neuroscience with the unique qualia of individual experience and expression. A few fundamental principles argued in emotion science are basic emotions are biological and physiological from evolution, emotions combine and are cognitively appraised, and emotions have intensity. These principles are incorporated into the Emotion Scale Model by modeling eight basic emotions and illustrating three levels of intensity. Second and third level exercises combine basic emotions with a Relation dynamic and appraise complex emotions with given circumstances.

Emotion Scales embodies emotion physically, but not through a process of therapeutic recall. It does not contextualize emotional expression with past personal narratives. The catalyst is from physical behaviors learned through embodied qualia and then exercised by scaling a monologue through different modes such as physical size, vocal volume, and emotional intensity. Students experience the Emotion Scale Model through the blocking of three chairs in the classroom space, in a row for basic scaling and in a triangle for compounding. Emotion expression is psychological-physiological; it is
qualia and motor. The experience trains actors to access, control, and release emotional qualia in the process of performing a monologue safely and intelligently. The Emotion Scale Model demonstrates a pedagogical model can be derived from neuroscientific models and concepts and be used to guide students to explore and experience emotion in performance circumstances.

Another area of findings emerges from the historical research itself. By tracking memory from the memory arts to memory science, I have surveyed key points which are marginally studied. Embedded in the oratory arts of antiquity were memory techniques claimed to be shared by actors and performers of the time. By studying the historical conception of memory, I was able to revive the techniques of the memory arts for myself and inform the embodied approach of the dissertation. Islamic medicine and Avicenna psychology formed much of the understanding of the human mind in the Medieval period and had probable interpretation in dramatic performances. By tracking emotion from the heart to the mind, I also found a framework for studying how ideas of human behavior and acting theory transformed. Locke and discoveries of the scientific revolution in medicine forced dramatists to question the inner and outer mechanisms of artistic behavior. These historical findings offer a new lens to examine the traditional historical narrative for both theater and medical psychology.

Future research

Future areas for study for theater could be exploring other important basic types of memory in the actors’ rehearsal process and better educating actors to the challenges of a long run of a show. Emotion is a basic form of memory. The other four categories of
the Performance Memory Model -- sensory, motor/bodily, spatial, and higher cognition -- all have potential to expand into a collection of exercises comparable to Emotion Scales. By proposing both exercises, Memory Accumulation and Emotion Scales, the dissertation demonstrates how future work may grow into a larger body of acting techniques. The study not only contributes to the pedagogical tradition of acting, but also demonstrates an approach and method towards developing new techniques for acting education.

Another area for future inquiry and study would be testing the proposed exercises and testing the new neuroscientific vocabulary. Testing the exercises may require a lengthy study of students’ responses in class and in practice. Testing may be organized around case studies or questionnaires aimed at specific applications of the techniques. Various groups such as college actors, mid-career professionals, or mature actors may offer comparative data sets to the effectiveness of techniques at different stages of the actor’s career. Testing neuroscientific vocabulary becomes a broader question of the performativity of words and less focused on specific data or learning outcomes. The field of Performance Studies claims to re-conceive performance beyond the models of the performing arts to include performance efficacy in others areas, for example, professional services (law, medicine, business) or social rituals (ceremonies, religious services, parades) or technology. The New York University model derives its broadly conceived model of performance from the linguistic arguments of J. L. Austin’s performativity of words which proposes the action or “doing” of words. Thus, Performance Studies does not study art as just an object, but studies art as an action with assessable consequences in the culture and society. By incorporating the vocabulary of neuroscience into the practice of acting, this study proposes the words will have efficacy in the creative process.
Although the linguistic theory may be argued in a cultural context, it would be difficult to scientifically test and evaluate.

In the effort for an ethical dialogical stance with science, this dissertation aims to suggest future areas of consideration for science as well. Scientists use actors to create behavioral templates for experiments. If they acquire a better understanding of the actors’ process, they are better skilled to accomplish the focus of the experiment. I propose to the scientific community that a closer study of the actor’s rehearsal process (complex encoding) and the repetition of performance memory in an extended run (over decoding) would benefit both fields and give scientists an affective model when designing experiments.

