Tension design of contemporary orchestral music in different performances of "Sula" by Helena Tulve

Gerhard Lock,^{*1} Maris Valk-Falk,^{#2}

Tallinn University Institute of Fine Arts, Music Department and Estonian Academy of Music and Theatre Department of Musicology, Estonia

[#] Estonian Academy of Music and Theatre, Institute of Interpretation Pedagogics, Estonia

 $^{\scriptscriptstyle 1}$ gerhard.lock@tlu.ee, $^{\scriptscriptstyle 2}$ maris@schoenberg.ee

ABSTRACT

Cognitive musicology is a psychological domain of music which attempts to proximity several interpretations as notation in a score, analysis, performance, and perception. The previous study of the authors developes the interdisciplinary analysis method of tension design combining music theoretical and perception approaches (investigating contemporary music). In this study we observe different performances of "Sula" (Thaw, 1999) by Estonian composer Helena Tulve (1972). We investigate the impact of performance style of different conductors (Toomas Vavilov, Paul Mägi) and orchestras (ERSO, Orchestra of Estonian National Opera) on the perception-based tension design of the piece and how it is connected to score-based tension design. Observed performances reveal concordance in the overall shape of culmination points (CP-s) of final sections. Most significant for both conductors is the difference of approaching CP-s: Vavilov points out peaks, Mägi builds blending plateaux. Reputedly listeners perceive the overall contour of perception-based tension design individually, but also revealing concordance in significant moments of tension design. This study reveals, that Vavilov's sharp pointing of CP-s corresponds more frequently to expectations of the listeners, while Mägi "overrides" the "real" CP-s, focusing more on blending increasing and releasing phases. Vavilov's interpretation shows more segmentation, while Mägi guides the listeners toward one main CP (13'08''). He also "overrides" the crucial CP (10'54''), which is as a composed out caesura (bar 181) clearly shown in the score. Vavilov accentuates this crucial CP (13'16"). But the listener's grasping of the conductors general idea of overall TD depends on the type of analytical or esemplastic perception.

I. INTRODUCTION

A. Background

Cognitive musicology is a psychological domain of music which attempts to proximity several interpretations as notation in a score, analysis, performance, and perception (Krumhansl & Schenck 1997, Kirschbaum 2001, Zbikowski 2002, Baroni 2003, Clarke & Cook 2004, Valk-Falk, Lock & Rosin 2005, Lock & Valk-Falk 2008).

The following study deals with one of the most important feature of music - tension - which can be considered as equally influential for both performing and listening, composing, interpreting, and analysis. Analysis of tension confines usually with verbal (unsystematical) descriptions, there are only few theoretical approaches, among them (1) energetic analysis and (2) phenomenological (Kirschbaum 2001). There is no unifying and embracing study, yet, concerning tension in music in general and for tension in 20th century and contemporary music in particular. One important

aspect of tension is the concept of culmination (Höhepunkt) which can be defined as an event which is distinguishly more salient than the other musical events around it. It is the result of physically measurable increase of energy and/or psychological caused increase of tension (Kirschbaum 2001: 12). Analysis of tension development of music proceeds from the assumption that there is a co-influence of different musical parameters. After Kirschbaum (2001: 23-26) must be checked out, which of those parameters attract mostly the listener's attention. Kirschbaum combines the idea of perception analysis using only one participant (himself) with score-based analysis to verify the listening and vice versa. Following systematical overview is a condenced and modified version after Kirschbaum (2001: 23-26) used as theoretical basis of this study: 1) dynamics (crescendo-decrescendo; ascending and descending of sound pressure); 2) pitch (ascending and descending contour; narrowing and widening of sound space; motivic repetition and sequences; fast change of pitches); 3) rhythm (supports the motion towards the culmination equalizing vertical and horizontal rhythmic structure); 4) tempo (continous shortening and lengthening of note duration or "composed accelerando and ritenuto"); 5) texture (instrumentation: increasing-decreasing the number of voices); 6) special effects or complex sound events (attraction points).

