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Individual and Intra-Individual Differences in Interest during Instrumental Music Classes in Suburban High Schools

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INDIVIDUAL AND INTRA-INDIVIDUAL DIFFERENCES IN INTEREST DURING INSTRUMENTAL MUSIC CLASSES IN SUBURBAN HIGH SCHOOLS

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THE UNIVERSITY OF SAN FRANCISCO
Dissertation Abstract

Individual and Intra-Individual Differences in Interest During
Instrumental Music Classes in Suburban High Schools

Individual differences in interest (how students' interest differs from one another in response to the same experiences) and intra-individual differences in interest (how each student's interest changes across different experiences) are theorized to play a part in a complex system of interactions between students, lesson content, and educational context. In this study, 360 students from two suburban high school instrumental programs in Northern California rated an average of 12 classroom tasks and music selections on the dimensions of interest, meaning, involvement, complexity, and comprehension. Expected relationships between interest and the other variables were informed by literature on situational interest in educational motivation (meaning and involvement) and by literature on emotional appraisals of interest (complexity and comprehensibility). Student individual differences variables (enduring interest in music in general, gender, age, experience) were also gathered as part of the study. Analyses explored relationships between students' interest in tasks and music selections and the other variables.

Findings show students' perceptions of the tasks and music selections in their music class were highly idiosyncratic, that is, students did not rate each task the same as all other tasks, and students did not agree with each other in their ratings of each task. Though the other variables were closely related to interest in the current study, meaning, involvement, complexity and comprehensibility were also highly idiosyncratic, and the close relationships of these constructs to interest were not explained by student individual differences variables. Data from this study show that meaning can be distinct from

interest, and a task can be meaningful but not interesting. The role of involvement is much closer to interest than the other variables in these data, as students' perceptions of involvement varied closely with interest.

Although involvement, meaning, complexity, and comprehensibility correlate strongly with interest, the implications of these findings for researchers are that common self-report instruments for the measurement of interest might not adequately distinguish between these constructs. For education practitioners, the magnitude of idiosyncrasy present in these data strongly imply that learning experiences are not interesting to everyone at once, even in a population with very high individual-interest in the subject in general.

This dissertation, written under the direction of the candidate's dissertation committee and approved by the members of the committee, has been presented to and accepted by the Faculty of the School of Education in partial fulfillment of the requirements of the degree of Doctor of Education. The content and research methodologies presented in this work represent the work of the candidate alone.

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Chapter One: Statement of the Problem

Zach pumped his fist with excitement on Monday when he perfectly played the warm-up exercise on his saxophone. Friday, he rolled his eyes during warm-ups and muttered to his seatmate that he was bored. Zach says he is interested in music, but he does not always feel interested during his high-school band class.

When it comes to fostering student interest in the classroom, researchers still do not know what conditions promote interest or why, especially given students' individual differences (Silvia & Kashdan, 2009). Many students are just like Zach: interested in some classroom tasks but not others, and their interest, even in the same task, varies from moment to moment. These moment-to-moment changes in feelings of interest are called "intra-individual differences" and are measured and analyzed across experiences within students, indicating Zach's changing feelings. Students' various characteristics such as their level of experience in music or their individual-interest in music (a personal interest that endures over time) might also differently influence their feelings interest in tasks or music selections in the music classroom. Such characteristics are called "individual differences" and are measured and analyzed between students, indicating ways that Zach is similar to or different from his classmates. Ultimately, given differences both within students and between students, no classroom tasks are interesting to all of the students all of the time (Silvia, 2006b).

Separate bodies of literature investigate student feelings of interest. Table 1.1 presents a comparison of some of the differences between these bodies of literature. On

one hand, education psychologists see interest as a part of motivation and seek to create interesting classroom lessons for students. Studies in this lineage examine characteristics of tasks or instructional approaches and their influence on student interest (e.g., Dohn, 2011; Mitchell, 1993; Tsai et al., 2008). On the other hand, social psychologists see interest as an emotion and seek to understand how feelings of interest emerge in a person. Studies of emotion have used appraisals – perceptions of self and environment – to examine the processes and components of interest in abstract or artistic stimuli (e.g., Silvia, 2005b; Silvia, Henson, & Templin, 2009). Unfortunately, even though researchers from both education and social psychology perspectives view environmental characteristics and personal characteristics as crucial to the elicitation of interest, no studies have blended these two streams of research in a classroom context (for an investigation of interest's appraisals related to educational text, see Connelly, 2011).

Table 1.1

Branches of Research Relevant to the Current Study

Domain	Theory	Prominent Researchers	Focus of Research
Education	Appraisal (Control-Value)	Pekrun et al. Meyer & Turner	Emotion in the Classroom (not including interest)
Social Psychology	Appraisal (Sequential-Check)	Silvia	Interest in Aesthetic Stimuli
Education	Phase Model of Interest Development	Mitchell Durik et al.	Interestingness of Lessons

Specific to interest in education, Mitchell (1993) explored the interestingness of classroom tasks and found different types of interest responses based on different task

features such as meaning and involvement. Mitchell also confirmed a distinct difference between active feelings of interest during class and enduring interest in a subject. The type of interest that endures over time, a characteristic of the student, is called "individual-interest" in the present study. Durik and her colleagues (Durik & Harackiewicz, 2007; Durik, Matarazzo, & Delaney, 2009) followed Mitchell's (1993) findings by investigating the influence of individual-interest on students' momentary interest in response to task conditions. However, neither Mitchell (1993) nor Durik et al. (Durik & Harackiewicz, 2007; Durik, Matarazzo, & Delaney, 2009) explored intra-individual differences in students' interest across tasks. Tsai et al. (2008) measured students' intra-individual differences in interest in relationship to their perceptions of instructional approaches and mediating effects of individual-interest within that relationship but did not include task characteristics or appraisal components of interest. This particular study (Tsai et al., 2008) raised many questions about the various influences on students' interest, and is therefore ripe for replication and extension in order to explore many complex influences on students' interest in the classroom.

Existing theoretical approaches to the study of interest dance around the experiences of Zach and his classmates who are sometimes interested and sometimes not interested during class. In summarizing their decades of classroom motivation research, Meyer and Turner (2002, 2006) conclude that emotions are ubiquitous in classroom situations. Pekrun and colleagues (Frenzel, Pekrun, & Goetz, 2007; Pekrun, Elliot, & Maier, 2006; Pekrun et al., 2010) have investigated a specific class of emotions they call "achievement emotions" in the classroom. An appraisal model, control-value theory, developed by Pekrun (2006), frames his line of research specific to achievement

emotions, but he does not include interest in the array of emotions, though he does include boredom. Silvia (2005a, 2005b), a social psychologist interested in aesthetic emotional response and a class of emotions he calls "knowledge emotions," investigates interest in poems and visual art. Silvia's research has so far confirmed that appraisal theory can be applied to the study of interest, but his research does not consider educational materials, tasks, or environments.

Owing to the lack of research applying appraisal theories of interest in an educational context, little is known about the process by which the characteristics of tasks influence interest or how student characteristics such as individual-interest and prior experience influence feelings of interest in an educational context. Recent research in both educational and social psychology veins has revealed large amounts of variation at the intra-individual level – up to 45%, according to Tsai et al. (2008). Just like Zach's experience with his warm-ups in music class, students' judgments of what is interesting and their perceptions of their own interest vary widely over time and also across stimuli. The variation in students' interest that originates at the intra-individual level might be attributable to interactions between the person, environment, and process of emerging interest (Tsai et al., 2008). Without an understanding of the relationships between classroom-task characteristics, student characteristics, and the appraisal components of interest, how and why different students respond differently to different lesson conditions remain mysterious.

Because appraisal theories were developed to explain intra-individual variation (Smith and Roseman, 2001), appraisal theories show promise for explaining how interest emerges in relationship to features of the person and environment, and therefore might

illuminate some sources of intra-individual variation in the classroom. The present study drew inspiration from many studies in both education and social psychology arenas (i.e., Durik & Harackiewicz, 2007; Durik & Matarazzo, 2009; Mitchell, 1993; Silvia, 2005b) to expand on the research approach of Tsai et al. (2008) in order to examine how several of the many aspects of students, feelings, and tasks work together with interest during instrumental music class.

Purpose of the Study

The purpose of this study was to examine individual and intra-individual differences in students' feelings of interest in tasks and music selections of the instrumental music classroom. Specifically, this study explored the relationship between students' interest in the tasks and music selections of their music classes, and students' perceptions of those tasks and music selections along the dimensions of meaning, involvement, complexity, and comprehensibility. Guided by the research of Tsai and her colleagues (2008) into individual and intra-individual differences in interest, student individual differences variables included individual-interest, gender, and years of ensemble experience. Tasks and music selections were characterized by students' perceptions of meaning and involvement (Durik and Harackiewicz, 2007; Mitchell, 1993) as well as interest's theorized sequential appraisal components: complexity and comprehensibility (Silvia 2005a, 2005b).

The researcher used a quantitative approach, developing a context-specific survey reflective of specific tasks and repertoire in the sample classrooms. Survey data represented students' perceptions of their interest in the tasks and repertoire of their music classrooms (Mitchell, 1993). Following the call of Meyer and Turner (2006) and

Pekrun (2006) for the application of emotion theories to research in the domain of educational psychology, interest was framed and measured in the context of appraisal theory. The theorized appraisal structure of interest is two-dimensional, with appraisals of interest being predicted by appraisals of complexity and coping potential (Silvia, 2005b).

Significance of the Study

Both researchers and teachers seeking to understand students' experiences of interest stand to benefit from the results of the current study. If a combination of education and appraisal theoretical frameworks were helpful in this study for refining the understanding of the interplay of the various facets of interest, the resulting progress toward an overarching theoretical framework could provide crucial guidance for future research into the interest of Zach and his classmates whose feelings of interest seem always to be in a state of flux. The present study explored the feasibility of combining theories and methods of research on student interest from social psychology and educational psychology. The multifaceted nature of interest, involving emotional, conative (motivational/volitional), and cognitive elements, makes it a prime target of research aiming to understand the interplay between thinking, feeling, and action (Dai & Sternberg, 2004). However, many theories of interest have developed independently of each other, though they all share much in common (Henn, 2010). Krapp (2002) noted, "a central problem is the lack of an overarching theoretical framework that could be used to summarize and systematically integrate results from different research programs" (p. 407). The findings of this study could aid in the development of such an overarching theoretical framework that will ultimately help teachers to better understand the inner workings of student interest and guide the pursuit of deeper understandings of student

experiences through research.

Hopefully, this study also lends helpful advice to Zach's teacher, who aims to keep Zach and his classmates interested in the tasks at hand. In addition to its relevance to the methodological and theoretical aspects of educational psychology, findings of the current study might inform practical considerations for the music classroom. A more accurate theoretical representation of the interplay between student and environment characteristics in the elicitation of interest could be useful for making suggestions for practice. For instance, emergent rules of engagement between students and lesson tasks can provide guidelines for teachers who aim to foster students' interest; Zach's teacher might be able to apply theoretical understandings to tailor lesson plans to keep Zach interested every day.

Theoretical Framework

In order to explain the ways that students and environments interact and the ways in which feelings of interest emerge, this study invoked two complementary theoretical approaches. Educational psychologists would say that Zach feels interested during class because he has an individual-interest in music. His interest is especially piqued, however, by tasks that involve him in meaningful activity such as the challenging rhythmic exercises that he says lead him to put in a little extra practice. From an educational psychology perspective, interest is a product of both the students' individual-interests and the task conditions that promote interest. From another perspective, social psychologists would say that Zach is constantly making judgments about tasks and self during band class. When, in the course of these judgments, he comes to believe that the scale exercise is just complex enough to match his abilities, he feels interest. From a social psychology

perspective, interest emerges through a sequence of cognitive appraisals, which the student automatically and sometimes unconsciously makes in regard to each task.

Underpinning this entire endeavor is a general definition of interest and the aim of any educator who wishes to elicit interest in students: in either domain, education or social psychology, interest is a motivational variable characterized by a tendency to engage with content over time (Hidi & Renninger, 2006; Silvia, 2006b). Someone who is interested in astronomy is prone to stargazing. Someone who is interested in paintings gravitates toward museums. Someone who is interested in a potential suitor at a party spends the evening by his side. This definition applies similarly to two different perspectives of time. Interest felt in the moment encourages Zach to stay focused on his scales exercises. Individual-interest over weeks or years or over a lifetime keeps Zach engaged in music as a daily or weekly practice.

Situational interest. Situational interest (the construct this study and other recent studies often simply call "interest") refers to the outcome of the interaction between a learner and specific features of the environment such as objects, events, ideas, themes, lesson content, or auxiliary details (Hidi & Harackiewicz, 2000; Renninger, Ewen, & Lasher, 2002; Renninger, 2009). The "situational" distinction indicates that this type of interest applies only to current engagements in contrast to types of interest such as individual-interest that endure beyond the immediate environment or situation (Hidi & Renninger, 2006). Interest is a dynamic experience, specific not only to the environment and the person, but also the changing or interactive nature of the relationship between person and environment (Krapp, 2002b). Situational interest is further divided into two durational components: "triggered" and "maintained." When situational interest is

triggered, a student's attention might be attracted by bright colors or intriguing illustrations in a textbook, or the use of a new technology in a classroom. When situational interest is maintained, students might be involved or engaged by the social interactions of group work, or emphasis on personal utility of the lesson content. Student-perceived task conditions identified by Mitchell (1993) for the maintenance of situational interest are meaning and involvement. Meaning and involvement are the correlates of interest that are the focus of the present study.

Individual-interest. The difference between situational interest and individual-interest is, first and foremost, a matter of duration. Individual-interests denote relatively stable, enduring dispositions rather than momentary feelings (Ainley, Hillman, & Hidi, 2002). People with individual-interests show a tendency to reengage with their specific objects of interest, such as a certain content area, and are more likely to experience positive feelings or values they associate with those objects. The intensity of individual-interests vary, but an object of individual-interest is distinguished by the assignment of more relative value, knowledge, or preference than other topics, tasks, classes, etc. (Renninger, Ewen, & Lasher, 2002).

Individual-interests are content, but not context, specific (Trend, 2005). Whereas situational interest is dependent on environmental features for sustenance, individual-interests are sustained in the person over time, with or without continued environmental support. Like situational interest, individual-interest is specific to an object - an idea, topic, domain, or activity. Although people with individual-interests are likely to experience situational interest when encountering the object of their interest, individual-interests do not guarantee the presence of situational interest (e.g. Ainley, Hillman, &

Hidi, 2002). Yet, individual-interests are so closely related to situational interest, that the feeling of interest (situational interest) has been described as "a momentary manifestation of this latent disposition [individual-interests]" (Tsai, Kunter, Lüdtke, Trautwein, & Ryan, 2008; p. 461).

When Zach says he is "interested in music," he is speaking of his individual-interest. His individual-interest extends, in Zach's case, not only to his saxophone playing in the high-school band, but also to the bass guitar that he plays in his garage band with his friends and to his affinities for videogame theme songs and cool jazz. Contrast this general attraction to or appreciation for these types of musical experiences with his day-to-day feelings about his musical activities, when things are not so simple. Most days, Zach is thrilled to be in band class, except for the parts of class when he has to play solo. Zach is not interested in every piece that the band plays or in every exercise the band practices. He doesn't feel the same amount of interest every moment of every day; his interest varies. Zach is interested playing in his garage band too, but sometimes his friends annoy him when they do not take the music seriously and then he says he feels bored and does not want to rehearse anymore. Zach's consistent enthusiasm for certain elements of music (his individual-interest) is much steadier than his feelings of interest associated with musical activities. Those comings and goings of interest are the focus of this particular study.

Appraisal theory. Within the domain of emotion research, a prominent family of guiding theories can be categorized as appraisal theories (Silvia, 2006b). Appraisals are cognitive evaluations, usually subconscious, of our relationships with objects. Objects can be anything, people, ideas, tasks, goals, situations, and thoughts, even feelings.

Although many variations in structure or sequence of appraisal theories have developed, the overarching concept is that emotions arise from appraisals (Roseman & Smith, 2001) rather than appraisals explaining emotional experiences after the fact. Appraisal theories assert that people experience emotions based on evaluations of certain aspects of their environments, such as an object of interest, or evaluations of certain aspects of themselves, such as personality traits or repertoire of skills (Silvia, 2007).

In appraisal theory, emotions are differentiated based on discreet structures of appraisal dimensions. For instance, the emotion of anger theoretically consists of a three-dimensional appraisal structure: goal incongruence, other accountability, and unfairness. When an employee is passed-over for a promotion, if he perceives that the situation a) denies his opportunity to achieve his goal, b) is the fault of his newcomer superstar coworker, and c) arose despite his years of dedicated and deserving service, then the employee will feel anger. If, on the other hand, he appraises the situation as perfectly fair and attributable to his coworker's stellar performance, the employee who was passed-over for a promotion will feel something entirely different from anger even though the objective circumstances of his situation have not changed.

Interest's appraisal structure. The work of Silvia has so far confirmed his theory of a two-dimension sequential appraisal structure for interest: complexity and comprehensibility (Silvia, 2005a, 2005b, 2006a, 2009). Appraisals of object features that belong to the complexity class of variables include surprise, conflict, and salience in addition to both novelty and complexity (Silvia, 2006b). Comprehensibility simply describes a person's sense of his ability to understand or master an object or action. An appraisal along the complexity dimension would answer the question, "Does the object

(idea, task, thing, situation, topic, person, etc.) present a challenge to me?" and an appraisal along the comprehensibility dimension would answer the question, "Can I handle the challenge presented by this object?" The present study uses the operational term "comprehensibility" gleaned from survey items while Silvia's publications use the theoretical term "coping potential".

For the sake of effective measurement, semantic-differential items typically represent the two dimensions of interest. Complexity, for instance, is measured along a scale ranging from "simple" to "complex." Coping potential is measured along a scale ranging from "comprehensible" to "incomprehensible" (Silvia, 2005a). The use of semantic-differential items provides a measure of the intensity of experience as well as the opportunity to record the absence or antithesis of the expected appraisal.

Appraisal theory describes Zach's emotional experience in band as a stream of conscious and unconscious evaluations. Zach is constantly deciding whether what he is doing is complex enough to match his abilities. When a new étude seems complex yet within his grasp to understand and perform, Zach feels interested. In contrast, when the daily rhythm exercise seems simple in comparison to Zach's well-developed skills, Zach does not experience interest. Zach isn't always aware of these appraisals or of his feelings, but when asked to pay attention to his thoughts or feelings, he notices and reports what he thinks or feels.

Summary. Educational psychologists and social psychologists alike conceive of interest as a multifaceted product of the interaction between learner and object. Whether the constituent parts are appraisals, environmental characteristics, or a combination of both is a matter of perspective. Focus on the student experience reveals appraisals of

complexity and comprehensibility (Silvia, 2005a, 2005b, 2006a, 2009); focus on the learning environment reveals conditions of meaning and involvement. What's clear is that, in either line of research, much of the variance in interest emerges from the within-student or intra-individual level, and individual-interest and its facets are theorized to affect how students interpret their environments and experience interest. The present study employed both perspectives in combination to examine the interaction between music students - a population with high individual-interest - and their learning environments.

Background and Need for the Study

The interactions between facets of environment, person, and experience are complex. Teachers are well aware of students' changing interest levels. Some students, like Zach, are intensely interested in music, while others seem not to connect so closely with the course content – even in music class. And no student is always highly interested in every activity undertaken in the classroom; interest changes from moment to moment. It is thus well understood through the experience and observations of both teachers and researchers that individual and intra-individual differences in student interest abound. Recent research documents that interest toward a lesson can vary both between and within students. "Why, how, and under what circumstances do which students feel interested" are the questions before teachers and researchers in the domain of classroom interest.

Background. Research into interest in the classroom (i.e. Tsai et al., 2008) has discovered that large amounts of variation in interest originate at the intra-individual level – differences of response within each individual student over time or across tasks. Intra-

individual variation is evident in students' interest and in students' perceptions of the environment. At the between-students (also called "individual-differences") level, interest varies in response to perceptions of the environment, and in relationship to students' individual-interests (Durik & Harackiewicz, 2007; Mitchell, 1993). But the processes of the relationships between interest, perceptions, environment, and individual-interests are unclear, in part because the emergence of interest in the classroom has not yet been explored in terms of component appraisals of interest – complexity and comprehensibility. Two points of great curiosity arise from these lines of research: a) how environmental and student characteristics influence the magnitude of intra-individual differences in interest and intra-individual differences in perceptions of task conditions and b) by what processes task characteristics and individual-interest affect situational interest. Table 1.2 shows how the research design of Tsai et al. (2008), whose work closely resembles the present study, was adapted and extended to explore in greater depth the phenomenon of interest in the secondary music classroom along the dimensions of individual-interest, student perceptions of lesson conditions, and intra-individual differences.

Table 1.2

Approaches to Relevant Constructs

Construct	Tsai et al. (2008)	Present study	Inspiration
Individual-interest	Diverse/typical sample	High individual-interest sample	Tsai, et al., 2008
Perceptions of lesson conditions	Autonomy-support and control	Meaning, involvement, complexity, and comprehensibility	Durik & Matarazzo, 2009; Mitchell, 1993
Intra-individual differences	Magnitude of intra-individual variation	Patterns of bias in intra-individual relationships (intra-individual and intra-task variation)	Silvia, Henson, & Templin, 2009

Perceptions of task characteristics. In his investigation of interest in the secondary math classroom, Mitchell (1993) noticed that different types of interest, categorized by duration and personal significance, were elicited by different situations or tasks. He organized the tasks or lessons along themes of lesson content or students' values, and was one of the first researchers to verify "catch" and "hold" (also called triggered and maintained situational interest) phenomena in the classroom environment. But just like many researchers before him (e.g., Berlyne, 1960), the conditions that Mitchell observed did not have universal interest effects. As a matter of fact, even though researchers have searched for lesson conditions that elicit interest for everyone, the very design of correlational studies like Mitchell's demonstrates variability in interest responses. How would interest covary with lesson features if there were no variability in interest response (Silvia & Kashdan, 2009)? What Mitchell missed in his study of interest in the classroom is that different students sometimes interact differently with different

conditions in an organized way based on interactions between their individual characteristics and characteristics of the lesson; how those interactions work is only just beginning to emerge.

Student characteristics. Because Mitchell (1993) had teased out some of the facets of interestingness, the stage was set for Durik and Harackiewicz (2007) to explore interactions between the different facets of interest and interestingness. They devised an experiment to pair lesson conditions designed to elicit situational interest with control conditions. Durik and Harackiewicz (2007) administered their experimental and control math lessons to students with high and low individual-interests in math in order to explore individual-interest as a moderator of the effects of lesson conditions on situational interest.

Durik and Harackiewicz (2007) divided their lesson features into "catch" conditions to trigger interest and "hold" conditions to maintain interest. Their results revealed that the triggering "catch" conditions elicited situational interest for the participants with low individual-interest, but thwarted situational interest for the participants with high individual-interest. In the maintaining "hold" condition, the interest of the two groups were reversed. Participants with high individual-interest experienced more situational interest following the utility intervention, but the situational interest of participants with low individual-interest was crippled by the intervention.

Clearly, Durik and Harackiewicz (2007) uncovered some important differences in their participants' experiences of situational interest. Their findings are best described as an interaction effect for individual-interest with task conditions. Interaction effects sometimes point to practical problems. In the case of this study, the researchers found

that their well-intentioned interest-enhancing interventions such as emphasizing the utility of a lesson topic actually decreased interest for some of their participants. However, there is still one more level to the story of the many facets of interest.

Intra-individual variation. Intra-individual variation represents the differences in one student's experiences or perceptions over time or across tasks. Sometimes called "within-person" variation, it is measured by comparing repeated measures over time (e.g. Tsai et al., 2008) or by comparing repeated measures across conditions (e.g. Silvia, 2005a, 2005b). Tsai et al. (2008), in particular, found that a great deal of the variation in interest originated at the intra-individual level.

The aim of Tsai et al. (2008) was to investigate whether autonomy-support, cognitive autonomy-support, and controlling behaviors influence all students' interest equally. Their research showed much variation in interest and perceptions of lessons both between and within students. Because effects of perceptions of autonomy-support and control on interest appeared at the within-person and between-person levels, the large amount of intra-individual variation does not seem to be random error. Might perceptions of task characteristics (as opposed to broad lesson conditions) or perceptions of the match between task and student characteristics also explain some of the intra-individual variation in interest?

Silvia's (2005a, 2005b) investigations into the appraisal structure of interest suggest that appraisals of complexity and coping potential (coping potential operationalized as comprehensibility) have the potential to explain some of the within-person variation. Silvia (2005a) devised a within-person study of the effects of appraisals on interest. After all, the effects of appraisals on interest are qualities of intra-individual

relationships, not group-level trends. In Silvia's (2005a) study, participants viewed non-representational pictures of experimental visual art, rating their impressions on semantic-differential scales representative of overall interest and interest's appraisal dimensions: complexity, and coping potential. Results revealed that people found objects more interesting when they appraised them as both more complex and easier to understand (high complexity and high coping potential), not either complex or easy to understand.

