

## **Perception of Tension in Music: Musicians versus Nonmusicians**

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*Music therapists are often highly trained musicians who deal with diverse populations, most of whom do not have formal musical training. Questions may arise regarding the issue of a therapist's ability to understand, and predict, the musical perceptions and preferences of a client when their own background is so different. The current work is a look at a series of studies using various musical stimuli and comparing responses of musicians and nonmusicians to perceived "musical tension." Subjects (N = 126) included adult musicians and nonmusicians as well as a case study of a father/daughter. All subjects listened to recordings through individual headphones and were physically isolated from other subjects to ensure individuality of responses. Subjects, whether adults or children, were given instructions telling them that they were about to hear a piece of music and that they would be using a Continuous Response Digital Interface (CRDI) dial to trace the musical tension they heard. No specific definition of musical tension was given to any of the subjects. In effect, individual subjects supplied their own definition, either knowingly or unknowingly, in the absence of a formal one. Results indicated that group perceptions of the points at which tension and its release were strongest are remarkably similar between musicians and nonmusicians (correlations ranged from  $r = .71$  to  $r = .95$ ). Within at least the western art music tradition the likelihood that perceptions of group responses to tension and release in music could be predicted is high. These data indicate that therapists, trained as musicians, might be able to predict with some accuracy the responses of their clients who are not trained musicians.*

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Historically it has been common for people to assume that special abilities in music, extensive musical training, or a combination of the two set people apart as it relates to the way they responded to music. This included everything from analytical ability (cognition) to preference (affective response). Logically it makes a great deal of sense to assume that time spent studying, performing, and listening critically to music will alter the framework in which a human being will interact with musical stimuli.

For music therapists there are many issues relating to "transfer," or moving knowledge from one place to another (Madsen, 1986). Music therapists are trained in much the same way as many professional musicians. This would seem to somehow separate them perceptually from the populations they try to help. The ability to not only sympathize, but empathize, often requires that we walk in the other persons proverbial shoes. But remembering how one thought or felt before becoming proficient in music is not usually practical. As a result, the therapist must do the best they can to transfer from their own experience to the perspective of someone with a different, often very different, musical background.

The good news is that research is beginning to clarify some of the issues surrounding this gap between the musical experiences of the therapist and the client. Madsen, Byrnes, Capperella-Sheldon, and Brittin (1993) examined data from adult musicians and non-musicians relating to perceived aesthetic experience. In five separate studies, each using a different piece of music, musicians and nonmusicians did not differ substantially in their levels of aesthetic interest. One of the notable facets of this series of studies is that, in all cases, subjects were given no formal definition of an aesthetic response. This means that the collective group responses were not biased by the researchers' definition, since by default each subject provided their own.

This line of investigation into aesthetic responsiveness is ongoing. The latest work in the area has moved toward helping therapists and educators identify appropriate semantic substitutes for the term "aesthetic experience." Byrnes (1997) used the term "liking" with children and special populations. Madsen (1997) applied a scale anchored by the terms "ugly" and "beautiful." Lychner (1998) looked for comparisons between groups tracking "aesthetic experience," "felt emotional response," and a control group using a scale anchored by "more" and "less" but with no other definition.

When comparisons to groups tracking “aesthetic experience” were made, no consequential differences were found.

A parallel line of investigation, concerned with perceived human response to tension in music, is attempting to quantify another aspect of feelingful responses. Madsen and Fredrickson (1993) replicated a study by Nielsen (1983) which asked adult musicians and nonmusicians to track tension in a musical selection. These initial efforts again showed marked similarities in the responses of the two populations. In particular the timing of responses. The magnitude of musician’s responses were somewhat lower, possibly indicating a higher level of differentiation or comparison to a broader context. But tension onset and release points were very similar across populations. These two studies used the same piece of music as a stimulus, the first movement of Franz Joseph Haydn’s *Symphony No. 104*.