In search for new analytical methods for analysis of contemporary music which considers also the tensional aspect of music a method called "tension design" was developed in the following contexts: (1) research project on applying graphical analysis methods to the music of 20th century (grant holder Kerri Kotta, supported by Estonian Science Foundation, 2006-2008), (2) research project for the Conference of Interdisciplinary Musicology in Thessaloniki (CIM08) on investigating structure of contemporary music applying tension design and empirical perception analysis (Lock & Valk-Falk 2008), (3) doctoral study since autumn 2008 of Gerhard Lock at Estonian Academy of Music and Theatre (supervisors Prof. Jaan Ross and associated Prof. Kerri Kotta) investigating principles of tension design for contemporary music exploring musical tension in combination of music theoretical and music psychological-empirical methods.

B. Aims

In this study we observe two different performances of orchestral piece "Sula" (Thaw, 1999) by Estonian composer Helena Tulve (1972). We investigate the impact of performance style of different conductors (Toomas Vavilov, Paul Mägi) and orchestras (ERSO, Estonian Radio ERCD050, 2005; Orchestra of Estonian National Opera, first performance at NYYD-festival 1999, arhive recording by Estonian Radio) on the perception-based tension design of the piece using empirical perception analysis. First, we show the results of 12 participants of testing with different background (music, visual art, dance) exploring the frequency distribution and avarage of tension value of their responses. Second, we focus on one important culmination point (CP) called crucial CP (crCP), which indicates a turning point both in structure and form, and perception of tension development. The concept of culmination points and their hierarchical relations (basic, main, crucial, avoided and final CP) is used after the score-based analysis principle developed by Gerhard Lock (Lock & Valk-Falk 2008).

II. METHODS

In this study we combine the following methods: (I) analysis of culmination points (CP) after score-based tension design (s-b TD), (II) perception-based tension design (p-b TD). 12 participants "drawed" the tension development of (i) the whole piece of two performances (total length 18'50" in Toomas Vavilov's, and 15'58" in Paul Mägi's interpretation), and (ii) a short section (approximate length 1'30'') including the crucial culmination point (CrCP, at 13'16" in Vavilov, and at 10'54" in Mägi), and one main culmination point (mCP at 13'19" in Vavilov, and at 10'57") using Behringer USB-Midi-Fader slider-controller, and MAX/MSP patch (especially designed by Hans-Gunter Lock for p-b TD since 2008) indicating important events in perception (culmination peaks, starting or ending points, higher and lower tension points, gradual ascending/descending of tension, sudden changes of tension), and considering the above mentioned TD-parameters conciously or unconciously, following their primary sensation of tension, moving the slider continuously (exeption could be made if tension remains on constant level), to respond immediately to sudden changes of tension, using the whole slider range (but keep the upper part of the range for the strongest climax). Finally, spoken information (iii) was asked to judge the importance of the TD-parametres after Kirschbaum (2001) (see A. Background above).

Final experiment was conducted 23.05.2009 at Tallinn University Institute of Fine Arts, Music Department, and 29.-30.05.2009 at Estonian Academy of Music and Theatre (EAMT) Department of Musicology (with technical support of Electronic Studio of EAMT). The group of 12 participants are divided by age (average 25), by gender (average 63% female, 45% male). Subjects belong to broader cultural environment, but with more or less musical background, and bear contemporary approaches to cultural ideals of certain circle of art. Background of participants is characterised by their educational manner, range, complexity, and interests to music. The occupations are divided into (1) music (m), (2) visual art (va), and (3) dance (d) in subsequent levels: (1a) advanced / musician = ad/m, advanced / musicologist = ad/mcol, advanced / composer / performer = ad/p/comp, 2 subjects, 18%, (1b) beginner/ musician/ performer = b/m/p, beginner/ musicologist = b/mcol, beginner / musician / conductor = b/m/cond, 6 subjects, 55%, (2) advanced visual artist ad/va, 2 subjects, 18%, (3) advanced dancer-choreographer = ad/d-ch, 2 subjects, 18%. Two participants have humanitarian background in pedagogics/

language/ dance=ped/lang/d, and history/museology=h/museo. For research process of tension design it is useful to identify the participants by occupations in different fields by hierarchical order: (1) music — GL_ad/mcol/comp, JK_ad/p/ comp, HS_b/mcol, EV_b/comp/lang, IO_b/cond, JS_b/cond, MP_b/m/ped/lang/d, MMP_am/m/h/museo; (2) visual art — RR_ad/va, MP_ad/va; (3) dance — KO_ad/d-ch, HP_ad/d-ch. The score of participants by occupation divides into students (5), doctoral students (2), dancer-choreographers (2), freelance visual (painting) and media-artists (2), musicology (2), choir music (2), composition (2), music therapy (1).