Silvia, Henson, and Templin (2009) used a purely statistical approach (beyond the theory-driven approach guiding the research design) to delve into intra-individual differences in interest. Their results led them to identify and verify two latent classes of people: those for whom appraisals of complexity had a larger effect on interest, and those for whom coping potential had a larger effect on interest. For both classes of people, both complexity and coping potential still predicted interest. One appraisal simply had a stronger effect than the other. Their discovery of these two latent classes showed that patterns of intra-individual variation could be classified into individual differences categories.

Need. In music education circles, teachers of instrumental music have long been concerned with recruiting new students, preventing student attrition, fostering musical independence, maintaining enthusiasm, and inspiring lifelong participation in music. The commonly suggested means of achieving these goals are often concerned with interest or its facets such as relevance, utility, belonging, excitement, and involvement (Bergin, 1999). The tenor of advice articles in trade journals imply that methods of eliciting student interest either have a universally positive effect, or, at least, do not carry risks of negative effects. The practical assumption of universality and positive effects has not

borne out in research.

Not only do students respond differently to lesson content and conditions, but their interest can actually be harmed by the lessons supposed to foster interest (e.g., Durik & Harackiewicz, 2007; Durik & Matarazzo, 2009; Matarazzo, Durik, and Delaney, 2010). Given the heavy contribution of interest to overall motivation (Krapp, Hidi, & Renninger, 1992), educators cannot afford to ignore students' interest when planning lessons or creating materials. If educational interventions designed to elicit students' interest such as the selection of repertoire or instruments based on perceived salience (as in Calloway, 2009) risk harming students' interest, a deeper understanding of the relationships between student traits, lesson conditions, and student interest is needed to help educators avoid harmful missteps.

The sheer amount of intra-individual variation in student perceptions of class sessions in the study of Tsai et al. (2008) might indicate a much deeper level of specificity necessary for designating the object of interest than has been previously considered in within-student studies. Large amounts of intra-individual variation might, under future scrutiny, arise at all levels of specificity of objects of interest. For example, Goetz, Frenzel, Pekrun, and Hall (2006) found that students' emotional experiences in the classroom are domain-specific; Tsai et al. (2008) found that students' interest experiences in the classroom are class-meeting specific. It stands to reason that students' interest experiences are also task-specific (Mitchell, 1993).

If the effect of individual-interest on situational interest is explained by perceptions of task conditions, then by what process might individual-interest exert its power? Silvia (2005b) has shown that interest is highest in objects that are appraised as

more complex and easier to understand. In other words, when appraisals on both the complexity and coping potential dimensions are high, the object is appraised as interesting. Given Silvia's (2006a) findings that experts in art, relative to non-experts, tend to rate more complex art as easier to understand, it is likely that individual-interest might influence situational interest by mediating appraisals of complexity and coping potential. For instance, students high in individual-interest might have a greater appreciation for a task's complexity and might also find the same task easier to understand as they bring their prior knowledge to bear on the situation.

Research Questions

The following questions guided the study:

1. What is the magnitude of intra-individual variation in students' interest in tasks and music selections of the music classroom?

2. Do students' ratings of complexity and comprehensibility predict students' ratings of interest in tasks and music selections of their secondary instrumental music classes?

3. Do students' ratings of task characteristics such as involvement and meaning predict their ratings of interest, complexity, and comprehensibility in tasks and music selections of their secondary instrumental music classes?

4. Do student characteristics of individual-interest, gender, age, or years of experience in instrumental music predict students' ratings of interest, complexity, comprehensibility, meaning, and involvement or the relationships between these ratings in tasks and music selections of their secondary instrumental music classes?

Definition of Terms

Interest. Interest represents students' reports of their feelings of interest during a specific task or activity. In this study, based on Izard's (1977) definition of the basic emotion interest-excitement, interest was measured with two semantic differential items related to each task: interesting - uninteresting; boring - exciting (Silvia, 2005b; Berlyne, 1960)

Individual-interest. Individual-interest represents students' enduring tendency to reengage with an object over the long-term, in this case school instrumental music. In the present study, individual-interest was operationalized as a latent trait represented by items on a Likert-type scale adapted from a scale originally developed by Marsh and colleagues (Marsh, Trautwein, Lüdtke, Köller, and Baumert, 2005) to measure math domain-specific interest.

Complexity. Silvia (2005a) used the label "novelty-complexity" to represent a class of variables describing the collative features of objects of interest, that is, students' appraisals of cognitive conflict elicited by novelty, conflict, or complexity. Ratings of complexity are measured with one semantic differential item related to each task: complex - simple.

Comprehensibility. Comprehensibility represents students' appraisals of their feelings of competence related to challenges posed by objects of interest. Ratings of comprehensibility are measured with semantic differential items related to each task: comprehensible - incomprehensible, easy to understand - hard to understand.

List of Variables

Student characteristics variables.

Gender. student report, fill-in-the blank

Age. student report, fill-in-the-blank

Years of band or orchestra experience. student report, fill-in-the-blank

Individual-interest in music. Enduring tendency to reengage with music; latent trait represented by items on Likert-type scale adapted from Marsh, Trautwein, Lüdtke, Köller, and Baumert (2005)

Repeated-measures variables.

Interest. Students' ratings of their feelings of interest during a specific task or music selection; measured with semantic differential items related to each task: interesting - uninteresting; boring - exciting (Silvia, 2005b; Berlyne, 1960)

Complexity. Students' ratings of the complexity of the task or music selection; measured with a single semantic-differential item related to each task: complex - simple

Comprehensibility. Students' ratings of their feelings of competence related to challenges posed by the task or music selection; measured with semantic differential items related to each task: comprehensible - incomprehensible; easy to understand - hard to understand

Meaning. Students' ratings of their perceptions of the meaning of the object; measured with a semantic-differential item related to each task: meaningful – meaningless.

Involvement. Students' ratings of their perceptions of how involved they feel with the object; measured with a semantic-differential item related to each task: involving –

passive.

Summary

When Zach's interest rises and falls from day to day or even during one period of music class, his teacher wonders what to do to keep him interested. Research approaches to interest – the attempts to explain what is going on when Zach feels interested one moment and bored the next – remain fragmented. Different theoretical approaches to the study of interest have described different dimensions on which interest varies. Two threads of research have separately observed individual differences and intra-individual variation in interest. At the individual differences level, individual-interest and task characteristics have been shown to play meaningful roles in the emergence of situational interest in the classroom. At the intra-individual level, ratings of complexity and comprehensibility predict situational interest. The present study aimed to shed light on the relationships of variables across two threads of research at the individual and intra-individual levels. Ultimately, the hope is that Zach's teacher can apply understandings of the way that interest works during lessons to help Zach stay engaged in music class.

Chapter 2: Review of Literature

Interest emerges from interactions between a person and an object (Krapp, 2002a); interest does not exist in the object or person alone, but in the interaction itself (Krapp, 2007). Because of this, interest is content, context, or domain specific (Hidi & Harackiewicz, 2000; Schiefele, 1991). The object of interest can be a subject of study, a particular activity, a class in school, a personal relationship, a certain book, or any number of ideas, things, places, or people. An object of interest can be as general as vehicles or as specific as the buoyant properties of racing catamarans; sports, or an olympic Greco-Roman wrestling match; reading, or *Harry Potter and the Order of the Phoenix* (Schiefele, 1991). It is impossible to be interested in everything; interest in everything would require infinite attention (Silvia, 2006b).

Many influences affect interest on both sides of the person-object relationship. For students in the classroom who may or may not be interested in lessons, student characteristics such as individual-interest (a personal interest in a particular domain that endures over time), domain experience, gender, or age, and lesson components such as the meaning or involvement of tasks are bound up in the system of interaction between person and object. The present study considers components not only of the person-object interaction in the classroom, but also the process components of the emergence of interest within the person from the perspective of appraisal theory of emotion. Appraisal theorists conceptualize the person-object relationship as a series of judgments a person makes about an object of interest.

Meyer and Turner (2006), in the course of their decades of research into educational motivation, have come to believe that motivation research must a) be situated in a classroom, and b) consider affect. The literature review for the present study aims to take their advice by delving into both educational psychology research on motivation and social psychology research on emotion to find inspiration for inquiry on the emergence of interest in the classroom. Research exploring relationships between interest and achievement, though rich in robust findings, falls outside the purview of this review.

Although the educational psychology literature is dense with research involving students' interest in educational texts, interest in the classroom has not received as much attention. Classroom motivation studies have been more likely to focus on engagement or enjoyment – constructs often conflated with interest but actually distinct from interest (Iran-Nejad, 1987; Silvia, 2005b). Accordingly, this review will focus on literature involving interest in classroom settings. Furthermore, studies taking an appraisal-theory approach to the study of emotion in the classroom have yet to consider the emotion of interest, although boredom has been widely studied. Therefore, this literature review will also focus on emotion literature pertinent to interest in order to guide current investigations into the emotion of interest.

Interest in the Classroom

For over a century, researchers have struggled to describe in theory and measure in practice the complexity of the object-person interaction (Schraw & Lehman, 2001). More recently, with advances in theoretical approaches and statistical methods, as well as a flowing tide of popularity, research into interest has gained some momentum. The following statement, buried in the last paragraph of a call-to-arms article, caused quite a

stir in the field of interest research:

> As a process, interest has a durational aspect - there are triggering conditions and there are conditions which ensure the continuation of interest…. We argue that this can be adequately researched only by studying the variety of ways in which information has significance to the reader, and this cannot be done without extending our understanding of the origins of interest beyond a reader's knowledge system to his/her value system mediated through affective experience. (Hidi & Baird, 1986; p. 191)

From this very idea, that interest is a process to be understood in an affective context, came a new line of research to develop and validate a dynamic theory of interest in education. Although the impetus for Hidi and Baird's (1986) article sprang from research into text-based conditions for eliciting interest, Mitchell (1993) had the classroom context in mind. He investigated which conditions of lessons in the classroom exemplified the durational aspects of interest emphasized by Hidi and Baird (1986).

Task conditions and situational interest. Mitchell (1993) reported a construct-validation study in three parts. In part one, he reviewed the literature on interest with the intention of developing a model of situational interest useful to classroom teachers. The resulting model imagines Dewey's (1913) notions of "catch" and "hold" phases of situational interest, and distinguishes personal interest ("trait" interest or stable personality traits, now most commonly called "individual-interest") from situational interest (feelings of interest, or "state" interest as a response to environmental variables).

The second part of the study consisted of a qualitative inquiry into student perceptions of interest. Open-ended questionnaires were administered to students in first-

year Algebra and Geometry courses. Focus groups of 5–9 students were interviewed for further information. From the gathered data, the situational interest facet was further refined to include two "hold" facets and three "catch" facets specific to the students' math classes. The refined model of situational interest is shown in Mitchell's (1993) figure 2.

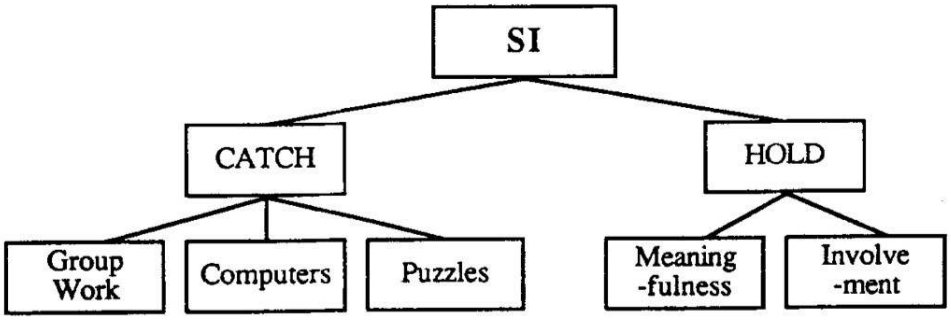

Figure 2. Hypothesized construct of situational interest (SI) in the mathematics classroom.

Figure 2.1. Mitchell's (1993) multifaceted model of interest

In part three, Mitchell developed and piloted a survey with items related to each of the five sub-facets plus general situational interest and personal interest scales, all derived from the part-two qualitative observations. The final survey was administered to 350 high school students of the same populations that answered the questionnaires in part two of the study. Six models were considered in a LISREL analysis to determine which structure fit the data best:

1. Complete independence of factors (null model)
2. A single facet (general interest)
3. Two facets (personal interest and situational interest)
4. Four facets (nested: personal interest, situational interest, catch, and hold)
5. Six facets (the hypothesized model, but with situational interest and involvement combined into one facet)

6. Seven facets (the full hypothesized model)

For each successive model, the chi-squared statistic decreased and the comparative fit index increased, indicating that the hypothesized model, Model 6, best described the data (CFI = .96). These results support the idea of a multifaceted nature of situational interest and suggest that different objects in the environment (e.g. tasks) have different relationships with students' interest.

Mitchell (1993) illuminated a path for research into lesson conditions that inspire student interest. Other researchers followed, seeking more tasks and conditions of tasks that students perceive as interesting, and the list has grown long (see Bergin, 1999). Evidence seems to show that, as Mitchell observed, certain elements of tasks are more likely to evoke student interest.

Involvement. Hands-on tasks such as science laboratory activites are often implicated in the elicitation of situational interest (Palmer, 2009). Three recent studies of students' interest in science lessons observed ways that hands-on tasks inspired interest.

Holsterman, Grube, and Bögeholz (2009) administered retrospective surveys to German biology students. The students rated their interest, frequency of experience, and quality of experience for 28 hands-on classroom tasks. Seven of the hands-on experiences had a positive effect on most students' interest. One hands-on experience had a negative effect on most students' interest. The other hands-on experiences did not affect student interest, demonstrating the difficulty of identifying specific influences of interest and also demonstrating the immense variation in student response.

Also in the science classroom, Palmer (2009) held hands-on science lessons for Australian ninth graders to conduct their own experiments. He found that interest

fluctuated widely between students and between different segments of the lesson tasks. The most interesting segment for the greatest number of students was the experiment phase, in which students tested their hypotheses. Students reported that physical activity made the experiment phase more interesting than the other phases of the task. Dohn (2011) observed a high-school biology class as they prepared for a field trip to an aquarium. The biology students also reported that hands-on lessons were more interesting than others.

The hands-on activities in the above studies strongly resemble the concept of involvement, first suggested by Mitchell (1993) as a condition for the maintenance of situational interest. Involvement also seemed to play a role in the influence of tasks on situational interest in a study of Italian history students. Del Favero, Bascolo, Vidotto, and Vicentini (2007) compared an individual instructional approach to a whole-class-discussion approach to problem solving. The researchers found that both methods affected situational interest, however the discussion condition reported higher perceptions of participation as well as higher situational interest. Their findings bolster the claim that tasks that are perceived by students as involving positively influence situational interest.

Meaning. Hulleman, Godes, Hendricks, and Harackiewicz (2010) asked undergraduate psychology students to write about how their course material related to their lives. Students who participated in the writing intervention showed increases in perceptions of value and interest for classroom tasks. The effect was especially strong for low-performing students. These findings contrast sharply with the results of the experiment on text-based interest, in which Durik and Harackiewicz (2007) found that a utility intervention negatively impacted the interest of students with low individual-

interest. Nevertheless, Hulleman et al. (2010) demonstrated that students are more interested when they perceive that tasks are meaningful.

Palmer (2009) and Dohn (2011), also encountered elements of meaning in their studies of interest in science lessons, described by their students as "learning." Of Palmer's (2009) young scientists, 79% attributed their interest to learning. These findings were notable because interpretations of previous research have attributed learning to interest rather than viewing the relationship between learning and interest as reciprocal.

Learning might represent aspects of meaning, or learning could be an indication of encounters with novelty, suspense, or surprise. Palmer (2009) and Dohn (2011) also both found that novel tasks evoked the most interest. In Palmer's study, although students attributed their interest to choice, physical activity, and social involvement, the main source of students' interest was novelty. Dohn's findings were very similar, and harken back to Berlyne (1960) and his theory of emotional arousal as a result of encounters with novel or complex objects.

The music classroom. Two studies of students' interest in music show particular support for the role of meaning and involvement in promoting interest. Renwick and McPherson (2002) tackle meaning with a longitudinal case study of practice habits of a young clarinetist, and Abeles (2004) shows that an involving educational partnership between a professional orchestra and a school promoted students' interest in music.

Renwick and McPherson (2002) followed a young clarinetist for her first three years of music instruction. They conducted multiple interviews and videotaped and coded four of the student's practice sessions annually. The researchers compared practice behaviors during practice of teacher-chosen repertoire with behaviors during the practice

of self-selected repertoire. When practicing pieces she chose herself, the student engaged in more strategies, and more effective strategies such as silent fingering, varying tempo, and singing. She spent more time on the practice of self-selected repertoire and showed more persistent responses to challenge. Specifically, her practice time per note increased from .79 seconds on teacher-selected repertoire to 9.83 seconds per note on self-selected repertoire. In her third year of clarinet playing, she showed mature practice skills only when she worked on self-selected repertoire; her third-year practice behaviors related to teacher-assigned pieces resembled her first-year behaviors: straight run-throughs of each piece. In interviews, the student often gave conflicting or changing answers over time about her preferences or interests. However, she showed particular interest in repertoire that she called "fun, jazzy songs." (p. 178). It is possible that the piece to which she referred carried particular meaning for the student because of its relationship to the student's individual-interest in jazz music (cf. Hidi, Berndorff, & Ainley, 2002). She pursued the acquisition of the repertoire by requesting that her teacher write out the piece for her.

Abeles (2004) interviewed teachers and students who participated in educational partnerships between orchestras and elementary schools. Many young students expressed increased interest in orchestra music through statements of vocational choices such as "When I grow up, I want to play the viola" (p. 249). Accordingly, Abeles used the Vocational Choice Scale to measure students' interest in music as a career. He compared the vocational interests of students who participated in school/orchestra partnerships to students who did not participate in the programs. Students who participated in the school/orchestra partnerships were significantly more likely to enroll in instrumental

music classes at their schools.

Strong differences in student interest emerged between the four different partnership programs observed in the study. The partnership that sparked the most interest by far in students included in-school violin lessons, providing instruments and weekly instruction along with visits from orchestra members. The other partnerships did not provide instruments or specific instrumental instruction.

Although Abeles (2004) did not consider Mitchell's (1993) study as an explanation for his findings, involvement and meaning are obvious in the violin lessons provided in the first partnership program. The students in this group were nine times more likely to choose music vocations on the Vocational Choice Scale and significantly more likely to enroll in instrumental music than students who did not participate in such programs. Other school/orchestra partnerships observed by Abeles (2004) showed significant results when comparing participating students' interests to non-participating students' interests, however the results did not approach the magnitude of the first program with its violin instruction – clearly an involving feature.

Student characteristics. Some of the differences in the ways that students experience interest toward lessons seem to originate in characteristics of individuals, sometimes called individual differences. Recent research reveals that lesson conditions believed to inspire interest can actually decrease the interest of some students; what is interesting to some is decidedly uninteresting to others. For instance, students with enduring personal interest in a lesson topic experienced colorfully illustrated learning texts as less interesting than plain text - an experience opposite from that of students with low interest in the lesson topic (Durik & Harackiewicz, 2007). Anttila (2010) found that,

for about one-third of his sample of Finnish students, music class had a negative effect on students' formations of musical interests and identity. Some of the disaffected students even insisted they liked music or reported that they often played music at home, but were apathetic or even hostile in their music classes. These disaffected students' responses stood in stark contrast to other students who reported feelings of interest toward music class.

Individual-interest. Individual-interest is the name for an enduring personal interest or a disposition of interest toward a particular object. People with individual-interests exhibit structured knowledge of their object of interest. They generate curiosity questions that are linked to prior understanding of the object in a system of stored knowledge and stored value (Renninger, Ewen, and Lasher, 2002). For a student with an individual-interest in surfing, prior experiences with surfing will equip her with knowledge of paddling techniques and she will begin to ascribe value to indications of water depth or wave direction. This student of surfing will naturally wonder how fluctuations of tide and weather affect the amplitude or speed of the waves. Thus surfing becomes more than just a preference; it becomes a domain of competence. And the individual-interest in surfing is more than an attraction; it is a set of abilities about surfing (Renninger et al., 2002).

Individual-interests are accompanied by feelings of competence, ownership, mastery, and identity. Our student who has an individual-interest in surfing thinks of herself as a surfer, and, through her actions and activities, others see her as a surfer. One important benefit of these competence and identity feelings is that frustration can be tempered by possibility (Renninger et al., 2002). People with individual-interests tend to

connect meaning to tasks within the domains of their interests, which can inspire them to persist in the face of frustration (Schiefele, 1991).

Intense and sustained individual-interests in conceptual domains are evident as early as the toddler years, but decline as school begins (Alexander, Johnson, Leibham, & Kelley, 2008). The decline beginning at school age might reflect the tendency for individual-interests to become more specific, more distinct, and further differentiated over adolescence, gradually becoming more stable into adulthood (Low & Rounds, 2006; Tracey, Robbins, & Hofsess, 2005).

Durik and Harackiewicz (2007) found startling results when they compared the situational interest responses of students with high individual-interest to responses of students with low individual-interest: Students with low individual-interest responded better to triggering conditions than to maintenance conditions; students with high individual-interest responded better to maintenance conditions than to triggering conditions. The interactions between individual-interest, situational interest, and lesson conditions for promoting interest were unexpected because educational theories of interest are based on research with aggregated samples that attempt to describe a population-level phenomenon. In the aggregate, however, triggering and maintenance conditions both seem to promote interest; Durik and Harackiewicz's (2007) study revealed the presence of interactions attributable to measurable student characteristics. In this case, individual-interest explained certain differences in situational interest response.

Durik and Harackiewicz (2007) speculated about their counterintuitive findings within the framework of Self Determination Theory (SDT; Deci & Ryan, 1985). SDT asserts that if the utility intervention designed by the researchers corresponds to

personally held values or identifications, the student's intrinsic motivation might be heightened. However, if the utility intervention is not congruent with a student's values, the intervention could be viewed as an extrinsically controlling manipulation, thereby decreasing student interest. In a later study, Hulleman et al. (2010) used a more autonomous approach to the utility intervention by asking students to write about the ways that course materials were relevant to their own lives. In stark contrast to the results of Durik and Harackiewicz (2007), the writing intervention was related to large increases in interest among low-performing students but had no effect for high performing students, and indicates a need for better understanding of manifestations of meaning or autonomy-support in order to fashion lessons or instructional techniques that elicit student interest.

Individual-interest has certainly been implicated in the emergence of situational interest, however, it does not explain all of the differences in students' situational interest. For instance, Holsterman et al. (2009) controlled for individual-interest in their study of students' interest in hands-on activities and still found wide variance for situational interest by task.

Prior knowledge and other individual characteristics. To further investigate the interactions observed by Durik and Harackiewicz (2007), Durik and Matarazzo (2009) included prior knowledge along with individual-interest as predictor variables in their study of interest in a biology lesson. They found that students with little prior knowledge of biology experienced less interest as their perceptions of task complexity increased. The opposite was true for students with high prior knowledge. Results were similar in the analysis of students' willingness to return for another lesson. Students with high biology knowledge indicated more willingness to return as their perceptions of task complexity

increased. The same was true for students with high individual-interest in biology. Students with low biology knowledge and interest were less willing to return as task complexity increased.

Similar to effects for prior knowledge, Chen and Darst (2002) found associations between gender, acquired skill, and individual-interest that seemed related to student's situational interests in basketball lessons, and Hulleman, Durik, Schweigert, and Harackiewicz (2008) found that task values mediated relationships between initial interest and subsequent interest. However, Reber, Hetland, Chen, Norman, and Kobbeltvedt (2009) found no effect for gender or prior knowledge, and Palmer (2009) found no effect for gender or achievement.

Intra-individual variation. If educators seek to foster students' interest in classroom lessons, one of the challenges they face is to create interesting lessons - a task easier said than done. Both Palmer (2009) and Tin (2009) saw students' interest vary widely over the course of a single lesson. Although the list of interest-invoking environmental characteristics such as task conditions and instructional approaches is long (see also Bergin, 1999), no truly universal triggers of interest have been discovered. A defining feature of early research into interestingness and conditions that inspire interest is an inconsistent arousal response (Berlyne, 1960). Some people react to novelty or complexity with interest and exploration, others with aversion and anxiety. According to Silvia and Kashdan (2009) "in the extent to which people find pictures, poems, text, random images, classical paintings, and social encounters to be interesting…variability is clearly the norm" (p. 787).

The fact is that much of the variation in student interest seems to appear at the

intra-individual level that is, students' individual experiences of interest vary day-to-day, class-to-class, and task-to-task. Tsai et al. (2008) found up to 45% of the variance in student interest experiences in the classroom at the intra-individual level. Interest therefore varies not only between students but also within students.

Tsai et al. (2008) repeatedly measured students' interest experience (situational interest) and perceptions of lesson conditions over three weeks in math, German (first language), and second foreign language (third language) classes. They also gathered data on individual-interest, elementary-school subject grades, and gender. The researchers administered surveys immediately following each class. Interest measures consisted of Likert items: two measuring feelings of interest and three measuring the value or meaning of the lesson topic. Unfortunately, factor-analytic results showed that the instrument did not distinguish between value and feeling, therefore responses to all five items were aggregated into composite interest scores for analysis. A request for the original raw data file for the purpose of reanalysis as background for the present study was denied.

Likert items also measured perceptions of situational factors. Student perceptions, rather than observations, were used for this study because the researchers recognized the potential for students to experience the same environment differently. Individual factors (student characteristics) were assessed in a pre-test.

