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PART WRITING, ERROR DETECTION, AND WRITING-TO-LEARN:
THREE STRATEGIES FOR LEARNING MUSIC THEORY CONSTRUCTS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy in the Graduate
School of The Ohio State University

By

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The Ohio State University
1997

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1997
ABSTRACT

In the last twenty years educators have advanced the premise that writing, in various forms, can foster learning in every discipline. The pedagogical techniques used in the field of music theory often include voice-leading and error-detection exercises, but rarely include the short in-class writing assignments favored by the proponents of writing-to-learn. This investigation examines the effectiveness of the writing-to-learn strategy in the music theory classroom, and compares it to traditional exercises that also engage the students' thought processes. Through a series of in-class treatments, quantitative and qualitative data were gathered from the sophomore music theory class at The Ohio State University. The treatments were administered through a crossover design with the intervention based on a mixed effects model. Factors analyzed include treatment mode (error detection, part writing, or writing-to-learn), student grade history for the freshman music theory courses (in GPA, 0.0-4.0), student's musical instrument (instrumentalist, keyboardist, or vocalist) and gender, resulting in a 3.4.3.2 factorial design. The qualitative data were subjected to a protocol analysis. Analysis of the qualitative and quantitative data indicates that only
part writing had a significant impact on learning. The implication is that music theory is best learned through creative musical exercises, and that voice-leading procedures share many pedagogical traits with the writing-to-learn strategies. The theoretical foundations of the writing-to-learn movement are re-examined, and the linguistic learning theories of Piaget and Vygotsky are applied to music. The manipulation of notation—the symbolic representation of music—appears to be a powerful pedagogical tool. Writing-to-learn may still be usefully employed in music theory, but part writing more efficiently helps students learn some types of musical concepts.
Dedicated to my wife, Carol
ACKNOWLEDGMENTS

This investigation could not have been completed without the help of a great number of people. I express my deepest thanks to my advisor, Burdette Green, who worked tirelessly to help me develop and clarify my ideas. I also express great thanks to the other members of my committee, David Butler and Ann Blombach, who helped me with the statistical design and classroom implementation of my investigation. Thanks to Dr. Hisama, the coordinator of Music 421, for allowing me into her classrooms. Thanks to Rob Leighty of the Statistical Consulting Service for his help in organizing and processing my data. Thanks also to Andrea Lundsford and George Newell for their ideas about the cross-disciplinary use of writing.

Thanks to my parents and grandparents, who have believed in me and supported my education, and to God to for the talent, perseverance, and drive to finish this degree.

Special thanks are due my wife, Carol, who had to persevere with me through the challenges and triumphs of academic life. This degree is as much hers as mine. Finally, I am thankful for the memory of Kenneth Holder, who sparked my interest in writing when I was but a Freshman music major.
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PREFACE

This study applies writing-to-learn methods to the music theory classroom. This interdisciplinary involvement can create a certain amount of confusion because terms such as "writing" and "composing" can be used to describe the act of creating both prose and music notation. Unless the context clearly indicates otherwise, this paper will use the term writing to mean the creation of prose, and composing to mean the creation of musical notation.
CHAPTER 1

INTRODUCTION

The pedagogical toolbox we bring to the field of music theory typically includes musical analysis, voice leading and error-detection exercises, and sometimes composition. Rarely has writing been considered an appropriate tool for teaching music theory, with the notable exception of the analytical essay. In the last twenty years, however, educators have advanced the simple premise that writing, in various forms, can foster learning in every class, in every discipline. In my own classes, I have discovered that certain writing exercises help students grasp new concepts. This experience has led me to explore more formally the impact of writing-to-learn on learning music theory constructs.

Although writing has been used in the music theory curriculum to record thoughts and communicate information, the use of short, ungraded writing assignments, addressed primarily to the writers themselves, is relatively unknown. This specialized kind of writing is most favored by educators interested in using writing in all the disciplines because it creatively engages the students’ thought processes. This dissertation examines the effectiveness
of this type of writing in the music theory classroom, and compares it to traditional exercises that also creatively engage the students' thought processes: error detection and part writing.

Creative voice-leading exercises usually require the student to notate an original setting that illustrates a specific problem or concept. Error-detection exercises require the student to circle errors or star correct solutions. While this activity requires a minimal use of language, the act of circling the incorrect responses does involve the physical act of putting pencil to paper. Is writing prose more effective than part writing or circling errors for learning music theory? This study seeks to answer this question.

1.1 Writing-to-Learn

While we routinely use writing in many ways to communicate, define a position, or make new connections, some forms of writing, such as lists, reminder notes, and diaries, tend to be mental scribbles indecipherable to all but the writer. These scribbles constitute one of language's most private forms: writing for the purpose of bringing personal meaning to a situation that previously had none. Mnemonic devices are also often organized linguistically, substituting well-known phrases or letter collections for words or ideas to be remembered.

If writing-for-oneself can be intricately bound with clarifying or remembering ideas, might this type of writing be used in the classroom
setting? In what ways might the use of language promote the learning of particular ideas or subjects? The importance of these questions is underscored by a growing body of work that since the 1970s has discussed the impact of writing on learning, and turned attention to classroom writing in college curricula. Two major educational movements, writing-across-the-curriculum (WAC) and writing-to-learn (WTL), have evolved into philosophical and political rallying points for those who believe that writing is a necessary component of every academic course.

This focus on the pedagogical importance of writing has led to groundbreaking research on the writing process (Emig, 1971; Britton et al., 1975; Martin, 1976; Fulwiler and Young, 1982; and Humes 1983), and on the effects of various forms of writing in the classroom (Emig, 1977; Applebee, 1984; Newell, 1984; Langer and Applebee, 1987; Tierney, 1989; Rose, 1989; Johnson, 1991; Menon, 1992; Licata, 1993). These studies assume that writing can play an important role in a variety of disciplines, in all levels of schooling.

While many hypotheses have been formulated, few empirical studies have carefully measured writing's effects on learning, and none have examined the role that writing can play in the music theory classroom. The lack of this kind of research in music theory pedagogy has at times forced me to borrow from mathematics pedagogy--another field dominated by a symbol system separate from language.
1.2 Background: The Need to Develop Critical Thinking Skills

There has been concern in academia about ways to correct the perceived lack of critical thinking skills among college students. The changing demographics of our college populations, increasing class sizes, increasing teaching loads, and the incorporation of advanced technology in everyday classrooms have changed today's courses. Teaching students how to learn contrasts sharply with teaching students what to learn, yet each discipline must struggle with designing an appropriate balance between the two.

The field of music theory pedagogy is no exception. Michael Rogers' *Teaching Approaches in Music Theory* (1984) discusses the struggle between teaching students what to learn versus teaching them how to learn:

> Of course, one purpose of theory courses is to teach data and terminology--the proper names for processes and events--so that communication and discussion about pieces can take place. But a more substantial and inclusive view of theory should also admit the possibility of learning how to ask questions as well as how to answer them. In fact, one of the most important goals of any theory class ought to be discovering which questions about music are most worth asking in the first place. (p. 5)

The first step in the development of critical thinking is the ability to ask the right questions. The need to foster critical thinking across all disciplines was just one of the impulses that caused the growth of the writing-across-the-curriculum movement.
1.3 Writing in the Music Theory Classroom

Writing prose does not often play an important role in the music theory classroom, where notes and the symbols of analysis provide the focus of communication:

The process of musical learning, then, inevitably and by virtue of its functioning out of its own significant structure, is not complete until its “constituent elements,” . . . are focused, summarized, and defined, in the symbols of the written language of notation. (Flagg 1949, p. 7)

Typically the classroom teacher relies on the short analytical exercise and the workbook composition. Little emphasis is placed on prose writing except as a means of relaying information in analytical essays because the teacher usually feels pressed for time.

But might writing—specifically the short, ungraded writing assignment—help solve the challenges that face music theory pedagogy? Are prose writing exercises as effective for learning as exercises which involve written notation? Rogers (1984) states that

Theory, then, is not just something to learn but is also something to do. It represents not just a cluster of answers but a range of options for thinking about and listening to music. Music theory, in my opinion, is not a subject like pharmacy with labels to learn and prescriptions to fill, but is an activity—more like composition or performance. The activity is theorizing: i.e., thinking about what we hear and hearing what we think about—and I would include even thinking about what we think. (p. 7)

Certainly there are times when the workbooks and short exercises are vitally necessary, and when lecture and example are more efficient than any prose writing assignment could be; but, there may also be times when short writing
assignments are the most efficient way to teach music theory. Howard Gardner, in his book *Frames of Mind: The Theory of Multiple Intelligences*, (1983) says that:

Much of the teaching and learning occurs through language—at one time, principally through oral instructions, employing verse, collections of adages, or simple explanations; and now, increasingly, through the word in its written form. A compelling example of this aspect can be found in the sciences. Despite the evident importance of logical-mathematical reasoning and symbol systems, language remains the optimal means for conveying the basic concepts in textbooks. In addition, language supplies the metaphors that are crucial for launching and for explaining a new scientific development. (p. 78)

Prose writing may be especially relevant to helping students understand the philosophical side of the theoretical equation, and may also prove potent at helping students understand how they think about music theory itself. However, as Gardner cautions,

For every goal currently being pursued, there is presumably a set of intelligences which could readily be mobilized for its realization, as well as a set of intelligences whose mobilization would pose a greater challenge. (Gardner, 1983, p. 384)

Does writing, which is an exercise completely separate from the activities commonly used to learn the basic concepts of music theory, provide a new, more effective way to teach, or does it actually hinder students' learning? Does the written "language" of music—notation—help students learn more effectively than written prose, or is the reverse true? At a deeper level, there lies this fundamental question: Just how do students best learn music theory constructs?
1.4 Purpose of the Study

This study examines three types of exercises that involve the physical act of putting pen to paper, in order to test the hypothesis that writing prose can be used effectively to teach music constructs. Moreover, by comparing the effects of the writing-to-learn assignments with those of error-detection exercises and creative part-writing exercises, this study weighs their effectiveness on learning three different music theory topics: Neapolitan sixthths, augmented sixthths, and common-tone diminished seventh chords. To accomplish this, the study employs both quantitative and qualitative research methods. It also analyzes the effect of assignments on students of varying academic ability and performance background, and it examines their thought processes by means of think-aloud protocols.

In order to provide a suitable rationale for this study, chapter two will review the cognitive models of Vygotsky, Piaget, and Bruner, and trace their influence on the writing-to-learn movement. To follow up, chapter three will examine current theories of writing in the classroom and chapter four will discuss error detection and creative part writing as pedagogical tools.

Chapter five will detail the methodology of the research, including the design, participants, materials, instruments, measures, and procedures. Chapters six and seven will present the data and assess its implications for
both the quantitative and qualitative facets of the study. Chapter eight will
draw conclusions and offer recommendations for future research.
CHAPTER 2
WRITING AND LEARNING: THEORETICAL FOUNDATIONS

Because this study was motivated by the writing-to-learn movement, the movement's central hypothesis—that writing may be concretely related to how students think and learn—must be examined. While the writing-to-learn movement is based on many concepts, its most important assumptions are that: (1) writing is a complex developmental process vital to learning; and (2) different types of writing promote different types of learning. These assumptions have philosophical roots that inspired the early writing-across-the-curriculum proponents. This chapter will examine these positions and describe the models that were developed to define the relationship between writing and learning. Chapter Three will then explore recent experimental research on writing's effects on learning, particularly in the field of mathematics. The purpose of this entire review is to build a strong theoretical and experimental base from which to hypothesize about the effects of writing, whether prose or music notation, on students' understanding of music theory.
2.1 The Roots of Writing-to-Learn

The idea that learning and language are intricately linked is not new. Indeed, the writing-to-learn movement traces its roots to cognitive theories proposed in the first half of this century by the psychologists Jean Piaget and Lev Vygotsky. Piaget wrote many texts on the subject of child development, but perhaps the most important to the writing-to-learn movement are *Language and Thought of the Child* (1959), *Judgment and Reasoning in the Child* (1969), and *Psychology of the Child* (1969). Vygotsky's most influential book, *Thought and Language* (1986), was written in part as a response to Piaget's current theories. Both of these psychologists explored the idea that language, and specifically writing, was somehow related to learning. Their research provided a psychological basis for later theorists in the writing-to-learn movement. The sum of Piaget's and Vygotsky's work far exceeds their thoughts on the connection between writing and learning, so the following discussion focuses on what these pioneers had to say specifically about this relationship.

2.2 Piaget on Speech and Thought

Piaget saw language as a practical way to discover the workings of the child's mind. For this reason language plays an important role in his theories about cognitive development. He argued strongly that thought could be
analyzed by examining speech (Piaget, 1959, p. 261), because he viewed
language as a window on the child's thought processes.

Piaget's *Language and Thought of the Child* (1959) was based on observations
of several children over an extended period of time. Through careful
examination, he concluded that their speech fell into one of two functional
categories: egocentric or socialized (p. 5). He asserted that egocentric and
socialized speech in children indicated the presence of egocentric and
socialized thought. This idea is explored further below, first by examining the
differences between egocentric and socialized speech, then the differences
between egocentric and socialized thought, and finally by discussing the
transition between egocentric speech/thought and socialized speech/thought.
The differentiation of egocentric speech and socialized speech is important,
for this was an idea that later researchers developed.

The function of egocentric speech is to chant one's thoughts or actions;
this speech is a by-product of the child's activities, a speech for the child's sake
which may not be comprehended by others. It resembles a verbal dream
more than a conscious activity (1959, p. 8). Egocentric speech may be defined
as internally directed:

When a child utters phrases belonging to the first group [egocentric
speech], he does not bother to know to whom he is speaking nor
whether he is being listened to. He talks either for himself or for the
pleasure of associating anyone who happens to be there with the
activity of the moment. This talk is ego-centric, partly because the child
speaks only about himself, but chiefly because he does not attempt to
place himself at the point of view of his hearer. (1959, p. 9)
Egocentric speech is not used to communicate or to obtain answers from others. It is much like a monologue in a play—addressed to no one in particular, as though thinking aloud. As such, egocentric speech is a running commentary on immediate activity, and is the prevalent type of speech for children before the age of seven. Piaget’s studies showed that egocentric speech disappears and is replaced by socialized speech as the child matures and begins to try to understand the world by interacting with it, rather than existing in it. While egocentric speech is dominant in young children, it comprises less than one-fourth of a child’s spontaneous speech after the age of seven (1959, p. 257).

Socialized speech is the opposite of egocentric speech, for a child uses socialized speech to exchange information or ideas with others and to ask questions (1959, p. 8). It therefore becomes an important factor in the child’s development of logical, rational, and objective thoughts. Since Piaget argued that the thoughts of children are reflected in their speech, he asserted that the two types of speech are also applied to two types of strikingly different intellectual processes: egocentric and socialized thought.

Piaget claimed that egocentric thought was similar to egocentric speech in its indifference to the world at large:

It [egocentric thought] is the assemblage of all the different precritical and consequently pre-objective cognitive attitudes of the child’s mind; whether these attitudes relate to nature, to others or to himself matters little. Fundamentally, egocentrism is thus neither a conscious phenomenon (egocentrism, when self-conscious, is no longer egocentrism), nor a phenomenon of social behavior (behavior is an
indirect manifestation of egocentrism but does not constitute it) but a kind of systematic and unconscious illusion, an illusion of perspective. (1959, p. 268)

Egocentric thought reflects an intellectual simplicity of mind, an absence of rational referential systems and an inability to see relative intellectual positions. It is characterized by mental inertia (1959, pp. 270-271).

Socialized thought, on the other hand, is characterized by the ability to disassociate oneself from the subject or object under consideration. Social thought requires the child to be objective, and to understand that which is subjective within himself. Social thought can establish meaningful relationships between objects, people, and the newly acquired view of the "self" as a part of a larger whole (1959, p. 271). The maturing child sees his immediate world, and especially adults, as revolving around himself. With greater exposure to the surrounding world, he begins to recognize adults as providers—not just of physical needs—but also of intellectual needs. He asks questions, and expects adults to provide "the" answers. Social speech becomes indelibly linked with obtaining objective information, and as social speech becomes more dominant the child is better able to think critically, i.e., from an outside point of view. As the child grows older, however, the adult is seen less as a resource for undiminished truth and more as an intellectual sparring partner: "The adult ceases to represent unquestioned or even unquestionable Truth and interrogation becomes discussion" (1959, p. 258).

Socialized thought is initially indicated by questioning, and as this type of
thought matures it forms the basis of objective adult reasoning, so that the individual is eventually set free of egocentrism (1959, p. 281).

Simply defining egocentric and socialized thought and speech does not explain why the child undergoes a process of transformation from one stage to the other. The idea of a gradual change from egocentric thought/speech to socialized thought/speech is fundamental to Piaget's theory, especially as seen by later educators.

Piaget ascribes the child's shift in speech and thought to a desire to begin to interact with peers and adults to learn more about the surrounding world. Egocentric speech is dominant early in a child's life but then gradually fades away:

It is due, in the first place, to the absence of any sustained social intercourse between the children of less than 7 or 8, and in the second place to the fact that the language used in the fundamental activity of the child--play--is one of gestures, movements and mimicry as much as of words. (1959, p. 40).

Piaget feels that children under the age of seven or eight have no social life with their peers: "...there is neither division of work, centralization of effort, nor unity of conversation. We may go further, and say that it is a society in which, strictly speaking, individual and social life are not differentiated" (1959, p. 41). As children enter the midpoint between their seventh and eighth years, they begin to manifest the desire to work with others, and socialized speech begins to supplant egocentric speech in
importance and in usage, reflecting a similar change in their thought processes.

This explanation for the disappearance of egocentric speech was supported by experiments that seemed to prove that egocentric speech does become less common as children mature. Piaget suggested that the loss of egocentric speech does not indicate the elimination of egocentric thought, but that this type of thought remains stored in the "most abstract and inaccessible part of the mind," that is, the part of the mind that is pure symbolic thought. In support of this hypothesis, Piaget noted that the incidence of egocentric thought increases with those activities that are highly symbolic, such as physical exercise and imaginative play, while social thought increases as activities come closer to approximating real work (1959, p. 265).

Piaget distinguished some major differences between ego-centric thought and its opposite, social thought:

1) It [ego-centric thought] is non-discursive, and goes straight from premises to conclusion in a single intuitive act, without any of the intervening steps of deduction. This happens even when thought is expressed verbally; whereas in the adult only invention has this intuitive character, exposition being deductive in differing degrees. 2) It makes use of schemas of imagery, and 3) of schemas of analogy, both of which are extremely active in the conduit of thought and yet extremely elusive because incommunicable and arbitrary. (1959, p. 127)

From these ideas Piaget developed the concept of dual- or multiple-realities that are constructed by the child. Social thought constructs a reality of interaction with others, while egocentric thought is more of a point of view, a state of being that views oneself as the center of a particular universe, and
that does not consider anyone else's existence. These realities are hierarchical in mature adults, with social thought dominating their construction of reality. Children's realities, however, are not so neatly structured. Children may entertain several realities, which come and go without the hierarchical construction of mature thinkers. Children are not uncomfortable with these shifting realities, even as they become aware of them in a succession of stages. Through these stages of constructing reality, children gradually shed their singular, self-centered point of view to recognize the validity of others in their world:

Finally, as the child becomes conscious of his subjectivity, he rid himself of his egocentrism. For, after all, it is in so far as we fail to realize the personal nature of our own point of view that we regard this point of view as absolute and shared by all. Whereas, in so far as we discover this purely individual character, we learn to distinguish our own from the objective point of view. Egocentrism, in a word, diminishes as we become conscious of our subjectivity. (1972, p. 246-247)

Egocentrism fades into the background as children become aware of the need to work, coordinate, and communicate with their peers and teachers in the school environment.

Piaget defined through his writings a cognitive model that described thoughts by recording language. According to Piaget, children gradually shift from a self-centered understanding of the world to a more social, outgoing understanding. As the shift of perspective occurs, children begin to make more and more cognitive connections, learning proceeds, and they mature.
Piaget’s theories were widely disseminated and were studied and modified by cognitive theorists, such as Lev Vygotsky.

2.3 Vygotsky and Inner Speech

Vygotsky was intrigued by Piaget’s model of the relationship between language and cognitive development, and began a series of experiments to better define this relationship. Vygotsky’s theories greatly influenced writing researchers in the late 1960s, for he diverged from Piaget and hypothesized that language, rather than just being a window to the thought process, plays an integral role in the cognitive development of children.

In experiments modeled after Piaget’s case studies, Vygotsky added a series of difficulties for children to overcome, to determine if the act of problem solving would affect their thought or speech development:

For instance, when a child was getting ready to draw, he would suddenly find that there was no paper, or no pencil of the color he needed. In other words, by obstructing his free activity we made him face problems. (1992, p. 29-30)

Vygotsky discovered that the incidences of egocentric speech almost double in situations where children are presented with difficulties compared to when they were not. The children ask themselves questions and provide their own answers in an attempt to solve the problems: “Where’s the pencil? I need a blue pencil. Never mind, I’ll draw with the red one and wet it with water; it will become dark and look like blue” (1992, p. 30). As the experiments proceeded, it became increasingly clear to Vygotsky that disruptions in a
child's activities are an important stimulus for the development of egocentric speech.

Vygotksy's studies were not limited to pre-school children; they also examined the influence of activity disruption on children older than eight years. He found, as had Piaget, that egocentric speech almost entirely disappears for older children. However, Vygotsky noticed that when confronted with disruptions older children often engage in deep thought, as indicated by long pauses, and respond in language that resembles the egocentric speech of younger children when asked to voice their thoughts. Vygotsky thus argued "... that the same mental operations that the preschooler carries out through voiced egocentric speech are already relegated to soundless inner speech in schoolchildren" (1992, p. 30). This assumption set Vygotsky apart from Piaget. While Piaget's egocentric speech was nothing more than children's running commentary on their actions, Vygotsky saw children's speech as being integral to their thought creation and sense of reality. Language, in the form of inner speech, actually influences their learning.

At first, speech is a means of expression and a way to release tension, but as children mature their speech becomes an instrument of thought, influencing how they seek and plan solutions to problems. Vygotsky recorded the following incident, which he claimed illustrates the way in which egocentric speech alters the course of a child's activity:
A child of five-and-a-half was drawing a streetcar when the point of his pencil broke. He tried, nevertheless, to finish the circle of wheel, pressing down on the pencil very hard, but nothing showed on the paper except a deep colorless line. The child muttered to himself, "It's broken," put aside the pencil, took watercolors instead, and began drawing a broken streetcar after an accident, continuing to talk to himself from time to time about the change in his picture. (1992, p. 31)

This observation shows that the child's speech, far from being just a running commentary, actively influenced his perception of the situation: a single comment completely changed his frame of reference.

Vygotsky recognized that egocentric speech diminishes with age, but he did not conclude (as had Piaget) that egocentric thought diminishes as well. Thus, he sought to define the roles that egocentric speech and egocentric thought play as children mature. He observed that the egocentric speech of younger children marks the end result or a turning point in an activity. As children grow older egocentric speech shifts to the middle and finally to the beginning of an activity. Vygotsky likened it to the developmental sequence in a child's naming of drawings. At a young age, the child will name a drawing after it has been drawn; at an older age the drawing is named after it is half-drawn. Eventually the child knows beforehand what the drawing will be (1992, p. 31). Egocentric speech, more than just diminishing with maturity, changes developmentally with age, again suggesting that the relationship between thought and language is more than casual.

Egocentric speech is an important component in Vygotsky's theories of cognitive development. Whereas Piaget stated that egocentric speech simply
dies off, Vygotsky maintained that egocentric speech is an intermediate stage towards the development of an "inner speech" in adults. While some differences exist between the developmentally mature inner speech of adults and the egocentric speech of children, both have important similarities. First, both types of speech are used as speech-for-oneself. When adults think aloud, their words are strikingly similar to the egocentric speech of children. Second, both types of speech are incomprehensible out of context; they share the same structural characteristic of omitting elements that are obvious to the speaker. The similarities of egocentric speech to inner speech led Vygotsky to hypothesize that egocentric speech does not disappear at age seven-and-a-half, as Piaget claimed, but becomes the unspoken inner speech of adults (1992, p. 32-33).

While Piaget described a potential relationship between language and cognitive development, Vygotsky described this relationship in great detail. For Vygotsky, language is not just a window on the thought process; it is an integral component of the thought process itself, a tool that actively influences cognition. This new theory of the relationship between language and learning enabled Vygotsky to create a cognitive model that differed substantially from Piaget's.
2.4 Vygotsky’s Cognitive Model

Vygotsky’s cognitive model differs significantly from Piaget’s model because it establishes a relationship between the roles of egocentric and socialized speech. Vygotsky assumed that from the onset of language in children the primary function of speech is social and communicative, whereas Piaget considered early speech to be completely self-directed. According to Vygotsky, children’s speech is “global and multifunctional” at first. But, with age children begin to differentiate between different discourses, and eventually they distinguish between egocentric and socialized (or communicative, as Vygotsky preferred) speech. Egocentric speech arises from socialized speech as they assimilate and imitate the linguistic conventions in the surrounding environment, and incorporate those conventions into internalized language. Specifically, Vygotsky says that:

Egocentric speech emerges when the child transfers social, collaborative forms of behavior to the sphere of inner-personal psychic functions. . . . Something similar happens, we believe, when the child starts conversing with himself as he has been doing with others. When circumstances force him to stop and think, he is likely to think aloud. Egocentric speech, splintered off from general social speech, in time leads to inner speech, which serves both autistic and logical thinking. (1992, p. 35)

Socialized speech is first internalized psychologically (egocentric speech), and then physically (inner speech) (1992, p. 86).

Vygotsky described the maturation of speech in children as progressing through four specific stages. First is the “primitive or natural stage.” This stage is characterized by pre-intellectual babblings and pre-verbal thought.
Second is the “naive psychology stage,” which is characterized by exploration of their own bodies and of the immediately surrounding world. In this stage, children learn how to apply their experience of the world to influence the physical properties of nearby objects—creating tools and exercising the first stirrings of practical intelligence. Children are able to use the correct grammatical forms and structures of language without understanding the logic behind these structures: “The child may operate with subordinate clauses, with words like because, if, when, and but, long before he really grasps causal, conditional, or temporal relations. He masters syntax of speech before syntax of thought (1992, p. 87).” Gradually children move from the second stage to the third, which is characterized by external signs, such as when fingers are used to count and mnemonic aids are used to remember facts of interest. This is the stage where Vygotsky’s egocentric speech begins to separate itself from socialized speech. The fourth stage, the “ingrowth stage,” is characterized by the internalization of the external operations of the third stage. Rather than using fingers, children begin to count mentally and to memorize without the use of mnemonic aids. This is the stage where external speech becomes internalized, forming inner speech.

The child who has progressed through all four stages has reached mental maturity, and although there remains much to be learned, the building blocks for the process of learning are in place. In the final stage of cognitive
development there is constant interaction between the internal and external operations, and these become intricately and inexorably linked:

Schematically, we may imagine thought and speech as two intersecting circles. In their overlapping parts, thought and speech coincide to produce what is called verbal thought. Verbal thought, however, does not by any means include all forms of thought or all forms of speech. There is a vast area of thought that has no direct relation to speech. The thinking manifested in the use of tools belongs in this area, as does practical intellect in general . . .

Nor are there any psychological reasons to derive all forms of speech activity from thought. No thought process may be involved when a subject silently recites to himself a poem learned by heart or mentally repeats a sentence supplied to him for experimental purposes. . . . (1992, p. 88)

The space shared in common between the two circles represents inner speech, where thought and speech activity meet.

Vygotsky's model of the interrelationship between language and thought is essential to current writing-to-learn theories because he established that language has a causal effect on learning. He described the process of how language, and specifically inner speech, not only influences but becomes part of the thought process:

. . . we came to the conclusion that inner speech develops through a slow accumulation of functional and structural changes, that it branches off from the child's external speech simultaneously with the differentiation of the social and the egocentric functions of speech, and finally that the speech structures mastered by the child become the basic structures of his thinking.

This brings us to another indisputable fact of great importance: Thought development is determined by language, i.e., by the linguistic tools of thought and by the sociocultural experience of the child. (1992, p. 94)
Language, through the inner speech, is intricately linked to thought development, and thus to learning. This relationship between inner speech and the thought process of children has been explored even further.

2.5 Inner Speech and Learning

Vygotsky's description of inner speech was very influential to later researchers, for it delineates the interaction of language and thought. Inner speech is more than just an internalized form of external speech; it is unique, with a special relationship to the other speech formations. It has a syntax that is disconnected and incomplete when compared to external speech:

It still remains speech, i.e., thought connected with words. But while in external speech thought is embodied in words, in inner speech words die as they bring forth thought. Inner speech is to a large extent thinking in pure meanings. It is a dynamic, shifting, unstable thing, fluttering between word and thought, the two more or less stable, more or less firmly delineated components of verbal thought. (1992, p. 249)

Vygotsky observed that inner speech is a distinct plane of verbal thought. As inner speech becomes uttered speech, a complex transformation occurs. Inner speech must be syntactically reinterpreted and organized before it can be understood as external speech (1992, p. 249).

Inner speech is the translator between thought and word, between outgoing and incoming messages. It becomes a tool that one uses to bring words to a thought, or more importantly for this study, thoughts from another's words. Vygotsky contends that there can be no learning without language:
We might say, therefore, that neither the growth of the number of associations, nor the strengthening of attention, nor the accumulation of images and representations, nor determining tendencies—that none of these processes, however advanced they might be, can lead to concept formation. Real concepts are impossible without words, and thinking in concepts does not exist beyond verbal thinking. That is why the central moment in concept formation, and its generative cause, is a specific use of words as functional "tools." (1992, p. 107)

Vygotsky assumed then that language, translated through the processes of the inner speech, becomes the means through which we learn. The writing-to-learn research that followed would be organized around which forms of the written language facilitated this translation process most efficiently.

Vygotsky argued that an integral part of learning is the ability to direct one's ideas through the aid of words and signs, and that the process of forming concepts is mediated by signs. (1992, p. 108). The symbolic representation of language is writing, and so the relationship between writing and learning becomes important in Vygotsky's cognitive theories. This investigation, however, is concerned with whether or not notation, which is the symbolic representation of music, is of equal or greater importance to writing when it comes to learning music theory constructs. Does the physical act of writing music, like the act of writing prose, interact with the inner speech to help students create meaning?

Writing as a specific form of language is an important cognitive agitator. The relationship between writing and inner speech is in many ways a study in contrast:

Inner speech is condensed, abbreviated speech. Written speech is deployed to its fullest extent, more complete than oral speech. Inner
speech is almost entirely predicative because the situation, the subject of thought, is always known to the thinker. Written speech, on the contrary, must explain the situation fully in order to be intelligible. The change from maximally compact inner speech to maximally detailed written speech requires what might be called deliberate semantics—deliberate structuring of the web of meaning. (1992, p. 182)

The "web of meaning" is a description of how word and thought interact continually to produce a network of ideas and feedback:

The relation of thought to word is not a thing but a process, a continual movement back and forth from thought to word and from word to thought. In that process, the relation of thought to word undergoes changes that themselves may be regarded as developmental in the functional sense. Thought is not merely expressed in words; it comes into existence through them. Every thought tends to connect something with something else, to establish a relation between things. (1992, p. 218).

Conceptualizing, creating meaning, constructing reality: these are all facilitated by the word, especially in its written form. The idea that writing interacts strongly with the inner speech to create meaning is one of Vygotsky's greatest contributions, an idea that polarized a brand new educational movement dedicated to improving student's learning through writing.

2.6 Vygotsky's Influence in the West

Vygotsky's book, while published in Russia in 1934, was not translated into English until 1962. When it became available in the United States and Great Britain, it influenced a generation of researchers who were studying how the educational system used the written word. These researchers, notably
James Britton et al., James Moffet, and Janet Emig were classifying and clarifying types and uses of writing, and they contributed fundamentally to an emerging pedagogical writing movement. They believed that writing and learning are related, but were struggling to discover the strength of this relationship.

In 1963, James Britton, Tony Burgess, Nancy Martin, Alex McLeod, and Harold Rosen began what would become an eight-year process to examine the writing abilities of 500 British children aged eleven to eighteen. Their immediate goal was to classify student writing assignments by comparing two separate features of writing: its audience and its function. The results, first published in 1971, revealed some startling evidence.

Every exchange of written communication involves three basic components: a writer, the written item, and the reader. Britton et al. focused their research on the written item and the perceived reader, or audience. The written product is directly influenced by who the writer thinks will read it, in other words, the writer's audience. Britton identified four general categories of audience—Self, Teacher, Wider Audience, and Unknown Audience—each of which has one or more subcategories:
1. *Self*
   Child (or adolescent) to self

2. *Teacher*
   2.1 Child (or adolescent) to trusted adult
   2.2 Pupil to teacher, general (teacher-learner dialogue)
   2.3 Pupil to teacher, particular relationship
   2.4 Pupil to examiner

3. *Wider audience* (known)
   3.1 Expert to known laymen
   3.2 Child (or adolescent) to peer group
   3.3 Group member to working group (known audience which may include teacher)

4. *Unknown audience*
   Writer to his readers (or his public)

5. *Additional categories*
   5.1 Virtual named audience
   5.2 No discernible audience

Figure 2.1: Britton’s categories of audience (1975, p. 66)

These categories classify the total range of audiences that children might encounter during school years, and provide the framework to study the amount of work that students aged 11-18 directed to each of these audiences. The idea of self as the audience is a powerful pedagogical tool that intrigued Britton and his colleagues. The “self” audience produces “writing from one’s own point of view without considering the intelligibility to others of that point of view; a written form of ‘speech for oneself’” (1975, p. 117). Writing for the self differs from writing for others because the writer is not concerned with external factors (1975, p. 118). They found however, that in 1971 only
0.5% of the writing samples fell in this category, and most of these comprised private class notes.

The students, as might be expected, did much more work writing with the teacher as audience. When students write for the teacher, they have a definite “other” in mind. This relationship to the other may be informal and sympathetic (child to trusted adult), formal and neutral (pupil to teacher, general and specific), or severely restrictive and neutral or hostile (pupil to examiner). These subcategories, combined, represented almost 95% of the writing collected by Britton and his colleagues. The pupil to examiner relationship was the most prevalent of the audience subcategories, representing 48.7% of the total samples, and the pupil to teacher (general) category was second in number of responses, representing 38.8% of the sample.

Britton's study collected very little data on the pupil to wider known audience, for this category was virtually non-existent in the classroom experience. The only examples of this type were letters written by students to groups of their peers, an activity that fell outside of the official school curriculum; this type of audience constituted only 0.3% of the total writing samples. There were slightly more instances of pupil to unknown audience; these usually occurred in the upper classes and signified a maturation of the student's writing skills. This type of audience represented 1.8% of the total samples.
The evidence collected by Britton, *et al.* raised a series of questions about the use of writing in the public schools of Great Britain. Was it useful for students to be writing for a single person (the teacher) 95% of the time? Was it significant that almost half of the writing was for examinations? Britton and his colleagues tried to answer these questions by examining all of the functions or purposes for writing that schoolchildren might encounter.