Analysis of spoken commentaries shows preference of certain TD-parameters (after Kirschbaum 2001) in hierarchical order. Participants were asked to response to following questions: which of the tension design parameters attracted your attention mostly, to which parameters you focused your attention mainly? Finally they were encouraged to make free comments (see parameters in Table 1).

Table 1. Frequency distribution of occurrance of TD-parameters after Kirschbaum (2001) and components complemented in spoken commentaries by participants.

commentances by participants.		
TD-parameters and components	Frequency	Index (r/N)
$(N=r_1\ldots r_n\ldots r_{21})$	distribution by range	
	(r=%) and occurance	
	(n)	
Dynamics	43 (9)	0.428
Texture	33 (7)	0.333
Tempo	24 (5)	0.238
Rhythm	24 (5)	0.238
Special effects	24 (5)	0.238
Density of texture	14 (3)	0.143
Indiscrete "movement" of pitch	14 (3)	0.143
Variating dynamics	9 (2)	0.095
Repeating of motives	9 (2)	0.095
Instrumentation	9 (2)	0.095
Dissonances	9 (2)	0.095
(Complex) sound phenomena	9 (2)	0.095
Variating intensity	5 (1)	0.048
Tensity of tempo	5 (1)	0.048
Volume	5 (1)	0.048
Components of texture	5 (1)	0.048
Motives	5 (1)	0.048
Increasing the pitch	5 (1)	0.048
Climax	5 (1)	0.048
Sound intensity	5 (1)	0.048
Percussion timbre	5 (1)	0.048
		•

Besides the "drawing" process of tension design via slider-controller we used verbal information (spoken commentaries of participants to comparise their oppinions while "drawing" the tension "contour"). After evaluative and qualitative methods of analysis (see Clarke 2004: 91) we aimed at discovering of intentions to show the tension components. Dynamics, texture, tempo, rhythm, and special effects have high value in frequency distribution (0.428 to 0.238) in this material. Varying sound intensity, volume, motives, climax, tensity of tempo have low distribution (0.048) in this material. Variating dynamics, repeating motives, instrumentation, dissonances, complex sound phenomena have mediate value (0.095). Spoken commentaries reveal (1) opinion on view that "drawing"

tension design seems to be possible responding to complex TD-parameters, (2) need for listening the work before drawing tension design for to avoid of breaking boundaries of the slider-controller, (3) need to apply more than one parallel slider-controller to express tension on the ground of mental and/or emotional relation to music; while using one slider-controller supports immediate communication between listener and music instead to calculative dividing of tension levels to different parametres separately, (4) determinants or extending factors of responses (intensity, culmination points, balance of ascension, instrumentation, to discover rhythm dependence upon tempo, dynamic dependence upon pitch etc.). Participants with background of visual art claimed fast movement agential to tension, and described some emotional qualities, such as phobia, discomfort, chivity.

III. ANALYSIS

Following analysis section observes responses of 12 participants to both performances of Helena Tulve's piece for symphony orchestra "Sula" (Thaw, 1999), which belongs to the most important pieces of the 1990s of Estonian contemporary music (2004 won the International Rostrum of Composers). It denotes the process of thawing, melting – the transformation of ideas, materials, timbres and sounds from one state to another. The composition was partly inspired by the rather topical notion of global warming, by this image of a colossal iceberg thawing up (Age Hirv in Tulve 2005). Figure 1 shows generalyzed graphs for frequency of responses and figure 2 average of responses of all participants to the whole piece. In figures 3-8 we explore one of the most important culmination points, so called crucial culmination point (crCP), which represents an crucial change of texture and is the first big climax at the beginning of the final plateau-like culmination section (duration in Vavilov 12'10", in Mägi 10'10"). This crCP is characterized by a composed out and indexed caesura (bar 181) which is differently interpreted by the conductors of the performances under observation. Comparison of sonogramm of crCP segment (figures 3-4) of both performances reveals that Toomas Vavilov clearly points out the caesura while Paul Mägi "overrides" in general the "real" CP-s, focusing more on blending increasing and releasing phases. Vavilov's interpretation shows more segmentation, while Mägi guides the listener toward one maine CP (13'08''). Figures 5-8 analyze frequency distribution, absolute intensity level, and intensity range of the crCP.