Fredrickson (1995) made a direct comparison between the populations from the replication study (Madsen & Fredrickson, 1993) and similar populations tracking “aesthetic experience” on the same musical selection. In the depictions of musicians’ responses the tension graph exhibited a much higher degree of definition than did the aesthetic graph. There were some similarities in contour noted, specifically that the major peaks and valleys of the tension graph coincided with the smaller, but still discernible, fluctuations in the aesthetic graph. The nonmusician population produced graphs with more definition in the area of tension but even less in aesthetic response. This made the comparison more difficult for the nonmusician population. Even so, it was felt that in both cases there were enough similarities to speculate that tension might be a component of the aesthetic experience.

When Lychner (1998) compared “aesthetic experience,” “felt emotional response,” and “more/less” it was decided to also add “perceived tension” as an additional variable. While the first three types of responses were highly similar there were marked differences in the tension responses. This led the researcher to speculate that, while tension might be related to aesthetic response, it represents a unique dimension. If this is so, it may be useful to compare musicians and nonmusicians responses to musical tension in a variety of musical settings, with a variety of populations, to see if the similarities found by Madsen and Fredrickson (1993) transfer.

As a continuation of the original replication of Nielsen’s work

Fredrickson (1997a) chose to examine responses from school-aged children. In order to make comparisons to the adult musicians and nonmusicians from Madsen and Fredrickson (1993), the same recording of Haydn's *Symphony No. 104* was used. Subjects were 120 school-aged children from grades 2, 5, 8, and 11/12. Younger subjects (Grades 2,  $n = 30$ , and 5,  $n = 30$ ) were randomly selected from intact music classes in a suburban elementary school. Older students (Grades 8,  $n = 30$ , and 11/12,  $n = 30$ ) were randomly selected members of an 8<sup>th</sup> grade choir and a high school band respectively. When comparing the graphs of mean group responses the similarities were striking. As musical sophistication and age decrease, magnitude of response increases. However, tension initiation and release points are very consistent. Correlations between groups were quite high. The lowest was between adult musicians and 2<sup>nd</sup> graders ( $r = .71$ ). Very high correlations existed between 8<sup>th</sup> grade choir and high school band ( $r = .96$ ), nonmusicians and 5<sup>th</sup> or 8<sup>th</sup> graders ( $r = .97$ ), as well as 5<sup>th</sup> graders and 8<sup>th</sup> grade choir members ( $r = .98$ ).

To this point, this line of research had not utilized a new musical stimulus. Percy Grainger's *Irish Tune from County Derry*, a large form setting of the melody also known as *Danny Boy*, was chosen for the next comparison. This study (Fredrickson, 1997b) involved musicians ( $n = 40$ ) and nonmusicians ( $n = 56$ ) listening to a melody which is set for a large ensemble (in this case a band) but utilizing melodic material that can be considered easily recognizable by a wide cross-section of listeners. While not as striking as the graphs from earlier studies, the directionality of the graphs and the points at which they changed direction included many similarities; enough so that the correlation was high ( $r = .81$ ). The pattern that emerged was one in which musicians used a smaller area of the dial to register their perceptions but appeared to be perceiving a number of definite tension and release points. The nonmusicians used a good deal more of the dial but had a high level of agreement on the location of those tension and release points within the musical context.

Data have been gathered for the studies in this area of research to date, with the exception of Nielsen's original work (1983), using versions of the Continuous Response Digital Interface (CRDI). The CRDI has been used to record responses relating to a wide variety of music-related responses from various populations. Reliabil-

ity for the current versions of this instrumentation has been calculated to be high (Capperella, 1989; Gregory, 1989, 1995; Tyler, 1996; Zeigler, 1996).

The current work is a look at three musician/nonmusician comparisons using various musical stimuli. Music included works by Franz Joseph Haydn (*Symphony No. 104*, 1st movement), Gustav Holst (*First Suite in Eb*, Chaconne), and Dimitri Shostakovich (*Festive Overture*). Subjects ( $N=126$ ) included adult musicians and non-musicians as well as a case study of a father/daughter.

### Method

In the following series of studies methodology remained consistent. All subjects listened to recordings through individual headphones and were physically isolated from other subjects to ensure individuality of responses. The pictorial overlay used on the CRDI dial was the same one originally developed for the tension replication (Madsen & Fredrickson, 1993). Subjects, whether adults or children, were given instructions telling them that they were about to hear a piece of music and that they were to use the CRDI dial to trace the musical tension they heard. Then they were told to try the dial to experience how it felt. Finally, all subjects were afforded the opportunity to ask questions. In only a very few cases did any subject ask what was meant by musical tension. In these cases they were told that "it" was whatever they felt it to be. That response satisfied even the youngest subjects and is important to remember when reviewing results.