Britton *et al.* developed a matrix to describe the functions of student writing. They identified three: transactional, expressive, and poetic:

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Mature     Transactional  Expressive  Poetic

Immature  Expressive
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Figure 2.2: Britton's functions of written utterances (1975, p. 83)

Every type of mature writing falls somewhere among these three categories, sometimes obviously fulfilling one function, sometimes evenly divided between two neighboring functions. This matrix is developmental, and reflects some of the ideas developed initially by Piaget and Vygotsky. The expressive function of writing is the first to be developed in children, and as they mature their writing abilities expand to include both the transactional and poetic functions.
Expressive writing is that which functions as pure expression:

We would describe it as an utterance that 'stays close to the speaker' and hence is fully comprehensible only to one who knows the speaker and shares his context. It is a verbalization of the speaker's immediate preoccupations and his mood of the moment. Centrally, it is utterance at its most relaxed and intimate, as free as possible from outside demands, whether those of a task or of an audience. (1975, p. 82)

Expressive writing is in some ways a written component of Vygotsky's inner speech and Piaget's egocentric speech/thought: it is less concerned with communicating to others than with communicating the state of the writer at a particular moment; it is heavily dependent on context if it is to be understood by others; and it is little concerned with formal conventions, consisting instead of a steady stream of current thoughts. Indeed, this type of writing is described as "thinking aloud on paper" (Britton et al., 1975, p. 89).

Britton and his colleagues discovered that only a small amount (5.5%) of the writing required in schools was expressive in function and that assignments requiring this function were almost exclusively given in English classes.

Transactional writing is writing to communicate with the world, an interaction with others, and is thus similar to Piaget's social speech/thought. Transactional writing acts

... to inform people (telling them what they need or want to know or what we think they ought to know), to advise or persuade or instruct people. Thus the transactional is used for example to record facts, exchange opinions, explain and explore ideas, construct theories; to transact business, conduct campaigns, change public opinion. Where the transaction (whatever it is we want to do with language) demands accurate and specific reference to what is known about reality, this need constitutes a demand for the use of language in the transactional category. (Britton et al., 1975, p. 88)
A majority (63.4%) of the writing assignments collected from the British public schools were transactional in function.

Poetic writing functions as writing to the world, distancing oneself as a spectator of the surrounding environment, rather than as a participant:

Poetic writing uses language as an art medium. A piece of poetic writing is a verbal construct, an ‘object’ made out of language. The words themselves, and all they refer to, are selected to make an arrangement, a formal pattern. (1975, p. 90)

Poetic writing is meant to be an object to scrutinize and analyze, writing that exists for its own sake and not as a means for accomplishing a specific communicating function (1975, p. 91). Britton found that 17.6% of the writing required in school was poetic in function, but that the number of poetic writing assignments declined sharply in the upper grades.

The Britton study was important in shaping future writing pedagogy, for it noted the dominance of specific types of writing in the school, specifically transactional writing for an examining audience, which constituted 43% of the writing examples. This proportion was three times greater than that of transactional writing for the teacher-learner dialogue. Expressive and poetic writing functions constituted a much smaller proportion of the examples—combined they represented only about one-fourth of the samples. The proportions indicate a clear bias in favor of transactional writing, especially in examination situations (1975, p. 176).

Britton and his colleagues expressed two major concerns about the dominance of the transactional function. First, their research suggested that
while students learned to write for a public audience more efficiently in teacher-to-learner dialogs than in the pupil-to-examiner relationships, the later was more prevalent. Britton's team did not suggest that this fact was the result of any kind of planning; it was likely the result of haphazard notions about what actually goes on with school writing assignments. Most surprising, however, was the lack of writing in the expressive function category:

Our disappointment arises from our belief that expressive writing, whether in participant or spectator role, may be at any stage the kind of writing best adapted to exploration and discovery. It is language that externalizes our first stages in tackling a problem or coming to grips with an experience. Moreover, it represents, we believe, the move into writing most likely to preserve a vital link with the spoken mode in which up to this point all a child's linguistic resources have been gathered and stored. (1975, p. 197)

Britton et al. viewed expressive writing as a means to vitalize the learning process. The lack of expressive writing suggested an unhealthy focus on writing assignments that were analogic and informative, at the expense of writing that was more abstract and informative at a deeper level:

The small amount of speculative writing certainly suggests that, for whatever reason, curricular aims did not include the fostering of writing that reflects independent thinking; rather, attention was directed towards classificatory writing which reflects information in the form in which both teacher and textbook traditionally present it. (1975, p. 197)

This clear challenge for curricular change was taken up by educators who saw a need to reform writing pedagogy. One of Britton's collaborators, Douglas Barnes, became in his own right an important reformer.
Barnes agreed firmly with Britton’s conclusions that school curricula stressed teaching specific facts rather than teaching how to learn. The process of examining writing assignments caused him to change his own perspective on the use of language in the classroom:

One way of putting it would be that I now know that my primary interest is not in language but in the learner’s access to the means of learning. 'Access to the means of learning' does not mean merely the chance of speaking in classroom discussion. It includes the opportunity for exploratory talk and writing and it includes access to the principles upon which knowledge is based. One characteristic of good teaching is that instead of merely handing over approved knowledge or standard skills to pupils, it helps them to grasp underlying principles so that they themselves can see why the teacher judges this statement to be more valid than that statement, this way of doing things to be more appropriate than that. The importance of this understanding is that it equips them for a future in which there will be no teacher present to make judgements for them. (Barnes et al., 1986, p. 71-72.)

Piaget recognized that language could be used to examine thought, Vygotsky explored the idea that the two were intricately linked in a cause and effect relationship, and Britton began to classify and identify the specific types of writing that would facilitate learning. Barnes’ statement advances writing-to-learn philosophy another step, declaring that exploratory writing and talk not only facilitate specific types of learning, but also help emplace structures that enable students to discover how to learn.

Speech, while not identical with thought, provides a means of reflecting upon thought processes, and controlling them. Language allows one to consider not only what one knows but how one knows it, to consider, that is, the strategies by which one is manipulating the knowledge, and therefore to match the strategies more closely to the problem. (Barnes, 1976, p. 98.)
According to Barnes, teachers must facilitate the development of learning skills in their students. Trivial information is not as important as theory. Exploratory language, both verbal and written, facilitates students' attempts to construct theories about how to learn.

Barnes created his own categories to describe the uses of school writing, distinguishing between language that is either "exploratory" or "presentational." Presentational language is characterized by "getting right answers, with satisfying a teacher's criteria, and not primarily with reordering the speaker's thoughts." (Barnes et al., 1986, p. 73) This idea is related to Britton's transactional writing in its concern with external demands to write. Exploratory writing, on the other hand, borrows from Vygotsky's ideas about the relationship of language to learning:

Exploratory talk serves the purposes of understanding, giving the pupils an opportunity to reorder their pictures of the world in relation to new ideas and new experiences. The exploratory uses of language, both in speech and writing, are important because they lead to understanding rather than mimicry. (Barnes et al., 1986, p. 73)

Barnes argues that, as an enabler for learning, exploratory language is more important than presentational language.

Barnes emphasized the ability to describe student learning. His ideas of how language should be characterized were developed into theories of learning: "Through language we both receive a meaningful world from others, and at the same time make meanings by re-interpreting that world to our own ends" (Barnes et al., 1976, p. 101). Barnes' theories were strongly
supported by the research of past psychologists, including Vygotsky, the
cognitive psychologist Bruner, and others, and he was the most aggressive of
the early researchers in describing the benefits of reevaluating the use of
writing in school (Barnes, 1976, p. 114-115). Barnes argued for establishing a
new relationship between students and teacher, and for changing the use of
language in the classroom (Sheeran & Barnes, 1991, p. 108). Writing need not
be represented in schools by a few unchanging genres. Barnes encourages
teachers to diversify the types of writing assignments they use.

Barnes, Britton, and their colleagues established a precedent for curricular
re-evaluation, but their focus was on the written product, and not on the
writing process itself. At about the same time that Britton and his colleagues
were cataloging the writing products of 500 students in England, Janet Emig
was carefully studying the writing process of eight twelfth-graders in Chicago.

Emig had her students participate in “think-alouds,” a system whereby
students tried to verbalize everything they were thinking as they wrote. She
recorded and analyzed the student’s comments by means of an outline of the
dimensions of her students’ composing processes. These dimensions
included such general categories as the context of composing, the nature of
the stimulus to write, the contemplation of product, the seeming teacher
influence on the writing, and the acts of prewriting, planning, starting,
composing aloud, reformulation, and stopping. Emig’s think-aloud research
methodology for describing the writing process significantly impacted future researchers.

Emig incorporated Britton's system of writing functions in her explanation of the writing process, using his conception of expressive writing as a foundation for her own categories of writing. In Emig's system, expressive writing remains as the base from which the other categories arise, but the classifications of transactional and poetic writing are changed. Expressive writing is still writing for the student, unchanged from Britton's theory, but the transactional and poetic functions are renamed extensive and reflexive, respectively.

![Diagram of Emig's modes of student writing](image)

Figure 2.3: Emig's modes of student writing. (1971, p. 37)

Reflexive writing is basically contemplative, while extensive writing is active. These modes differ in some important ways:

- Reflexive writing has a far longer prewriting period; starting, stopping, and contemplating the product are more discernible moments; and reformulation occurs more frequently. Reflexive writing occurs often as poetry; the engagement with the field of discourse is at once committed and exploratory. The self is the chief audience—or, occasionally, a trusted peer.
Extensive writing occurs chiefly as prose; the attitude toward the field of discourse is often detached and reportorial. Adult others, notably teachers, are the chief audience for extensive writing. (Emig, 1971, p. 91)

Emig identified two major modes of writing, but found that of the two, extensive writing, the mode which least engages the student, was the more prevalent type of writing assigned in schools.

Emig concluded from her case studies that the state of writing instruction in the United States was in disarray: teachers of composition were often assigning projects that had rigid parameters and highly selective criteria that students found overly complex (1971, p. 93). Emig's study inferred that writing instruction was a "limited, and limiting, experience." Composition teachers were not using the many modes of writing that were available, and while they were providing their students with a steady stream of extensive writing assignments, they were neglecting the very important writing processes of prewriting and revision. She concluded her study with this charge to the educators of her time:

American high schools and colleges must seriously and immediately consider that the teacher-centered presentation of composition, like the teacher-centered presentation of almost every other segment of a curriculum, is pedagogically, developmentally, and politically an anachronism. (1971, p. 100)

Emig's call for curricular change echoed Britton's and Barnes', and from these three pivotal studies a new pedagogical consensus was formed: a movement to incorporate writing as learning into every discipline. As Britton stated:
It is clear that the part played by memory in the writing process requires much detailed study. There is very little that we can say with any degree of certainty. It does seem probable that under some circumstances the act of writing actually assists the operation of the memory, and also that some things are remembered more clearly and fully from the written record than from the spoken word, but we were not able to investigate these phenomena in our study. (Britton et al., 1975, p. 44)

The call for curricular change and the new emphasis on exploring the writing and learning processes occurred at the same time as contemporary theorists in cognitive psychology were exploring ideas based on Vygotsky's analogy of the Web of Meaning.

In the 1970s, cognitive psychologists were arguing that meaning is represented by bits of information that can stand as independent arguments (Anderson, 1976; Anderson & Bower, 1973; Clark, 1974; Frederikaen, 1975; Kintach, 1974; and Norman & Rumelhart, 1975). These bits can be stored, and then combined in a variety of new and changing ways to form ordered arrangements called schemata. This structuring of schemata offers the basis for processing new information (Rumelhart & Ortony, 1977; Rumelhart, 1980), and several researchers developed tools to measure this act of processing (Langer, 1982; Meyer, 1975; Langer, 1986b; Langer & Applebee, 1987). Glaser (1984) describes how "psychological science is gaining increased understanding of the nature of human thinking and problem solving." (p. 93) Glaser continues in his article to describe ways in which psychology is beginning to understand the learning process, and concludes with the following: 40
Psychological knowledge of learning and thinking has developed cumulatively through S-R formulations, Gestalt concepts, information-processing models, and current knowledge-based conceptions. With deepening study of cognition, current research and development is increasing the likelihood that we can move to a new level of application at which a wide-spectrum of thinking skills is sharpened in the course of education and training... Teaching thinking has been a long-term aspiration, and now progress has occurred that brings it into reach. The cognitive skills developed by people in a society are profoundly influenced by the ways knowledge and literacy are taught and used. We should take heed. The task is to produce a changed environment for learning—an environment in which knowledge and skill become objects of interrogation, inquiry, and extrapolation. As individuals acquire knowledge, they also should be empowered to think and reason. (p. 102-103)

The proponents of the writing-to-learn movement argue that certain forms of writing can produce an environment where students are empowered to think. The idea that writing can affect learning by enabling students to use their skills as “objects of interpretation, inquiry, and extrapolation” is the central focus of this movement.

2.7 Conclusion

The writing-across-the-curriculum movement has its roots in the theories of Vygotsky and Piaget and its catalyst is the work of a few researchers who asked hard questions about how students in the United States and Great Britain were being educated. The physical beginning of the WAC movement, however, stems from a few liberal arts colleges, where new faculty members with access to the works by Britton, Barnes, and Emig were inclined to
experiment with curricular change. This trend shaped the writing movement, and established its most important beliefs. The historical development and spread of the WAC movement is best presented in Randall Freisinger's "Cross-Disciplinary Writing Programs: Beginnings" (1982), Elaine Maimon's "Writing Across the Curriculum: Past, Present, and Future" (1982), Bruce Petersen's "Additional Resources in the Practice of Writing Across the Disciplines" (1982), and Stephen Tchudi's "Teaching Writing in the Content Areas: College Level" (1986).

Piaget, Vygotsky, Britton et al., Barnes, and Emig laid a theoretical foundation for incorporating writing into every classroom and every discipline, and evidence that such a change was needed. This foundation, backed by current theories in cognitive psychology, would support new research as "writing across the curriculum" and "writing-to-learn" became pedagogical catch-phrases. It is not clear, however, how music theory pedagogy relates to the theories of Vygotsky and Piaget. The two traditional theory exercises used in this study, part writing and error detection, involve some degree of writing, but the language being written and read is musical notation. Is music, at its heart, something that can be learned through language, or is it better learned through its own notation? The next chapter examines current theories about writing and learning, and how these theories have been applied throughout the curriculum, even in areas dominated by their own symbol systems, such as music and mathematics.
CHAPTER 3
WRITING-TO-LEARN: CURRENT LITERATURE AND RESEARCH

The relationship between writing and learning has become the focus of a growing number of researchers, and their work plays an important role in this study. Their body of literature can be broadly divided into categories that describe: 1) theoretical relationships between writing and learning, 2) practical application of the writing-to-learn curriculum and, 3) qualitative and quantitative research of the writing process and product. This chapter discusses these areas in detail, and then considers how writing-to-learn has been specifically applied to the non-linguistic fields of music and mathematics. The writing-to-learn exercises and many of the procedures used in this study are based on the research that is presented in this chapter.

3.1 The Relationship Between Writing and Learning

Emig's *The Composing Processes of Twelfth Graders* (1971), and Britton's *The Development of Writing Abilities (11-18)* (1975) present theories about the relationship between writing and learning that have been examined and refined by contemporary educators. Modifications of these theories included such ideas as "Writer-Based" prose versus "Reader-Based" prose (Flower,
1979), differentiating between language for learning and language for informing (Freisinger, 1980), and directing writing towards the instructor audience as dialogue participant or as examiner (Jobst, 1982). All of these modifications, however, retain the idea that some forms of writing are more effective than others for helping students learn.

As the writing-to-learn and writing-across-the-curriculum movements grew in momentum, authors identified philosophical premises that underlie writing-to-learn theory. Martin (1976), generalizing about writing in the classroom, claimed that writing serves a variety of pedagogic functions and most completely fulfills the learning function in any particular academic context. Kinneavy (1980) tied the writing-to-learn and writing-across-the-curriculum movements to rhetorical theory, while Freisinger (1982) claimed that cross-disciplinary writing programs have three premises: 1) language for learning differs from language for informing; 2) the composing process is complex and developmental; and 3) discourse involves a broader range of writing functions and audiences than is normally recognized. Joanne Kurfiss (1985) succinctly characterized the basic theoretical stance of the writing to learn movement:

1. Writing can help students learn and think about content in any discipline, thus helping to achieve the goals of the instructor.
2. Writing used for learning does not require explicit teaching of writing--only use of writing as a pedagogical tool... This model highlights not writing for its own sake, but writing for the discipline's sake, i.e., writing for content mastery. (pp. 3-4)
In other words, the history or mathematics or music instructor has no obligation to teach students how to write, but only to use writing as a tool for learning. Paul Connolly (1989) further explored this idea:

[Writing-to-learn is] less about formal uses of writing to display memory and test mastery than it is about informal writing about language that is forming meaning; about writing that is done regularly in and out of class to help students acquire a personal ownership of ideas conveyed in lectures and textbooks. (p. 2)

Connolly continued by saying that writing-to-learn is not "grammar across the curriculum," nor is it "making spelling count" in a class project (p. 4).

Connolly also theorized about language's role in creating meaning. He concluded that: 1) knowledge is constructed socially within a community; and 2) the materials which construct this knowledge are the symbol systems that create "meaning"—systems such as musical notation, mathematical and scientific symbols, and the graphic arts. The primary source of constructed knowledge, however, is language—spoken or written. As Connolly writes,

While musicians may speak to one another through their notes or mathematicians may spring to a blackboard to talk in numbers, natural language remains the most important mediator of concepts we do not yet fully hold. It negotiates all the necessary integrations between the experiences we have stored in our personal stories and the more abstract lessons that are filed in a culture's various systems of thought. (p. 4)

Language, the mediator between thought and communication (as in Vygotsky's inner speech), is integral to the learning process. According to Connolly, "local" symbol systems, such as notation and numbers, are, for teaching, subordinate to language, which is the primary conveyor of meaning.
Hypotheses of how writing might enhance learning were proposed by several authors, who described in their own terms the interaction between writing and learning, and their perspectives provide a basis for estimating writing's potential impact on learning music theory. Sheridan Baker (1983) explained that writing enhances learning because it:

... teaches us how to move from the circumscribed self-center of childhood and adolescence into mature thinking, how to generalize from our attitudes, emotions, hunches, and private ideas into mature and valid thought. (p. 224).

Similarly, Knowblauch and Brannon (1983) stated that:

Presumably what any classroom seeks to nurture is intellectual conversation, leading to enhanced powers of discernment. Since writing enables both learning and conversation, manifesting and enlarging the capacity to discover connections, it should be a resource that all teachers in all disciplines can rely on to achieve their purposes. (p. 473)

Baker, Knowblauch and Brannon generally assume that writing enables learning through its ability to help students discover connections, but the relationship of learning through writing has been more specifically defined by other researchers, including Emig (1977), Dowst (1980), Boone (1983), Applebee (1984), Gere (1985), and Archambeault (1991). The writing-to-learn principles emphasize teacher and class participation in a shared exchange of ideas so that students will gain a deeper understanding of topics than the simple lecture format can provide. Students learn through writing because they are forced to manipulate information in a personal context. How this occurs is still not fully known, but researchers have examined several theories.
Emig (1977) argued that writing and learning share similarities: both are multifaceted, may be enriched by self-provided feedback, serve an analytical and connective function, and engage and commit the mind in their own particular rhythm (Emig, pp. 5-6). These similarities enhance writing's effect on learning. Kenneth Dowst (1980) claimed that writing created order and focus for any subject. Beth Boone (1983), like Dowst, reported that writing forces students to organize, to look for patterns, and to explain how and why things work.

According to Arthur Applebee (1984), factors that contribute to the positive role of writing in thinking include:

... (a) permanence of the written word, allowing the writer to rethink and revise over an extended period; (b) the explicitness required in writing, if meaning is to remain constant beyond the context in which it was originally written; (c) the resources provided by the conventional forms of discourse for organizing and thinking through new ideas or experiences; and (d) the active nature of writing, providing a medium for exploring implications entailed within otherwise unexamined assumptions. (p. 577)

The physical limitations on thinking required by writing force the writer to concentrate on a subject: reviewing, revising, and actively participating in the communication process itself.

Ann Ruggles Gere (1985) suggests that the writing process requires coordination between hand, eye, and brain:

Writing is uniquely suited to foster abstract thought. As cognitive psychologists and composition theorists have noted, writing is an extremely focused activity which simultaneously involves hand, eye, and brain. The linearity of writing, one word after the other, leads to more coherent and sustained thought than thinking or speaking. The physical limitations imposed on writers make writing a slow process
Betty Archambeault's paper, "Writing Across the Curriculum: Mathematics," (1991) considers two fundamental characteristics of learning that she feels can be influenced by writing:

The first is the purposeful construction of mental connections between the new material and previously stored information. The formation of this schematic organization is essential to long term learning. . . . A second factor essential to the learning of new information is active processing of the material. . . . Active processing occurs as the learner restates information, applies information in different contexts, interprets the information in different words, and organizes the information to represent different points of view. (p. 2)

These factors can be enhanced through the use of writing because

Requiring students to write about content material in the classroom is consistent with these two fundamental elements of learning theory. Writing requires a high level of active processing of information. Unless students are merely copying word for word from printed text, they are translating the new information into their own words, forming connections with previously learned information, interpreting and applying it in new contexts. Writing is also the concrete visualization of content material. The learner is not only making connections, but creating new connections while developing a personal organizational schema. (p. 3)

Creating new connections, constructing meaning and knowledge, and exploring implications are ways to describe writing's effect on learning. These ideas were important to the theory of writing to learn, for it seemed plausible that writing, which is the most specific form of language, could enrich learning in every discipline.

Writing, in general, enables students to grasp new concepts, but the research of Britton and Emig suggest that some forms of writing were more
effective than others. Writing assignments should be developed around a specific pedagogical goal (Connelly and Irving, 1976), because certain types of writing promote certain types of learning (Odell, 1980):

I want to urge that we consider individual writing tasks and try to determine the unique way in which a particular task relates to a writer's attempt to understand a particular subject. More specifically, I suggest that we try to identify the conceptual activities writers need to engage in as they try to understand and write about specific sets of data that are included in specific courses in our own discipline and in other disciplines. (p. 43)

Odell recognizes that the most effective types of writing assignments will vary between disciplines.

Several researchers have examined specific types of writing assignments to determine their impact on learning. Annette Bradford (1983) applied Piaget's developmental stages to integrate theories of how different writing assignments influence cognitively immature students, recognizing that remedial writers need different types of writing assignments than do proficient writers. George Newell (1984) determined through his study that different types of writing (essays, note-taking, and study questions) had different affects on students' ability to integrate knowledge.

James Marshall's 1987 article "The Effects of Writing on Students' Understanding of Literary Texts" presents a practical study of how writing can impact the learning process by studying the effects of three different types of writing assignments on the understanding of short stories in an eleventh-grade English class. Marshall hypothesized that writing enables meaning to be constructed by providing a "blueprint" or "skeleton" which must be
fleshed out to secure meaning (p. 31). Different kinds of writing affect learning in different ways:

... writing takes on several forms in school. Those forms will encourage different modes of thinking and result in different outcomes, depending in part on the constraints and opportunities presented by the writing tasks themselves. (p. 31)

Marshall explored four types of writing conditions: no writing, restricted writing, personal analytic writing, and formal analytic writing. He found that personal analytic writing was as powerful as the more familiar formal analytic writing in helping ... students develop their understanding of the short stories. Both tasks prompted the students to interpret the stories; both encouraged a process of reasoning that included the consideration of textual evidence. Yet the personal analytic tasks allowed the students to draw additionally upon their own histories, values, and sources of knowledge in devising informed but tentative interpretations. Because the form was more flexible, the students could employ in their personal writing a language more clearly consonant with their initial experience of the stories. Because the tasks asked them to address that experience directly, their personal essays were less a report on shared knowledge than an opportunity to begin the process of independent analysis. (p. 59)

Marshall's study proposed that several types of writing did indeed facilitate students' understanding of short stories by providing a structure from which to construct meaning. Written language can increase the number of strands in the web of meaning (to use Vygotsky's analogy), some types of writing create thicker strands than others.

Russel Durst (1987) also investigated the thought processes that students employ when they write analytically. His goal was to provide a clearer picture about how students actually use writing as a heuristic, a "tool for critical
thinking about the subject matter" (p. 347). He was quite concerned about discovering how writing affected thinking, saying that

It has become a truism in the field of composition, and a central tenet of "writing across the curriculum" advocates, to say that such activities help develop critical reasoning skills. Yet despite a widespread belief in the heuristic value of analytic writing, we know little about how students actually approach such tasks. In analytic writing, students employed more varied and complex thinking operations than in summary writing, asking more complicated questions, making higher-level plans, and spending more time interpreting the readings and evaluating their own essays. (p. 347)

Durst argued that analytic writing required students to think more critically and ask harder questions of themselves and their instructor.

Connections. The web of meaning. Constructing Realities. Structuring Schemata. These phrases are all attempts to describe the very intricate way in which we learn about our environment, and all of these have been used to support the claim that language and learning are inseparably linked. If we accept these arguments, the question still remains: how can writing be appropriately used in the classroom? The development of the theoretical framework for the writing-to-learn movement was accompanied by an growing body of literature dedicated to practical applications of the writing-to-learn theory. Teachers offered hosts of new ideas about applying writing-to-learn in various disciplines.

3.2 Practical Application of Writing-to-Learn

Prior to the advent of the writing-to-learn movement pedagogy within most disciplines rarely featured writing as anything but a way to record
information already learned. Walvoord and Smith (1982), looking at traditional teaching methods, stated that “Think, Then Write, was common advice, which rested on a notion of writing as the transcription of thought already formulated, not as a process inextricably entwined with thinking and learning” (p. 3). Among the many articles that give practical ideas for incorporating writing in the classroom, there are two genres of essay that focus respectively on writing in fields other than English and on describing the types of writing assignments available to teachers.

It is important to the writing-to-learn movement for teachers in disciplines other than English to feel comfortable with these new techniques. To this end, many articles describe how to teach and respond to these new writing assignments, such as those by Odell (1979), Raimes (1979), Hamilton (1980), Maimon et al. (1981), Berkenkotter (1982), Drenk (1982), Fulwiler and Jones (1982), Griffin (1982a), MacAllister (1982), Moss and Holder (1982), Schiff (1982), Walvoord and Smith (1982), Rose (1989), and DeNight (1992). Ann Gebhard (1983), for example, described four principles essential to effective writing programs—regard for audience, consequential writing tasks, varied assignments, and imagination. In general, these articles are good resources for the mechanics of how to assign and grade writing assignments, regardless of the academic discipline.

Different types of writing assignments have been proposed to help students learn new subjects. Toby Fulwiler (1980) was the first to champion journal writing as a way to encourage students to write in different

Other types of writing assignments that have been proposed for writing across the disciplines included microthemes (Bean et al., 1982), freewriting (King, 1982), lab reports and letters (Thaiss, 1982), workaday writing (Tchudi, 1986), explanations (Birken, 1989), and divided-page exercises, peer perspectives, and minute papers (Tobias, 1989), to name just a few. A wide variety of writing-to-learn strategies can be found in the essays contained in *Writing to Learn Mathematics and Science* (Connolly and Vilardi, Eds, 1989).

The writing-to-learn movement has been shaped by researchers who first hypothesized about the relationship between writing and learning and then developed practical classroom applications. A few others, however, have tried to prove or disprove the fundamental hypothesis that writing affects learning.

### 3.3 Quantitative Research on Writing and Learning

There has been a constant demand for validation within the writing to learn movement. The early studies by Britton *et al.* and Emig provided a basis for future research, both quantitative and qualitative. S. L. Fletcher (1981) stressed the need for more rigorous theoretical basis and highlighted three areas of need: administrative theory, pedagogic theory, and speculative
theory. Robert Weiss (1983) also posed several questions for further research concerning the experienced-based curriculum. Deborah Swanson-Owens (1986) identified some of the legitimate and unexpected resistance to implementing new curricula and suggested an analytic model for teachers interested in curricular change.

Weiss and Walters tested four hypotheses in a 1979 study that examined 178 students and five teachers. The students represented such diverse academic fields as history, psychology, physical sciences, reading theory and practice, and statistics. The four hypotheses were: 1) the more students write in the various content areas the better they will write; 2) more writing in content areas will reduce anxiety toward writing; 3) as students do more learner-centered writing they will learn more; and 4) the concepts students gain through learner-centered writing will be clearer than concepts they do not write about. The research supported the last two hypotheses, but not the first two. Despite the fact that the students learned more through learner-centered writing; reducing anxiety about the writing processes and improving the writing skills of the students did not result from an increase in writing assignments.

Ann Humes (1983) described the process and subprocesses of writing, describing four phases in writing: planning, translating, reviewing, and revising. Ernest Spencer (1983) evaluated a survey that documented writing in 101 Scottish secondary schools, and concluded from the data that learning can be improved through writing.
Newell (1984) examined the relationship between different types of writing assignments and their affect on learning. He asked students to read a paragraph and then complete one of three tasks: notetaking, answering study questions, and essay writing. He found that students were better able to incorporate and integrate information learned through essay assignments than they were through other written assignments.

Ann Penrose (1986) reviewed past research in a close examination of the claim that writing is a way of learning. She concluded that writing has a general impact on the affective and social dimensions of learning, but more research is necessary before assertions that it affects the cognitive dimension can be fully accepted. Penrose believed that the environment of writing influences learning, but more studies are needed to prove the argument that writing actively promotes learning.

Langer and Applebee (1987) examined writing assignments to assess their value in fostering learning and integrating new information with previous knowledge and experience. The report used a two-pronged analysis: one prong examined the thinking and learning processes involved in various writing tasks; the other examined writing and learning in collaborative classroom settings. They concluded that activities involving writing lead to better learning than activities involving reading and studying only.

Robert Tiemey (1989) examined 137 undergraduate students in twelve treatment groups. These groups participated in a combination of introductory activities, reading activities, and questioning activities. Tiemey found that
reading and writing in combination are more likely to prompt critical thinking than when they are separated from one another.

Lloyd Johnson (1991) studied the effects of using essay questions on Algebra tests. He found that these questions, if the students have been prepared to write them, can effectively increase achievement. Kenneth Licata (1993) researched the relationship between students' grades and writing about mathematical relations in a high school science course. He concluded that writing-to-learn exercises have a rich potential for use in the classroom.

The body of quantitative research is small, especially given the enormity of the writing-to-learn movement's claims. It has been difficult to develop tools that accurately identify the true cause of learning. This difficulty has led to the development of sophisticated qualitative measures, and specifically, the protocol analysis of think-alouds, that is, the evaluation of students' spoken thoughts as they undertake a specific task.

3.4 Qualitative Analyses

A variety of qualitative procedures have been developed to measure the relationship between writing and learning, but think-aloud methodology has become one of the most important means of evaluation. This process requires subjects to speak their thoughts as they undertake a specific task. Researchers assume that these spoken thoughts closely track true thought patterns and that this procedure actually records the subject's mental processes. A variety of measures, generally called protocol
analyses, can then be applied to the transcripts so that objective assessments can be made. Peter Smagorinsky (1994) provides an excellent introduction to the challenges and rewards of the think-aloud methodology.

Analysis of thought process through think-alouds has its roots in the early part of this century (see Duncker, 1926, and Claparede, 1934, for example). The specific type of data manipulation known as protocol analysis was developed by Newell and Simon (1972). In this procedure a think-aloud transcript is categorized into different cognitive processes; these processes are then evaluated according to the researcher's needs (such as examining order, number, or hierarchy of the cognitive processes). Emig (1971) had collected data through a think-aloud procedure, but did not subject her data to rigorous analysis. Linda Flower and John Hayes helped define this methodology through a series of studies that established standards for conducting think-aloud protocols (Flower & Hayes, 1977, 1980a, 1980b, 1981a, 1981b, 1981c, 1984; Hayes & Flower, 1980). Some of the most prominent research in the area of writing-to-learn has incorporated the protocol analysis, such as the studies by Newell (1984), Langer (1984, 1986a, 1986b), Durst (1987), Langer and Applebee (1987), Marshall (1987) and Sweigart (1988). Each of these studies used protocol analyses to differentiate various thought processes in an attempt to discover just how writing affects learning.
The proponents of writing-to-learn claim that writing has a positive interaction with learning. The relationship between writing and learning is complex, and writers have examined this relationship through a variety of paradigms, including traditional research methodology and sophisticated protocol analyses. Most of these writers, however, have been from fields within the humanities. Does the relationship of writing to learning change when the discipline uses non-linguistic symbols? Very little has been written about writing-to-learn in music, but the field of mathematics has examined this question of applicability in some detail.

This chapter will conclude by examining the few studies that link writing with music. It will then explore relationships between teaching basic mathematics and basic music theory to see if this research has value for the present study, and will finally examine recent research about writing in mathematics.

3.5 Writing-to-Learn in Music

A few articles report studies that apply writing-to-learn to music instruction, but there are only two that apply writing specifically to the music theory course. Clearly, the writing-to-learn movement has had little impact on music theory pedagogy.

Jane Ambrose, in her article entitled "Music Journals" (1987) described several journal assignments given to a music appreciation class and a Western music survey class. Her assignments for journal writing include
concert reviews, reactions to new music, and descriptions of music in the students' own language. Larson and Merrion (1987) describe several procedures to incorporate expressive writing in a fourth grade music class. The authors found that journal writing in the music classroom produced these worthwhile results: students gravitate towards musical association, finding new ways to describe the sounds they hear; they shift from creative writing to aesthetic writing; and they become more receptive to the whole process of expressive listening/writing. Bergee and Crawford (1995) integrated writing-to-learn exercises into an eighth-grade band program.

Deron McGee's "The Power of Prose: Writing in the Undergraduate Music Theory Curriculum." (1993) is one of the first articles to address writing-to-learn in the music theory classroom. This article is, however, introductory, and does not detail the characteristics that separate music theory from other disciplines. While McGee offers general ideas, he does not address how specific writing assignments can enhance learning in the music theory classroom.

Davidson, Scripp, and Fletcher applied reflective writing to teach their students sight-singing skills at the New England Conservatory of Music. Their article "Enhancing Sight-Singing Skills Through Reflective Writing: A New Approach to the Undergraduate Theory Curriculum" (1995), claims that questionnaires, journals, and writing about practice sessions improved their students' skills and attitude:
The commitment to reflective writing in the basic skills courses in the New England Conservatory's curriculum has, in turn, supported new levels of understanding of the cognitive nature of basic musical skills. Teachers are more aware of the range of students' understanding, while students, through their own practice and reflective efforts, learn to use and expand their notions of the new performance skills. (p. 3)

They assert that reflective writing provided students with the ability to:

- develop ideas about skill acquisition
- think critically about progress with their course work
- develop and monitor practice strategies
- continually update personal goals
- develop a framework for progress beyond issues of accuracy
- create a context for comparing instruction and pedagogy within and across sections of the course, classes, schools and even countries
- generalize from sight singing to other musical skills, and
- draw new conceptual distinctions that differentiate craft and artistry, innate and acquired skills, process and result (p. 23)

They concluded that reflective writing helped their students to "have a better chance of using their newly acquired skills in the service of broader musical understanding and goals" (p. 25). They found that students' understanding of music, and specifically of aural skills, was enhanced through the use of writing.

The field of music has been largely ignored by both the writing-to-learn movement and the writing-across-the-curriculum movements, and because of its reliance on musical notation and special analytic symbols, the discipline of music theory has been almost completely isolated from the influence of these movements. Only a few pedagogues have attempted to integrate the principles of writing-to-learn into the music theory classroom. Because of the absence of information on the use of writing in music theory, one must rely
on disciplines such as mathematics that seem to share pedagogical characteristics with music theory.

3.6 Similarities Between Music Theory and Mathematics

How similar are courses in basic music theory to courses in basic mathematics? Pedagogues in the field of mathematics have studied the problem of applying writing-to-learn principles to a subject that is at times completely non-linguistic. The following excerpt, taken from Keith and Keith (1985), could also be applied to the field of music theory:

As disciplines, mathematics and English have very few touching points, and many practitioners in each feel profound insecurities and anxieties about the other's subject matter. Furthermore, mathematics has traditionally been taught either by lecture or through programmed sequences of problems, or by some combination of the two, and this system has never found much use for the elaborateness of the discursive and even explorative form of writing activity. (p. 1)

Music theory courses, like the mathematics courses described above, are also taught through both programmed sequences of problems and lectures, and have rarely used writing activities as a pedagogical practice.