Figure 1. This graph shows the frequency of responses of all participants for both interpretations (Count Vavilov, Count Mägi) of Helena Tulve's "Sula". In the field of music 5 participants responsed more frequently to Vavilov (GL ad/mcol/comp, HS b/mcol, IO b/cond, JS b/cond, MMP am/m/h/museo) than to Mägi (3 - $JK_ad/p/comp,\ EV_b/comp/lang,\ MP_b/m/ped/lang/d).\ In\ both$ visual art and dance the participants responsed more frequently to Mägi. In visual art field is notable the nearly equale number of responses to both interpretations by RR ad/va (589, 585). In dance field KO_ad/d-ch responsed quite similarly (1582, 1529), but for HP ad/d-ch Vavilov was more powerful than Mägi which is seen also in her different frequency of responses (1408, 881).



Figure 2. This graph shows average of responses of all participants for both interpretations (Vavilov, Mägi) of Helena Tulve's "Sula". In the field of music 4 participants (EV b/comp/lang, IO b/cond, JS b/cond, MP m b/m/ped/lang/d) responsed more frequently to Vavilov than to Mägi, among them most frequently EV (81), which is also the highest average from all participants. The lowest average appears by JK ad/p/comp (12.34) also for Vavilov, she in general responsed low to both interpretations. Relatively similarly responsed (GL ad/mcol/comp, participants HS b/mcol. MMP am/m/h/museo). In visual art field both participants show oppositional average of tension level. In dance field one participant HP shows nearly eaquale average to both interpretations and her values are similar to GL's average levels.



10:53.68 10:54

Figure 3.

This sonogramm shows Vavilov's clearly pointed caesura during crucial culmination point (crCP).

Figure 4.

crCP

Mägi (1999)

. 10:57 (next mCP)

This sonogramm shows Mägis "overriding" of the crucial culmination point (crCP).

Response to crCP - decreasing frequency distribution



--- Series1 --- Series2

Figure 5. The radar graph shows general tendency in frequency of responses to the CrCP for both interpretations (Vavilov = Series1, Mägi = Series2) in decreasing order and in relation to each other. The frequency number expresses how often the participants responded in the time frame of the CrCP (for Vavilov including 13'16" until 13'18"; for Mägi 10'53" until 10'56"). For Vavilov this means that 11 participants responded to the CrCP (6-1) and one participant did not response (0), her next reaction referes already to the next mCP (13'20"). For Mägi all 12 participants responded to the CrCP, there was a proportionally even higher rate of responses (8-3). One possible explanation can be, that Mägi's interpretation is perceived obviously as more detailed, which causes more frequent changing of tensity situation. A second possible explanation would be that Vavilov's pointing out of the caesura makes the tensity situation more clear than the "overriding" of Mägi, which obviously caused uncertainess in the perception.





- Series1 - Series2

Figure 6. The radar graph shows responses of the participants to CrCP for both interpretations (Vavilov = Series1, Mägi = Series2) in relation to their own frequency of responses, and grouped according to their background (music, visual art, dance). There can not be drawn any strong generalization of similarity in responses in each field. According to the individuality of the participants we can see in the field of music one, who responsed equally to both interpretations (GL_ad/mcol/comp = 6, 6), one who's responses differ extremly (MMP_am/m/h/museo = 1, 8), one who did not response to Vavilov but only to Mägi (EV_b/comp/lang = 0, 4), and one who responsed slightly more to Vavilov than to Mägi (JS_b/cond = 6, 5). One possible explanation for differences in reaction could be seen in advanced, basic, and amateur background, but this must not be generally the case. In the field of visual art both participants

responsed more frequently to Mägi and less to Vavilov, in the field of dance both participants responsed more frequently to Mägi than to Vavilov, too. It is notable, that in both visual art and dance fields one participant responsed more often than participants of the music field.