Data were analyzed simultaneously at the between-student and within-student level using hierarchical linear modeling (HLM). Initial results showed substantial variation in interest at the within-student level (36% of variation in math, 45% in German, and 36% in second foreign language classes). Within-student variation was also

substantial in student perceptions of lesson conditions (36%-38% for perceived autonomy-supportive climate, 52%-58% for controlling behaviors, and 44%-50% for cognitive autonomy support).

In the first analysis, a fixed-effects model tested the effects of students' perceptions of autonomy-supportive climate, controlling behaviors, and cognitive autonomy support on interest. As expected, students who perceived more autonomy support, and less controlling behavior reported more interest. The effects of students' perceptions of autonomy support and control accounted for 19% of the within-student variation in interest. At the between-student level, individual-interest significantly predicted interest, and no effect emerged for gender or grades. The model accounted for 27% of between-student variance in interest in math and second foreign language, and 19% of the variance in interest in German class.

The second model controlled for the student-mean of perceptions of autonomy support and control by including the mean perceptions as between-student predictors. In this model, the explained variance at the between-student level increased, but the effect of individual-interest decreased slightly.

Fixed-effects models assume homogeneity of effects for perceptions of autonomy support and control on interest, but given the large amounts of intra-individual variation in both interest and perceptions of lesson conditions, it seemed unlikely that the effects would be the same for all students. A third, random-effects model revealed significant effects for all perceptions on students' interest in all classes. Further exploration showed that in two cases, students with high individual-interest seemed less affected by their perceptions of teacher autonomy support and control.

Appraisal Theory

Motivation research and early emotion theories of interest, such as arousal theory, have measured the environment, attributing the emotion of interest to objective characteristics of the object of interest: interesting objects such as task conditions and teaching approaches that include objectively salient themes make people interested. In contrast, current theories of emotion measure the perceptions of the person, attributing the emotion of interest solely to the person's subjective evaluations of the environment. Emotion theories, in a "beauty is in the eye of the beholder" orientation, see an object's interestingness as a function of the impressions and feelings of the person interacting with the object.

Interest can be studied within the framework of emotion theories because it meets the criteria necessary for bearing the distinction "emotion." In fact, interest-excitement is one of Izard's (1977) basic emotions in his seminal book, *Human Emotions*. In order to be considered an emotion, the phenomenon of interest must be closely associated with physiological, cognitive, and affective changes, and must demonstrate an adaptive or evolutionary purpose (Lazarus, 1991). Across several decades of empirical study, interest has met all of these conditions (Silvia, 2008a). It makes sense, then, to conceptualize interest within the same theoretical framework as other emotions, rather than as a construct unique to motivation or cognition and divorced from emotion or affect.

Appraisal theory developed in response to intra-individual variation, which posed insurmountable explanatory challenges and stymied prior emotion theories, e.g., many individuals' different emotional responses to the same stimulus, one individual's differences in response over time to the same stimulus, or similar responses to unrelated

or even dramatically different stimuli. Objective measures of interestingness could not be found for any object; nothing is universally interesting. By attributing emotional response to subjective appraisals by the person rather than objective qualities of the object, appraisal theory accounts for individual and intra-individual differences in emotional experiences, because, depending on dispositional traits or prior experiences, different people can differently interpret objects such as events or ideas (Roseman & Smith, 2001).

The appraisal structure of interest. Silvia (2005b) reported a series of four experiments validating the theorized appraisal structure of the emotion of interest. In experiment one, participants viewed polygons of varying complexity, selected the "most interesting polygon" and reported their ratings of their ability to understand abstract art. Silvia's (2005b) hypothesis was that when people rated their ability to understand (coping potential) as high, they should pick more complex polygons as the most interesting. His suspicions were confirmed. Higher ratings of coping potential, operationalized as comprehensibility, significantly predicted the choice of more complex polygons ($\beta = .446$, $p < .031$).

In experiment two, Silvia (2005b) used complex, novel, and abstract poems. One group received information that helped them comprehend the poems, thus boosting their ability to understand or cope with the complex objects above the abilities of the people in the control group. People in the experimental group who were better able to understand the complex poems also found the complex poems more interesting. A mediation analysis showed that receiving information about the poems predicted feelings of interest and comprehensibility (i.e. perceived ability to understand the poem), however, when interest and comprehensibility data were subjected to simultaneous analysis, the effect of

receiving information disappeared ($\beta = .119$, $p > .47$), yet the effect for comprehensibility remained significant ($\beta = .567$, $p < .001$). These results show that giving information about the poems to the students increased their interest by increasing their perceptions of their ability to understand the poems.

Experiment three explored the effects of complexity and comprehensibility on interest by manipulating complexity. In this experiment, half of the examples of visual art were simple, and half of the examples were complex. When complexity was high, ratings of comprehensibility predicted interest. When complexity was low, comprehensibility was unrelated to interest ($r = -.09$). In alignment with the first two studies, people high in appraised comprehensibility found the complex art more interesting ($r = .41$, $p < .001$; Silvia, 2005b).

Experiment four added convergent validity to the first three experiments by replacing self-reports of interest with a measure of a behavioral manifestation of interest: viewing time. This study replicated portions of experiments one and three, allowing participants to view complex and simple polygons for as long as they liked. Just as in the prior experiments, results showed that participants who rated higher in comprehensibility (coping potential) spent more time viewing the more complex polygons (Silvia, 2005b).

Semantic-differential-type scales. For most of Silvia's studies (i.e. Silvia, 2005a; 2005b; 2006a; 2008b), the instruments for the measurement of interest and its appraisals use semantic-differential-type (SD) items. These types of items were adapted from Osgood's (Osgood, Tannenbaum, & Suci, 1957) scales for the measurement of meaning and have a long history of use in affective research, particularly in interest (i.e. Berlyne, 1960; Berlyne & Peckham, 1966). Originally, SD items consisted of a set of standardized,

contrasting adjective pairs (e.g. good-bad) along a seven-point continuum with the adjectives at the poles. Identical sets of adjective pairs were presented to subjects for each of many words or statements. Silvia (e.g. Silvia 2005b) and those before him who measured interest using these scales (e.g. Berlyne, 1960) applied the same item structure – a set of adjective pairs presented for each object of interest – however, the intention was not to measure aspects of meaning, but to measure attitudes of interest.

Osgood's (Osgood et al., 1957) scales tended to factor into a three-dimensional representation of semantic space – evaluation, potency, and activity. Of the three dimensions, evaluative scales are the most reliable (Heise, 1969). Items that load on the evaluation factor are the types of items applied to attitude scales such as those used in the present study (e.g. interesting-uninteresting).

The advantage of SD scales in the measurement of attitudes toward affective stimuli is that each scale remains the same regardless of changing stimuli – in this case, objects of interest. With identical scales across multiple stimuli, affective responses can be reliably compared (Heise, 1969). However, caution is required when interpreting results across stimuli; some adjective pairs are more relevant to certain stimuli. For example, a warm-cool item would be interpreted differently for the prompt "Mojave desert" than for the prompt "Mother." This type of challenge to validity is referred to in SD literature as a "concept-scale interaction" (Messick, 1957). Kahneman (1963) addressed the issue of concept-scale interaction specific to the measurement of attitudes and found that error variance attributable to concept-scale interaction was very small. Friborg et al. (2006) compared Likert scales to semantic differential scales for the purpose of measuring positive psychological constructs and reported, "a semantic

differential format may effectively reduce acquiescence bias without lowering psychometric quality (p. 875)."

Appraisals in education. As of this report, a search of PsychInfo and ERIC databases confirmed only one published study applying appraisal theory to an educational context. Connelly (2011) applied Silvia's appraisal structure of interest in an experimental design using educational text. Just like Silvia's studies in art, poetry, and polygons, results showed that both coping potential (Silvia's term for comprehensibility) and complexity predicted interest. As a part of his study, Connelly (2011) suggested an additional appraisal dimension for the emotion of interest: goal-relevance. His assertion, however, suffers from a problem of definition: are goals components or correlates of interest? The consensus in motivation literature is that goals and interest are discreet constructs with a reciprocal relationship (Ainley, 2006; Ainley & Patrick, 2006; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008; Linnenbrink, 2006; Pekrun, Elliot, & Maier, 2009). In emotion literature, however, goal-relevance is hypothesized to determine the intensity of the resulting emotional reaction and is not considered a part of the appraisal structure of a discrete emotion (Smith & Kirby, 2009). In addition to theoretical confusion, Connelly's study did not consider intra-individual relationships or mediation effects, both of which play an integral role in construct validation of appraisal structures of emotion, making Connelly's argument in support of a third appraisal dimension for interest preliminary only. Therefore, adding goal-relevance as an appraisal dimension potentially confounds interest and goals rather than refining the structure of interest, though goal-relevance might bear upon the intensity of students' experiences of interest.

Individual differences in appraisal research. Silvia (2005a; 2005b; 2008b) attempted to explain some of the variance in the effects of appraisals on interest by including a measure of trait curiosity. The trait curiosity scores did not explain within-person effects of appraisals on interest. The domain of social psychology supports a distinction between "state interest," a short-term, environment-supported experience of interest, and "trait interest," an enduring disposition to prefer certain topics, tasks, or themes (Silvia, 2006b). These terms are nearly synonymous with situational interest and individual-interest, respectively (Henn, 2010).

Individual-interest. Recent research applying appraisal theory to the study of the distinction between state and trait interest suggests that state and trait interest differ by the amount or intensity of appraisals generated toward an object rather than the types of appraisals (Silvia, 2007). So the appraisals that give rise to feelings of interest are the same whether people have high or low individual-interest. People with high individual-interest in a subject will report high appraisals on both dimensions of interest – complexity and comprehensibility - relative to people with low individual-interest in the subject. A student with a passion for swimming might see a kickboard and, calling to mind the many ways the short piece of foam can be used for practicing strokes, rate the object as complex. Though he sees the object as complex, having spent many hours in the pool with a kickboard, the swimmer also believes he understands the complexity of the kickboard. His appraisals of complexity and comprehensibility are therefore much higher than the appraisals of students with low individual-interests in swimming, even if those students also find the object interesting.

People with high individual-interest seem to experience more interest than people

with low individual-interest, however, the experience of interest seems to consist of the same appraisals regardless of individual-interest. Moreover, individual-interest does not seem to predict intra-individual variation in interest or in perceptions of the environment (Tsai et al., 2008) and therefore cannot be characterized simply as an average of situational interest experiences or as a "mood" of interest. The two types of interest are distinct but not discrete.

In his studies of the appraisals of interest, Silvia (2006a; Silvia & Sanders, 2010) has found that curious people, people with high fluid intelligence, and experts all report stronger appraisals of interest than novices or people low in curiosity or fluid intelligence. Despite the differences in amount of interest along a semantic differential scale, all relationships between complexity, comprehensibility, and interest ratings were the same for nearly every subject in Silvia's (2005a, 2005b) samples. These results suggest that the same appraisal dimensions describe interest regardless of fluid intelligence, curiosity, or expertise in the topic area. Further, this lack of distinction implies that the two types of interest are indeed facets of the same emotional experience and individual-interest (represented in these studies by expertise) is simply a durational distinction.

Appraisal bias. Research into individual differences in the emotion of interest has identified types of appraisal bias, a basic difference in the way people experience interest (e.g., Silvia, Henson, & Templin, 2009). Just like the differences in response to lesson conditions found by Durik and her colleagues (Durik & Harackiewicz, 2007; Durik & Matarazzo, 2009; Matarazzo, Durik, & Delaney, 2010), these types of appraisal biases indicate the presence of individual and intra-individual differences in interest.

Silvia et al. (2009) found two distinct classes of interest appraisal profiles. Most –

about 58% – of their subjects showed complexity as the dominant appraisal dimension; appraisals of complexity had a stronger effect on their interest. But some of their subjects' interest was determined more strongly by their appraisals of comprehensibility. Because Silvia et al. (2009) knew what they were looking for, they measured personality traits like sensation-seeking, openness to experience, and curiosity in addition to interest and its constituent appraisals. Members of the first class with the strong complexity appraisal profiles also exhibited more novelty-seeking traits, providing some construct validity to the distinction between the classes.

The results of recent studies in educational and social psychology provide compelling evidence for meaningful distinctions between different profiles of interest response according to levels of individual-interest. Appraisal theories of emotion are well equipped to explore the individual differences uncovered by recent findings because they have been developed specifically to explain individual and intra-individual variation.

The Present Research

Tsai et al. (2008) demonstrated the potential for repeated measures to illuminate intra-individual variation. Mitchell (1993) distinguished meaning and involvement as influential conditions for the elicitation of student interest, and Silvia (2006a, 2006b) showed how different object characteristics affect interest via complexity and comprehensibility, theorized appraisal components of the feeling of interest. Drawing inspiration from classroom research into interest as a motivational variable and from laboratory research into the components of interest as an emotion, the present study aims to inform understanding of how the different facets of interest – person, environment, and appraisal components – interact to inspire students' interest in the classroom.

Chapter Three: Methods

This study aimed to inform understanding of intra-individual differences (how students' interest changes across experiences) and individual differences (how students differ from one another in response to the same experiences) in students' interest by exploring relationships between student characteristics, students' reports of their interest in tasks and music selections, and the relationships between interest and four correlates of interest: complexity, comprehensibility, meaning, and involvement.

The study employed a correlational design for repeated-measures data gathered in instrumental music classrooms of two Northern-California high schools. For each of twelve tasks or music selections from their music class, students rated their perceptions of the tasks or music selections on scales for interest, complexity, comprehensibility, meaning, and involvement. Students also provided their age, gender, years of experience in music class, and responded to a survey of individual-interest (personal interest in music that endures over time). The following questions guided the study:

1. What is the magnitude of intra-individual variation in students' interest in tasks and music selections of the music classroom?
2. Do students' ratings of complexity and comprehensibility predict students' ratings of interest in tasks and music selections of their secondary instrumental music classes?
3. Do students' perceptions of task characteristics such as involvement and meaning predict their ratings of interest, complexity, and comprehensibility in tasks and music selections of their secondary instrumental music classes?

4. Do student characteristics of individual-interest, gender, age, or years of experience in instrumental music predict students' ratings of interest, complexity, comprehensibility, meaning, and involvement or the relationships between these ratings in tasks and music selections of their secondary instrumental music classes?

Instrumentation

The paper-and-pencil survey consisted of two parts: student characteristics (individual differences) and repeated measures of student perceptions of tasks and music selections. Data collected via the individual differences survey included gender, age, years of experience, and individual-interest (enduring interest in music, not specific to a task or music selection). For the repeated-measures survey, students rated each task or music selection on eight semantic-differential items representative of the variables interest, complexity, comprehensibility, meaning, and involvement. Students responded to an average of twelve sets of ratings, one set of eight items for each task or music selection. Table 3.1 lists the variables measured in both the individual-differences and repeated-measures parts of the survey. Appendix A includes an excerpt (the full individual-differences survey, but only 7 sets of semantic-differential items) from the actual paper-and-pencil survey given to students in one particular class.

Table 3.1

Survey Instruments and Variables

Individual Differences Survey	Perceptions of Tasks and Music Selections Survey (Repeated Measures)
Gender	Interest
Age	Complexity
Ensemble experience	Comprehensibility
Individual-interest	Meaning
	Involvement

Repeated measures. The repeated-measures survey consisted of a set of eight semantic-differential items on seven-point scales. The eight items were repeated for each of the tasks and repertoire chosen as prompts from the lists generated in a previous questionnaire phase of the study. For the sake of brevity, no more than twelve total tasks and repertoire selections were included as prompts on the survey, requiring no more than 96 semantic-differential responses on the instrument for each student. In an attempt to mitigate potential confounds or patterns of response related to the order of prompts, the order of tasks was varied unsystematically (i.e. arbitrarily shuffled) across surveys so that repeated-measures prompts were not presented in the same order to every student. The order of the semantic-differential items were the same for each task or music selection.

The semantic-differential scales on the survey were "meaningless – meaningful", "interesting – uninteresting", "passive – involving", "boring – exciting", "comprehensible – incomprehensible", "easy to understand – hard to understand", "worthless – valuable" and "complex – simple." For the purpose of analysis, item scores were coded with numbers one to seven. Semantic-differential scale items used to measure interest, complexity, comprehensibility, and meaning have appeared in research by Silvia (2005a, 2008), using samples of art and poetry as prompts. The item measuring involvement was

created for this study from words and concepts suggested by students in research by Mitchell (1993).

An additional item appeared in the item sets for repertoire-selection prompts: "How often have you practiced or played this piece on your own outside of class? Daily, weekly, only when required, or never?" This item aimed to measure student self-selection of repertoire, an important aspect of students' musical interest (Renwick & McPherson, 2002). The practice frequency prompt was dropped in the analysis phase due to missing data (most likely an error in the visual design of the survey) and a tendency for students who consistently responded to the prompt to indicate that they practiced all of the tasks and repertoire the same – mostly "never".

Individual differences. The survey of individual differences had two parts. The first part asked students to report demographic-type individual-differences data in a fill-in-the-blank format. Items in the first part addressed age, ensemble experience (three items), instruments played (two items), expected grade in the ensemble, private lesson experience (two items), and intention to continue participating in instrumental ensembles (one item). The second part of the Individual Differences Survey was adapted from the academic self-concept and interest studies of Marsh et al. (2005). In the second part, nine Likert-type items measured individual-interest (a personal interest that endures over time) in a seven-point scale along two dimensions: music class-specific individual-interest (four items), and music domain-specific individual-interest (five items). For the purpose of analysis, item scores ranged from one to seven, negative items were flipped during the data-entry process, and, according to item-total correlations and principal component

analyses, responses were averaged within and across scales to form scores representing class-specific interest, domain-specific interest, and overall individual-interest.

In prior uses of the Individual-interest Scales, Marsh et al. (2005) found the scales were sufficiently reliable (Cronbach's αs > .8). Factor-analytic procedures showed discriminant validity between the domain- and class-interest scales, however, factor solutions were not reported for the domain-specific interest scale (Marsh, et al., 2005). Tsai et al. (2008, p. 465) employed a seven-item Individual-interest Scale based on those used by Marsh et al. (2005). Their adapted scale also showed acceptable reliability (Cronbach's αs > .86). For the present study, validity was addressed before administering the instrument to students, first by evaluation from expert educators and researchers – colleagues of the researcher – who reviewed the instrument to assess construct validity and clarity (face validity), and second by interviewing students during the pilot phase to address cognitive validity of the items in these scales (Karabenick et al., 2007).

In the present study, of the individual differences variables, only age, years of experience, gender, and overall individual-interest were reported and included in analyses.

Survey Development

Because interest, complexity, comprehensibility, meaning, and involvement all apply to an object of interest (in this case, a task or music selection), the survey items used in this study applied to the specific context of the class in which each student participant responded to the survey. That is, each survey item in the repeated-measures section of the survey had an object of interest that came directly from the context of the specific class the student attended. The process of developing the context-specific survey

instrument included a questionnaire phase and a cognitive pretesting phase to address the ecological and cognitive validity of the instrument.

Questionnaire. In the first phase, open-ended paper-and-pencil questionnaires were collected from 365 student participants during their regular instrumental music class sessions (five students would later participate in cognitive pretesting in lieu of taking the final survey). Questionnaire prompts explored the tasks and music selections of the sample classrooms and the characteristics of those tasks in terms of student perceptions of interest: which tasks were interesting or uninteresting, and why. Tasks described by student questionnaire responses as interesting or uninteresting ultimately became prompts for the repeated-measures section of the final survey.

The researcher addressed the student participants verbally, with prompts such as "You have two minutes. List all of the music selections you remember from your instrumental music class this year." and "You have five minutes. For each task or music selection you just listed, describe in only a few words what about that task or selection makes you feel interested or uninterested." Students responded in writing – one sheet of lined paper per participant. The researcher provided paper and pencils. The timed responses lasted approximately ten minutes, with additional time for distribution and collection of response sheets.

Results of the questionnaire. Participants' responses ranged from six tasks and music selections reported to more than 50 tasks and music selections reported. Most of the variation in number of responses was attributable to the students' chosen unit of analysis, for instance, one student might list "scales" and another student in the same

class might list "major scales, minor scales, rhythmic scales, thirds patterns…" which together could be interpreted as scales.

A frequency analysis of questionnaire responses generated a list of tasks and music selections for use as prompts in the repeated-measures section of the survey. Questionnaire responses of recollected tasks and music selections were quite similar within each class, indicating that for the most part, all students experienced and remembered the same tasks and music selections. Many tasks and selections appeared on the responses of 100% of students within a class. One task (tuning) appeared on the responses of 100% of the entire sample. Several tasks (scales, performing, rehearsing, chorales) appeared on a large proportion of responses in four or more of the seven sample classes. The students' reports of their interest in each task or music selection, however, varied greatly. The variation between students' reported interest in the same tasks and music selections confirmed the need for a within-person design to investigate the phenomenon of interest.

The resulting list of tasks included warm-up activities, drills of fundamental instrumental skills, listening tasks, playing tests, and rehearsal activities. Music selections were specifically addressed in the study because rehearsal of music selections is often the primary task of traditional instrumental music classes, and many instrumental music teachers believe that student interest is inspired or inhibited by music selections (Apfelstadt, 2000; Droe, 2006; Reynolds, 2000). A popular saying among band directors, and the title of Reynolds' (2000) widely read article in Music Educators' Journal is "Repertoire *is* the Curriculum." Table 3.2 lists the tasks and music selections (repertoire) that were used as prompts for each class in the repeated-measures survey.

Table 3.2.

Selected Survey Prompts by Class

	Class A	Class B	Class C	Class D	Class E	Class F	Class G
Tasks	Tuning	Tuning	Tuning	Tuning	Tuning	Tuning	Tuning
	Warm up	Warm up	Warm up	Rhythm	Longtones	Longtones	Rhythm
	Performing	Performing	Scales	Scales	Scales	Scales	Scales
	Rehearsing	Rehearsing	Rehearsing	Performing	Rehearsing	Rehearsing	Rehearsing
	Recording	Breathing	Recording	Sightreading	Sightreading	Sightreading	Sightreading
	Tests	Tests	Chorales	Chorales	Chorales	Chorales	Chorales
Repertoire	Tricinium	Buccimis	Hymnsong	Prelude #2	Lux Arumque	Water's Edge	Vivaldi Gloria
	Our Heritage	The Mikado	Our Heritage	Summer	Pirates	North Wall	Dreaming
	Cappriccio	Goddess	Black Granite	Black Hawk	Africa	Brookpark	Celebration
	Flight	Fuego	Persis	Egypt	Barnum	Tribal Dances	Unfinished
	Pop Culture	Pop Culture	Bayou	Symphony #5	Danse Hel.	Christmas	7th Symphony
	Incredibles	Incredibles	Incredibles	Soul Man	Soul Man	Soul Man	Kashmir

Selection of survey prompts. Prompts for the repeated-measures survey of students' perceptions of interest, complexity, comprehensibility, meaning, and involvement are shown in Table 3.2. Tasks and music selections were selected as prompts based on frequency of students' reports of each task or music selection and how well the students' descriptions of the tasks and music selections aligned with correlates of interest as described by guiding theory (i.e. meaning and involvement [Mitchell, 1993] and complexity and comprehensibility [Silvia, 2005b]). Recent evidence (i.e. Durik & Harackiewicz, 2007) supports prior theory (i.e. Hidi & Renninger, 2006), which states that interest-triggering conditions such as novelty and salience, and interest-maintaining conditions such as meaning and involvement elicit students' interest differently. Therefore, it behooves the present study to select prompts that exemplified extremes of more and less interesting, comprehensible, complex, meaningful, or involving. If differences in task conditions accounted for part of the intra-individual variation in student responses (changes in students' interest across experiences), then selecting prompts based on students' descriptions that suggested the presence or absence of these properties allowed more variance to emerge in responses. Silvia et al. (2009), in their study of the latent classes of interest's appraisal structure, took this tack by selecting relatively complex and relatively simple pictures selected from a pretest of 30 pictures. Their argument was that selecting a range of pictures would expand the within-person variance in interest and its appraisal components.

Cognitive pretesting. A focus group of four students was assembled on a volunteer basis from one of the sample schools in order to pilot the survey instruments and gather information about the instruments' cognitive validity (Karabenick et al., 2007).

Students who participated in the cognitive-pretesting interviews were not included in the final survey response. Cognitive pretesting is an interview process developed and recommended by Karabenick et al. (2007) for the analysis of survey-item validity. The central question in cognitive pretesting is, "Do the survey items mean the same thing to the student that the items mean to the researcher?" Younger students (in this case, ninth and tenth graders) were solicited because younger students have the least vocabulary and familiarity with the tasks of their music classrooms and are therefore more likely to reveal murky wordings or confusing organization lurking within the survey.

Following the recommendations of Karabenick et al. (2007), a series of interview questions probed students' cognitive processes as they encountered each item. For each of the nine repeated-measures semantic-differential items, for each of the twelve tasks and music selections specific to these students' class, and for all items on the individual differences survey, the following questions guided the students' collective discussion:

Question 1: Please read this question out loud

Question 2: What is this question trying to find out from you?

Question 3: Which answer would you choose as the right answer for you?

Question 4: Can you explain why you chose that answer?

Follow-up questions: Can you tell me a little more about what that question means to you? Can you give me an example? Can you tell me a little more about why you chose that answer? Can you describe a time when that happened?