Mathematics and music theory share other classroom concerns beyond the preferred method of transmitting information. Math educator Mike Bethesda voiced a concern that also applies to the music theory classroom: the dilemma of covering the amount of material that needs to be covered. R.H. Weiss (1980) tells of Bethesda's participation in

. . . . a department meeting at which a major concern was "the overwhelming burden of the material that 'should' be covered in a
plane geometry course. . . . We are concerned with allowing time to teach topics presently and embarrassingly not covered. (p. 48)

The curricular time crunch is one that music theory teachers must face. Often the music theory sequence is structured so that different classes of the same course are taught by different instructors who must cover the same material so that students are not disadvantaged if they are forced to change sections between academic periods. Mathematics, then, is similar to music theory in both its mode of presenting information and in its time constraints.

The Weiss article described above reports a large case study of how several high school teachers used writing in their classrooms to promote learning. These included both math and geometry teachers. The coordinator of the project noted that

Perhaps because literacy is so different from “numeracy,” writing so alien to teaching and learning mathematics, inventiveness was a peculiar requirement of math teachers in the project. . . . It was Mike who observed that math students commonly learn procedures without understanding the mathematics involved. He didn’t cry “Eureka!” but he acknowledged with evident relief that when he had students explain in writing what it was they did when they worked equations, they began to understand the mathematics. (p. 32)

Music theory students, like these math students, commonly learn procedures without understanding the theory involved. It is even more critical for music students to understand the theory behind the procedures, because these procedures emphasize generalities; the music itself is often full of contradictions and exceptions. In math, two plus two always equals four, but in music two plus two equals four only if the context allows. The contextual nature of music theory is one characteristic that separates it from the field of
mathematics. Moreover, this characteristic reinforces the need for music students to know the theories behind the procedures, and not just the procedures themselves. If writing-to-learn can improve theoretical learning in the mathematics classroom, is it not reasonable to assume that the same might be true in music theory?

3.7 Writing-to-Learn in Mathematics

How does writing improve theoretical thinking? Boone presents a specific example of how writing improved theoretical awareness in her mathematics class:

I have always heard that the best proof of understanding an idea is found in the ability to write about it clearly; thus, I require my Algebra II/Trig students to write rulesheets periodically throughout the school year. Rulesheets are essentially summaries, in the students' own words of procedures involved in solving problems. . . . If a student has misunderstood something, I will see it in his rulesheet and be able to help. In order to write a rulesheet, the student must organize what he or she learns. For many students, this is the first time they have consciously been forced to look for patterns, to explain how and why things work, rather than just to do problems by rote. (Boone, 1983, p. 35)

Keith and Keith (1985) echo this sentiment, stating that . . . with the growth of the idea that writing can be an effective instrument for learning, and particularly as a result of cross-curriculum writing workshops, there is a growing interest in how writing activities might complement present teaching techniques and improve learning in mathematics. In fact, writing assignments may address in a unique way the main problems facing the mathematics teacher: helping students to read texts, teaching them how to learn a new concept and recognize when they have understood it, and encouraging students to learn in such a way that they retain the material for the next courses in the mathematics sequence. (p. 2)
Retention is very important to music theory, for the concepts continually build on one another. Might writing improve retention, or are traditional theory exercises more effective?

Keith and Keith’s paper focused on writing's effect on two issues that they considered crucial to the mathematics classroom: the "importance of assignments that translate visual identification into verbal description, and of assignments that stimulate the growth of skill in explicitly algorithmic thinking and procedures" (1985, p. 3). Music theory instruction is dominated by the need to develop the ability to understand, to identify, visual symbols. The written representation of music theory constructs involves a system of encoded symbols that represent various ideas, just as in mathematics.

Some mathematics professors have expressed reservations about using writing because it cannot supplant the necessary graphic representations. Archambeault (1991) made a valid point when she noted that

In particular, mathematics teachers are often reluctant to integrate writing activities into regular classroom instruction. Some mathematics teachers have suggested that writing activities have limited application in mathematics classrooms because of the highly symbolic nature of the subject and because mathematics does not rely on lengthy text passages to communicate information. (p. 2)

Basic music theory is first and foremost about reading and manipulating musical notation, and written prose does not immediately fit into this picture. This does not mean, however, that writing has no place in the music theory classroom. Keith and Keith defended the use of writing in a symbol dominated subject:
Most mathematics courses describe procedures and then provide many practice problems which require an understanding of those procedures to carry out. The student will, in many if not most cases, have to explain the procedure to him/herself and evaluate that explanation and refine it in order to learn the procedure, but rarely, if ever, is there much opportunity for student-teacher interaction at that crucial stage of learning. As a result, mathematics seems to be a foreign language in an unfriendly country into which the students are thrust as tourists. (1985, p. 3)

In other words, writing may be a way to enhance the students' growing familiarity with a new, symbolic, language. Archambeault agreed with this principle in her paper:

Although writing is difficult for many students and teachers, it is generally viewed as a more achievable task than mathematics. Using writing activities in the mathematics classroom is not the only way of enhancing the learning of mathematics, but is also a way of making mathematics seem more "reachable" to those students who have labeled themselves as "math illiterates." (1991, p. 3)

One of the greatest struggles that music students have with music theory is its abstractness and its set of constructs that most students must learn for the first time. Writing may be a key to easing this struggle.

Keith and Keith make the following conclusions about the overall effect of writing exercises in their mathematics classes:

1) They improve class participation.
2) They create substantial hurdles for even the good students and thus broaden opportunities for conceptual growth even for the better students in a course.
3) They stimulate meaningful discussions of mathematics as a language and of strategies for learning it. They break down the fear-barriers of math as a "special," sacred language isolated from the "real" world.
4) One is led to emphasize kinds of writing given less emphasis in orthodox writing-across-the-curriculum projects. Research projects and journal assignments have been unwieldy in the ten-week college-course framework. The most useful assignments have been
those that get at the students' grasp of concepts on the spot in class and overnight, and those that anticipate material to be covered the next day. Having the students write to other specific audiences than the teacher forces them to write more explicitly and to grasp the need for explicitness.

5) Above all, they force one to consider curriculum implications, particularly the way the difficulties with writing in mathematics illuminate a basic problem in the design of the curriculum for teaching mathematics in college where departmental controls and tight schedules provide little room for the kind of discursive trial-and-error approach to learning that writing assignments can make available in the mathematics class. (1985, pp. 8-9)

My own personal experience in applying writing to music theory courses echoes almost exactly the conclusions that Keith and Keith noted, but anecdotal evidence is not conclusive enough to make broad claims for the use of writing in the music theory classroom. For this reason, this study will attempt to discern whether writing can actually be an effective, efficient way to teach music theory, compared to the more traditional exercises used in the music theory classroom. Chapter Four examines two of these traditional music theory exercises: part writing and error detection.
CHAPTER 4
TRADITIONAL TEACHING METHODS IN MUSIC THEORY

Two widely used methods for teaching music theory, four-voice part writing and error detection, have gained favor. These pedagogical exercises have a long history in the theory classroom and require a thorough knowledge of the musical subject. Given any applicable theoretical topic, both demand that the student know how a construct is formed, and how it functions within a musical context. Students can demonstrate their understanding of certain constructs by correctly completing either of these exercises. Part writing and error detection differ, however, in the amount of creativity allowed the student.

The pedagogical use of these two methods has such a strong tradition that few studies have attempted to measure their effectiveness. This chapter considers factors involved in part-writing and error-detection exercises, and reviews studies that have investigated the pedagogical power of these exercises. Finally, the question of whether or not musical notation constitutes a "language" is raised.
4.1 Creative Four-Voice Part Writing

The usual starting point for basic music theory instruction begins with teaching the standard conventions of the Classical period. A basic literacy in the harmonic conventions of this style period, for example, can be logically extended to introduce students to the increased complexities of the music of later periods. The Classical period favored strong chord root relationships and full sonorities; it added to the previous century's emphasis on counterpoint a new emphasis on chord progression. As Johann Philipp Kirnberger (1776) stated:

Simple plain counterpoint can be for two, three, or four, or more voices. It is best to begin with four voices, because it is not possible to write for two or three voices perfectly until one can do so for four voices. (p. 159)

Kirnberger's enthusiasm for four-voice writing reflects the growing importance of chord structure in music. The part-writing exercise evolved from counterpoint exercises of the previous era, and, because of the increased importance of harmonic motion, four-voice exercises became the norm. Writing for four voices allows the construction of triads with one doubling, and the full construction of seventh chords—in other words, it facilitates a complete harmonic environment.

The goal of the "creative" part-writing exercise is to put a specific chord or a series of chords into a context that is stylistically plausible. To do so students must understand what chords could possibly precede and follow the target chord, and how the individual voices of that chord could be approached and
resolved. The notation typically corresponds to ranges that reflect soprano, alto, tenor, and bass voices, and vertical and horizontal spacing of notes must be historically appropriate. The exercise allows students to manipulate the full texture of chords in a context that is still manageable.

The value of part-writing exercises has, for the most part, been assumed, with centuries of tradition behind their use. It seems rather obvious that one of the best ways to teach students the craft of music is to allow them the work in the medium of notation. The individual note must meet several criteria, as Stephenson (1995) explains: "Normally it must at least (1) fit the current scale, (2) form a consonance or dissonance appropriate to the context, (3) contribute to an overall melodic shape, and (4) fulfill its unique tendencies as a particular scale degree" (pp. 109-110). Stephenson's criteria highlight several reasons for the pedagogical success of the part-writing exercise. First, students must realize that the notes fit into the current scale, which usually reflects the key or mode of the exercise. This limits the choice of chords because these should fit into a single key scheme (unless, of course, the purpose is to modulate). The key establishes the appropriateness of certain harmonic progressions. Second, students must realize that the notes fit contextually within the framework of consonance and dissonance. Dissonance requires careful treatment, perhaps as part of seventh and chromatic chords (Gauldin, 1988). Dissonance limits the voice-leading options the student has. All the notes should move according to stylistic norms, creating a smooth melodic contour for each voice line. The student's successful assimilation of this
information for specific constructions shows a thorough knowledge of that item.

Part of the power of part writing lays in the creativity it inherently requires of students. Given a blank staff and a few guidelines, the student is free to explore possible ways to complete the assignment. Rarely will just one solution be appropriate—quite commonly multiple solutions are possible. It remains for the student to decide how to solve the puzzle, and it is this decision-making process, of planning ahead and revising the product in process, that makes part writing so powerful. Students must actively engage themselves in the process, simultaneously reviewing past information and integrating it with the new to form a novel solution to the musical problem.

Part writing exercises can be structured in a variety of ways, with the students receiving one or more pieces of information: key, chord progression, starting and ending chords, bass line, soprano line, figured bass. As the parameters for the assignment increase, the amount of creativity and freedom the student has decreases. Some music educators have argued that students learn best through part writing when given the greatest amount of freedom (Walton, 1961; Walton, 1965; Benjamin, 1989).

Current research has examined part writing as a group activity (Zbikowsky and Long, 1994), as a tool for teaching species counterpoint (Mancini, 1989), and vice-versa (Stephenson, 1995), and as a way to incorporate Schenker's theories of music into the basic classroom (Halasz, 1988). In the history of music education in this century, part writing has often been specifically

Because part writing is such an established pedagogical technique, it has often come under fire, especially if the part-writing exercises are used to the exclusion of other musical exercises. Young (1950) argued for an expansion of musical activities, stating that: "Theory teachers have often restricted their class work to writing in a traditional manner for a four-voice chorus. The intense concentration required to obtain a reasonable proficiency in this style has excluded many more worthy class activities (p. 10)." Watson (1966) rails against four-part writing because it is too traditional, suggesting instead a curriculum based on twentieth-century stylistic genres. On the other hand, others have identified the ability to write in the four-voice style as an important precursor for the college music major (see Quincy, 1986, and Garland, 1952, for example).

The textbook for the sophomore music theory course, *Harmony and Voice Leading*, 2nd ed. by Aldwell and Schachter (1989), incorporates various types of part-writing exercises into its format. Examples of these types can be seen in the five exercises at the end of the chapter on Neapolitan chords. The first exercise asks students to write brief phrases or progressions that include the Neapolitan chord in a variety of contexts (the contexts are given in the text, ex: bII6-V). The second asks students to write chromatic scales, and the third and fourth ask students to harmonize a melody. The last exercise provides a
figured bass exercise to be completed. All, except the second, involve part writing, the only difference being the amount of information and type of context given to the student. An informal sampling of numerous other music theory textbooks revealed that part writing is an important component in each.

In this study, students were given a grand staff and one theoretical construct that they were to include in their progression, allowing them a great amount of creativity and freedom as they chose the context for the chord in question.

4.2 Error-Detection Exercises

Error detection is to some extent the final culmination of part writing. The context is completely written out; the student must simply determine if that context is appropriate. Error detection provides no room for creativity, but instead tests the student's ability to look at a score and ascertain if something is wrong. This exercise often has an aural component--the students hear the chords being played as they watch the score. The exercise becomes a way for students to calibrate their eyes and their ears, so that they can detect if they are hearing what they are seeing. This procedure, like voice-leading, has become an important traditional method for learning music (Kuntz, 1950), (Ramsey, 1981), and (Decarbo, 1982). Because error detection often involves listening as well as watching, it is often suggested as an exercise in aural skills, sightsinging, or conducting texts.
The detection of errors in a given chord progression requires a sharp eye and keen ear. The student watches for errors as the progressions are played, catching them either by sound or sight. The student must have a thorough knowledge of harmonic context and voice-leading tendencies—just as in part writing—but the decision-making process is severely reduced, since no planning is required by the exercise. Instead of trying to come up with one of many possible solutions, the student simply determines if the solution is in some way inappropriate.

The error-detection treatments used for this study were variants of the traditional model. The errors were embedded in the musical score; the instructors played the score exactly as written. While the aural experience should have alerted students to trouble spots, they could have conceivably found the written errors without the aural component. This strategy was adopted for a specific reason. I did not want to test students' dictation skills, but rather their ability to identify specific pieces of information about three harmonic constructs. A more traditional error-detection exercise would have measured the student's ability to hear chromatic chords; the variant used in this study measured students' ability to recognize the chords by sight. Thus, it matched more closely the other two treatments used in the study (see chapter five for a full description of these treatments).

Error-detection exercises are not included as part of the end-of-chapter exercises contained in Harmony and Voice Leading, but such exercises were incorporated into the music theory sections taught at The Ohio State
University. This technique was also familiar to the students from their aural skills classes. The error-detection exercises in this study consisted of from four to eight musical progressions, most of which contained errors. The instructor played through these progressions and the students watched them to detect and circle any mistakes. Thus, the students were using their "mind's ear" to help them detect the errors in the short musical examples.

4.3 Notation—The Language of Music

A major reason for the long-lived positive view of part-writing and error-detection exercises is that they force the student to deal with the visual symbols of music—notation. Part writing requires the student to actively create a complex musical setting, while error detection requires the student to analyze an existing setting. In either exercise the student must interpret the notation symbols in a specific context. The students are dealing, without any mediator (such as language), with music as it exists in notation. As Marion Flagg writes:

The process of musical learning, then, inevitably and by virtue of its functioning out of its own significant structure, is not complete until its "constituent elements," . . . are focused, summarized, and defined, in the symbols of the written language of notation." (1949, p. 7)

According to Flagg, students can not completely understand music until they write it—in notation. Frederic Homan extends this idea, using language as a foil to music:

Because music is so abstract—you can not touch or smell it, only hear it—we tend to listen as though we were having some sort of tonal bath.
We hear the sounds in our head. Unlike words, there is no dictionary to define or explain what the sounds "mean." We simply react to the sounds. The music washes over us and soon fades away leaving us pleased or irritated, interested or bored, elated or indifferent.

Similarly, when we learn to perform a piece of music we tend to move from note to note—in effect reading letters, not words—until the music is learned technically and somehow it begins to "make sense."

The problem to be addressed in [music theory] is, very simply, how sounds are put together to create music. The process is two-fold: what we hear when we listen to music and what we see on the printed page when we are performing. We seek to develop more awareness for ourselves of these two aspects of music. (1980, p. 1)

Homan and Flagg argue that complete learning does not take place in music theory until students can adequately express themselves in notation. These attitudes are in direct opposition to what some of the writing-to-learn theorists have said. I return to Connolly’s statement from Chapter 3:

While musicians may speak to one another through their notes or mathematicians may spring to a blackboard to talk in numbers, natural language remains the most important mediator of concepts we do not yet fully hold. It negotiates all the necessary integrations between the experiences we have stored in our personal stories and the more abstract lessons that are filed in a culture's various systems of thought. (1989, p. 4)

Is language, and therefore writing, the basis of all learning, or does music, with its own symbol system, present a learning challenge that the proponents of writing-to-learn have never considered?

While language is undoubtedly necessary for communicating ideas to students, it might not be the most effective way of solidifying musical ideas. Submersing oneself in the music itself—learning to work in the written language of music—might be more effective. The preface of *Harmony and Voice Leading*, 2nd ed. discusses the idea of learning a musical "language":

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There are no shortcuts in learning music theory--especially in the development of [part-] writing skills. If twentieth-century students wonder why they need to master such skills--why they need to take the time to learn a musical language spoken by composers of the past--they can be reminded that they are learning to form the musical equivalents of simple sentences and paragraphs. The purpose is not to learn to write "like" Mozart or Brahms, but to understand the language the great composers spoke with such matchless eloquence, the language that embodies some of the greatest achievements of the human spirit. (Aldwell and Schachter, 1989, p. vii)

"Writing," or part writing as the context of this passage suggests, is an integral part of the pedagogical focus of this textbook. The authors have decided that only through this practice can students "learn the language" of the music of the common practice period.

So which language helps us to learn music theory best? Is it the language of prose, that which enables us to communicate to others our thoughts and feelings, or is it the written language of music, where no fact exists outside of context, and where meaning and communication are ephemeral objects, never to be truly obtained? That is the question that this study directs its attention to. The following chapter outlines the experimental procedures that were used to explore the differences between writing-to-learn, four-voice part-writing, and error-detection exercises.
CHAPTER 5
THE METHODOLOGY OF THE INVESTIGATION

This study uses both qualitative and quantitative research methods to test the hypothesis that writing-to-learn exercises provide an effective and efficient way to teach music theory. Thus, it is necessary to describe the design, procedures, treatments, instruments, materials, measures, participants and setting for this study. For the sake of expediency some supporting materials are placed in appendices.

Three learning paradigms were used as treatments for both the qualitative and quantitative studies: a) short, ungraded writing-to-learn exercises; b) voice-leading exercises; and c) error-detection exercises. Voice-leading and error-detection activities are common teaching tools in the music theory classrooms while writing-to-learn activities are not. This study explores the efficiency of each treatment in an effort to determine whether or not the short writing-to-learn exercises compared favorably with the traditional classroom practices.
5.1 Design of the Quantitative Intervention

The treatments (A, B, or C) were administered through the crossover design shown in Figure 5.1, with the intervention based on a mixed effects model. Factors analyzed in this study include the treatment mode (A, B, or C), student grade history for the previous year of music theory courses (in GPA, 0.0-4.0), student's musical instrument (instrumentalist, keyboardist, or vocalist) and gender, resulting in a 3x4.3x2 factorial design.

<table>
<thead>
<tr>
<th>Intervention 1</th>
<th>Intervention 2</th>
<th>Intervention 3</th>
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<tbody>
<tr>
<td>P₁X₁O₁</td>
<td>P₂X₂O₂</td>
<td>P₃X₃O₃</td>
</tr>
<tr>
<td>7:30 Group:</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>9:30 Group:</td>
<td>A</td>
<td>B</td>
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<tr>
<td>12:30 Group:</td>
<td>C</td>
<td>A</td>
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<tr>
<td>3:30 Group:</td>
<td>B</td>
<td>C</td>
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Figure 5.1: Design of the intervention

In this design the groups represent the different class sections, Pₙ represents the pretests administered prior to each treatment, Oₓ represents the post-test administered after each treatment, and Xₙ represents the treatment (A, B, or C) as shown.

The crossover design has been described as having "... excellent internal validity because history, maturation, regression, selection, and mortality are all generally well-controlled" (Best and Kahn, 1993). Because university classes were used as the experimental groups, random assignment of
treatments was not possible. However, the crossover design helped to control for any problems caused by the lack of randomness. The intervention times each involved different materials, so my research also incorporated an equivalent materials design to insure that the particular topics being studied at the time of the treatments were as "equal as possible in interest to the students and in difficulty of comprehension." (Best and Kahn, 1993) The topics chosen were the Neapolitan six chord, the augmented sixth chords, and the common-tone diminished seventh chord. While these chords differ in structure, they share common features: they often resolve to V, they use chromatic spellings, and the chords themselves can often be reinterpreted depending on context. This study assumes that these topics were of equal interest and difficulty for the majority of the students. Order effect--a concern in any rotation design--was limited here by creating treatments that would not interfere with each other and by allowing an optimum time lapse between the treatments. Instructor variability was of great concern, and although the crossover design helped to diminish the effect of this variability, a training session was provided for the instructors as a precaution. The instructors were also required to create and follow a guide for parallel lessons before each treatment application. This guide helped to control the class content, as defined by Bloom's taxonomy (1956).
5.2 The Treatments

The three treatment conditions used in this experiment involve in-class exercises designed to help students learn harmonic constructs, and all require putting pencil to paper. Music theory is similar to mathematics at a basic level in that lectures have limited applicability. While a lecture can lay out general principles, the students can usually master the concept only through repeated practice. This study compares a new practice exercise to two exercises that students have traditionally had available. The three treatment exercises are described as follows:

5.2.1 Short, ungraded writing-to-learn exercises. In this treatment students were asked to define or explain theoretical ideas to specific audiences by completing the following tasks: (Assignment 1) Describe to yourself as many ideas as you can about the purpose, structure and function of the topic; (Assignment 2) Describe to a hypothetical friend in Music 223 (the previous theory course) the purpose, structure, and function of the topic. These tasks were followed by another: Describe the most important question you still have about the topic. The tasks were chosen from a wide range of writing-to-learn exercises (discussed below) after initial research indicated those that were most appropriate for music theory topics. Appendix A shows the specific questions used for each of the topics tested.
Theory is a difficult discipline to teach. While there are teachable fundamentals, students have to learn that context creates exceptions to every rule:

Of course, one purpose of theory courses is to teach data and terminology—the proper names for processes and events—so that communication and discussion about pieces can take place. But a more substantial and inclusive view of theory should also admit the possibility of learning how to ask questions as well as how to answer them. In fact, one of the most important goals of any theory class ought to be discovering which questions about music are most worth asking in the first place. (Rogers, 1984, p. 5)

The writing exercises for this study were designed to reflect the type of exercises that earlier researchers (Applebee, 1984; Newell, 1984; Tierney, 1989; Johnson, 1991; and Licata, 1993) had found most effective for learning. Recalling Britton’s functional categories, the method least likely to be used in school is expressive writing, “writing close to the self, carrying forward the informal presuppositions of informal talk and revealing as much about the writer as his matter” (Britton et al., 1975, p. 141). The writing-to-learn movement tries especially to use this type of writing in the classroom—writing that is for the student, rather than the teacher:

This model highlights not writing for its own sake, but writing for the discipline’s sake, i.e., writing for content mastery. One characteristic of writing used in this way is that most of it is not graded, and only some of it is even “examined” by the instructor. (Kurfiss, 1985, p. 3)

A large number of ungraded writing activities have been proposed by writing-to-learn researchers, but there are elements that apply to all successful writing exercises. One of these is that the writing is “learning-centered”:
The essential purpose of such writing is to answer either or both of two related questions--how well am I the learner learning something, or how well can I express something being learned--or any variation of them. Personal revelation is encouraged, even when the writing responds to specific queries or readings, as is not the case in most college or school writing. This kind of writing is what we define provisionally as learning-centered. (Weiss and Walters, 1979, p. 4)

Weiss and Walters asked the following questions after every treatment application in their study: “Which concept dealt with in today’s class is most clear? Which is least clear?” They found that these types of ungraded assignments did improve students’ learning.

Another characteristic of successful writing activities is that they focus on the writer. Marshall (1987) found that personal analytic writing was as powerful as formal analytic writing because it gave students the opportunity to undertake independent analysis. Extended writing also had a statistically significant impact on learning compared to fill-in-the-blank exercises. Marshall’s personal writing assignments asked students to “explain and elaborate upon their responses to the story, drawing on their own values and personal experience to make sense of their reactions to the text” (1987, p. 43).

Another requirement of successful writing activities is that students have the opportunity to discuss the issue in their own language and structure, even if the subject is highly technical. Licata (1993) used an experimental paradigm to examine the “efficacy of higher level writing (application and analysis)” in a high school science class, and found that free responses had a positive impact on student learning. He presented the following tasks:
In one sentence, tell all you can about the relation between the pressure and the volume of a confined gas.

In one sentence, tell all you can about the relation between the volume and the temperature of a confined gas. (1993, p. 118)

These writing activities were designed to help students understand technical, non-linguistic concepts.

A goal of the present investigation is to see if writing-to-learn activities have an impact on how music students learn music theory. The writing treatments were designed, therefore, to resemble the above examples, which showed positive results in other disciplines. To increase the likelihood that students would write for themselves rather than for the teacher, the treatments were presented as ungraded activities (Kurfiss, 1985). Following the example of Newell (1984) and Weiss and Walters (1979), the writing questions were designed to be learning-centered, i.e., the questions asked the students to relate to the new topics in their own language, to help them focus on what they know. The writing treatments were open-ended and extended (Marshall, 1987), and comprehensive within a specific content idea (Licata, 1993). Specifically, these questions took the following form:
Answer the following questions as completely as possible, not worrying about spelling, grammar, or even about having complete sentences. Put down as many ideas as you can, even if you’re not sure they are completely correct. There will be time in class to discuss these questions after you’re done answering them.

(First application)
Describe to yourself as many ideas as you can about the purpose, structure and function of [selected topic]. What is the most important question you still have about [selected topic]?

(Second application)
Describe to a hypothetical friend in music 223 the purpose, structure, and function of [selected topic]. What is the most important question you still have about [selected topic]?

Figure 5.2: Instructions for each of the two writing applications.

The first task asks students to catalog newly received information in their own language and syntax with themselves as audience. This maximizes the possibility that the question will elicit the type of writing that proved so powerful in other studies. The second task again asks students to recall newly learned concepts, but this time in an organized and prioritized fashion so that they may explain the topic to another student with almost as much experience in music theory as they themselves have. This activity asks the student to analyze the information they have, and to engage in analytic writing as described by Licata (1993). Both activities end by asking the students to determine the concepts that are still unclear, helping them to assess what they do and do not know.
5.2.2. **Creative part-writing exercises.** In this treatment, exercises asked students to put harmonic constructs into a limited, written musical context of their own creation that incorporates the four-part voicing style characteristic of the Classical and Romantic periods. This is a common exercise because it requires the student to use the new construct in a context that is both musical and manageable. The topics chosen for this study are chromatic chords that must be handled with specific stylistic restrictions. The voice-leading exercise tests students to see if they understand the restrictions under which these chords can be used.

The voice-leading activity also allows the students to analyze the information they have, but writing about this information is done in notation rather than prose. The students must use some creativity to complete the activity because there are usually several ways to construct a correct solution. These exercises were developed with the course textbook in mind and with the help of the course coordinator. Appendix B shows examples of this treatment for each of the three theory topics.

5.2.3. **Error-detection exercises.** Initially this treatment exercise asked students to examine eight separate four-voice progressions and to identify mistakes (if any) by circling them. Six progressions had only one obvious mistake, although one mistake in chord spacing or voice-leading often resulted in multiple errors. Two of the eight progressions were entirely correct. The students identified correct progressions by placing a star next to
them. After the first treatment period the number of progressions in the
treatment was reduced to four (with one correct example). This redirection
was effected primarily because the coordinator of the course expressed
concern about the excessive amount of time it took students to get through
each of the error detections. The students were not proficient at error
detection so the number was reduced to match the amount of time required
by the other treatments. The impact was negligible, since the students were
typically only able to complete half of the eight-example exercises anyway.
These exercises were also developed with the textbook in mind and with the
assistance of the course coordinator. Appendix C shows examples of this
treatment for each of the three constructs tested.

5.3 Participants and Setting

The participants of this investigation were students enrolled in the
Autumn 1995 sections of Music 421, the fourth of a six-quarter theory
sequence at The Ohio State University's School of Music. This setting was
appropriate for many reasons. This course offers a large sample of students
engaged at an appropriate level (as defined by Best and Kahn, 1993, p. 19).
Music 421 begins to deal fully with contextual theoretical concepts that are
complex and difficult to teach. Moreover, these fourth-quarter students,
usually Sophomores, have had time to adjust to both University and
departmental requirements, and have achieved a level of comfort in the
classrooms that Freshmen may lack. The Sophomore classes are taught by the more experienced Teaching Associates who are themselves comfortable in the classroom setting. Thus, Music 421 is the appropriate level and environment to examine the learning of complex constructs (Best & Kahn, 1993, p. 18).

Students taking the second-year theory course were divided into four sections, and the instructors were fully responsible for the lectures and recitations. The classes were scheduled to meet on Mondays, Wednesdays, and Fridays at 7:30, 9:30, 12:30, and 3:30. The students had weekly homework assignments, bi-weekly quizzes, as well as a midterm and final exam. Classroom equipment included chalkboards, a piano, a stereo system, and moveable desks. The instructors were responsible for presenting material, answering questions, and grading papers. (Appendix D contains a copy of the course syllabus.) Students who did not wish to participate in the study were not penalized in the course grading. Initially a total of 93 students undertook the study, and 81 students completed the introductory survey. Background information gathered from the subjects through a questionnaire is summarized in Table 5.1:
Class time: Number of Students / Number who completed questionnaire

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<th>Time</th>
<th>Total</th>
<th>Completed</th>
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<tbody>
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Number of Subjects by Sex

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</tr>
<tr>
<td>12:30</td>
<td>12</td>
<td>11</td>
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</tr>
<tr>
<td>3:30</td>
<td>10</td>
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<td>1</td>
</tr>
<tr>
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<td>3</td>
<td>4</td>
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</tr>
<tr>
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(Number: Wh=White, non Hispanic; AfA=African American; AsA=Asian American or Asian; His=Hispanic; NvA=Native American)

Number of Subjects by Instrument

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<th>K</th>
<th>NA</th>
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</tr>
<tr>
<td>% of Total</td>
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<td>19%</td>
<td>19%</td>
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</table>

(I=instrumental; V=vocal; K=keyboard and percussion)

Number of Subjects by GPA of Previous Music Theory Courses

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Table 5.1: Summary of the Introductory Questionnaire
The case study required eight undergraduate volunteers who were also participating in the larger experiment. These students were chosen from a pool of volunteers and paid for the extra time that this part of the study required (see Appendix E for a description of the terms of payment). An attempt was made to balance the volunteers according to the racial, sexual, and academic demographics of the classes at large. Also, an effort was made to have each class section represented. After I described the study to the entire class, I asked volunteers to place their names on a sign-up sheet. Thirty-seven students indicated that they were interested in the think-aloud portion of the study. These students were contacted and invited to an informational meeting. Eight students actually came to the meeting, so these students were chosen for the think-aloud case studies. Chapter seven profiles these volunteers in more detail.

5.4 Preparatory Training for Instructors and Students

Because the instructors and student participants of this study were unfamiliar with some of the treatment formats, training sessions were used to familiarize them with the new techniques. The instructors' training session occurred during the week before classes began, on September 19, as part of their course-specific training. Their role was detailed, and the guide for creating parallel lessons was explained. Specifically, the instructors were expected to do the following tasks: 1) complete the guide for creating parallel
lessons for each of the three topics; 2) use the two tape recorders needed to
record the question sessions following the treatments; 3) follow the timing for
the study, starting and stopping the in-class exercises at the appropriate times;
and 4) collect the writing assignments to give to the researcher.

The students were introduced to the study during the second class session.
By that time the classes were fairly stable in terms of their specific
populations. The goal of the study (to determine which types of assignments
help students learn harmonic constructs best) was explained to the students
during the introduction, a script of which appears in Appendix F. Each of the
three treatment exercises was explained, and an example of each was given.

The students who had volunteered for the think-aloud procedures were
interviewed to determine their study and writing habits. They were then
trained in a one-hour session that included a lecture and an audio
presentation of a think-aloud exercise. Appendix G contains an outline of
this presentation. The students were supervised through a practice think-
aloud exercise that incorporated a spurious, humorous topic to put the
students at ease, as recommended by Perkins (1981). These students were
then given a schedule indicating the time frames within which they would be
expected to take part in the think-aloud exercises. The think-alouds occurred
during independently arranged meetings between the first day (after the pre-
test) and the last day (before the post-test) of each topic presentation.
5.5 Course Materials

The coursebook used for Music 421 was Aldwell and Schachter's *Harmony and Voice Leading*, 2nd ed. It covers the Neapolitan (Phrygian II) chord in Chapter 28, pp. 456-476, the augmented sixth chords in Chapter 29, pp. 477-502, and the common-tone diminished seventh chords in Chapter 30, pp. 516-519. In addition, the course instructors used many handouts and samples of music.

5.6 Instruments Developed for the Investigation

A number of instruments were developed to measure the effects of the treatments and to gain information on the participants. In many cases these were adaptations of existing examples that are described below. The instruments this study used were a parallel lesson guide, a general questionnaire for all of the participants, a questionnaire for the case study volunteers, an attitude survey, pre- and post-tests, and a long-term memory assessment.

The parallel lesson guide (Figure 5.3) was adapted from a guide developed by Sweigart (1988). It provides instructors with guidelines to insure that different levels of inquiry (as defined by Bloom, 1956) are addressed in the classroom lectures for each treatment, even if the outward presentational styles of the teachers differ. Appendix H contains samples of how the teachers used this form.
Instructions: Use this guide when planning your lectures, briefly describing how you intend to address each of the segments below:

Identify the topic being introduced today:

Explain why this topic is important to us:

Cite musical samples that illustrate this topic:

Provide other information about this topic (voice leading rules, etc.)

Draw generalizations and conclude topic.

Figure 5.3: Parallel lesson guide

The general information questionnaire collected data from the participants about age, sex, race, section, grade history in music theory, and performance emphasis. This questionnaire is contained in Figure 5.4.

The think-aloud volunteers were given a more detailed questionnaire to assess their general study habits, their perceived writing and studying skills, and their use of writing-to-learn exercises. Figure 5.5 contains this questionnaire.
The general attitude survey, adopted from Sweigart (1988), was used to collect data on students' attitudes toward each of the three learning treatment exercises. The anonymous survey asked students to consider opposing attitudes, and indicate on a continuum how they felt. This survey is contained in Figure 5.6.

The pre- and post-tests for each topic were identical, and measured the students' knowledge of a specific topic before and after it was taught in the classroom. These tests (contained in Appendix I) required three types of answers: four-part voice leading, written descriptions, and analysis of a musical excerpt.
Instructions: Answer as completely as possible. All information will be kept strictly confidential, and will be used in my study only in the form of base percentages.

Teacher: ___________________________   Class Time: ________________

Name: _____________________________   Age: __________

Sex (circle one):  M       F

Race (circle one):  African-American   American Indian
                      Asian-American   White, Hispanic
                      White, non-Hispanic Other

Major Instrument: ___________________

Grades received for the last three quarters of music theory:

Music 221: ______   Music 222: ______   Music 223: ______

Figure 5.4: General Informational Questionnaire
Please answer the following questions as completely as possible.