As in the "aesthetic response" studies cited earlier, no specific definition of musical tension was given to any of the subjects. In effect, individual subjects supplied their own definition, either knowingly or unknowingly, in the absence of a formal one.

#### *Study #1*

One of the musicians in the original tension replication studies brought his 7-year old daughter with him when he took part in the experiment. To give her something to do the researcher let her participate in the protocol (her data were not included in the study). While watching the computer screen, which shows the data on the computer monitor as it is being taken, the researcher noticed an interesting phenomenon. The data from the daughter's perceived tension was quite similar to that of her father. She could

not see, nor was she in physical contact with her father during the taking of the data. Results can be seen in Figure 1.

The correlation between the two sets of data is quite high ( $r = .80$ ). The two individual graphs exhibit many of the same characteristics as the group graphs from the first study (Madsen & Fredrickson, 1993). The data from the musician indicates a finer level of discrimination and a tendency to use less of the dial. The father in this case was a highly trained, experienced college-level ensemble conductor. The 7-year old daughter had exhibited no unusual musical abilities up to that point nor had she been involved in early musical training outside of her public school experience. Her father did say that her classroom teacher at school (not her general music teacher) used a lot of music in the classroom and had been teaching all of the class to play bass ukulele.

### *Study #2*

The next investigation compared a group of musicians ( $n = 32$ ) from a study by Fredrickson (1999) to a group of nonmusicians ( $n = 32$ ). The musicians had originally listened to their own concert performance of the Chaconne from Gustav Holst's *First Suite in Eb* to see if the act of rehearsing and performing a piece of music significantly changes the level of awareness as it relates to musical tension. The nonmusicians listened to the same recording, and performed the same research protocol. Here again, the general pattern that has emerged from this line of research is evident in Figure 2. The magnitude of the response to perceived tension is less in musicians but the onset and release points are nearly identical. These data produced another high correlation ( $r = .91$ ).

### *Study #3*

Finally, a group of musicians ( $n = 30$ ) and nonmusicians ( $n = 30$ ) listened, and recorded their reactions to *Festive Overture* by Shostakovich. This selection was chosen as an example of a rousing concert overture that would serve as a contrast to the previous selection that is traditionally played at slower tempo. Additionally it was felt that the selection would not be familiar to a majority of the nonmusicians responding. On a postlistening questionnaire only 23% of the nonmusicians thought they had heard the piece before, compared to 63% of the musicians (13% of whom remembered having performed it).