Interviewing students to discover how they think about items constituted a crucial step in validating this survey because of the fine distinctions between related constructs: meaning, and involvement, on one hand, complexity and comprehensibility on the other.

If students interpreted items idiosyncratically, results would indicate idiosyncratic interpretations rather than idiosyncrasies in interest. After all, each student response is merely a proxy for the phenomenon of interest and its correlates.

The interviews were recorded electronically and transcribed for reference during survey revision (Appendix E). Based on student interview responses, the following items were adjusted to improve clarity or fidelity with the research purpose:

1. The practice frequency item in the survey was changed to reflect students' suggestions for responses, e.g., "only when necessary" was changed to "once in a while", and the practice item was added to every task in the survey.
2. The prompt for the intention-to-return item was changed from "band and orchestra" to "organized music ensemble" at the suggestion of students who felt that jazz band, chamber ensembles, and pit orchestra were excluded by the "band and orchestra" wording.

Additionally, the cognitive-pretesting interview served as a form of "member checking," a technique recommended by Winne, Jamieson-Noel, and Muis (2002) for validating the categorization of emergent themes from qualitative data. Although the survey-development procedure was not constructed with qualitative analyses in mind, the survey prompts were participant-generated and therefore, students who participated in the cognitive-pretesting interview possessed a unique expertise, just like members of a qualitative-research participant sample, for evaluating whether the survey prompts were representative of boring and interesting classroom tasks and repertoire.

Collection Procedures

Recruiting of participating teachers and students, participant and school site

permissions, survey development, cognitive pretesting, and survey administration took place during the spring of 2012.

Recruiting. The researcher approached teachers of instrumental music in person at a music-education event. The researcher described the study, and requested permission to send an informational email to potential teacher-participants. Permission from the participating schools was obtained following the teachers' verbal or emailed agreement to participate. Students of the teachers who decided to participate in the study were verbally solicited by the researcher during their instrumental music class, and were given the Study Information Sheets (Appendix B) to communicate participants' rights and an overview of study procedures.

Protection of human subjects. Loss of confidentiality might result in social bias (positive or negative) toward an individual student whose responses were revealed. Therefore, confidentiality has been protected to the greatest extent possible. Participants were not asked to write their names on their written responses. Transcripts of interviews omit participant names. Even without names attached to responses, some risk of loss of confidentiality has remained because some of the collected information such as student variables or recordings of interviews could be used to identify individual students or teachers. To address this risk, physical data (written responses) were kept in a locked file cabinet in the researcher's office, and electronic data (recordings, transcripts, spreadsheets) were password protected in the researcher's electronic file storage.

Beyond potential loss of confidentiality, the risks of participation in this study were extremely low. It is possible that participation might have influenced student or teacher attitudes by encouraging contemplation of the interestingness of tasks. The

interview frameworks and surveys were designed with objectivity in mind. Strong or biased language was hopefully avoided in order to protect participants from influence. Loss of instructional time was an unfortunate cost of the study, and the researcher carefully organized distribution, collection, and instruction procedures with efficiency in mind in order to minimize loss of instructional time. It is unlikely, though possible, that the survey items might have elicited uncomfortable feelings for some participants. All participants were verbally reminded that they could choose to withdraw their participation at any time.

The researcher followed opt-in consent procedures as dictated by the University of San Francisco Institutional Review Board for the Protection of Human Subjects (USFIRBPHS). Information sheets carefully describing the study and potential risks as well as the rights of participants were distributed to all participants and their parents. All participants and their parents were thus informed of the voluntary nature of participation, informed of the freedom to withdraw at any time, and given an overview of procedures. There were no known financial benefits or costs associated with participation in this study. Participants were not reimbursed or rewarded for their participation. This study applied for and received approval (by email, March 21, 2012) from the USFIRBPHS.

The data-collection points requiring student response (questionnaire, cognitive pretesting, and survey) were arranged at the convenience of the participating teachers and students following IRB and school-site approval.

Questionnaire. The administration of the quick-write questionnaire during the regularly scheduled class meeting times was scheduled at the convenience of the teachers and lasted approximately 10 minutes plus a few minutes for distribution of paper and

recitation of instructions. Responses were collected and coded by the researcher for survey development.

Cognitive pretesting. During the collection of questionnaire responses, the researcher verbally solicited participants for cognitive pretesting interviews in a small group. The interview group met approximately two weeks after questionnaire administration for about thirty minutes during a scheduled tutorial session during the regular school day. Volunteers (n=4) first responded to the Individual Differences and Interest Experience Surveys. Following their responses, which were timed in order to get a sense of how long the final administration would take, they were interviewed about their thinking regarding each item. The survey was revised to clarify points of confusion discovered during the cognitive pretesting interviews.

Survey and data entry. Following a period of survey revision, the researcher scheduled with participating teachers a final visit to the classrooms to administer the student perceptions and individual differences surveys. The surveys were administered during regular class meetings and took less than 20 minutes for the students to complete.

The researcher and two colleagues entered the survey responses into Microsoft Excel to be examined prior to importing into R. Analyses were conducted by computer, using Microsoft Excel and R, the open-source statistics software.

Consolidation of music selections. In the questionnaire phase of survey development, students described each task and music selection as boring or interesting. Most of the tasks were common to multiple classes, however, the music selections were unique to each class, resulting in a list of nearly 50 different music selection. The researcher applied a code to music selections in order to consolidate these into categories:

"boring repertoire 1" to "boring repertoire 5" and "interesting repertoire 1" to "interesting repertoire 5." The application of this code was intended to facilitate the visualization of analytical results, and the code categories were retained for the analyses in this study. Some auxiliary analyses were conducted without the consolidated categories, using each unique music selection within the grouping variable, and the results were comparable (nearly identical) to the results using the consolidated categories.

Data

Sample. 360 high-school students constituted the sample of participants in the study. The two high schools selected for this study were located in suburban Northern California. The sample was one of convenience, facilitated by the professional relationship between the researcher, teachers, and administrators at the two school sites. However, the sample closely resembles the demographic profile of US instrumental-music students described by Elpus and Abril (2011). In their investigation of students enrolled in secondary-school instrumental music classes, Elpus and Abril (2011) found an over-representation of white students, students higher in socioeconomic status, native English speakers, students with higher standardized test scores, students with higher grade-point averages, and students of highly educated parents. Though racial and socio-economic information was not collected from the participants, the band directors whose students participated in the study verified the similarities between their students and the population described by Elpus and Abril (2011), and the demographic profile of instrumental-music students did not reflect the overall population of the school. The similarity between music students at the sample schools and the national profile of instrumental music students implies that the results of the present study might be

generalized to the national level of instrumental music students. The results, however, should not be assumed to apply to a general or non-subject-specific secondary-school student population.

Dimension reduction. An exploratory principal components analysis (PCA) with Varimax rotation enabled the researcher to examine the component structure underlying student responses to the eight repeated-measures items for the purpose of dimension reduction. If two or more variables load very heavily on a component, combining data for those two variables to make a composite variable should be considered. In light of prior research using similar items, the expected components for these data were interest, involvement, meaning, comprehensibility, and complexity. Table 3.3 presents the results of the component analysis for eight repeated-measures items.

Table 3.3

Loadings for Four-Component Solution (excluding loadings .3 and below)

	1	2	3	4
Interesting	.88			
Boring	.90			
Involving	.59	.53		
Meaningful		.84		
Valuable		.86		
Easy to Understand			.95	
Comprehensible			.77	
Complex				.90
Eigenvalues	2.30	2.04	1.60	1.02
Explained Variance	.26	.23	.18	.11

The PCA solution demonstrated that these data clearly load onto four discrete components. The first component, with strong loadings for interesting and boring and moderate loading for involving, accounted for 26% of total variance explained by the

component solution. The second component showed strong loadings for meaningful and valuable, with a moderate loading for involving, accounted for 23% of total variance explained. The third component, with strong loadings for easy to understand and comprehensible, accounted for 18% of the total variance explained. The fourth component showed a strong loading only for complex and accounted for 11% of the total variance explained. Thus the component solution exhibited many of the expected relationships between the items. The item involving was the only exception to the expected component solution, as involving loaded moderately onto two components and was the only item with ambiguous properties in the component analysis.

Principal component solutions informed the creation of composite scores representing the variables "interest" (two items: interesting, boring), "comprehensibility" (two items: comprehensible, easy to understand), and "meaning" (two items: meaningful, valuable). Scores from the two items were averaged to create the composite variables. Complexity and Involvement were each represented by a single item. Despite moderate loadings on the interest and meaning factors and because of its theoretical importance, involvement was not included in the interest or meaning composite variables and was instead retained as a separate variable.

Descriptives. The researcher collected surveys from 360 students in secondary instrumental-music classrooms at two suburban high schools. Students completed a demographic questionnaire and individual-interest inventory to measure student-characteristics variables.

Mean, standard deviations, and ranges of student-characteristics variables are shown in Table 3.4. As expected, individual-interest (personal interest in music that

endures over time) was high for the overall sample (5.39 on a 7-point scale). Students reported an average of 6.26 years of experience participating in music ensembles. There were no missing values in the student-characteristics data.

Table 3.4

Mean, Standard Deviation, and Range for All Student-Characteristics Variables (N=360 students, male=197)

Variables	Mean	Standard Deviation	Range
Individual-interest	5.39	0.96	2-7
Age	15.95	1.34	13-18
Experience	6.26	2.04	1-9

Note: Scale of Individual-interest is 1-7

Table 3.5 shows means, standard deviations, and ranges for the semantic-differential repeated-measures items, which were consolidated into five variables: interest, complexity, comprehensibility, meaning, involvement, and individual-interest. Students responded to eight semantic differential items per task, for an average of 11.83 tasks per student. As expected in a music course, students' mean scores for all variables were higher than the center of the scale, i.e., above 4 on a scale of 1-7. Large standard deviations (1.33-1.90 on a 7-point scale) suggest substantial variance across student responses.

Table 3.5

Mean, Standard Deviation, and Range for All Repeated-Measures Variables (N=360 students, B=11.83 tasks per student)

Variables	Mean	Standard Deviation	Range
Interest	4.77	1.84	1-7
Complexity	4.23	1.90	1-7
Comprehensibility	5.66	1.33	1-7
Meaning	5.39	1.54	1-7
Involvement	5.22	1.71	1-7

Note: Scale of all items is 1-7

These data were remarkably complete, with less than one percent missing values at the within-student level. Because the types of planned analyses addressing the research questions (multilevel models) accommodate uneven groups, no imputation procedures or deletion methods were applied to address missingness for repeated-measures variables.

Table 3.6 shows means and standard deviations of student responses grouped by task. When grouped by task, means and standard deviations of student responses showed that students rated tasks and repertoire in general as more or less interesting relative to other tasks and repertoire, i.e. despite generally high reports of interest, some tasks and repertoire were rated more interesting, complex, meaningful, etc. than others. For example, a simple comparison of mean responses to the "Warm Up" prompt and the "Performing" prompt shows that students reported greater interest, complexity, comprehensibility, meaning, and involvement for "Performing" (means from 4.72 to 6.31) than they did for "Warm Up" (means from 3.15 to 5.76). In fact, the highest means for interest, comprehensibility, and involvement for any task were found in response to the "Performing" prompt, while the lowest means for interest, complexity, and involvement for any task were found in response to the "Warm Up" prompt. This was the expected result, and demonstrated in a practical sense that students did not simply rate all tasks in their music class the same. These preliminary results confirmed that these data reflect the properties that the research questions and planned analyses were designed to explore.

Table 3.6

Mean and Standard Deviation for All Dependent Variables by Task (N=360 students, B=11.83 tasks per student)

Tasks	Interest	Complexity	Comprehensibility	Meaning	Involvement
Performing	5.97(1.37)	4.72(1.76)	6.07(1.20)	6.20(1.12)	6.31(1.20)
Interesting rep5	5.96(1.32)	5.96(1.33)	4.92(1.32)	6.07(1.30)	6.07(1.56)
Interesting rep1	5.89(1.54)	5.28(1.70)	5.56(1.32)	5.67(1.45)	5.88(1.48)
Interesting rep2	5.68(1.55)	5.15(1.64)	5.45(1.30)	5.53(1.45)	5.80(1.52)
Sightreading	5.64(1.30)	5.52(1.32)	5.28(1.21)	6.30(0.97)	6.20(1.17)
Interesting rep4	5.57(1.59)	4.08(1.96)	6.00(1.18)	5.21(1.49)	5.37(1.60)
Interesting rep3	5.55(1.56)	4.05(1.93)	5.99(1.25)	5.34(1.40)	5.45(1.59)
Rehearsing	5.34(1.45)	4.77(1.59)	5.83(1.11)	6.13(1.10)	5.86(1.35)
Boring rep3	4.90(1.62)	4.25(1.59)	5.66(1.27)	4.94(1.42)	5.18(1.45)
Recording	4.76(1.62)	3.88(1.72)	5.51(1.45)	5.38(1.57)	4.86(1.79)
Chorales	4.42(1.55)	3.52(1.72)	5.55(1.34)	4.79(1.43)	4.69(1.58)
Boring rep1	4.27(1.99)	3.75(1.82)	5.61(1.44)	4.64(1.70)	4.57(1.88)
Boring rep2	4.19(1.93)	3.64(1.79)	5.53(1.48)	4.34(1.65)	4.56(1.81)
Scales/rhythm	4.13(1.51)	4.47(1.75)	5.63(1.19)	5.89(1.09)	5.28(1.55)
Breath/longtone	3.71(1.68)	3.23(1.95)	5.87(1.20)	5.43(1.46)	4.80(1.66)
Tuning	3.58(1.58)	3.51(1.92)	5.83(1.39)	6.12(1.21)	4.85(1.69)
Tests	3.47(1.70)	4.35(1.86)	4.85(1.46)	4.27(1.79)	4.60(1.99)
Warm Up	3.19(1.36)	3.15(1.65)	5.76(1.40)	4.84(1.46)	4.07(1.57)

Note: "rep" is short for "repertoire," the term for music selections rehearsed and performed by a musician or music ensemble.

Nested features. The design of this particular study used repeated-measures; each student responded to multiple prompts for each of multiple tasks in their music classroom. This design resulted in nested data that can be grouped either by student (N=360) or by task (B=11.83). The data set was arranged such that each student's responses were represented over multiple rows, one row per task or music selection. Each row within each student case contained the same individual differences data including an arbitrarily assigned student identification number. Following the individual differences data, each row contained a task or musical-selection-category identification number and the student's ratings of that particular task. This arrangement was repeated for an average of 11.83 rows per student to create a data frame with 4258 rows.

Research questions addressed the ways that the students' repeated-measures responses related to each other regardless of task, making student the grouping of interest and resulting in a within-student and between-student level of analysis. At the within-student level, each student's repeated-measures responses produced a set of relationships between the dependent variables for that student. Results at this within-student level demonstrated the ways students' sense of interest, comprehensibility, meaning, and other variables varied together or not within the set of each student's responses. At the between-student level, comparisons could be made across many within-student relationships to discover how those within-student relationships varied from student to student. Grouping by task, though not directly relevant to the research questions of this particular study, could be used to explore the data to check for outliers or potential confounds to proposed analyses.

Correlation analyses. Table 3.7 shows intercorrelations amongst dependent

variables at the between- and within-student levels. At the within-student level, where repeated-measures data are grouped by their nesting within each student and within-student correlations averaged across students, moderate to high correlations (.56-.70) between complexity, meaning, involvement, and interest indicated that when students report that they feel more interested, they also tend to report higher complexity, meaning, and involvement. Correlations between comprehensibility and the other variables were small (-.06-.31) at the within-student level.

The between-student correlation structure, showing correlations between students' average reports for each variable, showed moderate to high correlations between all variables (.46-.86) with the exception of a low correlation between comprehensibility and complexity. Of note, between-student correlations between interest, meaning, and involvement were all above .83, an unusually high correlation coefficient that could likely lead to problems with parsing variance across variables in analyses to address research questions that include between-student elements (only research question 4). These characteristics of the data indicated that within-person analyses were the most appropriate for interrogating these data (research questions 1, 2, and 3).

Table 3.7

Correlations Between- and Within-Student Among Dependent Variables

	Interest	Complexity	Comprehensibility	Meaning	Involvement
Interest	1	.56	.21	.58	.70
Complexity	.59	1	-.06	.45	.54
Comprehensibility	.46	.09	1	.31	.23
Meaning	.83	.51	.56	1	.68
Involvement	.83	.52	.53	.86	1

Note. Correlations above the diagonals represent within-person correlations and correlations below the diagonals represent between-person correlations.

Computed with task as the grouping variable as opposed to student as the

grouping variable, such that the repeated measure would be all students rating each task, Table 3.8 shows intercorrelations amongst dependent variables at the between- and within-task levels. Just as in the within- and between-student correlations, comprehensibility stood out for its relatively smaller correlations with other variables at both the within-task and between-task levels (-.39-.41). Complexity was moderately correlated with other variables at the within-task level (.46-.52), but highly correlated with Involvement (.89) and Interest (.80) at the between-task level. Interest, meaning, and involvement were highly correlated at the within-task level (.72-.73) and moderately to highly correlated at the between-task level (.37-.72).

Table 3.8

Correlations Between- and Within-Task Among Dependent Variables

	Interest	Complexity	Comprehensibility	Meaning	Involvement
Interest	1	.52	.32	.72	.72
Complexity	.80	1	.02	.46	.48
Comprehensibility	.04	-.39	1	.41	.35
Meaning	.37	.51	.23	1	.73
Involvement	.87	.89	.02	.72	1

Note. Correlations above the diagonals represent within-task correlations and correlations below the diagonals represent between-task correlations.

Comparing correlation coefficients between- and within-students, the relationships showing the most idiosyncrasy were those including comprehensibility. From this, it was clear not only that comprehensibility did not vary as strongly with the other variables, but that the properties of the variance of comprehensibility appeared different at the between-student level from the within-student level. The same attributes bore out between- and within-task.

Comparing correlations coefficients across different groupings, the relationship between interest and meaning was also idiosyncratic, showing great differences when

grouped by task or grouped by student. Despite high intercorrelations between interest, meaning, involvement, and complexity, these idiosyncrasies across groupings reveal a point of quantitative distinction between meaning and the other variables.

Of note: Whether by task or by student, the high correlations between meaning, involvement, complexity, and interest would likely create some problems for planned analyses, especially at the between-student level. Although regression analyses rely on shared variance, very high intercorrelations would make it difficult to distinguish between variables in parsing variance across predictors and outcomes, especially for more complex models that include multiple predictor variables. Because the research questions focus on relationships at the within-student level, centering predictor variables on the within-student mean as opposed to the grand mean of all responses was a reasonable solution to the problem of multicollinearity, eliminating the between-students information that showed the highest intercorrelations.

Plotting within-student curves. To visualize the relationships between interest and the other repeated-measures variables, within-student curves were plotted for the relationships between interest and the other four variables: complexity, comprehensibility, meaning, and involvement. Figure 3.1 shows similar slopes for meaning, involvement, and complexity, with a much flatter slope for comprehensibility. The curves for meaning, involvement, and comprehensibility show significant overlap in the upper range of interest. The similarities between meaning and involvement, which were highly related in the correlation analyses reported in Table 3.7, are evident in both the shape of the curves and the overlapping bands of variance in the upper-half of the interest scale. Complexity is uniquely solitary in this visualization, reflecting moderate correlations with interest and

the other three variables and a nearly linear relationship with interest.

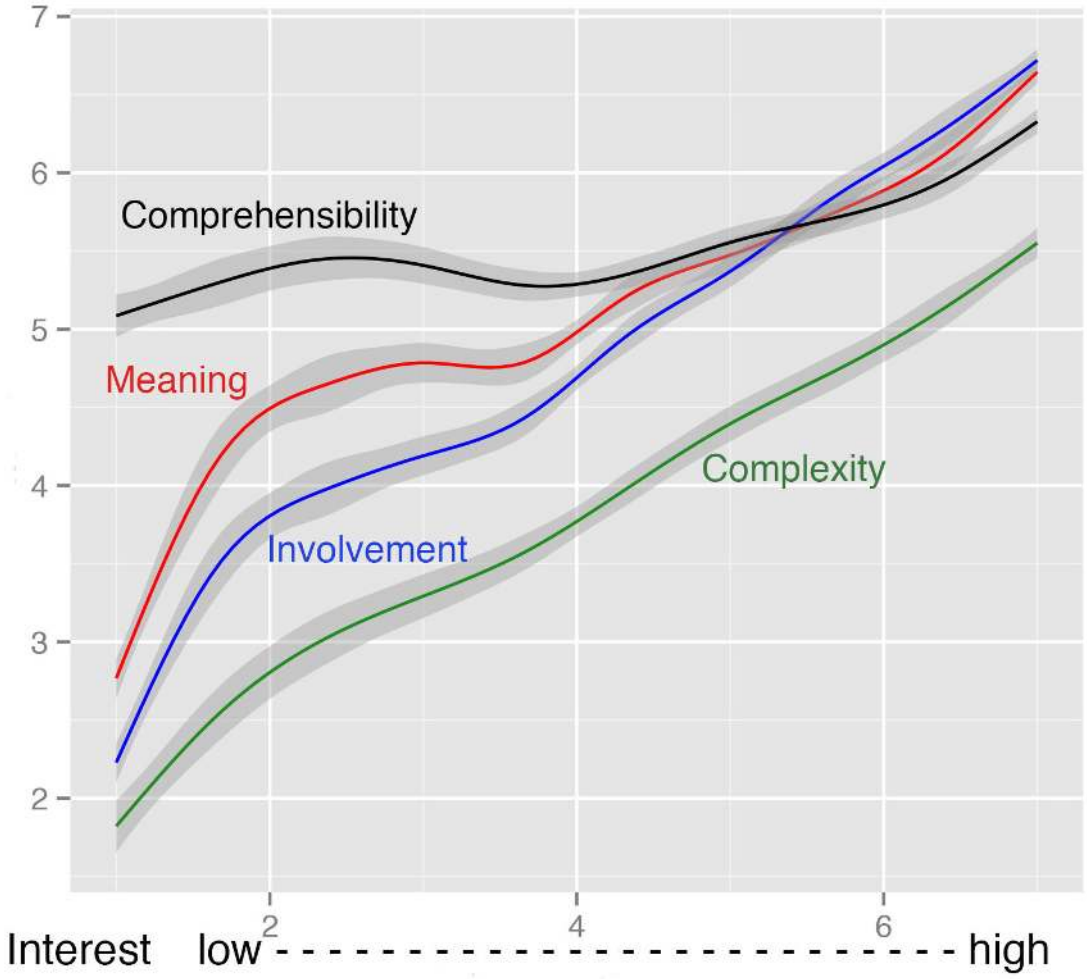

Figure 3.1. Within-person curves plotting complexity, comprehensibility, meaning, and involvement against interest

Summary

360 students enrolled in high school music classes responded to a survey in two parts: student characteristics, and repeated measures. In the repeated-measures segment, students reported their ratings of tasks and music selections in terms of interest, meaning, involvement, complexity, and comprehensibility. In the student characteristics segment, students reported their age, gender, years of experience in instrumental music ensembles, and took an inventory of their individual-interest in music (personal interest in music that

endures over time as opposed to momentary interest in a specific task). The repeated-measures segment of the survey was adapted from prior research, developed through student questionnaires, and validated and revised through student interview to be specific to the tasks and music selections of the classes participating in the study. Data gathered from the survey are well suited for the research questions of this study with appropriate statistical properties to pursue analyses.

Chapter Four: Results

The purpose of this study was to examine intra-individual differences (how students' interest changes across experiences) and individual differences (how students differ from one another in response to the same experiences) in students' interest in tasks and repertoire of the instrumental music classroom. Specifically, this study explored the relationships between student characteristics, students' reports of their interest in tasks and music selections, and the relationships between interest and four correlates of interest: complexity, comprehensibility, meaning, and involvement. Guided by the research of Tsai and her colleagues (2008) into individual and intra-individual differences in interest, student characteristics included individual-interest, gender, age, and years of music-ensemble experience.

The following questions guided the study:

1. What is the magnitude of intra-individual variation in students' interest in tasks and music selections of the music classroom?
2. Do students' ratings of complexity and comprehensibility predict students' ratings of interest in tasks and music selections of their secondary instrumental music classes?
3. Do students' perceptions of task characteristics such as involvement and meaning predict their ratings of interest, complexity, and comprehensibility in tasks and music selections of their secondary instrumental music classes?
4. Do student characteristics of individual-interest, gender, age, or years of experience in instrumental music predict students' ratings of interest, complexity, comprehensibility,

meaning, and involvement or the relationships between these ratings in tasks and music selections of their secondary instrumental music classes?

Research Question 1

Research Question 1 explored the magnitude of intra-individual variation in student ratings of interest, that is, how students' ratings of interest vary in repeated measures across different tasks. Another way of saying this is: how do students experience interest differently from task to task? The intraclass correlation coefficient (ICC) is a measure of between-group variability that sheds light on the proportions of variance between and within groupings.

Unconditional multilevel models, also called "null models", were constructed for all five dependent variables: interest, complexity, comprehensibility, meaning, and involvement. The null model was used to estimate the ICC because it partitioned variability within-group (e.g. tasks within students or students within tasks) and between-group (e.g. student to student or task to task). Results for null models are presented in Table 4.1. These results were used to calculate the ICC, which is the focus for Research Question 1.