Name: _______________  Teacher: ____________

Age: ___________  Class time: ____________

Sex (circle one)  M  F

Race (circle one):  African-American  American Indian
                  Asian-American  White, Hispanic
                  White, non-Hispanic  Other

1. Describe how you learn music theory:

2. What types of exercises do you think help you learn music theory most easily?

3. Do you use the act of writing to help you learn new topics? If so, how?

4. Do you think that writing could help you learn music theory? Why?

Figure 5.5: Think-Aloud Volunteer Questionnaire
Name Qasimë
We are interested in your thoughts and feelings about today’s class. Below you will see a list of word pairs or phrases that look like this:


If you feel very good about the exercises completed last class meeting, place an X near good:


If you feel very bad about the exercise completed last class meeting, place an X near bad:


If you don’t feel either very good or very bad about the exercise, place an X closer to the middle but toward the side you favor.

Important: 1. Place your X in the center of the space you choose.
2. Be sure to mark an X for every word pair.
3. Make only one X on a word pair.

Unpleasant _ _
Good _ _
Worthless _ _
Enjoyable _ _
Dislike _ _
Excited _ _
Frustrated _ _
Interesting _ _
Worst _ _
Easy _ _
Negative _ _
Confidence _ _
Raising _ _
Want more classes _ _
like this _ _

Figure 5.6: Attitude Survey

5.7 Scoring Methods

The pre- and post-tests were analyzed through a point system developed for each of the harmonic constructs. Generally, the tests measured whether a student could a) recognize the specific concept in an analysis, b) discuss the
concept in their own language, and c) create the concept in the context of a four-part voice-leading example. Each of the three sections of the test were weighted equally for purposes of scoring, and only the concept was examined in the test (i.e., voice-leading errors or chord misspellings). (Spellings not related to the specific concept being measured were not considered for scoring in the pre- or post-tests.) Figures 5.7 through 5.9 show the scoring rubric used for each of the three theoretical constructs:
Analytical Identification:

Did the student recognize the chord in a musical context? (Two examples @ 1 point each--.5 for correct fundamental bass, .5 for correct quality) 2 pts.

Did the student label the chord appropriately? (Two examples @ 1 point each--1 point for correct inversion, but only if root is identified correctly) 2 pt.

Description of Chord:

Is chord construction explained? (Usually first inversion, double the bass, major chord, built on b2--.5 point each) 2 pts.

Is voice-leading explained? (b2 moves to leading tone--.5, other three voices--.5) 1 pt.

Is context explained? (preparation and resolution--.5, dominant prolongation--.5) 1 pt.

Four-part harmonization:

Is the chord approached correctly in context? (chord choice, voice leading choice .5 point each) 1 pt.

Is the chord built correctly in context? (chord built on right pitch, spelled and doubled correctly, .5 point each) 1 pt.

Are special voice leading concerns taken into account? (b2 --> leading tone) 1 pt.

Are the rest of the voices resolved correctly? (All or nothing for the point, if the voices resolve incorrectly the chord is probably spelled incorrectly. The cross-relation between the flat two and the natural two is OK if going to a triad, if resolving to a dominant seventh chord, incorrect) 1 pt.

Figure 5.7: Scoring rubric for Neapolitan six chords

98
Analytical Identification:

Did the student recognize the chord in a musical context? 2 pts.
(Two examples @ 1 point each--student must have labeled as some sort of augmented chord.)

Did the student identify the chord appropriately? 2 pt.
(Two examples @ 1 point each--student correctly identified chord as German, French, or Italian)

Description of Chord

Is the Chord construction explained? 2 pts.
(list three types, mention +6, mention root, mention additional notes--.5 points each)

Is the voice leading explained? 1 pt.
(Augmented sixth resolving--.5, other voices--.5)

Is context explained? 1 pt.
(Preparation and resolution, .5 each.)

Four-part harmonization:

Is the chord approached correctly in context? 1 pt.
(Chord selection, voice leading .5 each)

Is the chord built correctly in context? 1 pt.
(Augmented sixth, other voices--.5 each)

Are special voice leading concerns taken into account? 1 pt.
(#4, b6 .5 each)

Are the rest of the voices resolved correctly? 1 pt
(.5 each for other two voices)

Figure 5.8: Scoring rubric for augmented sixth chords
Analytical Identification:

Did the student recognize the chord in a musical context? 2 pts.
(Two examples @ 1 point each--student indicated fully
diminished seventh of any kind)

Did the student identify the chord appropriately? 2 pt.
(Two examples @ 1 point each)
(Student labeled the chord "CT")

Description of Chord:

Are the appropriate notes given? 2 pts.
(Student mentions that CT is root of next chord,
mentions four-two construction, mentions the raised 2,
mentions the raised 4--5 each. If the student indicated
the root, #2, and #4, they also get credit for the four-two
inversion.)

Is the voice leading appropriate? 1 pt.
(#2-3, #4-5--5 points each)

Is context appropriate? 1 pt.
(Shares common tone with following chord, resolves to
major--5 each.)

Four-part harmonization:

Is the chord approached correctly in context? 1 pt.
(chord selection, voice leading--5 each)

Is the chord built correctly in context? 1 pt.
(four-two construction, fully diminished 7th--5 each)

Are special voice leading concerns taken into account? 1 pt.
(#2-3, #4-5--5 each)

Are the rest of the voices resolved correctly? 1 pt.
(common-tone, other voice--5 each)

Figure 5.9: Scoring rubric for common-tone diminished seventh chords
These rubrics produced a score for each test that ranged from 0-12 points. Statistical significance for treatment, sex, and grade history was measured by subjecting these test scores to an analysis of covariance. The results of this analysis are discussed in Chapter Six.

The attitude surveys were used to generate mean percentages that defined how the classes as a whole felt about each of the treatments, and how each of the treatments was received by the students. Appendix J contains a summary of these surveys.

The transcripts from the think-aloud protocols were analyzed through a coding system that was modified from Langer (1984), and Sweigert (1988). This system tracked five cognitive activities: Questioning, Planning, Generating, Reviewing, and Monitoring for Evaluation. Figure 5.10 shows the definitions of these five activities.
1. Questioning: Uncertainties and incomplete ideas the writer has at any point in the transcripts: 

"... whatever you call them, I'm not sure... " "Um, it also says in the, the, sec-c the flat two chord is supposed to, um, ooo, it's supposed to, uh, resolve to, I guess it's the seventh its supposed to resolve to I, or it either has to resolve, oh, OK, OK, OK..."

2. Planning: Expression of what ought or might come next in the text or changes that ought or might be made or what procedure will be followed next: 

"... OK. Now well go back and look at the uh, top two examples." "I'm gonna walk over to this keyboard right over here, and I'm gonna, I'm gonna look at this on the keyboard..."

3. Generating: Ideas being developed or explained; personal experience being drawn upon by writer; citing evidence: 

"... there's also the soprano, that B shouldn't be on top, instead, uh, the alto should be on top so that it expands into the octaves..." "In, in my notes she says that, um, I mean I have a flat two, it goes to I six-four and she then goes to V in root position."

4. Reviewing: Restating content to modify; revising or restructuring any written content: 

"OK, that can go. Slip the C out there in the bass in the I chord, put the G in the soprano, the second line G, we'll just have closed chords there." "Um, so let's see, I'm going to put this in, I can always change it."

5. Monitoring for Evaluation: Evaluative metacommments about the appropriateness of particular information or ideas; validating comments about the procedure: 

"Um, OK, let's see, is the quality right with the sixth, augmented six chord?" "Um, let me see now, what else do I want to check for?"

Figure 5.10: General cognitive processes

The cognitive activities defined above were further categorized (as per Sweigart, 1988) by whether or not they focused on the product of the treatments or the process of the treatment:
Process: Comments about the construction of text or the completion of an exercise that precedes construction; not related to specific aspects of subject matter.

Product: The focus is specifically on the text itself or on the generation of specific information for the text. (p. 56)

The first example after each cognitive definition is an example of a cognitive activity that focuses on the product; the second example focuses on the process. This protocol was developed to track the type of cognitive process that each treatment required. By evaluating the transcripts and relegating each phrase to one of the five general processes listed above, these results could then be compared to determine if any of the treatments encouraged specific cognitive processes. The results from this analysis are presented in chapter seven; samples of the evaluated transcripts appear in Appendix K. The transcripts of the classroom question period were also analyzed and the questions were organized into categories of inquiry (see Appendix L).

5.9 Procedures for the Investigation

Prior to the beginning of the fall quarter at The Ohio State University, I met with the coordinator and teaching associates of Music 421 during their course-specific training period. During this session I explained the basic structure and goals of the study. In addition, I introduced the idea of writing-to-learn assignments to the teaching associates, and familiarized them with the types of writing assignments this study would require. During the first
week of classes, I attended every class section and explained to the students the basics of the study and administered the information survey. I also collected names of students interested in participating in the think-alouds. These volunteers were trained in their tasks the following week.

The treatments were administered at three separate times, coinciding with the initial presentation of three topics. Prior to each new day of presentation, the instructors were required to complete a guide for creating parallel lessons (a total of six for each teacher). The presentation format for each of the topics was the same. For the first five minutes of the class period, the pre-test was administered. At the end of the initial class period, students were given a short in-class assignment that corresponded to one of the three treatment exercises. After five minutes of working on the questions, students were encouraged to ask questions about the topics. These questions were recorded, analyzed, and categorized (transcripts appear in Appendix L). On the second day of the new topic, a thirty-five minute lecture was again followed by a five minute in-class exercise featuring the same paradigm as the previous lecture. A question period followed, and these questions were again recorded. On the third day of the new subject, the post-test and attitude survey was given during the first ten minutes of the session.

The think-aloud volunteers attended an hour-long training session during the second week. At that time, I presented a think-aloud session and gave a short explanation of the procedure. Each student then met privately
with me for a half-hour session during which the student completed a think-
aloud exercise in my presence. This training exercise involved spurious
topics, to help the students ease into the think-aloud procedure.

The think-aloud volunteers were asked to complete tests similar (but not identical) to the pre- and post-tests given the rest of their class. This test occurred between the first and second presentations. Thus, each student completed think-alouds for each of the three treatment exercises. For each of the think-alouds, the students were presented with the think-aloud instructions (Figure 5.11), and the first five minutes of each session were spent on a warm up, which consisted of a whimsical topic to familiarize the student with the think-aloud procedure. I then presented the student with the appropriate task and left the room. The students were asked to complete this task within a half-hour session that was to be recorded. Most did not need that much time to complete the procedure.

One final measure occurred on March 28th at the beginning of Spring quarter, 1996, approximately five months after the last treatments had been given. The test consisted of multiple choice questions that asked students about each of the three topics used during the fall study. The questions assessed students' knowledge of context and voice-leading characteristics. The measure was multiple-choice to allow a thorough, yet timely, testing of each of the three chromatic chords used in the study. The results of this measure are examined in Chapter Six.
1. Say whatever's on your mind. Don't hold back hunches, guesses, wild ideas, images, intentions.
2. Speak as continuously as possible. Say something at least once every five seconds, even if only, "I'm drawing a blank."
3. Speak audibly. Watch out for your voice dropping as you become involved.
4. Speak as telegraphically as you please. Don't worry about complete sentences and eloquence.
5. Don't over explain or justify. Analyze no more than you would normally.
6. Don't elaborate past events. Get into the pattern of saying what you're thinking now, not of thinking for a while and then describing your thoughts.

Figure 5.11: Instructions for the think-alouds
(adapted from Steinberg, 1986)

5.10 Timetable Adjustments

The original timetable of the study was developed with the help of the coordinator of Music 421, as shown in Figure 5.12 (see also Appendix D, course syllabus sample):
### Neapolitan Sixth Chord
- **October 2**: Pre-test, 1st treatment
- **October 4**: 2nd treatment
- **October 6**: Post-test

### Augmented Sixth Chords
- **October 16**: Pre-test, 1st treatment
- **October 18**: 2nd treatment
- **October 20**: Post-test

### Common-tone Diminished Seventh Chords
- **October 30**: Pre-test, 1st treatment
- **November 1**: 2nd treatment
- **November 3**: Post-test

---

Figure 5.12: Original timetable of study

The original timetable for the pre-tests, treatments and post-tests was modified during the course of the study for a number of reasons. The study took place in the environment of a live classroom, so the adjustments and activities of normal campus activity took its toll on the planned schedule. The impact of the schedule changes, however, was controlled for by the pre-test/post-test format, which controls for prior knowledge. The treatments for the Neapolitan chords all took place as scheduled, except that the 7:30 section had several students out the Friday of the post-test because of off-campus performances. These students were allowed to complete the post-tests on their own time, under the same time limit imposed on their classmates.

The schedule for the augmented sixth had to be adjusted because it occurred during the week that President Clinton and Vice-President Gore
visited the campus. The 12:30 and 3:30 classes on October 20 were canceled, and the morning classes were poorly attended due to traffic problems. The afternoon classes, therefore, completed their post-tests on Monday, October 23. The 9:30 class was given the wrong pre-test and first treatment on October 16, so the pre-test and correct treatment were administered again on October 18, with the result that they too did not complete the post-tests until Monday, October 23. The pre-test/post-test format, designed specifically to offset prior knowledge as a confounding factor, mitigated any negative affect this might have had on the study.

The segment on common-tone seventh chords was pushed back to the week of November 13-17 because the classes were not keeping pace with the syllabus. During this treatment, the instructor of the 9:30 class called in sick on November 13th, which meant her class finished the treatment on Monday, November 20. The instructor of the 12:30 class forgot to give the class the first pre-test and treatment, and so this section was also pushed back, starting on November 15 and concluding November 20. Once again, the design of the study was able to account for prior knowledge the students may have gained from the extra class.

5.11 Treatment of Data

The data for this study were analyzed in a number of ways. The raw scores from the pre-tests, post-tests, and long-term memory survey were analyzed
statistically for significance. The information surveys were compiled as qualitative data. The attitude surveys were scored and averaged (see Appendix I). The data from the transcripts was gathered to show raw percentages of thought processes. All other data were used qualitatively to augment the findings of the data that was manipulated by analysis for significance.

5.12 Summary

The procedures, methods, and measures used in this study were designed to show as clearly as possible the effects each exercise had on how the students learned music theory. The results of the quantitative data are presented in the next chapter, and the results of the qualitative data in Chapter Seven.
CHAPTER 6
STATISTICAL ANALYSIS

Data on three types of in-class assignments were collected to assess their affect on learning harmonic constructs, specifically to see if any of the treatments generated either (1) higher improvement scores (post-test minus pre-test), or (2) higher post-test scores than the others. Performance instrument, music theory GPA, race, and sex were also examined to see if these factors interacted with the treatments.

A mixed-effects general linear model served as the means to analyze improvement and post-test scores. The pre-and post-tests presented three types of tasks: analysis, description, and harmonization. Scores from each of these categories were analyzed separately, and the overall scores of each test were also analyzed. The mixed effects model tests two types of factors: fixed and random. Fixed effect factors are those for which the investigation has a specific interest. Random effects are those factors which are not necessarily of interest, but might affect the response. Since this study used a cross-over design, multiple responses (one set for each treatment) were collected from each subject. The effect of using multiple responses was included in the analysis to discover if responses from the same subject were similar.
The students in this study may be thought of as a sample of potential students that could have participated, so that subject is a random effect, while all other factors are fixed effects. The variable factors and their abbreviations are provided in Figure 6.1:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Post-test score minus pre-test score</td>
</tr>
<tr>
<td>TRT</td>
<td>Treatment (WR=1, ED=2, FW=3)</td>
</tr>
<tr>
<td>INTER</td>
<td>Time period of treatment (1, 2, or 3)</td>
</tr>
<tr>
<td>IA</td>
<td>1 if subject had TRT 3 in previous time period, 0 otherwise*</td>
</tr>
<tr>
<td>IB</td>
<td>1 if subject had TRT 2 in previous time period, 0 otherwise*</td>
</tr>
<tr>
<td>INSTR</td>
<td>Instrument (1=instrument, 2=keyboard, 3=voice)</td>
</tr>
<tr>
<td>GPA</td>
<td>Music Theory Grade Point Average (used as is)</td>
</tr>
<tr>
<td>SEX</td>
<td>1=Female, 2=Male</td>
</tr>
</tbody>
</table>

*These factors represent the potential for order effect in the design.

The analytical model had to account for missing data, and this was accomplished by using a model from Milliken and Johnson's *Analysis of Messy Data* (1984, pp. 446-448):

\[ y_{ijkm} = \mu + \beta m + \pi k + \tau j + \lambda l(k-l) + \epsilon ijkm \]

Throughout this analysis, a factor is considered significant if its p-value (denoted Pr > F) is less than 0.05, and significant results will be indicated by bold type in the tables of this chapter.

Since the pre- and post-tests included three tasks—a part-writing exercise, a writing exercise, and a short analysis exercise—each task was assigned 4 points, so that the total score on any of the pre- or post-tests ranged from 0 to 12. These tests were analyzed in several ways. First, each type of task was
analyzed for significance. For example, the statistical analysis examined whether or not the writing treatment had a significant affect on how students answered each of the three types of questions on the test. The tests were also examined in full to see if any of the treatments had an affect on the overall score. Each analysis was conducted twice, once using the improvement scores (in other words, once using as scores the difference between each student’s pre- and post-tests), and once using just the scores generated by the post-test (ignoring the student’s performance on the pre-test).

The full statistical analysis examined the following variables (in order as they appear in the tables): time period of the treatment, the treatment itself, order effect, instrument, treatment as it interacted with instrument, GPA, treatment as it interacted with GPA, sex, and sex as it interacted with GPA. If the full statistical analysis showed that a factor was significant at the .05 level in the full model, a reduced model of variables was run for computational ease. This model included only the following variables: time period of treatment, treatment, order effect, instrument, GPA, and sex. If a factor was still significant in the reduced model, Bonferroni multiple comparisons were performed to determine which factor levels were different.

The analyses presented in this chapter are organized according to the order of questions on the post-test. They examine the effect of the variable factors on the results from the individual post-test questions—part writing, prose writing, and analysis—and finally on the post-test as a whole. Analysis of the
data using improvement scores is presented first, followed by analysis of the data using only the post-test scores.

6.1 Improvement Scores for the Part-Writing Question

This analysis determined whether or not any of the variable factors influenced the part-writing question, as measured by improvement scores from the pre-test to the post-test. Improvement scores were obtained by subtracting the pre-test scores from the post-test scores. Under the writing treatment (treatment 1), one subject had the unusual improvement score of minus four. Initially, this outlier was the driving force behind some "significant" results. Because this unlikely score was so influential, it was removed and the analysis rerun. The results, with the anomalous subject removed, are shown in Table 6.1:
Tests of Fixed Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>NDF</th>
<th>DDF</th>
<th>Type III F</th>
<th>Pr &gt; F</th>
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</thead>
<tbody>
<tr>
<td>INTER</td>
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<td>1.43</td>
<td>0.2456</td>
</tr>
<tr>
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<td>73</td>
<td>1.10</td>
<td>0.3391</td>
</tr>
<tr>
<td>IA</td>
<td>1</td>
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</tr>
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<td>73</td>
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<td>0.6580</td>
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<tr>
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<td>73</td>
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</tr>
<tr>
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<td>73</td>
<td>0.46</td>
<td>0.7625</td>
</tr>
<tr>
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<td>1</td>
<td>73</td>
<td>4.69</td>
<td>0.0335</td>
</tr>
<tr>
<td>GPA*TRT</td>
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<td>73</td>
<td>1.10</td>
<td>0.3394</td>
</tr>
<tr>
<td>SEX</td>
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<td>73</td>
<td>0.00</td>
<td>0.9710</td>
</tr>
<tr>
<td>TRT*SEX</td>
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<td>73</td>
<td>0.25</td>
<td>0.7769</td>
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Tests of Fixed Effects

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<td>0.1907</td>
</tr>
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<td>81</td>
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<td>0.9974</td>
</tr>
<tr>
<td>IA</td>
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<td>81</td>
<td>0.25</td>
<td>0.6217</td>
</tr>
<tr>
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<td>81</td>
<td>0.35</td>
<td>0.5570</td>
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<tr>
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<td>0.5697</td>
</tr>
<tr>
<td>GPA</td>
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</tr>
<tr>
<td>SEX</td>
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<td>81</td>
<td>0.03</td>
<td>0.8599</td>
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Parameter Estimate:

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<thead>
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<th>Estimate</th>
<th>Std Error</th>
<th>DDF</th>
<th>T</th>
<th>Pr &gt;</th>
<th>T</th>
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</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>0.52927320</td>
<td>0.23300075</td>
<td>81</td>
<td>2.27</td>
<td>0.0258</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.1: Improvement score analysis of Test Question 1 (Part-writing)
In the full model of this study, music theory GPA is significant ($p = 0.0335$ and $0.0258$). Holding all other factors constant, increasing GPA one unit increases the improvement score an average of 0.53 units. No other factors are significant for students' improvement scores on the part-writing question.

6.2 Improvement Scores for the Writing Question

This analysis determined whether or not any of the variable factors influenced the writing question, as measured by improvement scores from the pre-test to the post-test. The statistical results are summarized in Table 6.2:
### Tests of Fixed Effects

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<tr>
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<td>74</td>
<td>0.41</td>
<td>0.6624</td>
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<tr>
<td>IA</td>
<td>1</td>
<td>74</td>
<td>0.50</td>
<td>0.4817</td>
</tr>
<tr>
<td>IB</td>
<td>1</td>
<td>74</td>
<td>0.03</td>
<td>0.8539</td>
</tr>
<tr>
<td>INSTR</td>
<td>2</td>
<td>74</td>
<td>2.97</td>
<td>0.0572</td>
</tr>
<tr>
<td>TRT*INSTR</td>
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<td>74</td>
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<td>0.7281</td>
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<tr>
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<td>74</td>
<td>4.51</td>
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</tr>
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</tr>
<tr>
<td>TRT*SEX</td>
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<td>74</td>
<td>0.41</td>
<td>0.6659</td>
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### Tests of Fixed Effects

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<td>82</td>
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<tr>
<td>SEX</td>
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<td>82</td>
<td>0.90</td>
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### Parameter Estimate:

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<th>Parameter</th>
<th>Estimate</th>
<th>Std Error</th>
<th>DDF</th>
<th>T</th>
<th>Pr &gt;</th>
<th>TI</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>0.30838160</td>
<td>0.14869871</td>
<td>82</td>
<td>2.07</td>
<td>0.0412</td>
<td></td>
</tr>
<tr>
<td>instr1-instr2</td>
<td>0.27075354</td>
<td>0.24517522</td>
<td>82</td>
<td>1.10</td>
<td>0.2727</td>
<td></td>
</tr>
<tr>
<td>instr1-instr3</td>
<td>0.55259972</td>
<td>0.23616851</td>
<td>82</td>
<td>2.34</td>
<td>0.0217</td>
<td></td>
</tr>
<tr>
<td>instr2-instr3</td>
<td>0.28184618</td>
<td>0.30270533</td>
<td>82</td>
<td>0.93</td>
<td>0.3545</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.2: Improvement score analysis of Test Question 2 (Writing)
In the full model of this study, music theory GPA is again significant at the 0.05 significance level \( (p = 0.0371 \text{ and } 0.0412) \). Instrument, however, is also very close to being significant \( (p = 0.0572 \text{ and } 0.0587) \). Holding all other factors constant, increasing the GPA 1 unit increases the average improvement score by 0.31 units. If significance is relaxed to the 0.06 level, then holding all other factors constant, students playing brass, woodwind, and string instruments (instrument 1) score an average of 0.55 units higher on the writing question than students whose main instrument is voice (instrument 3).

6.3 Improvement Scores for the Musical Analysis Question

This analysis determined whether or not any of the variable factors influenced the analysis question, as measured by improvement scores from the pre-test to the post-test. The statistical results are summarized in Table 6.3:
Tests of Fixed Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>NDF</th>
<th>DDF</th>
<th>Type III F</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
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<td>INTER</td>
<td>2</td>
<td>74</td>
<td>2.07</td>
<td>0.1329</td>
</tr>
<tr>
<td>TRT</td>
<td>2</td>
<td>74</td>
<td>0.42</td>
<td>0.6559</td>
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<tr>
<td>IA</td>
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<td>74</td>
<td>0.56</td>
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<td>74</td>
<td>0.95</td>
<td>0.3917</td>
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<tr>
<td>TRT*INSTR</td>
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<td>74</td>
<td>1.47</td>
<td>0.2205</td>
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<td>GPA</td>
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<td>0.8523</td>
</tr>
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<td>SEX</td>
<td>1</td>
<td>74</td>
<td>0.57</td>
<td>0.4539</td>
</tr>
<tr>
<td>TRT*SEX</td>
<td>2</td>
<td>74</td>
<td>0.37</td>
<td>0.6929</td>
</tr>
</tbody>
</table>

Table 6.3: Improvement score analysis of Test Question 3 (Musical Analysis)

In the full model of this analysis none of the fixed effects was significant.

6.4 Improvement Scores for the Total Test

This analysis determined whether or not any of the variable factors influenced the combination of all three questions, as measured by total improvement scores from the pre-test and post-test. The statistical results are summarized in Table 6.4:
## Tests of Fixed Effects

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</tr>
</thead>
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<tr>
<td>TRT*INSTR</td>
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<td>74</td>
<td>0.51</td>
<td>0.7255</td>
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<tr>
<td>GPA</td>
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<td>6.99</td>
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## Parameter Estimates:

| Parameter | Estimate | Std Error | DDF | $T$ | $Pr > |T|$ |
|-----------|----------|-----------|-----|-----|------|------|
| GPA       | 1.04249623 | 0.38272824 | 82  | 2.72 | 0.0079 |

Table 6.4: Analysis of Total Improvement Scores
Music Theory GPA is highly significant in the full model ($p = 0.0100$ and $0.0079$). Holding all other factors constant, increasing GPA 1 unit increases the improvement score an average of 1.04 units.

6.5 Post-Test Scores for the Part-Writing Question

This analysis determined whether or not any of the variable factors influenced the part-writing question, as measured by the post-test scores. Under the writing-to-learn treatment (treatment 1), one subject had the very unusual improvement score of minus four. As reported above, this outlier was the driving force behind some initially “significant” results and had to be removed. The results, with the anomalous subject removed, are shown in Table 6.5:
Tests of Fixed Effects

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Tests of Fixed Effects

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Parameter Estimate:

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Table 6.5: Post-test score analysis of Test Question 1 (Part-writing)
In the full model, music theory GPA \((p = 0.0001)\) and order effect \((p = 0.0397)\) appear significant. The order effect, therefore, was accounted for in the statistical model before investigating the effect of other factors. GPA is the only significant factor in the reduced model \((p = 0.0001)\). Holding all other factors constant, increasing GPA 1 unit increases the post-test scores an average of 0.93 units.

6.6 Post-Test Scores for the Writing Question

This analysis determined whether or not any of the variable factors influenced the writing question, as measured by post-test scores. The statistical results are summarized in Table 6.6:
## Tests of Fixed Effects

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## Tests of Fixed Effects

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### Parameter Estimate:

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</table>

Table 6.6: Post-test score analysis of Test Question 2 (Writing)
In the full model instrument \((p = 0.0204)\) and music theory GPA \((p = 0.0118)\) are significant. In the reduced model, treatment is also significant \((p = 0.0071)\). The fact that treatment becomes significant after removing a few highly nonsignificant interactions is somewhat unexpected. The analysis was unable to provide a clear answer to this emergent significance, but suggests that it is connected to the GPA*TRT interaction. One possible reason that treatment does not become significant until GPA*TRT is removed from the model is the difference in interpretation for the main effect for treatment when an interaction with a continuous variable is present in the model. When GPA*TRT is included in the model it tests whether the slope of the line through GPA is different for each treatment, whereas the coefficient for treatment tests whether the intercepts for those lines are different. It is possible that the intercepts were not very different, when GPA*TRT was fit, but when the interaction was removed an overall treatment effect appeared.

Holding all other factors constant, increasing GPA 1 unit increases post-test scores an average of 0.38 units. Holding all other factors constant, students playing brass, woodwind, or string instruments (instrument 1) score 0.66 units higher on average than vocalists (instrument 3). The analysis of the reduced model shows that students receiving the error-detection treatment (treatment 2) score an average of 0.53 units lower than students receiving the part-writing treatment (treatment 3). This final conclusion, however, is not supported by the full statistical model.
6.7 Post-Test Scores for the Musical Analysis Question

This analysis determined whether or not any of the variable factors influenced the analysis question, as measured by post-test scores. The statistical results are summarized in Table 6.7:
Table 6.7: Post-test score analysis of Test Question 3 (Musical Analysis)
In the full model it appears that music theory GPA ($p = 0.0025$ and 0.0009) is significant. There is also some evidence that the different treatments affect the instrument classes differently ($p = 0.0037$ and 0.0020). Holding all other factors constant, increasing GPA 1 unit increases the post-test scores an average of 0.47 units. Instrument was a significant factor for the analysis question. Vocalists (instrument 3) receiving the part-writing treatment (treatment 3) did significantly better than when they received the writing-to-learn treatment (treatment 1). There is also weak evidence that vocalists receiving the error-detection treatment (treatment 2) did better than vocalists receiving the writing treatment (treatment 1). The evidence is weak because the p-value (measure of significance) is not less than $0.05/9$, or 0.0055. The difference between treatments 1 and 2 is 0.0147, but still low enough to suggest a significance.

6.8 Post-Test Scores for the Total Test

This analysis determined whether or not any of the variable factors influenced the combination of all three questions, as measured by total post-test scores. The statistical results are summarized in Table 6.8:
Tests of Fixed Effects

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Tests of Fixed Effects

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Estimate Statement Results:

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Table 6.8: Analysis of total post-test scores
It appears that instrument \((p = 0.0067)\) and music theory GPA \((p = 0.0001)\) are significant in the full model, with some evidence that treatment is significant at the level of 0.1 \((p = 0.0785)\). The reduced model affirms the significance of treatment \((p = 0.0205)\). Holding all other factors constant, increasing GPA 1 unit increases the post-test score 1.73 units. Students playing woodwind, string, or brass instruments (instrument 1) score an average of 1.68 units higher than vocalists (instrument 3). Keyboard and percussion players (instrument 2) score 1.72 units higher on average than vocalists (instrument 3). Students receiving the writing treatment (treatment 1) score an average of 1.11 units lower than students receiving the part-writing treatment (treatment 3).

The following tables distribute the results of the initial investigation in two ways. Table 6.9 displays the improvement scores (i.e., post-test results minus pre-test results) of every student who completed at least one treatment. The table is broken down to show results for each type of test question: part writing, prose writing, and analysis. This table shows the improvement scores \((\gamma)\), the frequency of that particular improvement score, the percent of students achieving that particular improvement score, and the cumulative frequencies and percents. Table 6.10 shows the pure post-test scores for any student that completed at least one of the treatments. The score of the test, the frequency of that score, the percent, and the cumulative frequency and percent are provided.
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<th>Percent</th>
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Table 6.9: Distribution of improvement scores

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<td>136</td>
<td>61.8</td>
<td>220</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 6.10: Distribution of post-test scores
6.9 Long-Term Memory Test

This study also included a long-term memory measure, which was given to the students the second day of classes during Spring quarter of 1996 (approximately three months after their last measure). The data from this test were analyzed by a logistic regression with random effects. Treatment effect and instrument effect were examined, based on the results from the previous measure, to see if these had any long term significant effect. In these tables the boxes surround the central 50% of the score distribution, and the "+" indicates the location of the median score. A significant affect would be reflected in the tables by a shifting of the boxes, but in the following cases there is virtually no shift at all in the distributions. The following side-by-side box plots illustrate that there is no significant difference in the scores of the long-term memory measure:
Table 6.11: Box plots of the long-term memory measure results
Tables 6.9 and 6.10 illustrate the lack of significance found for any variable in the long-term memory measure. None of the treatments had a significant effect on the students' knowledge three months later. This lack of significance is disappointing but not surprising, given the limited exposure to each treatment the students received.

The statistical results in this chapter are made possible through the help of consultants at The Ohio State University Statistical Consulting Service. The tests and analyses were developed with their help and expertise. The final portion of this chapter will examine the statistical limitations of the study, and a discussion of the implications of the data provided in this chapter.

6.10 Statistical Limitations of the Investigation

The statistical limitations are due to several factors including population and classroom environment, cultural bias, and design focus. Each of these factors limits the claims of this study, and further research will be needed to verify that these factors do not have a significant impact on learning.

One frustrating limitation was the inequity of representation of some subsections of the Sophomore music theory class. Table 5.1 (Chapter Five) displays the proportions of students in the categories of race, gender, GPA, instrument, and class section. One of the prominent features of the sophomore class is its overwhelmingly white population; the proportion of minority students to white students was so low that this study could not
examine race as a factor. This distinction may be an important limitation, because other studies have suggested that learning patterns differ according to cultural groupings (see, for example, *Ways with Words*, Shirley Heath, 1983). It is impossible to say how the racial imbalance may have affected this investigation, but it is certain that the implications drawn from the statistics in this chapter may not hold true for students from cultures that are not predominantly white.

The design of the study precludes certain limitations. The decision to hold the study in an actual teaching environment creates the opportunity for uncontrollable factors. Examples of items which proved to be uncontrollable were instructor illness, classroom schedule changes due to the presidential visit, modifications to the time table by the coordinator's decision, and the fact that the four classes occurred in three different rooms. This investigation attempted a balance between internal and external validity, and the uncontrollable environmental factors were a result of that compromise.

### 6.11 Statistical Implications

The statistical analyses of data indicate that there were significant factors that influenced students' scores. These significant factors include music theory grade point average, performance background, and treatment.

Perhaps to no one's great surprise, GPA was a significant factor. This grade point average was calculated by averaging students' grades from the three
previous quarters of music theory; an all inclusive grade point average was not used. Music theory grades were gained through the information survey, and were rechecked (with the students' permission) through the registrar's computer system. The higher a students' previous GPA in music theory, the higher they scored on the post-test. The following statistical analyses showed GPA as a significant factor:

<table>
<thead>
<tr>
<th>Analysis:</th>
<th>Average Improvement per Unit (AIU):</th>
</tr>
</thead>
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<tr>
<td>Improvement Score Analyses</td>
<td></td>
</tr>
<tr>
<td>Analysis of Test Question 1 (Part-writing)</td>
<td>0.53</td>
</tr>
<tr>
<td>Analysis of Test Question 2 (Writing)</td>
<td>0.31</td>
</tr>
<tr>
<td>Total Improvement Scores</td>
<td>1.04</td>
</tr>
<tr>
<td>Post-Test Score Analyses</td>
<td></td>
</tr>
<tr>
<td>Analysis of Test Question 1 (Part-writing)</td>
<td>0.93</td>
</tr>
<tr>
<td>Analysis of Test Question 2 (Writing)</td>
<td>0.38</td>
</tr>
<tr>
<td>Analysis of Test Question 3 (Musical analysis)</td>
<td>0.47</td>
</tr>
<tr>
<td>Total Post-Test Scores</td>
<td>1.73</td>
</tr>
</tbody>
</table>

Table 6.12: GPA as a significant factor

The average improvement per unit score (AIU) is an indicator for how much better a student would do on the specific questions with a one point increase in music theory GPA, on average. The effect of GPA is consistent across all three test questions. While the idea that smarter students have a higher learning curve is a bit obvious, the interaction of GPA with the treatments is interesting. A question that interested me was whether or not any of the treatments had a significant impact on students with lower theory grades; but
in this investigation the interaction between treatment and GPA was never significant. The AIU was greatest for the part-writing question, and least for the prose writing question. In this study the best students showed better retention on the part-writing question than on the other two questions. This phenomenon could be attributed to several factors. In performing the test, students gave greater consideration to the part-writing question than to the prose writing question. Although there were few cases of students leaving their part-writing test questions blank, there were many cases where less time was apparently spent with the writing question than with the part-writing question. The better students, regardless of treatment or performance background, were able to show the growth of their musical knowledge on the post-tests more readily on the part-writing questions than on either the writing or analysis questions.