Response to crCP - absolute intensity level



Figure 7. This graph shows absolute intensity level of the participants to CrCP for both interpretations for Vavilov ca. 13'21" and Mägi ca. 10'54". It reveals that 11 participants responsed to Vavilovs clearly pointed caesura, only one participant did (EV not respond b/comp/lang). For Vavilov intensity level is remarkably heterogeneous. Three highest points belong to IO b/cond (125),

MP m_b/m/ped/lang/d (118), and MP va_ad/va (124). For Mägi 8 participants reached a tension level of around 100, extremly low level reveals JK_ad/p/comp (44), KO_ad/d-ch reaches (107); RR_ad/va (72) and MP va (73) reveal equally midrange tension level.



Figure 8. This graph shows intensity range of responses to crCP for both interpretations (Vavilov 13'16'' until 13'18'', Mägi (10'53'' until 10'56''). In the field of music the largest intensity range reveals GL_ad/mcol/comp (Vavilov, 78; Mägi, 48). The other participants remain mostly low in range, although they show notable individuality.

All responses are extremly individual – see graphs for all participants (Appendix 1–12), and there is hardly a logical explanation for the remarkable difference between them. The individual graphs show (i) differences between responses to both interpretations, (ii) individual trajectores of tensity changes, (iii) only partly responsing to the caesura of the Vavilov interpretation.

IV. RESULTS

Observed performances reveal concordance in the overall shape of culmination points (CP-s) of final sections. Most significant for both conductors is the difference of approaching CP-s: Vavilov points out peaks, Mägi builds blending plateaux. Reputedly listeners perceive the overall contour of perception-based tension design individually, but also revealing concordance in significant moments of tension design. This study reveals, that Vavilov's sharp pointing of CP-s corresponds more frequently to expectations of the listeners, while Mägi "overrides" the "real" CP-s, focusing more on blending increasing and releasing phases. Vavilov's interpretation shows more segmentation, while Mägi guides the listeners toward one main CP (13'08''). He also "overrides" the crucial CP (10'54"), which is as a composed out caesura (bar 181) clearly shown in the score. Vavilov accentuates this crucial CP (13'16"). But the listener's grasping of the conductors general idea of overall TD depends on the type of analytical or esemplastic perception.

V. CONCLUSION

The analysis of responses reflects three aspects of perceptual experience, first, between score and listener; second, between score and listened structure of the work; and three, between different participants according to the status of their musical and/or other background (visual art and dance) within a group with average age 25 in this study. Similarity of general responses to common music parametres after Kirschbaum (dynamics, texture, tempo, rhythm, special effects) and order of components compiled by subjects shows certain association between classical and contemporary music in the level of microstructure within certain age-group with equal cultural background. This study shows two perceptual results, first, differences of tension obtained from musical language based on individual perceptual activity, and second, similarity stage of responses to tension corresponds on macrolevel (form) to general principles of perception in correlation to basic musical structure and the importantness of crucial changes in texture for tensity development of final sections of contemporary orchestral music.

ACKNOWLEDGMENT

We are due many thanks to Hans-Gunter Lock from Electronic Music Studio of Estonian Academy of Music and Theatre (EAMT) and head of New Media Lab of Department of New Media of Estonian Academy of Arts for assistance in software for building experimental part with MAX/MSP environment. We express our gratitude to the 12 participants of perception test for sharing their time and thoughts with us. Also we are indebted to Tallinn University Institute of Fine Arts Music Department, and EAMT Department of Musicology for providing perfect working atmosphere. This article is part of the doctoral studies of Gerhard Lock at EAMT.

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APPENDIX

Crucial culmination point and its approximate timepoints.

Vavilov		Mägi	
13:16		10:53.7	
13:16.2	caesura	10:54	"overrided" caesura
13:19		10:57	

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1. GL_ad/mcol/comp





2. JK_ad/p/comp







3.2 CrCP Mägi



4. EV_b/comp/lang







6

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6. JS_b/cond



6.2 CrCP Mägi



7. MP_b/m/ped/lang/d 7.1 CrCP Vavilov



7.2 CrCP Mägi



8. MMP_am/m/h/museo



8.2 CrCP Mägi



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10. RR_ad/va



10.2 CrCP Mägi







11.2 CrCP Mägi



12. HP_ad/d-ch



12.2 CrCP Mägi