Table 4.1

Results from the Null Models for All Dependent Variables by Student

Fixed Effect	Coefficient	Standard Error	*p* Value
Interest Average person-mean, γ_{00}	4.77	.05	<.001
Comprehensibility Average person-mean, γ_{00}	5.66	.04	<.001
Complexity Average person-mean, γ_{00}	4.23	.05	<.001
Meaning Average person-mean, γ_{00}	5.39	.04	<.001
Involvement Average person-mean, γ_{00}	5.22	.05	<.001

Random Effect	Variance Component
Interest Person mean residual, u_{0j}	0.53
Interest Level-1 residual, e_{ij}	2.84
Comprehensibility Person mean residual, u_{0j}	0.55
Comprehensibility Level-1 residual, e_{ij}	1.22
Complexity Person mean residual, u_{0j}	0.71
Complexity Level-1 residual, e_{ij}	2.90
Meaning Person mean residual, u_{0j}	0.51
Meaning Level-1 residual, e_{ij}	1.87
Involvement Person mean residual, u_{0j}	0.64
Involvement Level-1 residual, e_{ij}	2.28

Interest-Only Null-Model Fit	
χ^2	16951.23
AIC	16957.23
BIC	16976.30

The ICC described the proportion of variance associated with differences between students, where $\boldsymbol{\tau}_{00}$ was the between-student (level 2) variance and $\boldsymbol{\sigma}^2$ was the within-student (level 1) variance:

$$\boldsymbol{\rho}_1 = \boldsymbol{\tau}_{00} / (\boldsymbol{\tau}_{00} + \boldsymbol{\sigma}^2) = .532 / (.532 + 2.842) = .1577$$

indicating that about 16% of the variance in interest occurred at the between-student level. This also means that 84% of the variance in interest occurred at the within-student level. The same process was then followed with task as the grouping variable. The ICC is

reported for each variable by student and by task in Table 4.2.

Table 4.2

Intraclass Correlation Coefficients for Each Dependent Variable by Student and by Task

Variable	ICC (Student)	ICC (Task)
interest	0.16	0.24
complexity	0.20	0.15
comprehensibility	0.31	0.04
meaning	0.21	0.17
involvement	0.22	0.13

In Table 4.2, the column ICC (Student) states the proportion of the variance in any individual report of interest that could be explained by the properties of the individual who provided the rating – the extent to which one student rated all tasks the same. The column ICC (Task) states the proportion of the variance in any individual report of interest that could be explained by the properties of the task – the extent to which all students rated one task the same. Intraclass correlation coefficients of .31 and below made it clear that students were not rating all of the tasks the same, as less than a third of the variance occurred at the between-student level for all dependent variables. That meant that differences in ratings occurred at the within-student level, that is, individual students rated each task differently. Does that mean that students are rating each task in the same way, that is to say are boring tasks boring and interesting tasks interesting for all students? To explore that question, the researcher calculated ICCs with task as the grouping variable instead of student ID as the grouping variable. That meant that the intraclass correlation coefficient by task indicated the extent to which all students rated one task the same. The answer to the question was that students did not rate each task the same. In fact, 75% or more of the variation in student ratings occurred within the

task, that is, students disagree on the interestingness, meaning, involvement, and complexity of each task.

In the case of comprehensibility, the very low task ICC (.04) indicated that the properties of the task did not explain students' reports of comprehensibility. Yet, about 31% of the variance in comprehensibility was explained by student as the grouping variable, the most of any of the repeated-measures variables. That meant that, compared to their responses for other variables, individual students tended to rate their comprehensibility the same across the various tasks.

Research Question 2

Research Question 2 aimed to observe the relationship between ratings of complexity and comprehensibility and ratings of interest. Prior research (i.e., Silvia 2005b, 2006a) predicts that both complexity and coping potential, operationalized as comprehensibility, will be significantly positively related to interest.

Multilevel modeling. Idiosyncratic differences between correlation coefficients across groupings, as well as low intraclass correlation coefficient (ICC) values, as measured in analyses to address Research Question 1, indicated substantial variation at the within-student level, and pointed to potential violations of the assumption of independence of observations. A rule-of-thumb established by Muthén (1991, in Hox, 2010) is that a design effect greater than 2.0 warrants a multilevel approach. In the case of these data, with interest as the outcome variable, the design effect was indeed greater than 2.0:

Design Effect = $1 + (B - 1)\text{ICC} = 1 + (11.83 - 1).16 = 2.73$

From these characteristics of the data, the researcher concluded that ordinary least

squares regression would produce biased standard-error estimates. The solution to this problem was to address nested characteristics of these data (i.e. a repeated measures design, or ratings of tasks within students) using multi-level modeling. All further analyses were conducted with the *nlme* package in open-source statistical software program *R* using restricted maximum likelihood (REML) estimation methods.

Three assumptions must be met to proceed with multilevel modeling: sufficient sample size, strong multilevel effects, and a normal distribution of residuals. The number of level-2 units (students) was robust for this type of analysis: 360 students (level-2 units) reporting 11.83 points each for five level-1 variables. Maas and Hox (2005) recommend at least 100 level-2 units. The multilevel effects in these data were quite strong, as exemplified in the low ICCs for every level-1 variable. The histogram in figure 4.1 shows the distribution of standardized residuals for the multilevel linear model that models the full model of level-1 data: interest predicted by complexity, comprehensibility, involvement, and meaning.

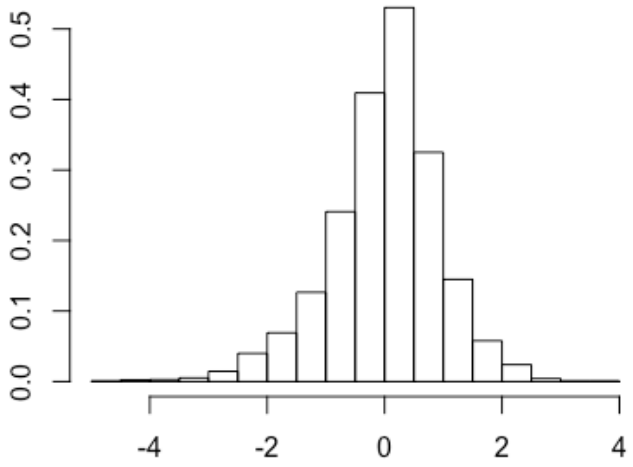

Figure 4.1. Distribution of residuals for full model

Random coefficients model. A random coefficients multilevel model explored the relationship between complexity and comprehensibility and interest, allowing the relationship between the variables to vary across individuals. Predictor variables were centered on the person-mean in order to produce an interpretable intercept result for interest in light of high intra-individual variation.

The Level-1 (within-student) model was

$$Interest_{ij} = \beta_{0j} + \beta_{1j}(comprehensibility)_j + \beta_{2j}(complexity)_j + e_{ij}$$

The Level-2 (between-student) model was

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + u_{2j}$$

The combined model was

$$Interest_{ij} = \gamma_{00} + \gamma_{10}(comprehensibility)_j + \gamma_{20}(complexity)_j + u_{0j} + u_{1j} + u_{2j} + e_i$$

In this model, Interest was the dependent variable, and comprehensibility and complexity were the predictor variables. $Interest_{ij}$ represented the amount of interest in task *i* for student *j*. Predictors were centered on the student-mean, subtracting each student's mean report from the raw score so that every student's mean score for each predictor variable had a value of zero. Therefore, β_{0j} would be student *j*'s interest when all predictor values are average (zero). β_{1j} and β_{2j} were the slopes that represented the relationships between the predictors and interest for student *j*. The within-person residual was represented by the term e_{ij}. At the between-student level, β_{0j} was modeled as the grand-mean intercept (γ_{00}) and a between-student residual (u_{0j}). β_{1j} and β_{2j} were similarly

modeled as between-student slopes and between-student residuals. Results from the random coefficients multilevel model are presented in Table 4.3.

Table 4.3

Random Coefficients Model Comprehensibility and Complexity

Fixed Effect	Coefficient	Standard Error	*p* Value
Intercept, γ_{00}	4.773	0.046	<.001
Mean interest-comprehensibility slope, γ_{10}	0.373	0.024	<.001
Mean interest-complexity slope, γ_{20}	0.562	0.016	<.001
Random Effect	**Variance Component**		
Person mean residual, u_{0j}	0.635		
interest-comprehensibility slope, u_{1j}	0.046		
interest-complexity slope, u_{2j}	0.031		
Level-1 residual, e_{ij}	1.629		
Model Fit			
χ^2	15014.77		
AIC	15034.77		
BIC	15098.32		

The random coefficients model analyzed the task-level interest, comprehensibility, and complexity relationship within and between the 360 students. The intercept represented the mean of interest when complexity and comprehensibility are zero (i.e. at the student-mean), and it was statistically significant (γ_{00}=4.773, p = <.001). comprehensibility was a significant predictor of interest (γ_{10}=0.373, p<.001), indicating that when students reported higher ratings for comprehensibility, they also reported higher interest. As comprehensibility increased by one point, interest increased by 0.373 points, the average impact of comprehensibility on interest across students. Complexity was a significant predictor of interest (γ_{20}=0.562, p<.001), indicating that students who reported high ratings for complexity also rated their interest higher. As complexity

increased by one point, interest increased by 0.562 points, the average impact of complexity on interest across students.

The random effects of complexity and comprehensibility reflected the variation in coefficients across students. Accounting for the impacts of complexity and comprehensibility, the estimate of variation in interest intercepts across students is 0.635. Within-student variation was 1.629. The larger source of variation in interest was across tasks within students rather than differences in the conditional mean (intercept) and coefficients for complexity and comprehensibility across students. The variation in coefficients across students was 0.031 for complexity and 0.046 for comprehensibility. These estimates indicated that the coefficients vary from one student to another, that is, different students exhibit different relationships between complexity and interest and comprehensibility and interest. Though the variances were small, confidence intervals showed these estimates to be significant, reflecting non-zero variances in coefficients from one student to another; different students exhibited different relationships between complexity, comprehensibility, and interest. In other words, the impact of complexity and comprehensibility on interest varied from student to student.

Model fit. Results from these models showed that the largest source of variation in interest was variation among tasks within students with lesser variation from differences in the conditional mean and slopes for comprehensibility, complexity, and interest across students. Though the results of a likelihood ratio test were included in Table 4.3 it is important to note that likelihood ratio tests yield inaccurate results when model variables are non-normally distributed, as was the case with these data. Therefore model preference was driven more by theory than by fit statistics.

The proportion of variance in interest explained beyond the null model for interest can be accounted for at each level of the model.

Level 1:

$$R^2 = \frac{(2.842+0.532) - (1.629+0.635)}{2.842 + 0.532} = 0.329$$

The level-1 or within-student model explained 33 percent of the variance in interest beyond that accounted for in the null model. The level-2 or between-student variance was not modeled here because level-2 data had been removed from this model in the centering process. Additionally, because the guiding theoretical model explained within-person relationships, the addition of the predictor variables to the model was not expected to improve model explanatory power at the between-student level.

Research Question 3

Research Question 3 explored the relationship between ratings of involvement and meaning and interest as well as model compatibility between involvement and meaning and complexity and comprehensibility, i.e. how the appraisal (Silvia, 2006a) and education (Mitchell, 1993) models compared, and whether combining models improved the capacity of the models to predict interest.

Random coefficients model. As in Research Question 2, a random coefficients multilevel model explored the relationship between involvement and meaning and interest. Predictor variables were centered on the person-mean in order to produce an interpretable intercept result for interest in light of high intra-individual variation. Results of the random coefficients multilevel model are presented in Table 4.4.

The Level-1 (within-student) model was

$$Interest_{ij} = \beta_{0j} + \beta_{1j}(involvement)_j + \beta_{2j}(meaning)_j + e_{ij}$$

The Level-2 (between-student) model was

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + u_{2j}$$

The combined model was

$$Interest_{ij} = \gamma_{00} + \gamma_{10}(involvement)_j + \gamma_{20}(meaning)_j + u_{0j} + u_{1j} + u_{2j} + e_{ij}$$

Table 4.4

Random Coefficients Model Involvement and Meaning

Fixed Effect	Coefficient	Standard Error	*p* Value
Intercept, γ_{00}	4.773	0.046	<.001
Mean interest-involvement slope, γ_{10}	0.652	0.024	<.001
Mean interest-meaning slope, γ_{20}	0.233	0.026	<.001
Random Effect	**Variance Component**		
Person mean residual, u_{0j}	0.666		
interest-involvement slope, u_{1j}	0.069		
interest-meaning slope, u_{2j}	0.094		
Level-1 residual, e_{ij}	1.259		
Model Fit			
χ^2	14028.28		
AIC	14048.28		
BIC	14111.82		

The random coefficients model analyzed the task-level interest, involvement, and meaning relationship within the 360 students. The intercept represented the mean of interest when involvement and meaning are zero (i.e., when involvement and meaning are at the within-student mean), and it was statistically significant (γ_{00}=4.773, p = <.001).

Involvement was a significant predictor of interest (γ_{10}=0.652, p<.001), indicating that students who reported higher involvement also rated their interest higher. As involvement increased by one point, interest increased by 0.652 points, the average impact of involvement on interest across students. Meaning was a significant predictor of interest (γ_{20}=0.233, p<.001), indicating that students who reported high meaning also rated their interest higher. As meaning increased by one point, interest increased by 0.233 points, the average impact of meaning on interest across students.

The random effects of involvement and meaning reflected the variation in coefficients across students. Accounting for the impacts of involvement and meaning, the estimate of variation in interest intercepts across students is 0.666. Within-student variation was 1.259. The larger source of variation in interest was across tasks within students rather than differences in the conditional mean (intercept) and coefficients for involvement and meaning across students. The variation in coefficients across students was 0.069 for involvement and 0.094 for meaning. A relatively larger value for these estimates indicated that the coefficient varies from one student to another, that is, different students exhibit different relationships between involvement and interest and meaning and interest. Though the variances were small, confidence intervals showed these estimates to be significant, reflecting non-zero variances in coefficients from one student to another; different students exhibited different relationships between involvement, meaning, and interest. In other words, the impact of involvement and meaning on interest varied from student to student.

Model fit. Results from this model showed that the largest source of variation in interest was variation across tasks within students rather than differences in the

conditional mean (intercept) and coefficients for involvement and meaning across students. Though the results of a likelihood ratio test are included in Table 4.4 it was important to note that likelihood ratio tests yield inaccurate results when model variables are non-normally distributed, as was the case with these data. Therefore model preference was driven by theory rather than fit statistics.

The proportion of variance in interest explained, beyond the null model for interest, could be accounted for at each level of the model.

Level 1:

$$R^2 = \frac{(2.842+0.532) - (1.259+0.666)}{2.842 + 0.532} = 0.429$$

The level-1 or within-student model explained 43 percent of the variance in interest beyond that accounted for in the null model. The level-2 or between-student effect was not modeled here because level-2 data have been removed from this model in the centering process.

Combined models. The next step in Research Question 3 was to explore the effects of meaning and involvement on complexity and comprehensibility. Additional random effects models analyzed the relationships between the dependent variables within the 360 students to determine whether meaning or involvement, variables of interest in the education model, strongly predicted complexity or comprehensibility (or the theoretical term "coping potential"), variables of interest in the appraisal model. Results are reported in Table 4.5. Intercepts were all statistically significant as were nearly all level-1 effects, indicating positive relationships between meaning and involvement and interest, complexity, and comprehensibility. That meant students who reported higher meaning and involvement also reported higher interest, complexity, and

comprehensibility. There was a single exception to this blanket relationship: the mean slope for involvement and comprehensibility was not significant. All of the variance components across the three models were also significant, indicating that all students did not exhibit the same relationships between meaning, involvement, and the other variables.

Table 4.5

Random Effects of Involvement and Meaning on Interest, Complexity, and Comprehensibility

	Interest		Complexity		Comprehensibility	
Fixed Effect	β	SE	β	SE	β	SE
Intercept, γ_{00}	4.77	0.05	4.23	0.05	5.66	0.04
Mean x-involvement slope, γ_{01}	0.65	0.02	0.49	0.03	0.02	0.02
Mean x-meaning slope, γ_{02}	0.23	0.03	0.23	0.03	0.22	0.02
Random Effect (Variance Component)						
Person mean residual, u_{0j}	0.67		0.80		0.58	
x-involvement slope, u_{1j}	0.07		0.08		0.06	
x-meaning slope, u_{2i}	0.09		0.08		0.08	
Level-1 residual, e_{ij}	1.26		1.84		0.84	

For meaning, the mean level-1 effect was similar for interest, complexity and comprehensibility (β~.22), yet involvement showed very different effects across the three models: a relatively larger level-1 effect for interest (β=.65), than for complexity (β=.49), and no significant level-1 effect for comprehensibility. That meaning is similarly predictive of interest, complexity, and comprehensibility means that inclusion of all of these variables in the same model will reduce the explanatory power of meaning. This will not be true for involvement and comprehensibility. Though the effect of involvement on complexity was fairly large (.49), more residual variance, variance unexplained by involvement or meaning, remained at both level 1 and level 2 in the model with

complexity as the outcome. Therefore, the effects of complexity will not be as diminished by the addition of multiple terms to the full model.

The full model. Finally, a random coefficients multilevel model explored the relationship between all of the variables from the previous models: complexity, comprehensibility, involvement, meaning, and interest. Predictor variables were centered on the person-mean in order to produce an interpretable intercept result for interest in light of high intra-individual variation. Results of the full random-coefficients multilevel model are reported in Table 4.6.

Table 4.6

Random Coefficients Model Complexity, Comprehensibility, Involvement, and Meaning

Fixed Effect	Coefficient	Standard Error	*p* Value
Intercept, γ_{00}	4.773	0.05	<.001
Mean interest-complexity slope, γ_{10}	0.275	0.02	<.001
Mean interest- comprehensibility slope, γ_{20}	0.140	0.02	<.001
Mean interest-involvement slope, γ_{30}	0.521	0.02	<.001
Mean interest-meaning slope, γ_{40}	0.129	0.03	<.001

Random Effect	Variance Component
Person mean residual, u_{0j}	0.683
interest-complexity slope, u_{1j}	0.033
interest- comprehensibility slope, u_{2j}	0.004
interest-involvement slope, u_{3j}	0.086
interest-meaning slope, u_{4i}	0.098
Level-1 residual, e_{ij}	1.062

Model Fit	
χ^2	13545.72
AIC	13587.72
BIC	13721.14

The full random coefficients model analyzed the task-level interest, complexity, comprehensibility, involvement, and meaning relationships within the 360 students. The intercept represented the mean of interest when complexity, comprehensibility,

involvement, and meaning are zero (i.e., when all of the predictor variables are at the within-student mean), and it was statistically significant (γ_{00}=4.773, p = <.001). Complexity was a significant predictor of interest (γ_{10}=0.275, p<.001), indicating that students who reported higher complexity also rated their interest higher. As complexity increased by one point, interest increased by 0.275 points, the average impact of complexity on interest across students. Comprehensibility was a significant predictor of interest (γ_{20}=0.140, p<.001), indicating that students who reported high comprehensibility also rated their interest higher. As comprehensibility increased by one point, interest increased by 0.140 points, the average impact of comprehensibility on interest across students. Involvement was a significant predictor of interest (γ_{10}=0.521, p<.001), indicating that students who reported higher involvement also rated their interest higher. As involvement increased by one point, interest increased by 0.521 points, the average impact of involvement on interest across students. Meaning was a significant predictor of interest (γ_{20}=0.129, p<.001), indicating that students who reported high meaning also rated their interest higher. As meaning increased by one point, interest increased by 0.129 points, the average impact of meaning on interest across students.

The random effects of complexity, comprehensibility, involvement, and meaning reflected the variation in slope coefficients across students. Accounting for the impacts of all predictor variables, the estimate of variation in interest intercepts across students is 0.683. Within-student variation was 1.062. The larger source of variation in interest was across tasks within students rather than differences in the conditional mean (intercept) and coefficients for complexity, comprehensibility, involvement, and meaning across students. The variation in coefficients across students was 0.033 for complexity, .004 for

comprehensibility, .086 for involvement, and 0.098 for meaning. A relatively larger value for these estimates indicated that the coefficient varies from one student to another, that is, different students exhibit different relationships between complexity and interest, involvement and interest, and meaning and interest. It does not appear that the effect of comprehensibility on interest varies across students when controlling for complexity, involvement, and meaning. Contrast the variance component for the relationship between comprehensibility and interest for this model (.004) with the same variance component in the appraisal model (.046), and it is clear that the addition of meaning and involvement to the model renders comprehensibility by interest relationships the same across students even while a significant effect for comprehensibility on interest remains. Due to the complexities of four random effects in one model, confidence intervals could not be obtained for the random effects, and significance of the variance terms cannot be estimated.

Model Fit. As in previous models, results from this model showed that the largest source of variation in interest was variation across tasks within students rather than differences in the conditional mean (intercept) and coefficients for involvement and meaning across students. Though the results of a likelihood ratio test are included in Table 4.6 it was important to note that likelihood ratio tests yield inaccurate results when model variables are non-normally distributed, as was the case with these data. Therefore model preference was driven by theory rather than fit statistics.

The proportion of variance in interest explained, beyond the null model for interest, could be accounted for at each level of the model.

Level 1:

$$R^2 = \frac{(2.842+0.532) - (1.062+0.683)}{2.842 + 0.532} = 0.483$$

The level-1 or within-student model explained 48 percent of the variance in interest beyond that accounted for in the null model. The level-2 or between-student effect was not modeled here because level-2 data have been removed from this model in the centering process.

Research Question 4

Research Question 4 examined the relationships between student characteristics (individual-interest, gender, age, years of ensemble experience) and within-student reports of interest, complexity, comprehensibility, involvement, and meaning.

Given the positive relationships between meaning, involvement, complexity, comprehensibility, and their effects on interest as well as the increasing proportion of variance explained relative to the null interest model and steadily declining fit statistics for each progressive model, the researcher proceeded to conduct interaction models using a combined model with all four level-1 variables.

The results of the random coefficients models in Research Questions 2 and 3 showed that variance components for within-student variables were significant, indicating that impacts of complexity, comprehensibility, involvement and meaning on interest vary substantially between students. Interactions models attempt to explain differences in slopes across students in terms of students' individual characteristics of individual-interest, gender, age, and years of ensemble experience.

Centering. Grand-mean centering of level-2 variables means that results represent the expected value or variance when all other variables were zero. Thus, the

value zero represented the mean for individual-interest, or age or years of experience in music ensemble classes, and all values were now represented as deviations from the mean of zero. When predictors are centered, an interaction can be interpreted as the effect of one variable while holding all other variables constant.

Noting that between-student correlations between interest, meaning, and involvement were all above .83, predictor variables were centered on the student-mean at level 1. Just as in the previous analyses of appraisal and education within-person models, this produced an interpretable intercept, the mean value for interest when all predictors were zero. Thus, all level-two relationships had been removed from the within-student data. Within-student correlations between variables were within the acceptable range for regression analyses (.21-.70).

Interactions models. Table 4.7 shows the results of all four of the interactions models, one model each for individual-interest, gender, age, and years of experience in instrumental music ensembles.

Table 4.7

Interactions Models for Each Level-Two Variable: Individual-interest, Gender, Age, Years of Experience in Instrumental Music

Fixed Effect	Null	Individual-interest	Gender	Age	Experience
Intercept, γ_{00}	4.77(0.05)*	4.77(0.04)*	4.83(0.07)*	4.90(0.58)*	4.78(0.05)*
Level 2 mean effect, γ_{01}		0.43(0.04)*	-0.12(0.09)	-0.01(0.04)	-0.01(0.02)
complexity, γ_{10}	0.28(0.02)*	0.27(0.02)*	0.25(0.03)*	0.29(0.21)	0.27(0.02)*
comprehensibility, γ_{20}	0.14(0.02)*	0.14(0.02)*	0.14(0.03)*	0.44(0.24)	0.14(0.02)*
involvement, γ_{30}	0.52(0.02)*	0.52(0.02)*	0.54(0.04)*	0.81(0.31)	0.52(0.02)*
meaning, γ_{40}	0.13(0.03)*	0.13(0.03)*	0.13(0.04)*	-0.23(0.34)	0.13(0.03)*
complexity*L2-interest slope, γ_{11}		-0.02(0.02)	0.04(0.03)	0.00(0.01)	0.00(0.01)
comprehensibility *L2-interest slope,γ_{21}		0.00(0.02)	-0.01(0.04)	-0.02(0.01)	-0.02(0.01)**
involvement*L2-interest slope, γ_{31}		0.06(0.03)	-0.03(0.05)	-0.02(0.02)	0.01(0.01)
meaning*L2-interest slope, γ_{41}		-0.03(0.03)	0.00(0.05)	0.02(0.02)	-0.01(0.01)
Random Effect		**Variance Component**			
Person mean residual, u_{0j}	0.68	0.51	0.67	0.69	0.68
interest-complexity slope, u_{1j}	0.03	0.03	0.03	0.03	0.03
interest- comprehensibility slope, u_{2j}	0.00	0.01	0.00	0.00	0.00
interest-involvement slope, u_{3j}	0.09	0.08	0.09	0.09	0.09
interest-meaning slope, u_{4j}	0.10	0.10	0.10	0.10	0.10
Level-1 residual, e_{ij}	1.06	1.06	1.06	1.06	1.07
Model Fit					
χ^2	13547.80	13478.48	13535.25	13574.32	13545.72
AIC	13599.80	13530.48	13587.25	13626.32	13587.72
BIC	13764.89	13695.65	13752.36	13791.48	13721.14

Note: Parameter estimate standard errors listed in parentheses.
* $p < .001$, ** $p<.0$

Across the four interactions models, only individual-interest had a significant mean effect for the interest intercept (γ_{01}=0.43, p = <.001). This means that, holding complexity, comprehensibility, involvement, and meaning constant, for every one-unit increase in individual-interest (scale 1-7), interest increased by .43 units. The full model including individual-interest explained 53 percent more variance than the null model at level 1 and 22 percent more variance than the null model at level 2.