The student's applied background was also a significant factor in the statistical analyses. Several different analyses showed that musical instrument was a significant or very near to significant factor.
Key to identification numbers:

1 = woodwind, brass, and string players
2 = piano and percussion players
3 = vocalists

Analysis:___________________________ Average Improvement per Unit:

Improvement Score Analyses
Analysis of Test Question 2 (Writing)* 1 scores higher than 3 by 0.55

Post-Test Score Analyses
Analysis of Test Question 2 (Writing) 1 scores higher than 3 by 0.66
Total Post-Test Scores 1 scores higher than 3 by 1.68
2 scores higher than 3 by 1.73

*Significant at the .06 level rather than the .05 level.

Table 6.13: Musical instrument as a significant factor

Wind and string players were able to answer the prose writing question (note that this is different from the writing-to-learn treatment) more effectively than the vocalists, regardless of treatment.

The vocalists also scored significantly lower than everyone else on the total scores. This may be an artifact of earlier training. So little of vocal education at the high school level seems to focus on good music reading skills that many vocalists come to the college level with an underdeveloped understanding and comprehension of notation. These results indicate that vocalists represent a population of special concern for the music theory teacher. While there are certainly exceptions to the rule, it seems that the average vocalist needs an extra push to learn the concepts of music theory.
The statistical analyses failed to indicate which treatment helps vocalists learn most easily, but the post-test analysis of Test Question Three (the musical analysis test question) provides a possible answer. Instrument and treatment are intertwined for significance in this statistical measure, which shows that vocalists that received the writing-to-learn treatment scored an average of 1.57 units lower on the analysis question than vocalists who received the part-writing treatment, and that vocalists receiving the writing treatment scored 1.24 units lower than vocalists who received the error-detection treatment.

Key to treatment numbers:

1 = writing
2 = error detection
3 = part writing

Analysis: Average Improvement per unit:

Test Question 3 (Musical Analysis)
treatment 1 to treatment 2 1 scores lower than 2 by 1.24
treatment 1 to treatment 3 1 scores lower than 3 by 1.58

Table 6.14: Treatment as a significant factor for vocalists

This is a rather remarkable disparity, considering there is only a maximum of 4 units total, and reveals that analysis was learned more readily with notational exercises (part-writing and error-detection) than with writing exercises.

Vocalists seem to do better with part-writing exercises and error detection than they did with the writing, which may indicate that this special
population just needs more time “in the music” than their counterparts in the instrumental world. It seems that they learn best when they work through notation, and not through the medium of language.

Treatment was also a significant factor in this study when considering the post-test scores only.

Key to treatment numbers:

1 = writing
2 = error detection
3 = part writing

<table>
<thead>
<tr>
<th>Post-Test Score Analysis</th>
<th>Average Improvement per unit</th>
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</thead>
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<tr>
<td>Analysis of Test Question 2 (Writing)</td>
<td>2 scores lower than 3 by 0.53</td>
</tr>
<tr>
<td>Analysis of Total Post-Test Scores</td>
<td>1 scores lower than 3 by 1.11</td>
</tr>
</tbody>
</table>

Table 6.15: Treatment as a significant factor

The Analysis of Test Question 2 (Writing) Post-Test scores showed that students receiving the part-writing treatment scored 0.53 units higher than students receiving the error-detection treatment. As discussed above, the Post-Test Analysis of Test Question 3 (Analysis) indicated that vocalists had better scores when they received the part-writing treatment than when they received the writing treatment, and that they also scored higher with the error-detection treatment than they did with the writing treatment. In the analysis of total post-test scores, treatment was again a significant factor, showing that students that received the part-writing treatment scored 1.11
units higher, on average, than did the students receiving the writing-to-learn treatment.

The traditional exercises, and specifically part writing, were more effective than writing in helping students learn music theory. This fact is at odds with the conventions of writing-to-learn. The following chapter examines the qualitative data, which compliment the findings of the quantitative investigation.
CHAPTER 7
QUALITATIVE ANALYSES

This chapter examines the qualitative data—the attitude surveys, taped classroom discussions, and case studies—in light of the results reported in the previous chapter. That data indicated that the part-writing treatment had a greater impact on students' learning than did the other treatments. The qualitative data helps to define this impact through an exploration of the information contained within the taped classroom discussions, the attitude surveys, and the case studies.

7.1 Taped Classroom Discussions

Every treatment application included a time for questions and answers, and this discussion was recorded. Complete transcripts of these discussions is provided in Appendix L. For the purposes of this qualitative investigation questions were organized into the categories presented in Figure 7.1:
Figure 7.1: Question categories

The following table summarizes the types of questions that students asked after each treatment exercise:
Number of responses for each category; percentage of total that number represents

<table>
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<tr>
<th>Treatment:</th>
<th>Writing</th>
<th>Part-Writing</th>
<th>Error Detection</th>
</tr>
</thead>
<tbody>
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<td>Context/Mode:</td>
<td>3 (9.4%)</td>
<td>0 (0.0%)</td>
<td>1 (3.2%)</td>
</tr>
<tr>
<td>Context/Progression:</td>
<td>6 (18.8%)</td>
<td>7 (25.0%)</td>
<td>8 (25.8%)</td>
</tr>
<tr>
<td>Definition/Labeling:</td>
<td>3 (9.4%)</td>
<td>0 (0.0%)</td>
<td>1 (3.2%)</td>
</tr>
<tr>
<td>Assignment Mechanics:</td>
<td>4 (12.5%)</td>
<td>3 (10.7%)</td>
<td>4 (12.9%)</td>
</tr>
<tr>
<td>Voice Leading:</td>
<td>4 (12.5%)</td>
<td>5 (17.9%)</td>
<td>9 (29.0%)</td>
</tr>
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<td>Spelling:</td>
<td>5 (15.6%)</td>
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<tr>
<td>Miscellaneous:</td>
<td>2 (6.3%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
</tbody>
</table>

Table 7.1: Summary of classroom questions

Each of the treatments shows unique patterns in generating questions. The questions from the writing treatment exhibited the most balanced percentages, with none of the question types occurring more than 18.8% of the time. Questions in the context/mode and definition/labeling categories were more prevalent after the writing-to-learn treatment than after either of the other two treatments. Questions from the part-writing treatment were less balanced; almost a third of the questions asked about spelling, and another fourth about context/progression. The questions generated by the error-detection treatment were primarily about voice leading, context, and spelling. While prose writing and part writing generated a large percentage of questions about chord function (15.6% and 14.3%, respectively), error detection did not.

Because part writing had a significant affect on the post-test scores, it is noteworthy that spelling, context/progression, and voice leading categories constituted a large part of the questions after this treatment. The error-
detection treatment also stimulated a high percentage of these types of questions. The grading rubrics set up for the pre- and post-tests (see Chapter 5) measured spelling, context and voice leading. The fact that the part-writing and error-detection treatments generated a higher percentage of questions about these three criteria might explain why writing scored lower than the other two treatments on the post-tests. The part-writing and error-detection treatments stimulated questions about the issues that were evaluated most closely on the pre- and post-tests.

7.2 Attitude Surveys

The attitude survey was collected after each post-test. It measured, on a scale of 1 (most negative) to 7 (most positive) how each student felt about the current treatment. These surveys were scored, with each pair of terms generating between 1 and 7 points. Appendix J lists the complete analysis of these surveys; Table 7.2 presents a summary of that analysis:
N6: Neapolitan Sixth Chord
+6: Augmented Sixth Chords
CT: Common-Tone Diminished Seventh Chord

Average scores for Partwriting treatment:  
4.17 (N6)  
4.44 (N6)  
4.70 (+6)  
3.88 (CT)  

Adjusted Average*: 4.295

Average scores for Error-Detection treatment:  
4.57 (N6)  
3.45 (+6)  
3.38 (+6)  
3.87 (CT)  

Adjusted Average*: 3.952

Average scores for Writing treatment:  
4.81 (N6)  
3.40 (+6)  
3.32 (CT)  
3.38 (CT)  

Adjusted Average*: 3.853

*The average has been adjusted by adding and then dividing by two the doubled topic; the sum of this total has then been averaged with the other two scores. One topic is doubled in each category because the three treatments were applied to four class sections.

Table 7.2: Summary of Attitude Surveys

The students' attitude toward part writing is more positive than their attitude towards the other two treatments. Whether or not the difference between part writing and the other two treatments is significant is unclear. The difference does, however, suggest that either the students felt good about the part-writing treatment because they intuitively sensed that it was helping them, or that the negative attitudes about the other two less familiar treatments might have carried over into the test results.
73 Case Studies

Eight students volunteered to participate in the case studies. These students completed the same pre-tests, treatments, and post-tests that the other students did, but they also met with the researcher once during each treatment period to participate in think-aloud tasks. As explained in Chapter 5, these tasks required students to complete exercises similar to the treatments they were getting in class, but to speak aloud every conscious thought. The students will be referred to by their self-chosen code names: Liebermann; Forte; Coltrane; Smetana; Prince; Satie; Anacrusis; and Treble Clef. Here then, is the flip side of the quantitative coin: an examination of how eight students worked intellectually to grasp new concepts, and of why the part-writing treatment may have had the greatest impact on learning. The vital statistics of the case study students, as gathered by the information survey, are presented in Figure 7.2:
<table>
<thead>
<tr>
<th>Name</th>
<th>Sex</th>
<th>Race</th>
<th>Age</th>
<th>Instrument</th>
<th>TGPA/CGPA</th>
<th>Class Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liebermann</td>
<td>F</td>
<td>W</td>
<td>18</td>
<td>Trombone</td>
<td>3.77</td>
<td>3.49</td>
</tr>
<tr>
<td>Forte</td>
<td>F</td>
<td>W</td>
<td>19</td>
<td>Euphonium</td>
<td>3.90</td>
<td>3.59</td>
</tr>
<tr>
<td>Coltrane</td>
<td>M</td>
<td>W</td>
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<td>Saxophone</td>
<td>3.77</td>
<td>3.82</td>
</tr>
<tr>
<td>Smetana</td>
<td>M</td>
<td>W</td>
<td>19</td>
<td>Voice</td>
<td>3.65</td>
<td>3.32</td>
</tr>
<tr>
<td>Prince</td>
<td>F</td>
<td>B</td>
<td>20</td>
<td>Euphonium</td>
<td>3.23</td>
<td>3.13</td>
</tr>
<tr>
<td>Satie</td>
<td>M</td>
<td>W</td>
<td>19</td>
<td>Piano</td>
<td>3.67</td>
<td>3.23</td>
</tr>
<tr>
<td>Anacrusis</td>
<td>F</td>
<td>W</td>
<td>18</td>
<td>Clarinet</td>
<td>2.57</td>
<td>3.01</td>
</tr>
<tr>
<td>Treble Clef</td>
<td>F</td>
<td>W</td>
<td>26</td>
<td>Piano</td>
<td>4.00</td>
<td>3.83</td>
</tr>
</tbody>
</table>

**Sex:** M=Male, F=Female  
**Race:** W=White, non-Hispanic; B=African American  
**TGPA:** grades received in music theory only (on a 4.0 scale)  
**CGPA:** cumulative grade point average (on a 4.0 scale)

---

**Figure 7.2: Characteristics of the think-aloud volunteers**

Their individual participation in the study varied, as indicated in Figure 7.3:
Pre = Pre-test; T1 = First treatment; T2 = Second treatment; Post = Post-test; AS = Attitude Survey; TA = Think-aloud.

X = Task completed by student, -- = not completed.

Neapolitan Six Chord:

<table>
<thead>
<tr>
<th>Name</th>
<th>Pre</th>
<th>T1</th>
<th>T2</th>
<th>Post</th>
<th>AS</th>
<th>TA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liebermann</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>--</td>
</tr>
<tr>
<td>Forte</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>X</td>
</tr>
<tr>
<td>Coltrane</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Smetana</td>
<td>--</td>
<td>--</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Prince</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Satie</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Anacrusis</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
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<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
<td>X</td>
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</table>

Augmented Sixth Chords:

<table>
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<tr>
<th>Name</th>
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<th>T1</th>
<th>T2</th>
<th>Post</th>
<th>AS</th>
<th>TA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liebermann</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>--</td>
<td>X</td>
</tr>
<tr>
<td>Forte</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Coltrane</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Smetana</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Prince</td>
<td>--</td>
<td>--</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Satie</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Anacrusis</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Treble Clef</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Common-tone Diminished Seventh Chord:

<table>
<thead>
<tr>
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<th>T1</th>
<th>T2</th>
<th>Post</th>
<th>AS</th>
<th>TA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liebermann</td>
<td>--</td>
<td>--</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Forte</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Coltrane</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Smetana</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Prince</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Satie</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Anacrusis</td>
<td>--</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>--</td>
<td>X</td>
</tr>
<tr>
<td>Treble Clef</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Figure 7.3: Summary of completed tasks
The data gathered from these individuals provides an important glimpse into how students learn music theory. Through the surveys and think-aloud tasks, a pattern emerged which showed that students were using non-linguistic learning strategies to gain confidence with the new subjects.

To begin, the volunteers completed a questionnaire that provided basic information about their learning styles (See Figure 5.5, Chapter 5). The first question asked the students to describe how they learn music theory. Their responses were varied:

Liebermann: I teach myself. I sleep through lectures then read the chapter or find another book to explain it better. I compose at the piano so sometimes when I read about theory I think to myself, "Oh, so someone else knows this stuff too!" Kind of like when you read a poem that explains exactly how you feel.

Forte: Having the basics told to me and then letting me figure out the technical things by doing exercises. Usually, working by myself I learn more than sitting through an hour of lecture if I have somewhat of a clue of what I am doing.

Coltrane: Mostly through my studies of Jazz. I'm a jazz saxophonist & I've learned most of my way around Western harmonies through the changes of tunes I learn--the classes reinforce.

Smetana: Mostly through trial and error. Also by listening and analyzing then trying.

Prince: Through plowing through the examples and going back and reading the chapters for stuff that I've forgotten or didn't know.

Satie: Seeing practical examples of the concepts being taught (which doesn't happen enough right now).
Anacrusis: By going to class, taking notes, asking questions, doing the homework, talking over assignments with friends.


Most of these responses mention the utility of musical exercises for grasping new concepts. The next question addresses this specifically by asking the students which types of exercises were most effective:

Liebermann: Short composition exercises.

Forte: Those that have repetitions [sic] of certain ideas. If I do a lot of one thing at a time I learn it, then when it shows up w/ other ideas I remember how to do it.

Coltrane: Learning tunes/chord progressions, analyzing tunes.

Smetana: The harmonization of given melodies.

Prince: Homework.

Satie: Programmed exercises (example Basic Materials in Tonal Music and Harmonic Materials in Tonal Music--both by Harder).

Anacrusis: Completing practice work in class or at home & then having a class discussion on the practice examples.

Treble Clef: Practice--analysis of hymns to start out with then other music, and having to write chords' function along with number (IV, V).

These sets of responses show different attitudes towards learning in the classroom. Working in the medium of music is an important part of learning; several students mentioned this in the first question. “Trial and error,” “plowing through the examples,” and “playing exercises” are all comments that the students used to describe how they learned music theory.

In fact, only “Liebermann” and “Coltrane” did not mention musical exercises.
specifically, and both of them made reference to learning through their musical activities—composing and playing jazz. The types of exercises that students thought were most effective involve notation in every case, whether it be through short composition exercises (Liebmann) or analysis (Treble Clef). Music is best learned, these students feel, through immersing themselves in the music itself.

The students were also asked about whether they use writing to learn new concepts:

Liebermann: Not really.

Forte: Generally I do not write about what I learn, but rather if someone asks me a question I can tell them how I would do something & learn something myself along the way.

Coltrane: Yeah, If I write it in my notes or transcribe licks I remember it alot [sic] better (tunes).

Smetana: Not Normally.

Prince: I use notecards for my other (non-music) classes. I tried using them for theory but it’s hard to write theories on notecards: Facts are easily memorized but ideas aren’t.

Satie: Yes. It prevents me from quickly rushing through material, so that my mind has more of a chance to learn.

Anacrusis: No.

Treble Clef: Not with music theory--other classes I take alot [sic] of notes. Not with aural training either.

The final question asked students if they felt that writing could help them learn music theory:
Liebermann: No, because I need to picture things to understand them and notation is like a picture or diagram.

Forte: Depending on how it was approached. Being forced to write a paper in detail does not help me, but small, short essays on one particular point may help.

Coltrane: Yeah--Writing is good kinestetic/tactual [sic] exercise--most people learn this way--not aurally or visually.

Smetana: Yes, writing always forces you to think logically and completely and also to formulate conclusions.

Prince: Maybe. I'll have to see. I've tried it with the notecards and it was pointless but I'm willing to try anything to help me towards my goal of being the "Theory God".

Satie: Writing has helped so far--those two books I mentioned have made theory much easier to me.

Anacrusis: I am a better talker than writer, so I don't think I would be benefitted [sic] by writing about my assignments. The one time when I had to write about an analysis, I was very lost & had a lot of problems!

Treble Clef: Not really. Looking at music & analyzing it helps best.

These responses reveal differing attitudes towards writing-to-learn. Some students used writing to help them learn outside of the music classroom (Prince, Satie, and Treble Clef), some emphatically did not (Liebermann, Smetana, Anacrusis). "Satie's" answer even echoes one of the theoretical claims of writing-to-learn; that writing, because of the physical activity involved, slows down the thinking process, forcing the mind to organize the material fully. It is interesting that "Coltrane's" answer is directed towards writing music to learn, rather than prose. Writing out the music helps him to remember the music.
The students were split on whether or not they felt that writing could help them learn music theory. "Forte's" hypothesis (that small, short essays on one particular point might help) presages the format of the writing treatments used in the study. "Satie" is clearly referring to writing notation, and "Coltrane" probably is as well, since he also refers to aural and visual learning. "Satie's" experience is that writing—writing the music itself—has been useful in helping him learn music theory.

Some of the students were open-minded about writing-to-learn, but the majority viewed musical exercises as the best way to learn new concepts. The consensus seems to be that working with notation produces the best effects. This view is supported by the quantitative data gathered from the pre- and post-tests, but it is interesting to look at the individual test results.

The pre- and post-test results from the case study students show their progress through the treatment process. A summary of the pre- and post-tests is provided in Table 7.3:
<table>
<thead>
<tr>
<th>Name</th>
<th>Treatment</th>
<th>Topic</th>
<th>Pretest score*</th>
<th>Post-test score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liebermann</td>
<td>WR</td>
<td>N6</td>
<td>0/0/0</td>
<td>4/1.5/4</td>
</tr>
<tr>
<td>Forte</td>
<td>WR</td>
<td>N6</td>
<td>2/0/0</td>
<td>4/1.5/3.5</td>
</tr>
<tr>
<td>Coltrane</td>
<td>WR</td>
<td>+6</td>
<td>0/15/2</td>
<td>3.5/25/4</td>
</tr>
<tr>
<td>Smetana</td>
<td>WR</td>
<td>+6</td>
<td>0/5/2</td>
<td>4.5/3</td>
</tr>
<tr>
<td>Prince</td>
<td>WR</td>
<td>+6</td>
<td>--/--/--</td>
<td>0/5/0</td>
</tr>
<tr>
<td>Satie</td>
<td>WR</td>
<td>CT</td>
<td>0/0/1</td>
<td>--/--</td>
</tr>
<tr>
<td>Anacrusis</td>
<td>WR</td>
<td>CT</td>
<td>--/--/--</td>
<td>--/----/</td>
</tr>
<tr>
<td>Treble Clef</td>
<td>WR</td>
<td>CT</td>
<td>2/0/0</td>
<td>3/2/4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Treatment</th>
<th>Topic</th>
<th>Pretest score*</th>
<th>Post-test score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liebermann</td>
<td>PW</td>
<td>+6</td>
<td>2.5/1/2</td>
<td>--/--</td>
</tr>
<tr>
<td>Forte</td>
<td>PW</td>
<td>+6</td>
<td>2.5/5/2</td>
<td>4/3/4</td>
</tr>
<tr>
<td>Coltrane</td>
<td>PW</td>
<td>CT</td>
<td>0/0/0</td>
<td>--/--</td>
</tr>
<tr>
<td>Smetana</td>
<td>PW</td>
<td>CT</td>
<td>0/0/0</td>
<td>5/0/4</td>
</tr>
<tr>
<td>Prince</td>
<td>PW</td>
<td>CT</td>
<td>0/0/0</td>
<td>3/35/4</td>
</tr>
<tr>
<td>Satie</td>
<td>PW</td>
<td>N6</td>
<td>0/0/0</td>
<td>3/2/4</td>
</tr>
<tr>
<td>Anacrusis</td>
<td>PW</td>
<td>N6</td>
<td>0/0/2</td>
<td>2/15/4</td>
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<td>Treble Clef</td>
<td>PW</td>
<td>N6</td>
<td>0/0/0</td>
<td>15/15/4</td>
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</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Treatment</th>
<th>Topic</th>
<th>Pretest score*</th>
<th>Post-test score*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liebermann</td>
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<td>CT</td>
<td>--/--/--</td>
<td>4/0/4</td>
</tr>
<tr>
<td>Forte</td>
<td>EC</td>
<td>CT</td>
<td>4/0/2</td>
<td>35/5/4</td>
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<tr>
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<td>EC</td>
<td>N6</td>
<td>0/0/5</td>
<td>4/3/4</td>
</tr>
<tr>
<td>Smetana</td>
<td>EC</td>
<td>N6</td>
<td>--/--/--</td>
<td>4/5/4</td>
</tr>
<tr>
<td>Prince</td>
<td>EC</td>
<td>N6</td>
<td>0/0/0</td>
<td>15/2/4</td>
</tr>
<tr>
<td>Satie</td>
<td>EC</td>
<td>+6</td>
<td>0/5/0</td>
<td>2.5/5/4</td>
</tr>
<tr>
<td>Anacrusis</td>
<td>EC</td>
<td>+6</td>
<td>0/0/0</td>
<td>15/1/2</td>
</tr>
<tr>
<td>Treble Clef</td>
<td>EC</td>
<td>+6</td>
<td>5/1/2</td>
<td>5/1.5/4</td>
</tr>
</tbody>
</table>

*The scores reflect the three types of questions on the pre- and post-tests: Partwriting question/Writing question/Analysis question

WR = writing, PW = Part-writing, ED = Error detection, N6 = Neapolitan Six Chord, +6 = Augmented Sixth Chords, CT = Common Tone Diminished Seventh Chord

Table 7.3: Summary of pre- and post-test scores
These scores show several trends. The first is the general success the case study students had with the analysis question. This success reflects the class at large, for most students were able to complete the analysis with little difficulty. The analysis question was in some ways quite simple because it consisted of several familiar chords that should have been easily recognizable, plus one unfamiliar chord. The more astute students correctly assumed that the strange chord was the subject in question, and simply labeled it as such without really knowing the details of that topic. Some students that were completely unable to part write or describe a concept were able, nevertheless, to identify it in the analysis question (see, for example, “Smetana’s” PW score or “Treble Clef’s” ED score). The second trend is toward low scores on the writing question. This result occurred even when the student knew how to part write the chord. There were many examples of students who wrote eloquently on the writing treatments, but when it came to the post-tests, wrote little. Two factors may explain this situation. The first is a lack of interest—the students did not want to take the time to write everything they knew about a topic. It was an unfamiliar activity, so they concentrated on the other tasks. The second was a perceived lack of time. The test questions were rotated in their format, so that for some students the part-writing question was at the top of the page, for some in the middle, and for some at the bottom. The goal was to reduce the effect of the time limitations. If the students went in order, each activity would have been the first (and presumably most
carefully done) for one-third of the students in the class. There were several examples, however, of students skipping the prose writing question, wherever it occurred, in favor of completing the part-writing and analysis questions. This may reflect a certain apprehension or uncomfortableness with the writing question.

7.4 Think-aloud protocols

The think-aloud protocols are described in Chapter 5, and Figure 5.10 in that chapter defines the thought processes this protocol measured. The transcripts for the think-alouds were analyzed for the five different types of thought processes (Reviewing, Evaluating, Generating, Questioning, and Planning) and the focus of the thought process (Product or Process). The frequency of the thoughts was recorded for each of the think-alouds, and is presented in Table 7.4 as a percentage of the total thought processes voiced:
Numbers represent the percentage of total for each thought process.

### Writing Treatment:

<table>
<thead>
<tr>
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<th>RT</th>
<th>RS</th>
<th>ET</th>
<th>ES</th>
<th>GT</th>
<th>GS</th>
<th>OT</th>
<th>OS</th>
<th>PT</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liebermann</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
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<td>25.3</td>
<td>0.0</td>
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<td>53.3</td>
<td>0.0</td>
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<td>1.0</td>
<td>4.0</td>
<td>1.0</td>
<td>--</td>
</tr>
<tr>
<td>Coltrane</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Anacrusis</td>
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<td>25.0</td>
<td>12.5</td>
<td>4.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>Treble Clef</td>
<td>32.5</td>
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<td>0.0</td>
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<tr>
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<td>1.0</td>
<td>10.7</td>
<td>11.2</td>
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<td>3.5</td>
<td>5.5</td>
<td>2.3</td>
<td>3.5</td>
<td>2.3</td>
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### Error-Detection Treatment:

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<tr>
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<th>ES</th>
<th>GT</th>
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Table 7.4: Summary of think-aloud data
These percentages reflect the thought processes the students were using as they were struggling to learn a new topic. The averages should be weighed carefully, since each contains a maximum of only eight responses, but some trends do appear.

The Reviewing process is more prevalent for the part-writing and writing treatments than it is for error detection. One of the claims of writing-to-learn is that this procedure forces students to review and revise their products. Indeed, this seems to hold true for the case study students. Error detection, which involved less writing, shows a corresponding drop in score of the reviewing category.

The Evaluating process, on the other hand, is much more common during the error-detection treatments than it is for the other two. This is also expected, because the primary focus of the error-detection exercise is evaluation of the chord progressions. Writing stimulated more of the Generating thought process, but all three of the exercises were about equal in this category, as they were for the Questioning category. For the Planning thought process the part-writing treatment ranked higher; it was followed by the error-detection treatment. The students put more time into preparing their answers for these two treatments. Prose writing, by comparison, stimulated few of the Planning thought processes.

As the transcripts from the think-alouds were analyzed, two separate, but perhaps related, phenomenon were noticed. The first was the students' use of
written notation to help them grasp the new ideas, and the second was their use of simulated playing when they faced difficult decisions in their assignments. Through these phenomena the eight students reveal individual insights into how students learn music theory.

7.5 Student One: "Liebermann"

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Table 7.5: Percentages of "Liebermann's" thought processes generated by the three think-alouds.

"Liebermann's" protocol analysis for the error-detection treatment shows a much higher percentage of the Reviewing process and a much lower percentage of the Generating process, relative to the averages for that treatment. Her part-writing treatment also shows a higher average of Reviewing processes. "Liebermann" was a very careful worker, and cautiously reviewed the work on both of her think-alouds.

"Liebermann's" error-detection activity shows interesting characteristics. In one corner of her exercise she summarized the voice-leading characteristics of the common-tone diminished seventh, and referred to this summary as she checked for errors. She became confused by the first example, however, and wrote different versions of the chord to understand what was going on:
“I’m gonna draw them all right here and then stack ‘em in some sort of order.” Even after that, she failed to understand that the chord simply had bad voice leading, but she circled the common-tone diminished seventh chord and went on to the next example. She began to have trouble with this next progression too (this example had nothing wrong with it), and again began to stack different versions of the common-tone diminished seventh chord. At that point, she discovered that they were the same in basic shape (that is, that they were both fully diminished seventh chords):

Now, what kind of chord do we have here. Uh, looking at the middle chord of course. Let's see, um, I'm gonna stack it just like we did on the other one. We got a Bb, I have a Db, I have a G, and E natural. Hey, its about the same shape as the last chord I put, figured out.

“Liebermann,” though unable to identify exactly what a common-tone diminished seventh should look like, nevertheless, through manipulating notes on the staff, made a connection that the two chords are somehow related. At this point she went to the piano and fingered the chord progression, still trying to find a non-existent error. She kept switching the fingering, using different roots in an attempt to figure out the exercise. In the end, she gave up, unable to find an error, and not yet confident that the example was correct.

When “Liebermann” was confused, she wrote the chords in various versions to understand the problem. While she was not entirely successful, she did make important connections about the structure of the common-tone
diminished seventh chord through the use of notation. She also used the keyboard as a last resort, but this did not seem to add to her success.

Student Two: "Forte"

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Table 7.6: Percentages of "Forte's" thought processes generated by the three think-alouds.

"Forte’s" protocols for the writing treatment yield average results. The Questioning category is quite prominent for the error-detection treatment, revealing her indecision and discomfort:

... And let's see, G, A#, A# goes to B#, acts as the leading tone or the V of IV, uh, I don't see why, um, OK, it'd be C, um, I don't, its, I don't see why that was done that way, better voice leading, that one looks pretty good, G, what the heck? That's not a I chord. Its, its a minor I chord, right? ...

The Generating process was more prevalent than average for "Forte's" part-writing treatment, but the rest of the percentages are close to average.

"Forte" also used notation to clarify her ideas--on the prose writing exercise! During the writing exercise, she became confused, and drew a staff on the page to help her out: "Making myself a little staff, so I can get a visual picture here. Just gives me something to look at, better than this." At that point she was able to describe more about the Neapolitan chord. Later in the
transcripts she again referred to the need to "get a picture" so she could better describe the subject. Proponents of writing-to-learn claim that the act of writing helps students learn, but for "Forte" manipulating notes on the staff actually helped her to write. She used the notated example of the Neapolitan chord to translate her ideas into prose.

7.7 Student Three: "Coltrane"

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Table 7.7: Percentages of "Coltrane's" thought processes generated by the three think-alouds.

Coltrane's think-aloud is about at the average for error detection, except the increase in percentage of the Generating category. He did nothing unusual during the think-aloud, and completed the exercise without difficulty.

7.8 Student Four: "Smetana"

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Table 7.8: Percentages of "Smetana's" thought processes generated by the three think-alouds.
"Smetana's" think-aloud protocol for the writing treatment shows a higher percentage of the Generating process than average, and a lower percentage of the Reviewing process. Generating is also prevalent for the error-detection and part-writing treatments. His transcripts and think-aloud tasks revealed nothing out of the ordinary.

7.9 Student Five: “Prince”

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Table 7.9: Percentages of “Prince’s” thought processes generated by the three think-alouds.

“Prince’s” protocols are about average, except for the part-writing treatment.

In this treatment the Reviewing process ranks lower than normal and the Planning process scores much higher.

The think-aloud transcript from “Prince’s” writing exercise offers the only example in the case study of the writing-to-learn treatment, by itself, helping a student to arrive at a solution. The exercise asked her to describe the augmented sixth chord, and this is what she wrote:

The Augmented 6th chord is commonly used to lead into V chords. I see it right now as a form of decoration. It really doesn’t at this time make much sense to me.
In the book it shows a iv chord that has notes written on top of it. It starts with German six-five where it had an F, A, C, D#. The sixth was sharp to show that it was an augmented 6. It also had a French four-three where it had a F, A, B, D# where the D was augmented again to show a raised 6. I think the last form was an Italian six-three where it has a F, A, D# with the augmented 6 again. I want to reiterate the fact that I am still confused about this whole world of Augmented 6th.

"Prince" figured out some of the details of the augmented sixth, but could not weave the ideas together into a sensible whole. One of the things that she pondered was which "inversion" fits the Italian augmented sixth chord. The transcript from that portion of the think-aloud shows how she resolved that struggle:

Uh, and I think that the last one, I think, I'll put that in there 'cause this is wrong, but I don't know what else to put. I think the last form was an Italian five-three, yeah, I guess that I'll have to go with that. The Italian five-three, I think. Well, I already said I think so that's good enough. I think the last one, Italian five-three, where it, but it couldn't be a five-three because it has to have a six in it. 'Cause that would be the same as the six-five, right? Oh, we'll just put it in, but, it has a F, A, C, D#. But that's the same as the German six-five, that doesn't make sense. Mm, mm, that doesn't make sense. Well, I said I think so I'll just underline think. All right, um, and I have the F, A, C, D#, with the augmented six doubly again. Um, I think the Italian, I wanna say, OK, four-three, six-five, it can't be five-three. Maybe I'll look at seven, but it has that six in it. Can't remember. I'm gonna make it a six-three, I think that's what it was. The Italian six-three, yeah. OK. So the F, A, D#, take out the C, yeah, yeah, that feels good. I hope that's right. F, A, D#, yeah.

"Prince" was positive from the start that there was a "6" in the inversion name, but could not initially rectify that with the other information she had. As she wrote and thought her way through this problem, she was able to arrive at the correct construction of the chord.
On the part-writing exercise she wrote a perfect example of a common-tone diminished seventh chord, and used the keyboard to play through her progression, saying the chords as she played them. She was able to confirm her evaluation that the progression "sounded good" by playing it on the piano. Apparently, the aural/tactile feedback of the keyboard helped her to decide that the progression was correct.

7.10 Student Six: "Satie"

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Table 7.10: Percentages of "Satie's" thought processes generated by the three think-alouds.

"Satie's" protocols reveal that the Reviewing process played an important part in the error-detection and part-writing exercises. These exercises show many scratch-outs and erasings, and his indecision about what to do resulted in the large percentage of the Reviewing thought process.

One characteristic of "Satie" was his habit of "fingering" the examples:

Now, uh, its going to Fb for the Italian six in the bass, and D is rising, um, OK, it went to a D natural, right, Ab, um, I'm trying to think of this as a piano in my head. Every, every time I think of a chord I think of a piano, um, and where it is. I'm just gonna kinda finger it in front of me here on the paper...
Later on in the transcript, he again returned to this idea of thinking through the examples with his fingers:

... uh, I don't see any significant problems here. Uh, no, it looks OK. I'm gonna say its all right. I, I usually almost always, I, I see that clavinova over there, it makes me want to go over there and uh, finger these out because that's the way I think of these usually....

The tactile sensation of playing was very important to "Satie," and this probably reflects the fact that he was also the only piano major in the case study.

He also wrote chords on the staff to help him figure out what was wrong with some of the examples in the error-detection exercise. In this case, he solved the error in a progression by rewriting it correctly:

.... I'm going to write a chord next to the, next to the final chord I'm going to write what I think it would be, be better as. Um, I'm writing the alto, the tenor and the bass, put stems on, and soprano I want to make, want to make an A there, A# which wasn't in the example. Uh, it looks like basically I just had to switch those two notes that I circled and it would have been all right.....

By writing his own resolution for the troubling chord, "Satie" was able to identify the problem. Once again, a student used notation, and part writing specifically, to clarify a difficult situation.
7.11 Student Seven: "Anacrusis"

Table 7.11: Percentages of "Anacrusis's" thought processes generated by the three think-alouds.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>RT</th>
<th>RS</th>
<th>ET</th>
<th>ES</th>
<th>GT</th>
<th>GS</th>
<th>QT</th>
<th>OS</th>
<th>PT</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing</td>
<td>37.5</td>
<td>0.0</td>
<td>0.0</td>
<td>20.8</td>
<td>25.0</td>
<td>12.5</td>
<td>4.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Error-Det.</td>
<td>12.3</td>
<td>3.5</td>
<td>29.8</td>
<td>53</td>
<td>53</td>
<td>0.0</td>
<td>3.5</td>
<td>1.8</td>
<td>14.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Part-Writ.</td>
<td>46.8</td>
<td>0.0</td>
<td>24.1</td>
<td>3.8</td>
<td>11.4</td>
<td>5.1</td>
<td>3.8</td>
<td>0.0</td>
<td>5.1</td>
<td>0.0</td>
</tr>
</tbody>
</table>

"Anacrusis" protocol scores are about average, except that Planning played a larger part in the error-detection exercise than in the other two exercises. More Review and Evaluating processes than average were generated through the writing and part-writing exercises.