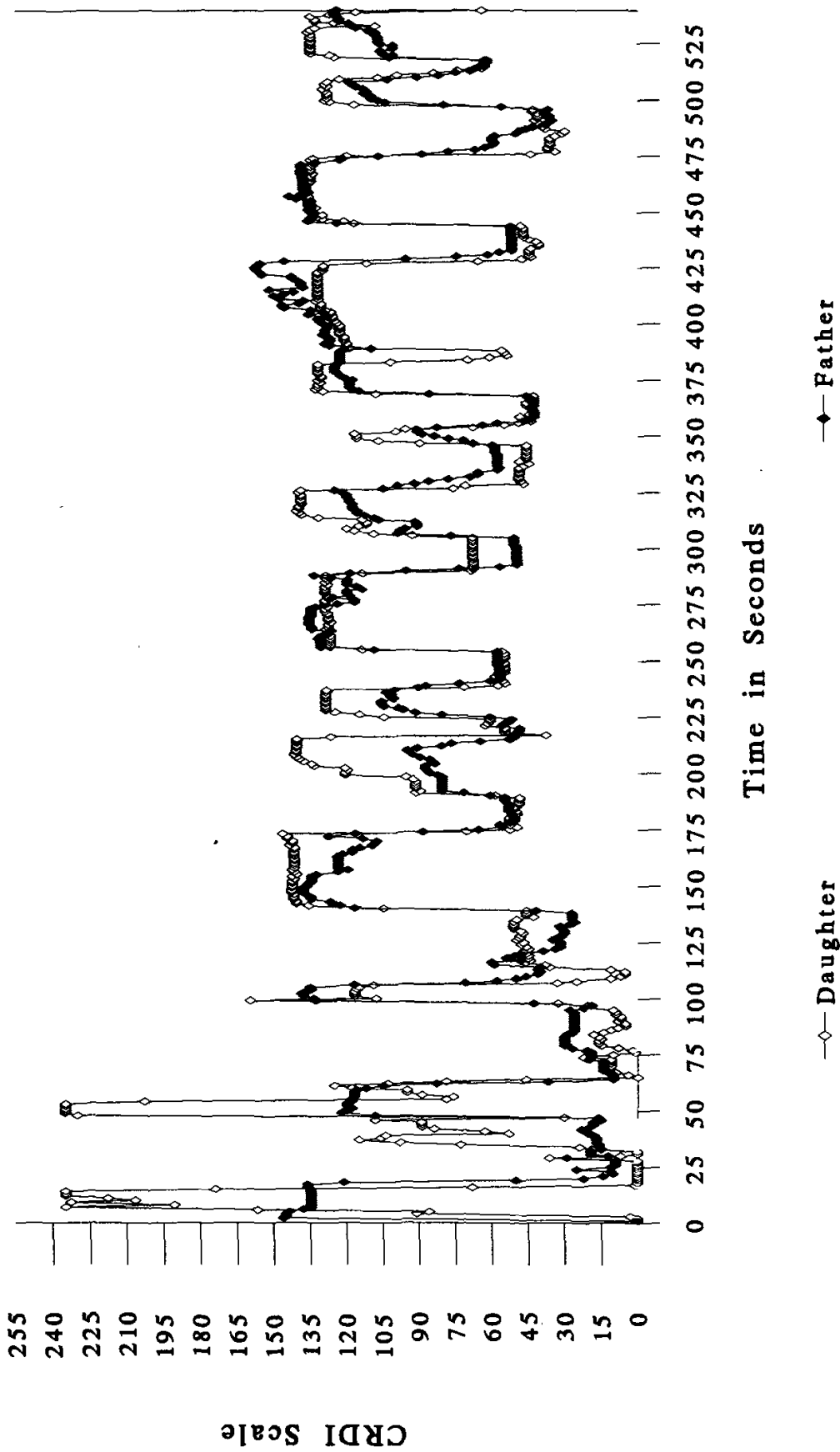


FIGURE 1.  
Perceived tension in Haydn's *Symphony No. 104*, First Movement, Father/Daughter.