Level 1:

$$R^2 = \frac{(2.842+0.532) - (1.059+0.515)}{2.842 + 0.532} = 0.533$$

Level 2:

$$R^2 = \frac{(2.842/11.83+0.532) - (1.059/11.83+0.515)}{2.842/11.83 + 0.532} = 0.216$$

Across the four interactions models, only the model including years of ensemble experience showed an interaction effect, an effect on the relationship between the predictor variables and interest. Years of experience had a significant negative effect on the slope of the comprehensibility variable. The effect was quite small: a one-year increase in experience reduced the comprehensibility – interest slope by .02 units, on average.

Summary

Differences in the correlation matrixes between- and within- students along with low intraclass correlation coefficients showed high intra-individual variation in students and in tasks and illuminate a great deal of idiosyncrasy in the relationships between repeated-measures variables. These characteristics emphasize the importance of within-

student modeling of the data. That is, aggregation of the repeated-measures data into student means would remove a large proportion of the variance for all variables. Across all repeated-measures variables, students rated each task differently from other tasks and differently from other students. The appraisal model showed positive relationships between comprehensibility and interest and complexity and interest and explained quite a bit more variance relative to the null interest model. The education model likewise showed positive relationships between involvement and interest and meaning and interest and explained even more variance than the appraisal model relative to the null interest model. Four interactions models included explanatory variables at the between-students level. Of the four models, only individual-interest showed a significant effect on students' reports of interest. Years of experience in ensemble music was the only explanatory variable to show a significant interaction effect: a small negative effect on the relationship between interest and comprehensibility.

Chapter Five: Discussion

When it comes to fostering student interest in the classroom, teachers and researchers still do not know what conditions promote interest or why, especially given students' individual differences (Silvia & Kashdan, 2009). Many students are interested in some classroom tasks but not others, and their interest varies from task to task and even moment to moment during the same task. Take the experience of Zach, the music student whose demeanor swings from excited fist-pumps one moment to bored distraction the next. These moment-to-moment changes in feelings of interest are called "intra-individual differences" and are measured and analyzed within students across time points or across environmental conditions. Students' characteristics such as their level of experience in a classroom subject might also differently influence their interest. Such student characteristics are called "individual differences" and are measured and analyzed between students, indicating ways a student could be similar to or different from his classmates. Ultimately, given differences both within students and between students, no classroom tasks are interesting to all of the students all of the time (Silvia, 2006b).

Summary of the Present Study

For Zach's teacher, understanding how interest works will help with creating lesson plans to inspire greater interest in Zach – more fist-pumps and fewer distracted moments. Many theories of interest have developed independently of each other, though they all share much in common (Henn, 2010). Krapp (2002) noted, "a central problem is the lack of an overarching theoretical framework that could be used to summarize and

systematically integrate results from different research programs" (p. 407). The findings of this study, by applying simultaneously within-student and between-student approaches to the problems of individual and intra-individual differences in the classroom, could aid in the development of such an overarching theoretical framework.

Theoretical framework. Separate bodies of literature investigate student feelings of interest. On one hand, education psychologists see interest as a part of motivation and seek to create interesting classroom lessons for students. Studies in this lineage examine student perceptions of tasks or instructional approaches and their influence on student interest (e.g., Dohn, 2011; Mitchell, 1993; Tsai et al., 2008). In another stream of research, social psychologists see interest as an emotion and seek to understand how feelings of interest emerge in a person. Studies of emotion have used appraisals – perceptions of self and environment – to examine the processes and components of interest in abstract or artistic stimuli (e.g., Silvia, 2005b; Silvia, Henson, & Templin, 2009). Even though researchers from both education and social psychology perspectives view environmental content and learner traits as crucial to the elicitation of interest, no studies have yet blended these two streams of research in a classroom context (for an investigation of interest's appraisals related to educational text, see Connelly, 2011). The music classroom is a germane setting for this study because lesson content – musical repertoire – elicits strong emotional responses from students (Reynolds, 2000).

Across individual and intra-individual levels of inquiry and across two prominent theories of interest, this study explored the relationship between students' individual characteristics and students perceptions of tasks and music selections. Tsai et al. (2008) demonstrated the potential for repeated measures designs in the secondary classroom to

illuminate intra-individual variation in interest. Mitchell (1993) distinguished meaning and involvement as influential conditions for the elicitation of student interest in the secondary math classroom at the between-student level, and Silvia showed how student perceptions of different objects affect interest via the appraisal components of the feeling of interest at the within-student level. For this study, student characteristics included individual-interest, gender, age, and years of ensemble experience. Students' perceptions of tasks in their music classrooms were characterized by meaning and involvement (Durik and Harackiewicz, 2007; Mitchell, 1993) as well as interest's theorized sequential appraisal components: complexity and coping potential (Silvia, 2006). Coping potential is operationalized as "comprehensibility" in this study.

Methodology. The researcher developed a context-specific survey reflective of specific tasks and repertoire in the sample classrooms. Survey data represented students' perceptions of their interest and the theorized facets of interest in the tasks and repertoire of their music classrooms (complexity, comprehensibility, involvement, and meaning). A within-students design called for the same semantic-differential items to be surveyed for each task or piece of music, conceptualized in analyses as repeated-measures. Each student rated twelve tasks on scales of interesting to boring, complex to simple, meaningful to meaningless, etc. The tasks themselves were chosen to maximize variance in ratings across tasks and therefore maximize variance across repeated measures within each student's set of responses. Demographic data (years of music experience, age, gender), and a survey of individual-interest (adapted from Marsh et al., 2005) were collected at the same time as the repeated-measures items.

Research questions. The following questions guided the study:

1. What is the magnitude of intra-individual variation in students' interest in tasks and music selections of the music classroom?

2. Do students' ratings of complexity and comprehensibility predict students' ratings of interest in tasks and music selections of their secondary instrumental music classes?

3. Do students' ratings of involvement and meaning predict their ratings of interest, complexity, and comprehensibility in tasks and music selections of their secondary instrumental music classes?

4. Do student characteristics of individual-interest, gender, age, or years of experience in instrumental music predict students' ratings of interest, complexity, comprehensibility, meaning, and involvement or the relationships between these ratings in tasks and music selections of their secondary instrumental music classes?

Findings. In addressing the magnitude of intra-individual variation (research question 1), the data show students' perceptions of the tasks and music selections in their music class were highly idiosyncratic. Not only for interest, but across all repeated-measures variables, students rated each task differently from other tasks and differently from other students. Between 69% and 84% of the variance occurred at the within-student level where variances represent the differences in student's responses from task to task. The data also show that meaning can be distinct from interest, and a task can be meaningful but not interesting.

As for the appraisal and educational models of interest gleaned from prior research, both models were appropriate for describing these data (research questions 2 and 3). The appraisal model of interest (Silvia, 2006a) showed positive relationships between

comprehensibility and interest and between complexity and interest. The relationships between comprehensibility, complexity, and interest explained about a third of the variance in students' ratings of interest. The education model of interest (Mitchell, 1993) likewise showed positive relationships between involvement and interest and meaning and interest and explained 43% of the variance in students' ratings of interest. The two models, appraisal and education, also work well together, showing improved explanatory power. However, the "involvement" variable is an important exception to these affirming results. Very high correlations between involvement and interest make for some ambiguous relationships between variables and raise important questions. Both the concept of involvement and the measurement item for involvement warrant further investigation, especially in the context of an instrumental music classroom where every task demands a musical response from the student – a "hands-on" learning environment that might tend to be highly involving across nearly all tasks.

Interest, meaning, involvement, complexity and comprehensibility were all highly idiosyncratic, and the close relationships of these constructs to interest were not explained by student individual differences variables (research question 4). At the between-students level, only individual-interest had a significant positive effect on students' mean interest; students with higher individual interest also rated task as more interesting compared to the ratings of students with lower individual interest. Years of experience in ensemble music was the only explanatory variable to show a significant interaction effect: a small negative effect on the relationship between interest and comprehensibility. Students with more years of experience in ensemble music had weaker relationships between interest and comprehensibility; compared to less

experienced students, their interest in the task was less affected by how comprehensible or incomprehensible they felt the task was.

Although involvement, meaning, complexity, and comprehensibility correlate strongly with interest, the implications of these findings for researchers are that common self-report instruments for the measurement of interest might not adequately distinguish between these constructs. The roles of involvement and meaning in students' interest need further investigation to parse relationships between discrete concepts. For education practitioners, the magnitude of idiosyncrasy present in these data strongly imply that learning experiences are not interesting to everyone at once, even in a population with very high individual-interest in the subject in general.

It turns out that Zach's fleeting interest is not unique to Zach and not unique to his feelings of interest. Zach and his classmates aren't just interested or uninterested in music; they feel differently about each task. But they don't exactly agree with each other on which tasks are interesting and uninteresting. Moreover, while meaning and comprehensibility and complexity seem to be pieces of the puzzle of their interest, the students also disagree with each other on the meaningfulness, complexity, or comprehensibility of each task. And their individual-interest, experience, gender, and age don't do much to solve the puzzle of their differences of opinion from one task to the next.

Limitations

Several limitations apply to the present study. The following section describes potential ambiguities brought about by context effects, problems of definition in survey

prompts and analytical groupings, the temporal proximity of stimulus to measurement, and the possibility of distortion from common method variance.

Survey design. Self-report instruments are designed to elicit certain types of responses. In this sense, instruments might be characterized as interventions because, by establishing context and response scales, they influence respondents, encouraging certain answers. Additionally, one item can influence other items – "…even randomly distributed items can create context effects…" by eliciting certain memories (Winne, Jamieson-Noel, & Muis, 2002). The close associations between construct definitions and the sequential administration of two survey instruments exposes the collection of self-reported quantitative data to the problem of priming. Thus, the act of responding to one of the surveys would influence responses to the other.

Definition of terms. The selection of some prompts for the repeated-measures section of the survey contained some problems of definition due to aggregation of music selections at the analysis stage. Each ensemble played different music selections. Students responded to prompts that included the titles of music selections that they played in their classes. In order to analyze all of the students' responses together (N=360) and still include repertoire as part of the task analyses, the researcher assigned pieces of music to "boring repertoire" and "interesting repertoire" categories of tasks. This assignment was made according to student responses to the survey-development questionnaire administered a few weeks in advance of the survey. This solution to the problem of defining a task is similar to Mitchell's (1993) scales for "computers" or "group work," which were not the same tasks across classrooms. Ultimately, this problem of definition limited the potential for these data to describe student perceptions of the

tasks themselves, preventing future analyses of these data from exploring characteristics of individual tasks.

Proximity to measurement. The retrospective nature of the prompts for student response also constitutes a limitation to the study. Students' reported memories of events could be more biased or vague than reports given during the emotional experience (Silvia, 2005b), and time and events situated between stimulus and response raise the potential for reappraisals and reconstruction of meaning (Schutz & DeCuir, 2002). All self-reports are necessarily retrospective because the act of interpreting and responding to an item relies on the retrieval of memories (Karabenick et al., 2007) whether those memories were initiated a few seconds or a few months beforehand. In the case of this study, the task and music selection prompts referred to classroom experiences that had all taken place repeatedly, but at differing frequency (daily, weekly, per semester) and as recent as five minutes before the survey or as distant as a month before the survey.

Common method variance. Common method variance refers to variance that is attributable to the measurement method rather than to the constructs being measured. Usually, this concerns a potential for biased results when self-report surveys are used to collect data at the same time from the same participants, as is frequently the case in self-report social science research. This is especially of concern when predictor and criterion variables are obtained from the same person in the same measurement context using the same item context and similar item characteristics as in the present study and in the studies that have most closely inspired the present study. Also of note, common method variance can have the effect of either magnifying or reducing relationships between

variables, and the effect will depend on both the construct itself and how it is measured (Podsakoff, MacKenzie, Lee, and Podsakoff, 2003).

In the present study, several development and analysis steps offer evidence to ameliorate, though not eliminate, concern for potential bias from common method variance across the repeated-measures variables: 1. Cognitive pretesting supports construct validity. The students who were interviewed regarding the survey items and survey design indicated that they understood the survey items to represent ideas that were familiar to them as part of their experience in music class and expressed semantic and experiential meaning similar to the researcher's understandings of the constructs represented by the survey items. 2. With the exception of the "involving-passive" item (addressed later in this chapter), component analyses showed that survey items loaded onto distinct components, a further indication of construct validity in the survey method. 3. Intraclass correlation coefficients (ICCs) indicate differences in the distribution of variance between task and student, and correlations between variables across students and tasks show a variety of relationships, including orthogonal relationships between variables. These properties indicate good statistical distinction between variables despite common survey methods. 4. The magnitude of idiosyncrasy present in these data was surprising because the type of analyses (simultaneously between and within students) and constructs (closely related) in this study would actually include common method variance as a point of consistency or rater bias, a phenomenon that was assumed to be present yet wasn't present in the amount expected. In this sense, it is a surprising result that students didn't just rate every task or musical selection the same and that students didn't agree with each other on the interestingness of tasks or musical selections. The concern for

common method variance in this case is that the survey method caused students to respond in a way that magnified idiosyncrasy in their ratings of tasks and musical selections.

Interpreting results. The present study used a correlational design for exploring relationships between variables. In interpreting results from this study, it is important to keep in mind that causation cannot be inferred from these correlational data or the analytical approaches applied in this study. Sequence or direction of relationships are also not distinguished by the present study. Though the theories that guide this study conceptualize involvement, meaning, complexity, and comprehensibility as facets or components of interest, the design of the study models only reciprocal relationships. The predictor variables are correlates of interest.

Finally, "Every measurement is a sample of behavior" (Winne & Perry, 2000, p. 558), and the fact that strong evidence of broad individual and intra-individual differences in experience inspired this very study to measure intra-individual differences and their potential influences, signifies that each student response was merely a sample of a range of responses that they might offer as samples of ranges of emotional experiences.

Discussion of Findings

The findings of this study contribute to understandings of student interest in part by extending findings from other studies of interest and its theorized components. The following section places these results within the context of the larger research literature on interest.

In the education line of research, the within-person approach to modeling proved fruitful for examination of the education model. In particular, the relationship between

involvement and meaning, when analyzed at the between-student level, showed that these two variables varied together so closely as to be nearly the same. However, when analyzed at the within-student level, involvement and interest showed greater differentiation. In the appraisal line of research, findings similar to past research in laboratory settings obtained in a classroom setting and showed some interesting properties of students' ratings of comprehensibility.

In the realm of repeated-measures designs for the study of interest in the classroom, the present study made an attempt to disentangle terminology for operationalizing interest and its theorized components. Findings show that single-item measures are viable and, at the within-student level, can differentiate between the different facets of interest even across different theoretical models. For instance, a task can be meaningful yet uninteresting.

In these quantitative data, involvement is not as distinct from interest as the other repeated-measures variables. Student interview data from the survey development process also show that it is likely students think of interest and involvement in the same way. Despite the agreement of preliminary qualitative data, it is possible that the quantitative result is an artifact of either the measurement instrument or the music classroom, where nearly every task requires the active involvement of students to produce a musical result.

Intra-individual variation in interest in the music classroom. In the development of the survey, students shared which tasks and musical selections were most interesting or boring to them. Tasks and musical selections were then selected for inclusion in the final survey with the aim of maximizing variance in student perceptions

across those tasks. Therefore, pertaining to Research Question 1, intra-individual differences should have been large, and they were, due to the selection of boring/interesting tasks and music selections. But surprisingly, intra-task variation was also very large for every repeated-measures variable. In fact, intra-task variation was higher than intra-individual variation for every variable except interest. Students did not rate all tasks the same as other tasks (this was expected, as tasks and music selections were chosen in order to maximize variance), and students did not agree with one another in their ratings of each task (this was unexpected).

Tsai, Kunter, Lüdtke, Trautwein, and Ryan (2008) measured students' intra-individual differences in interest in relationship to their perceptions of the autonomy-supportive climate, controlling teacher behavior, and cognitive autonomy support experienced in lessons in math, German, and second foreign-language classes. The student-characteristics variables were individual-interest, gender, and prior achievement in the subject of the measured lesson. Each student in the study responded to the repeated-measures scales for an average of eight lessons. The finding that stood out to these researchers was the large amount of intra-individual variation in interest – variation in student responses to the interest scale from one lesson to the next. Tsai and her colleagues found that, for each academic subject, 36 to 45 percent of the variance in interest occurred at the within-students level, meaning that each student did not rate all lessons the same.

Specific to the repeated-measures approach to the study of interest in the classroom, the present study differed from the work of Tsai et al. (2008) in two main ways: in the present study, interest and meaning were analyzed as separate constructs

with semantic-differential items rather than as a composite-scale of Likert-type items, and tasks within a lesson were selected for the present study to maximize intra-individual variation for the purpose of studying underlying structures of interest. Thus, intercorrelations between variables were much higher in the present study, and intraclass correlation coefficients (ICCs) for each variable were much lower. In effect, the idiosyncratic student responses that Tsai and her colleagues found intriguing were magnified in the present study.

In describing the data for the present study, ICCs and intercorrelations were calculated by task as well as by student. Whereas Tsai and her colleagues found differences in relationships between interest and lesson characteristics within and between students, results from the present study showed that there are differences in relationships between interest and other task characteristics from task to task as well as from student to student. Any given student did not rate all tasks the same, and any given task was not rated the same by all students. Differences between meaning and interest also appeared in the present study, and part of the idiosyncrasy in the relationship between meaning and interest within students can be attributed to the phenomenon of the task of tuning in the instrumental music classroom: a task that students rated on average as highly meaningful yet uninteresting.

The role of individual differences in intra-individual variation. At the level of individual differences between students, results from the present study show much in common with results from Tsai et al. (2008). Addressing Research Question 4, though individual-interest as a student-characteristics variable had a significant effect on students' mean interest, interaction effects (the effects of individual-differences variables

on intra-individual-differences effects for predictor variables) were either marginally significant or not significant. Expanding the search for interactions that explain intra-individual differences through relationships with individual differences variables, several recent studies in the classroom environment show similarly small or non-significant results. Tsai found very small interactions: in math class, individual-interest moderated the effect of control on interest; in second foreign-language class, individual-interest moderated the effect of autonomy-support on interest. Park, Holloway, Arendtsz, Bempechat, and Li (2012) found very small interactions between autonomy (amount of choice offered) and engagement (interest, enjoyment, and concentration) and GPA and relatedness (satisfaction with support from others), but no other significant effects across multiple variables. Tanaka and Murayama (2014) modeled separate interest and boredom structures and found small level-2 interaction effects between mastery-approach and mastery-avoid at level 2 and difficulty, expectancy, and utility at level 1. The present study found a very small negative effect for years of experience (level 2) on comprehensibility (level 1). Across these recent studies and the present study, individual differences measured by what are theorized to be related constructs have very small if any impact on the relationships between interest and its components. Student characteristics do not explain how or why meaning, involvement, complexity, or comprehensibility relate to interest.

The appraisal model. The present study shared some methods in common with research on the appraisal model for the emotion of interest by Silvia (2005a, 2006a), especially measurements using semantic-differential survey items and within-person modeling approaches. In the appraisal model, addressing Research Question 2 across the

present study and Silvia's similar studies, complexity and comprehensibility were both significant predictors of interest. Silvia did not report random effects for the studies in which he used multilevel models for analysis, but variances for effects of complexity and comprehensibility on interest were significant in the present study, indicating differences across students in the relationships between complexity, comprehensibility, and interest.

The strength of the appraisal model for quantitative analysis is the correlational relationship between interest, complexity, and comprehensibility. Data from the present study showed that complexity and comprehensibility were not correlated with each other at either the within-student or between-student level, yet both comprehensibility and complexity are moderately correlated with interest. These relationships make for a strong model in which the two predictor variables, comprehensibility and complexity, can be shown to separately influence interest, the outcome variable, and each concept is discrete from the others.

Comprehensibility showed some unique features relative to interest, complexity, involvement, and meaning. The very low task ICC (.04) for comprehensibility indicated that the properties of the task did not explain students' reports of comprehensibility. Yet, about 31% of the variance in comprehensibility was explained by student as the grouping variable, the most of any of the repeated-measures variables. That meant that, compared to their responses for other variables, individual students tended to rate their comprehensibility the same across the various tasks. In his prior research, Silvia has often modeled comprehensibility (Silvia calls it "coping potential" – a composite of the same survey items "easy to understand-hard to understand" and "comprehensible-incomprehensible") as a single score for each participant rather than as a response to

repeated-measures prompts (2005b, 2006a). The findings of the present study support this approach to some degree, although changes in the effect of comprehensibility across the various models in the present study show that comprehensibility is not completely static across all objects of interest.

Silvia has replicated within-person repeated-measures studies of interest, complexity, and comprehensibility in laboratory settings using unfamiliar works of visual art and "polygons" (computer generated nonsense visual shapes) as prompts for the repeated-measures items (2005a, 2005b, 2006a). Results of the present study show that similar relationships between these variables are apparent in the music classroom, where tasks and repertoire of the music classroom are familiar to students. In a call for more methodologically rigorous research on the topic of interest in education, Renninger and Hidi (2011) wrote of Silvia's research "The specific measurements associated with appraisals of collative variables that are the focus of this conceptualization of interest are unlikely to be directly applicable to educational practice because these measures are restricted to visual triggers." (p. 172). Given the reach of Renninger and Hidi's paper, it may be of importance to the overall literature on interest to note that the present study shows that Silvia's findings obtain in the classroom, using tasks and musical repertoire as objects for study.

As to the question of whether or how individual characteristics might influence students' interest, Silvia has found only marginally significant or no effects for intercepts or interactions for his proposed level-2 variables: trait-curiosity, training in visual arts, and positive/negative affect (2005a, 2005b, 2006a). The present study found no effects for gender or age, but found a significant effect for individual-interest on students' mean

interest, and a small interaction effect for years of ensemble experience on comprehensibility.

The education model. Specific to a motivational approach to interest in education, Mitchell (1993) explored the interestingness of classroom tasks and found different types of interest responses based on different task features such as meaning and involvement. Mitchell also confirmed a distinct difference between active feelings of interest during class and enduring interest in a subject. The type of interest that endures over time, a characteristic of the student, is called "individual-interest" in the present study. Mitchell's results, which showed that meaning and involvement could be successfully measured and modeled as components of situational interest, are applied to the present study, and are also extended well beyond the reach of between-students design to address Research Question 3.

"All music is meaningful," said a student in the cognitive-pretesting interview in explaining how she views the repeated-measures items (Appendix E). But survey data from her classmates disagree. Intraclass correlation coefficients (ICCs) for the data in the present study showed the greatest amount of variation for interest and theorized components of interest occurred at the within-students level. That means that each student rated each task differently; students did not simply respond in the same way across multiple tasks and repertoire. Aggregation of repeated-measures responses into student means, or eliminating the repeated-measures design of the survey would have eliminated up to 84 percent of the variance in the data. Therefore, the within-students repeated-measures design of the present study is a crucial extension to Mitchell's (1993) line of research because the intra-individual approach is dynamic across objects of

interest, in this case, tasks in the classroom. Results from the present study showed that most of the variation in interest, meaning, and involvement occurred at the within-student level, an aspect of analysis that Mitchell's design did not allow.

The present study used semantic-differential items to measure interest, meaning, and involvement, and these items did not show strong statistical distinction from one another. Mitchell developed Likert-type scales for his survey, which were well differentiated in his factor analysis. Mitchell reported correlations between interest, meaning, and involvement, which, except for the differences in measurement, are equivalent with between-person correlations in the present study. For the present study, correlations between interest, meaning, and involvement were all very high (.83-.86), but the Mitchell study showed greater range of correlations (.39-.75). The highest correlation in the Mitchell study was between interest and involvement, a relationship that also varied closely in the present study, even at the within-students level. So it is surprising that, comparing correlation coefficients across different groupings within- and between-student and within- and between-task, the relationship between interest and meaning shows great differences when grouped by task or grouped by student. Despite high intercorrelations between interest, meaning, involvement, and complexity, these differences across groupings reveal a point of quantitative distinction between meaning and the other variables – a point described later in this chapter.

It is also worth considering that involvement might have a peculiar meaning in music class, where students are required to respond to each task with a musical action, making every task, to a certain extent, a hands-on learning experience in which students are deeply involved and rarely passive. Note, however, that involvement showed similar

variance to other variables, especially meaning and interest, indicating that students did not simply rate all tasks and musical selections as similarly involving.

Mitchell distinguished "personal interest" (called "individual-interest" in the present study) from "situational interest" (simply "interest" in the present study) in his study, but he did not designate a specific relationship between the two in his analyses. Interactions models for the present study showed that students' individual-interest had a significant effect on mean interest. Students with higher individual-interest scores rated tasks as more interesting, on average, than students with lower individual-interest scores. Individual-interest did not influence the relationships between interest, meaning, and involvement.