"Anacrusis" had an interesting way of working through the exercises and treatments; she would construct the scale of the exercise, and then write out the notes of the triads below each scale degree:

... so I always have to do something and that is write the whole scale out on the bottom of my paper. And then I just write the uh, third and fifth, I think that they arpeggiate them on cue cards. Um, it just helps me because I, I am not really good at theory, and I need as much help as I can get, I need it to be visual.

"Anacrusis" needed to be able to look at this chord chart to feel comfortable about the exercises — this is perhaps related to the fact that she had the lowest theory GPA of the eight volunteers. On the think-aloud for the writing treatment, she did a rather remarkable thing. Rather than answering in writing, she drew a staff. On the staff she wrote out a common-tone diminished seventh chord and resolved it to a V chord, all the while...
describing it verbally. “Anacrusis” forwent the writing to simply “talk” through the concept. This is perhaps not surprising, because she had declared that she learned through talking better than through writing:

I am a better talker than writer, so I don’t think I would be benefited by writing about my assignments. The one time when I had to write about an analysis, I was very lost & had a lot of problems!

She used part writing to spark the ideas, talking through the construction and resolution of the common-tone diminished seventh chord.

7.12 Student Eight: “Treble Clef”

<table>
<thead>
<tr>
<th>Treatment</th>
<th>RT</th>
<th>RS</th>
<th>ET</th>
<th>ES</th>
<th>GT</th>
<th>GS</th>
<th>QT</th>
<th>QS</th>
<th>PT</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writing</td>
<td>32.5</td>
<td>3.6</td>
<td>15.7</td>
<td>72</td>
<td>24.1</td>
<td>0.0</td>
<td>48</td>
<td>0.0</td>
<td>12.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Error-Det.</td>
<td>5.9</td>
<td>1.5</td>
<td>21.5</td>
<td>8.1</td>
<td>30.4</td>
<td>10.4</td>
<td>5.9</td>
<td>0.7</td>
<td>14.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Part-Writ.</td>
<td>32.8</td>
<td>0.6</td>
<td>20.1</td>
<td>9.8</td>
<td>20.7</td>
<td>0.6</td>
<td>8.0</td>
<td>0.6</td>
<td>6.9</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Table 7.12: Percentages of “Treble Clef’s” thought processes generated by the three think-alouds.

“Treble Clef’s” protocols are close to average for all three of the treatments, except that Reviewing plays a lesser role than average in the error-detection exercise.

“Treble Clef’s” writing treatment provides another example of how students used notation to help them write. She attempted to build a common-tone diminished seventh chord on a staff before she wrote anything:
... OK, um, I'm gonna draw a staff here and gonna show myself an example that I can look at. So I'm drawing the staff lines. I just need enough room to put two chords I think, 'cause after that, I'll be able to figure out what I want to say...

She was unable to build the common-tone diminished seventh chord, however, so she scratched out the first attempt, drew another staff, and again attempted a solution. After struggling through her self-imposed part-writing exercise, she eventually gave up, and talked about general characteristics of the chord. She based her knowledge on what she could notate; failing that, she talked broadly about neighbor motion. Her inability to notate the chord translated into an inability to discuss specific traits of the chord.

7.13 Conclusion

The qualitative evidence supports the quantitative data: when students learn harmonic constructs, they learn best through the part writing. The many examples in the case study of students turning to part writing to help them through difficult exercises emphasizes the importance of this exercise. What is so special about part writing, and why didn't the writing-to-learn exercises have a greater impact? The final chapter examines these two questions, and points to the direction of future research.
For teaching harmonic constructs, part writing was clearly the most effective of the three treatments. This finding raises interesting issues in light of the fact that the writing-to-learn movement has shown promise in almost every field. Why is it that prose writing did not help students as readily as part writing did?

One answer to this question could be the student's lack of familiarity with the writing-to-learn treatments. Because part-writing exercises were used extensively in the classroom apart from this study, the students may have placed a greater value on these exercises. There were several instances on the pre- and post-tests where students only partially answered the writing question; rarely, however, did students leave the part-writing question blank—regardless of the order of the questions on the test.

Nevertheless, this investigation took several steps to eliminate the impact of familiarity with any of the treatments. Each of the three treatments were measured by the same type of test, which included a prose writing question, a part-writing question, and an analysis. It is not significant, therefore, that some students spent more time on the part-writing than on the prose writing.
question—if a student had greater facility with the mechanics of part writing, that facility would hold true across all three treatments. The effects of the writing-to-learn treatment, for example, were measured through part writing, as well as prose writing and analysis. In other words, if any of the treatments facilitated learning the test as a whole would reflect improvement. The format of the test was deliberately structured so that familiarity or facility with any one of the questions would not compromise the results. So the question remains—why didn’t writing have a greater effect on learning musical constructs?

The writing-to-learn philosophy is based on the idea that “inner speech,” the mechanism that translates innate knowledge into active vociferation, is activated most readily by the written word. The process of writing words slows the learner, so that communication can be clarified. Music, however, is basically non-linguistic, even music that accompanies text. Indeed, music performance itself is in some respects a substitute for language. A performer tries to communicate meaning to the audience, whether that be in the realm of feeling or thought or simply the essence of the piece itself, unrelated to physical realities.

According to Mary Serafine, music is cognition “in which the artform is not considered a clearly specified external object, but rather an internal, subjective entity springing from mental operations” (1988, p. 233). The most essential manner of learning music, then, may be purely through the
medium itself. Part writing is, after all, a form of writing, and the many benefits of writing words may also be derived from "thinking" with notation. Creative part writing forces the students to grasp the very concepts that were measured in the tests: preparation, resolution, identification, spelling, and voice leading.

Both the qualitative and quantitative data indicated that part writing was the most effective treatment. Perhaps writing-to-learn principles did prove valid, but in writing notation, rather than prose. Clearly, part writing was a significant factor in students' performance on the tests, and the case studies showed that students turn to part writing when struggling with details. This chapter examines part writing, and more generally, notation, as somehow akin to a language, and compares part writing to the role of writing prose in the music theory classroom. Finally, directions for further research are considered.

8.1 Notation as Language

As a subject, music theory has unique characteristics that set it apart from other fields, even those such as mathematics that use symbolic language. The discipline focuses on notation, yet that notation is not music. Rather, it is a written representation, much the same as written prose can serve as a symbolic representation of spoken language. Many elements of writing-to-learn theory are applicable to music—but the writing involved concerns
notation rather than language. The role of notation in learning music can be re-examined by returning to the theories of Piaget, Vygotsky, and the writing-to-learn proponents.

Egocentric thought, according to Piaget's theory, is highly symbolic, and it is this type of thought that part-writing exercises may engage. Ego-centric thought makes use of schemas of imagery and analogy, which Piaget says are random and incommunicable (1959, p. 127). In his view, egocentric thought constructs a reality for the individual alone; the outside world is only secondarily in focus.

In the struggle to comprehend musical meaning, we often use analogy and imagery; notation, at its deepest level, may be nothing more than this. Musical meaning is inherently individualized. The way any piece of music impacts us is quite personal--so personal that it is difficult to define musical meaning even in a general way. Music theory, as a discipline, uses a highly developed system of imagery and analogy schemas. For this reason, the act of theorizing may tap into the symbol-based egocentric thought more readily than socialized thought, for the symbolic nature of Piaget's egocentric thought seems closely related to the theorist's needs.

Piaget's egocentric speech is internally directed, a running commentary on immediate activity. Children who think and speak egocentrically exist in a world of their own, rather than interacting with others. There may be corollaries to this in how we experience music. Students are often told to "get
into" the music, to lose themselves in the experience, especially in extemporaneous styles of music such as jazz.

The analogy of musical thought to egocentric thought and speech is not fully applicable, however. Piaget's model of egocentric thought reflects an intellectual simplicity of mind, an absence of rational referential systems and an inability to see relative intellectual positions (1959, pp. 270-271). Because this intellectual simplicity of mind is not conducive to an understanding of harmonic constructs, I turn to Vygotsky's modification of egocentric thought--his "inner speech."

Vygotsky focused on language as a fomenter of learning with his paradigm of inner speech. His model of the interaction between language and thought allows for non-linguistic experiences in learning:

Schematically, we may imagine thought and speech as two intersecting circles. In their overlapping parts, thought and speech coincide to produce what is called verbal thought. Verbal thought, however, does not by any means include all forms of thought or all forms of speech. *There is a vast area of thought that has no direct relation to speech.* (Vygotsky, 1992, p. 88) (Emphasis mine.)

The inner speech that Vygotsky modeled forms a direct link between speech and thought. Might there be an area of pure thought not covered by inner speech that translates between thought and music--an "inner music"? Inner music would be condensed and abbreviated, just like inner speech. The act of transferring musical thought from the maximally compact inner music to the intricately detailed written notation might create what Vygotsky called "deliberate semantics"--the web of musical meaning. Perhaps music is learned
through an inner pool of thought that is intricately linked to the musical process, a process that creates musical meaning for each of us. Mary Louise Serafine describes this type of musical cognition as "the activity of thinking temporally with sounds, both simultaneous and successive" (1988, p. 72). Musical cognition does not just follow sensory input, but actively constructs musical events (Serafine, 1988, p. 73).

"Inner music," like inner speech, would necessarily be dynamic, shifting, and unstable. Perhaps, as inner music becomes perceived music, a complex cognitive transformation occurs as the inner music is syntactically reinterpreted and organized. Vygotsky described inner speech as

...condensed, abbreviated speech. Written speech is deployed to its fullest extent, more complete than oral speech. Inner speech is almost entirely predicative because the situation, the subject of thought, is always known to the thinker. Written speech, on the contrary, must explain the situation fully in order to be intelligible. The change from maximally compact inner speech to maximally detailed written speech requires what might be called deliberate semantics—deliberate structuring of the web of meaning. (1992, p. 182)

Perhaps, the musical web of meaning describes how notation and thought interact continually to produce a network of ideas and feedback. Of the specific types of tasks available, part writing seems most suited to facilitate this interaction.

An inner music modeled on Vygotsky's inner speech would continuously and spontaneously engage with the music we hear and perform. Vygotsky claimed that writing could be integral to thought creation because it influences how children seek and plan solutions to problems. In the present
study, the qualitative data indicated that students use notation in the same manner. Understanding harmonic functions, which is a goal of music theory, would then be facilitated by stimulating the interaction between thought and the musical phenomenon. Part writing, using the representation system of music, appears to help create a web of meaning needed to learn and understand the fundamentals of what is heard.

Piaget and Vygotsky laid a foundation for exploring why notation, as the physical, symbolic representation of music, is an effective mediator for learning. The interaction between pure thought and musical action, as represented by an inner music, may explain why writing notation proved more effective than the other treatments. This effectiveness may also stem, however, from qualities that part writing shares with the writing-to-learn exercises.

8.2 Writing Notation as Writing Prose

The writing-to-learn theorists claimed that writing impacted learning for a variety of reasons, most of which also seem applicable to writing notation. Writing notation, like writing prose, forces students to sharpen their focus to successfully resolve problems (Dowst, 1980) and to seek out and organize patterns (Boone, 1983). The factors that Applebee (1984) claims contribute to the positive role of prose writing in thinking may also apply to writing music: the permanence of the product, allowing revision and review; the
explicitness required to maintain meaning; the facilitation of organization; and the active nature of the process. The act of writing notation forces students to engage in the very activities that writing-to-learn proponents advocate.

Writing musical notation requires students to integrate prior knowledge with new information. This integration is explicitly articulated through the exercise of writing. As Archambeault says:

Writing requires a high level of active processing of information. Unless students are merely copying word for word from printed text, they are translating the new information into their own words, forming connections with previously learned information, interpreting and applying it in new contexts. Writing is also the concrete visualization of content material. The learner is not only making connections, but creating new connections while developing a personal organizational schema. (Archambeault, 1991, p. 3)

The benefits of writing described here can be directly applied to writing notation. Unless students are simply copying music, they are being forced to create new connections with what they have previously known. Part writing and prose writing share many of the same relationships to learning. If writing prose can create connections, though, why didn't it significantly impact the results of this study?

James Marshall claimed that different kinds of writing influence learning in different ways:

... writing takes on several forms in school. Those forms will encourage different modes of thinking and result in different outcomes, depending in part on the constraints and opportunities presented by the writing tasks themselves. (Marshall, 1987, p. 31)
The part-writing tasks may have been more effective than the writing tasks because they encouraged modes of thinking that facilitated performance on the post-tests. In other words, prose writing may still be a useful tool in the music theory classroom, but, for the measurements in this investigation, part writing was the most beneficial.

The writing exercises chosen for this study were modeled on tasks taken from successful studies in math pedagogy. It appears now that the prose exercises that worked well in mathematics did not work as well in music. Perhaps the contextual limitations of music affect learning to a greater extent than contextual limitations in mathematics. The creative, open-ended nature of many music tasks is quite different than the single-answer exercises in math. This may also explain why the error-detection exercises did not significantly impact learning. The task is oriented toward a single item; find that item (the error or the mathematical answer) and the goal is accomplished. Part writing and ostensibly prose writing forces students to consider alternatives, and to organize and prioritize them. Part writing is a creative way to work using the medium of music notation, and therein lies the strength of the exercise.

Recent cognitive research supports the idea that part writing is an important cognitive agitator in music. The cognitive theory of multiple intelligences mentioned in chapter 1 (Gardner, 1983, 1985) maintains that intelligence is multifaceted; rather than a single base intelligence, humans
have a number of differing kinds of intelligences: mathematical, musical, linguistic, social, physical, etc. Diana Deutsch’s research supports this hypothesis. In 1973 she investigated different types of interference patterns on her subject’s musical memory, and found that non-musical interference patterns had a much smaller impact on musical memory than did musical interference patterns. Her research implies that musical memory is more dramatically influenced by musical events than by non-musical events.

David Marr (1982) suggested that the different intelligences, or “modules,” operate according to their own principles, and have little interaction with the other intelligences. Applying Marr’s theory to this investigation would indicate that it is natural that musical intelligence—in this case the recognition and construction of certain constructs—is aided through musical exercises that specifically activate the musical intellect. Unfortunately this theory does not explain the lack of significance we can assign to the error-detection exercise, which also presumably activates the musical intellect.

While the present study equated mathematical notation to musical notation in its design, there may be, after all, a vast difference between the two. John D. Barrows states that:

Looking at music today, there is a superficial similarity between mathematics and music because both make use of symbolic notations. But differences abound: mathematics has a logical inevitability that music lacks; clearer still is the division between the skill of making music, either by composing or performing, and the pleasure that comes from listening. There is no similar division in mathematics. It is not a spectator sport. (1995, p. 205)
Music also displays a cultural diversity that is absent from mathematics (Barrow, 1995, p. 208). Mathematical notation carries a specific message that refers to a theorem or formula unequivocally. $E=MC^2$ can not be confused with the formula for finding $\pi$. Musical notation however, does not represent a physical fact, but an ephemeral experience, guided by, but not ruled by, the actual notation. A series of numbers and letters on a blackboard may be a formula, but a series of notes may or may not be regarded as music, depending on the aesthetic framework of the observer.

Musical appeal is a prospective property. It looks as if it might be listable or decidable only because, like words on a page, music is written down using a finite number of symbolic marks on pieces of paper. But that prescription is necessarily incomplete, and much of the attractiveness of music is added in the special translation process that we call performance. (Barrow, 1995, p. 220)

Music does not reside in the notation itself, but is simply framed by it. Musicians do not take years and years of lessons simply to learn how to read music—they must learn to interpret it. It is perhaps this interpretative factor that demonstrably sets music apart from mathematics. There is not interpretive license in math; either you are following the formula or you are not. Musical notation is rather inexplicit in its information. So much must be assumed that it takes years to learn all of the subtleties of performing well a piece that can be rather simply notated. When students are learning the basics, they must understand both the concept and the notational signature of various ideas. While a German augmented sixth chord looks and resolves one way, a dominant seventh, which sounds the same, resolves differently.
There is a dual purpose to music notation, it not only gives you information for the immediate present but also clues to the past and the future of the piece.

8.3 Writing-to-Learn in Music Theory Instruction

The question remains: is prose writing a viable alternative in the music theory classroom? The answer is probably yes, but not in the role initially envisioned in this study. Music is different from other disciplines because it incorporates a language unique to itself. As Barrow (1995) states, "Just as there appears to be a universal genetic programming of humans that endows linguistic skills, so there might be a universal musical grammar that plays the same role for sound patterns (p. 194)." (Emphasis mine.) Connolly (1989) stated that verbal language remains the most important mediator of concepts, even in symbolic fields. While for most music students this holds true, some students intuitively learn the grammar of some styles of music simply by listening to the music itself. There are too many examples of talented self-taught musicians who have a thorough aural grasp of advanced harmonic constructs to claim that verbal language is necessary for learning music.

Musical genius aside, the normal music theory classroom can probably benefit from the use of writing in the classroom.

Borrowing from the studies in mathematics, this study examined writing as a primary pedagogical tool for learning specific music concepts. Writing
was not as successful in this role as part writing. Prose writing may have a place, however, in helping students when the music itself is ambiguous, where context is ill-defined, and where students must think critically to make the appropriate decisions. As Rogers states:

The natural inclination to weight those aspects of musical experience that are the most "teachable" and "testable" should be carefully examined. Theory teachers, too often, tend to overstress topics or questions that permit only clear-cut right or wrong answers while avoiding those gray areas of ambiguity that can be so treacherous. Channeling of the thought process into black-and-white categories is important at a beginning stage so that basic concepts can be established, but eventually a theory program must move ahead to create tolerance and enthusiasm for the discovery, exploration, and comparison of a wide range of differing musical ideas and must promote the ability to back up decisions and judgments with logic, consistency, and imagination. In the long run, most questions that do have unequivocal answers turn out to be insignificant, whereas those that allow a variety of interpretation have the power to kindle real musical insight. (Rogers, 1984, p. 5)

Writing may be a way to find answers to interpretive situations, not by defining an augmented sixth chord, for example, but by helping a student decide if a particular sonority is functioning like an augmented sixth or something else. This study provided situations that were very clear for the students; little ambiguity was thrown at them in terms of context. If samples of real music had been used, however—samples that provided confusing situations—prose writing might have had a greater impact. This is an area of research that should be explored in the near future.
8.4 Future Research

There are vast areas of research that could be developed from this introductory study. A beginning was made toward understanding the thought processes that students use as they work through music theory problems, but more research is needed in this area. How does part writing affect the cognitive processes of the students? What mental processes do students engage as they learn about music? A series of protocol analyses could begin to explore this question. Do the theories of writing-to-learn fully apply to part writing? Is there truly an “inner music”, similar in function to Vygotsky’s inner speech? How do students approach difficult analysis problems? Would writing-to-learn exercises help students with analysis? We know very little about how students actually make decisions about music, and future research must investigate this process. The role of prose writing in music theory needs to be better defined, as described above, for writing may still be an important tool for the theory pedagogue. The affect of writing on musical learning could be examined in a variety of contexts, including the interpretive situations Rogers describes. The processes of learning musical constructs are still largely unknown, and there is much to explore.

8.5 Summary

This study examined the impact of three types of exercises on learning music theory. Of the three—part writing, error detection, and
writing-to-learn--part writing was the most effective. The creative openness of the exercise, and the musical literacy it required made it the most efficient way to help students learn the selected harmonic constructs. Prose writing may have a useful role in the music theory classroom, but not as a primary method of instruction for tasks such as these. Writing's role may be of more limited value in the music theory classroom than the writing-to-learn advocates anticipated.

The tools we bring to the pedagogical toolbox of music theory can include a variety of tasks, but exercises that engage the students in the notational system work best for the constructs examined in this investigation. Future curricular development should recognize this, and create for students an environment that facilitates their learning efficiently and well.
APPENDIX A

WRITING-TO-LEARN QUESTIONS

Topic 1: Phrygian II

1) Describe to yourself as many ideas as you can about the purpose, structure and function of the Phrygian II chord. What is the most important question you still have about the Neapolitan chord?

2) Describe to a hypothetical friend in Music 223 the purpose, structure, and function of the Phrygian II chord. What is the most important question you still have about the Neapolitan chord?

Topic 2: Augmented Sixths

Question 1: Describe the concepts related to the Augmented Sixth chord as you understand it. Try to describe both its purpose and its practical applications, as well as voice-leading concerns. Put down any ideas you have, even if you are not sure if you're right. What is the most important question you still have about the Augmented Sixth chord?

Question 2: Describe the Augmented Sixth to a friend who is taking Music 223. Try to describe both its purpose and its practical applications, as well as voice-leading concerns. What is the most important question you still have about the Augmented Sixth chord?

Topic 3: Common-Tone Diminished Sevenths

Question 1: Describe the concepts related to the CT o7 chord as you understand it. Try to describe both its purpose and its practical applications, as well as voice-leading concerns. Put down any ideas you have, even if you are not sure if you're right. What is the most important question you still have about the CT o7?

Question 2: Describe the CT o7 chord to a friend who is taking Music 223. Try to describe both its purpose and its practical applications, as well as voice-leading concerns. What is the most important question you still have about the CT o7?
APPENDIX B

VOICE-LEADING EXERCISES

Subject 1: Neapolitan Sixth

Instructions: Choose a key signature with more than one flat or sharp.
Compose a 4-voice progression that contains an example of a N6.

Subject 2: Augmented Sixths

Instructions: Choose a key signature with more than one flat or sharp.
Compose a 4-voice progression that contains an example of Augmented Sixths.

Subject 3: Common Tone Diminished Sevenths

Instructions: Choose a key signature with more than one flat or sharp.
Compose a 4-voice progression that contains an example of an CT o7.
APPENDIX C
ERROR-DETECTION EXERCISES
Topic 1: Neapolitan Sixths

Instructions: Eight chord progressions and analyses are given. Many of these examples, however, have errors in them. In each example, circle any errors (for example, if the voicing is wrong, circle the incorrect note; if the voice leading is wrong, circle the note incorrectly resolved plus the note of resolution; if a progression is weak, circle the weak chord). If the example is completely correct, put a star in the space in front of it. There will be time in class to ask questions after you're done with this exercise.
Topic 2: Augmented Sixths

Instructions: Four chord progressions and analyses are given. Many of these examples, however, have errors in them. In each example, circle any errors (for example, if the voicing is wrong, circle the incorrect note; if the voice leading is wrong, circle the note incorrectly resolved plus the note of resolution; if a progression is weak, circle the weak chord). If the example is completely correct, put a star in the space in front of it. There will be time in class to ask questions after you’re done with this exercise.
Topic 3: Common-Tone Diminished Sevenths

Instructions: Four chord progressions and analyses are given. Many of these examples, however, have errors in them. In each example, circle any errors (for example, if the voicing is wrong, circle the incorrect note; if the voice leading is wrong, circle the note incorrectly resolved plus the note of resolution; if a progression is weak, circle the weak chord). If the example is completely correct, put a star in the space in front of it. There will be time in class to ask questions after you're done with this exercise.
APPENDIX D

COURSE SYLLABUS FOR MUSIC 421

MUSIC THEORY IV (Music 421)
Autumn Quarter 1995

Classroom: Hughes 318
Office: Hughes 306A
Telephone: 292-5345
Office hours: TBA

Required Texts:
Aldwell and Schachter, Volume 2 Workbook to *Harmony and Voice Leading*

Course Requirements

Attendance at all classes is expected and required. Homework assignments are due at the beginning of class. Late homework will be marked down by one grade for each class meeting that it is late, unless you inform the instructor in case of personal emergency, illness, or religious holiday. Your lowest assignment grade will be dropped before your semester average is calculated.

**Homework, Attendance, Participation = 45%**

<table>
<thead>
<tr>
<th>Exam No. 1: Friday, Oct. 13</th>
<th>Exam No. 1 = 15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam No. 2: Monday, Nov. 6</td>
<td>Exam No. 2 = 15%</td>
</tr>
<tr>
<td>Final exam (date to be announced)</td>
<td>Final Exam = 25%</td>
</tr>
</tbody>
</table>
Course Prerequisite:

Music 223 (Music Theory III)

Recordings

Recordings of assigned pieces will be on reserve whenever possible. Make a concerted effort to listen to them or better yet, play through them at the piano.

Course Description:

As the fourth quarter of the music theory sequence, Music 421 will continue to build upon your knowledge of the musical language of common-practice style tonal western art music, by studying harmonic and voice-leading procedures in compositions from the seventeenth through nineteenth centuries. We will cover the material in the Aldwell and Schachter text from Chapter 28 to the end of the book. Skills to be developed include four-part writing, realizing figured bass, harmonizing melodies, and analysis at a number of levels; topics to be covered include the Neapolitan, augmented sixth chords, advanced uses of mixture, altered dominant seventh chords, common-tone diminished seventh chords, and chromatic voice leading. The primary goal of Music 421 is for you to consolidate your study of first-year theory into the ability to understand more complex musical procedures through exercises in writing, composition, and analysis.

As you study the material introduced in lecture and work through daily assignments, make every effort to listen and play through the musical examples. Always sing through and try out your exercises on a piano--your ear will catch many things your eye may not. Music theory and analysis is best learned (and most enjoyable!) through active bodily interaction with the music; merely looking at scores will not lead to the best possible results.

Course material is cumulative, so attendance at all classes (with the exception of medical reasons, emergencies, or religious holidays) is required. If you have an unexcused absence, your homework is still due that day in class. Please consult with your instructor during office hours if you would like to benefit from individualized help.

Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9/20-22</td>
<td>Introduction to course; review material of Theory III; establish common theoretical language to be used this quarter.</td>
</tr>
<tr>
<td>Week</td>
<td>Dates</td>
<td>Topic</td>
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<tr>
<td>------</td>
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<tr>
<td>2</td>
<td>9/25-29</td>
<td>Review and develop skills in four-part writing, figured bass, and harmonic analysis.</td>
</tr>
<tr>
<td>3</td>
<td>10/2-6</td>
<td>Phrygian II (Neapolitan [Chapter 28] In-class pre-test/treatment/post-test)</td>
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<tr>
<td>4</td>
<td>10/9-13</td>
<td>Extended analysis of chromaticism in compositions Exam No. 1 on Fri, 10/13</td>
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<tr>
<td>5</td>
<td>10/16-20</td>
<td>Augmented Sixth Chords [Chapter 29] In-class pre-test/treatment/post-test</td>
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<tr>
<td>6</td>
<td>10/23-27</td>
<td>Analysis of compositions containing augmented sixth chords. Advanced Uses of Mixture; Augmented Triads [Chapter 30]</td>
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<tr>
<td>7</td>
<td>10/30-11/3</td>
<td>Common-tone diminished seventh chords; altered dominant seventh chords [Chapter 30] In-class pre-test/treatment/post-test</td>
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<tr>
<td>8</td>
<td>11/6-10</td>
<td>Analysis of compositions emphasizing material introduced during weeks 6 and 7 Exam No. 2 on Mon, 11/6 No class on Fri, 11/10 (Holiday)</td>
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<tr>
<td>9</td>
<td>11/13-17</td>
<td>Continue analysis of compositions emphasizing recent material</td>
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<tr>
<td>10</td>
<td>11/20-24</td>
<td>Advanced topics in chromaticism [Chapter 31 and 32] No class on Fri, 11/24 (Holiday)</td>
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<tr>
<td>11</td>
<td>11/27-12/1</td>
<td>Analysis of compositions with emphasis on chromatic voice-leading and larger contexts</td>
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Final exam period Dec. 4-7 (date of exam to be announced)

Finis.
APPENDIX E

TERMS OF PAYMENT FOR THINK-ALOUD VOLUNTEERS

As a member of this select group of volunteers, you will be required to do the following:

1) Attend an hour long presentation on the mechanics of think-aloud protocols.

2) Participate in one 1/2-hour supervised preliminary practice session.

3) Participate in three 1/2-hour think-aloud exercises during the third, fifth, and seventh weeks, sometime between the Monday and Wednesday lectures.

When you complete these tasks you will be paid $10/hr. for the time you took (total $30.00).
I would like to take just a few minutes to describe some unique opportunities that are going to occur in the classroom this quarter. You have the privilege of participating in a study of how music theory is learned, and how we can improve our teaching.

At certain times during this quarter you will be asked to do a variety of activities. These activities will be evaluated by me for the study, for which you will receive a pass/fail grade based simply on whether or not you complete the activity. It is my hope that as many of you as possible can attend classes during the testing periods (not that you would even think of missing [teacher of class]'s class) so that my study will represent as broad a population as possible.

Specifically, there will be three types of activities, and you will do each activity once. These three activities are: very short in-class writing (prose) exercises, voice-leading composition exercises, and multiple-choice identification exercises. These treatments will be described in greater detail when you are to do them. There will also be times when parts of the classroom discussion are recorded, I hope that you don’t act any differently during these times than you do “normally.”

In addition, I would like to offer a few of you a special opportunity. It will require about three hours of your time during the quarter, and the eight students selected for this part of the study will be paid $10/hr. This opportunity involves participating in a special type of study called a “think-aloud”, in which you will complete music theory assignments while speaking your thoughts into a tape recorder. If you would like to volunteer for this specific study, please put your name and phone number on the sign-up list that I will now pass around the room. I would like to have at least two people from each class period. Do you have any questions? Thank You!
APPENDIX G

TRAINING OUTLINE FOR THE THINK-ALOUD PROCEDURE

a) explain nature of the protocol

b) students listen to a model tape and look at accompanying text

c) students fill out informational survey

d) confirm or eliminate student volunteers

a) explanation

One of the purposes of this study is to find out how students think about music theory. Since I can't see inside your heads, I will want you to say aloud what you are thinking as you complete three different exercises. These exercises will be given to you at specific times during the quarter, specifically during weeks 3 (Oct 2-6), 5 (Oct 16-20) and 7 (Oct 30-Nov 3).

The procedure works in the following manner. I will give you an assignment and ask you to work on it just as you might if you were working in class or at home. While you work you will attempt to say aloud whatever you are doing and whatever you are thinking before, during and after you write. Whenever you pause to think about what to write next, say aloud what you're thinking. It is imperative that you say as much as you can about what you are thinking. While this may seem a daunting task, it is not as hard
as it seems. I have an example of a think-aloud, and a transcription for you to follow along with.

b) play the think-aloud example I created, and let the students follow along with the transcript:

Think Aloud Exercises

Instructions: Choose a key and modulate to its subdominant using a common chord modulation.

[See transcript below]

Describe to a friend why you chose that specific chord progression.

"Dear friend,

I chose this progression for several reasons. The first reason I chose this progression was because I wanted to establish both keys. I established both keys by the strong V-I progression. I then figured out what the common chords could be, finding I, ii, IV, or vi as possibilities. I chose the ii because of its ambiguity in establishing the key of G. The ii, in retrospect, became vi in the key of C. I chose to go to IV after because it provides a smoother progression than vi going straight to V. After I was at the IV chord, I used the root movement by 5ths in ii-V7-I progression to firmly establish the new key of C."

---Transcript for the Think Aloud---

All right... This is, uh, an example of a think aloud... My instructions say choose a key and modulate to the subdominant using a common chord modulation... The first thing I want to do is choose a key...[ ] a choose the key of G... and I'm writing F#'s on the, on the staff... ah, now choose a key and modulate to its subdominant, so I'm in the key of G, and I need to figure out what key I'm modulating to the subdominant of G, is C, so I eventually need to get to C... and I have to use a common chord modulation... and, uh, let's see, the first thing I need to do is figure out a way to establish bosh, both the keys of G and C, uh, so
I'll be writing on going I to V to I, for both of those, I'm writing I to V to I below on the staff... uh in both the key of G and the key of C so there's a I to V to I in the key of C... now I have to figure out a way, um to use a, a common chord to get between the two... and if I just quickly run through my possibilities, uh in the key of G and in the key of C, and I wrote down G and I wrote down C, and in the key of G um, the I chord is in the key of C the V, and in the key of G the ii chord, the a minor chord, is the same as vi in the key of C, and let's see, the iii chord in G, uh, is can't be used as common chord because its not equal to the vii diminished, uh, the IV in the key of C in the key of G is equal to I in the key of C, um, and I'm just writing these down, straight down the column as I go, uh, V in the key of G cannot be used as a common modulation because its not the same quality as the ii, uh, vi, ah, in the key of G could be used its iii in the key of C... then vii in the key of G could be used its iii in the key of C... so that can't be used. OK. So our possibilities are in the key of G I, ii, IV, or vi. Uh, I don't want to use I because that's... uh, its going to be hard to to move away from the tonic if I use I, and so I think I'll use ii as the modulation... modulator... modulatory chord, excuse me, and so uh in the key of G I'll be moving I to V, to I--now I'm writing it underneath the staff, uh and now I'll have a ii in the key of G, uh, which becomes a vi in the key of C and I've writing that as the modulation right there, and then vi, a good place for vi to go is IV, and from IV I'll go to ii in the key of C, and then V in the key of C, and a I in the key of C. All right, so now I've established my chord progression and now what I want to try to do is write a four-voice uh, write a four voice, uh, example uh using these chords, I starting off with G, uh, in the I chord I'll start off with G3 in the bass, uh, and it should be G2 in the bass, G3 in the tenor, uh, D1 in the alto and a, a B, ah, excuse me D4 in the alto and a B4 in the, in the, a, soprano, uh, and then I'm going to move to V so the G in the bass goes up to the D, moves up, the G in the tenor moves down to F#, uh the D in the alto will hold through, the B in the soprano will move down to A, and I'm double-checking to make sure I don't have any parallel fifths, and I don't, uh and then going down back to I in the key of G, uh, the bass drops down to G, the tenor has to move up from F# to G, because of its the leading tone, uh, the alto stays with the D, and the soprano moves up to the B. And then we get to the ii chord, and now this is going to be a little bit trickier, the bass obviously moves up to the A, um, the soprano moves down to the A using contrary motion, . . . . . .

c) describe the terms of payment

d) have the students fill out the questionnaire
It will be necessary for me to select 8 of you to participate in the study. To help me make my choice, I have a short survey I would like you to fill out. When you have finished with this survey and handed it back to me, you will be finished tonight. I will select the students for my study by Thursday, and will contact you on Friday if you are one of those eight students.
APPENDIX H
SAMPLE PARALLEL LESSON GUIDES

One example from each of the four teachers is given below. Teacher comments are in italics.

Example 1 (3:30 section):

Parallel lesson guide 1: Phrygian II (Monday, October 2)

Identify the topic being introduced today:

*Neapolitan (Phrygian II)*

Explain why this topic is important to us:

*Important chromatic chord in much 19th century music.*

Cite musical samples that illustrate this topic.

*Mozart, Fantasy K. 397
Schubert, Die Krahe.*

Provide other information about this topic (voice leading rules, etc.)

|--*Usually given as six-three*
|--*Avoid b2 --> 2*
|--*Predominant harmony*
|--*Resolve b2 to 1*
|--*best to double bass (4)*

Draw generalizations and conclude topic.

|--*Basically functions like I16 in terms of chordal context & function*
|--*Adds expressiveness & intensity to a progression.*
Example 2 (7:30 section):

Parallel lesson guide 1: Augmented Sixths (Wednesday, October 18)

Identify the topic being introduced today:

*Augmented 6 chords.*

Explain why this topic is important to us:

*Used often in tonal music to make a point of V.*

Cite musical samples that illustrate this topic:

*Mozart on Pg. 477. Examples on Board of each.*

Provide other information about this topic (voice leading rules, etc.)