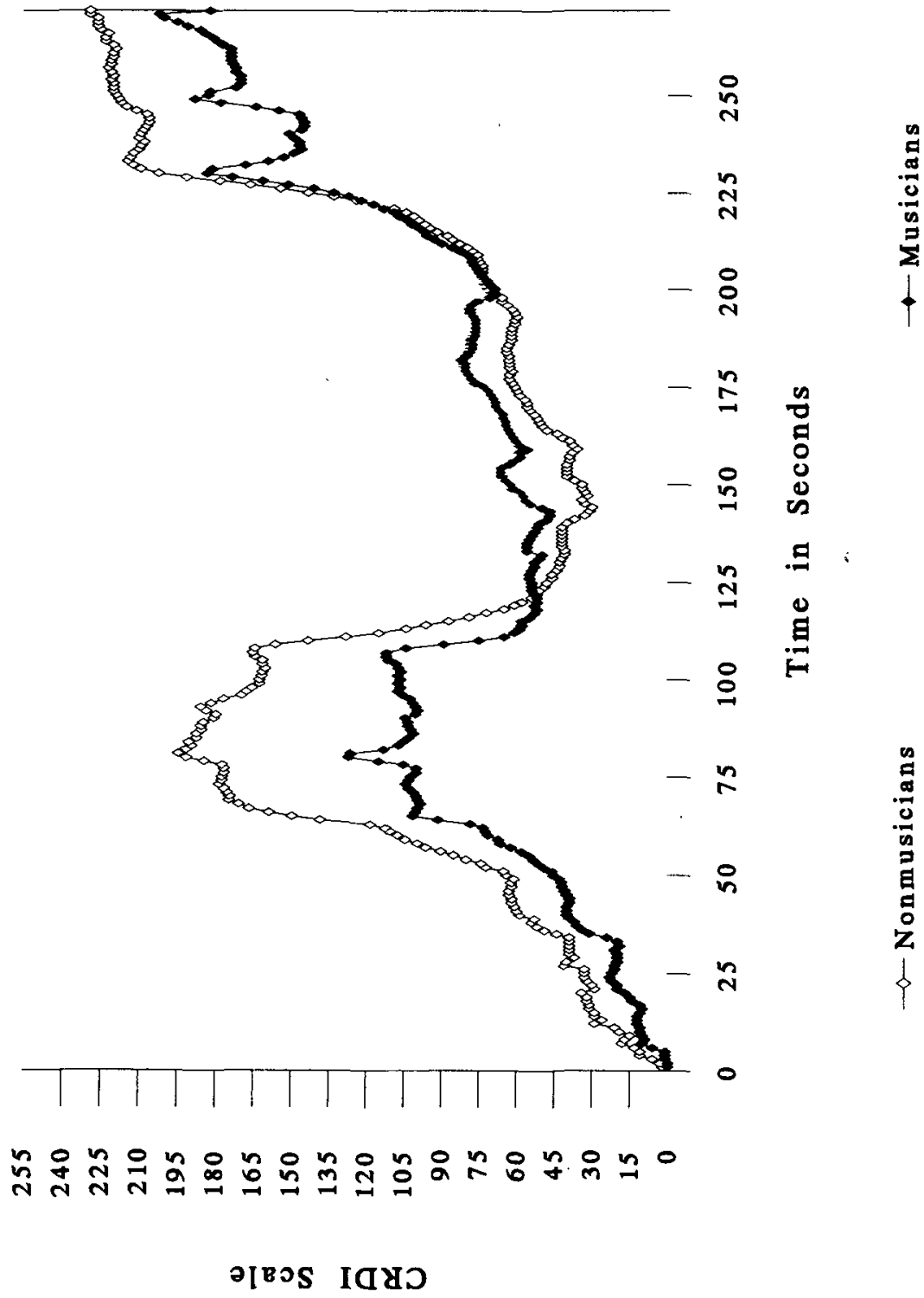


FIGURE 2.  
Perceived tension in Holst's *First Suite in Eb, Chaconne*.