Conclusions. This study attempted to add to understandings of how students' perceptions of tasks and repertoire in the music classroom contribute to their interest. Interest and its theorized components all exhibit highly idiosyncratic relationships with each other, and the design of the present study intentionally magnified those idiosyncrasies by selecting more interesting and more uninteresting tasks as survey prompts. A combination of results of correlational analyses and information from the cognitive-pretesting interviews indicates that involvement and interest might be best modeled as a single construct, at least in the music classroom. Meaning and interest, on the other hand, seem to be more distinct than their correlational characteristics show, as one of the tasks, tuning, was rated on average more meaningful than most tasks yet less interesting than most tasks. Comprehensibility, when the variance was parsed by task, showed very little between-tasks variance, only about 5 percent. But when the variance for comprehensibility was parsed by student, about 31 percent of the variance was

between students, the highest of all the variables in the present research. Compared to responses for other variables, individual students tended to rate their comprehensibility the same across all tasks. This finding suggests that comprehensibility might best be modeled at the between-student level for future research.

The theoretical models from appraisal and education lines of research each produced the expected results: significant positive relationships between interest and all the other repeated-measures variables (complexity, comprehensibility, meaning, and involvement). These results extended previous research by replicating the appraisal model in a music classroom and by applying the education model to a within-persons repeated-measures design, an approach that maximizes the variance available for analysis.

Attempts to explain variance in relationships between interest and its component by including individual differences variables such as gender, age, experience, and individual-interest showed only small results: mean interest ratings were higher for students with high scores on the individual-interest inventory, and students with more years of experience in music ensemble classes had slightly flatter slopes for comprehensibility than students with fewer years of experience. These findings add to a research lineage with similarly weak or inconsistent results in explanatory relationships between individual and intra-individual differences.

Implications for Research

This study and its findings offer particular insights into directions and methods for self-report surveys in classroom environments, especially research aimed at understanding students' emotions or experiences in a music-education setting. There are also specific lessons to be gleaned from comparisons between survey instruments used in

this study and survey instruments used in previous research.

Idiosyncrasy in relationships between variables. The relationship between meaning and interest provides an example of idiosyncratic differences across between and within aspects of students and tasks: Within-person correlations mean that each of 360 students has a correlation between interest and meaning, and all of these correlations are averaged into one value (.58). Between-person correlations mean that 360 students all have an average interest response and an average meaning response, and these averages are correlated with each other (.83). The ICC for meaning, by person, means that only 21% of the variance is accounted for by the between-students relationship, and 79% of the variance is characterized by the within-students relationships. Within-task correlations means that each of 18 tasks has a correlation between interest and meaning, and all of these correlations are averaged into one value (.72). Between-task correlations mean that the 18 tasks each have an average rating for interest and an average rating for meaning, and these averages are correlated with each other (.37). The ICC for meaning, by task, means that only 17% of the variance in meaning is accounted for by the between-tasks relationship, and 83% of the variance in meaning is characterized by the within-task relationships.

The highest intercorrelations show similarly idiosyncratic differences across contexts: Between-task, complexity and involvement are correlated at .89, meaning that, on average, a task that is complex is also involving, and a task that is less complex is also less involving. But within-task, the correlation between complexity and involvement is only .48. In light of the high between-task correlation, this must mean that the correlations between 360 individual ratings of complexity and involvement for each task

vary greatly. Within- and between-student correlations between complexity and involvement are .54 and .52, respectively.

Similar though less dramatic differences in correlations emerge between meaning and involvement. When measured at the between-students level, a correlation of .86 shows that a student who rates tasks and repertoire as meaningful, on average, also rates them as involving. But within-students, the correlation between meaning and involvement is only .68 indicating that the relationship between meaning and involvement is not as strong as each student rates each task. Within- and between-task, meaning and involvement are correlated with each other at .73 and .72, respectively, which might indicate that the two variables are very near the same. From these correlation results, it is clear that meaning and involvement share a large proportion of variance, yet note the large differences in shared variance with interest across correlational approaches in Table 5.1, in which the correlations of the two variables with interest are identical between student and within task (.83 and .72, respectively), yet great differences in correlations with interest emerge within student and between task.

Table 5.1

Comparison of Correlations with Interest

Correlation with Interest	Meaning	Involvement
Within student	.58	.70
Between student	.83	.83
Within task	.72	.72
Between task	.37	.87

In Figure 5.1, the low between-task correlation between meaning and interest means that a biplot of the average ratings of meaning and interest for each of the 18 tasks shows scattered points with not much linear impulse. The high between-task correlation

between involvement and interest means that a biplot of the average ratings of involvement and interest for each of the 18 tasks shows points nearly in line with one another.

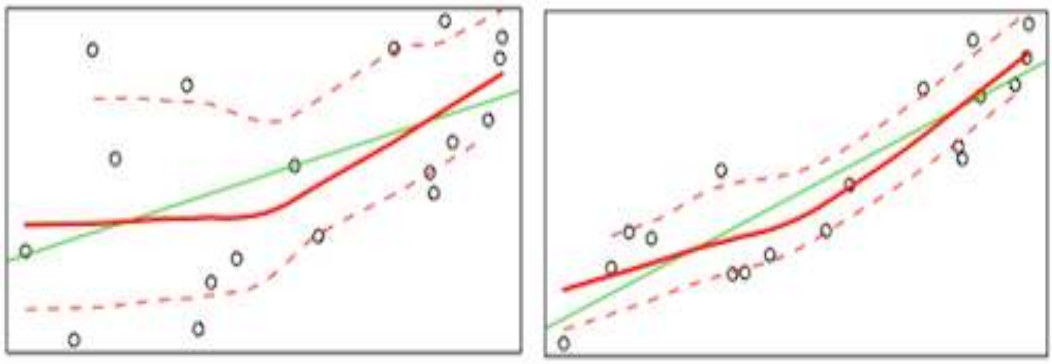

*Figure 5.1.*Between-task biplots of meaning (left) and involvement (right) with interest on the horizontal axis.

Putting these points about intercorrelations into perspective in terms of the operationalization of these variables in self-report survey research, it becomes clear that conflating terms across survey items and scales can create real problems for the measurement of student interest and related constructs. These idiosyncrasies and overlapping meanings are both quite interesting and also confounding for this line of research.

Operational vocabulary and object definition. High intercorrelations and weak component distinction in the present study and in other studies that inform this one (e.g. Tsai et al., 2008) may be, in part, a statistical manifestation of overlapping semantic terms in measurement items. In the cognitive pretesting interview that was part of the survey development process in in the present study (Appendix E), students mused aloud about what they thought of when they responded to the repeated-measures items. For "meaning," students wondered if playing scales would be "useful later." Considering the

"boring" and "interesting" items, students thought about whether playing *Soul Man* would be "difficult," "challenging," or "fun." "Challenging" and "fun" came up again in reference to the "involvement" item, and students said "comprehensible" and "easy to understand" meant "how you do" in a rehearsal. Regarding "complex" pieces, the students said that meant they were "hard."

Many of these same terms and phrases that these students mused about have appeared in the items of other research surveys. For instance, Mitchell's scales, which emerged from focus-group surveys with students, used "fun" and "interest" in both interest and involvement scales, so it seems possible that these overlapping terms could contribute to a high correlation between interest and involvement (.75 in Mitchell, 1993) even though items showed excellent distinction in the factor solution. In the present study, though there were no overlapping terms across survey items, the correlations between interest and involvement were even greater (.83 at the between-students level, and .70 at the within-students level). With similarities between students' interpretations of interest and involvement and high correlation coefficients across research studies, it may well be that "involving" is just another way of saying "interesting." But high correlations are not in and of themselves irrefutable evidence that involvement and interest are the same construct.

In a case that demonstrates that high intercorrelations are not clear indications that terms stand for the same construct, at the between-task level students rated tuning highly on average for meaning, and low on average for both involvement and interest. This indicates that students, on average, despite high correlations between interest, meaning, and involvement, consider tuning to be meaningful, yet passive and uninteresting relative

to other tasks. Might there be a task or other object that is involving but not interesting or vice versa?

Adding to potential conflation of terms across items, various studies have defined the object of interest more or less specifically. Silvia's research design (2005a, 2005b, 2006a) asks participants to rate the interestingness of random polygons, abstract visual art, and poems. Mitchell (1993) surveyed students about their math class in general for that year. Tsai et al. (2008) and Tanaka and Murayama (2014) had students respond to survey items immediately following a particular class period. Park et al. (2011) used the experience sampling method to ask students to respond to whatever they happened to be doing when their watch alarms beeped at random. In the present study, students in the cognitive pretesting interview (Appendix E) wondered if some of the items might also relate to their experiences playing in jazz band or in the pit orchestra for the school musical, and not only in the ensemble class where the survey was administered. This demonstrates that what the students are actually thinking of is influential and yet unknown. The large proportion of intra-individual variation in student responses across research studies might indicate a much deeper level of specificity necessary for designating the object of interest than has been previously considered in within-student studies in the field.

Table 5.2 shows how operational terms and phrases have overlapped or have been conflated across multiple studies of interest, and also shows differences in objects of interest across these studies.

Table 5.2

Object Definition and Operational Vocabulary Used in Measures Items Across Studies

	Object	Interest	Meaning	Involvement	Complexity	Comprehensibility
Present study	Tasks and repertoire	*(un)interesting, exciting/boring*	*meaningful(less)*	*involving/passive*	*complex/simple*	*easy/hard to understand, (in)comprehensible*
Mitchell, 1993	Math class this year	*fun, dull, interesting, look forward to, like*	*use(ful), need, important,*	*fun, just talking, lose interest*		
Silvia, 2006	Abstract images	*interesting*	*		*complex*	*easy to understand*
Tsai et al., 2008	Class session today	*interesting,* ***meaningful****,* ***useful****,* ***important****, enjoyed*	*			
Park et al., 2011	Class session today	*interesting, enjoy, concentrating*				*understand*
Tanaka and Murayama, 2014	Activity at time of ESM alarm	*interesting, like, bores, dull*	*useful*			*hard for me, comprehension***

Note: The survey work of Tsai et al. (2008) was presumably conducted in German, and the work of Tanaka and Murayama (2014) in Japanese. Only items in English are provided in their published research.

* Tsai et al. (2008), in their Interest scale, included many of the operational words from the meaning-scale items of Mitchell (1993), and interest-scale items of Silvia (2005). Silvia included *meaning* in the Coping Potential scale in 2005a, but had eliminated the word *meaning* from his survey items by 2005b.

**Tanaka and Murayama separate difficulty (*"hard for me"*) from expectancy (*"on the basis of comprehension…I will do well")*

Methodological Implications. The present study successfully employed somewhat unusual survey instruments in comparison to related prior studies. In particular, the combination of semantic-differential-type items, single-item measures, and repeated measures represent a borrowing of methods from programs of study outside of education research for the purpose of illuminating the complexities of interest, as an emotion, as it is experienced by individual students in a classroom environment.

Semantic-differential-type items. Semantic-differential-type items consist of pairs of words at the ends of a bi-polar scale. Osgood (1957) developed the semantic differential item for the study of semantic meaning, using a very specific set of word pairs to explore broader concepts of language. More recent social-psychology research on emotion has borrowed the format of Osgood's scales but used word-pairs relevant to the specific construct of interest. For instance, Ellsworth and Smith (1988) used the words "pleasant-unpleasant" and "enjoyable-unenjoyable" in their exploration of appraisal patterns of complex emotions. Some of the semantic-differential-type items in the present study have been used in previous social-psychology research by Silvia (2005a, 2005b).

Aside from the work of Silvia, other studies specific to education that are closely related to the present study used Likert-type scales, a set of statements to which a student responds along a continuum from "agree" to "disagree." Semantic-differential items have potential to eliminate ambiguity by using word-pairs rather than statements that have, in prior research, conflated terms. The previous section and Table 5.2 show examples and explanations of how the language of Likert-type item scales used in prior research in an education context have contributed to ambiguity in the measurement of interest and its correlates.

In the present study, cognitive pretesting showed that students found the semantic-differential items easy to understand and answer. Students also saw the word pairs as relevant to their classroom tasks and musical selections, and were able to articulate what the various word pairs meant to them in the context of their feelings during music class. In the administration of the survey, all participating students responded easily and without seeking clarification or instruction. These experiences show that semantic-differential-type items with word pairs derived from the constructs of interest are an efficient option for self-report survey in a classroom setting at the high-school level.

Single-item measures. Two constructs in the present research were each represented by a single item rather than by a two-item scale. Those two items were "involving-passive" and "simple-complex", representing the constructs involvement and complexity, respectively. These items were created or selected with simplicity and clarity in mind, per the suggestion of Ainley (2006):

> When the construct being measured is relatively narrow, well-known to the respondent and is unambiguous, there is good evidence that single-item measures relate consistently to other forms of measurement. (p. 400)

Semantic differential items are especially suited to meet these conditions well, reducing potential for ambiguity by narrowly defining the construct through a pair of opposing words with well-known meaning.

Of note in the present study, weak statistical distinction of the item measuring involvement might be attributable to ambiguous meaning of the word pair "involving-passive," which might have been unfamiliar to students. Alternatively, weak distinction

of this variable might be an effect of the music-ensemble classroom context in which every task or musical selection requires a musical response that is "involving" for students, and, from the students' perspectives, the involvement of a task might well track very closely with the interestingness of a task. An additional possibility is that the construct of involvement might not be distinct from interest or meaning at all, a potential reinforced by the overlapping terms "fun" and "interest" used in Mitchell's (1993) Likert-type scales for the validation and measurement of the constructs interest and involvement.

Given the weakness of the involvement item, involvement and complexity, both represented by single-item measures, showed properties quite different from each other. There was quite a bit of overlap and confusion between involvement and the other variables meaning and interest, with involvement loading evenly onto both the interest component and the meaning component. Complexity, on the other hand, was clear and distinct from other variables in the component analysis and other correlational analyses. The distinction and clarity of the complexity variable indicates that the problem with the involvement item is likely a problem of the definition of the construct, of the clarity of the word pair chosen for the item, or a context effect rather than inadequacy of a single semantic-differential-type item to capture a measurement of a construct. Thus, the present study offers preliminary evidence that in addition to being efficient, single-item measures can be appropriate and effective for self-report survey research in a repeated-measures design.

Repeated measures. Until very recently, most studies of the emotion of interest conceived of interest as a one-time measure of a participant's feelings in response to a single object or stimulus or as an average response across several objects or stimuli. This

approach has led to a defining feature of early research into interestingness and conditions that inspire interest: an inconsistent arousal response (Berlyne, 1960). Some people react to novelty or complexity with interest and exploration, others with aversion and anxiety. According to Silvia and Kashdan (2009) "in the extent to which people find pictures, poems, text, random images, classical paintings, and social encounters to be interesting…variability is clearly the norm" (p. 787). Crucially, however, this variability is not confined to differences between people responding to the same object. The fact is that much of the variation in student interest seems to appear at the intra-individual level, that is, students' individual experiences of interest vary day-to-day, class-to-class, and task-to-task. Tsai et al. (2008) found up to 45% of the variance in student interest experiences in the classroom at the intra-individual level. The present study found that up to 84% of the variance in interest occurs from task to task within the sets of student responses, yet up to 95% of the variance can also be said to occur from student to student within the sets of responses for each task, such that the variability within-students is not necessarily attributable to differences between tasks. These profound idiosyncrasies in student reports of interest would be missing if the data were aggregated to represent students' ratings of interest with average student responses.

Appraisal models of emotion use within-person repeated-measures designs because the ways students feel in general (between-students, or individual differences) is not the same as how they feel in the moment (within-students, or intra-individual differences), and the greater amount of variation lies in those moment-to-moment and task-to-task changes. Education researchers now employ repeated-measures designs as a matter of course when measuring students' interest. With the exception of Mitchell

(1993), studies in Table 5.2 used within-person repeated-measures designs (i.e. Tsai et al., 2008; Park et al., 2011; and Tanaka and Murayama, 2014).

In the present study, research questions addressed the ways that the students' repeated-measures responses related to each other regardless of task, nesting tasks within students, making students the grouping of interest, and resulting in a simultaneously within-student and between-student level of analysis. At the within-student level, each student's repeated-measures responses produced a set of relationships between the dependent variables for that student. Results at this within-student level demonstrated the ways students' sense of interest, comprehensibility, meaning, and other variables varied together or not within the set of each student's responses. At the between-student level, comparisons could be made across many within-student relationships to discover how those within-student relationships varied from student to student. Compared to a between-students approach, the within-students repeated-measures approach is clearly more appropriate for understanding variability in interest and the ways interest arises in and across individuals.

In the Instrumental Music Classroom. This study was conducted in instrumental music classrooms of two suburban high schools. The survey instrument was developed to address specific tasks from each classroom of participants for the present study. Findings confirm that students find some repertoire and tasks more interesting, involving, meaningful, complex, and comprehensible than others, and their responses vary greatly not only from task to task, but from student to student. To the researcher's knowledge, there are no published studies conducted in music-education settings that employ either the within-person repeated-measures design or the guiding appraisal and

education theories of the present study.

Of potential importance to scholars in music education, or to scholars outside of music education who might wish to investigate emotion phenomena in the music classroom, is that results of this study were in many ways comparable to results from studies in laboratory environments and in classrooms across various academic subjects and age groups. Music education scholars note that phenomena observed, theorized, and measured in other academic environments could be present in similar ways in music education classrooms. Scholars in other academic subjects or other psychology disciplines note that the instrumental music classroom is a viable environment for study of phenomena that are not unique to music.

Suggestions for Future Research. The initial inspiration for this study came from a question about moment-to-moment changes in students' experiences of interest, but ultimately that question was not included and the design of this study did not address moment-to-moment or even more gradual changes in interest in the same activity over time, and the mystery remains. The question of change over time arose again in students' responses during the cognitive-pretesting interview (Appendix E) when the students discussed how they feel differently about their repertoire when it is new to them versus after they have rehearsed and performed each piece. What is the life cycle of a task or of an object of study, and how do student perceptions change over time? Given the large intra-individual variation and the tendency for relationships between variables to vary across students, would the structures we've observed in the present study be consistent over time? Would interest vary in organized ways?

Interviews with students conducted as part of the survey-development portion of

the present study showed that students differentiate between interest, involvement, meaning, complexity, and comprehension even though the statistical properties of their responses do not show great distinction across all analytical approaches. Given the wealth of experience shared by students in the cognitive-pretesting portion of the survey-development process, qualitative approaches to understanding students' experiences of interest would clearly complement the current lineage of survey research. In the case of interviews for the present research, students prompted to address the operational vocabulary of the survey demonstrated in their answers that many of the variables overlap semantically. These similarities were manifested in the statistical relationships between the variables.

To capture moment-to-moment changes in student interest, surveys have significant drawbacks as a measure due to their retrospective nature. In order to know whether interest is really as dynamic as students say it is, behavioral or physiological correlates of interest might be a better approach for measurement, e.g. skin conductivity or eye tracking. In order to successfully examine interest using these methods, and to integrate findings with existing research, it would first be crucial to determine whether or how behavioral and physiological measures correspond to survey and interview observations.

So far, attempts to explain intra-individual variation with individual differences variables have shown weak results, if any. A latent-class analysis on repeated-measures survey data (Silvia, Hensen, and Templin, 2009) showed that patterns of intra-individual variation can take the role of individual differences. For approximately 32 percent of the participants, their ratings s of comprehensibility had a larger effect on their interest, but

for the other 68 percent of participants, their ratings of complexity had a larger effect on their interest. Further study might examine how people in these two classes differ in their assessments of interest across a range of stimuli. Along similar lines, Hox (2010) suggests using the within-person standard deviation of a repeated-measures variable as an individual differences variable. Perhaps the magnitude of intraindividual variation explains some of the differences in interest across students, that is, how students perceive objects and respond differently from one another.

Without prompting, students in the cognitive-pretesting interview described their interest in any given piece of music as changing over time as they rehearsed their music selections. Future survey research can address the dynamic nature of interest by, for instance, following students' interest in one piece of music from introduction through performance. Further qualitative inquiry, such as observations of the classroom, tasks, teachers, and students, and also interviews of students and teachers, stand to further illuminate students' experiences of interest over the life cycle of a task as in Renwick and McPherson (2002).

Regarding the theorized components of interest, it seems clear from the present study that meaningful tasks must not always be interesting. Under what task conditions do distinguishing deviations from patterns of related constructs appear? Similar findings in Silvia (2005b) regarding distinctions between interest and enjoyment were the impetus for a study in which students rated their interest and enjoyment of disturbing and calming paintings, showing that enjoyment is unrelated to interest (Turner and Silvia, 2006). An object can elicit negative feelings and still be interesting. Perhaps objects that exemplify distinctions between related constructs will eventually be found for meaning, complexity,

involvement, and interest.

Implications for Educational Practice

Results of the present study show that, while it is true in general that students find the tasks and repertoire of their instrumental music class interesting, some music selections and some tasks such as performing or tuning are more interesting than others. Further, students' interest varies idiosyncratically across tasks; not all students find the same tasks or repertoire similarly interesting. There is also much idiosyncrasy in student perceptions of classroom tasks in terms of complexity, meaning, and comprehensibility. And though involvement varies closely with interest, there are still great differences in student perceptions of how involving a task is. This close relationship between students' interest and their perception of involvement in tasks and repertoire holds true across dimensions of meaning and complexity of tasks as well: the more meaningful, the more interesting; the more complex, the more interesting. Teachers might benefit from thinking of interest, involvement, meaning, and complexity as synonymous. In the face of flagging student interest, addressing the meaning of a task, creating or imposing an element of complexity, or involving students to a greater extent in the task might provide a boost in interest.

Comprehensibility – the student's perception of a task as comprehensible or easy to understand – shared less in common with interest and the other variables. Students' average reports of comprehensibility were very high in general and showed less change from task-to-task than the other variables.

In considering application of these findings in a music classroom, to a certain extent, manipulating the involvement, meaning, complexity, or comprehensibility can

probably influence student's interest in a task or piece of music. However, selecting more or less interesting tasks or music selections (relative to other tasks and music selections) might not have a very large impact on students' feelings of interest, or even their perceptions of the tasks themselves when interest already runs quite high. In a group interview, students said that the life cycle of music selections (i.e., where they are in the rehearsal preparation process with any given piece) contributes a great deal to the changes in their interest.

If the effect turns out to be larger than what is evident in these data, one new finding may turn out to be particularly valuable for how teachers approach their lesson designs and repertoire choices: the interaction between experience and comprehensibility. This finding shows that students with more years of experience in instrumental music ensembles report a slightly weaker effect for comprehensibility on interest, and thus they might be more resilient than other students to challenges to their perceived ability to comprehend tasks or repertoire. Students with less experience in ensemble music may benefit from greater interventions to support comprehension in order to elicit interest in more complex tasks or repertoire.

Summary

Zach pumped his fist with excitement on Monday when he perfectly played the warm-up exercise on his saxophone. Friday, he rolled his eyes during warm-ups and muttered to his seatmate that he was bored. Zach says he is interested in music, but he does not always feel interested during his high-school band class. Many students are just like Zach: interested in some classroom tasks but not others, and their interest, even in the same task, varies from moment to moment.

Individual differences in interest (how students' interest differs from one another in response to the same experiences) and intra-individual differences in interest (how each student's interest changes across different experiences) are theorized to play a part in a complex system of interactions between students, lesson content, and educational context. In this study, students rated their perceptions of tasks and musical selections in their instrumental music class. Expected relationships between interest and the other variables were informed by literature on situational interest in educational motivation (meaning and involvement) and by literature on emotional appraisals of interest (complexity and comprehensibility). Student individual differences variables (enduring interest in music in general, gender, age, experience) were also gathered as part of the study.

Findings show students' interest in the tasks and music selections in their music class was highly idiosyncratic, that is, students did not rate each task the same as all other tasks, and students did not agree with each other in their ratings of each task. Ratings of meaning, involvement, complexity and comprehensibility were also highly idiosyncratic, and the close relationships of these constructs to interest were not explained by student individual differences variables. Data from this study show that meaning can be distinct from interest, and a task can be meaningful but not interesting. The role of involvement is much closer to interest than the other variables in these data, as students' perceptions of involvement varied closely with interest.

Although involvement, meaning, complexity, and comprehensibility correlate strongly with interest, the implications of these findings for researchers are that common self-report instruments for the measurement of interest might not adequately distinguish

between these constructs. For education practitioners, the magnitude of idiosyncrasy present in these data strongly imply that learning experiences are not interesting to everyone at once, even in a population with very high individual-interest in the subject in general.

Zach and his classmates aren't just interested or uninterested in music; they feel differently about each task. But they don't exactly agree with each other on which tasks are interesting and uninteresting either. Moreover, while meaning, involvement, comprehensibility, and complexity seem to be pieces of the puzzle of their interest, the students also disagree with each other on the meaningfulness, involvement, comprehensibility, or complexity of each task. And their individual-interest, experience, gender, and age don't explain their disagreements. It turns out that Zach's fleeting interest is not unique to Zach and not unique to his feelings of interest alone.