*On Board, show usual resolutions. Talk about parallel problems on Ger+6.*

Draw generalizations and conclude topic:

*(Nothing.)*

Example 3 (12:30 section):

Parallel lesson guide 2: Phrygian II (Wednesday, October 4)

Identify the topic being introduced today:

*Neapolitan 6th—voice leading & spelling b2 eventually to 1 & subsequent partwriting implications. Usually six-three position—it discourages five-three.*

Explain why this topic is important to us:

*Future partwriting, understanding typical cadence.*

Cite musical samples that illustrate this topic:

*Schubert Die Krahe, (Chopin Prelude), Chopin Mazurka Op. 33/4*
Provide other information about this topic (voice leading rules, etc.)

\[ b_2 \rightarrow 1 \]
\[ b_2 \rightarrow (1) \ 7 \rightarrow 1 \]

 Occasionally \( b_2 \) to natural 2

Draw generalizations and conclude topic.

More common in minor (TT in bass to V in major)
More common in first inversion
Etc, Etc.

Example 4 (9:30 section):

Parallel lesson guide 2: Phrygian II (Friday, October 6)

Identify the topic being introduced today:

More bII

Explain why this topic is important to us:

Same.

Cite musical samples that illustrate this topic:

Verdi—Requiem
Beethoven—Piano Sonata Op. 571
Bach—a minor invention
Bach—WTC Prelude in b-minor
Schubert—Moments Musical No. 6

Provide other information about this topic (voice leading rules, etc.)

avoiding \( b_2 \)-natural 2 in soprano
leading to bII6 via VI, I6, IV
modulation to BII (via bVI)
enharmonic respellings of bII (Schubert)

Draw generalizations and conclude topic.

see above
APPENDIX I

PRE- AND POST-TESTS

Phrygian II (Neapolitan)

Code Name: _________

Teacher: _______________

1. Provide a Roman numeral analysis for the following progressions:

2. Create a four-voice progression in g minor that starts and ends on I and includes the Neapolitan chord:

3. Describe the Neapolitan chord in as much detail as possible.
Augmented Sixth

Code Name

Teacher

1. Describe the augmented sixth chords in as much detail as possible.

2. Provide a Roman numeral analysis for the following progression:

   ![Musical Staff Image]

3. Create a four-voice progression in g minor that starts and ends on I and includes an augmented sixth chord:

   ![Musical Staff Image]
Common-tone Diminished Seventh

Code Name____________

Teacher_____________

1. Create a four-voice progression in g minor that starts and ends on I and includes a common-tone diminished seventh chord:

   \[ \text{Music staff} \]

2. Describe the common-tone diminished seventh chord in as much detail as possible.

3. Provide a Roman numeral analysis for the following progression:

   \[ \text{Music staff} \]

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APPENDIX J

SUMMARY OF ATTITUDE SURVEYS

The following summaries have modified the survey form slightly for ease of reading. The original surveys had every other pairing switched, so that a student simply marking down a single column wouldn’t skew the results. The scores after each pairing are based on the following calculations: the seven spaces between the pairings are worth from 1-7 points, with 1 point being the space closest to the negative term and 7 points the being the space closest to the positive term. A score of 4 would indicate the space directly in between the pairs, and so forth. Each response by a student generated a number of points, the number of responses for each answer is indicated in the summaries. The score following each pair is the mean average of the total of points generated for each pair. Since not all students answered every question, there will be at times different numbers of scores for each pair. The final score is the mean of all the questions combined. The end result of this is that the higher the score, the more positive the class felt about that treatment.

7:30, part-writing treatment (Neapolitan six)

<table>
<thead>
<tr>
<th>Pairs</th>
<th># of Responses</th>
<th>Average Score</th>
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<tbody>
<tr>
<td>Unpleasant</td>
<td>1 : 2 : 2 : 3 : 8 : 2 : 0 Pleasant</td>
<td>4.17</td>
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<tr>
<td>Bad</td>
<td>0 : 3 : 1 : 2 : 7 : 4 : 1 Good</td>
<td>4.61</td>
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<td>Worthless</td>
<td>1 : 1 : 3 : 5 : 3 : 2 : 3 Valuable</td>
<td>4.44</td>
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<tr>
<td>Distasteful</td>
<td>0 : 1 : 4 : 9 : 2 : 2 : 0 Enjoyable</td>
<td>4.00</td>
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<tr>
<td>Dislike</td>
<td>0 : 4 : 3 : 3 : 5 : 3 : 0 Like</td>
<td>4.00</td>
</tr>
<tr>
<td>Bored</td>
<td>2 : 3 : 1 : 8 : 3 : 1 : 0 Excited</td>
<td>3.56</td>
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<tr>
<td>Frustrated</td>
<td>2 : 0 : 5 : 2 : 3 : 4 : 2 Satisfied</td>
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<td>Dull</td>
<td>2 : 2 : 2 : 5 : 4 : 2 : 0 Interesting</td>
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<td>Worst</td>
<td>0 : 0 : 5 : 8 : 3 : 2 : 0 Best</td>
<td>4.11</td>
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<tr>
<td>Hard</td>
<td>0 : 2 : 3 : 4 : 4 : 3 : 2 Easy</td>
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</tr>
<tr>
<td>Negative</td>
<td>0 : 3 : 1 : 6 : 4 : 4 : 0 Positive</td>
<td>4.28</td>
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7:30, part-writing treatment (Neapolitan six)

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<td>4.56</td>
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<tr>
<td>Bad</td>
<td><em>1 : 1 : 2 : 4 : 3 : 3 : 2</em> Good</td>
<td>4.50</td>
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<tr>
<td>Worthless</td>
<td><em>2 : 1 : 0 : 3 : 5 : 2 : 3</em> Valuable</td>
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<td>Bored</td>
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<tr>
<td>Dull</td>
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<tr>
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<td>4.34</td>
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Average for entire survey: 4.47

9:30, part-writing treatment (Neapolitan Six)

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<td>5.18</td>
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<td>Distasteful</td>
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<td>Dislike</td>
<td><em>1 : 1 : 2 : 5 : 1 : 6 : 1</em> Like</td>
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Average for entire survey: 4.44

3:30, error detection treatment (Neapolitan Six)
(3:30, error detection treatment, Neapolitan Six)

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<tr>
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<td>0:2:3 Interesting</td>
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<tr>
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<td>0:0:3.6</td>
<td>2:5:1 Best</td>
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<td>Hard</td>
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<td>1:4:4 Positive</td>
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<td>3:5:2 Confidence</td>
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<td>Want fewer classes</td>
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Average for entire survey: 4.57

12:30, writing treatment (Neapolitan Six)

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Average for entire survey: 5.01

209
7:30, error detection treatment (Augmented Six)

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<tr>
<td>Distasteful</td>
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<tr>
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<td>Bored</td>
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<td>Excited</td>
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<tr>
<td>Frustrated</td>
<td>3 : 0 : 9 : 4 : 1 : 2 : 0</td>
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<td>Dull</td>
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<td>Hard</td>
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<td>Scary</td>
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Average for entire survey: 3.45

9:30, error detection treatment (Augmented Six)

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<tr>
<td>Distasteful</td>
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<tr>
<td>Bored</td>
<td>2 : 1 : 4 : 10 : 1 : 1 : 0</td>
<td>Excited</td>
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<tr>
<td>Frustrated</td>
<td>4 : 4 : 7 : 1 : 2 : 1 : 0</td>
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</tr>
<tr>
<td>Dull</td>
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### 9:30, error detection treatment (Augmented Six)

<table>
<thead>
<tr>
<th></th>
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Raising

Want fewer classes Want more classes
like this            like this

Average for entire survey: 3.38

### 3:30, writing treatment (Augmented Six)

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Average for entire survey: 3.40

### 12:30, part-writing treatment (Augmented Six)

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Average for entire survey: 4.70

7:30, writing treatment (Common-tone diminished seventh)
730, writing treatment (Common-tone diminished seventh)

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Raising

| Want more classes like this | 8 : 4 : 1 : 4 : 3 : 0 : 0 | | Average for entire survey: 332 |

930, writing treatment (Common-tone diminished seventh)

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<tr>
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| Scary | 2 : 1 : 3 : 8 : 2 : 0 : 0 | Confidence 3.56 |
| Raising

| Want more classes like this | 4 : 3 : 1 : 6 : 1 : 1 : 0 | | Average for entire survey: 338 |

330, part-writing treatment (Common-tone diminished seventh)

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### 330, part-writing treatment (Common-tone diminished seventh)

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Average for entire survey: 3.88

### 1230, error detection treatment (Common-tone diminished seventh)

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Average for entire survey: 3.87
APPENDIX K

PROTOCOL ANALYSIS OF THINK-ALOUD TRANSCRIPTS

The following sample has been analyzed according to the categories of thought processes described in Chapter Five. The categories are reflected directly under the text by the following symbols:

- Reviewing = R
- Planning = P
- Generating = G
- Evaluating = E
- Questioning = Q

Product and Process are indicated by a “T” or an “S” following the category code. Spurious comments that do not fall into the above categories are set off by asterisks.

**Think-Aloud, Error-detection treatment.**

OK, treatment question number 1, lookin at the Phrygian II. First off, I'll, I'll
RT
check the progressions because I know the Phrygian II is a, um, is a
GS
predominant chord, so I'm going to look at all the progressions, and number
PS
1, it precedes a IV chord which goes to one. That's not really good, um,
ET
number 4, the II precedes, the Phrygian precedes the V. Number three the
GT
Phrygian precedes the V, number 4 the Phrygian precedes the one six-four,
which is dominant. Number 1 I'm going to circle, the, um, I'm circling right now the second two chords in question number one in c minor because that Phrygian chord should go to a dominant chord, not really a IV chord. All right, another thing that I know about Phrygian chords is that that flat 2 in the Phrygian should not lead to two. Flat two scale degree should not lead to two, so um, let's look at the first example, we have a flat two in c going to the I, which is OK, I mean, its a bad progression, in um, number two our flat two, we're in the key of b minor, so flat two is c, and that c is going to two, so that's bad, allow me to circle that. I'm circling the c natural going to a c sharp in the progression, the second progression in b. We'll look at number three, we're in the key of f so the flat two is G flat, that is going to, that is voicing to ti, um, the leading tone, which is OK. Um, the fourth example is in e minor, and in e minor the flat two would be f natural. F natural, and its leading to I, which is OK. All right. Something else about the Phrygian chord. Let me think here. Well, I guess, I, this is not necessarily have to be about the Phrygian II
or the Neapolitan chord, we could just have any errors, so let me check for common errors such as parallelism, um, I mean to check for parallel octaves.

I'll do this by find octaves in each voice and doing, I'm looking at C, I find the octaves and see if they lead any where. The first chord's all right, the octaves in the second chord are all right, they're just going right across. The octaves in the third chord are all right. In example two, the octaves are all right, in the first chord, in the second chord there's a G and a G and those are all right, in the third chord there's a problem here, number two. The third chord, um, the, the Neapolitan chord has an E in the bass, and an E in the alto, and they're both going up to F sharp, which is parallel, so I'm putting lines in between there and gonna kinda circle the whole thing, putting lines to signify parallel octaves, there, then the last two chords, um, the octaves are OK. I'm going to look at example number three, find the octaves in the first chord, in the f minor chord, those are voicing OK,
the um, octaves in the second chord, the Neapolitan chord are leading to the
dominant, all right, the dominant you’re doubling the, um, tonic or the bass,
and its voice leading real fine. Let’s look at e minor, um the octaves are E on
the e minor chord, and they’re not voice leading badly at all. Second chord,
we have in the, in the Neapolitan chord, uh, c is doubled, and that’s OK. The,
uh, next one we have B’s which are doubled and they voice lead fine to the
seven, I mean, I mean the dominant chord, the V7, and then those octaves,
lets see, OK, so we only have one case of parallel octaves, let’s check for
parallel fifths, I know this is rather tedious but hang with me here. Um, in
the first chord we have, the fifth is between, between c natural and g, and that
is going to this, its going to the Phrygian thing, um, the Phrygian II. I think
that’s OK. I don’t think that’s parallel 5ths because that’s not even a 5th, that’s
a tritone between the tenor and the soprano voice, right? No, no, its not, its a
fifth, but its a fourth. I’m sorry the fifth is in the bass on first example. The
tenor and the bass is a fifth and its voice leading is fine, I got confused where
the fifths are. All right, in the Phrygian chord, the fifth there resolves fine, in the fifth in the IV chord, resolves fine. Um, let's look at the second example, the fifth is between B and F#, that's resolving fine, the fifth in the vi chord, let's see, vi chord, that's going to be a, that's a G chord, the fifth is between G and D, and that's voice leading all right, um, in the Neapolitan chord the fifth is between the 2 and the 5, that, is that voice leading, that voice leading is OK too, and then the V chord is between the um, I'm confused, is the F#, is voice leading fine. OK, third example, let's look at the f minor, the fifth is between the bass and the soprano, and that's voice leading fine. Let's look at, um, the second chord, the Neapolitan chord, which is a G flat chord, the fifths are between the G flat and the, um, D flat, that's voice leading fine, and then the V7 is between the C and the G, and there's not a fifth in this chord, so its OK leading to I. OK, let's look at the fourth example. We have, um, the bass and the tenor, there is a fifth, and that's voice leading fine, there also a fifth between the tenor and the soprano and that's (pause) I'm not sure if this is
voice leading, all right, oh, oh, oh, circles, we got E on the, on the soprano

and a B in the tenor, and that’ going up one half-step and the soprano is going

up one half step, I think that’s bad voice leading, I’m going to write some

things in there, um, bad voice leading on the first two chords, um, parallel

fourths, which is actually fifths backwards, I’m not sure, it just isn’t, it never

sounded right. OK, third chord, it, from the Neapolitan chord on example

number four, the Neapolitan chord is an F major chord and we have, um, well it looks like parallel fifths again, or are these parallel fourths? Hmm. It
goes down a half step, it goes down a half step. We have another set of these

parallel things, um, well, it fits a need, but I don’t think that’s right. I’ve
circled a number of parallels here that you, um, the first three chords, seem to
be doing fifth, the, um, the tenor and soprano are following each other in

fourths stacked with the tenor below, but its just a fifth backwards, um, I don’t

think that’s right, I could be mistaken, um, let’s look at the one six-four.
With a B chord, a B chord? No, no, one six-four is a, is a E chord, a one chord, 
and, um, the fifths are OK. In the V7, we have a B, that's a B chord, and the fifths are OK in that also. All right, now, um, one more thing about the Neapolitan chord, um, you were suppos... it should be in six position, which it is, in which case, a six, in, it should be flat II6, which is first inversion only, and in such case, you want to double the bass, so let's make sure that the bass is doubled on this quiz. In example 1 the bass is doubled, in example 2 the bass is doubled in the tenor, in example 3 the bass is a B flat, and it is doubled in the tenor, in example 4, the bass is A, and it is not doubled, so, I'm going to circle the bass note on example 4, the Neapolitan chord, and draw a little line here and say, needs to be doubled... needs to be doubled. (Sigh.) *Excuse me, I was going to sneeze. OK, its no problem. (Sneezes.) Pardon me.* Um, the Neapolitan chord, we checked where the flat II led to, it led all right except in example 2, we made sure that the bass was doubled, we also, um, we checked for parallels in these things, and we checked for progressions, the first one,
the progression doesn't seem to be quite right, so I circled the progression.

Um, the only one that doesn't seem to have a problem right now is number three, so let's look at this a little bit closer, because we never gonna, um, the first chord is a minor one chord, and that's going to the flat II, which is, um, D flat, which all works out, and that flat I's got to go the V7, and our flat two, uh, flat two scale degree is going to the seventh scale degree, which, so that's OK, and that seven is a C chord, its a major C chord, and um, that's hidden to the one, the minor one, yeah, and that's OK, seems to be OK, yeah. I don't see any problems in that one. Hmm. Number one the only thing wrong was the progression, and I had parallel octaves in number two, and some parallel fifths in number four, um, I think this is OK. I'm just looking over the thing now and, I can't believe I did it this fast, um, I'm trying to think of all the things that the Neapolitan, we talked about in class today, and that's really all I can think of, just to watch where its voice leading, um, make sure its a pre-
dominant chord, and um, make sure the bass is doubled, the bass needs to be

in first position, the chord, the Phrygian chord needs to be in first position, so

I think we're done, I'm hitting stop now.
APPENDIX L

TRANSCRIPTS FROM THE AFTER-TREATMENT QUESTION PERIOD

These transcripts were gathered after each treatment application and analyzed according to the procedures described in Chapter Seven. The categories are listed below:

Context / Mode (CM): Asking about the context of the topic in relation to a key or mode: "Is the Neapolitan chord done in the major key?"

Context / Progression (CP): Asking about the context of the topic in relation to appropriate progressions: "Um, so, the Neapolitan chord in, before any I or V?"

Definition / Labeling (DL): Asking the teacher to define the label of a chord: "The A, is that a flat II? That chord?"

Assignment Mechanics (AM): Asking about the current treatment exercise: "We don't get a grade for this, right?"

Voice Leading (VL): Asking about the resolution of specific voices in the chord: "All right, checking for the A flat its pointing down to the B?"

Spelling (SP): Asking about the specifics of chord construction: "Is the common tone with the embellished chord, is the common tone a, a certain note in the diminished seventh chord?"

Function (FN): Asking about the function of a chord: "So the reason for this chord is to get into V?"

Miscellaneous (MS): Questions that did not fall into any of the above categories: "Do the pop singers really know them [Neapolitan chords]?"

The categories are marked in bold type after each new question; discussion that is generated from this question is assumed to still be part of that question.
category. In the transcripts S = student, T = teacher. (?) indicates portions of the conversation that were inaudible.

12:30, Neapolitan sixths, first treatment

T: So, I can get them, when you’re done, and then I’m supposed to take questions from you about today’s topic, so, if you have questions, ask me now, that would be good. Yes ma’am.

S1: Is the Neapolitan chord done in the major key? [CM]

T: Is the Neapolitan chord done in a major key. For you, not right now, and it’s more difficult. Can you figure out why its more difficult, say, coming from six?

(Several students answer out, much is unclear on tape)
S2: The root is higher
S3: The six is minor.

T: Well, same root, same root then, what’s the distance between six and flat two?

S4: Diminished 6th?

T: That’s right, (a cough covers up his words), though. OK, more questions. There’s got to be more than all these.

S5: Um, so, the Neapolitan chord in, before any one or five? [CP]

T: Any, before any what?

S5: one or five?

T: Well. . .(interrupted)

S6: Its usually used at cadences.

T: Right. Its used, its such a distinctive sound you usually find it at cadences, matter of fact if its, its very often followed by silence or space, that example I played you, the Mozart, you heard that there was, like, a little filigree in the right hand, well otherwise there was this long pause that held on it for a long time, rather than the chord moving by pretty fast, and then there was a cadence, the rest of the cadence stuff. That’s very often what happens, what
happens is that, because it really stands out. It was one of the first things I learned to hear in, in harmonic dictation, I could catch the Neapolitan, always, and, um, rumour has it there's some, some pop songs that use it so, um, so I would suggest being hear them in a separate listening whatever it is.

S7: Do the pop singers really know them? [MS]

T: Well, they probably don't have to analyze them, but they know the sound, at least. Did I get all of these? More questions. Ask them if you have them. Now is a good time. It's not time to leave. I'm not letting you go even if you don't have questions.

S8: Uh, OK, uh ...

T: You don't have any questions, but I thought you might.

S9: What other chords does the Neapolitan come from? [CP]

T: What other chords can the Neapolitan come from.

S8: It came from Naples (laughs).

T: Well, Proctor would tell you that a Neapolitan can come from any thing.

S9: But ...

T: But really any chord can go to any chord, connections, the voice leading connections are pretty easy to draw. Even for triads, they're not that hard to draw.

S9: If they have a common tone, though? V-VI?

T: (drawing on board) OK, V, IV, Neapolitan chord, um, it could, it, it could foreseeably come from the regular ii, and be altered, but that doesn't happen directly that often. But, but, um, we'll look at some more examples and see if we can find some more things it comes from, its pretty small. Now, other. You understand that these are the same terms, Phrygian and Neapolitan?

S10: Does this chord have any relationship to the ice cream? [MS]

T: Go buy a box and let me know if you find any thing. This is research for you. OK, I have to give you the Mozart now, um, if you have more questions, ask them as I'm passing this out. You get one of each sheet...
S11: The a, is that a flat II? That chord? [DL]

T: The flat II used in, in front of the Neapolitan chord?

S11: Yeah.

T: No. It is not. I, I, I mean, I guess you could draw one, but that’s not, usually, usually its something you sit on, its a major triad, and its a meaty sound that, even though its a major triad it still sounds like it needs to go someplace because, in context, its so close to I, you feel that that wanting need to go to one, that its something that’s used for shock value--I hit you with it, boom, there it is, and you hear it go up and then they give you what you expect. Let’s keep those things moving. (continues to pass out assignment, answering questions about its application)

12:30, Neapolitan sixths, second treatment

T: Questions about Neapolitans? Ask now.

S1: We don’t get a grade for this, right? [AM]

T: Right. Do any of you have questions to ask at this point? Any questions? (Teacher dismisses the class.)

12:30, Augmented sixths, first treatment

T: Ok, the deal is, that, you have this assignment here.. you have questions that this brings up.. you should ask them cause that way you know that we’re recording you, Bruce can look at them.. which will tell you (??) And I’m going to pass out your test, save your test questions until after the period is over, and we can bring these back Monday, if you can remember, bring your tests back Monday so we can talk about them. Uh, there’s a specific thing in here I want to go over. So don’t spend a whole bunch of time on these. But all questions are encouraged. (??) (@ 5 min passes) OK, your supposed to be a little bit lost on this so ask questions if you have them. [No Questions]

12:30, Augmented sixths, second treatment

T: Ask questions. (@ 3 min pass) Do you have any questions, looking at this?
[No Questions]
12:30, Common-Tone Diminished Chords, first treatment

(Teacher hands assignment out and there is general student chatter
[undecipherable—something about Sousa] as they complete the treatment.)

T: I'm recording this, come on.

S1: OK, says to be that about them and to me taking a look at e (...) A's pointing down, A flat's pointing down to D, that would make it, B would be the.. [VL]

T: the...

S1: ... common tone?

T: B is, B is the root of this. Common tone is going to be the note that doesn't change. What note doesn't change?

S1: D

T: D, so D is the common tone.

S1: All right, checking for the A flat its pointing down to the B? [VL]

T: A Flat's pointin' down to what? What's the...

S1: In other words, its movin' down to B.

T: A Flat points to what?

S1: I'm sorry, G.

T: G. (After a pause.) All right?

T: More questions, more questions.

S2: Huh? (Several students) I have a question, I don't understand what's going on here, something is wrong with these? [AM]

T: Find the mistakes? (several students talk in background) The root.

S2: Oh.
T: If it's a fully diminished seventh chord, the root would be the leading tone of the key we're headed to, we're expected to.

S2: Oh, yeah.

S3: Treble clef's on top there, right? (Students begin to discuss a previous analysis not related to the study, and are then dismissed.)

12:30, Common-Tone Fully Diminished chord, second treatment

S1: What does a weak progression mean? A weak curl, er, chord, what's weak, what's weak about it, why? [CP]

T: We haven't actually discussed that kind of thing...

S2: (cutting Teacher off) Should we skip it?

T: Um, I don't, I don't know what the instructions are for that, what do they say?

S2: It says if the progression is weak, circle the weak chord. What would a weak, give us an example of a weak progression.

T: OK, I think, eh, he's talking about function here, so, strong function, weaker function, we do know that. Now as far as progression, strong and weak, we, we haven't covered that because basically in this system we're keeping now, uh, any (?) movement is OK so you might want to keep the leading tone.

S3: So there aren't any weak progressions? [CP]

S4: (undecipherable)

T: If, if, if all that's there is a common tone diminished seventh, what kind of function does it have? Strong function or weak function?

S5: Weak function.

T: Weak function, so then, if you take that out, and look at what you have,

S5: Yeah,

T: You should be able to tell if there is any movement at all, or not. Right?
S5: OK

T: If that will help you answer the question.

S6: Do you have to have a chord in common with the chord its going to? [VL]

T: The chord it is embellishing. It may be...

S6: It could be part of the common chord, right?

T: Right.

S7: How are we supposed to tell, if the bass is the same as the following chord? [VL]

T: How do you tell what?

S7: What the thing is.

T: Because if you're saying that there's a common tone

S7: (at same time) Yeah,

T: before its (?) and the chord its going to? Then the chord it came from and going to are part of the same chord, aren't they?

S7: Yeah.

T: So its a complete neighbor then, rather than an incomplete. Right? Does that make sense?

S7: Yeah.

T: We talk about it functioning as neighbors, that would be a complete neighbor where as a matter of fact its probably going to where it came from.

(Teacher goes around and helps two students quietly, none of which picks up very well on the tapes, but the phrase "voice leading" and "part writing" is repeated by Teacher. @ 3 minutes of silence pass as students work on treatment.)

T: Yeah, I'll take that. When you're ready, you can ask any questions. Yes sir.
S8: Um, ( ? .) Is the common tone with the embellished chord, is the common tone a, a certain note in the the diminished seventh chord? [SP]

(Several students answer that the common tone should be the seventh.)

T: Yes, the common tone should be the seventh of the diminished seventh chord.

S8: OK.

T: Now, you're asking what member of the chord its embellishing it in?

S8: Yes.

T: The examples so far that I've given you have always been root.

S8: What did you say?

T: The examples I've given you so far on V have always been root, but (pause) and it appears that, that's exactly what you have here. OK, stragglers, get done.

S9: Just a minute.

T: All right.

7:30, Neapolitan 6ths, first treatment

T: All right, let's, um, no, we can't do that yet, do you have questions, first of all, about anything, about the assignment you were just given?

S1: Are, Are we really allowed to put nothing, is he going to be mad about . . . [AM]

T: He's not going to be mad about anything.
S2: [at same time] I feel so STUPID.

S3: So the reason for this chord is to get into Five. [FN]

T: It's a, it's an alternative to get into V, yeah, it gives you a little bit more color to play with. I mean . . .
S3: Instead of going I - V - I if they were in [trails off] [CP]

T: Well like, if you think about in major octave progression ii - V happens right? ii - V and then it goes to I usually.

S3: Yeah.

T: And in this case, if you're in minor, ii-V is a diminished chord to a major chord, right?

S3: You got it.

T: It makes it a little bit more awkward to deal with then um, then a minor to a V, so I think for effect and for convenience' sake, they started to use this flat ii chord. Other questions? He really wants you to ask questions. Um, if there's something you don't understand, if there's a question about voice leading . . .

S4: What if we don't have any? [AM]

T: If you don't have any questions then . . .

[other voices in background]

S5: So is the scale for Phrygian, then, just a flat ii (?)? [FN]

T: Um, well think about Phrygian for a second, if we're starting, just for convenience' sake, we're starting on e,

S6: Where?

T: Phrygian would be on the third of a, of a regular no-accidental scale. What half-steps and whole steps are we dealing with?

S6: What are we in here?
S7: [At same time] A half-step.

T: Phrygian [begins to write a Phrygian scale on the blackboard]

S6: Half step.

T: What's this?

[Several students in semi-unison]: Whole, whole, whole, half, whole, whole, whole.
T: Ok, so that, actually, though, when we’re talking about Phrygian would sit on, on the third of a no accidentals kind of key.

S5: Oh, oh...

T: Ok, so we’re just talking about the mode. Actually, the Phrygian II though, doesn’t relate to the mode per se. They started calling it that because that is one of the few modes, there’s only two of them, that have a half-step between I and II. What’s the other one?

S7: The seventh

T: The seventh? [laughs] so, but, what is it.

[Several students at once]: Oh, Uh, (etc)

T: Think about it. OK, go in order. What do you start with?

S5: I don’t know...
S8: They told us, they told us Dorian first quarter...
[Many students chiming in, several of the modes, including Aeolian, Dorian, are mentioned.]
S9: I can never remember the modes because we never need them...

T: OK, Dorian is the second mode, Ionian is major, Dorian [students chime in and recite with her] Phrygian, [some cries of Aeolian] Lydian, Mixolydian, we’re on the fifth one, Aeolian,

S10: L- Locrian

T: Locrian [correcting student’s pronunciation], that’s what it is. Ok, so, we’re not really talking though about how this chord behaves in terms of the mode, we’re just saying since its a lowered second scale degree we’re going to call it Phrygian, OK.

S11: Cool.

T: I have to just check one other thing here, I think that’s all we have to do for today. [Classroom discussion shifts to individual conversations as class leaves.]

7:30, Neapolitan 6ths, second treatment

T: OK, while you’re finishing up, are there questions?
S1: (unintelligible) [SP]

T: They probably have the same quality, yes.

S1: Do you have to add accidentals in then? [SP]

T: Yes, definitely, um, it, any thing that’s going on in the key obviously you’re going to have to put in extra accidentals.

S1: If I resolve to V...A flat... [VL]

T: If you, if you resolve it to V, that’s what you’re saying? There’s, an, and, so there’s, so there’s no other way that you can deal with that particular um,

S1: Without the (?)

T: It’d be good if you could, It’d be really good if you could, because (interrupted by S1)

S1: ‘Cause I’ve already got my (?) (parallels?)

T: Well, going to which chord?

S1: Going to V from ii...

T: You’re saying that your in trouble with the A flat

S1: D flat, I’m in C major.

T: Oh, you’re in C major, OK, um, so you’re going to a, a D flat as your Neapolitan, and you’re having trouble resolving the E flat, OK, um, how’s, how could you deal with the fact that you guys in, in C minor, you could do some type of passing motion, you could do, um, you can always do a I six-four, OK, that can save your hide a whole lot of times. (?) Other questions?

S2: I really just want to check if I got this right. Is there going, is there gonna be an A flat in the Neapolitan? [SP]

T: In order for it to be the quality that it should have, in order for it to be the quality that it should be, you’re in C minor and in C major you would definitely have to have an A flat in the Neapolitan, it needs to be a major chord.

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S2: I can't get out of doin', I can't get out of having the, I can't get out of havin' the, a, augmented second as a skip

T: OK, and...

S2: And I moved it around so it didn't there, but with the A flat, (?)

T: Obviously, you didn't get any instruction on this, Mr. Kelley, then its going to be hard for you to be able to work it out without having some problems.

S2: Maybe that's part of the study

(Several students--That's part of the study)

T: Please pass them forward.

(students begin to leave, but Geri talks to several students about the part-writing exercises) [CP]

T: Well, its not definitely not going to work as well, is it. What, what would maybe get you easier to, say, a D flat chord. What would get you easier to a D flat chord? If you're in C major, (several chord suggestions, including secondary dominant, are suggested). ...V into V? You can, but you're going to have to alter it, right? And in fact in jazz it happens all the time. There, and you'll hear at the end of songs, you'll hear things like (plays piano) stuff like that, there were a Neapolitan, its in there, (plays it) that was it, it was altered a whole lot, but it basically goes into the VI, which is on A flat instead of an A, and they alter that as well on the way to the Neapolitan, and I need to do some work on this stuff too, so I get it for you on Friday... (begins to discuss class schedule for the next week).

7:30, Augmented Sixths, First Treatment

T: What are your questions, then?

S1: Why is he doing this? [AM]

T: What, what things, what couldn't you understand here, what weren't you sure about?

(several students talk)
S1: There was some, he did, he did a lot of bad voice leadings. [VL]

T: Like what?
SI: Half steps on the ends, you know how the, notice on the ends, how their supposed to resolve out? He didn't do that.

T: All right, then that was wrong.

SI: Right, so I circled it.

T: OK, good for you. All right...

SI: Did you hear that?

(Several students) Good for you, Bill.

T: ... so you have, um, what we're seeing then is that the half-step relationships are really important in this. And say, for instance, in the Italian, you have half steps here, here, and here. And you need to make sure that the correct things happen with those. Whoa, what's the matter.

S2: I, well,

S3: He's got the giggles. (laughter)

T: Do you have other questions? You need to ask some questions.

S4: Is it just for color? [FN]

T: It's mostly color, yeah, we'll talk more about that in a minute.

S5: What chords do you go into it with? Is IV, like he used an awful lot, a good thing or not? [CP]

T: Well...

S6: (unclear)

T: And he said, and you can see from his examples that its easily working on the IV.

S6: OK.

S5: All right!
S7: Yeah, but his examples are mostly wrong, so how do we know?
(A flurry of discussion by several students takes place at the same time.) [AM]

T: Let's see, let's listen to this. Jamie asked, on the first one, he's asking about the accidentals, OK?

S7: Yeah.

S6: Do we make, do we make, we lower that scale degree every, everytime.

T: Yes, we lower that (plays a progression) Yes I do.

S6: You see, we only have one chromatic note in the key and this one has two, and I thought to myself, that has nothing to make...

T: Does this fit in the context of A minor?

S6: No (cries of both No and Yes).

S6: Oh wait, oh, you're just pointing to the F and not the...

S3: Oh, he's point to the F!

T: Is this pointing to the F?

S6: Oh, yes it does then,

S7: Because its a thing in major.

T: Right.

S6: OK.

T: As for this, in major you're going to have to alter several things. OK. What are you going to have to alter to come up with this chord?

S8: The six. (several students "the six")

T: The six has to be lowered, or I'm sorry, this six has to be raised, right?

S8: Right.

T: Because that's not a part of the chord.
S8: Right.

T: Um, this would be considered what of the key?

S8: Six.

T: The sixth scale degree. What has to happen with that?

(Several students) Lowered

T: Has to be lowered, OK, and then this would be the root of the key, so it's OK, so...

S9: And that's in major? [CM]

T: If we're in major, yes, which we haven't talked about, so that was a very good question.

S10: Are we going to be talking about major or...

T: Yes, we will, we'll talk about that.

S11: Um, on that last one that (...?...), the one before it, is that ever acceptable, or... [CP]

T: Let's listen to it, you tell me if its acceptable, OK? (Plays progression)

(Several students) No.

T: It doesn't sound right at all. It sounds droopy. So, you know, this is one case... yeah, did you mark it?

S11: (?) (several students talking at once)

T: You wanted to hear what? OK, that's pretty bad. (plays another example)

S12: Can we, are there other inversions, or is what's up there exactly what we have to write down. [SP]

T: Most often, I mean, almost, almost invariably they are going to be in this position, and that's because then, you create this tension between the outer voices that lets you go into the octave. (knocks recorder off table) Again! I can't believe it, thank you for helping me. Sorry Bruce. (Lots of laughter)
S13: Hey Bruce, what's up.

(Lots of laughter and discussion as she picks up recorder.)

T: Scary to think of what I could do. And it's running, still running, it's a miracle!

(students express glee at the fact that the whole episode was caught with the other recorder still running.)

T: Listen, even if you're Mozart, he's got it in the right position. He's got. .
(Plays some Mozart) I'm sorry, so that the outer voices, the outer-most voices are there so you can get to this half-step relationship.

S14: So if it's not there, it's wrong?

T: Well, look at the quality of the chord and figure out those intervals like we were talking about, you may find something odd, but hopefully that won't be on this. OK?

S14: OK, so I'm writing here that it has to be exactly like this.

(Rosser begins to hand out an assignment.)

7:30, Augmented Sixths, Second Treatment

T: Um, do you have questions on this stuff.

S1: No.

T: Or are you questioned out?

(Students talk about traffic problems due to President Clinton's visit)

T: Do you have any questions? Do you have questions. We've asked a lot of questions already, sorry you weren't there for them. If there are no questions,

S2: No questions.