Future interdisciplinary discourse

The challenge of interdisciplinary studies offers new models in epistemology and methodology. It demands an ethical stance described by Dwight Conquergood’s dialogical relationships where sameness and difference are respected and challenged. I encountered a formable challenge in the collaboration between the scientific process (and culture) and the artistic process (and culture). In the model of the Relation dynamic of emotions, I found the interdisciplinary approach sometimes competing, sometimes combining, and sometimes canceling each other’s methods and models. But to engage in the dialogical brought a stronger foundation, a shared cannon in history, and a deeper narrative in the understanding of the performing body-mind, its emotional power and its embodied memory.
In the Reith Lectures 2003, V.S. Ramachandran, professor of Neuroscience at University of California, summarized his perspective on the new neurology of the arts:

Assume that 90% of the variance you see in art is driven by cultural diversity . . . and only 10% by universal laws that are common to all brains. The culturally driven 90% is what most people already study – it’s called art history. As a scientist, I am interested in the 10% that is universal . . . we can now test our conjectures by directly studying the brain empirically. There’s even a new name for this discipline. My colleague Semir Zeki calls it Neuro-aesthetics – just to annoy the philosophers. ("Lecture 3: The Artful Brain")

In the Theatres of Science Conference, University of Glamorgan, UK, 2004, I proposed the term “neuro-humanities” to extend the annoyance to everyone else. Included in the neuro-humanities are neuro-aesthetics, neuro-theology, (the study of Buddhist monks and Franciscan nuns in states of meditation and prayer), neuro-musicology (brain function and music) neuro-economics (processes of decision making), and neuro-linguistics (the study of the language areas of the brain). Neuroscientist, Steven R. Quartz uses the word “neurosociology.” “Ultimately, the human search for happiness depends on unraveling the dynamic of brain development and the influence that social life has upon it. This enterprise constitutes a nascent neurosociology, an approach to understanding the human condition and possible avenues for its betterment that recognizes the power of both our biology and our social context to shape us” (255). As the nurture versus nature debate resolves to the dynamic between DNA coded in the genome and the catalyst of culture, new interdisciplinary questions between science and culture challenge the future.
Concluding thoughts

Theater history records centuries of intersections between the scientific understanding of human behaviors and the skills needed to create representations of human behaviors in theater traditions. Science traditionally deconstructs human behavior to be studied; actors construct behavior to be culturally contemplated. Modern culture faces the exponential advancement of science, especially in the area of brain science. This fact pushes theater artists and educators to reconsider how we teach acting. Current advances in neuropsychology clarify fundamental principles used by actors when creating artistic behavior. Modern neuroscience provides principles to develop effective and safe acting exercises for students. To assume acting techniques have reached their pinnacle is egregious. Acting is an art; teaching acting is an art. Both art forms must continue to evolve and adapt for a new generation of actors. Science evolves and continues to redefine our basic understanding of self. The Relation dynamic between science and art still languishes in C. P. Snow’s gap, but science and art could share a narrative in the science of acting.
APPENDIX I. GLOSSARY OF TERMS

Basic emotions - modes of behaviors with ontological status. They are recognizably characteristic of mammalian life, have evolutionary purpose, are continually adaptive, and have physiological ontology in the brain and CNS.

Basic skills – are ontological physical or psychological abilities commonly used in performance. Isolated elements of human behaviors such as vocal qualities, movement coordination, or emotional control are examples of the components of actors’ training and techniques.

Binding memory – combines different types of information into a unified experience. For actors, binding occurs through the rehearsal process, when performers combine lines, action, blocking, emotion arousal, and motivations into unified performance behavior. Different types of memories (sensory, motor/bodily, spatial, emotion, Higher cognition) develop associations to each other in the context of creating a performance.

Central nervous system – (CNS) includes cerebrum, cerebellum, brain stem, and spinal cord.

Chunking – the process of consolidating short sequences of information. When information is “chunked,” it is known as a singular bound idea rather than individual elements.

Cognitive appraisals - mental functions, motivation, objectives, subtext, or fictional
memories. Cognitive appraisals are mental actions such as recognition, belief, evaluations, comparisons, decisions, wants, needs, responsibility, and attention to a situation.

Higher cognition – is the content, process, and awareness of mental activity. Frontal lobe is associated with many mental functions which are categorized as higher cognition. Although all memories are cognitive (meaning they are a function of the brain) I use the term “cognitive” within the context of acting training to refer to the traditions of actors techniques of objective, motivation, fictional sensory memory, fictional character memories, inner speech and subtext, semantic memory of lines, meaning of utterances, listening, and a sense of time and timing. Cognitive memory therefore, refers to memory patterns that record actors’ inner life and mental schema of the performance.