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Appendix A: Excerpts from Measurement Instruments

Student Open-ended Questionnaire

(Read) Please take out your pencil. You will write on a piece of lined paper being distributed now. Use your folder or music stand as a writing surface. DO NOT put your name on your paper. (Wait for students to be prepared with paper and pencil) This is a quick write. You will be given a time limit for each prompt. It is important that you get your ideas down in only a few words, not complete sentences. Please write quickly but legibly. Your responses are completely anonymous AND confidential. The words you write will not be shared with your teacher no matter how much he or she begs. Your ideas will be used to create a survey to measure interest in instrumental music class. Write down as many ideas as you can for each prompt:

1. Two minute time limit: brainstorm and list all the tasks and activities you remember from your instrumental music class this year. (Set timer and begin)

2. Two minute time limit: brainstorm and list all of the repertoire you remember from your instrumental music class this year. (Set timer and begin)

3. Five minute time limit: for each task or activity or piece of music, describe in only a few words what about that task, activity, or musical piece makes you feel interested or uninterested. (Set timer and begin)

(Read) Thank you for participating in the quick write. Please pass your paper to your right. (Collect papers at ends of rows)

Musician Individual Differences Survey

Age _____

How many years have you participated in music ensembles? _____

How many years have you played in this ensemble? _____

List the instruments you play in this ensemble _____

List other instruments you play _____

What is your gender? _____

Do you take private lessons on an instrument? Yes No

If yes, on which instruments? _____

Do you intend to play in a concert band, orchestra, or other organized music ensemble next year? Yes No

For the next statements, as they relate to your experience in this ensemble, please check the box under the answer that best matches your feelings about the statement:

How important is it for you to learn a lot during rehearsal?

not at all important ☐	unimportant ☐	somewhat unimportant ☐	neither important nor unimportant ☐	somewhat important ☐	important ☐	very important ☐

Would you like to rehearse more often?

not at all ☐	no ☐	not really ☐	just the same ☐	a little ☐	yes ☐	very much ☐

How much do you look forward to rehearsal?

not at all ☐	I don't ☐	not much ☐	neutral ☐	a little ☐	some ☐	very much ☐

How important is it for you to remember what you have learned in rehearsal?

not at all important ☐	unimportant ☐	somewhat unimportant ☐	neither important nor unimportant ☐	somewhat important ☐	important ☐	very important ☐

It is important to me to be a good musician.

strongly disagree ☐	disagree ☐	somewhat disagree ☐	neither agree nor disagree ☐	somewhat agree ☐	agree ☐	strongly agree ☐

I enjoy working on music.

strongly disagree ☐	disagree ☐	somewhat disagree ☐	neither agree nor disagree ☐	somewhat agree ☐	agree ☐	strongly agree ☐

Music is one of the things that are important to me personally.

strongly disagree ☐	disagree ☐	somewhat disagree ☐	neither agree nor disagree ☐	somewhat agree ☐	agree ☐	strongly agree ☐

I would even give up some of my spare time to learn new topics in music.

strongly disagree ☐	disagree ☐	somewhat disagree ☐	neither agree nor disagree ☐	somewhat agree ☐	agree ☐	strongly agree ☐

While working on music, it sometimes happens that I don't notice time passing.

strongly disagree ☐	disagree ☐	somewhat disagree ☐	neither agree nor disagree ☐	somewhat agree ☐	agree ☐	strongly agree ☐

The remaining pages of this packet contain the **Musician Interest Experience Survey**

For the continuum between each of the following word pairs, please mark the space that best matches your feelings about the activity or music selection printed at the top of each page:

Tuning

MEANINGLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**MEANINGFUL**
PASSIVE	_____	_____	_____	_____ neutral	_____	_____	_____	**INVOLVING**
INCOMPREHENSIBLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPREHENSIBLE**
HARD TO UNDERSTAND	_____	_____	_____	_____ neutral	_____	_____	_____	**EASY TO UNDERSTAND**
UNINTERESTING	_____	_____	_____	_____ neutral	_____	_____	_____	**INTERESTING**
BORING	_____	_____	_____	_____ neutral	_____	_____	_____	**EXCITING**
WORTHLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**VALUABLE**
SIMPLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPLEX**

How often have you practiced tuning on your own outside of class?

Daily	Weekly	Once in a while	A few times	Never
☐	☐	☐	☐	☐

Rhythm Exercises

MEANINGLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**MEANINGFUL**
PASSIVE	_____	_____	_____	_____ neutral	_____	_____	_____	**INVOLVING**
INCOMPREHENSIBLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPREHENSIBLE**
HARD TO UNDERSTAND	_____	_____	_____	_____ neutral	_____	_____	_____	**EASY TO UNDERSTAND**
UNINTERESTING	_____	_____	_____	_____ neutral	_____	_____	_____	**INTERESTING**
BORING	_____	_____	_____	_____ neutral	_____	_____	_____	**EXCITING**
WORTHLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**VALUABLE**
SIMPLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPLEX**

How often have you practiced rhythms on your own outside of class?

Daily	Weekly	Once in a while	A few times	Never
☐	☐	☐	☐	☐

Scales

MEANINGLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**MEANINGFUL**
PASSIVE	_____	_____	_____	_____ neutral	_____	_____	_____	**INVOLVING**
INCOMPREHENSIBLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPREHENSIBLE**
HARD TO UNDERSTAND	_____	_____	_____	_____ neutral	_____	_____	_____	**EASY TO UNDERSTAND**
UNINTERESTING	_____	_____	_____	_____ neutral	_____	_____	_____	**INTERESTING**
BORING	_____	_____	_____	_____ neutral	_____	_____	_____	**EXCITING**
WORTHLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**VALUABLE**
SIMPLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPLEX**

How often have you practiced scales on your own outside of class?

Daily	Weekly	Once in a while	A few times	Never
☐	☐	☐	☐	☐

Performing in concerts, festivals, and other events

MEANINGLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**MEANINGFUL**
PASSIVE	_____	_____	_____	_____ neutral	_____	_____	_____	**INVOLVING**
INCOMPREHENSIBLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPREHENSIBLE**
HARD TO UNDERSTAND	_____	_____	_____	_____ neutral	_____	_____	_____	**EASY TO UNDERSTAND**
UNINTERESTING	_____	_____	_____	_____ neutral	_____	_____	_____	**INTERESTING**
BORING	_____	_____	_____	_____ neutral	_____	_____	_____	**EXCITING**
WORTHLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**VALUABLE**
SIMPLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPLEX**

How often have you practiced or played this piece on your own outside of class?

Daily	Weekly	Once in a while	A few times	Never
☐	☐	☐	☐	☐

Three Preludes No. 2

MEANINGLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**MEANINGFUL**
PASSIVE	_____	_____	_____	_____ neutral	_____	_____	_____	**INVOLVING**
INCOMPREHENSIBLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPREHENSIBLE**
HARD TO UNDERSTAND	_____	_____	_____	_____ neutral	_____	_____	_____	**EASY TO UNDERSTAND**
UNINTERESTING	_____	_____	_____	_____ neutral	_____	_____	_____	**INTERESTING**
BORING	_____	_____	_____	_____ neutral	_____	_____	_____	**EXCITING**
WORTHLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**VALUABLE**
SIMPLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPLEX**

How often have you practiced or played this piece on your own outside of class?

Daily	Weekly	Once in a while	A few times	Never
☐	☐	☐	☐	☐

As Summer Was Just Beginning

MEANINGLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**MEANINGFUL**
PASSIVE	_____	_____	_____	_____ neutral	_____	_____	_____	**INVOLVING**
INCOMPREHENSIBLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPREHENSIBLE**
HARD TO UNDERSTAND	_____	_____	_____	_____ neutral	_____	_____	_____	**EASY TO UNDERSTAND**
UNINTERESTING	_____	_____	_____	_____ neutral	_____	_____	_____	**INTERESTING**
BORING	_____	_____	_____	_____ neutral	_____	_____	_____	**EXCITING**
WORTHLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**VALUABLE**
SIMPLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPLEX**

How often have you practiced or played this piece on your own outside of class?

Daily	Weekly	Once in a while	A few times	Never
☐	☐	☐	☐	☐

Soul Man

MEANINGLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**MEANINGFUL**
PASSIVE	_____	_____	_____	_____ neutral	_____	_____	_____	**INVOLVING**
INCOMPREHENSIBLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPREHENSIBLE**
HARD TO UNDERSTAND	_____	_____	_____	_____ neutral	_____	_____	_____	**EASY TO UNDERSTAND**
UNINTERESTING	_____	_____	_____	_____ neutral	_____	_____	_____	**INTERESTING**
BORING	_____	_____	_____	_____ neutral	_____	_____	_____	**EXCITING**
WORTHLESS	_____	_____	_____	_____ neutral	_____	_____	_____	**VALUABLE**
SIMPLE	_____	_____	_____	_____ neutral	_____	_____	_____	**COMPLEX**

How often have you practiced or played this piece on your own outside of class?

Daily	Weekly	Once in a while	A few times	Never
☐	☐	☐	☐	☐

Appendix B: Informed Consent

UNIVERSITY OF SAN FRANCISCO CHANGE THE WORLD FROM HERE

INFORMATION SHEET ABOUT A RESEARCH STUDY

Beth Ann Turner, a graduate student in the School of Education at the University of San Francisco, is doing a study on feelings of interest. She seeks to learn about when and how students feel interested during music class. You are being asked to participate in this research study because you are a student in a high-school instrumental music class.

If you agree to be in this study, you will first participate in a written interview about tasks and activities in your instrumental music classes. A few weeks later, you will fill out a survey indicating your experience and interest in instrumental music and your feelings about tasks and activities in your instrumental music classes. The interviews and surveys will be conducted in the classroom during your regular music classes. You are free to decline to answer any questions you do not wish to answer, or to stop participation at any time. You will not write your name on your responses, and study records will be kept as confidential as is possible. However, participation in research may risk a loss of confidentiality. Study information will be coded to remove identifying information, and will be kept in locked files at all times. Only study personnel will have access to the files. Individual results will not be shared with anyone associated with your school. No individual identities will be used in any reports or publications resulting from the study.

There will be no direct benefit to you from participating in this study. The anticipated benefit of this study is a better understanding of when and how students experience feelings of interest during music classes. There will be no costs to you as a result of taking part in this study, nor will you be reimbursed for your participation in this study.

If you have questions about the research, you may contact the researcher at baturner@usfca.edu. If you have further questions about the study, you may contact the IRBPHS at the University of San Francisco, which is concerned with protection of volunteers in research projects. You may reach the IRBPHS office by calling (415) 422-6091 and leaving a voicemail message, by e-mailing IRBPHS@usfca.edu, or by writing to the IRBPHS, Counseling Psychology Department, Education Building, University of San Francisco, 2130 Fulton Street, San Francisco, CA 94117-1071.

PARTICIPATION IN RESEARCH IS VOLUNTARY. You are free to decline to be in this study, or to withdraw from it at any point. Your school is aware of this study but does not require that you participate in this research and your decision as to whether or not to participate will have no influence on your present or future status as a student at your school.

PARENTAL or PARTICIPANT ABSTENTION OF PARTICIPATION

I decline to participate in the study described above. OR I decline to give my consent for my child to participate in the study described above.

Signature of Subject or Subject's Parent/Guardian
Date of Signature
Signature of Person Obtaining Consent
Date of Signature

Appendix C: Permission

Sample email to participating teachers:

[teacher names and contact information redacted]

I'm finally getting down to collecting data for the research study I told you about at the fall festival. Here's the official email:

I am conducting a research study on students' interest in instrumental music class as a part of my doctoral studies at University of San Francisco. If you are willing and able, I'd like to ask you and your students to participate in the study. Here's an overview to help you decide whether you'd like to participate or not:

Description of the study: A lot of students are bored in class - but fewer are bored in music class than in, say, math class. By observing the interplay between students' interest and the characteristics of tasks and activities, I hope to learn about the relationship between tasks and interest and ultimately help teachers to plan classes in ways that foster students' interest.

Procedures: I would like to visit your classroom and pose some questions about activities and repertoire to your students during a 10-minute quick write activity. A couple of weeks later, I'll ask for a few volunteers (5 or so) from your class to form a focus group and try out the survey that I have created. They'll be able to tell me whether the questions make sense and what they think about when they read the items on the survey. After I use their advice to revise the survey, I'll visit your classes to administer the survey to all of your students. The survey will probably take about 20 minutes to distribute and complete.

All interviews, focus groups, and surveys will be scheduled at your convenience.

All I need from you right now is a yes or no on whether you'd like to participate, and, if yes, the name of the person I should contact at your school in order to get permission for my study (I'm guessing your school secretary is the go-to person).

Thank you for considering.

Sincerely,

Beth Ann

Appendix D: IRB Approval

March 21, 2012

Dear Ms. Turner:

The Institutional Review Board for the Protection of Human Subjects (IRBPHS) at the University of San Francisco (USF) has reviewed your request for human subjects approval regarding your study.

Your application has been approved by the committee (IRBPHS #12-026). Please note the following:

1. Approval expires twelve (12) months from the dated noted above. At that time, if you are still in collecting data from human subjects, you must file a renewal application.

2. Any modifications to the research protocol or changes in instrumentation (including wording of items) must be communicated to the IRBPHS. Re-submission of an application may be required at that time.

3. Any adverse reactions or complications on the part of participants must be reported (in writing) to the IRBPHS within ten (10) working days.

If you have any questions, please contact the IRBPHS at (415) 422-6091.

On behalf of the IRBPHS committee, I wish you much success in your research.

Sincerely,

Terence Patterson, EdD, ABPP
Chair, Institutional Review Board for the Protection of Human Subjects
---
IRBPHS – University of San Francisco
Counseling Psychology Department
Education Building – Room 017
2130 Fulton Street
San Francisco, CA 94117-1080
(415) 422-6091 (Message)
(415) 422-5528 (Fax)
irbphs@usfca.edu
---
http://www.usfca.edu/soe/students/irbphs/

Appendix E: Cognitive Pretesting Transcript

Researcher: I'd like to know: How do you decide what to answer - what to write in the blank or which box to check?
Pause to read over Individual Differences Survey
Student1: It seems pretty straightforward. I don't think many people play more than one instrument though. Well, there are lots of people who play like two, but more than three, I don't think so
Student 2: It can't hurt to have it on there, though.
Student 3: Yeah, they seem like straightforward
R: What about these here with the boxes? What do you think of when you see, "How much do you look forward to rehearsals?" What goes through your head?
2: I guess I think of a response first and then choose… but for lots of these, there's kind of an "it depends" category.
R: tell me more about that.
2: It may depend on…
3: Like, it could depend on like how you're feeling that day or what kind of mood you're in. I know that sometimes I wanna come but then sometimes I just, like, don't.
R: So how would you choose an answer if it was something like that – that felt different to you every day.
3: I'd probably choose like, the neutral one, because its like, it depends, like you're neutral on it.
1: I'd probably just say "yes" there…
Student 4: Me too…
1: because normally I want to, but it's just those few days where its like you're getting sick.
4: It's rare.
R: So, you'd choose what your average is, what you think mostly?
1, 2, 4: yeah.
R: ok. Were there any of these where you wondered, "why are you asking that?" or anything that stood out as being strange or that might not apply to you?
Pause
1: Well, these two questions: "I enjoy working on music… It's important to be a good musician… It's one of the things that are important to me personally…" These are kind of like, if you're in band, you probably are feeling that, unless you're forced to be in band, you're not gonna be answering "disagree".
R: And do you (2) have something to add to that?
2: Umm, not really anything else, but I'm wondering here where it says "band or orchestra" right here, Is that saying say like just a band or orchestra, or maybe include more, just like, ensemble, or…
R: So what do you recommend? Ensemble…?
2: …or, well I guess we do jazz band here, but maybe that is your question so I don't want to deconstruct it.
R: No, no. That's good feedback. So maybe include "Jazz Band"?

1: Yep, or, I'm not sure about how many people are part of this, but like maybe there's some kind of outside of school band and they might [unintelligible] too.
R: The next part of this survey is different. Your job is to choose somewhere on the continuum between these word pairs, where you feel like your feelings fall. And here's the thing: there's one for each kind of thing that you do in class. So there's sightreading, tuning, performing, warmup exercises, scales, rhythm exercises, and then some of your repertoire. This is your repertoire, right? Nevermore, Lament and Tribal Dances, Soul Man, At Water's Edge, and Scaling the North Wall. So if we just could go through these one at a time, and you let me know, do these words seem to relate at all? Where might you put your answer and would that be meaningful to you where your answer falls? Does it reflect your feelings well?
1: Maybe, just a person might say, that right now, for example, reading pieces like "At Water's Edge" pieces from the beginning of the year - At the beginning of the year it was something maybe that was acceptable for us to do, but now it seems like one of the less things you want to do. So feelings change over time for sure.
R: Feelings change over time? So you might answer differently now than you would have when you first started the piece?
1, 2, 4: yeah.
R: Of the pieces on the survey, which are newer?
4: Soul Man.
2: Did you put down "Under the Sea?"
4: No, because we didn't have it yet.
4: Soul Man and Lament and Tribal Dance
1: And probably Nevermore
2, 4: yeah, Nevermore
R: Ok, so I've got some new stuff in there, and I've got some old stuff in there also, right? Ok. That's excellent. So, "Nevermore" is new also. And the other ones are old. "Scaling the North Wall" is old, and "Water's Edge" is old. Ok. So, your feelings change over time, and that's gonna make a big difference, right?
All: yeah.
R: What about these exercises? When you see "sightreading," and then you look at is it meaningful or meaningless to you, where would your feelings lie on that continuum?
4: I'd say, like, either one or two to the right (positive) of neutral.
2: I think a lot of people, including me, feel like you're ready to take on a new type of music and you just get a sheet of music in front of you and you can play it.
R: Do you feel like you just sit back and let it happen or does it involve you?
2: I would say so.
3: hmmm.
1: Well, compared to… we're both (1 & 2) in Jazz Band, and we do sightreading in that too, and that's really challenging and fun, but sometimes during intermediate band, it's really simple, like quarter note songs.
2, 3: Yeah.
R: I see what you mean.
4: Like, I'm in orchestra. The sightreading for CMEA was completely different. It was a lot harder - as opposed to intermediate band. I like the challenge.

1: Well, I think maybe intermediate band has to cater to all the new students that are coming in – their different abilities. And as the years go on, you can go into honor band…
2: And [unintelligible] It definitely changes a bunch of these factors here.
R: Incomprehensible/comprehensible. Does that even apply?
2: I guess it's basically asking how you do at it.
1: I think that's almost the same as "easy to understand."
Pause
R: How about uninteresting or interesting? How do you decide whether something is interesting or not?
3: For me, I think it goes for how difficult it is. Like, if it's not very difficult, I don't find it that interesting because it's not challenging, but if it's more difficult, like on a higher level, then it's more interesting because you actually have to put yourself into it to work on it.
4: Then if it gets too hard, it's not interesting again because you can't possibly do it. You have to get in this certain space where you can do it and it's fun and it's still challenging.
R: ok. And what about boring, exciting?
3: I think that kinda ties into the same thing and interesting/uninteresting because they go together.
R: What about is it worthless or valuable?
2: I think it's valuable
1: Yeah
4: I enjoy sightreading. I think it's really helpful to learn a new piece.
R: When you see worthless and valuable, do you consider that the same or different from interesting/uninteresting?
2: That's definitely different.
1, 4: yeah.
R: It's a different kind of idea? What about meaningless and meaningful? Is worthless and valuable the same as meaningless and meaningful?
1, 4: There is a slight difference.
2: Yeah, valuable and worthless sounds a little bit more sharp and to the point than meaningful. Because valuable is like that you have the ability and meaningful is that you'll probably be using it later and you feel that it's a good value to have… [sounds confused].
R: What about simple and complex? How do you think of it as it relates to sightreading?
1: This is one that it's a big "it depends."
4: Yeah [unintelligible]
R: What kinds of things does it depend on? The music that you're reading? Or other experiences that you're having?
All: yeah, exactly.
R: So let's look at some repertoire. How about Nevermore? Would you start by looking at the bottom here, where it asks, "How often have you practiced or played this piece on your own outside of class."
4: Personally, never.
1: Never.
2: Nevermore.

All: [Laughter]
4: I don't have this.
1: Maybe, like, once or twice, but I don't want to say "a few times." And then we don't really require practice at home, he just suggests it.
4: He suggests it but he doesn't require it.
1: Highly suggests it. But you can definitely tell if… I don't know, but you start to feel left behind if you're not on top of it. If you don't get help in class and you don't practice at home on your own then it will start getting worse and worse and everyone's progressing.
R: If you have the motivation to practice at all, what would you say is the minimum to put in, just to keep up?
2: Well, for intermediate band, I haven't really done too much because I've been on top of that situation. But in jazz band, I practice charts every other day.
R: Would weekly fit for you? (to 1) You suggested "a couple of times."
1: yeah.
R: For something that you practice a lot, what would you like to call that?
2: Maybe just "often."
R: What do you think? For something that you practice a lot, what would be a good description?
4: For orchestra? Because that's the one I practice more.
R: Great.
4: Um, maybe weekly, probably.
R: And you? (to 3)
3: I don't practice at home. I usually practice in class when [the teacher] gives us time.
R: So how would you describe that then?
3: I guess just, like, working, well, it's every day when we have class and working, I'll work on the hard stuff that needs to be figured out.
R: So you would choose…
3: "Daily", yeah.
R: What about something that you don't practice very much at all, maybe only when you have to – like you were describing, maybe a couple of times. How would you describe that?
4: I never practice intermediate band music.
R: So "never" would be your answer.
4: ever, ever, yeah.
2: Yeah, what was it? At Waters Edge, basically the trombones… It was like a four minute song or something like that, but the trombones and like all the brass only came in for like four measures.
1: In the middle.
2: yeah.
R: Do these [semantic differential items] make sense in relation to that tune?
All: yeah, some of them do, yeah
R: Which ones make more sense?
1: Involving-Passive… because…
4: definitely, yeah. Exciting-Boring.
1: yeah.

4: Easy to understand-hard to understand
2: I think some of them can also be grouped like we said before, but it comes out the same, I'd say – the groups.
R: It works out the same as when you were answering it for, say, sightreading?
1,2: yeah.
R: Are there any [items] that seem irrelevant – why would you ask that about a piece of music? Or that you wouldn't know how to answer?
1: I'm starting to say like the valuable and worthless ones. Because all music is just music that you play and it's… I don't really see how I would call it valuable and worthless.
2: Are you saying that maybe, is this song a good work – we should be working on it?
R: That's certainly one way to interpret it.
2: Then yeah.
1: yeah.
R: When did y'all get and start working on Symphony No. 5?
5: Beginning of the year.
4: No, because Black Hawk…
5: Symphony No. 5 was probably middle or towards the end of the second…
R: So you've had it for a while?
4,5: yes
R: And you're done with it?
4,5: we're playing it in the Spring Concert
R: Ok. So, how does it feel to look at these word pairs? Do they reflect – are they things you have feelings about? Or, what about the practice item? How do those relate to that particular tune?
4: I think, for the boring-exciting part, it's like it was more exciting at the beginning when we first got it because it was new, but as we've played it and we've played it already in a concert, it's not as exciting for us.
5: I feel like for the simple and complex one, it's like it was kind of like hard at the beginning, but now that we know it so well, it's like it's really simple to me at least. And I feel like… I just feel like it's really simple more than [mumbled].
R: Are there any that seem like they don't apply? Why would you ask that about this piece?
4: I think you could go and I think you could take off the meaningless and meaningful because I feel like all music is meaningful in some way unless you like don't even care, you're just in there for whatever reason.
R: Does the practice item work for you? Do those choices reflect your practice habits at all? Is there something there to describe how often you've practiced Symphony No. 5.
4: I don't practice outside of class.
5: Neither do I.
R: So it's good that I have "never" there?
4,5: Yeah.
5: Well, I came to tutorial a couple of times, but besides that…
3: Did you do this with orchestra also?
R: Yes. All instrumental music classes… Is there anything that you see that you want to know about or do you have advice for me? Did I miss something that you feel is really

important to you about your feelings of interest in band, or is there something you're curious about that you want to know?
2: This may just be something – I'd like to add on here. Maybe have something in between "weekly" and "a few times." Because there is a big difference between those two.
3: I agree.
2: Maybe like…
1: Once in a while
2: Once in a while, yeah.
R: Great suggestion, thanks. And I'm guessing I can take off the "only when required" option – is this true?
1,2,3: yeah. Totally.
R: Are you ever required to practice?
4,5: He suggests it.
3: But he doesn't require…
1: Highly suggested
R: I understand. That's very helpful, thank you. Anything else?
3: I was just going to say, I played flute for the play… My Fair Lady. And I practiced like a lot more for that than I did for either orchestra or intermediate band. And I just thought that might be helpful.
R: That is helpful. And this is what ya'll (1,2) were describing for jazz band also, yes?
2: Uh, yeah.
1: yeah.
R: So sometimes you practice more for either special things or different ensembles that have more challenge.
1: I guess maybe one other thing. These [refers to tasks] like warm ups and sightreading, for us jazz band members, there is improvisation too. There's nothing specific we're practicing, but working on that skill. And that may be, I guess, one other area, but since very few people do it, it wouldn't be a big category, so I'm just saying.
R: So it might even be that the same people would answer the same types of questions really differently in a different ensemble.
3, 2, 1: Definitely. yeah
R: I wish I could come in all the time and ask you guys all the questions in the world. You've been so helpful! But I can't take up all your time. I really appreciate you taking the time to meet with me today. I learned so much from you!