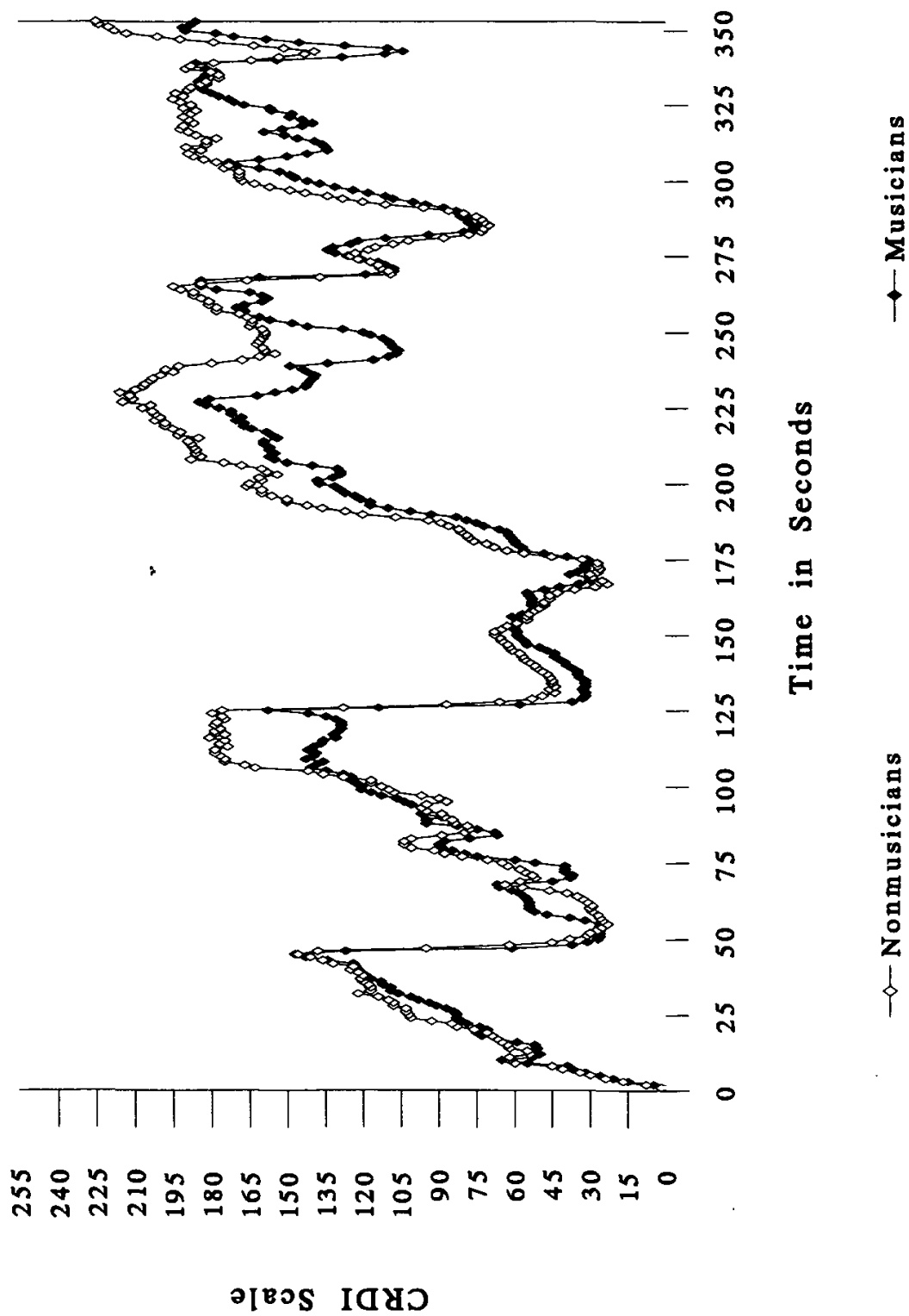


FIGURE 3.  
Perceived tension in Shostakovich's *Festive Overture*.

The impressive visual similarities in the graphs of these two groups' responses (see Figure 3) are borne out by the very high correlation ( $r = .95$ ). In this case, as in the previous studies, non-musicians tended to use more of the dial both in the direction of tension and release. The similarities in the onset and release points can be seen very clearly. There continue, however, to be slight variations within what appear to be larger sections of the musical material.

### Discussion

From these data, there appear to be some definite trends. While trained musicians, as a group, are registering perceptions that appear to include a higher level of detail, groups of nonmusicians are being somewhat more general. Nonmusicians tend to use more of the dial to register variations in magnitude. This could mean that the nonmusicians are experiencing greater and/or lesser levels of tension or it could indicate that musicians are taking into account a wider range of musical possibilities based on their experience. At the same time, group perceptions of the points at which tension and its release are strongest are remarkably similar. These trends appear to hold from childhood through adulthood. Specific groups at the extremes of age have not been tested at this point.

While the results cited here are encouraging it should be noted that the musical selections tested to date are limited. The scope and variety of western art music is broad and yet it is only one of many genres enjoyed by the population at large. Variations in cultures based on geography and tradition will no doubt play a role in the continued examination of this phenomenon. Even so, the results are strong enough to allow for some optimism in moving forward with this and similar lines of research.

These results are particularly interesting from the perspective of the music therapist. Within at least the western art music tradition the likelihood that perceptions of group responses to tension and release in music could be predicted is high. These data indicate that therapists, even though trained as musicians, might be able to predict with some accuracy the responses of their clients who are not trained musicians. While advanced musical training probably affects knowledge and perspective, musical tension as an element does appear to have a quality that is more basic in nature. Two caveats are important to note. First, individual variation must al-

ways be taken into account. Second, there has been no work done to provide a definition of tension that correlates to these data. For therapists to effectively use this information and make appropriate transfers more research is recommended.

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