Complex emotion – is the interaction of two identifiable emotion qualia, mediates by neural/hormonal systems, which can also give rise to affective experience, perceptual effects, appraisals, labeling processes and lead to behavior that is often, but not always, expressive, goal-directed, adaptive and recognizable by others. (adapted from emotion definition of Kleinginna and Kleinginna,) The process focuses on the merging of emotions.

Compound emotions - are the interactions of two identifiable emotion qualia when basic emotions schemas are recognizable in the same performance. A Compound emotion model is a stepping stone structure toward identifying the components of complex emotions. The process focuses on the merging of two emotions.

Consciousness – is an activity or function of the brain. Emergent properties of binding
and other unification principles bring a hyper-awareness of being self-aware.

Consolidation/reconsolidation – is when long term memory is encoded in the cerebral cortex. Re-consolidation is the alteration of memory during retrieval.

Decoding - (opposite: encoding) is the retrieval of memory. Memory has two distinct processes: encoding, the making of memory, and decoding. The rehearsal process is both the creation of performance memory (encoding) and the challenge of memory retrieval (decoding).

Emotion - is a complex set of actions and interactions around subjective (qualia) and objective (given circumstances) factors. Emotion can be accessed in the creative process by willfully triggering various nervous systems resulting in the arousal of neural/hormonal systems and a phenomenal awareness of pathways: bodily feedback (outside-in) or cognitive catalyst (inside-out). Emotion is integrated into cognitive appraisals, character schemas, and fictional motivational processes and plays an important role in the memorization of performance. Emotion influences physical and vocal expression/behaviors that can be observed and interpreted by an audience.

Environmental appraisal - means the given circumstances, historical factors, surroundings, and dramatic action which have a perceptible affect on acting.

Emotion memory - is memory of physical affective qualities and cognitive states as they relate to emotion expression.

Emotional memory exercises – are controversial exercise from the Stanislavski-Strasberg techniques based in personally emotional recall to learn emotional expressiveness.
Encoding – (opposite: decoding) is the making of memory. Memory has two distinct processes: encoding and decoding, or the retrieval of memory. The rehearsal process is both the creation of performance memory (encoding) and the challenge of memory retrieval (decoding).

Episodic memory – memory of event or scene which includes elements of what, where and when and autobiographical information.

Explicit – (antonym: implicit) Explicit and implicit memories differ in attention and awareness towards information of action and thought. Explicit means the individual is aware and attentive of activity. When actors and directors break down a scene they articulate explicit behaviors or motivations into the performance memory. Conscious learning of behaviors is explicit.

Implicit – (antonym: explicit) Explicit and implicit memories differ in attention and awareness towards information of action and thought. Implicit means the individual is unaware or shifts attention in consciousness from specific performance behaviors. Actors learn many actions, lines, music, movement, emotion expression in the rehearsal process and the various actions bind and become increasingly implicit. Implicit memory feels sub-conscious or instinctual.

Long term memory - Long and short term memories differ by the time span of retrieval from time of encoding. Long term memory is encoded in the cerebral cortex (consolidated) and is retrieved after it disappears from consciousness at least once. It can be altered during retrieval (re-consolidation).

Neuron – is the brain’s most basic component and the fundamental signaling element of the nervous system.
Motor memory - is memory of the muscles as feedback from the Peripheral Nervous System. Motor includes implicit memory such as speech phonemes and basic skills such as walking, sitting and everyday movement gestures and tasks. Motor includes explicit movement such as stunts, stage combat, and dance sequences. Motor memory is the primary component in emotion qualia.

Models - are physical, flexible, hypothetical and creative representations of larger organizational concepts and patterns. Modeling proposes parts are moveable and organizational patterns are fluid.

Outside-in and Inside-out. - Emotion is processed in two directions -- as response and as feedback. Response is the brain signaling the nervous systems to react to stimuli. Feedback is the nervous systems signaling bodily information to the brain. The two pathways allow actors to approach the study of emotion with two general strategies often labeled as “inside-out” or cognitive catalyst and “outside-in” or bodily feedback. “Inside-out” is the imagination and psychological component to emotional expression. “Outside-in” is the conscious activation of body and muscles; it uses feedback pathways as a catalyst for emotional experience and emphasizing motor aspects of emotion. It is important for actors to understand both processes and pathways as basic skills.

Performance memory – is the memory of the actors’ work. Performance memory is consolidated or encoded in the rehearsal process and ultimately decoded in performance.