(Class is dismissed.)
7:30, Common-tone Diminished 7ths, First Treatment

S1: Why do we have to spend 3 days on this? [AM]

S2: Because you don’t understand it real well, OK? That’s why.

T: OK, let’s listen up. Any questions?

(3-4 students continue talking. It’s impossible to pick individual voices out.)

T: You don’t always resolve to the same chord. Did you hear Dennis’ question? You don’t always have to resolve to the same chord. [CP]

S3: Right.

T: We’ll find out on Wednesday, that sometimes it can go to a six chord, it doesn’t necessarily have to go to uh, the chord it supposedly came from.

(Student talks under her.)

T: Pardon?

S4: Are there any good indications or indicators for knowing these? [FN]

T: No, not at all. They’re really embellishing.

S5: Super.

S6: Color.

T: There just color, right, they’re, they’re giving you a little extra information about I and V.

S7: (Interrupting) You said that you could go to goofy stuff afterwards, so it could be, like a transition between a, a, maybe like a, a key change or a . . . [FN]

T: The goofy stuff I was talking about is something totally different.

S7: All right.

T: I was talking about, are you listening? I was talking about diminished sevenths that can be, that are used as modulators, OK, but in this case we’re talking about just an embellishing chord that’s building off of either I or V, OK?
S7: So they can't be used to like set up a, a modulation or...

T: No, no, not usually, no, no, in fact...

S7: But that's what you said.

T: You, well I was, I was on a tangent, and you must not have been paying attention when I went to the tangent and when I came off it. So... (knocks recorder off table)

S8: Slow down!

T: Hello, what, what we're talking about, what we're talking about over here is the possibilities for modulation for the diminished seventh, the fully diminished sevenths, OK, but that is not the case with these chords, these are just embellishments of either the I or V, they'll usually at least keep you right in the key, but you're (?) what's going on, bring more attention to I and V.

S7: So these chords can not go back to I or V, then. [CP]

T: Well, you're going back, usually you're going back to something that's related to that, like a I six-four. OK? They have a common tone, um, well, we'll talk about the six-four, how its used, on Friday for sure, OK, and that will give you an idea of where, of what's happening at this time.

S9: What else do you, I don't, I still don't get it, (two students begin talking at same time)

T: Of what?

S9: altered chord.

T: That's what it is. That's what it is, right. Yes you do alter the chord.

S9: And then, you, uh, whatever the nominal root is you just work your way up... [SP]

T: Right, and see it's gonna be a different nominal root, but you have to make sure that you keep that common tone a common tone.

S9: So I mean you always raise it a half-step, I mean, the nominal root, I mean I don't understand it. [SP]

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T: Well, you can have, looking at these, listen up. Let's listen for a second. Looking at these two examples, the nominal root is going to change, depending on what inversion you choose to use. And that also depends on where you're headed, if you're going to a six-four it may be different than if you're going back to a root position chord, so depending on what you want to do, depending on how you're using the chord, you may choose to make the nominal root the one that's closest to the common tone, or the one that's two up from it. You could, basically, you could write it in just about any position as long as you had some of those half-step relationships.

S10: I totally don't know what, I mean, let's say your in C, and started on a I chord.

T: Mm-hmm.

S10: and then went to the common tone chord, uh, through ulterior means, I mean maybe a C#? I don't know.

T: Yeah, you would.

S10: Do you just raise it a half step? I mean...

T: If you're in C, like we actually did here, well, actually we weren't in C there.

S11: We were in G, weren't we?

T: If you're here in C, and you want to build that fully diminished seventh, what you're doing is making sure that this is a part of the chord, right, so you can take you pick as to how you want to, to write the chord, the four-two's the most common position. But if you're going to do this then you have to create what essentially, to our ears, are minor thirds.

S12: Wait, where do you get that?

S11: But it doesn't matter, does it? You could spell that as a, as a C...

T: As an E?

S11: As a C diminished down there, I mean, as, as a common tone diminished seventh.

S13: Yeah, how, how are we going to call that a C diminished seventh? [DL]
S11: Do you see, do you, do you understand what I mean? Does it matter what, what, what the root is?

T: (overlapping with student) Oh, no, we're not, no it doesn't, the root is not, I think we already said that, its nominal, we can use either root.

S11: And it will be a different chord, each of the inversions will be a different chord because each root is different, correct? [SP]

T: It's still a common tone diminished...

S11: I, I know, I, I understand that, but the function is still the same, [FN]

T: Right

S11: I mean, its still the same kind of chord, but its a different common tone diminished seventh, if you have a dominant in F, its gonna probably be C

(Teacher and the Student talk over each other)

T: Right, right

S11: if you have a dominant in G, it's gonna be D, but they're different, they're different chords, do you understand what I mean, because they have different roots, and if you take it in a different inversion its gonna be different chords.

T: It is, I understand what you mean except to our ears, it is the same.

S11: Because (...?...)

T: Right, right.

S11: All inversions will be enharmonically the same...

T: But remember what we keep saying, its a nominal root. In this case it doesn't matter which note you are using.

S11: Right, I, I know its not a root, but its not different in F, from the bass note, where E is the root? Because that would be F A C E, oh, I guess it would be E flat,

T: If F is the bass note instead of C,
S11: Then, then E flat,

T: Yeah...

S11: If, if A is the bass then E flat again? So its going to be enharmonically spelled the same no matter what.

T: All right. Well, you can...

S11: Inversionally.

T: Right, its going to sound, its going to sound the same no matter what, how you spell it. Its going to sound the same in terms of voice leading, like a diminished seventh. In jazz...

S11: All that matters is voice leading. [VL]

T: I'd say, right, I'd say in terms of voice leading that's the most important thing. Are you getting half-step relationship where they really need to be.

S14: So really it's just where we're going.

T: Right. Where you're, where you're coming from and where you're going. And most of the time that's just going to be a neighbor motion.

S14: OK.

T: OK. So try to keep it, try to keep those half steps doing what they need to do, in particular when you're moving into your chord of choice, OK, when you're moving into the, the final, uh, I or V that you're using.

S15: If I use that as Eb, I would, use... [SP]

T: You can still do that, its, we, here, you're talking...

S15: No, before the IV.

T: If you wrote it as an Eb? No, you can, you're allowed to, that's, some composers have done it that way in their works, and a lot of it just depends on where you're going with it.

S15: Even though I... (?)...
T: If you're going to have a half-step relationship between these two it's just not as clean, it's not as clean as if you use the D# because then you see that half-step relationship a little bit better. So go over the four-two first, if for some reason that's not working then do the four-three, OK?

S16: But we could do a seven chord if we tried.

T: You could, possibly, but it's not going to function as easily because the C is going to wanna go up to the E flat, I mean, if you wrote it that way that's what it's gonna look like. And we'll talk more about it on Friday. See you then.

7:30, Common-tone Diminished 7ths, Second Treatment

T: Keep writing.

S1: (?)

T: Yes it is. Hold on, no it's not, we're asking questions....

S1: Do we have to ask questions? [AM]

T: Do you have the right answer?

(laughing)

S1: She just asked it, though.

(General laughing)

T: Do you have questions, that's the question. Or have we answered every question?

S2: (?)

T: So you want to practice it some more?

(Cries of both "yes" and "no," students begin discussing homework, covering up the conversation Teacher is having with one of the students.)

T: No further questions on common-tone diminished seventh chords?

(Several students--"No")

T: All right, you can go.
3:30, Neapolitan Sixths, First Treatment

T: OK, any questions on assignment number 1. Anything that comes to mind.

S1: Um, the phrygian six... (?) [FN]

T: OK, phrygian six, um, as I said, the function of the Neapolitan is primarily, um, predominant meaning it goes to a dominant chord, it comes though to other types of chords, um, to establish fully diminished seventh chords, um, like that does not involve the Neapolitan.

S1: I have another question. You said to double the root... [SP]

T: Uh-huh...

S1: and I have a question about that...

T: I, I said to double the what?

(Several students): The bass.

T: The bass, OK, and so did you find one that did not?

S1: A bunch of them.

T: OK, if you found one then that did not double what, um, should be doubled, mark that and also see if, what the problem that usually arises is that leads to any voice leading errors. So if, um, the example doubles something up in the root, that leads to nasty parallels and other problems. Any more aloud questions?

S2: Is there something wrong with the second example? [AM]

T: Um, one thing's looking wrong with the second example, did any one find anything wrong in...

S3: Parallel octaves in the one second down.

T: OK, parallel octaves...
S3: Did you mean the second one down?

T: Oh...

S2: I meant the second one to the right.

T: The second one to the right, did anyone find anything?

S3: V7 chord is missing a note...

T: Yeah, that's OK. V7 chords, as long as you have the root, the third and the seventh are fine. But the only one we can omit is the fifth.

S4: (?)

T: Yeah, so check on the V7 going to the 7 resolves down like it's supposed to and the leading tone resolves up like it's supposed to. OK.

S3: So is anything wrong with that?

T: Um, I haven't looked at it.

S3: I just. . .

S5: There are some parallels?

S3: That flat two goes to ti, the raised seventh.

T: Um, yeah, flat two can go to raised seventh, but it cannot go to natural two, if you see that anywhere mark it.

S3: That happened in one, two, the third one on the right? The third one down on the right?

T: The third one on the right, yeah?

S3: Is that right?

T: Um...

S3: The third one down on the right, its the key of g minor,

T: OK, yeah, the g minor one?
S3: Isn't that one wrong?

T: Uh...

S3: You got it goin' to a sharp two, that's OK? [VI]

T: Um... yeah, that is one, so the third one down on the right, uh, A flat is a flat two and the resolution is down, and because you go from A flat to A natural, I'll just play that so you can hear it. (plays it) So that line (plays alto line), and the reason why it's considered bad is its considered to be kind of snakey sounding and not smooth. Um, if it was chromatic that's, it doesn't uh, and, and it continued up from tonic to flat two to natural two it's not considered good and smooth, um, smooth lines sound desireable to me, but flat two down to seven (plays it) even though there's slightly fat sound, awful jagged but jagged is prefer-preferable to (...?...)

S6: How about the, the fourth one on the left, in f # minor, you have a flat two six, is that in the wrong inversion? [SP]

T: OK, um, the left column, all the way at the bottom,

S6: Because it has the G, as G natural in the bass, which is the flat two there, but it that should be like a flat two period, right?

T: OK,

S6: I mean, its, its written in a flat two six, which is the wrong inversion, I mean, you said that...

T: OK, yeah, he has it in F# where G# is two, right? Uh, so then it would be, uh...

S6: He put the root in the bass, right?

T: OK, yeah, he has the root in the bass.

S6: Which is something you really don't want to do, right?

T: Which is not something you normally do, in some circumstances you can do it, you'll read about that in your book, but, uh, normally you would have it in first inversion. He labels it as a ii sixth, um, uh...

S7: Last one on the right has a wrong resolution of the flat two. [CP]
T: Last one on the right from the flat two, right. He has I-V-bII-I, I'll play that for you (plays it). It sounds rather stark. The flat two should go to a V, not to a I. OK, other questions or comments on, questions (?) or on the Neapolitan concept?

S3: How about the second one down on the right?

T: Second one down on the right. Anything wrong with that one?

S8: There's no seventh on the V7. [SP]

T: There's no seventh on the V7? OK, we've talked about, um, yeah, so what note is missing there?

(Several students): F#

T: Yeah, F# is missing so the chord's labeled as V7 but it doesn't have a 7th added, so he's got the wrong label, there's something wrong with it. OK

3:30, Neapolitan Sixths, Second Treatment

T: OK, if you have any questions of any kind, go ahead and ask them... yeah? .. no? OK. Questions? OK, does someone have um, a sample one that, uh, you found some errors in? Are they all perfect?

S1: Um, the first one?

T: The first one. What's wrong with it?

S1: I'm not sure, I, well, I'm not sure

T: OK

S1: Um, the natural, the d natural in the second chord in the row, I have all, D natural... [VL]

T: OK,

S1: doesn't resolve.

T: Um, wait, can you say that over again?

S1: D, D natural in the neapolitan chord in that does not resolve.

T: OK, um, did not resolve. It, um, it's supposed to go to what?
S1: one or seven

T: One or seven. Does it do that?

S1: Yeah.

S2: It goes to seven.

T: It goes to seven, so that's, so that's OK, you can. The flat II can go down to the raised leading tone. So the question was, uh, does the D natural resolve correctly in the first one and the answer is yes, because the d natural can either go to one or it can go to the leading tone. It cannot go up, um, regular scale degree, so...

S3: That one does have parallel octaves. [VL]

T: Ah-Ha, OK, where?

S3: Um, in the bass and the alto voices between the second and third chords.

T: Bass and alto before the second and third chords, great, yes, between the F sharp and the E sharp. OK, other errors you found? Or other questions about. .. yes?

S4: Neapolitan flat six, it can't go ... (?) ... [CP]

T: Um, its not, that's not the usual place for it to go. You can go to the dominant or the cadential, um, so where, where's another example of that on this sheet?

S5: Bottom right. . .

(several students) Bottom right hand

T: Bottom right hand corner. It goes from V to Flat II six and that's wrong. OK. Are there errors you found or other questions you have for me?

S6: Third one down on the right.

T: Third one down on the right.

S6: You have a Flat II but voice leading for a II flat six. I mean it shows that its voicing down but actually because its so close...
T: Uh-huh,

S6: you cross lines, kinda the. It's not really good voice leading. [VL]

T: Yeah, its, its bad voice leading. The point is that the, a, um, soprano is going from, in the third one down on the right, you have this (plays soprano line) while the, I'm sorry, (plays soprano line correctly) while the, um, alto voice has this (plays alto) (plays both lines together). And its um, its all muddy. The lines are tangled together because the A flat in the top voice coming down there, to f. OK, and any other last errors you found, or not? (Teacher dismisses class)

3:30, Augmented Sixth Chord, First Treatment

T: OK, would someone like to read their question aloud from number 2? There are no questions?

S1: Oh, from number 2?

T: From this number 2. Does anyone have any important questions?

S1: So what are, what are the resolutions again for all three types? [VL]

T: The resolution is dominant.

S1: I know, but, I, I mean, but, but the specifics...

T: Oh.

S1: I know it always goes to the dominant or the German goes to the cadential six-four, but what, um,

T: What notes go to what notes?

S1: Yeah.

T: Sharp 4 will go to 5, flat 6 will go to 5, um, 1 will either stay on 1 if its a cadential six-four or go down to the leading tone if its French or Italian, and if its French the 2 will stay on 2, if German the 3 will probably stay on three in a cadential six-four, or it may go down to the 2 but then watch for parallels. OK, so sharp 4 to 5, flat 6 to 5, 1 to 1, 2 and 2 to 2, and 3 to 3 or 2. Yeah.

S2: Can sharp 4 go to regular 4?
T: Can sharp 4 go to regular 4. Um, (?)

S2: (?)

T: Uh, it usually doesn't, I think it can do it though.

S2: If you were going to do a cadential 6 chord in major would flat three go to normal three?

T: Um, no, it goes to regular three. You’re in minor and you have a flat three for your augmented six chord in the German variety, it should go to, it should stay on minor, for example.

S2: If you’re in major... [CM]

T: Uh-huh,

S2: would you stay on the flat three?

T: Oh, if you’re in major, your major should become a minor.

S2: Should be a major with a minor third?

T: It’s should stay on the same pitch. OK, if you’re in major or minor the flat three should stay on the same pitch. OK, other questions? (tape cuts off)

3:30, Augmented Sixth Chord, Second Treatment

T: Would someone want to, um, say what their question for number 2 was? Yeah.

S1: What is the specific function of the augmented sixth chord. [FN]

S2: Yeah, what is the meaning of the chord. Why?

T: OK, can anyone answer that, what is it for?

(several students begin answering)

S3: Goes to the dominant, its a pre-dominant chord, goes to V.

T: It’s another way to go to V, its a fancy chord employing two chromatic tensions, those two chromatic tensions being what?
(Several students) Sharp 4, flat 6

T: Sharp 4, flat 6, so basically, its, um, a chromatic chord that precedes the dominant and is related to IV and ii, its derived from them, um, (?) thing. Does that answer your question, what does it good for?

S3: Yeah, (?)

T: Yeah, I, I think that um, the questions from last time and I saw a lot of your questions were, how does this work in music so today we'll look at some examples of that, uh, OK.

S4: What about inverting them? [SP]

T: What about inverting them?

S4: Mm-mm.

T: That's a good question, um, they do sometimes occur in inverted form, uh, so if you have your purple book please turn to pages, uh, page 493. OK. (Writes on chalkboard.) What's the inversion of an augmented sixth interval?

S5: Augmented Sixth? Diminished third.

T: Diminished third. So instead of the sharp 4 being on the top the sharp 4 would be on the bottom. (Writes on chalkboard.) So I'm in c minor, and the flat six would be, uh, right here, so you have a very tight interval (plays it on piano) uh, so that's the inversion, um, and it says in your book it occurs, comparatively infrequently but of course it occurs. Because composers are not like music theory students they don't have a set of rules to mark down for them or they'll be punished by bad grades. Composers like to work as freely as possible, and uh, sometimes they do things like that, um, turn it around. The example is in your book on page, um, 494. First look at the example, then look at it, the example is d minor (plays e minor chord), and the iv chord, and the, um, sharp iv7, (plays these) uh, if you were to extract or identify the second chord using scale degrees what would you say it would be? Chord 2. G# in the bass is what scale degree?


T: In D minor, sharp 4. Sharp the scale degree four, the D in D minor is one, obviously, the B flat is what?
S7: Flat 6?

T: Flat 6, and the F is what?

S8: Three.

T: Three. OK, So you have those four pitches which are from what nationality?

S9: German.

T: German. German is identified by what distinguishing feature?

(Several students) Flat 3.

T: Scale degree three, yeah. Flat three, so here's d minor so we have f natural so that was already flat, um, the inverted form is most often in the form of the #IV seven. So memorize that, um, as the most common inverted form. It looks like a sharp IV so in D minor you have a G#, a B natural--B flat so you have a second from, enharmonic second, then up to d and up to f, so it sounds like this (plays it). Enharmonic equivalent to what sonority? The German.

S9: Dominant.

T: Yeah, the dominant seventh (plays it). But then again it tricks you, instead of going from, uh (begins to play a chord), oh, what would the root of this be if it were a, dominant seventh, E flat, so think of a G# on a, C# on a A flat, so the B flat chord goes to uh, its tonic, so it would go down to E flat, instead it goes to this (plays it), and its a nice chord because its so different. Other questions that were at the bottom of that paper?

S10: Sorry, did you say that the IV7 was a sharp IV? [DL]

T: Yes, you may call that a sharp IV7.

S10: That's the proper way to do it?

T: Uh, yeah, that would work for the German, so, um, just remember that chord as the German, uh, German 6th, but inverted. You can label it as that. The problem when you're labeling is its not a normal, its not a normal looking chord because the third is not a regular major/minor third its a diminished third. So the sharp to the left of the chord means what happens to the chord. The root was raised. You have a chord, uh, chord, chord X, and
you have, uh, N, so chord X and I have N with the sharp or flat. That means it upsets the root. What if I had N over on this side. So what if I had four with a, a sharp there, or a natural there. Raises, it, it affects the third, so if N, uh, uh, variable N is to the left of the chord it affects the root, to the right of the chord it affects the third. And other questions that you wrote on the sheets?

S11: Did you make a mark? Don't you have a flat three?

S12: I, I just had question about the flat three. If you have a German augmented sixth chord with a flat three, do you still have that flat three in major? [CM]

T: Yeah. If, so you have a major...

S12: So do you want to alter the three?

T: Yeah, if you have a major you have to alter the three in the German, and you have to alter the six in any of them. And in the French the 1 and the 2 are the same in major and minor, and the Italian the 1 is the same.

S12: So the voice leading still works the same. [VL]

T: Yeah.

S12: How would you suggest approaching this chord in major? What chord should come before it? [CP]

T: Oh, OK, um, good question. Does anyone recall from your reading how we’re gonna approach? Through vi is one way, through IV another way, ii is another way. Let’s see, IV, vi, ii...

S12: One can’t go to it, right?

T: One can go to it.

S12: It can?

T: Yeah. So how to approach augmented sixths: you can go from I, ii, IV, vi, and then you move out of it to the dominant, remember, the German you want a special kind of dominant to avoid the voice-leading parallel problems. What should you do with the German?

(Several students) It goes to the one six-four

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T: Yeah, one six-four, cadential six-four. ... so augmented sixths, three varieties, German, French, Italian; four types, basically four types of chords can precede them, I's, ii's, IV's, or vi's, and go to dominant.

3:30, Common-Tone Diminished Seventh Chord, First Treatment

T: And you’re welcome to shout out any questions. We need data here.

S1: Are there any, are there any particular scale degrees that are popular roots? [SP]

T: Uh, popular roots would be, uh, sharp 2. So think of, um, the common tone as the, uh, the chord of resolution so if you have a tonic, we’re building a six-four-two above that so just think of that in terms of building up from scale degree two, so 2, 4, 6, and 1, um, is the common tone diminished seventh. It doesn’t have to be, however, so just take the chord you’re going to, uh, find the root of that and work backwards from that so just build up six-four-two from. OK, that was a brilliant question. Other questions?

S2: Could you explain that, uh, build four-two or, for, [SP]

T: Sure, build, build four-two up from the thing. Um, its, to construct the common-tone diminished seventh simply build four-two, and that’s our abbreviation for six-four-two. We’re picking six, six-four-two not randomly but because, um, because that’s the usual disposition of these notes. So if you have, um, as, as our uh, as the chord we’re going to, OK, C major. So I’m going to pick C as my common tone, and then I’m gonna build a six-four-two above it. So I take a two, and a four and a six and I haven’t inflected them yet, and now I want them inflected, so I’m going to put sharp two, uh, sharp four, but we’ll leave six because its a minor third and then I have C. So if you think about the chord I just wrote, it has D#, up to F# is a minor third, F# up to A is a minor third, and A up to C is a minor third. So I’m trying to build a chord which is constructed entirely by minor thirds, and to get the four-two position I just, uh, take my common tone and build a four-two above that. So basically you’re building a four-two type chord. Yeah?

S3: Um, then they can resolve to inversions (yawns)? Sorry, can you resolve to an inversion. [CP]

T: That’s just an example of fatigue. Uh, can they, uh, resolve to inversions?

S3: And, can you have parallel fifths since they’re, one’s a perfect fifth and one’s a diminished fifth? [VL]

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T: Um, can they resolve to inversions. Um, so you're looking to be resolving to, um,

S3: Like a I resolving to a diminished 6? 

T: Well, generally it resolves, it, it uh retains the common tone so if the common tone is the chord you're coming from, then the chord you're going too, so if you have that in the bass it wouldn't be inverted because you, you're keeping the same bass. However, if your common-tone diminished seventh chord was not, if your common tone was not in the bass, say it was up here, then I would resolve to, um, an inversion. So the most frequent position of the common-tone diminished seventh is four-two, that is, the common tone is in the bass and then your resolution would be root position. If your common tone is pushed up where, up somewhere else, um, then you, would resolve to that chord with that root, wherever, wherever you end on the sixth. . .

S3: And the, the, sharp 4 and the sharp 2, you said they, the sharp 4 resolves down to the third, or up to the fifth?

T: Um, sharp four goes up to the fifth, so think about, um, the pull on chromatic pitches. So with augmented sixths we always remembered that flat six is pulled down to five and sharp four is drawn up to five, uh, five. So think of the chromatic notes as being magnetized or being pulled toward something that it's going to, so, sharp two would go to three, sharp four would go to five, um, six could go five or it could go to seven. So, so sometimes you'll go to um, um, a seven, seven chord, but that's another special matter.

S3: Um, and what about the parallel fifths? [VL]

T: Um, what's the question?

S3: Well, I mean, you could go from a perfect fifth to an augmented, or, to a, a tritone, or. . .

T: I see, um, um,

S3: Do you know what I mean? Is that . . .

T: You don't, you have a tritone here between F# and C and a tritone here between D# and A, um, let's just resolve this and see what happens. So we're going to retain my C, that's my common tone, and we'll take my D# up to E,
my F# up to G, um, now this is the question. If I have my D# and A where
do I put the A, what do I do with it. Let's see, um, it actually it could go down
to G, yeah,

S3: OK.

T: So that there David you would have that tritone going, resolving to a
third. See, so your D# and your A, then, resolve inward. OK?

S3: Your D# goes to and E and your A goes to a G? Is that what you said?

T: Yeah, so then my C would also be, um, if I had a C in an upper voice, then
my C would be retained, so I don't really have the parallel problem, I have...

S3: Well, coming from a I, like I came from a I, and I doubled the root,

T: Uh-huh?

S3: And, you know, I mean I, I, CCG and E, and they all went up.

T: OK,

S3: So then you have D# went up, and then I put D# in the tenor,

T: Uh-huh,

S3: And A in the um, alto,

T: OK,

S3: So that's, that's parallel fifths right there.

T: Um, so, so,

S3: Well, I, but it's not really, I guess.

T: What did you do with your A? Where, where did you go with it?

S3: Well, its where came from.

T: Oh,

S3: You mean, A natural?
T: Starting from another key?

S3: No, it, it, it, if it were C,C,G,E.

T: C,C,G,E, yeah?

S3: OK?

T: Uh-huh,

S3: And then you went to C, D#, F#, there are, there are, there are parallel fifths in the inner voices.

T: Oh, between, between what and what?

S3: Between C and G, and the D# and the A.

T: OK, um, actually, its just kinda hard to talk about, but,

S3: But it's not parallel fifths because one is a tritone, right?

T: OK, yeah, its not, its not parallels just because its a tritone, um, we did talk about the diminished fifth not going to a perfect fifth when possible, um, so you should avoid that when you can, but if you do, um, (?) So there are (?) showing up on the board, um, but since its a tritone to a perfect fifth it's not parallels. OK. I think that's our last question.

3:30, Common-Tone Diminished Seventh Chords, Second Treatment

T: OK, questions, and answers and comments on this homework.

S1: I'm not finding it that hard anymore.

T: It's not so hard anymore? Good. All right, yeah.

S2: Do one common-tones, seven diminished seventh . . . (?) . . . [SP]

T: Do one common-tone diminished sevenths,

S2: If we're like in the key of E,

T: All right, actually, (writes on chalkboard). Um, the question or request was for, a form of common-tone diminished seventh chord in the key of E. From
I, I guess that would be here, so we want to go to the next, and what, uh, what do I do?

(Several students answer at once) E

T: I have an E, and that's easy,

S2: And then a sharp two, a sharp four and a six.

T: OK.

S4: F#

S5: F double-sharp

T: F double-sharp, this is important. So I indicate that with my X, with a, a curved X. So here I have F# by default, I want sharp two so I have to raise it another notch and that's how I get F double sharp.

S6: A#

T: A#, and

S6: and C . . .

(several students) C#

T: OK, so the C# is in the diminished chord, and you know how to deal with them. OK, I'll play it on the piano for you. (Plays as she talks) E, F double-sharp, A# and C#, that's good, it sounds right. See what I mean?

S2: Yeah, that's cool.

T: OK, so just remember, in, if you have sharps or flats or whatever, you got to raise, just raise it one level, yeah.

S7: But if the second chord is not in root position, its inverted, how do you figure that? [SP]

T: Uh-huh. If the second chord is not in root position, how do you handle that? Let's do that. So let's say we have . . .

S7: You have a I6,
T: Yeah. So if we, um, so I have a I6 now, (plays it) Um, I just take the note that it was friends with up here and then move it down here. So I take my F# and I put it right, my F double-sharp, and I put it here. So if you take the pitch as it was in its usual register, and put it down in the bass, say, but make sure you put,

S7: But now the common tone doesn't always have to be in the bass.

T: Yeah, now the common tone's not the bass,

S7: OK, I thought it always had to be the bass.

T: The common tone doesn't have to be in the bass, the common tone um, should be the root of the next chord,

S7: OK.

T: Even in inversion. Yeah.

S8: When you um, uh, resolve you would go from I to a common-tone diminished seven to a I6. [CP]


S8: The common-tone diminished seventh resolves to I,

T: Uh-huh.

S8: But, in the inversion you've got it cleared in the bass, but then the, the one of the tones is also resolving to the third so then your doubling the third. And that's, [VL]

T: Yeah, you can do that,

S8: That's OK?

T: Um, as you may have figured out in figured bass the third in um, I6 is often doubled, because of the voice leading thing. So, typically you don't double the third in a I6, its permitted, and there's a way to resolve it.

S8: OK.

T: Other questions. All right.

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9:30, Neapolitan Chord, First Treatment

(low talking precedes this conversation, but it is impossible to pick anything out)

S1: How many chords? [AM]

T: You have to have something before the Neapolitan and after the Neapolitan, so I guess a minimum of three, four might be best. You’re probably going to want to resolve the dominant.

(About 5 minutes passes as students complete the treatment.)

T: OK, that's enough.

S2: Any one else want a soda?

T: OK, we'll pick up the paper after the question and answer session. Yes?

S3: I want to know if (?) [FN]

T: (?) because, remember our Schenker, Schenkerian orientation? Which means that, um, the function, not the flavor, was important to him, so (?). Yes.

S4: Uh, the Neapolitan Six. Does it have to go to a, um, V in root position? [CP]

T: In root position, no.

S4: It does resolve to a V, though.

T: Um, it can be extended to go to anywhere, but eventually it will go to a dominant chord. We’ll talk more about eventually extending them.

S5: How do you approach it? [CP]

T: That's a really good question, um, you put it in it but then when you approach together somehow, you can have a lowered flat six which is really good, we're talking about the flat six which fits in normally with, um, (voice trails below level of tape recorder--seems to be talking about approach to
Neapolitan)... its a little hard to do a progression with a Neapolitan in it. Any other questions?

S6: When would we ever use the Neapolitan . . . (?) [FN]

S7: (?)

T: (laughs) No, but it has an affect that's pretty cool. Um, in minor it can depend too, on the ii diminished chord, pretty (?), so you have an (?) going around minor and all of a sudden you hit the . . . (?)

S5: So that means...

T: But that's not a good enough reason, OK, its an altered form of II, how's that?

S7: Can the half-diminished ii go to the flat two? [CP]

T: It's very, well, well talk about that. We'll come back, the chromatic movement from ii to flat II is very weird, because, you're going to have lots of problems with parallels, right? C minor (plays examples of ii diminished to N6, then plays I V N6 V I).

S7: . . . (?) . . flat two

T: Flat two, right.

S7: . . . (?) . .

T: . . . (?) . .

S5: So, whenever you see a diminished third in partwriting, its the Neapolitan? [VL]

T: Yeah, its either very bad partwriting, or its probably the Neapolitan. So if you see a diminished third in your own work make sure you're writing a, a, Neapolitan. Any other questions? Good, then I'll see you Wednesday.

9:30, Neapolitan Sixth, Second Treatment

T: OK, does anyone have any questions?

S1: Is it OK to a, in the flat II, do you double the third? [SP]
T: Right, double the bass.

S1: So it's not (?)?

T: You shouldn't be in other situations when you try to not double the bass, especially when, um, going to the dominant chord.

S1: First inversion chords (?) [SP]

T: Right. Any other questions? (Class leaves)

9:30, Augmented Sixths, First Treatment

T: Ok. Questions about augmented sixths, anything that, yes...

S1: (?)... augmented sixth. When you say augmented sixth is it, like, its actual chord that's six and, and augmented, or is it like, a s... a raised sixth... (?)... Do you know what I'm saying? [DL]

T: Yes, I understand. You're saying why, why, what does the augmented sixth stand for when you say "augmented sixth chord," right? The augmented sixth separating, or in a key or something like that? Yeah, its, its based on the key of the augmented sixth and the augmented sixth always expands out to an octave some notes, mainly V, in a key.

S1: Does it always go on... [CP]

T: On what?

S1: On one certain chord that earlier (?)

T: Yes? Nope it usually, it can go from any scale degree...

S1: OK,

T: and usually when we're looking at it almost always opens out to sol. You always have le going to sol and fi going to sol, sharp four going to 5 and flat six going to 5. Even in rap music, it closes up, OK? Pick a scale degree, go a half step below, half step above, put the right note in the bass, and you've got an augmented sixth chord.

S1: But it opens to the dominant?
T: It opens up to the dominant, it almost always fun, funct, functions as a subdominant, OK, and then (?) the dominant.

S1: So you can approach it from... [CP]

T: From anything, really, I, IV, ii6, iv6, ah, vi, flat vi, lots of things. We'll look at a lot of them, actually. And, um, in fact the X, when it doesn't go down to the dominant actually acts like a dominant-like dominant, so it's like a chord. So if you wanted to modulate to V in the major key, and you're hanging out in V and you think you're in I, and you hear an augmented sixth, you'll know that that's no longer tonic, you'll know that that's dominant (....) Any other questions about part writing?

S2: Part writing's (....)

T: (laughs). Yes. Go and practice you're homework for the weekend. (class is dismissed after a noisy, lively discussion about President Clinton's visit.)

9:30, Augmented Sixths, Second Treatment

T: Are you done yet?

(Some conversation, not decipherable)

T: Does anyone have any questions? Hello?

S1: Hello.

T: Having done this exercise, does anyone have any questions?

(several students talk, and begin to leave the room)

T: Having done this exercise, does anyone have any questions?

(several "No's" come from the students)

9:30, Common-tone Diminished Sevenths, First Treatment

T: Does anyone have any questions? Burning, burning questions?

S1: Why would you want to use this again? [FN]

T: You're always asking why. Why not?

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S1: Because you know that I like the simple things.

T: Well, simple pleasures for simple folks,

S1: Yeah,

T: You know, something better. If you're a composer, you've been through I-IV-V-I for a hundred years.

S1: Yeah,

T: You might get a little bit bored.

S1: OK.

S2: You say that's a part of the subdominant?

T: I, I wouldn't even, it functions the same way, like a neighboring subdominant, its function is neighboring motion, an embellishing thingy.

S2: And its V diminished six?

T: Well, yeah.

S2: Are you sure . . . (?) . . . [VL]

T: . . . (?) . . . You can, that's how I like to think of them. A lot of times it does resolve correctly, and a lot of people will tell you common-tone diminished seventh is a fully diminished seventh that doesn't resolve to the right, um, chord or whatever, but it, right. The actual diminished part, D# to A, and the F#, if you think of that as a seven diminished chord, it resolves correctly to E and G, just like you had a G in the bass. That's how I think of it.

S3: What did you say?

T: She's saying that this comes from a different key, right, its got a D# and an F#, and its resolution you have to go to another key a third above.

S3: OK.

T: You see here, so you can think of it as a diminished chord resolving correctly . . . (?) . . .

S4: Can we do it for imagination?
T: What do you think?

S4: I don’t know.

T: If it could, if it, if it could definitely go to three, if that could resolve to three, you could play a whole game in your key, using it as a neighbor chord and expanding it as a neighbor chord, then making it as some, as a single chord, then making it resolve correctly as E, you could make a whole section, heck you should do that for your final project.

S4: We have a final project?

T: Yes, but uh, but uh,

S4: (?)

T: Anyone else?

S5: So that’s the only way you approach it and resolve it? [CP]

T: Mmhm, it will get there eventually. . .(?) . .

(class is dismissed)

9:30, Common-tone Diminished Sevenths, Second Treatment

T: OK, as you’re finishing those up, does anyone want to ask any questions? Yeah.

S1: What’s the first one? [AM]

T: Now you know I’m not supposed to tell you, write it down. The first one? . . .(?) . . (plays it).

S2: I don’t like that at all.

T: (continues to play and talk at the same time, obscuring her words)

(Class splinters off into several discussions as students begin to leave.)
LIST OF REFERENCES


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