Peripheral Nervous System (PSN) - Emotion functions through the Central Nervous System.
System (CNS), the Peripheral Nervous System (PNS) is the network of nerves located throughout the body.

Priming memory - is when recall is “improved by prior exposure to the words or objects . . . even though the subject has no conscious memory of having seen the word before” (Kandel, *Principles* 1230). Sensory information may form priming memory. Sensory input is primary information for actors learning about the environment of the play. When actors change working environment (rehearsal or performance space) they will often drop lines and miss cues. Hypothetically, this may be partially caused by disrupted sensory memory undermining the binding of the performance memory.

Procedural memory - are defined as implicit motor skills such as riding a bike, driving a car, or getting dressed in the morning. Procedural memories are encoded in the motor cortex and processed through the motor systems of the brain.

Qualia (pl) – (quale – singular) are terms for “qualitative, experiential, or felt properties of mental states” (Levin 693). Qualia is the distinctive qualities or identifiable characteristics of the felt nature of mental states or experiences; characteristics such as the pain of a toothache, the taste of chocolate, sound of violin, redness of a cherry (Levin 693, Lakoff and Johnson, 103)

Relation dynamic - is the process of merging two emotions creating an the arousal of an energy state or compound/complex emotion. Relation dynamics are identified as competing, a Darwinian struggle of one emotion over another; combining, a blending or mixing or reacting of emotions to each other; or canceling, a neutralizing of each other’s arousal energies. Relation dynamic theorizes how
emotions mix or blend. They identify the process or phase of emotion interacting with each other. Relation dynamic may indicate sequencing in emotional experience and concatenate to cognitive appraisal processes.

Retrieval – means decoding, when memory becomes active in the present.

Semantic memory - is recall of facts independent of an experiential context. Semantic refers to a conceptual knowledge base including objects, people, places and facts about them. Semantic memory can be general semantic or autobiographical semantic. General semantic memory is information about the world or universe. An example is George Washington was the first president. Autobiographical semantic memory is information about self specifically, qualities which characterize an individual, not an event. Fictional autobiographical is information about a character. Semantic memory relates to directorial information an actor receives during the rehearsal process. Actors learn a play or performance through verbal instructions, the text of a play, blocking instructions, and discussions of character and their emotional behavior. The rehearsal process is a process of embodying semantic information about the performance into repeatable episodic memory of the event.

Sensory memory - is memory from the five senses. Sense memory is stored in the sensory areas of the brain, although from short term to long term memory is a complex chemical and structural process. For the purpose of this dissertation, sensory memory describes the memory of the five senses in the context of the performance.

Sense memory - Sensory recall memory is the process of retrieving sensory input
of specific past events and inserting the memory into performance memory model. For example, an actor “remembers” the smell of coffee and uses the memory to create a response even though in the performance the coffee cup prop is empty.

Short term memory - Long and short term memories differ by the time span of retrieval from time of encoding. Short term memory occurs when information is recalled immediately. Human beings have an average of seven units in their short term memory. Short term memory is regulated in the hippocampus.

Spatial memory – is memory of pathways and body orientation in an environment. It includes goal and memory of place as well as the route.

Techniques – are the actors’ ability to combine and use basic skills in performance.

Training – is the basic skills and techniques that become part of long term memory and continually used as strategies for constructing performances.

Transduction – is a process where stimuli at the body’s surface is translated into bio-neurological information. Environmental properties affect specific oriented receptors of each sensory system. Each sensory system transmits information to a specific region of the cerebral cortex which integrates into a unified perception.
APPENDIX II. EMOTION SCALE EXERCISE WORD BANK

Abhorrence   Acceptance   Admiration
Affectionate  Affirmation  Afraid
Aggravated    Aggressive   Agitate
Alarm         Alarmed      Alert
Amazed        Amazement   Ambivalent
Amused        Anger        Animated
Annoyance     Annoyed      Anticipation
Anticipatory  Anxiety      Anxious
Apathy        Appetite     Apprehension
Apprehensive  Ashamed      Aspiration
Astonish      Astonishment Astound
Attached      Attention    Aversion
Avoidance     Awe          Awed
Bashful       Bedeviled    Beguiled
Bewailing     Bewildered   Bitter
Bliss         Blushing     Bold
Bored         Boredom      Bothered
Brave         Bustling     Calm
Cantankerous  Caring       Cautious
Celebratory   Cheerful     Combative
Compassion    Concerned    Confound
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